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(54) **DETERGENT BOX ASSEMBLY AND WASHING DEVICE**

(57) A detergent box assembly (1) and a washing device are provided. The detergent box assembly includes a housing mechanism (10), a material box mechanism (20), an ejection mechanism (30), and a locking mechanism (41-43). The ejection mechanism (30) is separately coupled to the material box mechanism(20) and the locking mechanism (41-43). The locking mechanism is separately coupled to the housing mechanism and the material box mechanism, and includes a track (41), a track switch (42), and an actuating assembly. The track includes a locking end (411), a releasing end (412), a first part (413), and a second part (414), and the releasing end is configured to limit a maximum ejection displacement of the material box mechanism relative to the housing mechanism. The track switch includes a direction changing portion (421) and a guide portion (422), the guide portion (422) slides along the track, the direction changing portion (421) is configured to adjust a sliding position of the guide portion on the track, and the material box mechanism is in a locked state when the guide portion is located at the locking end. The actuating assembly is coupled to the ejection mechanism, the track switch, and the material box mechanism separately, and is configured to be driven by the ejection mechanism to drive the material box mechanism to move relative to the housing mechanism. The foregoing solution can provide a novel detergent box assembly.

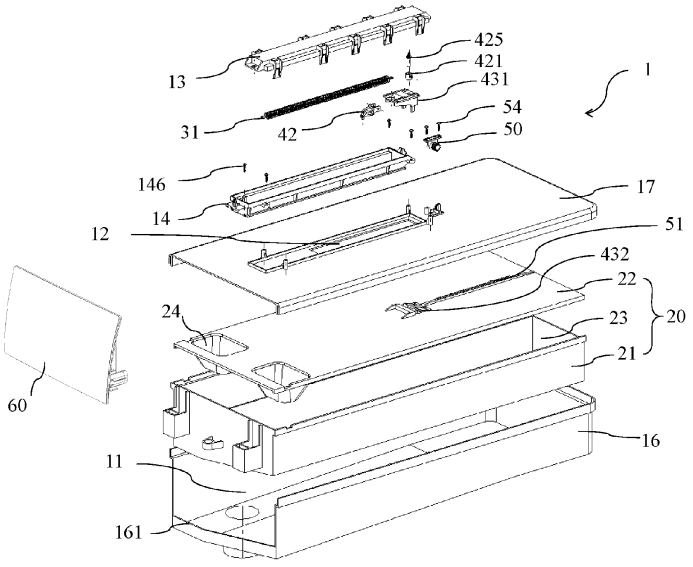


FIG. 2

EP 3 933 093 A1

Description

[0001] Embodiments of the present invention relate to the field of washing equipment, and in particular, to a detergent box assembly and a washing device.

[0002] A detergent box in a washing machine is a part for holding a detergent and is connected to a handle of the detergent box. Generally, a user opens or closes the detergent box by manually pulling or pushing the handle.

[0003] For ease of user operations, currently, some fully automatically or semi-automatically ejection detergent boxes are provided. For example, a locking structure is disposed at the back of the handle or the bottom of the detergent box, and a spring, a coil spring, or the like is used in combination to implement a function of automatically opening the detergent box by pressing the handle. The design is very difficult because of a limited mounting space for the detergent box and a complex mechanism.

[0004] An objective of embodiments of the present invention is to provide a novel detergent box assembly.

[0005] To achieve the foregoing objective, an embodiment of the present invention provides a detergent box assembly, including: a housing mechanism, a material box mechanism, an ejection mechanism, and a locking mechanism, where the housing mechanism is provided with a first accommodation cavity, and the first accommodation cavity is configured to accommodate the material box mechanism; and the ejection mechanism is separately coupled to the material box mechanism and the locking mechanism; the locking mechanism is separately coupled to the housing mechanism and the material box mechanism, and the locking mechanism includes a track, a track switch, and an actuating assembly, where the track includes: a locking end, a releasing end, and a first part and a second part respectively connected to the locking end and the releasing end side-by-side to form a loop; and the releasing end is configured to limit a maximum ejection displacement of the material box mechanism relative to the housing mechanism; the track switch includes a direction changing portion and a guide portion, the guide portion slides along the track, the direction changing portion adjusts a deflection angle of the guide portion in response to a sliding position of the guide portion on the track, and the material box mechanism is in a locked state when the guide portion is located at the locking end; and the actuating assembly is coupled to the ejection mechanism, the track switch, and the material box mechanism separately, and is configured to be driven by the ejection mechanism to drive the material box mechanism to move relative to the housing mechanism.

[0006] Optionally, the actuating assembly includes a sliding member and a block portion, where the sliding member is coupled to the ejection mechanism, and the sliding member includes a push rod; the block portion is disposed at the material box mechanism, and the block portion fits the push rod, and is configured to be pushed by the push rod to drive the material box mechanism to move relative to the housing mechanism, where the housing mechanism is provided with a first opening, and the first opening is used for the push rod to pass through and used for exposing the block portion.

[0007] Optionally, the block portion includes a first block rib and a second block rib that are disposed at an interval, and the push rod is located between the first block rib and the second block rib.

[0008] Optionally, the first block rib and the second block rib are arranged in a push-in direction of the material box mechanism, and the second block rib includes a first slope and a second slope that are disposed opposite to each other, where the first slope faces a pull-out direction of the material box mechanism, the second slope faces the push-in direction of the material box mechanism, and a gradient of the first slope is greater than a gradient of the second slope.

[0009] Optionally, the track switch further includes an elastic abutting portion, where the elastic abutting portion applies pressure to the guide portion toward the track, to improve the reliability and accuracy of the direction changing portion during switching between various parts of the track.

[0010] Optionally, the elastic abutting portion abuts against a side surface, facing the material box mechanism, of the sliding member.

[0011] Optionally, a side surface, facing the material box mechanism, of the sliding member includes a pair of limiting portions, the track switch is located in an accommodation space formed by the pair of limiting portions, and the pair of limiting portions is configured to limit a movement region of the elastic abutting portion relative to the sliding member.

[0012] Optionally, the direction changing portion is connected to the sliding member, and is rotatable about a first rotation axis and a second rotation axis relative to the sliding member, where the first rotation axis is perpendicular to the second rotation axis, to adjust a direction of the track switch.

