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(54) DOOR HANDLE AND DOOR ASSEMBLY

(57) A door handle and a door assembly. The door handle comprises: a main body, which is internally provided with an accommodation groove; a catch, which is mounted in a fitted manner on the main body; and a sliding switching apparatus, which is arranged in the accommodation groove and connected between the main body and the catch, wherein the catch has a first state of being hidden in the accommodation groove and a second state of being released from the accommodation groove, and when the catch is subjected to a pressing operation, the sliding switching apparatus can drive the catch to switch between the first state and the second state. The door assembly comprises a door body and the door handle mounted on the door body.

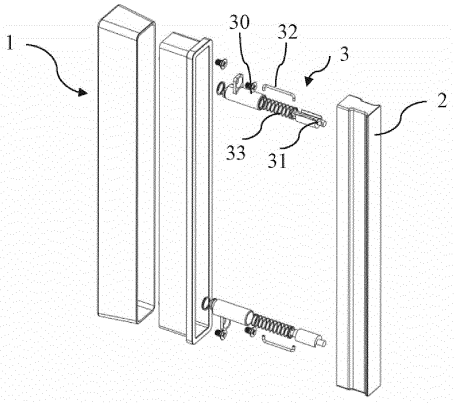

FIG. 5

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Description

Technical Field

[0001] Embodiments of the present application relate to, but are not limited to, door lock hardware, in particular to a door handle and a door assembly.

Background

[0002] A door handle is usually disposed at an outer side of the door. In some technologies, since the handle is disposed in a protruded manner, it will easily cause collisions and it is inconvenient to clean the door body. For example, a door handle at an inner side of a bathroom door of a user's home needs to be cleaned frequently because the inner side of the bathroom door gets dirty easily, and the protruded design of the door handle at the inner side brings great inconvenience to cleaning.

Summary

[0003] The following is a summary of the subject matter described in detail herein. This summary is not intended to limit the protection scope of the claims.

[0004] An embodiment of the present application provides a door handle, which includes: a main body provided therein with a housing groove; a pull handle disposed to be fitted with the main body; a sliding switch device disposed in the housing groove and connected between the main body and the pull handle, wherein the pull handle has a first state in which the pull handle is hidden in the housing groove and a second state in which the pull handle is released from the housing groove; the sliding switch device is configured to be able to drive the pull handle to switch between the first state and the second state when the pull handle is pressed.

[0005] In the embodiment of the present application, the pull handle can be hidden in the main body or the pull handle can be released from the main body with the sliding switch device, so that when the pull handle is installed on the door body, the pull handle can not only be hidden and convenient for cleaning, but also can protrude from the door body to be convenient for users to hold it.

[0006] Other features and advantages of the present application will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the present application. The objects and other advantages of the present application can be realized and obtained by the structures specifically indicated in the description, claims and accompany drawings.

[0007] Other aspects will become apparent after reading and understanding the drawings and detailed description.

Brief description of drawings

[0008] Accompanying drawings are used to provide a further understanding of technical solutions of the present application, and constitute a part of the description. They are used together with the embodiments of the present application to explain the technical solutions of the present application, and do not constitute a restriction on the technical solutions of the present application.

FIG. 1 is a schematic diagram of a first state of a pull handle of a door handle according to an embodiment of the present application.

FIG. 2 is a schematic diagram of a second state of a pull handle of a door handle according to an embodiment of the present application.

FIG. 3 is an exploded view of a main body and a pull handle of a door handle according to an embodiment of the present application.

FIG. 4 is an exploded view of a main body and a pull handle of a door handle viewed from another angle according to an embodiment of the present application.

FIG. 5 is an exploded view of a main body, a pull handle and a sliding switch device of a door handle according to an embodiment of the present application.

FIG. 6 is an overall view of a sliding switch device of a door handle according to an embodiment of the present application.

FIG. 7 is an exploded view of a sliding switch device of a door handle according to an embodiment of the present application.

FIG. 8 is an enlarged perspective view of a button shaft of a sliding switch device of a door handle according to an embodiment of the present application.

FIG. 9 is a cross-sectional view of a door handle in a vertical direction according to an embodiment of the present application.

FIG. 10 is an enlarged view of a part in FIG. 9.

FIG. 11 is a cross-sectional view of a door handle in a transverse direction according to an embodiment of the present application.

FIG. 12 is a schematic diagram of a sliding hook in a first lock position according to an embodiment of the present application.

FIG. 13 is a schematic diagram of a sliding hook in a second lock position according to an embodiment of the present application.

FIG. 14 is a schematic diagram of an unassembled main body of a door handle according to an embodiment of the present application.

FIG. 15 is a schematic diagram of an assembled main body of a door handle according to an embodiment of the present application.

FIG. 16 is a schematic partial cross-sectional view of a door handle installed on a door body according to an embodiment of the present application.

[0009] Description of reference signs:
main body-1; first installation body-1a; second installation body-1b; housing groove-10; installation groove-101; buckle portion-1010; receive cavity-11; projecting shoulder-12; pull handle-2; accommodation groove-20; positioning post-201; housing hole-2010; sliding switch device-3; button seat-30; button shaft-31; slide positioning element-32; elastic element-33; fixed portion-301; extended portion-302; chute structure-310; fixed end-311; inclined notch-3110; protruded portion-3011; installation hole-3011-a; circlip-3012; extended segment-312; connecting end-330; positioning end-331; slide hook-320; recess-3010; first travel groove-3101; second travel groove-3102; first arc groove-3103; first bend groove-3104; second bend groove-3105; second arc groove-3106; first lock position-3107; second lock position-3108; door body-4; first flat surface 41; second flat surface 42.

