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- LIN, Xiaoshan
QuanZhou (CN)
- WANG, Mingnan
QuanZhou (CN)
- CHEN, Zhiwei
QuanZhou (CN)
- LIANG, Pansheng
QuanZhou (CN)
- DENG, Xiaoqing
QuanZhou (CN)
- LIU, Qiqiao
QuanZhou (CN)

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(71) Applicant: **Fujian Xihe Sanitary Ware Technology Co., Ltd.**
QuanZhou, Fujian (CN)

(74) Representative: **Murgitroyd & Company**
165-169 Scotland Street
Glasgow G5 8PL (GB)

(72) Inventors:
• LIN, Xiaofa
QuanZhou (CN)

(54) **SWITCHING MECHANISM WITH PUSH BUTTON AND SHOWER HEAD**

(57) The present application discloses a switching mechanism with push button and a shower head. The switching mechanism with push button of the present application includes a casing, a push button, a seat body, a slider, a crank rod and a valve core. The push button includes a push block abutting against an outer wall of the casing and a shift rod, one end of the shift rod is connected with the push block and the shift rod penetrates through a strip-shaped hole. The slider is disposed in the casing, connected with the shift rod and provided with a first mounting hole. The crank rod is arranged in the casing, one end of the crank rod is rotatably connected with the seat body, and the other end of the crank rod penetrates through the first mounting hole. The valve core is disposed in the casing and includes a valve body and a switching rod extending from the valve body, the switching rod is arranged along an axial direction of the casing, one end of the switching rod is hinged with the crank rod in a way that the hinged contact point can slide along the crank rod, and the switching rod can slide along the axial direction in the valve body. The switching mechanism with push button of the present application has advantages of labor saving, quick switching response, simple structure and small empty stroke.

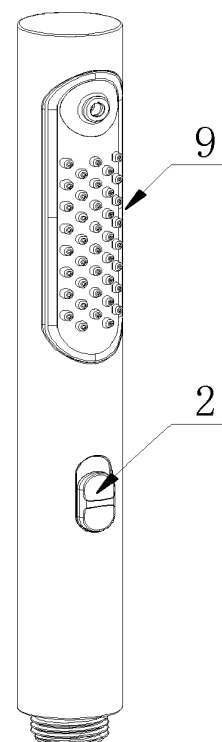


FIG. 1

Description

Technical Field

[0001] The present application relates to a switching mechanism with push button, in particular to a switching mechanism with push button and a shower head which are labor saving and have a small empty stroke.

Background

[0002] Chinese patent applications published as CN217491274U, CN217646636U and CN113769908B propose shower heads that can switch waterways by pushing a push button. A water dividing and switching mechanism of these shower heads includes a push button, a transmission mechanism and a water dividing mechanism. The push button is disposed at a handle of the shower head, and the water dividing mechanism is disposed at the back of a cover of the shower head. A complex transmission mechanism is used to perform the transmission between the push button and the water dividing mechanism. When a user pushes the push button, the water dividing mechanism is driven by the transmission mechanism, thus implementing water dividing and switching.

[0003] Due to a small size of the handle of the shower head, a complex structure and a large volume of the water dividing and switching mechanism, it is difficult to integrate the push button, the transmission mechanism and the water dividing mechanism of the water dividing and switching mechanism into the handle, which is not applicable for a shower head with a small size.

[0004] At the same time, there are many parts in the water dividing and switching mechanism, and there are fit clearances between different parts. Superposition of multiple fit clearances will lead to a large empty stroke in a process of pushing the push button, and a switching response will be slow.

[0005] The water dividing and switching mechanism is affected by a change of water pressure, moreover, with no assistance from a labor-saving mechanism, an operation of pushing the push button is relatively laborious and the user experience is poor.

Summary

[0006] In light of the above problems, a technical solution according to embodiments of the present application is as follows:

a switching mechanism with push button, including:

a casing configured in a barrel shape and provided with a strip-shaped hole penetrating through the casing, wherein a length of the strip-shaped hole extends in a direction parallel to an axis of the casing;

a push button including a push block abutting against

an outer wall of the casing and a shift rod, wherein one end of the shift rod is connected with the push block and the shift rod penetrates through the strip-shaped hole;

a seat body fixed in the casing and provided with an axially extending slideway;

a slider disposed in the casing, connected with the shift rod, provided with a first mounting hole, and slidably connected with the slideway;

a crank rod disposed in the casing, wherein one end of the crank rod is rotatably connected with the seat body, and the other end of the crank rod penetrates through the first mounting hole; and

a valve core disposed in the casing and including a valve body and a switching rod protruding from the valve body, wherein the switching rod is arranged along an axial direction of the casing, one end of the switching rod is hinged with the crank rod in a way that a hinged contact point can slide along the crank rod, and the switching rod can slide along an axial direction in the valve body;

wherein the hinged contact point between the switching rod and the crank rod is located between a contact point between the first mounting hole and the crank rod and a rotation connection point between the crank rod and the seat body.

[0007] The present disclosure further provides a shower head including the switching mechanism with push button described above.

[0008] The switching mechanism with push button according to the embodiments of the present application has following beneficial effects.

[0009] The push button, the slider, the crank rod and the switching rod of the switching mechanism with push button form a crank-slider mechanism. The user pushes the push button along the axial direction of the casing, the push button can reciprocate along the strip-shaped hole of the casing, the push button drives the slider to reciprocate along the slideway of the seat body, and the slider drives the crank rod to swing in a reciprocating manner. During the reciprocating swing of the crank rod, the switching rod can be pushed and pulled to reciprocate the switching rod in the axial direction of the casing, thus enabling the valve core to switch between different working states.

[0010] Since the hinged contact point between the switching rod and the crank rod is located between the contact point between the first mounting hole of the slider and the crank rod and the rotation connection point between the crank rod and the seat body, a force arm of a force applied by the slider to the crank rod is larger than a force arm of a force applied by the crank rod to the

switching rod. Therefore, the crank rod is a labor-saving lever, which can reduce an acting force required by the user for pushing the push button, and the user can push the push button simply by applying a small force.

[0011] In particular, the structure of the switching mechanism with push button is simple and very compact. In addition to the push button, the seat body, the slider, the crank rod and the valve core of the switching mechanism with push button can all be arranged in the barrel-shaped casing, which is even applicable for a shower head with a relatively small size. At the same time, in a path along which the force is transmitted from the push button to the switching rod, fit clearances may exist only between the slider and the crank rod as well as between the crank rod and the switching rod, so that an empty stroke of the push button is extremely short or even does not exist in the pushing process, the response speed of switching the valve core is fast with a satisfying user experience.

[0012] 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 particularly indicated in the specification and drawings.

Brief Description of Drawings

[0013] Accompanying drawings are used for providing a further understanding of technical solutions of the present application, and constitute a part of the specification. They are used together with 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 three-dimensional schematic diagram of a shower head according to an embodiment of the present application.

FIG. 2 is a front schematic diagram of a shower head according to an embodiment of the present application.

FIG. 3 is a bottom schematic diagram of a shower head according to an embodiment of the present application.

FIG. 4 is a right schematic diagram of a shower head according to an embodiment of the present application.

FIG. 5 is an exploded schematic diagram of a shower head according to an embodiment of the present application.

FIG. 6 is a three-dimensional schematic diagram of

a shower head with a first water outlet port in a water discharging state according to an embodiment of the present application.

FIG. 7 is a three-dimensional schematic diagram of a shower head with a second water outlet port in a water discharging state according to an embodiment of the present application.

FIG. 8 is a cross-sectional schematic diagram of the shower head in FIG. 4 taken along A-A direction with the first water outlet port in the water discharging state.

FIG. 9 is a partially enlarged schematic diagram at D1 in FIG. 8.

FIG. 10 is a partially enlarged schematic diagram at E1 in FIG. 8.

FIG. 11 is a cross-sectional schematic diagram of the shower head in FIG. 4 taken along B-B direction with the first water outlet port in the water discharging state.

FIG. 12 is a cross-sectional schematic diagram of the shower head of FIG. 8 taken along C-C direction.

FIG. 13 is a cross-sectional schematic diagram of the shower head in FIG. 4 along A-A direction with the second water outlet port is in the water discharging state.

FIG. 14 is a partially enlarged schematic diagram at D2 in FIG. 13.

FIG. 15 is a partially enlarged schematic diagram at E2 in FIG. 13.

FIG. 16 is a cross-sectional schematic diagram of the shower head in FIG. 4 taken along B-B direction with the second water outlet port is in the water discharging state.

FIG. 17 is a three-dimensional schematic diagram of a push button viewed from front according to an embodiment of the present application.

FIG. 18 is a three-dimensional schematic diagram of a push button viewed from back according to an embodiment of the present application.

FIG. 19 is a three-dimensional schematic diagram of a slider viewed from front according to an embodiment of the present application.

FIG. 20 is a three-dimensional schematic diagram of a slider viewed from back according to an embod-

iment of the present application.

FIG. 21 is a three-dimensional schematic diagram of a seat body viewed from front according to an embodiment of the present application.

FIG. 22 is a three-dimensional schematic diagram of a seat body viewed from back according to an embodiment of the present application.

FIG. 23 is a three-dimensional schematic diagram of a crank rod viewed from back according to an embodiment of the present application.

FIG. 24 is a three-dimensional schematic diagram of a crank rod viewed from front according to an embodiment of the present application.

FIG. 25 is a three-dimensional schematic diagram of a water outlet baffle according to an embodiment of the present application.

FIG. 26 is a three-dimensional schematic diagram of a switching rod according to an embodiment of the present application.

FIG. 27 is a three-dimensional schematic diagram of a valve body according to an embodiment of the present application.

FIG. 28 is a schematic diagram of a three-dimensional structure in which a seat body, a water dividing member and a water inlet member are assembled together.

FIG. 29 is a full cross-sectional schematic diagram of a shower head according to another embodiment.

[0014] Reference numerals:

1-casing, 100-water outlet cavity, 110-strip-shaped hole, 120-mounting opening, 2-push button, 21-push block, 22-shift rod, 221-clamping groove, 3-seat body, 30-sprinkler outlet port, 31-slideway, 311-guide rail, 32-hinge seat, 321-shaft hole, 33-vent hole, 34-avoidance channel, 35-water inlet channel, 36-first mounting cavity, 37-second mounting cavity, 38-valve seat, 381-second inner cavity, 382-second entrance, 39-communication channel, 4-slider, 41-first mounting hole, 411-first side surface, 412-second side surface, 413-first buckle, 414-second buckle, 42-second mounting hole, 421-clamping bump, 5-crank rod, 53-strip groove, 54-rotating shaft, 6-valve core, 61-valve body, 611-first inner cavity, 612-vent slot, 613-first entrance, 614-first exit, 615-straight hole, 62-switching rod, 622-spherical portion, 623-first limit protrusion, 624-second limit protrusion, 625-third limit protrusion, 626-fourth limit protrusion, 627-fifth limit protrusion, 63-first seal, 64-second seal, 65-third seal, 66-elastic member, 7-water dividing member, 71-flow chan-

nel, 9-water outlet cover, 91-first water outlet portion, 911-first water outlet port, 92-second water outlet portion, 921-second water outlet port, 10-water outlet baffle, 101-water outlet hole, 11-water inlet joint.

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Detailed Description

[0015] In order to make objects, technical solutions and advantages of the present application clearer, the embodiments of the present application will be described in detail below with reference to the accompanying drawings. Apparently, the described embodiments are only part of and not all of the embodiments of the present application. Based on the embodiments in the present application, all other embodiments obtained by those of ordinary skills in the art without making creative efforts fall within the scope of protection of the present application.

[0016] Reference is made to schematic structural diagrams of a switching mechanism with push button and a shower head according to the exemplary embodiments of the present application shown in FIGS. 1 to 29.

[0017] As shown in FIGS. 1-7, an exemplary embodiment of the present application provides a shower head.

The shower head includes a switching mechanism with push button, which can switch a water outlet mode of the shower head, and the shower head discharges water through different water outlet ports in different water outlet modes. The switching mechanism with push button includes a casing 1, a push button 2, a seat body 3, a slider 4, a crank rod 5 and a valve core 6.

[0018] The casing 1 is configured in a barrel shape, which may be cylindrical. A strip-shaped hole 110 penetrating through a wall surface of the casing 1 is provided on a side wall of the casing 1. The strip-shaped hole 110 is configured as a slit. A length direction of a cross section of the strip-shaped hole 110 is parallel to an axial direction of the casing 1.

[0019] As shown in FIGS. 17 and 18, the push button 2 includes a push block 21 and a shift rod 22. The push block 21 may be configured in an approximately plate-like structure, and one plate surface of the push block 21 abuts against an outer wall of the casing 1. The push block 21 may completely cover the strip-shaped hole 110 of the casing 1. A plate surface of the push block 21 facing away from the casing 1 is uneven, for example, the plate surface is provided with a protrusion and a depression to increase a friction between a finger and the push block 21. The shift rod 22 has a strip-shaped structure, which may be a straight strip-shaped structure. One end of the shift rod 22 is connected to the push block 21. The shift rod 22 may be perpendicular to the push block 21. The shift rod 22 penetrates through the strip-shaped hole 110.

[0020] As shown in FIGS. 11, 21 and 22, the seat body 3 is fixed in the casing 1, an outer contour of the seat body 3 may be configured as cylindrical, and the seat body 3 may be coaxially arranged with the casing 1. An outer wall of the seat body 3 is provided with a slideway

31 extending along the axial direction of the casing 1. The slideway 31 includes two guide rails 311. The two guide rails 311 are each configured in shape of a straight strip. The two guide rails 311 extend in the axial direction of the casing 1. The two guide rails 311 are provided on a same side of the casing 1 and are arranged at an interval. A water inlet channel 35 and an avoidance channel 34 are provided in the seat body 3. The water inlet channel 35 extends along an axial direction of the seat body 3. The avoidance channel 34 extends along a radial direction of the seat body 3 and traverses the water inlet channel 35. The avoidance channel 34 and the water inlet channel 35 are not communicated with each other. The avoidance channel 34 extends from a region of the seat body 3 located between the two guide rails 311 to a side of the seat body 3 facing away from the guide rails 311. The seat body 3 is further provided with a hinge seat 32. Two hinge seats 32 may be provided. The two hinge seats 32 are respectively located at opposite sides of the avoidance channel 34. A cross section of the avoidance channel 34 is straight strip-shaped and extends along the axial direction of the casing 1. The hinge seats 32 are each provided with a shaft hole 321, and the shaft holes 321 of the two hinge seats 32 are coaxially arranged.

