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(54) DRAIN VALVE SWITCH HAVING CLUTCH STRUCTURE, AND DRAIN VALVE

(57) The present disclosure provides a drain valve switch with a clutch structure, and a drain valve. The drain valve switch includes a switch body, a switch mounted on the switch body, a thread member, and a linkage member movable between a first position and a second position; when the linkage member is located at the first position, the switch body drives the thread member to rotate through the linkage member, and the switch body is locked or unlocked through the thread member; when the linkage member is located at the second position, the linkage member disconnects the linkage between the switch body and the thread member. When the drain valve switch is assembled or disassembled, the linkage member is placed at the first position, the switch body links the thread member through the linkage member, and the switch body is rotated to drive the thread member to rotate, so that the entire drain valve switch is locked or unlocked on a water tank or another device. The linkage member is adjusted to the second position during normal use. At this time, even if the switch body is rotated, the thread member cannot be driven to screw out of the installation position, so that the drain valve switch is unlikely to be disassembled.

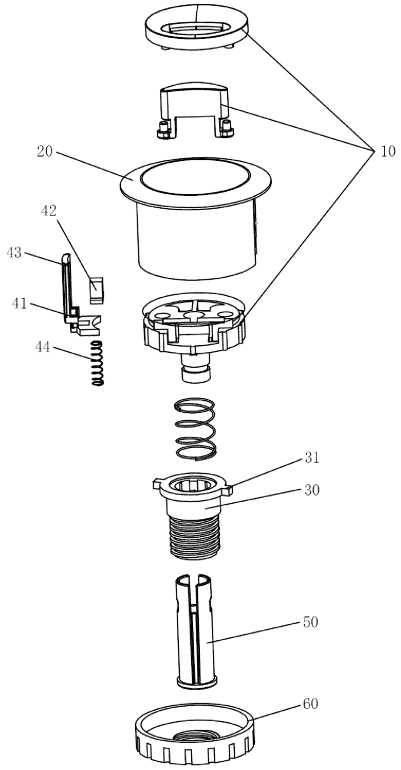

Fig. 4

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Description

BACKGROUND OF THE INVENTION

1. Technical Field

[0001] The present disclosure relates to a drain valve switch with a clutch structure, and a drain valve.

2. Description of Related Art

[0002] The switch (button switch or wrench switch) of the drain valve for the existing toilet is directly locked on the water tank cover through thread connection, and can be directly disassembled simply by rotating the switch body without the aid of special tools.

[0003] The drain valve switch used at home is safe and will not be disassembled and taken away at will. However, the switch installed in the public place is likely to be damaged or unscrewed and taken away by someone as it is very simple and easy to disassemble it, making it impossible to drive the drain valve in the water tank, and thereby resulting in the problem of extremely poor public health due to the toilet failure.

BRIEF SUMMARY OF THE INVENTION

[0004] To resolve the foregoing technical problem, the present disclosure provides a drain valve switch with a clutch structure, including a switch body, a switch mounted on the switch body, a thread member, and a linkage member movable between a first position and a second position; when the linkage member is located at the first position, the switch body drives the thread member to rotate through the linkage member, and the switch body is locked or unlocked through the thread member; when the linkage member is located at the second position, the linkage member disconnects the linkage between the switch body and the thread member, and the switch body is unable to be locked or unlocked through the thread member.

[0005] When the drain valve switch is assembled or disassembled, the linkage member is first placed at the first position, the switch body is made to link the thread member through the linkage member, and the thread member is driven to rotate when the switch body is rotated, thus locking or unlocking the entire drain valve switch on an installation position of a water tank or another device. In normal use, the linkage member is adjusted to the second position. At this time, the linkage between the switch body and the thread member is disconnected, and the thread member cannot be driven to screw out of the installation position even if the switch body is rotated. As the disassembly method for the drain valve switch is unique and is different from the assembly method for the drain valve switch available on the market, thus ensuring that the drain valve switch is unlikely to be disassembled.

[0006] Optionally, the thread member and the switch body are rotatably mounted together, and the linkage member is movably mounted on the switch body or on the thread member.

[0007] Optionally, the linkage member includes a driving portion, and when the switch is located in an initial position, the switch covers the driving portion; the switch leaves the initial position after being driven and exposes the driving portion for driving, so that the linkage member moves between the first position and the second position. In this way, the linkage member is set in a hidden position, making it more difficult for a person who does not know the corresponding structure to completely disassemble the drain valve switch.

[0008] Optionally, the thread member is provided with a linkage fitting portion, and the linkage member is provided with a corresponding linkage portion; when the linkage member is located at the first position, the linkage portion and the linkage fitting portion are in circumferential transmission fit; when the linkage member is located at the second position, the linkage portion is separated from the linkage fitting portion.

[0009] Optionally, the switch is a button, and the switch body is a button body; an inner cavity with a top opening is formed inside the button body, and the bottom of the inner cavity is provided with a through hole; both the button and the linkage member are movably installed in the inner cavity, and the thread member rotatably penetrates through the through hole and is capable of being axially limited, and the linkage fitting portion on the thread member is located in the inner cavity, and a thread portion on the thread member is located outside the button body.

[0010] Optionally, the linkage member moves between the first position and the second position along the axial direction of the thread member; when the thread member is rotated, on a plane perpendicular to the axis of the thread member, a projection trajectory drawn by the linkage fitting portion partially overlaps with a projection of the linkage portion; when the linkage member is located at the first position, the linkage portion and the linkage fitting portion align in the axial direction of the thread member, and when the switch body is rotated, the linkage portion abuts against the linkage fitting portion to form circumferential transmission fit; when the linkage member is located at the second position, the linkage portion and the linkage fitting portion misalign in the axial direction of the thread member, and the thread member is able to rotate freely relative to the linkage member.

[0011] Optionally, the linkage member includes an adjusting piece and a spring pin, and the spring pin forms the linkage portion; a periphery of a portion of the thread member located inside the switch body is provided with a boss, and the boss forms the linkage fitting portion.