[0013] Optionally, the housing mechanism further includes a guide rail upper cover and a guide rail lower cover, where the guide rail upper cover is detachably connected to the guide rail lower cover to form a second accommodation cavity, at least a part of the ejection mechanism and the locking mechanism is located in the second accommodation cavity, and the track is disposed at the guide rail lower cover.

[0014] Optionally, a first guide rail is formed after the guide rail lower cover is connected to the guide rail upper cover, and the sliding member is slidably connected to the first guide rail.

[0015] Optionally, the ejection mechanism includes an elastic stretching portion, where one end of the elastic stretching portion is connected to the sliding member, and the other end of the elastic stretching portion is connected to the housing mechanism.

[0016] Optionally, a sliding path of the guide portion on the track is a path for the guide portion to slide from the

locking end along the first part to the releasing end and from the releasing end along the second part to the locking end, where an end, near the locking end, of the second part is provided with a first locking surface, and the first locking surface is configured to limit the guide portion to moving along the second part toward the releasing end, to cause the material box mechanism to enter a locked state; and the releasing end is provided with a second locking surface, and the second locking surface is configured to limit the guide portion to sliding relative to the track, to cause the material box mechanism to be at the maximum ejection displacement relative to the housing mechanism.

[0017] Optionally, a surface of one end, near the locking end, of the second part is sunken, the first locking surface is formed on a side wall of the sunken part, and a surface, near the locking end, of the first part is lower than a surface, near the locking end, of the second part.

[0018] Optionally, the second locking surface is located on a side wall of the releasing end of the track.

[0019] Optionally, the locking end includes a first guide surface, and the first guide surface is configured to guide the guide portion to switch from the second part to the first part, and/or, the releasing end includes a second guide surface, and the second guide surface is configured to guide the guide portion to switch from the first part to the second part. Optionally, a surface of one end, near the releasing end, of the first part is sunken, the second guide surface is formed on a side wall of the sunken part, and a surface, near the releasing end, of the second part is lower than a surface, near the releasing end, of the first part.

[0020] Optionally, the first guide surface is located on a side wall of the locking end of the track.

[0021] Optionally, the detergent box assembly further includes a damping mechanism, where the damping mechanism includes a damper rack and a rotary damper, where the damper rack is connected to the material box mechanism, and is configured to mesh with a gear on the rotary damper; and the rotary damper is connected to the housing mechanism, and the housing mechanism is provided with a third opening used for exposing the damper rack.

[0022] An embodiment of the present invention further provides a washing device, including any one of the above-mentioned detergent box assembly.

[0023] The present invention provides a plurality of new implementations that can implement opening and locking of detergent box assembly in a "push-to-eject" manner, and the structure is relatively simple, to facilitate assembly, so that the detergent box assembly can be ejected and locked smoothly.

[0024] Compared with other disclosed technical solutions, the technical solutions of the present invention have flexible applications, a wide application scope, and easily adjustable technical parameters.

[0025] During unlocking of the detergent box assembly in a closed state, a distance by which a customer pushes a handle of a material box to move backward can be adjusted by changing an angle of a first guide surface or a length of a track. Similarly, a distance by which the detergent box assembly is ejected can be adjusted by adjusting the length of the track.

[0026] In the technical solutions of the present invention, in a process of closing the detergent box assembly again after the detergent box assembly is opened, the customer only needs to push a material box assembly to move by an actual distance by which the material box assembly can be opened to implement locking, thereby simplifying operations of the customer.

[0027] In addition, state switching is implemented by using a height difference between a first part and a second part of the track, which has high stability.

[0028] It may be found that, in the technical solutions of the present invention, unlocking and locking can be implemented by pushing the detergent box assembly. Therefore, there is no impact on the appearance of the handle assembly, and provides more feasibilities for the appearance.

FIG. 1 is a schematic structural diagram of a detergent box assembly according to an embodiment of the present invention;

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

FIG. 3 is a schematic structural diagram of a guide rail lower cover according to an embodiment of the present invention;

FIG. 4 is a partial schematic structural diagram of a guide rail lower cover from a perspective according to an embodiment of the present invention;

FIG. 5 is a partial schematic structural diagram of a guide rail lower cover from another perspective according to an embodiment of the present invention;

FIG. 6 is a top view of a guide rail lower cover according to an embodiment of the present invention;

FIG. 7 is a cross-sectional view of an actuating assembly according to an embodiment of the present invention;

FIG. 8 is a schematic structural diagram of a block portion according to an embodiment of the present invention;

FIG. 9 is a schematic structural diagram of a material box mechanism according to an embodiment of the present invention;

FIG. 10 is a schematic structural diagram of a sliding member according to an embodiment of the present invention;

FIG. 11 is a cross-sectional view of a sliding member according to an embodiment of the present invention;

FIG. 12 is a schematic structural diagram of a track switch according to an embodiment of the present invention;

FIG. 13 is a partial schematic structural diagram of a track switch according to an embodiment of the present invention;

FIG. 14 is a schematic structural diagram of a direction changing portion according to an embodiment of the present invention;

FIG. 15 is a schematic diagram of mounting a track switch and a sliding member according to an embodiment of the present invention;

FIG. 16 is a cross-sectional view of FIG. 15 from a perspective;

FIG. 17 is a cross-sectional view of FIG. 15 from another perspective;

FIG. 18 is a cross-sectional view of FIG. 15 from still another perspective;

FIG. 19 is a partial structural cross-sectional view of a locking mechanism according to an embodiment of the present invention;

FIG. 20 is a cross-sectional view of a detergent box assembly from another perspective according to an embodiment of the present invention;

FIG. 21 is a partial schematic diagram of P in FIG. 20;

FIG. 22 is a partial schematic diagram of Q in FIG. 20;

FIG. 23 is a schematic structural diagram of a guide rail upper cover according to an embodiment of the present invention;

FIG. 24 is a partial schematic structural diagram of a detergent box assembly according to an embodiment of the present invention;

FIG. 25 is a schematic structural diagram of an upper cover plate according to an embodiment of the present invention;

FIG. 26 is a partial schematic structural diagram of an upper cover plate according to an embodiment of the present invention;

FIG. 27 is a schematic diagram of a sliding path of a track switch in a track according to an embodiment of the present invention;

FIG. 28 is a schematic diagram of relative positions of a track switch and a track when a material box mechanism is locked according to an embodiment of the present invention;

FIG. 29 is a schematic diagram of relative positions of a track switch and a track when a material box mechanism is unlocked according to an embodiment of the present invention;

FIG. 30 is a schematic diagram of relative positions of a track switch and a track when a material box mechanism is ejected according to an embodiment of the present invention;

FIG. 31 is a schematic diagram of relative positions of a track switch and a track when a material box mechanism is in an open state according to an embodiment of the present invention;

FIG. 32 is a partial structural cross-sectional view of a detergent box assembly from another perspective according to an embodiment of the present invention; and

FIG. 33 is a schematic diagram of switching of a track switch on a track according to an embodiment of the present invention.