Detailed Description

[0010] Hereinafter, embodiments of the present application will be described with reference to the accompanying drawings. It is noted that the embodiments in the present application and the features in the embodiments may be combined with each other randomly if there is no conflict.

[0011] As shown in FIG. 1- FIG. 5, an embodiment of the present application provides a door handle including a main body 1 and a pull handle 2. The main body 1 is provided therein with a housing groove 10, and the pull handle 2 is fitted with the main body 1. As shown in FIG. 4, the main body 1 may include installation grooves 101 disposed at an upper end and a lower end of a bottom wall of the housing groove 10 respectively. The pull handle 2 may be provided with an accommodation groove 20 opposite to the housing groove 10, and at an inner side of the pull handle 2, positioning posts 201 may be respectively disposed at the upper end and lower end of the bottom wall of the accommodation groove 20. Positions of the positioning posts 201 may be provided in correspondence with the installation grooves 101, and the positioning post 201 may be provided therein with a housing hole 2010.

[0012] As shown in FIG. 3- FIG. 6, the door handle according to the embodiment of the present application further includes a sliding switch device 3. The sliding switch device 3 is disposed in the housing groove 10 and connected between the main body 1 and the pull handle 2. As shown in FIG. 4, the sliding switch device 3 may be disposed on the bottom wall of the housing groove 10 and in a fitting space formed by the housing groove 10 and the accommodation groove 20. In the embodiment of the present application, illustration is made by taking an example that the sliding switching devices 3 are respectively disposed at the positions corresponding to the installation grooves 101 at the upper end and lower end of the housing groove 10. The number and positions of the sliding switching devices 3 may be disposed as required, which are not limited in the embodiment of the present application. As shown in FIG. 1, the pull handle 2 has a first state in which the pull handle 2 is hidden in the housing groove 10. In this case, the pull handle 2 may be flushed with a door surface of the door body 4 (see FIG. 16), which is aesthetically pleasing and easy to clean. As shown in FIG. 2, the pull handle 2 further has a second state in which the pull handle is released from the housing groove 10. In this case, the pull handle 2 protrudes from the door surface of the door body 4 and can be held by a user to perform operations such as opening and closing of the door. When the pull handle 2 is pressed, the sliding switch device 3 can drive the pull handle 2 to switch between the first state in which the pull handle 2 is hidden in the housing groove 10 and the second state in which the pull handle is released from the housing groove 10.

[0013] As shown in FIG. 5- FIG. 7, the sliding switch device 3 may include a button seat 30, a button shaft 31, a slide positioning element 32, and an elastic element 33 which are fitted with the button seat 30 and can be received in the button seat 30. The button shaft 31 may be provided with a chute structure 310, and the slide positioning element 32, the elastic element 33 and the chute structure 310 can move in cooperation, so as to drive the pull handle 2 to switch between the first state in which the pull handle 2 is hidden in the housing groove 10 and the second state in which the pull handle 2 is released from the housing groove 10. The sliding switch device 3 has simple structure, which slides smoothly, does not get stuck easily and has a good hand feeling.

[0014] As shown in FIG. 7 and FIG. 10, the button seat 30 may be provided with a cavity, and may include a fixed portion 301 and an extended portion 302. The fixed portion 301 may be fixedly connected with the main body 1 and the extended portion 302 extends from the fixed portion 301 in a direction towards the pull handle 2. The fixed portion 301 of the button seat 30 may be provided with a protruded portion 3011. The protruded portion 3011 may extend outward from an outer side of the extended portion 302 along a radial direction of the extended portion 302 and may extend by a predetermined width along

a circumferential direction of the extended portion 302. The protruded portion 3011 may be provided with an installation hole 3011-a through which the button seat 30 and the main body 1 can be fixedly connected by a connector. The button shaft 31 may include a fixed end 311 and an extended segment 312 extending from the fixed end 311 in a direction towards the main body 1. The fixed end 311 and the pull handle 2 may be fixedly connected, and the extended segment 312 may extend into the cavity of the button seat 30. The extended segment 312 may include a cross-section along the axial direction, and the cross-section may be recessed in a radial direction of the extended segment 312, and the chute structure 310 may be disposed on the cross-section, i.e. the cross-section may provide an arrangement space for the chute structure 310, and the cross-section may be provided as a horizontal cross-section. An inclined notch 3110 may be provided at the fixed end 311, the fixed end 311 may be installed in the housing hole 2010, and the inclined notch 3110 may be clamped with the positioning post 201 to prevent the fixed end 311 from falling off. The elastic element 33 may be provided in the cavity of the button seat 30, and may include a connecting end 330 fixed to the fixed portion 301 and a positioning end 331 extending from the connecting end 330 in a direction towards the pull handle 2. The positioning end 331 may be fitted with the positioning post 201, for example, the positioning end 331 may be sleeved and positioned on the positioning post 201. In this embodiment, the elastic element 33 may be provided as a spring, and the extended segment 312 and the slide positioning element 32 may be sleeved in the spring. The slide positioning element 32 in the embodiment of the present application may be provided as a hook and slide hooks 320 (as shown in FIG. 10) may be respectively provided at both ends of the slide positioning element. The button seat 30 may include a circlip 3012 provided at the fixed portion 301. After the fixed portion 301 is installed to the main body 1, the fixed portion 301 may be limited by the circlip 3012 to prevent the fixed portion 301 from falling off.