[0012] Optionally, the adjusting piece is movably mounted inside a strip groove formed in the switch body, and the length direction of the strip groove is parallel to the axis of the thread member, the spring pin is elastically supported between the adjusting piece and the switch

body through an elastic member; the adjusting piece and a side wall of the strip groove are respectively provided with a retaining protrusion and a retaining groove; when the linkage member is located at the first position, the adjusting piece is located at a position where the retaining protrusion and the retaining groove are separated from each other, and the spring pin and the boss are in circumferential transmission fit under the influence of the elastic member, when the linkage member is located at the second position, the adjusting piece is located at a position where the retaining protrusion and the retaining groove are in retaining fit, and the adjusting piece overcomes the elastic force of the elastic member so that the spring pin and the boss misalign in the axial direction of the thread member; and a driving portion for manual or tool driving is disposed on a position of the adjusting piece close to the button.

[0013] Optionally, the thread member has an end located in the inner cavity and having an end diameter greater than a diameter of the through hole; and the drain valve switch with a clutch structure further includes a thread member retaining cover, where the thread member retaining cover is provided with a thread hole corresponding to a thread of the thread member, the thread member retaining cover is screwed into a portion of the thread member extending out of the switch body, and the thread member is relatively rotatably mounted on the switch body through the thread member retaining cover and the end of the thread member located in the inner cavity.

[0014] Optionally, the thread member is a hollow structure open at both ends; a transmission rod penetrates through the thread member and has an end connected to the switch.

[0015] Correspondingly, a drain valve includes the drain valve switch with a clutch structure.

[0016] It can be seen from the foregoing description of the present disclosure that, compared with the prior art, a drain valve switch with a clutch structure, and a drain valve of the present disclosure both include a switch, a switch body, a thread member and a linkage member with a linkage function; a connection relationship between the switch body and the thread member can be switched by changing a position of the linkage member; when the linkage member is located at a first position so that the switch body and the thread member are in a linkage relationship, the thread member is driven by rotating the switch body, to achieve the locking and unlocking of the thread member, thereby realizing the locking or unlocking of the switch body; when the linkage member is at a second position so that the linkage relationship between the switch body and the thread member is disconnected, the switch body and the thread member are relatively independent of each other, that is, the switch body cannot be locked or unlocked through the thread member, and the installed thread member cannot be screwed out even if the switch body is rotated, ensuring that the entire drain valve switch cannot be easily removed and taken away.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0017] The accompanying drawings described here are intended to provide a further understanding of the present disclosure and constitute a part of the present disclosure. The exemplary embodiments of the present disclosure and the description thereof are intended to explain the present disclosure and do not impose improper limitation on the present disclosure.

[0018] Where

FIG. 1 is a schematic structural diagram (axial side view) of a drain valve switch with a clutch structure according to the present disclosure;

FIG. 2 is a schematic structural diagram (axial side view) of a button body and an internal structure of a drain valve switch with a clutch structure according to the present disclosure;

FIG. 3 is a schematic structural diagram (top view) of a button body and an internal structure of a drain valve switch with a clutch structure according to the present disclosure;

FIG. 4 is a schematic structural diagram (exploded view) of a drain valve switch with a clutch structure according to the present disclosure;

FIG. 5 is a schematic structural diagram (section view) of a linkage member of a drain valve switch with a clutch structure of the present disclosure at a first position;

FIG. 6 is a schematic structural diagram (section view) of a linkage member of a drain valve switch with a clutch structure of the present disclosure at a second position;

FIG. 7 is a schematic structural diagram (section view) of a drain valve switch with a clutch structure of the present disclosure when its button is pressed;

[0019] The reference signs in FIGs. 1-7 respectively indicate: 10-button, 20-button body, 21-inner cavity, 30-thread member, 31-boss, 40-linkage member, 41-adjusting piece, 42-spring pin, 43-driving portion, 44-elastic member, 50-transmission rod, 60-thread member retaining cover.

DETAILED DESCRIPTION OF THE INVENTION

[0020] To make the technical problem to be solved by the present disclosure, the technical solution and beneficial effects more comprehensible, the present disclosure will be further described in detail below with reference to the accompanying drawings and embodiments. It should be understood that the specific embodiments described herein are merely intended to explain the present disclosure, rather than to limit the present disclosure.

[0021] Embodiment 1: a drain valve switch with a clutch structure includes a switch body, a switch mounted on the switch body, a thread member 30, and a linkage member 40 movable between a first position and a second position; when the linkage member 40 is located at the first position, the switch body drives the thread member 30 to rotate through the linkage member, and the switch body is locked or unlocked through the thread member 30; when the linkage member 40 is located at the second position, the linkage member 40 disconnects the linkage between the switch body and the thread member 30, and the switch body cannot be locked or unlocked through the thread member 30. The drain valve switch of the present disclosure may be installed on a water tank, a toilet or the like that contains a drain valve. When the switch body is rotated forward, the switch body can be locked on the water tank or the toilet through the thread member 30, and when the switch body is rotated backward, the switch body can be unlocked from the water tank or the toilet through the thread member 30.

[0022] When the drain valve switch is assembled, the linkage member 40 is placed at the first position first, and the switch body links the thread member 30 through the linkage member 40. When the switch body is rotated, the thread member 30 is driven to rotate, thus locking the entire drain valve switch on the water tank, toilet or another device. After the installation is completed, the linkage member 40 is adjusted to the second position. At this time, the linkage between the switch body and the thread member 30 is disconnected, and the thread member 30 cannot be driven to screw out of the installation position even if the switch body is rotated, thereby ensuring uneasy assembly of the drain valve switch.