[0021] As shown in FIGS. 14, 19 and 20, the slider 4 is provided inside the casing 1. The slider 4 may be configured in an approximately plate-like structure. The slider 4 is disposed between two guide rails 311 of the slideway 31, and the slider 4 can only slide along the guide rails 311, so that the slider 4 is slidably connected with the slideway 31. One end of the shift rod 22 extending into the casing 1 is fixedly connected to the slider 4. The slider 4 is provided with a first mounting hole 41, and the first mounting hole 41 penetrates through the slider 4.

[0022] As shown in FIGS. 9, 23 and 24, the crank rod 5 is provided inside the casing 1. The crank rod 5 may be configured in a strip shape, for example in a straight strip shape. The crank rod 5 penetrates through the avoidance channel 34 of the seat body 3. One end of the crank rod 5 is rotatably connected to the seat body 3. In this embodiment, one end of the crank rod 5 is provided with a rotating shaft 54, and two ends of the rotating shaft 54 respectively extend into the shaft holes 321 of the two hinge seats 32, so that one end of the crank rod 5 is hinged to the seat body 3. One end of the crank rod 5 facing away from the hinge seats 32 penetrates through the first mounting hole 41 of the slider 4.

[0023] As shown in FIG. 10 and 12, the valve core 6 is disposed in the casing 1. The valve core 6 includes a valve body 61 and a switching rod 62 extending from the valve body 61. The valve core 6 is configured in an approximately cylindrical structure. One end of the valve core 6 extends into the valve seat 38. The switching rod 62 is arranged along the axial direction of the casing 1, and one end of the switching rod 62 facing away from the valve body 61 is hinged with the crank rod 5, and a hinged contact point between the switching rod 62 and

the crank rod 5 can slide along the crank rod 5. The switching rod 62 can be moved relative to the valve body 61 along the axial direction of the switching rod, and the switching rod 62 can be moved to different positions to switch a working state of the valve core 6. The valve core 6 may be a water dividing valve, and the valve core 6 may be switched between different waterways when the switching rod 62 is moved between different positions.

[0024] As shown in FIG. 9, the hinged contact point between the switching rod 62 and the crank rod 5 is located between a contact point between the first mounting hole 41 and the crank rod 5 and a rotation connection point between the crank rod 5 and the seat body 3.

[0025] In this embodiment, the push button 2, the slider 4, the crank rod 5 and the switching rod 62 of the switching mechanism with push button form a crank-slider mechanism. A user pushes the push button 2 along the axial direction of the casing 1, the push button 2 can slide in a reciprocating manner along the strip-shaped hole 110 of the casing 1, the push button 2 drives the slider 4 to slide in a reciprocating manner along the slideway 31 of the seat body 3, and the slider 4 drives the crank rod 5 to swing in a reciprocating manner. During the reciprocating swing of the crank rod 5, the switching rod 62 can be pushed and pulled to move in a reciprocating manner the switching rod 62 in the axial direction of the casing 1, thus enabling the valve core 6 to switch between different working states.

[0026] Since the hinged contact point between the switching rod 62 and the crank rod 5 is located between the contact point between the first mounting hole 41 of the slider 4 and the crank rod 5 and the rotation connection point between the crank rod 5 and the seat body 3, a force arm of a force applied by the slider 4 to the crank rod 5 is larger than a force arm of a force applied by the crank rod 5 to the switching rod 62. Therefore, the crank rod 5 is a labor-saving lever, which can reduce an acting force required by the user for pushing the push button 2, and the user can push the push button 2 only by applying a small force.

[0027] In particular, the structure of the switching mechanism with push button is simple and compact. In addition to the push button 2, the seat body 3, the slider 4, the crank rod 5 and the valve core 6 of the switching mechanism with push button can all be arranged in the barrel-shaped casing 1, which is even applicable for a shower head with a relatively small size. At the same time, in a path along which the force is transmitted from the push button 2 to the switching rod 62, the fit clearances may exist only between the slider 4 and the crank rod 5 as well as between the crank rod 5 and the switching rod 62, so that an empty stroke of the push button 2 is extremely short or even does not exist in the pushing process, a response speed of switching the valve core 6 is fast with a satisfying user experience.

[0028] In an exemplary embodiment, as shown in FIG. 21, an opening is provided on one side of the shaft hole 321 of the hinge seat 32. The openings of the shaft holes

321 in the two hinge seats 32 face the same side. A width of the openings of the shaft holes 321 is slightly smaller than a diameter of the rotating shaft 54.

[0029] The rotating shaft 54 can be clamped into the shaft holes 321 through the openings of the shaft holes 321, so that the rotating shaft 54 can be more conveniently assembled into the shaft holes 321.

[0030] In an exemplary embodiment, as shown in FIGS. 23 and 24, the crank rod 5 is provided with a strip groove 53 having an arc-shaped cross section. The strip groove 53 extends in a same direction as the crank rod 5. The strip groove 53 may extend from one end of the crank rod 5 to the other end of the crank rod 5. The opening of the strip groove 53 faces the switching rod 62. As shown in FIGS. 9 and 26, one end of the switching rod 62 is provided with a spherical portion 622 having a spherical shape, and the spherical portion 622 is accommodated in the strip groove 53. A diameter of the spherical portion 622 is larger than the width of the opening of the strip groove 53 of the crank rod 5. The diameter of the spherical portion 622 is slightly smaller than the diameter of the strip groove 53 of the crank rod 5.

[0031] The crank rod 5 is provided with a strip groove 53 having an arc-shaped cross section, and one end of the switching rod 62 is provided with a spherical portion 622 having a spherical shape. The spherical portion 622 is accommodated in the strip groove 53, thereby further reducing the fit clearance between the crank rod 5 and the switching rod 62, and in turn reducing the empty stroke of the push button 2 in a process of moving forward and backward along the axial direction of the casing 1, and the response of switching the valve core 6 is fast. At the same time, the spherical portion 622 of the switching rod 62 and the strip groove 53 of the crank rod 5 are in a cooperative transmission, with a firm connection, a small contact area, and smooth operations, meanwhile the crank rod 5 is prevented from jamming.

[0032] In an exemplary embodiment, as shown in FIG. 9, a first side surface 411 and a second side surface 412 of the first mounting hole 41 of the slider 4 disposed oppositely in the axial direction of the casing 1 contact with opposite sides of the crank rod 5 respectively.

[0033] The first side surface 411 and the second side surface 412 are both arc-shaped curved surfaces, and the first side surface 411 and the second side surface 412 are both arched toward the crank rod 5.

[0034] Both the first side surface 411 and the second side surface 412 are arc-shaped curved surfaces. The crank rod 5 is in contact with the first side surface 411 and the second side surface 412 respectively, which can make the fit clearance between the slider 4 and the crank rod 5 be zero, and the empty stroke of the push button 2 in the process of moving forward and backward along the axial direction of the casing 1 can be further reduced. At the same time, the crank rod 5 slides along the first side surface 411 and the second side surface 412 when the crank rod 5 is swinging, and the crank rod 5 is not easy to interfere with the slider 4 and get jammed when

moving.

[0035] In an exemplary embodiment, as shown in FIG. 9, the first side surface 411 and the second side surface 412 are staggered in a radial direction of the casing 1.

[0036] The first side surface 411 and the second side surface 412 staggered in the radial direction respectively form a linear contact with the crank rod 5. During the rotation of the crank rod 5, the first side surface 411 and the second side surface 412 staggered in the radial direction will avoid the crank rod 5, thus completely preventing the crank rod 5 from interfering with the slider 4 and being jammed when moving.

[0037] In this embodiment, the first side surface 411 is closer to an axis of the casing 1 than the second side surface 412. When the crank rod 5 is swung in a direction approaching the first side surface 411, a portion of the crank rod 5 close to the first side surface 411 can reach an outer side of the first side surface 411 in a radial direction, and a portion of the crank rod 5 close to the second side surface 412 can reach an inner side of the second side surface 412 in a radial direction, thereby avoiding interference between the two portions of the crank rod 5 and the slider 4.

[0038] In an exemplary embodiment, as shown in FIG. 19, the slider 4 is provided with a second mounting hole 42. The second mounting hole 42 penetrates through the slider 4 in the radial direction of the casing 1. As shown in FIG. 9, the shift rod 22 penetrates through the second mounting hole 42, and the shift rod 22 may be in interference fit with the second mounting hole 42 so that the shift rod 22 is fixed to the slider 4.

[0039] In an exemplary embodiment, the shift rod 22 and the slider 4 may also be connected by a buckle. As shown in FIG. 20, a side of the second mounting hole 42 facing away from the push block 21 is provided with two opposite clamping bumps 421. As shown in FIG. 18, the shift rod 22 is provided with a clamping groove 221, and the clamping bumps 421 are clamped in the clamping groove 221.

[0040] In an exemplary embodiment, as shown in FIG. 20, the slider 4 is further provided with a first buckle 413 and a second buckle 414. Both the first buckle 413 and the second buckle 414 are provided at a side of the slider 4 facing the seat body 3.

[0041] The first buckle 413 and the second buckle 414 are respectively located at sides of the two guide rails 311 close to each other. The first buckle 413 and the second buckle 414 respectively hook the sides of the two guide rails 311 facing the seat body 3 to prevent the slider 4 from falling out of the guide rails 311. Multiple first buckles 413 and multiple second buckles 414 may be provided, and the multiple first buckles 413 are provided at intervals and the multiple second buckles 414 are provided at intervals so that the slider 4 can slide firmly on the slideway.

[0042] In an exemplary embodiment, as shown in FIGS. 2, 5, 11, the shower head further includes a water dividing member 7 and a water outlet cover 9.

[0043] As shown in FIG. 5, the casing 1 is further provided with a mounting opening 120. The mounting opening 120 is provided at one side of the casing 1. The water outlet cover 9 is configured in a plate-like structure. The water outlet cover 9 may be mounted at the mounting opening 120 of the casing 1 and closes the mounting opening 120.

[0044] As shown in FIGS. 2, 8, and 10, the water outlet cover 9 includes a first water outlet portion 91, a second water outlet portion 92, and a protruded portion 93. The first water outlet portion 91 is configured in a plate-shaped structure and is provided with multiple first water outlet ports 911. The first water outlet ports 911 penetrate through the first water outlet portion 91. The first water outlet portion 91 is arranged at an interval from the seat body 3. The protruded portion 93 protrudes from an edge of the first water outlet portion 91 toward the seat body 3, and the protruded portion 93 surrounds the edge of the first water outlet portion 91 and abuts against the seat body 3. The first water outlet portion 91, the protruded portion 93 and the seat body 3 surround and form a water outlet cavity 100, and the first water outlet ports 911 of the first water outlet portion 91 are communicated with the water outlet cavity 100. The second water outlet portion 92 is located at a side of the first water outlet portion 91. The second water outlet portion 92 is provided with a second water outlet port 921.

[0045] As shown in FIGS. 10 and 11, a first mounting cavity 36 is further provided in the seat body 3. The first mounting cavity 36 may be configured to be cylindrical. The first mounting cavity 36 is provided at one end of the water inlet channel 35, and the first mounting cavity 36 is communicated with the water inlet channel 35. The first mounting cavity 36 is arranged at an interval from the avoidance channel 34 in the axial direction of the casing 1. The first mounting cavity 36 is adjacent to the water outlet cavity 100. A sprinkler outlet port 30 is provided on a wall surface of the first mounting cavity 36 adjacent to the water outlet cavity 100.

[0046] As shown in FIGS. 5, 10, and 11, the valve body 61 of the valve core is configured as a bucket-shaped structure and is provided with a first inner cavity 611. The valve body 61 is disposed in the first mounting cavity 36 and coaxially arranged with the first mounting cavity 36. One end of the valve body 61 is provided with a first entrance 613 of the first inner cavity 611. The first entrance 613 faces the water inlet channel 35 and is communicated with the water inlet channel 35. An outer side surface of the valve body 61 is recessed to form a gutter, and an inner wall of the first mounting cavity 36 covers an opening of the gutter to seal the gutter. The gutter is communicated with the sprinkler outlet port 30 on the wall surface of the first mounting cavity 36. A first exit 614 is further provided on a side wall of the valve body 61. The first exit 614 penetrates through the side wall of the valve body 61. The first exit 614 communicates the first inner cavity 611 of the valve body 61 with the gutter.

[0047] In this way, as shown in FIGS. 8, 10 and 11, the

water inlet channel 35 of the seat body 3, the first inner cavity 611 of the valve body 61, the first exit 614 of the valve body 61, the gutter of the valve body 61, the sprinkler outlet port 30 of the seat body 3, the water outlet cavity 100 between the water outlet cover 9 and the seat body 3, and the first water outlet ports 911 of the water outlet cover 9 can be communicated in sequence. After water is injected into the water inlet channel 35, it flows through the first inner cavity 611 of the valve body 61, the first exit 614 of the valve body 61, the gutter of the valve body 61, the sprinkler outlet port 30 of the seat body 3, and the water outlet cavity 100 in sequence, and finally is ejected from the multiple first water outlet ports 911 of the water outlet cover 9.

[0048] A valve seat 38 is further provided in the seat body 3. The valve seat 38 is disposed between the first mounting cavity 36 and the avoidance channel 34. The valve seat 38 is arranged at an interval from the first mounting cavity 36. The valve seat 38 is provided with a second inner cavity 381, and the second inner cavity 381 extends along the axial direction of the casing. The second inner cavity 381 may be cylindrical and coaxially arranged with the inner cavity of the valve body 61. The second inner cavity 381 is provided with a second entrance 382, and the second entrance 382 is disposed at a side of the valve seat 38 facing the valve body 61 and faces the first entrance 613. The second entrance 382 is arranged coaxially with the first entrance 613 of the valve body 61. The second entrance 382 can be communicated with the water inlet channel 35 of the seat body 3.

[0049] As shown in FIGS. 11 and 15, a communication channel 39 and a second mounting cavity 37 are further provided in the seat body. The second mounting cavity 37 is disposed at a side of the first mounting cavity 36 facing away from the valve seat 38. The communication channel 39 is disposed at a side of the first mounting cavity 36 and extends along the axial direction of the casing 1. One end of the communication channel 39 extends to the valve seat 38 and is communicated with the second inner cavity 381 of the valve seat 38, and the other end of the communication channel 39 extends to the second mounting cavity 37 and is communicated with the second mounting cavity 37.