[0015] As shown in FIG. 7 and FIG. 8, the chute structure 310 may be of a vane type as a whole and may include a first travel groove 3101 and a second travel groove 3102 that form a cyclic path. The first travel groove 3101 may include a first arc groove 3103 and a first bend groove 3104. The second travel groove 3102 may include a second bend groove 3105 and a second arc groove 3106. The first bend groove 3104 and the second bend groove 3105 may intersect to present a V-shape, and a first lock position 3107 may be provided at their intersection. The first arc groove 3103 and the second arc groove 3106 may intersect to present a V-shape, and a second lock position 3108 may be provided at their intersection, and the first lock position 3107 and the second lock position 3108 may be spaced apart with a predetermined distance along a full length direction of the extended segment 312. The slide positioning element 32 can slide in the chute structure 310 and can be clamped at the first lock position 3107 or the second lock position 3108, so as to drive the pull handle 2 to switch between the first state and the second state. When the slide positioning element 32 is clamped in the first lock position 3107, the pull handle 2 may be in the first state, and when the slide positioning element 32 is clamped in the second lock position 3108, the pull handle 2 may be in the second state.

[0016] Transition steps may be disposed at joints between the first arc groove 3103, the first bend groove 3104, the second bend groove 3105, and the second arc groove 3106, and heights of the transition steps may be reduced along a direction of a sliding cyclic movement of the slide positioning element 32 within the chute structure 310. As shown in FIG. 8, the slide positioning element 32 may move in a counter-clockwise cyclic direction within the chute structure 310, and a transition step may be provided at a joint between the first arc groove 3103 and the first bend groove 3104, so that a height of the first arc groove 3103 is greater than that of the first bend groove 3104 at the joint. A transition step may be provided at a joint between the first bend groove 3104 and the second bend groove 3105, so that a height of the first bend groove 3104 is greater than that of the second bend groove 3105 at the joint. A transition step may be provided at a joint between the second bend groove 3105 and the second arc groove 3106, so that a height of the second bend groove 3015 is greater than that of the second arc groove 3106 at the joint. A transition step may be provided at a joint between the second arc groove 3106 and the first arc groove 3103, so that a height of the second arc groove 3103 is greater than that of the first arc groove 3105 at the joint.

[0017] According to the embodiment of the present application, transition steps with reduced heights are provided at the joints between the first arc groove 3103, the first bend groove 3104, the second bend groove 3105 and the second arc groove 3106, so that the slide positioning element 32 can be guided to change its state in an orderly manner during cyclic movement, and reverse sliding, sticking, positioning failure and the like can be prevented.

[0018] As shown in FIG. 9-FIG. 13, when the sliding switch device 3 is installed to the main body 1 and the pull handle 2, the fixed portion 301 of the button seat 30 may be installed in an installation groove 101 of the main body 1, and the protruded portion 3011 may be connected and fixed to the bottom wall of the main body 1 through a connector. An outer wall of the fixed portion 301 may be provided with a recess 3010, and the installation groove 101 may be provided with a buckle portion 1010, and the recess 3010 and the buckle portion 1010 may be clamped with each other. The fixed end 311 of the button shaft 31 may be installed in the housing hole 2010. The extended segment 312 may extend into the button seat 30 and may be sleeved within the elastic element 33. A slide hook 320 at one end of the slide positioning element 32 may be fixed to the fixed portion 301, and a

slide hook 320 at the other end of the slide positioning element 32 can extend into the chute structure 310 and slide in the chute structure 310.

[0019] During operation of the door handle of the embodiment of the present application, assuming that the door handle is in an initial state in which the door handle is in a position released from the housing groove 10, the slide positioning element 32 is clamped at the second locking position 3108 (as shown in FIG. 13), and the pull handle 2 is in the second state. When the pull handle 2 is pressed, the elastic element 33 is compressed, the button shaft 31 is forced to move in a direction towards the main body 1, a slide hook 320 of the slide positioning element 32 undergoes a pressing force from the button shaft 31 to move along a counterclockwise direction within the chute structure 310, to slide from the first arc groove 3103 towards the first bend groove 3104, and after the slide hook 320 reaches the first bend groove 3104, the pull handle 2 is no longer pressed, the elastic element 33 is partially released, which drives the slide hook 320 to retract and be clamped at the first lock position 3107 (as shown in FIG. 12), and a distance between the pull handle 2 and the main body 1 is reduced. In this case, the pull handle 2 can be received in the housing groove 10 of the main body 1 and is in the first state. The pull handle 2 is pressed again, the button shaft 31 is forced to move in the direction towards the main body 1, the slide positioning element 32 is disengaged from the first lock position 3107, moves along the second bend groove 3105 towards the second arc groove 3106, and after the slide hook 320 reaches the second arc groove 3106, the pull handle 2 is no longer pressed, the elastic element 33 is released and pushes the button shaft 31 to move outward. Under the driving of the elastic element 33, the slide positioning element 32 can slide along the second arc groove 3106 towards the second lock position 3018 and clamped at the second lock position 3018, so that the distance between the pull handle 2 and the main body 1 is increased, and the pull handle 2 is released from the housing groove 10 of the main body 1. In this case, the pull handle 2 is in the second state again.

[0020] The sliding switch device 3 of the embodiment of the present application has advantages of simple structure, convenient installation and operation, good pressing effect and being uneasy to get stuck.

[0021] An embodiment of the present application provides a door assembly, which includes a door body 4 and the aforementioned door handle installed on the door body 4.