[0023] Embodiment 2: referring to FIG. 1, on the basis of Embodiment 1, in this embodiment, the thread member 30 and the switch body are rotatably mounted together, and the linkage member 40 is movably mounted on the switch body. It is easy to understand that the linkage member 40 can also be movably mounted on the thread member 30. Specifically, the switch is a button 10, the button 10 includes a button decorative piece, the switch body is a button body 20, and the thread member 30 is a hollow structure open at both ends; a transmission rod 50 penetrates through the thread member 30, and one end of the transmission rod 50 is connected to the switch. When the button 10 is pressed down, the button 10 drives the transmission rod 50 to move downward, and the lower end of the transmission rod 50 actuates an activation assembly (not shown) of the drain valve, thus opening the drain valve to drain water. The drain valve switch also includes a button elastic member. After an external force pressing the button 10 is removed, under the influence of the button elastic member, the button 10 drives the transmission rod 50 to reset to initial positions together.

[0024] In this embodiment, the linkage member includes a driving portion 43. When the button 10 is in an initial position, the button 10 covers the driving portion 43; the button 10 leaves the initial position after being driven and exposes the driving portion 43 for driving, so that the linkage member moves between the first position and the second position.

[0025] Refer to FIG. 2, an inner cavity 21 with a top opening is formed inside the button body 20, and the bottom of the inner cavity 21 is provided with a through hole. Both the button 10 and the linkage member 40 are movably installed in the inner cavity 21, and the thread member 30 rotatably penetrates through the through hole and is capable of being axially limited. A linkage fitting member on the thread member 30 described below is located in the inner cavity 21, and a threaded portion on the threaded member is located outside the button body 20.

[0026] One end of the thread member 30 extends through the through hole into the inner cavity 21 and is close to the linkage member 40, and an end diameter of the thread member 30 at this end is greater than a diameter of the through hole to ensure that the thread member 30 will not fall off from the through hole.

[0027] A portion of the thread member 30 located in the inner cavity 21 is provided with a linkage fitting portion, and the linkage member 40 is provided with a corresponding linkage portion. When the linkage member 40 is located at the first position, the linkage portion and the linkage fitting portion are in circumferential transmission fit; when the linkage member 40 is located at the second position, the linkage portion is separated from the linkage fitting portion. Specifically, the linkage member 40 moves between the first position and the second position along the axial direction of the thread member 30. When the thread member 30 is rotated, on a plane perpendicular to the axis of the thread member 30, a projection trajectory drawn by the linkage fitting portion partially overlaps with a projection of the linkage portion (referring to FIG. 3). When the linkage member 40 is located at the first position, the linkage portion and the linkage fitting portion align in the axial direction of the thread member 30, and when the thread member 30 is rotated, the linkage portion abuts against the linkage fitting portion to form circumferential transmission fit. When the linkage member 40 is located at the second position, the linkage portion and the linkage fitting portion misalign in the axial direction of the thread member 30, and the thread member 30 can rotate freely relative to the linkage member 40.

[0028] In this embodiment, referring to FIGs. 2 to 6, the linkage member 40 includes an adjusting piece 41 and a spring pin 42, the spring pin 42 forms the linkage portion; a periphery of a portion of the thread member 30 located inside the inner cavity 21 of the switch body 20 is provided with a boss 31, and the boss 31 forms the linkage fitting portion. The adjusting piece 41 is movably mounted inside a strip groove formed in an inner wall of the inner cavity 21, the length direction of the strip groove is parallel to the axis of the thread member 30, the spring pin 42 is elastically supported between the bottom of the adjusting piece 41 and the bottom wall of the inner cavity 21 through an elastic member 44, and the elastic member

44 is preferably a compression spring; the adjusting piece 41 and a side wall of the strip groove are respectively provided with a retaining protrusion and a retaining groove; when the linkage member 40 is located at the first position, the adjusting piece 41 is located at a position where the retaining protrusion and the retaining groove are separated from each other, the spring pin 42 and the boss 31 are in circumferential transmission fit under the influence of the elastic member 44; when the linkage member 40 is at the second position, the adjusting piece 41 is located at a position where the retaining protrusion and the retaining groove are in retaining fit, and the adjusting piece 41 overcomes the elastic force of the elastic member 44 so that the spring pin 42 and the boss 31 misalign in the axial direction of the thread member 30; and a driving portion 43 for manual or tool driving is disposed at a position of the adjusting piece 41 close to the button 10. Specifically, the driving portion 43 is a toggle groove. During installation or assembly, a position of the adjusting piece 41 is toggled by using the toggle groove, thereby changing the position of the spring pin 42 so that the spring pin 42 moves between positions corresponding to and misalign with the boss 31. Referring to FIGs. 5 and 6, when the button 10 is in an initial position, the button 10 covers the driving portion 43 of the linkage member 40; in order to toggle the adjusting piece 41 in the switch body, the button 10 needs to be driven so that the button 10 leaves the initial position (as shown in FIG. 7), thereby exposing the driving portion 43 of the linkage member 40. In this way, as a position of the linkage member 40 is hidden, a person who does not know the corresponding structure is unable to completely disassemble the drain valve switch.

[0029] The drain valve switch further includes a thread member retaining cover 60. The bottom of the thread member retaining cover 60 is provided with a thread hole corresponding to a thread of the thread member 30, and the thread member retaining cover 60 is screwed into a portion of the thread member 30 extending out of the switch body, and the thread member 30 is rotatably mounted on the switch body through the thread member retaining cover 60 and an end of the thread member 30 located in the inner cavity 21.

[0030] When the drain valve switch is assembled, the switch is placed to expose a driving portion of the adjusting piece 41, and the adjusting piece 41 is toggled upward so that the adjusting piece 41 is located at a position where the retaining protrusion and the retaining groove are separated from each other. The spring pin 42 moves upward under the influence of the elastic member to circumferentially transmission-fit with the boss 31 (referring to FIG. 5). At this time, the button body 20 is rotated to drive the thread member 30 through the adjusting piece 41, the spring pin 42 and the boss 31, thus assembling or disassembling the drain valve switch, that is, locking or unlocking the drain switch. After the installation is complete, the adjusting piece 41 is toggled downward so that the adjusting piece 41 is located at a position where the retaining protrusion and the retaining groove are in retaining fit, and the adjusting piece 41 overcomes the elastic force of the elastic member so that the spring pin 42 and the boss 31 misalign in the axial direction of the thread member 30 (referring to FIG. 6), thereby releasing a linkage relationship between the button body 20 and the thread member 30.