[0029] To make the objectives, features and beneficial effects of the embodiments of the present invention more comprehensible, specific embodiments of the present invention are further described in detail below with reference to the accompanying drawings.

[0030] FIG. 1 is a schematic structural diagram of a detergent box assembly according to an embodiment of the present invention. FIG. 2 is an exploded view of FIG. 1. FIG. 3 is a schematic structural diagram of a guide rail lower cover according to an embodiment of the present invention. FIG. 4 is a partial schematic structural diagram of a guide rail lower cover from a perspective according to an embodiment of the present invention. FIG. 5 is a partial schematic structural diagram of a guide rail lower cover from another perspective according to an embodiment of the present invention. FIG. 6 is a top view of a guide rail lower cover according to an embodiment of the present invention. The following describes the structure of the detergent box assembly with reference to FIG. 1 to FIG. 6.

[0031] During specific implementation, the detergent box assembly 1 may include a housing mechanism 10, a material box mechanism 20, an ejection mechanism 30, and a locking mechanism.

[0032] The housing mechanism 10 is provided with a first accommodation cavity 11, and the first accommo-

dation cavity 11 may accommodate the material box mechanism 20. That is, the material box mechanism 20 may be placed in the first accommodation cavity 11 of the housing mechanism 10.

[0033] The ejection mechanism 30 is separately coupled to the material box mechanism 20 and the locking mechanism.

[0034] The locking mechanism is separately coupled to the housing mechanism 10 and the material box mechanism 20. The locking mechanism may include a track 41, a track switch 42, and an actuating assembly 43.

[0035] The track 41 may include a locking end 411, a releasing end 412, a first part 413, and a second part 414. Each of the first part 413 and the second part 414 has two sides respectively connected to the locking end 411 and the releasing end 412, so that the locking end 411, the releasing end 412, the first part 413, and the second part 414 form a loop. The releasing end 412 may limit a maximum ejection displacement of the material box mechanism 20 relative to the housing mechanism 10, and the locking end 411 may limit the material box mechanism 20 to moving relative to the housing mechanism 10, to cause the material box mechanism 20 to enter a locked state.

[0036] The track switch 42 may include a direction changing portion 421 and a guide portion 422. The guide portion 422 is slidable along the track 41. The direction changing portion 421 may adjust a sliding position of the guide portion 422 on the track 41, and the material box mechanism 20 is in the locked state when the guide portion 422 is located at the locking end 411.

[0037] The actuating assembly 43 is coupled to the ejection mechanism 30, the track switch 42, and the material box mechanism 20 separately. The actuating assembly 43 may be driven by the ejection mechanism 30 to drive the material box mechanism 20 to move relative to the housing mechanism 10.

[0038] As known from the above, the locking mechanism in the detergent box assembly 1 is separately coupled to the housing mechanism 10 and the material box mechanism 20, and the locking mechanism includes the track 41, the track switch 42, and the actuating assembly 43. The actuating assembly 43 is coupled to the track switch 42, and the actuating assembly 43 may be driven by the ejection mechanism 30 to drive the material box mechanism 20 to move relative to the housing mechanism 10. The track switch 42 includes the guide portion 422 and the direction changing portion 421. The direction changing portion 421 may adjust the sliding position of the guide portion 422 on the track 41, so that switching of the guide portion 422 between the locking end 411 and the releasing end 412 of the track 41 along the loop through the first part 413 or the second part 414 may be adjusted by using the direction changing portion 421, and the travel of the guide portion 422 between the locking end 411 and the releasing end 412 is an actual movement distance of the detergent box assembly 1 relative to the housing mechanism 10. Therefore, extra operations of a user during opening or closing of the detergent box assembly 1 can be reduced.

[0039] During specific implementation, to improve orderly sliding of the guide portion 422 of the track switch 42 between various parts of the track 41, the track 41 may further include an isolation portion 419. The isolation portion 419 is configured to isolate the first part 413 from the second part 414, so that when the guide portion 422 moves in the track 41, the guide portion 422 can only switch between the first part 413 and the second part 414 at the releasing end 412 or the locking end 411, thereby ensuring orderly sliding of the track switch 42 in the track 41.

[0040] During specific implementation, FIG. 7 is a cross-sectional view of an actuating assembly according to an embodiment of the present invention. FIG. 8 is a schematic structural diagram of a block portion according to an embodiment of the present invention. FIG. 9 is a schematic structural diagram of a material box mechanism according to an embodiment of the present invention. FIG. 10 is a schematic structural diagram of a sliding member according to an embodiment of the present invention. FIG. 11 is a cross-sectional view of a sliding member according to an embodiment of the present invention. The following describes the structure of the actuating assembly with reference to FIG. 2 and FIG. 7 to FIG. 11.

[0041] During specific implementation, the actuating assembly 43 may include a sliding member 431 and a block portion 432. The sliding member 431 may be coupled to the ejection mechanism 30, and the sliding member 431 includes a push rod 4311. The block portion 432 may be disposed at the material box mechanism 20, the block portion 432 fits the push rod 4311, and the block portion 432 drives the material box mechanism 20 to move relative to the housing mechanism 10.

[0042] During specific implementation, the housing mechanism 10 may be provided with a first opening 12, and the first opening 12 is used for the push rod 4311 to pass through and used for exposing the block portion 432, so that the push rod 4311 may fit the block portion 432.

[0043] In the embodiments of the present invention, the block portion 432 may be integrally formed on the material box mechanism 20. For example, the block portion 432 may be integrally formed on a part, facing the housing mechanism 10, of a top portion of the material box mechanism 20. In the embodiments of the present invention, the block portion 432 may be alternatively connected to the part, facing the housing mechanism 10, of the top portion of the material box mechanism 20 by a buckle or a fastener.

[0044] During specific implementation, the block portion 432 may include a first block rib 4321 and a second block rib 4322 that are disposed at an interval, and the push rod 4311 is located between the first block rib 4321 and the second block rib 4322.