[0022] As shown in FIG. 14-FIG. 16, the main body 1 of the door handle may include a first installation body 1a and a second installation body 1b. The first installation body 1a may be provided with the aforementioned housing groove 10. The first installation body 1a may include a front end opposite to the pull handle 2 and a rear end opposite to the second installation body 1b, and a projecting shoulder 12 may be provided at an edge of the front end of the first installation body 1a. The second installation body 1b may be provided with a receive cavity 11 for receiving the first installation body 1a, and may be fixedly connected to an upper end and a lower end of the first installation body 1a by fixation structures. The front end of the first installation body 1a may be fitted with a first flat surface 41 of the door body 4 to restrict the first installation body 1a from moving rearward. The rear end of the first installation body 1a may be sleeved in the receive cavity 11 of the second installation body 1b and may be fixedly connected with the second installation body 1b, and the second installation body 1b may be configured to restrict the first installation body 1a from moving forward. The fixation structures in the embodiment of the present application may be screws.

[0023] As shown in FIG. 16, when the door handle is installed on the door body 4, the first installation body 1a may be embedded into a handle groove (not signed) of the door body 4 from the first flat surface 41 of the door body 4, the front end of the first installation body 1a may be fitted with the first flat surface 41 of the door body 4, and a projecting shoulder 12 may be clamped on the first flat surface 41 of the door body 4 to restrict the first installation body 1a from moving rearward. The rear end of the first installation body 1a may protrude from the second flat surface 42 of the door body 4. The rear end of the first installation body 1a may be sleeved in the receive cavity 11 of the second installation body 1b and may be fixedly connected with the second installation body 1b, and the second installation body 1b can restrict the first installation body 1a from moving forward. When the pull handle 2 is received in the housing groove 10, the pull handle 2 may be flushed with the first flat surface 41 of the door body 3, and the pull handle 2 is hidden. When the pull handle 2 is released from the housing groove 10, the pull handle 2 protrudes from the first flat surface 41 and may be held by a user.

[0024] In the description of the embodiments of the present application, the term "multiple/a plurality of" refers to two or more. In the description of the embodiments of the present application, it should be noted that orientation or position relationships indicated by the terms "upper", "lower", "one side", "the other side", "one end", "the other end", "edge", "relative", "four corners" and "periphery" and the like are based on the orientation or position relationships shown in the drawings, which are only for convenience of describing the present application and simplifying the description, rather than indicating or implying that the structure referred has the specific orientation, be constructed and operated in the specific orientation, and thus cannot be interpreted as a limitation on the present application.

[0025] In the description of the embodiments of the present application, unless otherwise explicitly specified and limited, the terms "connection", "direct connection", "indirect connection", "fixed connection", "installation" and "assembly" should be understood in a broad sense, for example, they may be fixed connection, detachable connection or integrated connection; and the terms "in-

stallation", "connection" and "fixed connection" may be direct connection, or indirect connection through an intermediary, or may be an internal communication between two elements. For those of ordinary skills in the art, specific meanings of the above terms in the present application can be understood according to specific situations.

[0026] Although implementations disclosed in the present application are described above, the described contents are only implementations used for facilitating understanding of the present application, and are not intended to limit the present application. Without departing from the spirit and scope disclosed by the present application, any person skilled in the art to which the present application pertains may make any modifications and changes in the form and details of implementation, but the scope of patent protection of the present application shall still be defined by the appended claims.

Claims

1. A door handle, comprising:

a main body provided therein with a housing groove;
a pull handle disposed to be fitted with the main body;
a sliding switch device disposed in the housing groove and connected between the main body and the pull handle, wherein the pull handle has a first state in which the pull handle is hidden in the housing groove and a second state in which the pull handle is released from the housing groove; the sliding switch device is configured to be able to drive the pull handle to switch between the first state and the second state when the pull handle is pressed.

2. The door handle according to claim 1, wherein the sliding switch device comprises a button seat, and a button shaft, a slide positioning element and an elastic element which are disposed to be fitted with the button seat; the button shaft is provided thereon with a chute structure, and the slide positioning element is fitted with the elastic element and the chute structure to move and drive the pull handle to switch between the first state and the second state.

3. The door handle according to claim 2, wherein the button seat is provided with a cavity and comprises a fixed portion and an extended portion extending from the fixed portion in a direction towards the pull handle, the fixed portion is fixedly connected with the main body, the button shaft comprises a fixed end and an extended segment extending from the fixed end in a direction towards the main body, the fixed end is fixedly connected with the pull handle, and the extended segment extends into the cavity of the button seat.

4. The door handle according to claim 3, wherein the fixed portion is provided with a protruded portion that protrudes outward from an outer side of the extended portion along a radial direction of the extended portion and extends by a predetermined width along a circumferential direction of the extended portion.

5. The door handle according to claim 4, wherein an installation hole is formed in the protruded portion.

6. The door handle according to claim 3, wherein the extended segment comprises a horizontal cross section along an axial direction, and the chute structure is disposed on the horizontal cross section.

7. The door handle according to claim 3, wherein the elastic element is disposed in the cavity of the button seat and comprises a connecting end fixed to the fixed portion and a positioning end extending from the connecting end in a direction towards the pull handle; a positioning post is provided at an inner side of the pull handle, and the positioning end is disposed to be fitted with the positioning post.

8. The door handle according to claim 7, wherein the fixed end is provided with an inclined notch, and the inclined notch is clamped with the positioning post.

9. The door handle according to claim 3, wherein the elastic element is a spring, and the extended segment and the slide positioning element are sleeved in the spring; sliding hooks are respectively provided at two ends of the slide positioning element, a sliding hook at one end is fixed to the fixed portion, and a sliding hook at the other end is capable of extending into the chute structure and sliding in the chute structure.