[0050] As shown in FIGS. 5, 11, 13, and 16, the water dividing member 7 is configured in a tubular structure, and a flow channel 71 is provided in the water dividing member 7. One end of the water dividing member 7 extends into the second mounting cavity 37, and the other end of the water dividing member 7 extends to the second water outlet port 921. One end of the flow channel 71 of the water dividing member 7 is communicated with one end of the communication channel 39 facing away from the valve seat 38, and the other end of the flow channel 71 of the water dividing member 7 is communicated with the second water outlet port 921.

[0051] Thus, as shown in FIGS. 13, 15, and 16, the water inlet channel 35 of the seat body 3, the second

inner cavity 381 of the valve seat 38, the communication channel 39 of the seat body, the flow channel 71 of the water dividing member 7, and the second water outlet port 921 of the water outlet cover 9 are communicated in sequence. After water is injected into the water inlet channel 35, it flows through the second inner cavity 381 of the valve seat 38, the communication channel 39 of the seat body, and the flow channel 71 of the water dividing member 7 in sequence, and finally is ejected from the second water outlet port 921 of the water outlet cover 9.

[0052] The switching rod 62 extends from the first inner cavity 611 of the valve body 61 into the avoidance channel 34 through the second inner cavity 381 of the valve seat 38.

[0053] As shown in FIG. 10, the valve core further includes a first seal 63. The first seal 63 may be a rubber member. The first seal 63 may be configured in an annular structure. The first seal 63 is sleeved on the switching rod 62 and is fixedly connected with the switching rod 62. The water inlet channel 35 is communicated with a region between the valve seat 38 and the valve body 61, and the first seal 63 is located between the valve seat 38 and the valve body 61. A outer diameter of the first seal 63 is larger than an outer diameter of the first entrance 613 and the outer diameter of the second entrance 382.

[0054] Movement of the push button 2 along the axial direction of the casing 1 can drive the switching rod 62 to move, thereby implementing the switching of the waterway, which is as follows in detail.

[0055] As shown in FIGS. 13, 15 and 16, the switching rod 62 is moved along the axial direction of the casing towards the first inner cavity 611, then the first seal 63 is driven to move in a direction towards the first entrance 613 and the first seal 63 can close the first entrance 613 of the first inner cavity 611 and open the second entrance 382 of the second inner cavity 381, at this point, water is injected into the water inlet channel 35, then flows through the second inner cavity 381 of the valve seat 38, the communication channel 39 of the seat body, the flow channel 71 of the water dividing member 7 in sequence, and finally is ejected from the second water outlet port 921 of the water outlet cover 9.

[0056] As shown in FIGS. 8, 10 and 11, the switching rod 62 is moved towards the outside of the first inner cavity 611 in the axial direction of the casing, the first seal 63 is then driven to move in a direction towards the second entrance 382, and the first seal 63 can block the second entrance 382 of the second inner cavity 381 and open the first entrance 613 of the first inner cavity 611. At this time, water is injected into the water inlet channel 35, then flows through the first inner cavity 611 of the valve body 61, the first exit 614 of the valve body 61, the gutter of the valve body 61, the sprinkler outlet port 30 of the seat body 3, the water outlet cavity 100 in sequence, and finally is ejected from multiple first water outlet ports 911 of the water outlet cover 9.

[0057] In an illustrative embodiment, as shown in FIG.

10, the valve core further includes a second seal 64. The second seal 64 may be a rubber member. The second seal 64 may be configured in an annular structure. The second seal 64 is sleeved on the switching rod 62 and is fixedly connected with the switching rod 62. The second seal 64 is disposed within the first inner cavity 611 and located at a side of the first exit 614 away from the first entrance 613. An outer edge of the second seal 64 abuts against an inner peripheral wall of the first inner cavity 611. The second seal 64 seals a gap between an outer peripheral surface of the switching rod 62 and a side surface of the first inner cavity 611.

[0058] When the first seal 63 closes the second entrance 382 of the second inner cavity 381, the first seal 63 is subjected to a water pressure in a direction facing away from the second seal 64, and the second seal 64 is subjected to a water pressure facing away from the first seal 63, which counteract each other, so that influence of the water pressures on the movement of the switching rod 62 is reduced, thereby reducing the force required by the user for pushing the push button 2 when the first seal 63 closes the second entrance 382 of the second inner cavity 381.

[0059] In an exemplary embodiment, as shown in FIG. 15, the valve core further includes a third seal 65. The third seal 65 may be a rubber member. The third seal 65 may be configured in an annular structure. The third seal 65 is sleeved on the switching rod 62 and is fixedly connected with the switching rod 62. The third seal 65 is disposed within the second inner cavity 381. An outer edge of the third seal 65 abuts against an inner peripheral wall of the second inner cavity 381. The third seal 65 seals a gap between the outer peripheral surface of the switching rod 62 and a side surface of the second inner cavity 381.

[0060] When the first seal 63 closes the first entrance 613 of the first inner cavity 611, the first seal 63 is subjected to a water pressure in a direction facing away from the third seal 65, and the third seal 65 is subjected to a water pressure facing away from the first seal 63, which counteract each other, so that influence of the water pressures on the movement of the switching rod 62 is reduced, thereby reducing the force required by the user for pushing the push button 2 when the first seal 63 closes the first entrance 613 of the first inner cavity 611.

[0061] In an exemplary embodiment, as shown in FIG. 10, the outer peripheral surface of the switching rod 62 is provided with a first limit protrusion 623 and a second limit protrusion 624. The first limit protrusion 623 and the second limit protrusion 624 may be annular protrusions. The first seal 63 is sandwiched between the first limit protrusion 623 and the second limit protrusion 624.

[0062] The first limit protrusion 623 and the second limit protrusion 624 can respectively abut against opposite sides of the first seal 63 to prevent the first seal 63 from moving in the axial direction of the switching rod 62.

[0063] In an exemplary embodiment, as shown in FIG. 10, the outer peripheral surface of the switching rod 62

is further provided with a third limit protrusion 625 and a fourth limit protrusion 626. The third limit protrusion 625 and the fourth limit protrusion 626 may be annular protrusions. The second seal 64 is sandwiched between the third limit protrusion 625 and the fourth limit protrusion 626.

[0064] The third limit protrusion 625 and the fourth limit protrusion 626 can respectively abut against opposite sides of the second seal 64 to prevent the second seal 64 from moving in the axial direction of the switching rod 62.

[0065] In an exemplary embodiment, as shown in FIG. 10, the outer peripheral surface of the switching rod 62 is further provided with a fifth limit protrusion 627. The fifth limit protrusion 627 may be an annular protrusion. The fifth limit protrusion 627 is disposed at a side of the third seal 65 close to the first seal 63 and abuts against the third seal 65.

[0066] The fifth limit protrusion 627 prevents the third seal 65 from moving in a direction toward the first entrance 613 and falling out of the second inner cavity 381.

[0067] In an illustrative embodiment, as shown in FIG. 10, the valve core further includes an elastic member 66. The elastic member 66 is disposed within the first inner cavity 611. One end of the elastic member 66 abuts against a bottom wall of the first inner cavity 611 facing away from the first entrance 613. The other end of the elastic member 66 abuts against the third limit protrusion 625 of the switching rod 62. The elastic member 66 is in a compressed and deformed state. The elastic member 66 applies an elastic force to the switching rod 62 in a same direction as the orientation of the first entrance 613. The elastic member 66 may be a coil spring and is sleeved on the switching rod 62. The elastic member 66 is sleeved on the switching rod 62 to prevent the elastic member 66 from bending when compressed.

[0068] The elastic force applied by the elastic member 66 on the switching rod 62 causes the switching rod 62 to tend to move towards the outside of the first entrance 613. When water is cut off and water is no longer injected into the water inlet channel 35, there is no water pressure in the casing 1. The elastic member 66 can drive the switching rod 62 to move towards the outside of the first entrance 613, thereby driving the first seal 63 to automatically reset to a position where the second entrance 382 is closed. When the user uses the shower head again, an initial state of the shower head is always a state of discharging the water from the first water outlet ports 911, so there is no need to provide a mark on the push button or its vicinity to indicate a relationship between a pushing direction of the push button and the water discharging state of the shower head.

[0069] However, in the existing shower head products, a mark needs to be provided on the push button or its vicinity to indicate the relationship between the pushing direction of the push button and the water discharging state of the shower head. The mark is usually a screen-printed mark, laser mark or embossment mark, which

increases the additional cost.

[0070] In an illustrative embodiment, as shown in FIGS. 10 and 27, the valve body 61 is further provided with a straight hole 615 and a vent slot 612. The straight hole 615 is provided on the bottom wall of the first inner cavity 611. The straight hole 615 extends in a same direction as the switching rod 62. One end of the switching rod 62 is inserted into the straight hole 615. The straight hole 615 is in clearance fit with the switching rod 62, and the straight hole 615 constrains the switching rod 62 to slide only along its axial direction. The vent slot 612 extends from the straight hole 615 to an outer peripheral surface of the valve body 61.

[0071] As shown in FIGS. 12 and 22, the seat body is further provided with a vent hole 33. One end of the vent hole 33 is communicated with the vent slot 612. The other end of the vent hole 33 extends to an outer surface of the seat body.

[0072] The straight hole 615, the vent slot 612 and the vent hole 33 can communicate the first inner cavity 611 with the outside, so that an air pressure of the first inner cavity 611 is in balance with that of the outside, and the switching rod 62 is prevented from being difficult to move due to pressure built in the first cavity.

[0073] In an exemplary embodiment, as shown in FIGS. 25 and 10, the shower head further includes a water outlet baffle 10. The water outlet baffle 10 may be configured as an arc-shaped plate. The water outlet baffle 10 is provided with multiple water outlet holes 101. The multiple water outlet holes 101 may be sequentially arranged on the water outlet baffle 10 along a circumferential direction of the casing. The water outlet holes 101 penetrate through the water outlet baffle 10. The water outlet baffle 10 is disposed in the water outlet cavity 100 and covers the sprinkler outlet port 30 of the seat body 3. The water outlet holes 101 communicate the sprinkler outlet port 30 with the water outlet cavity 100. A diameter of the water outlet holes 101 is smaller than that of the sprinkler outlet port 30.

[0074] Water input from the sprinkler outlet port 30 into the water outlet cavity 100 is usually torrential and fast. If there is no water outlet baffle 10 for buffering, the shape of the water discharging out of the first water outlet ports 911 close to the sprinkler outlet port 30 will be dispersed due to a too strong jet flow. When the water outlet baffle 10 is provided, and the water outlet baffle 10 weakens a flow rate of water input into the water outlet cavity 100 from the sprinkler outlet port 30, so that the water output from each of the first water outlet holes 101 is more uniform.

[0075] In an illustrative embodiment, as shown in FIG. 11, the shower head further includes a water inlet joint 11. One end of the water inlet joint 11 is inserted into one end of the water inlet channel 35 of the valve seat 38 facing away from the first mounting cavity 36. The other end of the water inlet joint 11 extends out of the casing and is provided with an external thread. The water inlet joint 11 is used for externally connecting with a water

supply line to inject the water input from the water supply line into the water inlet channel 35 of the valve seat 38.

[0076] In an illustrative embodiment, as shown in FIG. 5, the shower head further includes a flow convergence post 12 and a flow limiter 13. As shown in FIG. 8, both the flow convergence post 12 and the flow limiter 13 are disposed in the second water outlet portion 92 and between the second water outlet port 921 and the flow channel 71 of the water dividing member 7. The flow convergence post 12 is provided with a post body. The flow limiter 13 includes a ring body and an impeller disposed at an inner side of the ring body. The ring body is sleeved on the post body.

[0077] When water flows from the flow channel 71 of the water dividing member 7 toward the second water outlet port 921, it flows through the flow convergence post 12 and the flow limiter 13, thereby driving the flow limiter 13 to rotate. When the flow limiter 13 is rotated, it drives the water to rotate, so that the second water outlet port 921 can output rhythmic water.

[0078] In another illustrative embodiment, as shown in FIG. 29, the second seal 64 is not provided within the valve core 6.

[0079] When the second seal 64 is not provided, pressure is not built in the valve body 61, the vent slot 612 does not need to be provided on the valve body 61, and the seat body 3 does not need to be provided with the vent hole 33 to relieve pressure, so that the valve core 6 has a simpler structure and a lower manufacturing cost.

[0080] The switching mechanism with push button of the present application can be applied to, but is not limited to, shower heads.

[0081] Unless otherwise expressly specified and qualified, terms "mount", "couple", "connect", "fix" and the like shall be understood in a broad sense, for example, they may be fixed connection, detachable connection or integrated connection; they may be mechanical connection or electrical connection; they may be direct connection or indirect connection through an intermediate medium, or may be an internal connection between two elements or an interactive relationship 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.

[0082] In the description of this specification, descriptions with reference to terms "one embodiment," "some embodiments," "example," "specific example," or "some examples," and the like mean that specific features, structures, materials, or characteristics described in conjunction with the embodiment or example are included in at least one embodiment or example of the present application. In this specification, the schematic illustration of the above terms does not need to be directed to the same embodiments or examples. Further, the specific features, structures, materials, or characteristics described may be combined in a suitable manner in any one or more embodiments or examples. Further, without contradicting one another, those skilled in the art may

incorporate and combine different embodiments or examples and features of different embodiments or examples described in this specification.

[0083] Although the embodiments of the present application have been illustrated and described above, it may be understood that the above-described embodiments are exemplary and cannot be construed as a restriction on the present application. Changes, modifications, substitutions and variations may be made to the above-described embodiments by those of ordinary skills in the art within the scope of the present application.

Claims

1. A switching mechanism with push button (2), comprising:

a casing (1) configured in a barrel shape and provided with a strip-shaped hole penetrating through the casing (1), wherein a length direction of a cross section of the strip-shaped hole is parallel to an axial direction of the casing (1); a push button (2) comprising a push block (21) abutting against an outer wall of the casing (1) and a shift rod (22), wherein one end of the shift rod (22) is connected with the push block (21) and the shift rod (22) penetrates through the strip-shaped hole;

a seat body (3) fixed in the casing (1) and provided with a slideway (31) extending along the axial direction of the casing (1);

a slider (4) disposed in the casing (1), connected with the shift rod (22), provided with a first mounting hole (41), and slidably connected with the slideway (31);

a crank rod (5) disposed in the casing (1), wherein one end of the crank rod (5) is rotatably connected with the seat body (3), and the other end of the crank rod (5) penetrates through the first mounting hole (41); and

a valve core (6) disposed in the casing (1) and comprising a valve body (61) and a switching rod (62) protruding from the valve body (61), wherein the switching rod (62) is arranged along the axial direction of the casing (1), one end of the switching rod (62) is hinged with the crank rod (5) in a way that a hinged contact point is able to slide along the crank rod (5), and the switching rod (62) is able to slide along an axial direction in the valve body (61);

wherein the hinged contact point between the switching rod (62) and the crank rod (5) is located between a contact point between the first mounting hole (41) and the crank rod (5) and a rotation connection point between the crank rod (5) and the seat body (3).