[0045] In some embodiments of the present invention,

the first block rib 4321 and the second block rib 4322 are arranged in a push-in direction of the material box mechanism 20. The second block rib 4322 includes a first slope 4323 and a second slope 4324 that are disposed opposite to each other. The first slope 4323 faces a pull-out direction of the material box mechanism 20, that is, the first slope 4323 faces the first block rib 4321, the second slope 4324 faces the push-in direction of the material box mechanism 20, and a gradient of the first slope 4323 is greater than a gradient of the second slope 4324. The gradient of the first slope 4323 is greater than the gradient of the second slope 4324. During the mounting of the block portion 432, it easy for the push rod 4311 to cross the second slope 4324 to be mounted between the first block rib 4321 and the second block rib 4322. In addition, the gradient of the first slope 4323 is relatively large, so that the push rod 4311 can be limited from crossing the first slope 4323 when the material box mechanism 20 is pushed in or pulled out.

[0046] When the material box mechanism 20 is pushed in the housing mechanism 10 in the push-in direction, that is, the material box mechanism 20 is closed, a pushing force is transferred to the push rod 4311 through the first block rib 4321. In this case, the first block rib 4321 pushes the push rod 4311.

[0047] When the material box mechanism 20 is pulled out relative to the housing mechanism 10 in the pull-out direction, that is, the material box mechanism 20 is opened, the push rod 4311 pushes the first block rib 4321. During the opening and closing of the material box mechanism 20, to prevent the push rod 4311 from crossing the first block rib 4321 and the second block rib 4322, a gradient of a side surface, facing the second block rib 4322, of the first block rib 4321 is relatively large. For example, the side surface, facing the second block rib 4322, of the first block rib 4321 may be a vertical side surface, that is, may be perpendicular to the material box mechanism 20.

[0048] FIG. 12 is a schematic structural diagram of a track switch according to an embodiment of the present invention. FIG. 13 is a partial schematic structural diagram of a track switch according to an embodiment of the present invention. FIG. 14 is a schematic diagram of a direction changing portion according to an embodiment of the present invention. FIG. 15 is a schematic diagram of mounting a track switch and a sliding member according to an embodiment of the present invention. FIG. 16 is a cross-sectional view of FIG. 15 from a perspective. FIG. 17 is a cross-sectional view of FIG. 15 from another perspective. FIG. 18 is a cross-sectional view of FIG. 15 from still another perspective. FIG. 19 is a partial structural cross-sectional view of a locking mechanism according to an embodiment of the present invention. FIG. 20 is a cross-sectional view of a detergent box assembly from another perspective according to an embodiment of the present invention. The following describes the structure of the track switch and the locking mechanism with reference to FIG. 2 and FIG. 7 to FIG. 20.

[0049] During specific implementation, the track switch 42 may further include an elastic abutting portion 423. The elastic abutting portion 423 applies pressure to the guide portion 422 toward the track 41.

[0050] In some embodiments of the present invention, referring to FIG. 17, the elastic abutting portion 423 abuts against a side surface 4317, facing the material box mechanism 20, of the sliding member 431.

[0051] During specific implementation, the side surface 4317, facing the material box mechanism 20, of the sliding member 431 is provided with a pair of third limiting portions 4312, the track switch 42 is located in an accommodation space formed by the pair of third limiting portions 4312, and the pair of third limiting portions 4312 may limit a movement region of the elastic abutting portion 423 relative to the sliding member 431. The elastic abutting portion 423 is slidable in the accommodation space formed by the third limiting portions 4312.

[0052] When the track switch 42 moves relative to the track 41, a top end of the elastic abutting portion 423 remains in contact with the side surface 4317, facing the material box mechanism 20, of the sliding member 431, and moves in the accommodation space formed by the pair of third limiting portions 4312. The elastic abutting portion 423 is subject to pressure from the side surface 4317, facing the material box mechanism 20, of the sliding member 431, to cause a bottom end of the guide portion 422 to move in a manner of being always tightly attached to a surface of the track 41, to ensure the reliability and accuracy of switching of the guide portion 422 between the first part 413 and the second part 414 of the track 41.

[0053] During specific implementation, referring to FIG. 15 to FIG. 18, the direction changing portion 421 is connected to the sliding member 431, and is rotatable about a first rotation axis A and a second rotation axis B relative to the sliding member 431, where the first rotation axis A is perpendicular to the second rotation axis B.

[0054] In some embodiments of the present invention, the first rotation axis A may be in a vertical direction, and the second rotation axis B may be in a horizontal direction.

[0055] During actual application, under the impact of various factors such as a requirement of an actual application scenario and an actual shape of the direction changing portion 421, the actual shape and structure of the direction changing portion 421 may alternatively have various different cases provided that a condition that the first rotation axis A is perpendicular to the second rotation axis B is met, or the first rotation axis A is not perpendicular to the second rotation axis B, provided that the direction changing portion 421 can adjust a moving direction of the track switch in a plurality of directions.

[0056] For example, referring to FIG. 14, the direction changing portion 421 is approximately in a shape of a hollow cylinder, and an axial direction of the hollow cylinder is a direction of the first rotation axis A. A radial direction of the hollow cylinder is a direction of the second

rotation axis B. A connecting portion 4213 is formed in a direction of an outer surface in the radial direction of the hollow cylinder, and the connecting portion 4213 forms the second rotation axis B. A rotating positioning pin 425 inserted into a hollow part 4214 of the hollow cylinder may be used as the first rotation axis A, and the direction changing portion 421 is rotatable about the rotating positioning pin 425. A first connecting hole 4313 may be provided in the sliding member 431, and the rotating positioning pin 425 may pass through the first connecting hole 4313 to connect the direction changing portion 421 to the sliding member 431 through fitting of the rotating positioning pin 425 and the first connecting hole 4313.

[0057] A second connecting hole 424 is provided in the track switch 42 and is configured to connect to the direction changing portion 421. Specifically, the second connecting hole 424 provided in the track switch 42 fits the connecting portion 4213 on the direction changing portion 421, to connect the direction changing portion 421 to the track switch 42.

[0058] In another example, the direction changing portion 421 is approximately in a shape of a pillar, a connecting shaft is extended in an axial direction from each of two ends of the direction changing portion 421, and the connecting shaft is used as the first rotation axis A. A connecting hole is provided in the sliding member 431, and the connecting hole fits the connecting shaft, to implement connection of the direction changing portion 421 and the sliding member 431. A connecting portion is formed in a direction of an outer surface in the radial direction of the direction changing portion 421, and the connecting portion forms the second rotation axis B.