10. The door handle according to any one of claims 2 to 9, wherein the chute structure comprises a first travel groove and a second travel groove which form a cyclic path; the first travel groove comprises a first bend groove and a first arc groove, the second travel groove comprises a second bend groove and a second arc groove, a first lock position is disposed at a joint between the first bend groove and the second bend groove, and a second lock position is disposed at a joint between the first arc groove and the second arc groove, the slide positioning element is capable of sliding in the chute structure and being clamped at the first lock position or the second lock position to drive the pull handle to switch between the first state and the second state.

11. The door handle according to claim 10, wherein

joints between the first arc groove, the first bend groove, the second bend groove and the second arc groove are each provided with a transition step, and heights of the transition steps are reduced along a sliding cyclic movement direction of the slide positioning element in the chute structure.

12. The door handle according to claim 11, wherein the joint between the first bend groove and the second bend groove is V-shaped, and the joint between the first arc groove and the second arc groove is V-shaped.

13. A door assembly, comprising a door body and the door handle according to any one of claims 1 to 12 installed on the door body.

14. The door assembly according to claim 13, wherein the main body comprises a first installation body and a second installation body, the first installation body comprises a front end opposite to the pull handle and a rear end opposite to the second installation body, the second installation body comprises a receive cavity, the front end of the first installation body is disposed to be fitted with a first flat surface of the door body and restrict the first installation body from moving rearward, the rear end of the first installation body is sleeved in the receive cavity of the second installation body and fixedly connected with the second installation body, the second installation body is disposed to restrict the first installation body from moving forward.