[0031] Embodiment 3: a drain valve includes a drain valve switch with a clutch structure in the foregoing embodiment.

[0032] It can be seen from the foregoing description of the present disclosure that, compared with the prior art, a drain valve switch with a clutch structure, and a drain valve of the present disclosure both include a switch, a switch body, a thread member and a linkage member with a linkage function; a connection relationship between the switch body and the thread member can be switched by changing a position of the linkage member; when the linkage member is located at a first position, the switch body and the thread member are in a linkage relationship, the thread member is driven by rotating the switch body, to lock or unlock the thread member, thereby realizing the locking or unlocking of the switch body; when the linkage member is at a second position so that the linkage relationship between the switch body and the thread member is disconnected, the switch body and the thread member are relatively independent of each other, that is, the switch body cannot be locked or unlocked through the thread member, and the installed thread member cannot be screwed out even if the switch body is rotated, ensuring that the entire drain valve switch cannot be easily removed and taken away.

[0033] The above is exemplary description of the present disclosure with reference to the accompanying drawings. It is obvious that the specific implementation of the present disclosure is not limited to the foregoing manners, and various insubstantial improvements made by adopting the method concept and technical solution of the present disclosure, or direct application of the concept and technical solution of the present disclosure on other occasions without any improvement fall in the scope claimed by the present disclosure.

Claims

1. A drain valve switch with a clutch structure, **characterized by** comprising a switch body, a switch mounted on the switch body, a thread member, and a linkage member movable between a first position and a second position; when the linkage member is located at the first position, the switch body drives the thread member to rotate through the linkage member, and the switch body is locked or unlocked through the thread member; when the linkage member is located at the second position, the linkage member disconnects the linkage between the switch body and the thread member, and the switch body

is unable to be locked or unlocked through the thread member.

2. The drain valve switch with a clutch structure according to claim 1, **characterized in that** the thread member and the switch body are rotatably mounted together, and the linkage member is movably mounted on the switch body or on the thread member.

3. The drain valve switch with a clutch structure according to claim 1, **characterized in that** the linkage member comprises a driving portion, and when the switch is located in an initial position, the switch covers the driving portion; the switch leaves the initial position after being driven and exposes the driving portion for driving, so that the linkage member moves between the first position and the second position.

4. The drain valve switch with a clutch structure according to any one of claims 1 to 3, **characterized in that** the thread member is provided with a linkage fitting portion, and the linkage member is provided with a corresponding linkage portion; when the linkage member is located at the first position, the linkage portion and the linkage fitting portion are in circumferential transmission fit; when the linkage member is located at the second position, the linkage portion is separated from the linkage fitting portion.

5. The drain valve switch with a clutch structure according to claim 4, **characterized in that** the switch is a button, and the switch body is a button body; an inner cavity with a top opening is formed inside the button body, and a bottom of the inner cavity is provided with a through hole; both the button and the linkage member are movably installed in the inner cavity, and the thread member rotatably penetrates through the through hole and is capable of being axially limited, and the linkage fitting portion on the thread member is located in the inner cavity, and a thread portion on the thread member is located outside the button body.

6. The drain valve switch with a clutch structure according to claim 4, **characterized in that** the linkage member moves between the first position and the second position along an axial direction of the thread member; when the thread member is rotated, on a plane perpendicular to an axis of the thread member, a projection trajectory drawn by the linkage fitting portion partially overlaps with a projection of the linkage portion; when the linkage member is located at the first position, the linkage portion and the linkage fitting portion align in the axial direction of the thread member, and when the switch body is rotated, the linkage portion abuts against the linkage fitting portion to form circumferential transmission fit; when the linkage member is located at the second position, the linkage portion and the linkage fitting portion misalign in the axial direction of the thread member, and the thread member is able to rotate freely relative to the linkage member.

7. The drain valve switch with a clutch structure according to claim 5, **characterized in that** the linkage member comprises an adjusting piece and a spring pin, and the spring pin forms the linkage portion; a periphery of a portion of the thread member located inside the switch body is provided with a boss, and the boss forms the linkage fitting portion.

8. The drain valve switch with a clutch structure according to claim 7, **characterized in that** the adjusting piece is movably mounted inside a strip groove formed in the switch body, and a length direction of the strip groove is parallel to the axis of the thread member, the spring pin is elastically supported between the adjusting piece and the switch body through an elastic member; the adjusting piece and a side wall of the strip groove are respectively provided with a retaining protrusion and a retaining groove; when the linkage member is located at the first position, the adjusting piece is located at a position where the retaining protrusion and the retaining groove are separated from each other, and the spring pin and the boss are in circumferential transmission fit under the influence of the elastic member, when the linkage member is located at the second position, the adjusting piece is located at a position where the retaining protrusion and the retaining groove are in retaining fit, and the adjusting piece overcomes the elastic force of the elastic member so that the spring pin and the boss misalign in the axial direction of the thread member; and a driving portion for manual or tool driving is disposed on a position of the adjusting piece close to the button.

9. The drain valve switch with a clutch structure according to claim 5, **characterized in that** the thread member has an end located in the inner cavity and having an end diameter greater than a diameter of the through hole; and the drain valve switch further comprises a thread member retaining cover, wherein the thread member retaining cover is provided with a thread hole corresponding to a thread of the thread member, the thread member retaining cover is screwed into a portion of the thread member extending out of the switch body, and the thread member is relatively rotatably mounted on the switch body through the thread member retaining cover and the end of the thread member located in the inner cavity.

10. The drain valve switch with a clutch structure according to claim 1, **characterized in that** the thread member is a hollow structure open at both ends; a transmission rod penetrates through the thread member

and has an end connected to the switch.

11. A drain valve, **characterized by** comprising the drain valve switch with a clutch structure according to any one of claims 1 to 10.