[0059] During actual application, the direction changing portion 421 may be alternatively in another structural shape, for example, a regular shape such as a cube or an irregular shape, provided that the direction changing portion is rotatable about the first rotation axis and the second rotation axis and the first rotation axis is perpendicular to the second rotation axis.

[0060] FIG. 23 is a schematic structural diagram of a guide rail upper cover according to an embodiment of the present invention. FIG. 24 is a partial schematic structural diagram of a detergent box assembly according to an embodiment of the present invention. The following describes the structure of the housing mechanism 10 with reference to FIG. 2, FIG. 3, FIG. 6, FIG. 20, FIG. 23, and FIG. 24.

[0061] During specific implementation, the housing mechanism 10 may further include a guide rail upper cover 13 and a guide rail lower cover 14. The guide rail upper cover 13 is detachably connected to the guide rail lower cover 14 to form a second accommodation cavity 15, at least a part of the ejection mechanism 30 and the locking mechanism is located in the second accommodation cavity 15, and the track 41 is disposed at the guide rail lower cover 14.

[0062] In the embodiments of the present invention, the guide rail lower cover 14 may be provided with a second opening 141, and the second opening 141 is used for the push rod 4311 to pass through, so that the push rod 4311 can fit the block portion 432.

[0063] During specific implementation, a first guide rail is formed after the guide rail lower cover 14 is connected to the guide rail upper cover 13, and the sliding member 431 is slidably connected to the first guide rail.

[0064] The first guide rail includes two parts, that is, a first guide rail upper portion 135 located on the guide rail upper cover 13 and a first guide rail lower portion 147 located on the guide rail lower cover 14. A part of the structure of the sliding member 431 is located between the first guide rail upper portion 135 and the first guide rail lower portion 147.

[0065] During specific implementation, the sliding member 431 may be provided with a pair of connection platforms 4314. The connection platforms 4314 are connected to the first guide rail. When the sliding member 431 moves relative to the housing mechanism 10, the connection platforms 4314 may move along the first guide rail.

[0066] In the embodiments of the present invention, a protruding portion 4315 is disposed on the connection platform 4314. The protruding portion 4315 is in contact with the first guide rail. Specifically, at least one side surface of a side surface, facing the guide rail upper cover 13, of the connection platform 4314 and a side surface, facing the guide rail lower cover 14, of the connection platform is provided with the protruding portion 4315.

[0067] The protruding portion 4315 on the side surface, facing the guide rail upper cover 13, of the connection platform 4314 may move along the first guide rail upper portion 135.

[0068] The protruding portion 4315 on the side surface, facing the guide rail lower cover 14, of the connection platform 4314 may move along the first guide rail lower portion 147.

[0069] The protruding portion 4315 disposed on the side surface, facing the guide rail upper cover 13, of the connection platform 4314 and the protruding portion 4315 disposed on the side surface, facing the guide rail lower cover 14, of the connection platform 4314 can reduce friction when the sliding member 431 moves relative to the housing mechanism 10, thereby improving smoothness of the movement of the sliding member 431 relative to the housing mechanism 10.

[0070] In the embodiments of the present invention, the protruding portion 4315 may be further disposed on a side wall of the connection platform 4314, and the protruding portion 4315 on the side wall of the connection platform 4314 may limit a position of the sliding member 431, to prevent the sliding member 431 from shaking during sliding in the second accommodation cavity 15 relative to the housing mechanism 10, thereby improving the stability of the sliding member 431 during sliding relative to the housing mechanism 10.

[0071] FIG. 22 is a partial schematic diagram of Q in FIG. 20. In the embodiments of the present invention,

the guide rail upper cover 13 includes a first bending portion 131, and the first bending portion 131 extends toward the guide rail lower cover 14 to form a pair of first limiting walls 132. The guide rail upper cover 14 includes a second bending portion 142, and the second bending portion 142 extends toward the guide rail lower cover 13 to form a pair of second limiting walls 143. The first guide rail is formed after the first limiting wall 132 and the second limiting wall 143 fit and are connected. The pair of second limiting walls 143 may be located inside the pair of first limiting walls 132, or may be located outside the pair of third limiting portions 4312. FIG. 22 exemplarily shows that the pair of second limiting walls 143 may be located inside the pair of first limiting walls 132.

[0072] In another embodiment of the present invention, the first bending portion 131 may further extend toward the guide rail lower cover 14 to form a pair of third limiting walls 133, the third limiting walls 133 are located inside the first limiting wall 132, the first limiting wall 132 and the third limiting wall 133 form a limiting groove, and the second limiting wall 143 is located in the limiting groove, to improve the stability of connection between the guide rail upper cover 13 and the guide rail lower cover 14, thereby preventing the guide rail upper cover 13 and the guide rail lower cover 14 from shaking relative to each other when the sliding member 431 slides on the first guide rail.

[0073] In still another embodiment of the present invention, the first bending portion 131 extends toward the guide rail lower cover 14 to form a pair of third limiting walls 133, the third limiting wall 133 is located outside the first limiting wall 132, the first limiting wall 132 and the third limiting wall 133 form a limiting groove, and the second limiting wall 143 is located in the limiting groove.

[0074] In an embodiment of the present invention, the protruding portion 4315 disposed on the side surface of the connection platform 4314 of the sliding member 431 faces or abuts against the second limiting wall 143.

[0075] In another embodiment of the present invention, the protruding portion 4315 disposed on the side surface of the connection platform 4314 of the sliding member 431 faces or abuts against the third limiting wall 133.

[0076] During specific implementation, to improve the reliability of connection between the guide rail upper cover 13 and the guide rail lower cover 14, referring to FIG. 23, a buckle 134 may be disposed on the guide rail upper cover 13, and a clamping portion fitting the buckle 134 is disposed at the guide rail lower cover 14.

[0077] During specific implementation, referring to FIG. 23 and FIG. 24, a first limiting hole 138 is provided in one of the guide rail upper cover 13 and the guide rail lower cover 14, and a first limiting portion 148 is disposed at the other of the guide rail upper cover 13 and the guide rail lower cover 14. The first limiting portion 148 passes through the first limiting hole 138 to limit relative positions of the guide rail upper cover 13 and the guide rail lower cover 14, to prevent the guide rail upper cover 13 and the guide rail lower cover 14 to moving relative to each other.