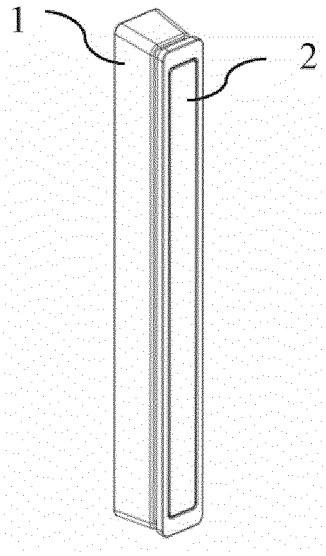


FIG. 1

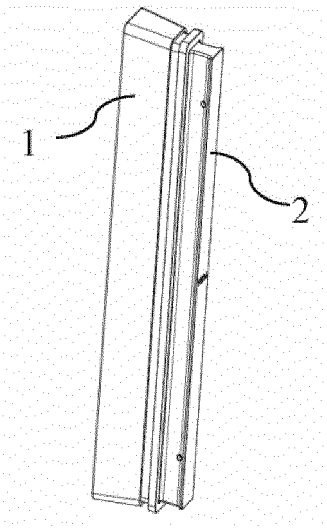


FIG. 2

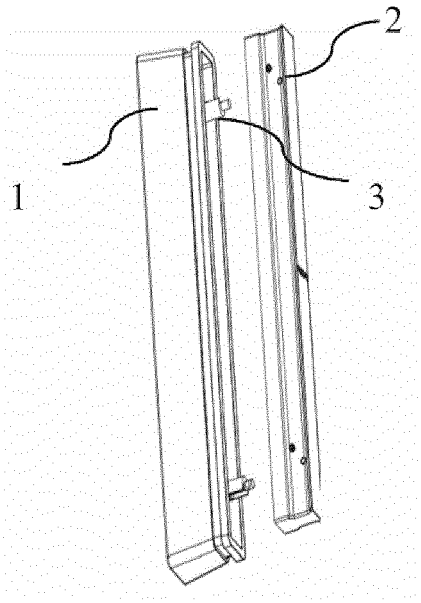


FIG. 3

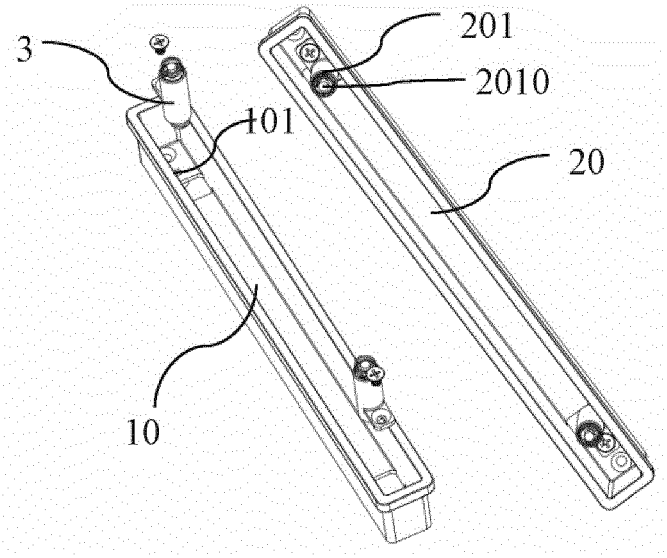


FIG. 4

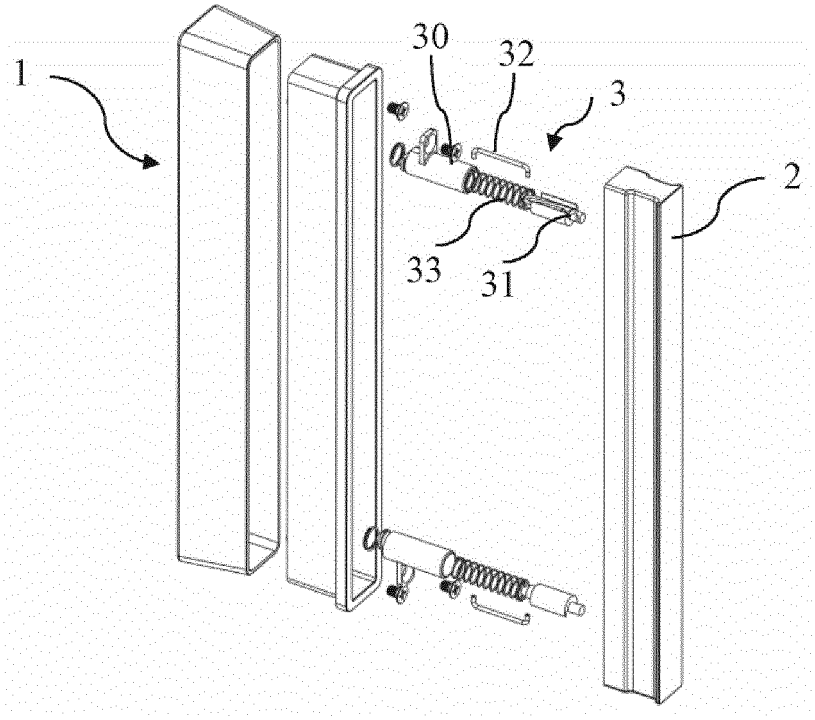


FIG. 5

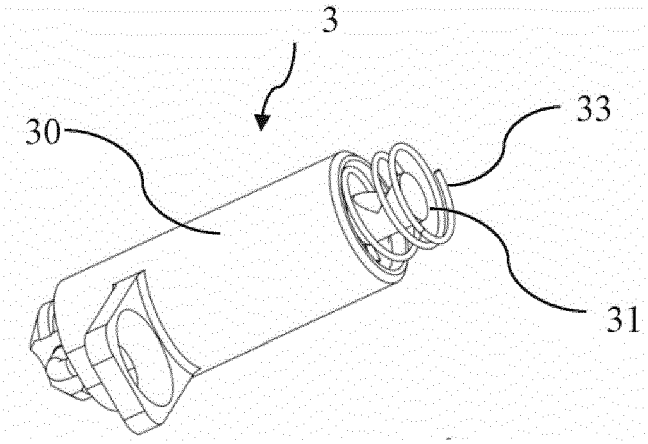
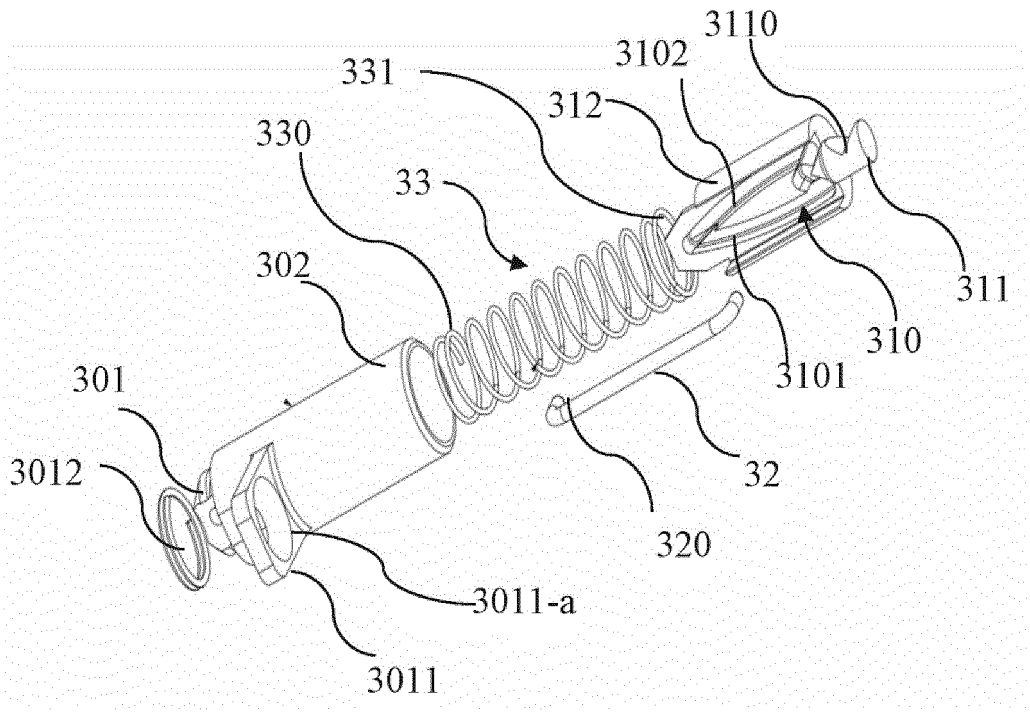


FIG. 6


3110
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310
3101
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3012
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3011-a
3011