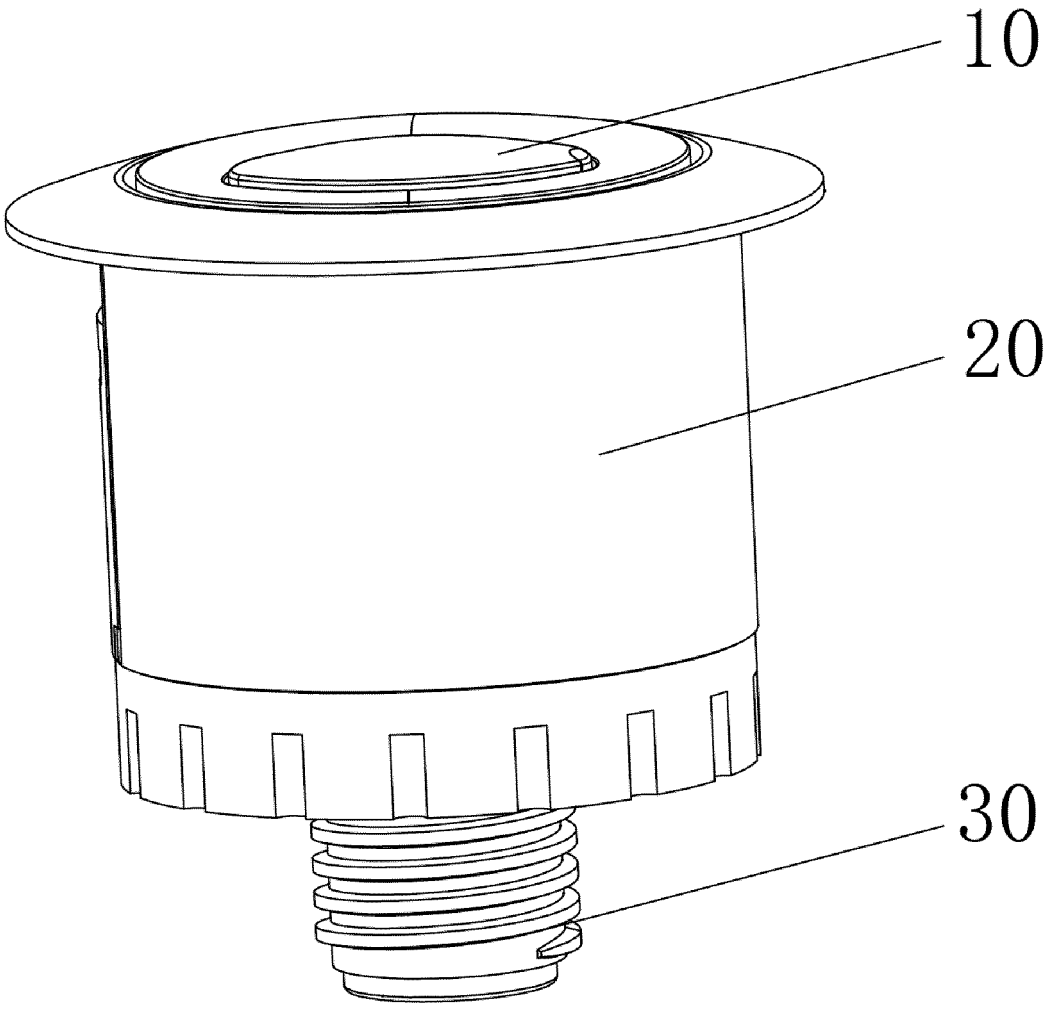

Fig. 1

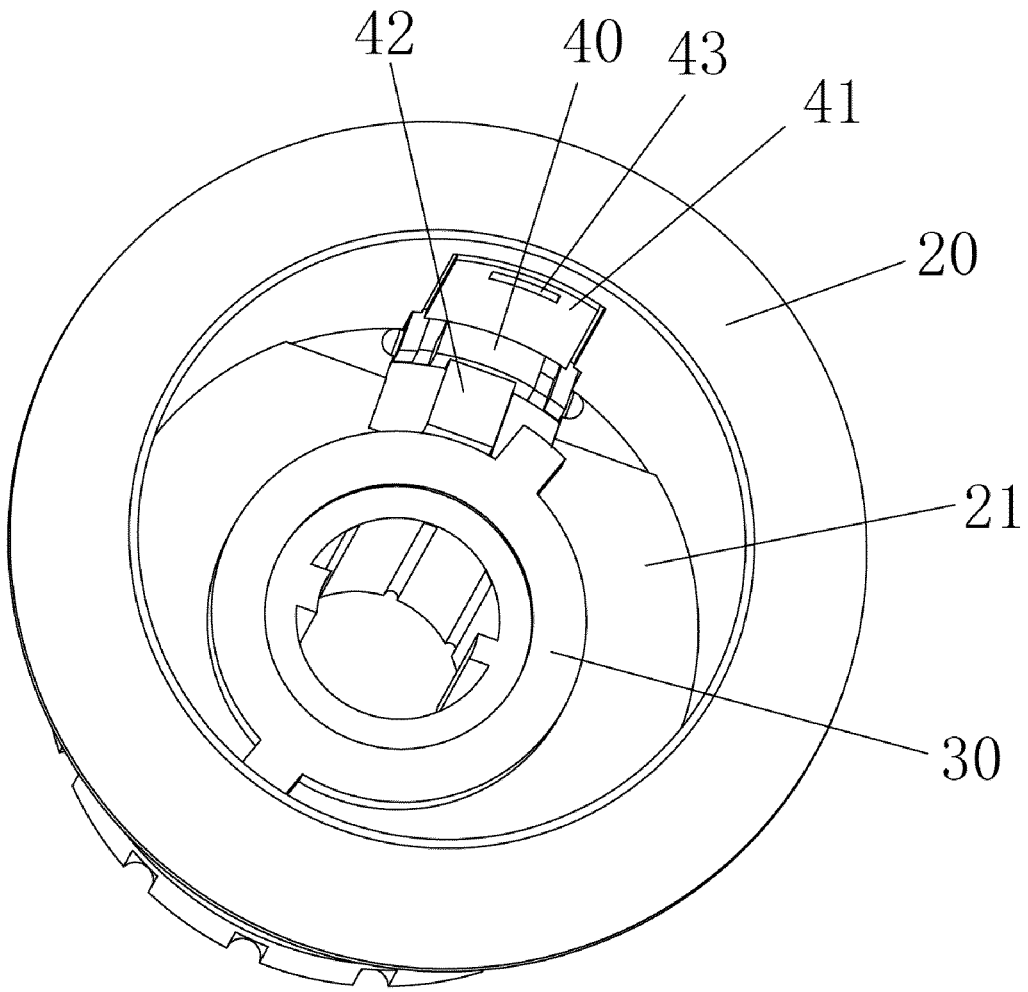

Fig. 2

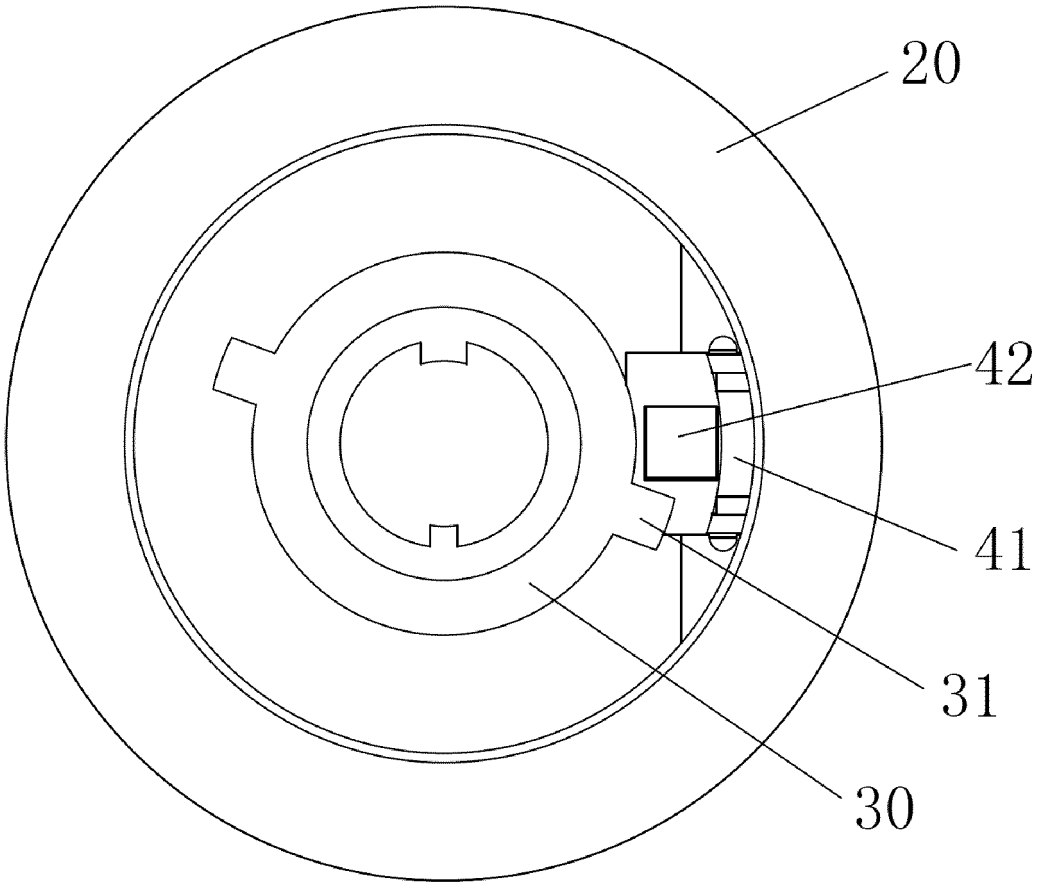

Fig. 3

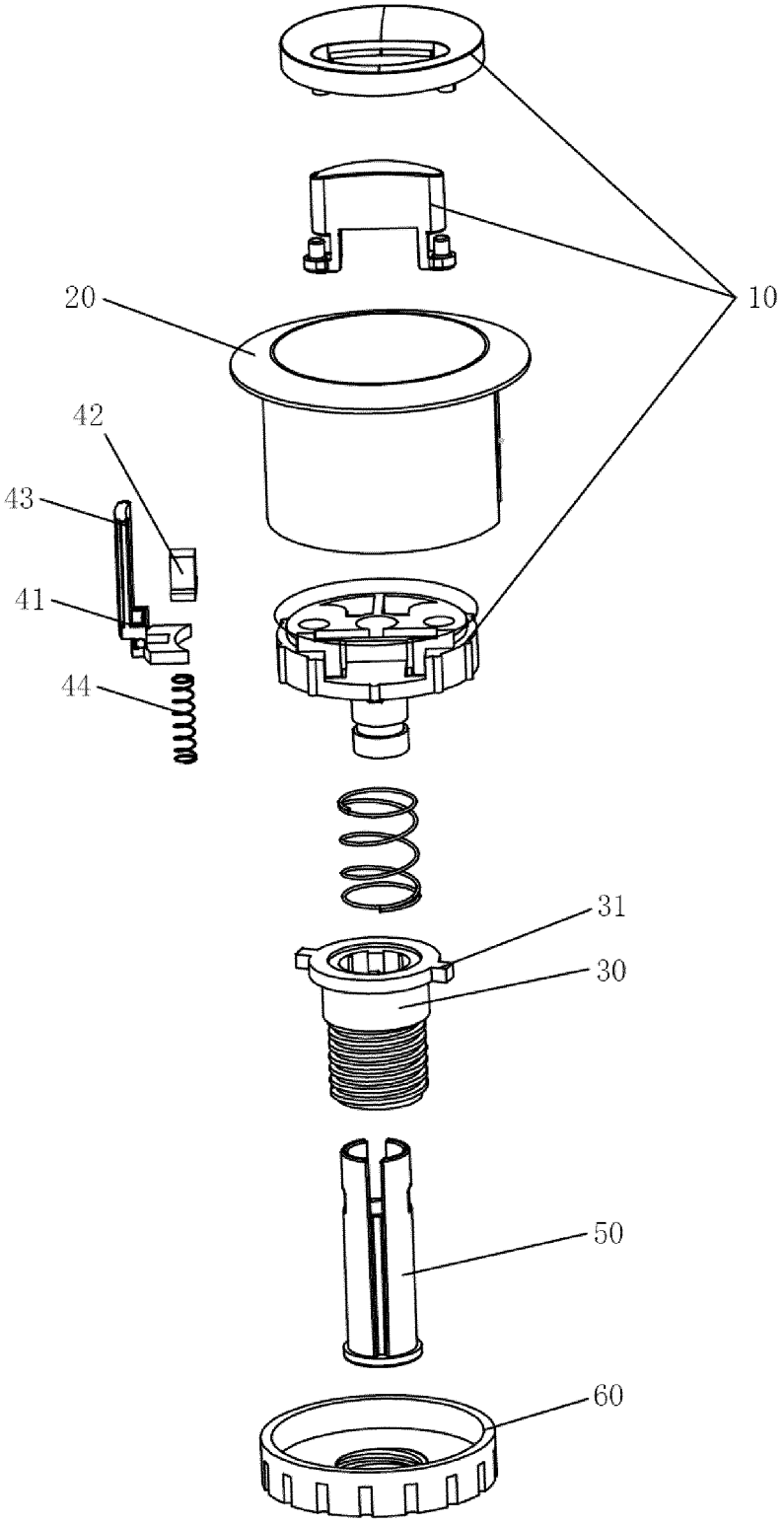

Fig. 4

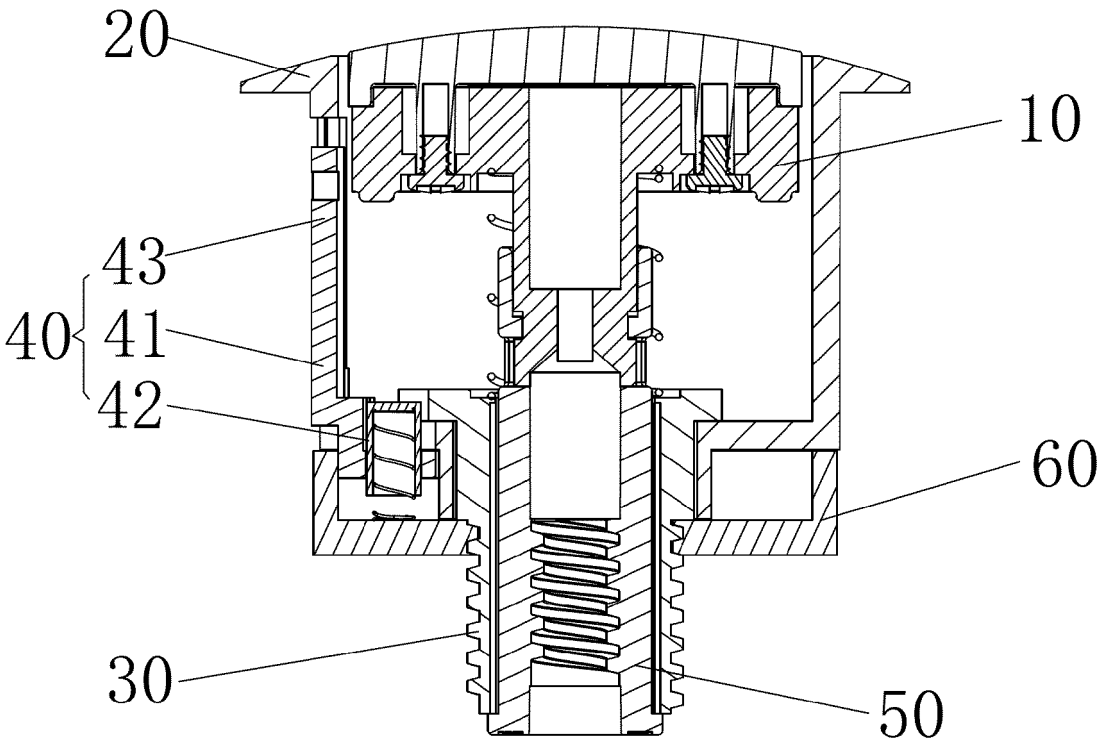

Fig. 5

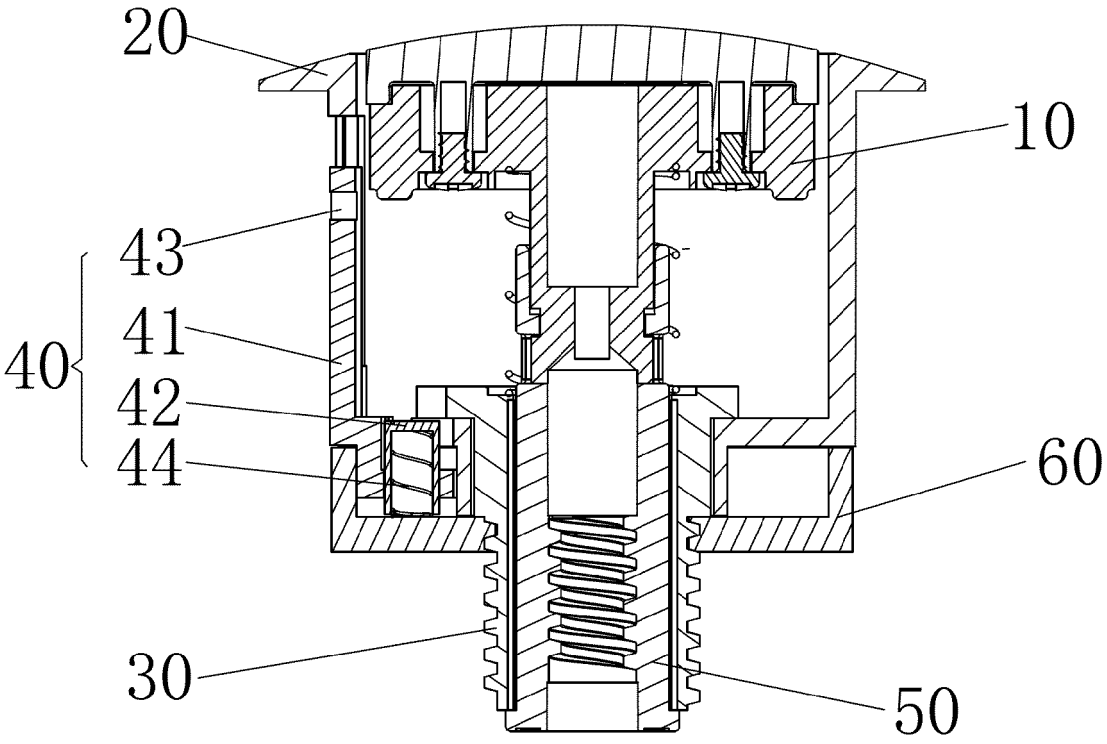

Fig. 6

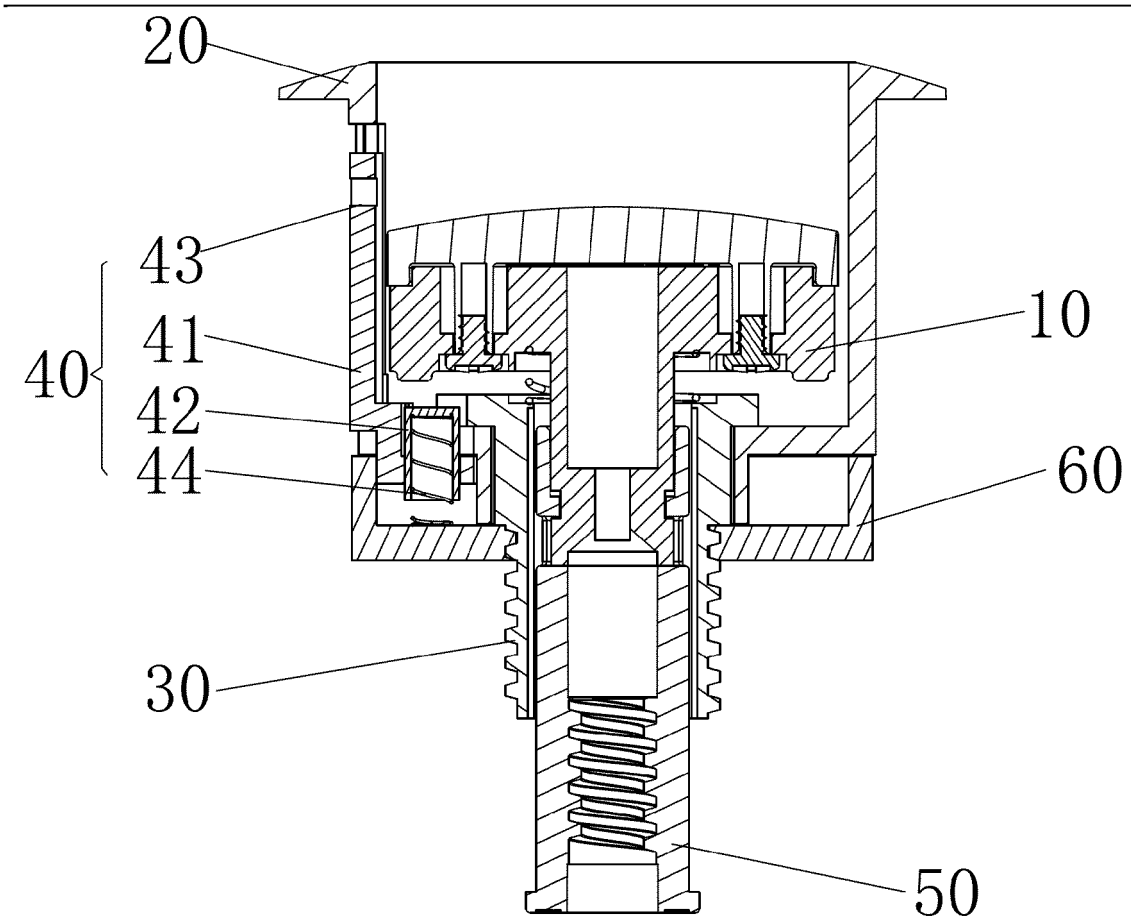

Fig. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/075634