2. The switching mechanism with push button (2) according to claim 1, wherein the crank rod (5) is provided with a strip groove (53) with an arc-shaped cross section, an extending direction of the strip groove (53) is the same as an extending direction of the crank rod (5), an opening of the strip groove (53) faces the switching rod (62), one end of the switching rod (62) is provided with a spherical portion (622) having a spherical shape, the spherical portion (622) is accommodated in the strip groove (53), and a diameter of the spherical portion (622) is larger than a width of the opening of the strip groove (53). 5
3. The switching mechanism with push button (2) according to claim 1, wherein the first mounting hole (41) comprises a first side surface (411) and a second side surface (412) disposed opposite to each other in the axial direction of the casing (1), the first side surface (411) and the second side surface (412) are in contact with opposite sides of the crank rod (5) respectively; and 10
the first side surface (411) and the second side surface (412) are both arc-shaped curved surfaces. 15
4. The switching mechanism with push button (2) according to claim 3, wherein the first side surface (411) and the second side surface (412) are staggered in a radial direction of the casing (1). 20
5. The switching mechanism with push button (2) according to claim 1, wherein the slideway (31) comprises two guide rails (311) extending along the axial direction of the casing (1) and located at a same side of the seat body (3); and 25
the slider (4) is sandwiched between the two guide rails (311). 30
6. The switching mechanism with push button (2) according to claim 5, wherein an outer contour of the seat body (3) is configured in a cylindrical shape which is coaxial with the casing (1); 35

the seat body (3) is provided with an avoidance channel (34) which radially penetrates through the seat body (3), and one end of the avoidance channel (34) is located between the two guide rails (311); and 40
the crank rod (5) penetrates through the avoidance channel (34), and one end of the crank rod (5) is hinged at a side of the seat body (3) facing away from the guide rails (311). 45
7. The switching mechanism with push button (2) according to claim 6, wherein two hinge seats (32) are respectively provided at two sides of an end of the avoidance channel (34) of the seat body (3) facing away from the guide rails (311), and the hinge seats (32) are provided with shaft holes (321); and 50

one end of the crank rod (5) is provided with a rotating shaft (54), and two ends of the rotating shaft (54) are respectively inserted into the shaft holes (321) of the two hinge seats (32).

8. The switching mechanism with push button (2) according to claim 6, wherein the seat body (3) is further provided with a water inlet channel (35) extending along the axial direction, and the avoidance channel (34) traverses the water inlet channel (35);

the seat body (3) is further provided with a first mounting cavity (36) located at one end of the water inlet channel (35) and a valve seat (38) located between the first mounting cavity (36) and the avoidance channel (34);

the valve body (61) is disposed in the first mounting cavity (36), and a first inner cavity (611) having a first entrance (613) is provided in the valve body (61);

the valve seat (38) and the valve body (61) are arranged at an interval, and a second inner cavity (381) having a second entrance (382) is provided in the valve seat (38);

the first entrance (613) and the second entrance (382) are arranged opposite to each other and are both able to be communicated with the water inlet channel (35);

the switching rod (62) passes through the second inner cavity (381) from the first inner cavity (611) and extends into the avoidance channel (34); and

the valve core (6) further comprises a first seal (63) disposed on the switching rod (62), the first seal (63) is located between the first entrance (613) and the second entrance (382) and is able to selectively close one of the first entrance (613) and the second entrance (382) following a movement of the switching rod (62).

9. The switching mechanism with push button (2) according to claim 8, wherein the valve core (6) further comprises a second seal (64) disposed on the switching rod (62); and

the second seal (64) is located in the first inner cavity (611) and seals a gap between an outer peripheral surface of the switching rod (62) and a side surface of the first inner cavity (611); or wherein the valve core (6) further comprises a third seal (65) disposed on the switching rod (62); and

the third seal (65) is located in the second inner cavity (381) and seals a gap between an outer peripheral surface of the switching rod (62) and a side surface of the second inner cavity (381); or wherein the valve core (6) further comprises an elastic member (66) disposed in the first inner

cavity (611) for applying an elastic force to the switching rod (62), and a direction of the elastic force is the same as an orientation of the first entrance (613).

10. The switching mechanism with push button (2) according to claim 9, wherein an outer peripheral surface of the switching rod (62) is further provided with a third limit protrusion (625); and one end of the elastic member (66) abuts against a bottom wall of the first inner cavity (611) facing away from the first entrance (613), the other end of the elastic member (66) abuts against the third limit protrusion (625), and the elastic member (66) is in a compressed state.

11. The switching mechanism with push button (2) according to claim 9, wherein the valve body (61) is further provided with a straight hole (615) and a vent slot (612), one end of the straight hole (615) is communicated with the first inner cavity (611), the vent slot (612) extends from the straight hole (615) to an outer surface of the valve body (61); and the straight hole (615) extends along a radial direction of the valve body (61), and one end of the switching rod (62) extends into the straight hole (615).

12. A shower head, comprising the switching mechanism with push button (2) according to any one of claims 1 to 11.

13. A shower head, comprising a water outlet cover (9) and the switching mechanism with push button (2) according to any one of claims 8 to 11;

wherein the casing (1) is further provided with a mounting opening (120), and the water outlet cover (9) is disposed on the mounting opening (120);

the water outlet cover (9) comprises a first water outlet portion (91) arranged at an interval from the seat body (3) and a second water outlet portion (92) arranged at one end of the first water outlet portion (91);

the first water outlet portion (91) is provided with first water outlet ports (911) communicated with the first inner cavity (611), and the second water outlet portion (92) is provided with a second water outlet port communicated with the second inner cavity (381).

14. The shower head according to claim 13, wherein the water outlet cover (9) further comprises a protruded portion extending from an edge of the first water outlet portion (91) to the seat body (3);

the first water outlet portion (91), the protruded portion and the seat body (3) surround and form

a water outlet cavity (100), and the first water outlet ports (911) are communicated with the water outlet cavity (100);

the first mounting cavity (36) is adjacent to the water outlet cavity (100), and the first mounting cavity (36) is provided with a sprinkler outlet port (30) communicated with the water outlet cavity (100); and

an outer side surface of the valve body (61) is recessed to form a gutter, and a side wall of the valve body (61) is further provided with a first exit (614) communicating the first inner cavity (611) with the gutter.

15. The shower head according to claim 13 or 14, wherein the seat body (3) is further provided therein with a second mounting cavity (37) located at a side of the first mounting cavity (36) facing away from the valve seat (38) and a communication channel (39) extending from the second inner cavity (381) to the second mounting cavity (37); the shower head further comprises a water dividing member (7), one end of the water dividing member (7) extends into the second mounting cavity (37), and a flow channel (71) is provided in the water dividing member (7), and two ends of the flow channel (71) are respectively communicated with the communication channel (39) and the second water outlet port.