[0078] During specific implementation, a second limiting hole 139 is provided in one of the guide rail upper cover 13 and the guide rail lower cover 14, and a second limiting portion 149 is disposed at the other of the guide rail upper cover 13 and the guide rail lower cover 14. The second limiting portion 149 passes through the second limiting hole 139 to limit relative positions of the guide rail upper cover 13 and the guide rail lower cover 14, to prevent the guide rail upper cover 13 and the guide rail lower cover 14 to moving relative to each other.

[0079] FIG. 21 is a partial schematic diagram of P in FIG. 20. FIG. 25 is a schematic structural diagram of an upper cover plate according to an embodiment of the present invention. FIG. 26 is a partial schematic structural diagram of an upper cover plate according to an embodiment of the present invention. The following describes the structure of the housing mechanism 10 with reference to FIG. 2, FIG. 20, FIG. 21, FIG. 25, and FIG. 26.

[0080] During specific implementation, the housing mechanism 10 may further include a lower housing 16 and an upper cover plate 17 detachably connected to the lower housing 16. One end of the lower housing 16 is provided with an opening 161, and the opening 161 is configured to provide an exit and entrance of the material box mechanism 20.

[0081] During specific implementation, a second guide rail is formed after the upper cover plate 17 is connected to the lower housing 16, and the material box mechanism 20 moves along the second guide rail relative to the housing mechanism 10.

[0082] Specifically, referring to FIG. 21, the upper cover plate 17 extends toward the lower housing 16 to form a pair of fourth limiting walls 171, the lower housing 16 includes a third bending portion 162, a part in the vertical direction of the third bending portion 162 forms a fifth limiting wall 163, and the fifth limiting wall 163 fits the fourth limiting wall 171, to make the lower housing 16 cover the upper cover plate 17.

[0083] The fifth limiting wall 163 may be located inside the fourth limiting wall 171, or may be located outside the fourth limiting wall 171.

[0084] During specific implementation, the upper cover plate 17 extends toward the lower housing 16 to form a pair of sixth limiting walls 172. As shown in FIG. 21, when the fifth limiting wall 163 is located inside the fourth limiting wall 171, the sixth limiting wall 172 is located inside the fourth limiting wall 171, the sixth limiting wall 172 and the fourth limiting wall 171 form a limiting groove, and the fifth limiting wall 163 is located in the limiting groove. When the fifth limiting wall 163 is located outside the fourth limiting wall 171, the sixth limiting wall 172 is located outside the fourth limiting wall 171, the sixth limiting wall 172 and the fourth limiting wall 171 form a limiting groove, and the fifth limiting wall 163 is located in the limiting groove.

[0085] During specific implementation, the guide rail lower cover 14 may be integrally formed on the upper

cover plate 17, or may be detachably connected to the upper cover plate 17.

[0086] In an embodiment of the present invention, when the guide rail lower cover 14 is integrally formed on the upper cover plate 17, the upper cover plate 17 is provided with a first opening 12 used for exposing the block portion 432 and a second opening 141 used for the push rod 4311 to pass through. The first opening 12 and the second opening 141 may be a same opening, or may be different openings.

[0087] In another embodiment of the present invention, when the guide rail lower cover 14 is detachably connected to the upper cover plate 17, the upper cover plate 17 is provided with a first opening 12 used for exposing the block portion 432, and the guide rail lower cover 14 is provided with a second opening 141 used for the push rod 4311 to pass through. A quantity of the second openings 141 is related to a quantity of the push rods 4311.

[0088] For example, there are two push rods 4311 disposed opposite to each other. There are two second openings 141, and each push rod 4311 fits the block portion 432 after passing through a corresponding second opening 141 and the first opening 12. Under the action of the ejection mechanism 30 and an external pushing force, the push rod 4311 may move in the second opening 141 and the first opening 12.

[0089] The ejection mechanism 30 may include an elastic stretching portion. One end of the elastic stretching portion is connected to the sliding member 431, and the other end of the elastic stretching portion is connected to the housing mechanism 10.

[0090] Referring to FIG. 2, FIG. 6, FIG. 25, and FIG. 26, when the guide rail lower cover 14 is detachably connected to the upper cover plate 17, the guide rail lower cover 14 is provided with a guide rail lower cover connecting portion 145, and the guide rail lower cover connecting portion 145 fits a fastener 146 to connect the guide rail lower cover 14 to the upper cover plate 17.

[0091] During specific implementation, the upper cover plate 17 may be provided with a guide rail lower cover fitting portion 18, and the guide rail lower cover fitting portion 18 is configured to fit the guide rail lower cover connecting portion 145 to connect the guide rail lower cover 14 to the upper cover plate 17.

[0092] Specifically, the guide rail lower cover fitting portion 18 is provided with a guide rail lower cover fastening portion 181, and the guide rail lower cover fastening portion 181 and the guide rail lower cover connecting portion 145 connect the guide rail lower cover 14 to the upper cover plate 17 by the fastener 146.

[0093] In the embodiments of the present invention, the sliding member 431 is provided with a first hook portion 4316, and one end of the elastic stretching portion is hooked to the first hook portion 4316.

[0094] In some embodiments of the present invention, when the housing mechanism 10 includes the guide rail upper cover 13 and the guide rail lower cover 14, the other end of the elastic stretching portion may be connected to the guide rail lower cover 14. Specifically, the guide rail lower cover 14 is provided with a hook portion 144, and the other end of the elastic stretching portion is connected to the hook portion 144 on the guide rail lower cover 14.

[0095] In the embodiments of the present invention, the elastic stretching portion may be a spring, or may be another part made of an elastic material.

[0096] During specific implementation, in scenarios that the material box mechanism 20 is opened and the material box mechanism 20 is closed, when the user overcomes the elastic force of the elastic stretching portion and pushes the material box mechanism 20 to move in the push-in direction of the material box mechanism 20, the block portion 432 connected to the material box mechanism 20 may drive the push rod 4311 of the sliding member 431 to move in the push-in direction of the material box mechanism 20.

[0097] During specific implementation, in a scenario that the material box mechanism 20 is unlocked and the material box mechanism 20 is ejected automatically, under the action of the elastic stretching portion, the sliding member 431 moves in the pull-out direction of the material box mechanism 20, the push rod 4311 drives the block portion 432, and the block portion 432 drives the material box mechanism 20 to move in the pull-out direction of the material box mechanism 20.