A. CLASSIFICATION OF SUBJECT MATTER

E03D 1/34(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)

E03D; F16K

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, CNTXT, CJFD, VEN: 便器, 马桶, 排水阀, 开关, 按钮, 离合, 联动, 连动, 拆卸, 安装, 凸, 螺纹, toilet, drain, flush, valve, switch, knob, clutch, linkage, disassembly, assembly, mount+, fix+, install+, setting, protruding, screw, thread, whorl

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 210066925 U (XIAMEN R&T PLUMBING TECHNOLOGY CO., LTD.) 14 February 2020 (2020-02-14) claims 1-11	1-11
Y	CN 205189086 U (LAB (XIAMEN) SANITARY FITTINGS INC.) 27 April 2016 (2016-04-27) description, paragraphs [0032]-[0039], and figures 1-7	1-5, 7, 9, 10, 11
Y	CN 106195295 A (ZHANG, Yulian) 07 December 2016 (2016-12-07) description, paragraphs [0005]-[0034], and figures 1-21	1-5, 7, 9, 10, 11
A	CN 206080379 U (COMPAS (XIAMEN) PLUMBING TECHNOLOGY CO., LTD.) 12 April 2017 (2017-04-12) entire document	1-11
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30 April 2020	**15 May 2020**
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** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

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