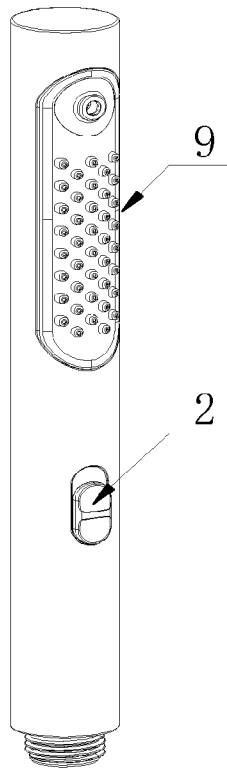


FIG. 1

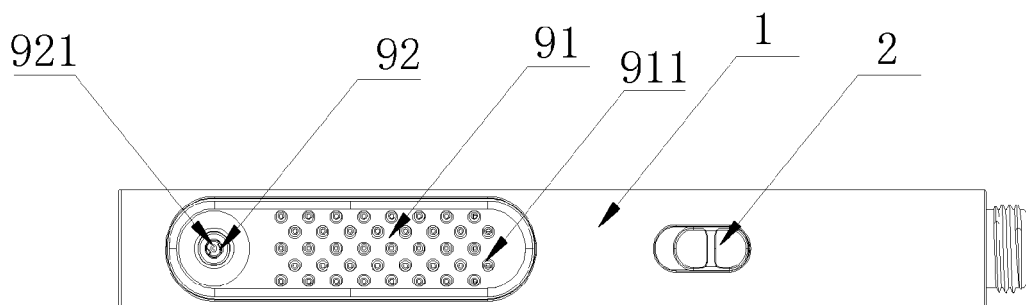


FIG. 2

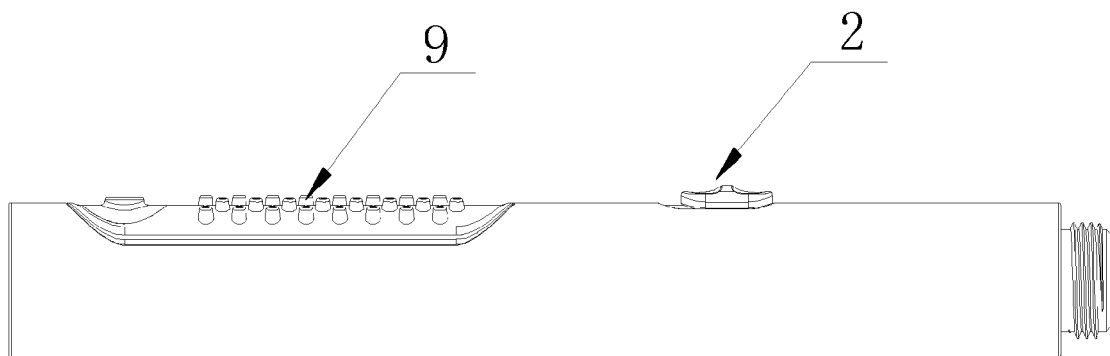


FIG. 3

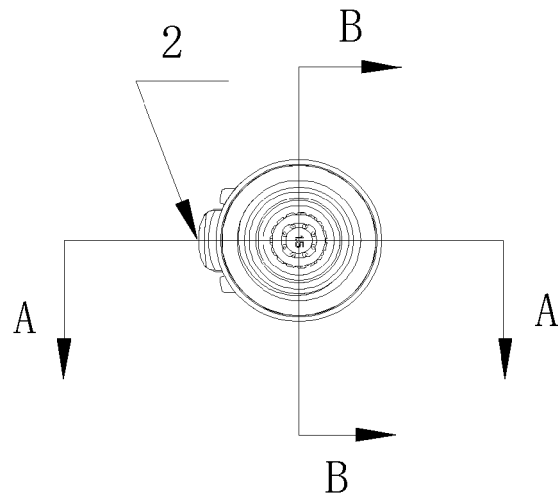


FIG. 4

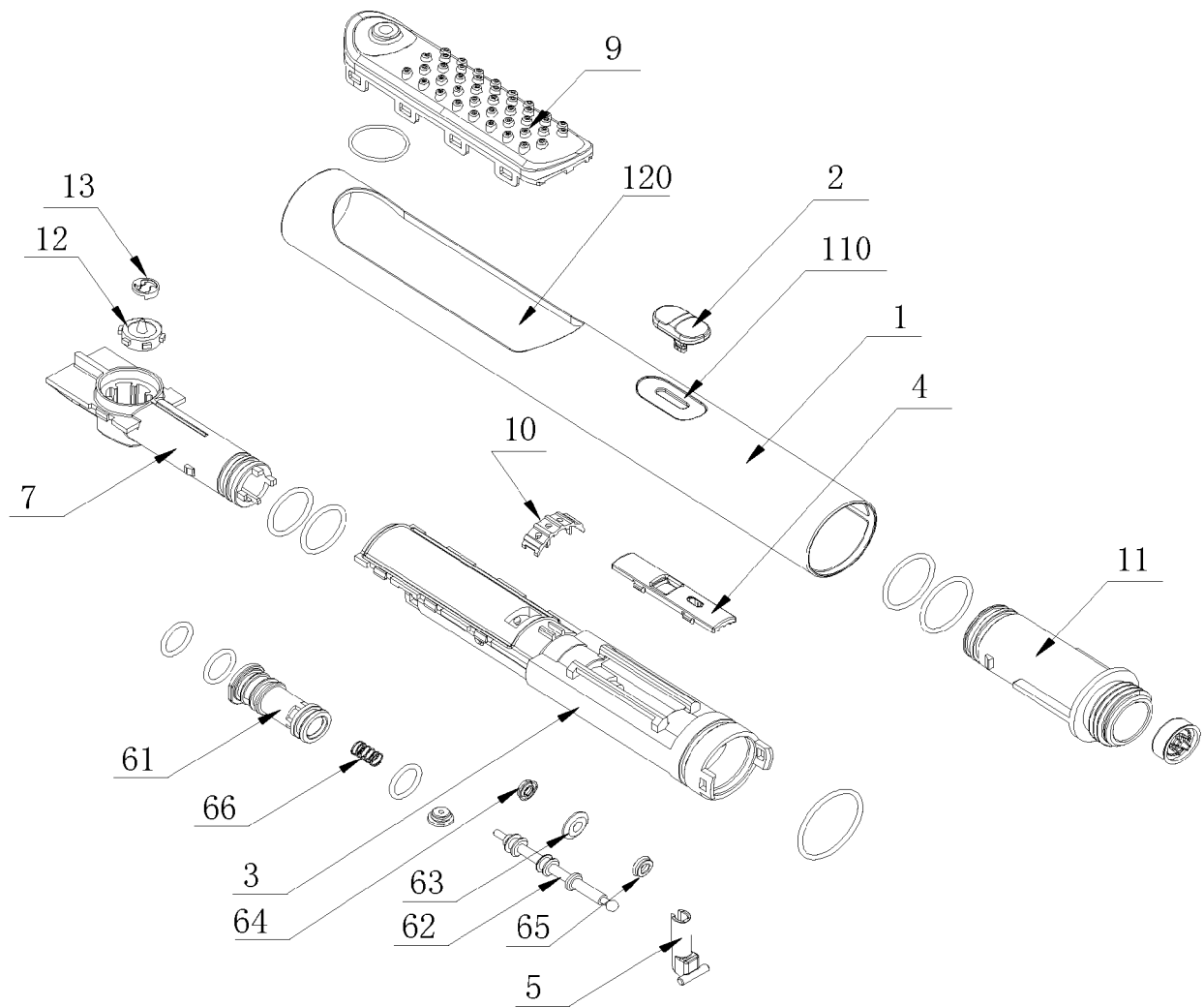


FIG. 5

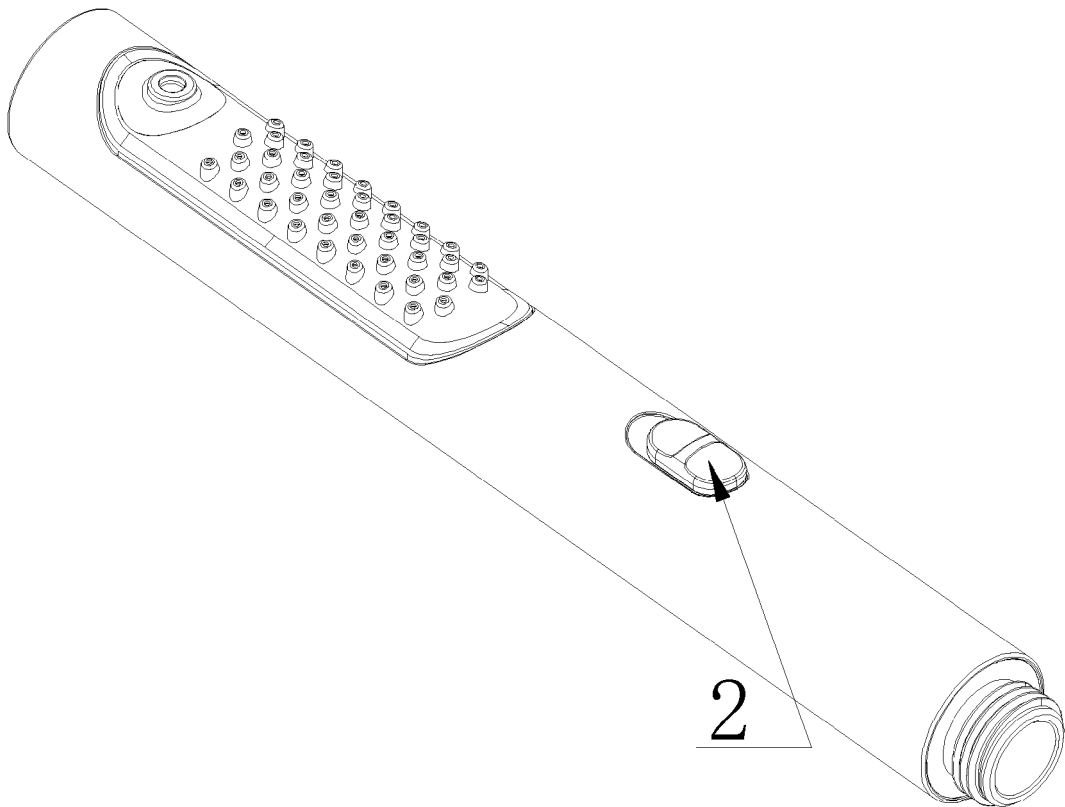


FIG. 6

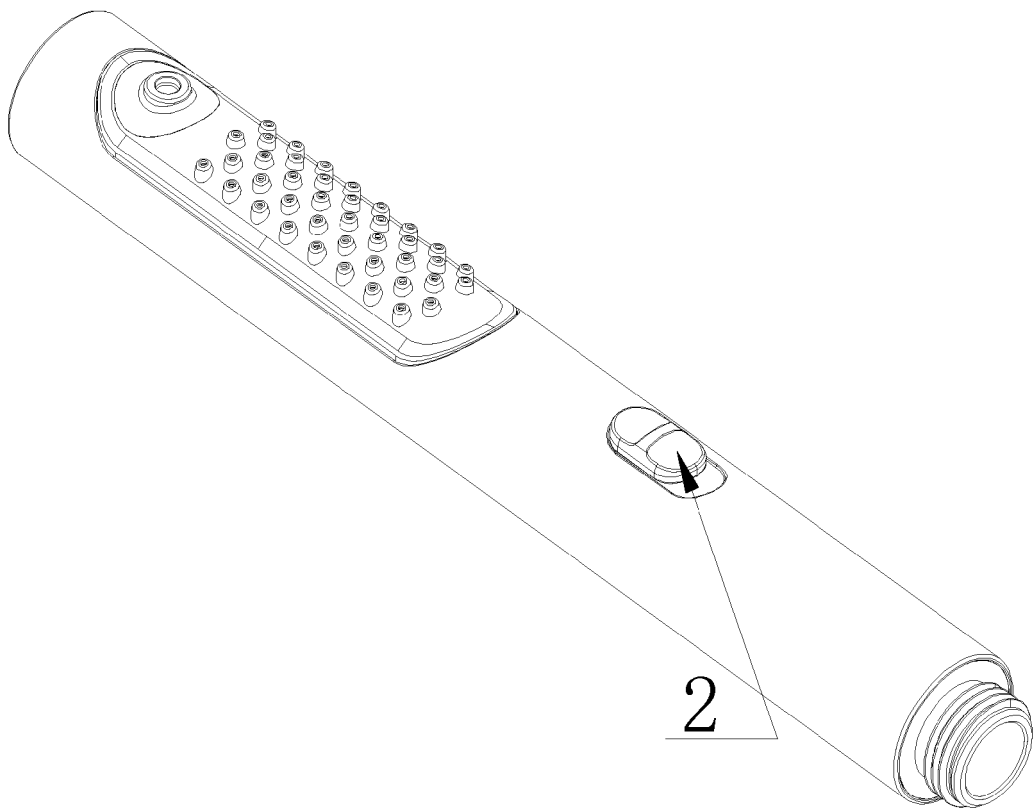


FIG. 7

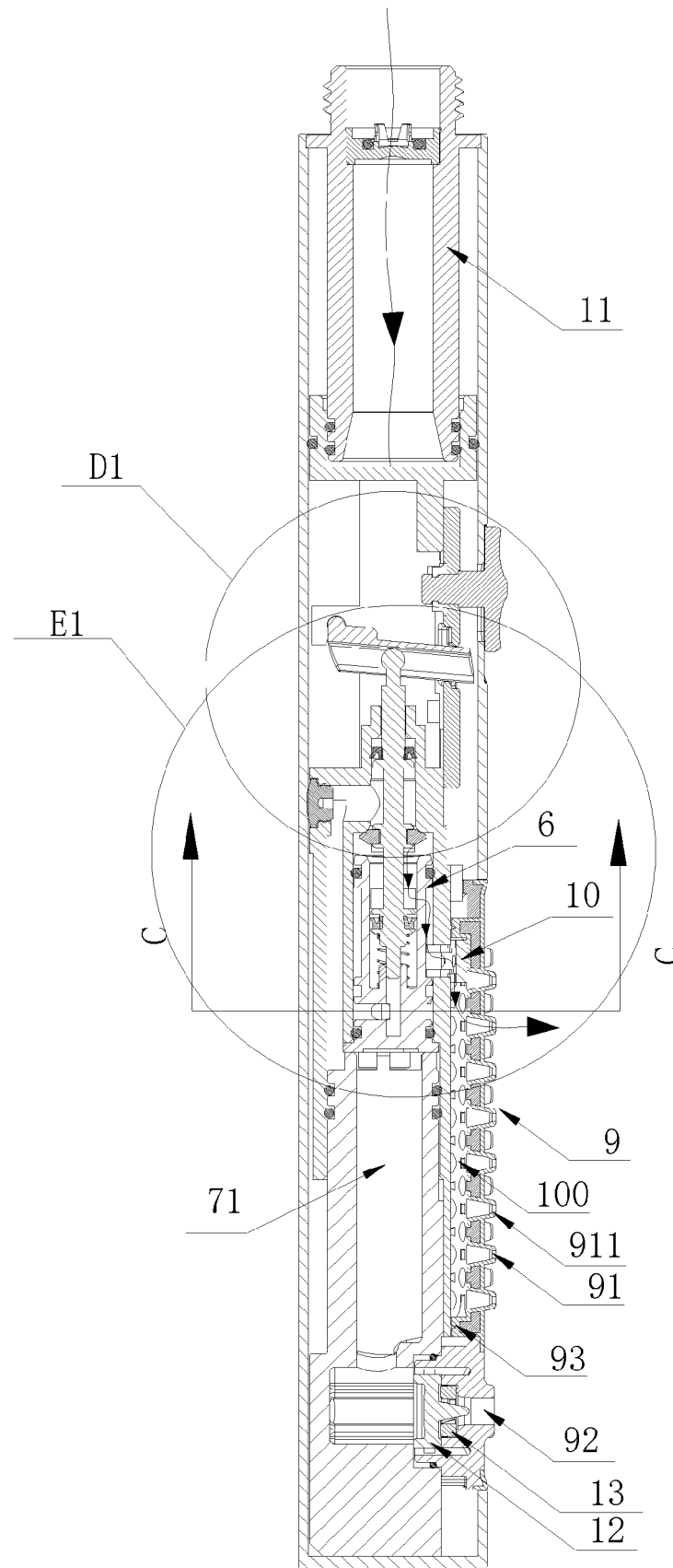


FIG. 8

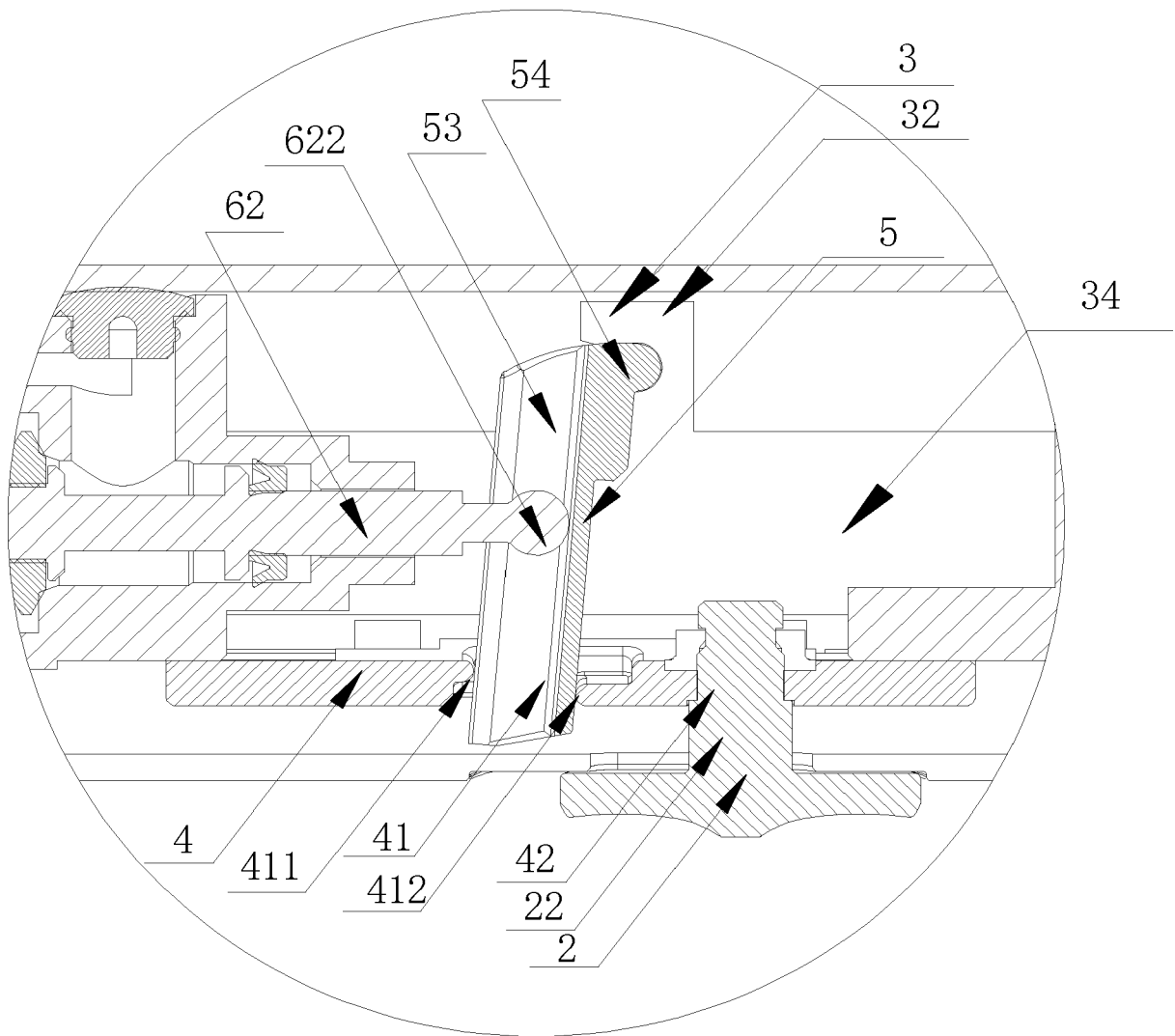


FIG. 9