[0098] FIG. 27 is a schematic diagram of a sliding path of a track switch in a track according to an embodiment of the present invention. Referring to FIG. 3 to FIG. 6, FIG. 19, and FIG. 27, a direction of an arrow in FIG. 27 represents a sliding direction of the guide portion 422 in the track 41. During specific implementation, a sliding path of the guide portion 422 on the track 41 is a path for the guide portion to slide from the locking end 411 along the first part 413 to the releasing end 412 and from the releasing end 412 along the second part 414 to the locking end 411. An end, near the locking end 411, of the second part 414 is provided with a first locking surface 416, and the first locking surface 416 may limit the guide portion 422 to moving along the second part 414 toward the releasing end 412, to cause the material box mechanism 20 to enter the locked state; and the releasing end 412 is provided with a second locking surface 418, and the second locking surface 418 may limit the guide portion 422 to sliding relative to the track 41, to cause the material box mechanism 20 to be at the maximum ejection displacement relative to the housing mechanism 10, so that the material box mechanism 20 is maintained in a stable state after being opened.

[0099] During specific implementation, a surface of one end, near the locking end 411, of the second part 414 is sunken, the first locking surface 416 is formed on a side wall of the sunken part, and a surface, near the locking end 411, of the first part 413 is lower than a surface, near the locking end 411, of the second part 414.

[0100] In the embodiments of the present invention, the surface, near the locking end 411, of the first part 413

is lower than a surface of the sunken part of the end, near the locking end 411, of the second part 414.

[0101] In the embodiments of the present invention, the second locking surface 418 is located on a side wall of the releasing end 412 of the track 41.

[0102] During specific implementation, the locking end 411 includes a first guide surface 415, and the first guide surface 415 is configured to guide the guide portion 422 to switch from the second part 414 to the first part 413, and/or, the releasing end 412 includes a second guide surface 417, and the second guide surface 417 is configured to guide the guide portion 422 to switch from the first part 413 to the second part 414.

[0103] During specific implementation, the first guide surface 415 is located on a side wall of the locking end 411 of the track 41.

[0104] During specific implementation, a surface of one end, near the releasing end 412, of the first part 413 is sunken, the second guide surface 417 is formed on a side wall of the sunken part, and a surface, near the releasing end 412, of the second part 414 is lower than a surface, near the releasing end 412, of the first part 413.

[0105] In some embodiments of the present invention, a height of the track 41 from the locking end 411 to the releasing end 412 of the first part 413 gradually increases. At the releasing end 412, a surface of the first part 413 is higher than a surface of the second part 414. A surface height of the second part 414 gradually increases from the releasing end 412 to the locking end 411. At the locking end 411, the surface of the second part 414 is higher than the surface of the first part 413. A surface of the track 41 of the first part 413 gradually increases from the locking end 411 to the releasing end 412. At the releasing end 412, a height difference is formed between the surface of the first part 413 and the surface of the second part 414, and the surface of the first part 413 is higher than the surface of the second part 414.

[0106] FIG. 28 is a schematic diagram of relative positions of a track switch and a track when a material box mechanism is locked according to an embodiment of the present invention. FIG. 29 is a schematic diagram of relative positions of a track switch and a track when a material box mechanism is unlocked according to an embodiment of the present invention. To improve the smoothness of unlocking the track switch 42, in the embodiments of the present invention, a side wall 4111 of the locking end 411 of the track 41 is arranged obliquely. An angle between the side wall 4111 and the first part 413 is an acute angle, and an angle between the side wall 4111 and the second part 414 is an obtuse angle, so that when the material box mechanism 20 is locked, the guide portion 422 abuts against the first locking surface 416. When a pushing force is applied to the material box mechanism 20 to unlock the material box mechanism 20, it is convenient for the direction changing portion 421 to rotate about the first rotation axis A, so that the guide portion 422 slides along the first guide surface 415 formed by the side wall 4111. In addition, the surface of the second part 414 is higher than the surface of the first part 413. In this case, the direction changing portion 421 rotates about the second rotation axis B, so that the guide portion 422 falls from the second part 414 into the first part 413, that is, switching from the second part 414 to the first part 413 is completed.

[0107] FIG. 30 is a schematic diagram of relative positions of a track switch and a track when a material box mechanism is ejected according to an embodiment of the present invention. FIG. 31 is a schematic diagram of relative positions of a track switch and a track when a material box mechanism is in an open state according to an embodiment of the present invention. To improve the stability of the track switch 42 at the releasing end 412, in the embodiments of the present invention, a side wall 4121 of the releasing end 412 of the track 41 is arranged obliquely. An angle between the side wall 4121 and the first part 413 is an acute angle, and an angle between the side wall 4121 and the second part 414 is an obtuse angle, so that the guide portion 422 is stuck in an angle region formed by the side wall 4121 and the first part 413 when no external force is applied, and does not switch from the first part 413 to the second part 414. When a pushing force is applied to the material box mechanism 20, being limited by the second guide surface 417 formed by the sunken first part 413, the guide portion 422 is prevented from crossing the second guide surface 417 to enter the first part 413. The direction changing portion 421 rotates about the first rotation axis A, and under the guidance of the second guide surface 417, the direction changing portion 421 then rotates about the second rotation axis B, so that the guide portion 422 switches from the first part 413 to the second part 414.

[0108] FIG. 32 is a cross-sectional view of a detergent box assembly from another perspective according to an embodiment of the present invention. Referring to FIG. 2, FIG. 8, FIG. 9, FIG. 24 to FIG. 26, and FIG. 32, during specific implementation, the detergent box assembly 1 may further include a damping mechanism 50, and the damping mechanism 50 includes a damper rack 51 and a rotary damper. The damper rack 51 is connected to the material box mechanism 20, and is configured to mesh with a gear 53 on the rotary damper. The rotary damper is connected to the housing mechanism 10, the housing mechanism 10 is provided with a damper fastening portion 55, and the damper fastening portion 55 fits a rotation fastening screw 54 to fix the rotary damper to the housing mechanism 10. The housing mechanism 10 is provided with a third opening 173, and the gear 53 passes through the third opening 173 to mesh with the damper rack 51.