FIG. 7

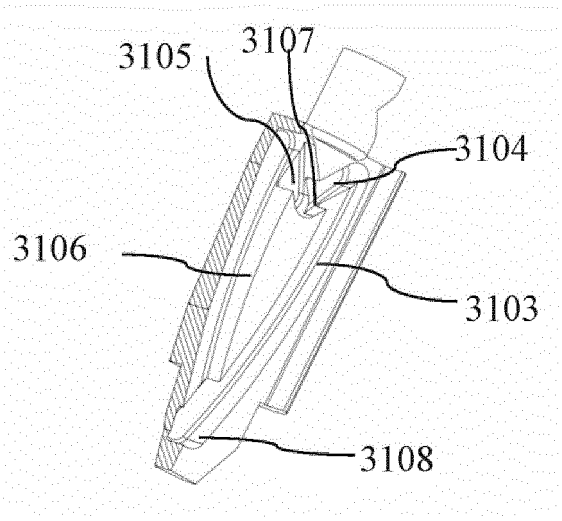
3105
3107
3104
3106
3103
3108

FIG. 8

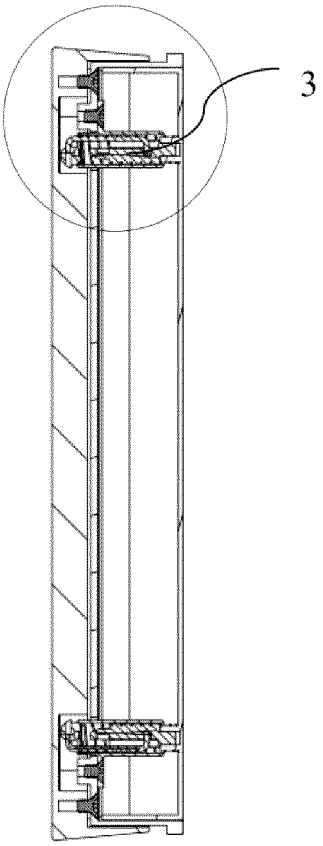

FIG. 9

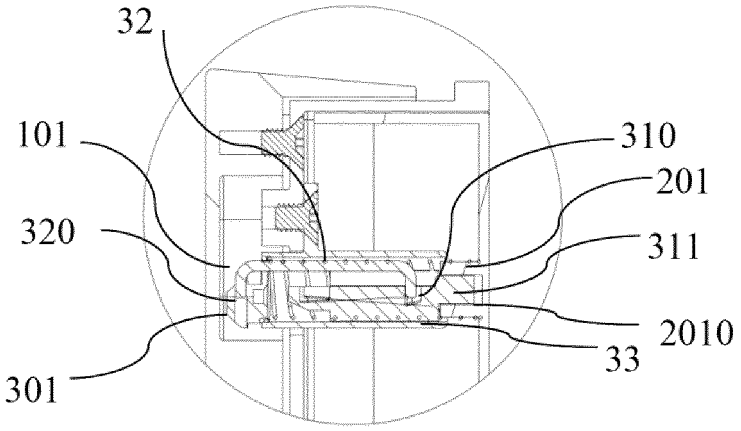

FIG. 10

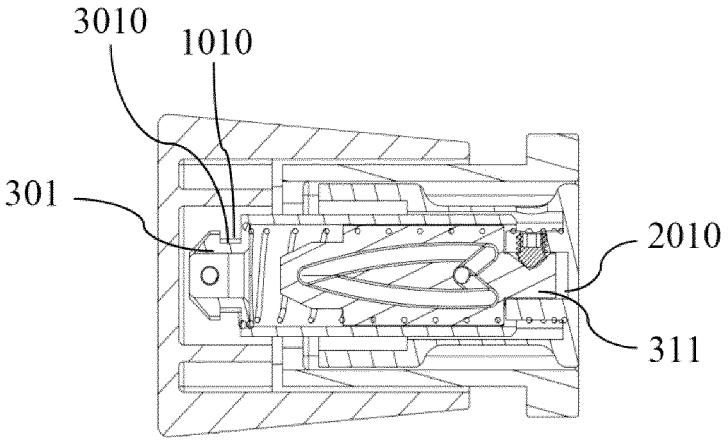

FIG. 11

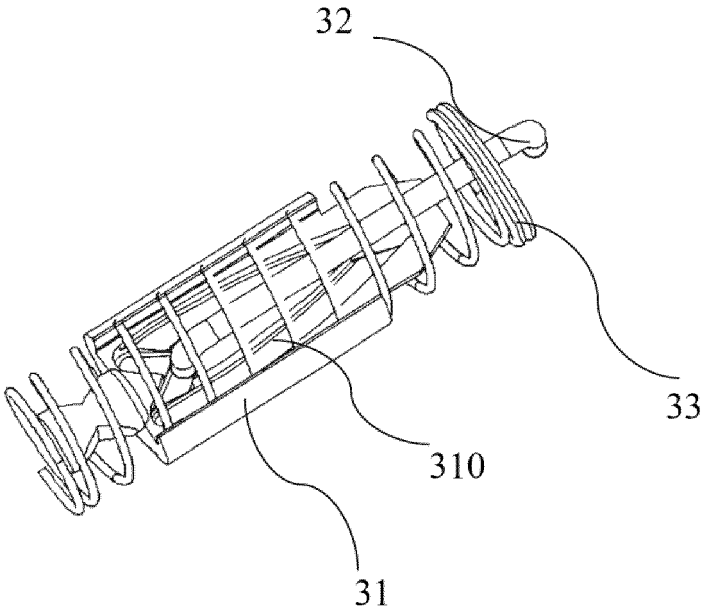

FIG. 12

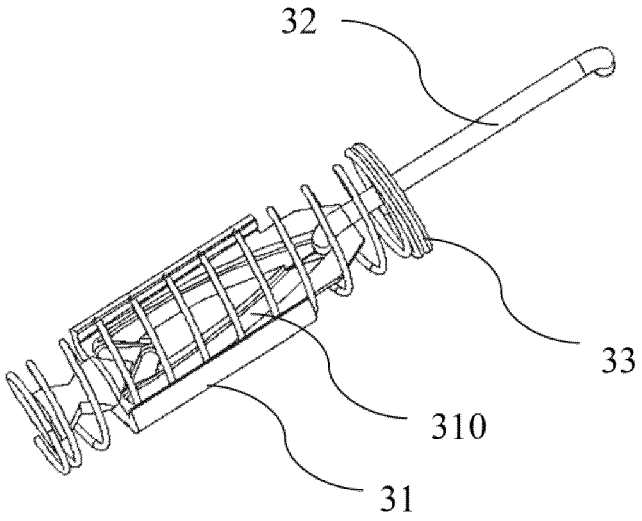

FIG. 13

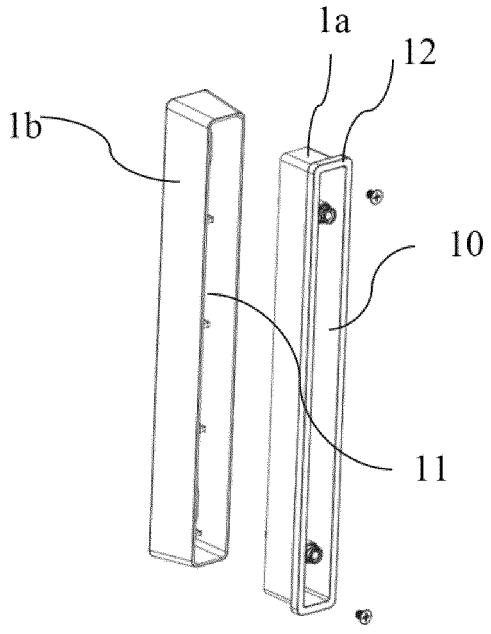

FIG. 14

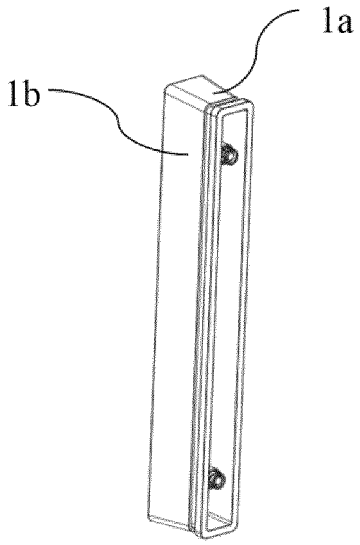

FIG. 15

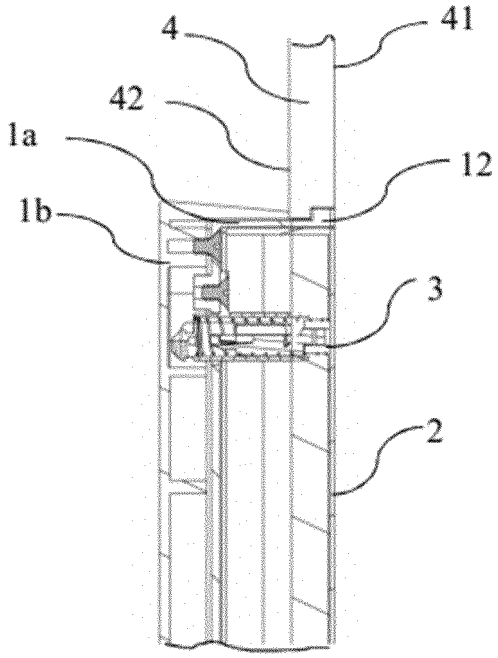

FIG. 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/129217

A. CLASSIFICATION OF SUBJECT MATTER

E05B 5/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E05B; E05C

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)

VEN; CNABS; CNTXT; CNKI: 把手, 拉手, 手柄, 手把, 隐藏, 齐平, 平齐, 按, 压, 弹簧, 弹性, 滑动, 滑移, 容纳, 收容, 缩入, 收缩, handle, conceal+, s hid+, push+, pring, elastic+, receiv+, flush+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 209413460 U (JIANG, Quanlong) 20 September 2019 (2019-09-20) claims 1, 8 and figures 1-7	1-9, 13, 14
Y	CN 209413460 U (JIANG, Quanlong) 20 September 2019 (2019-09-20) claims 1, 8 and figures 1-7	10-12
Y	CN 109252739 A (WANG, Jianni) 22 January 2019 (2019-01-22) description, paragraphs [0037]-[0041], and figure 1	10-12
X	CN 203835044 U (JIAXING VOCATIONAL & TECHNICAL COLLEGE) 17 September 2014 (2014-09-17) description, paragraphs [0016]-[0023] and figure 1	1, 13
X	CN 2093881 U (LI, Shitong) 22 January 1992 (1992-01-22) description pages 2, 3 and figures 1-4	1-9, 13
Y	CN 2093881 U (LI, Shitong) 22 January 1992 (1992-01-22) description pages 2, 3 and figures 1-4	10-12,
A	WO 2013061148 A1 (CONCHIGLIA SOCIETA PER AZIONI) 02 May 2013 (2013-05-02) entire document	1-14

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

* Special categories of cited documents:
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"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
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"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
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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
19 June 2021	**29 June 2021**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** **China**	Authorized officer
Facsimile No. **(86-10)62019451**	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/129217

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2008080936 A1 (ARCELIK AS et al.) 10 July 2008 (2008-07-10) entire document	1-14

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2020/129217

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 209413460 U	20 September 2019	None	
CN 109252739 A	22 January 2019	None	
CN 203835044 U	17 September 2014	None	
CN 2093881 U	22 January 1992	None	
WO 2013061148 A1	02 May 2013	IT RE20110091 A1	28 April 2013
WO 2008080936 A1	10 July 2008	None	

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