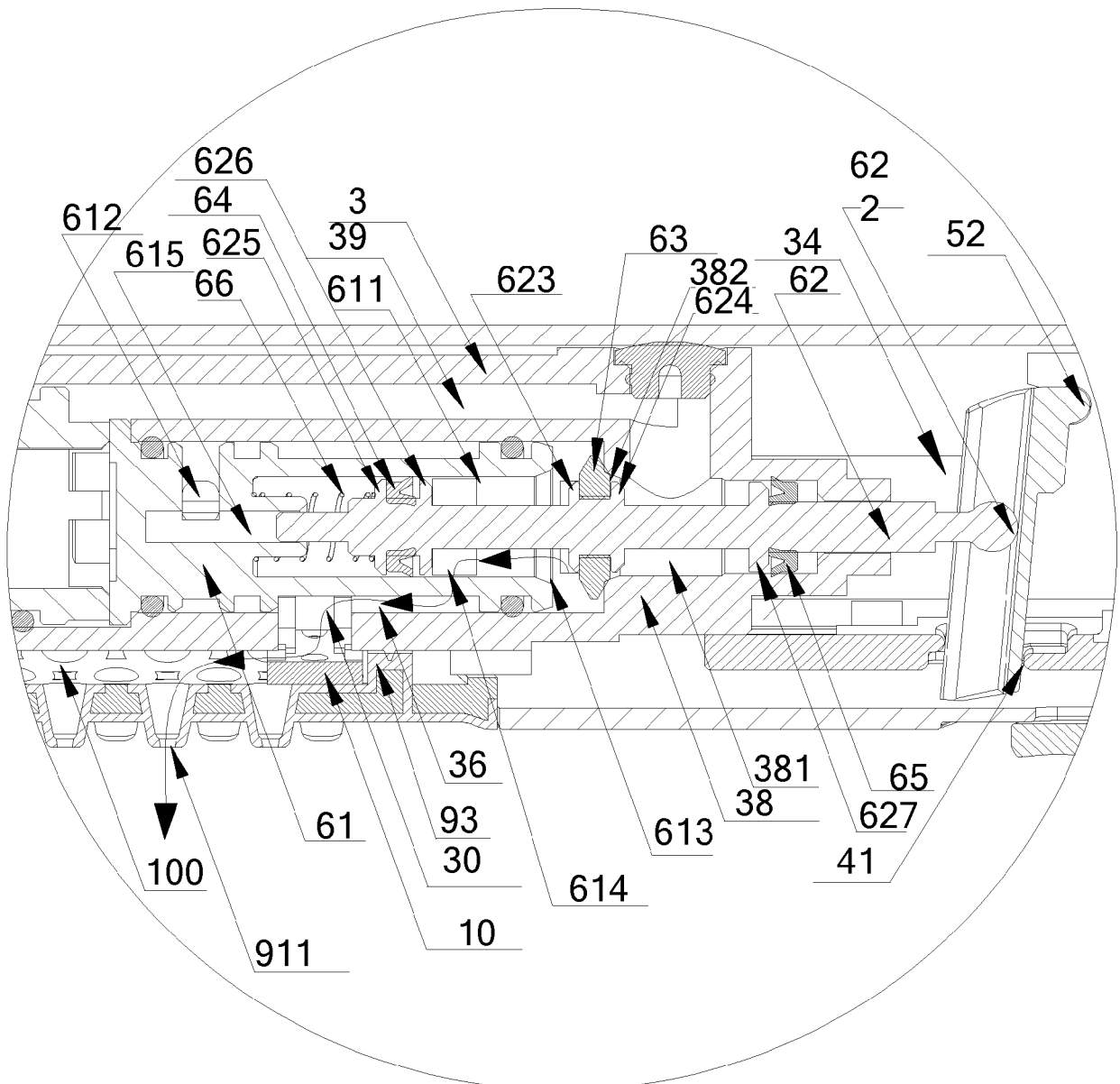


FIG. 10

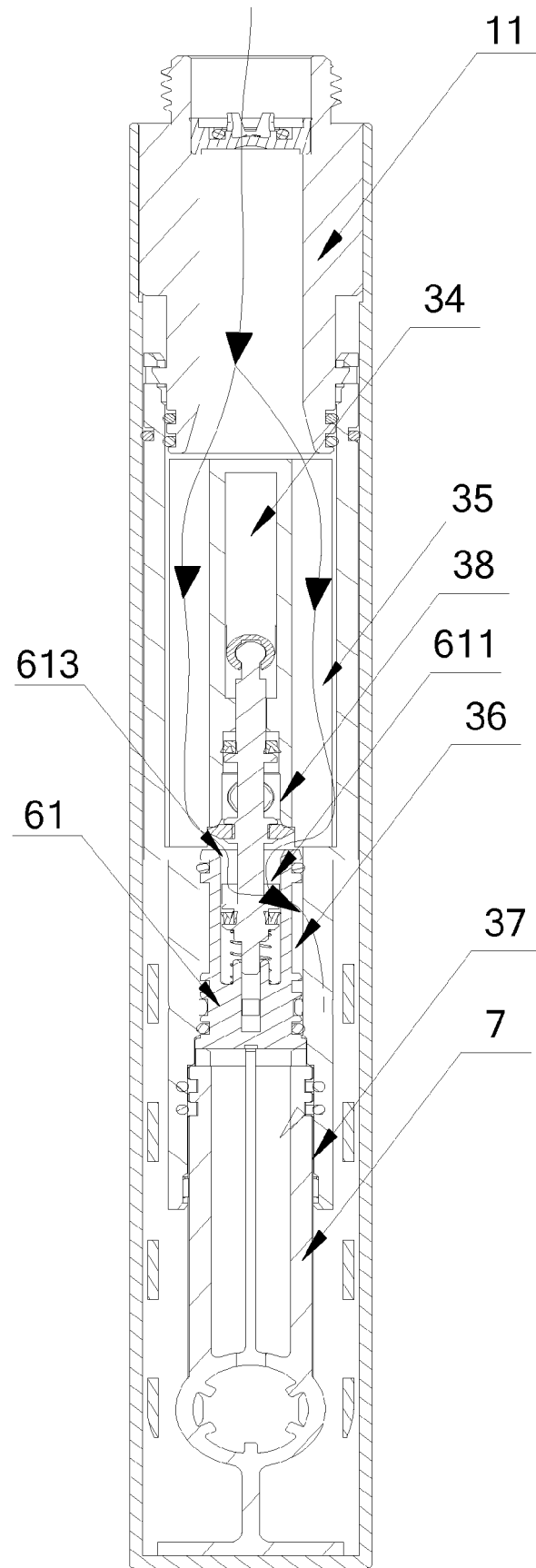


FIG. 11

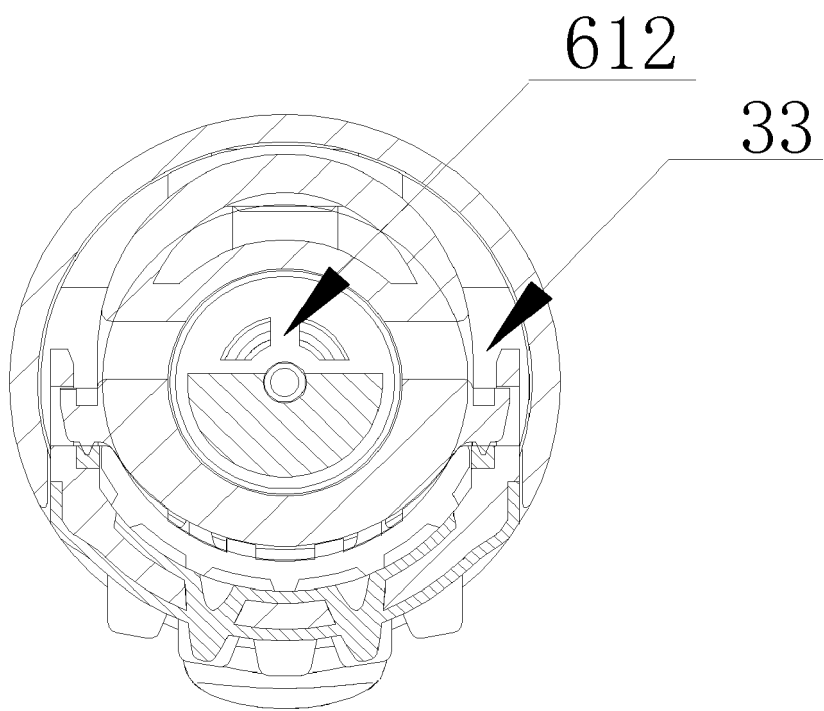


FIG. 12

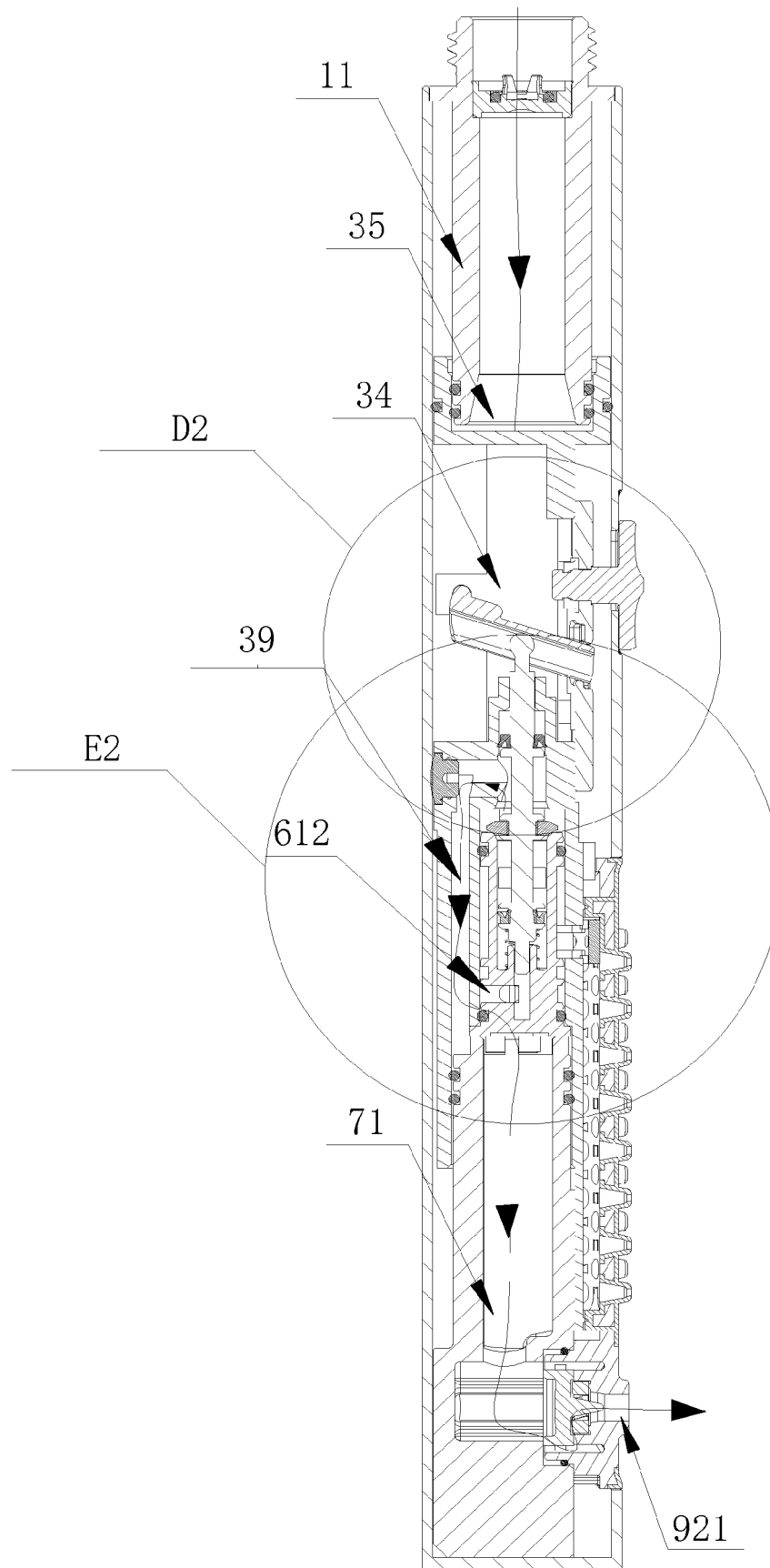


FIG. 13

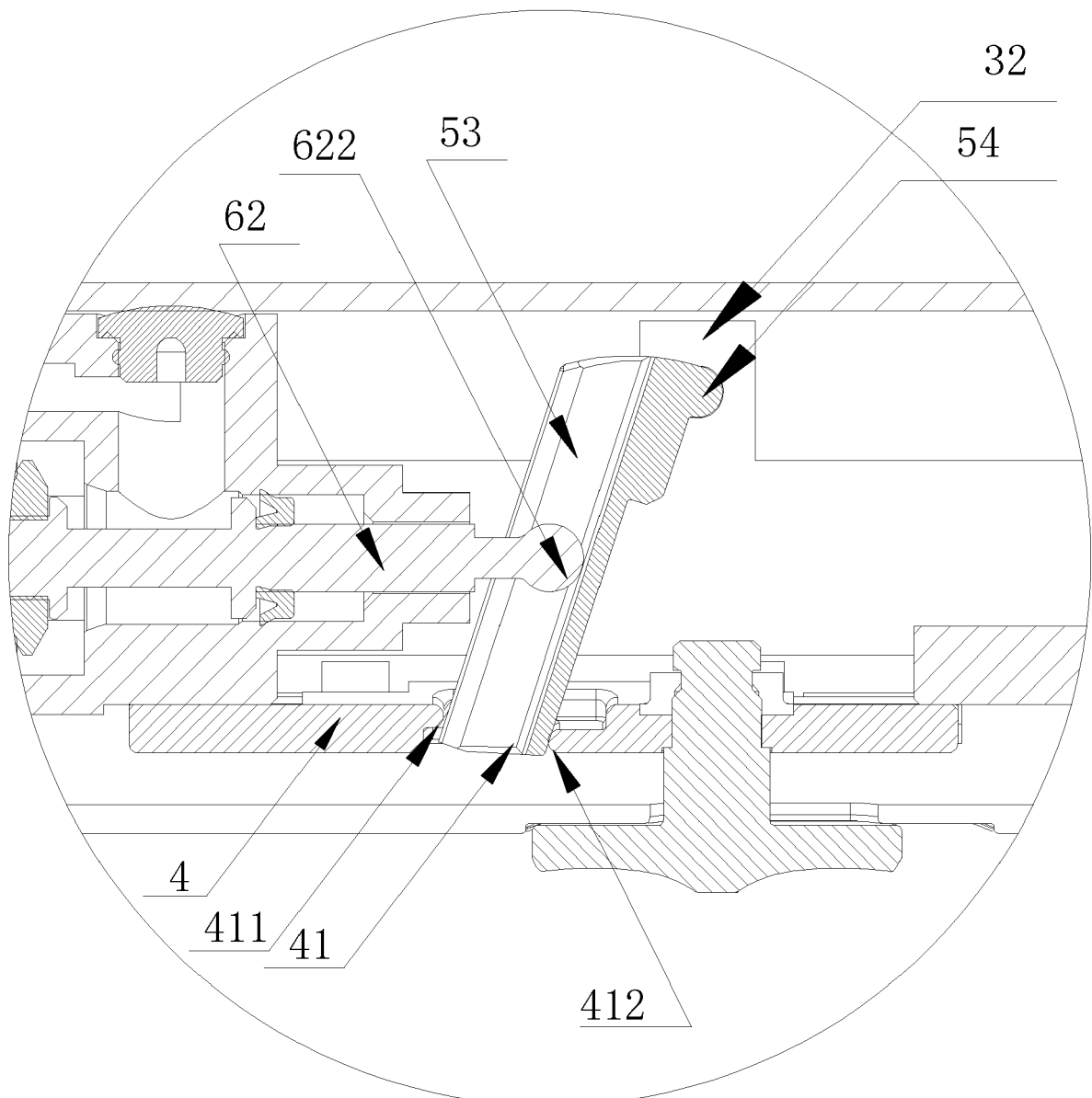


FIG. 14

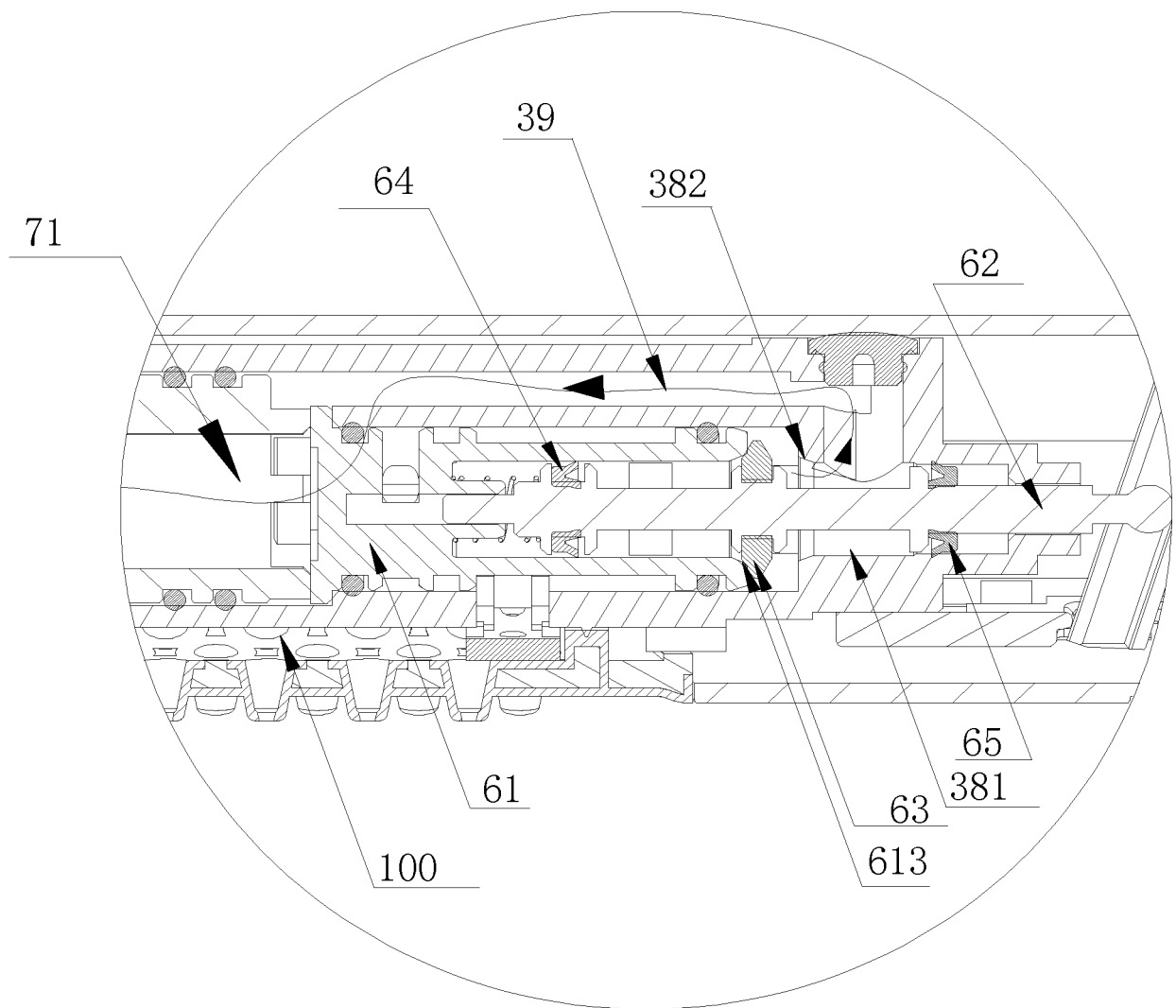


FIG. 15

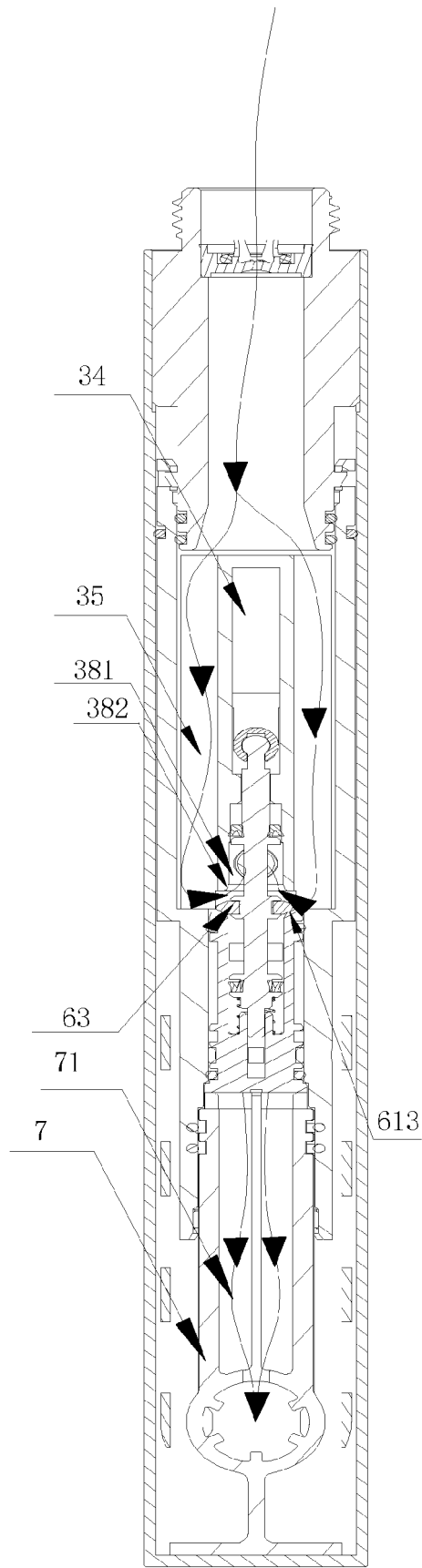


FIG. 16

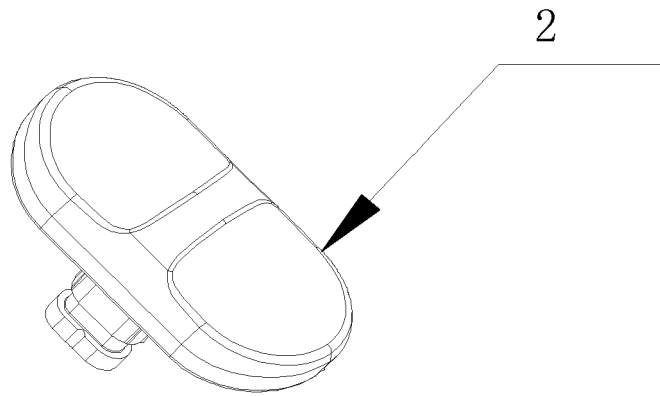


FIG. 17

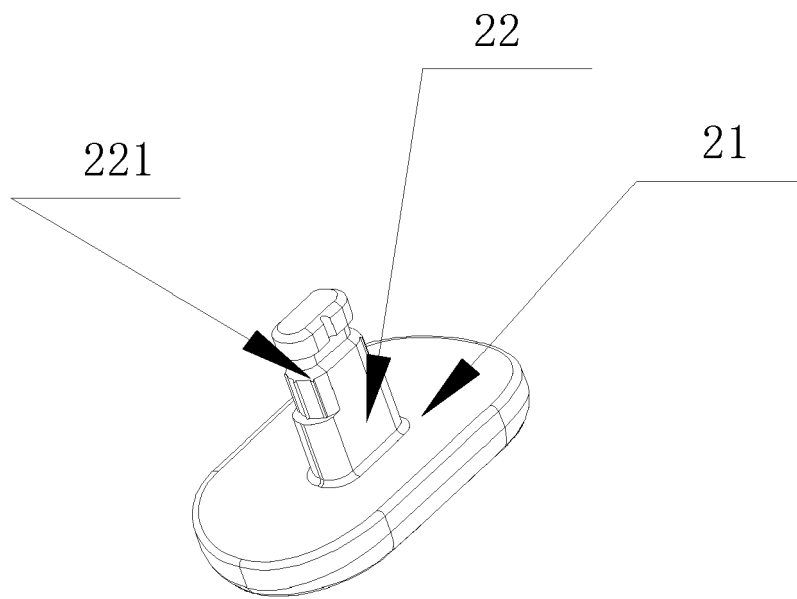


FIG. 18

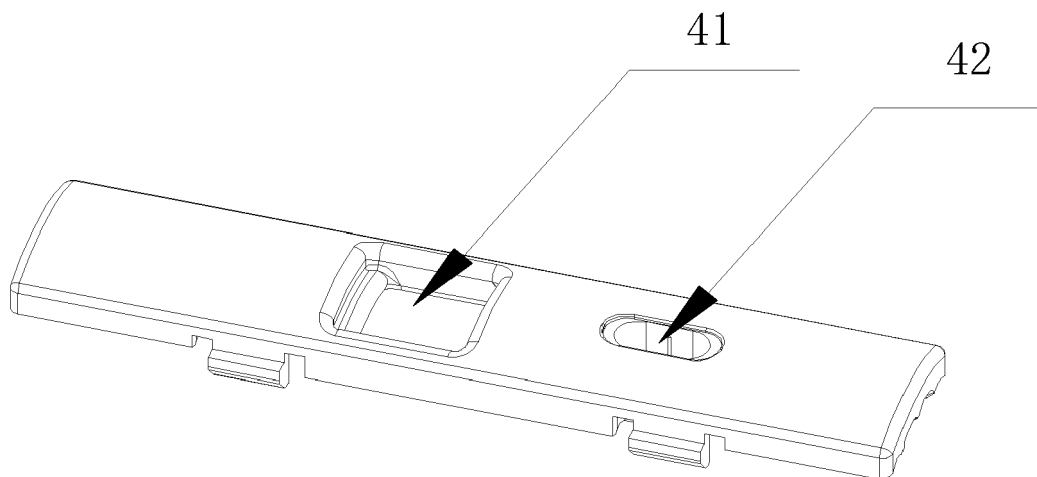


FIG. 19

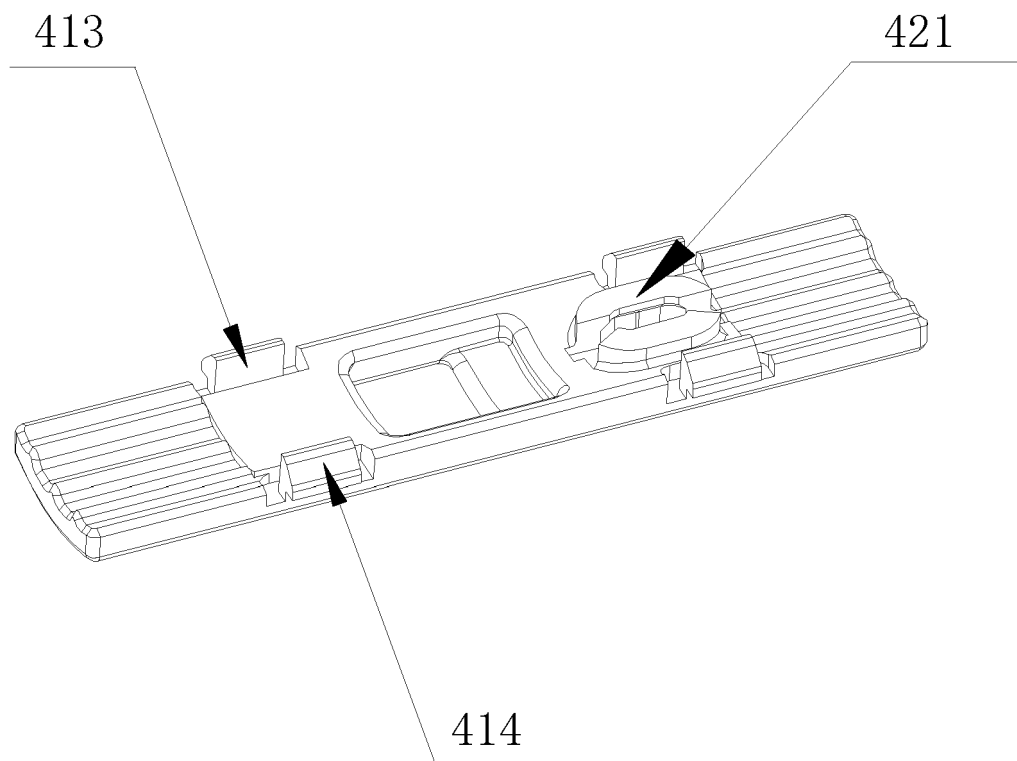


FIG. 20

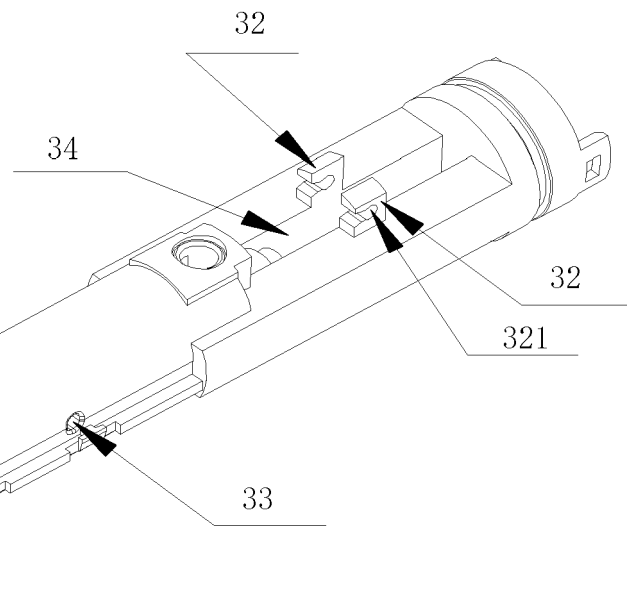
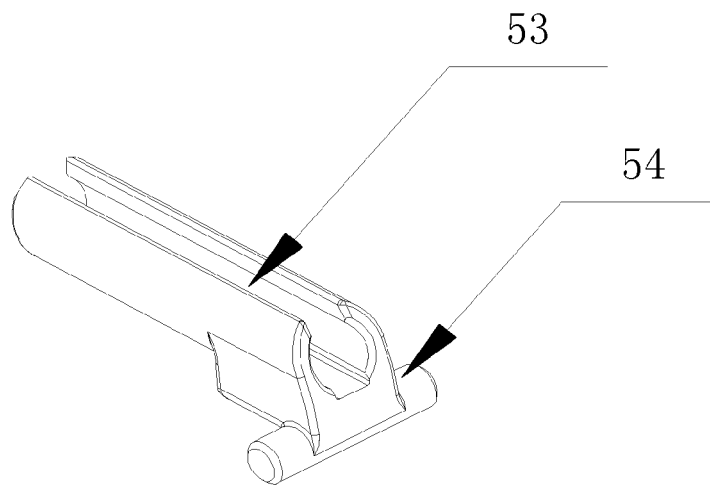
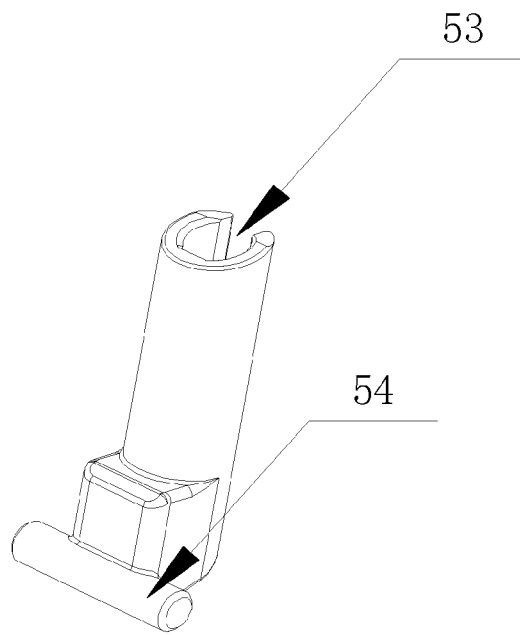
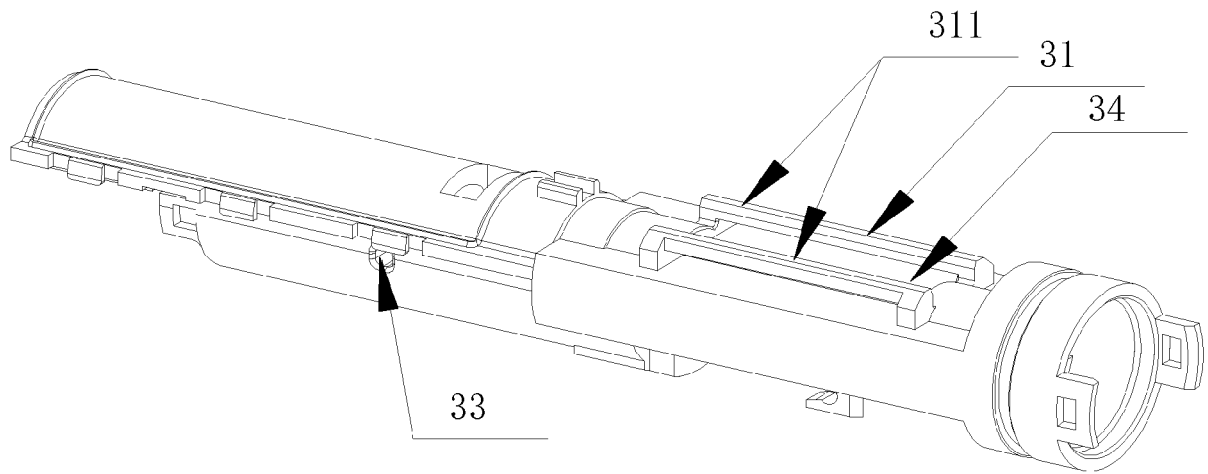


FIG. 21



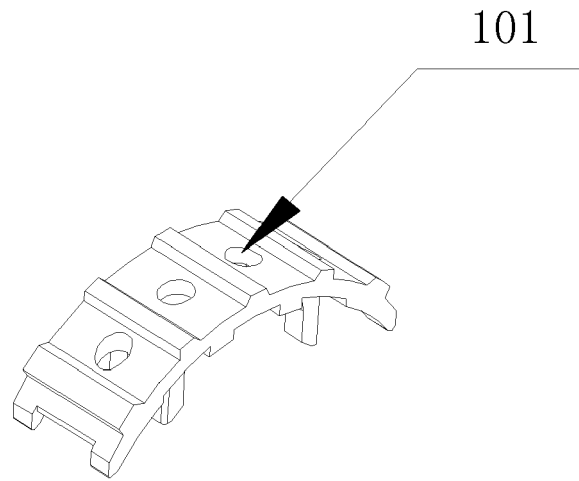


FIG. 25

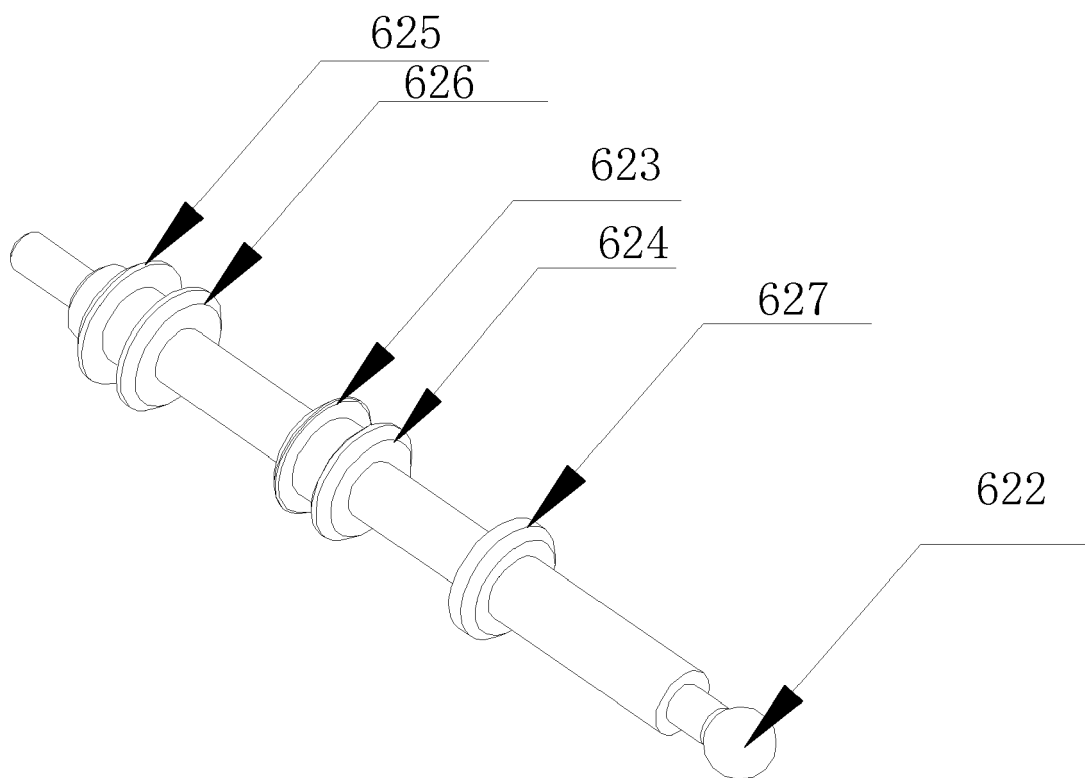


FIG. 26

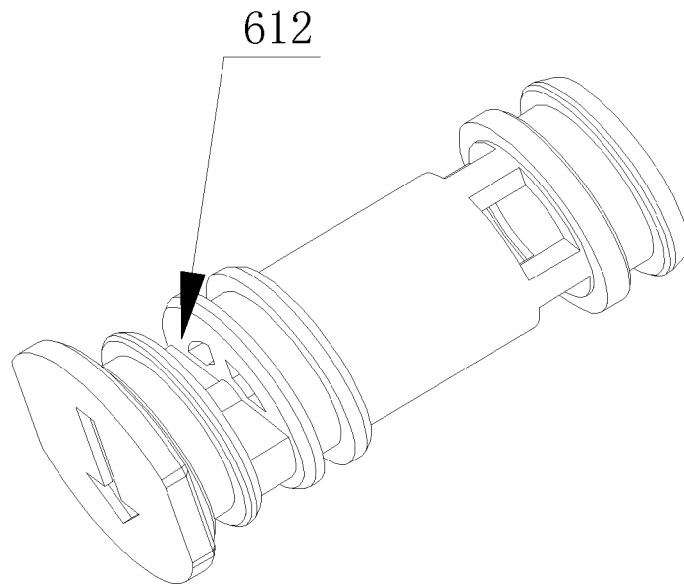


FIG. 27

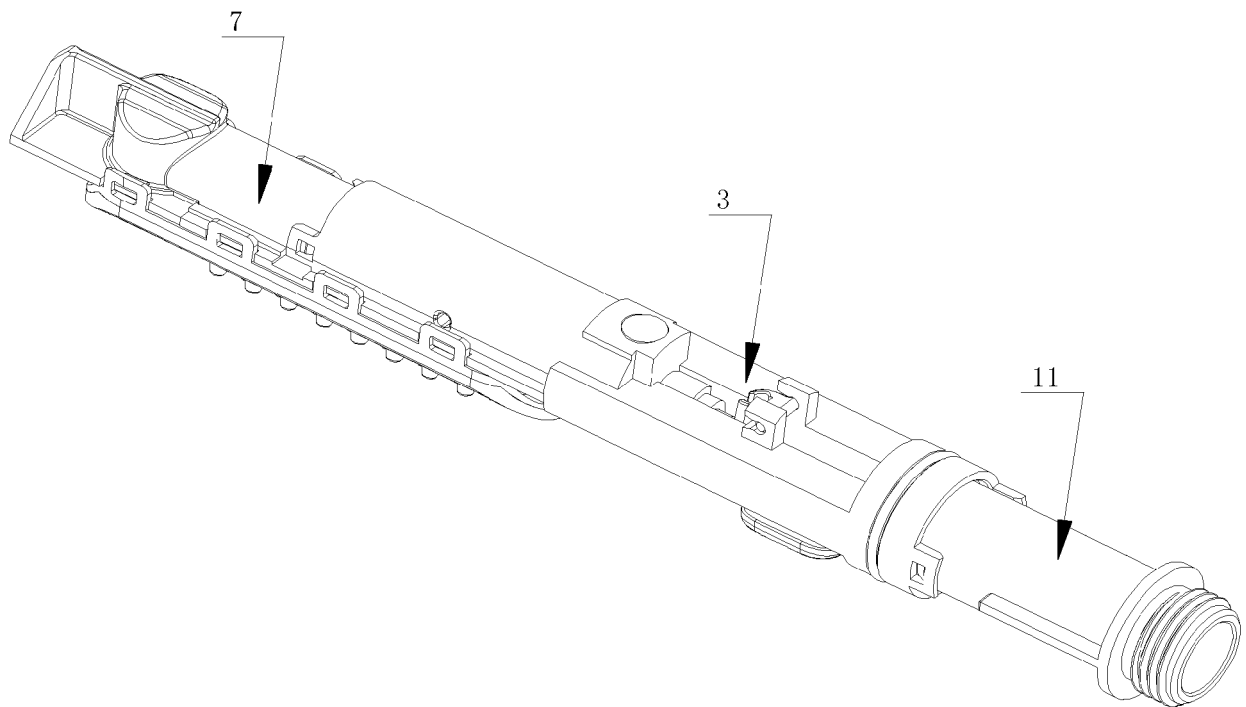


FIG. 28

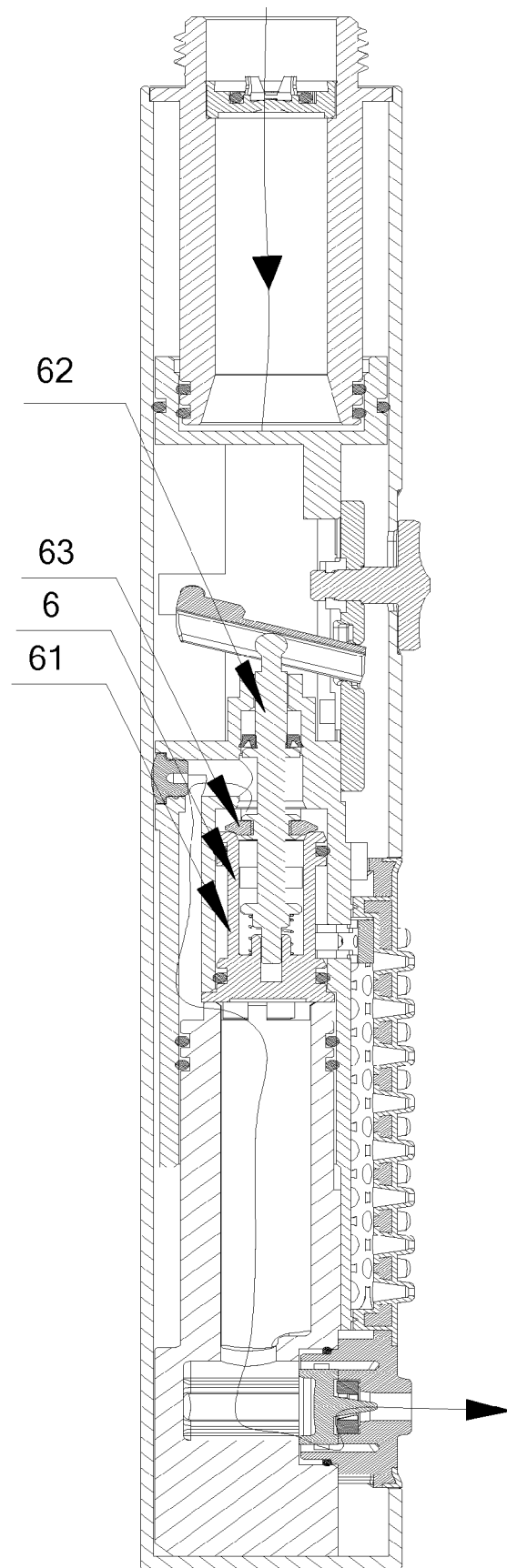


FIG. 29



EUROPEAN SEARCH REPORT

Application Number

EP 23 16 5223

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EPO FORM 1503 03.82 (P04C01)

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			B05B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 September 2023	Examiner Frego, Maria Chiara
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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