[0109] The gear 53 on the rotary damper meshes with the damper rack 51, so that when the material box mechanism 20 is ejected, the damper rack 51 drives the gear 53 on the rotary damper to rotate to generate a damping force inside the rotary damper, thereby generating a damping effect and implementing smooth ejection of material box mechanism 20. In the embodiments of the present invention, a characteristic of the rotary damper

may be that the damping force is directly proportional to a rotation speed. That is, a higher rotation speed of the gear 53 generates a larger damping force, and a lower rotation speed of the gear 53 generates a smaller damping force.

[0110] In the embodiments of the present invention, the damper rack 51 may be connected to the first block rib 4321.

[0111] Referring to FIG. 2, FIG. 9, FIG. 20, and FIG. 21, during specific implementation, the material box mechanism 20 includes a box body 21 and a box cover 22. The box cover 22 is detachably connected to the box body 21, and a third accommodation cavity 23 configured to accommodate a laundry treatment agent is formed.

[0112] During specific implementation, the box cover 22 is provided with a feeding port 24 configured to feed the laundry treatment agent.

[0113] In the embodiments of the present invention, the box body 21 may be provided with a first discharge port configured to provide an outlet of the laundry treatment agent. The material box mechanism 20 is located inside the housing mechanism 10, to make it convenient to feed the laundry treatment agent, a second discharge port may be provided in a lower housing of the housing mechanism 10, to feed the laundry treatment agent to a washing device.

[0114] During specific implementation, the block portion 432 may be disposed on the box cover 22 of the detergent box.

[0115] During specific implementation, to make it convenient to operate the detergent box assembly 1, the detergent box assembly 1 may further include a handle assembly 60. The handle assembly 60 includes a handle decoration member, a handle, and a distance adjustment portion. The distance adjustment portion is located between the handle decoration member and the handle, and is separately connected to the handle decoration member and the handle, to reduce a relative distance between the handle decoration member and the handle when the handle decoration member is pressed; and the handle is connected to the material box mechanism 20.

[0116] During specific implementation, referring to FIG. 2, a handle connecting portion 64 may be disposed at the material box mechanism 20, and the handle connecting portion 64 is configured to connect to the handle assembly 60.

[0117] To facilitate a better understanding and implementation of the embodiments of the present invention by a person skilled in the art, the following describes a working principle of the detergent box assembly 1 with reference to FIG. 1 to FIG. 33.

[0118] Referring to FIG. 20 and FIG. 32, when the sliding member 431 moves, the sliding member drives the guide portion 422 of the track switch 42 to move in the track 41 of the guide rail lower cover 14. Referring to FIG. 17 and FIG. 32, when the track switch 42 moves, a top end of the elastic abutting portion 423 of the track switch 42 remains in contact with the side surface 4317, facing the material box mechanism 20, of the sliding member 431. Therefore, the elastic abutting portion 423 is subject to a compressive force, and a bottom end of the guide portion 422 moves in a manner of being always tightly attached to the surface of the track 41. Under the action of the elastic abutting portion 423, no matter which part of the track 41 the guide portion 422 is located in, the bottom end of the guide portion 422 moves in a manner of being always tightly attached to the surface of the track 41. An effect of the elastic abutting portion 423 is the same as a spring, which applies an elastic force to the bottom end of the guide portion 422, to improve the reliability and accuracy of the direction changing portion 421 during switching between various parts of the track 41.

[0119] Referring to FIG. 4, the track 41 may include a locking end 411, a releasing end 412, and a first part 413 and a second part 414 respectively connected to the locking end 411 and the releasing end 412 side-by-side, and the track 41 is a loop. There are height differences between the locking end 411 and the releasing end 412 and the first part 413 and the second part 414, and there is also a height difference between the first part 413 and the second part 414. By setting appropriate height differences, the track switch 42 is slidable in a set direction in the track 41, and the track switch 42 is prevented from sliding in other directions than the set direction in the track 41.

[0120] Referring to FIG. 31, a locking principle of the material box mechanism 20 in a closed state is as follows: the elastic stretching portion is stretched to generate a tensile force in the pull-out direction of the material box mechanism 20, the force is applied to the sliding member 431 and is eventually transferred to the guide portion 422 of the track switch 42, and pulls the track switch 42 and the sliding member 431 to move. However, the surface of the end, near the locking end 411, of the second part 414 is sunken and forms the first locking surface 416, so that the guide portion 422 is prevented from sliding along the second part 414 from the locking end 411 toward the releasing end 412 and stays at the first locking surface 416, and this position is a locking position of the material box mechanism 20 in the closed state.

[0121] An unlocking principle of the material box mechanism 20 is described with reference to FIG. 4, FIG. 28, and FIG. 29. When the material box mechanism 20 is in a closed state and the material box mechanism 20 is pushed in the push-in direction of the material box mechanism 20, the pushing force is transferred from the first block rib 4321 of the box cover 22 to the push rod 4311 of the sliding member 431 and drives the track switch 42 to move in the push-in direction of the material box mechanism 20. After the guide portion 422 of the track switch 42 comes into contact with the first guide surface 415 (as shown in FIG. 4), referring to FIG. 17 and FIG. 18, the guide portion 422 moves along the first guide surface 415 and drives the track switch 42 to rotate about the first rotation axis A by a particular angle. In addition, under the action of the elastic abutting portion 423, after the

bottom end of the guide portion 422 is detached from the second part 414 and is located on the surface of the locking end 411, due to the height difference between the second part 414 and the first part 413, the track switch 42 rotates about the second rotation axis B by a particular angle and causes the guide portion 422 to fall in the first part 413 and to be tightly attached to the surface of the first part 413. In this way, switching of the guide portion 422 from the second part 414 to the first part 413 is completed, and the material box mechanism 20 is switched from a locked state to an unlocked state.

[0122] Working principles of automatic ejection and automatic locking after ejection of the material box mechanism 20 are described with reference to FIG. 30 and FIG. 31. After the material box mechanism 20 in the closed state is unlocked, under the action of the elastic stretching portion, the material box mechanism 20 is ejected automatically, and the sliding member 431 drives the guide portion 422 to move forward in a manner of being tightly attached to the first part 413 of the track 41. When the guide portion 422 reaches the releasing end 412, the surface of the first part 413 at the releasing end 412 is sunken, referring to FIG. 33, FIG. 17, and FIG. 18, in this case, under the action of the elastic abutting portion 423, the track switch 42 rotates about the second rotation axis B by a particular angle to cause the guide portion 422 to enter from the first part 413 into a sunken part 4131 of the surface. The guide portion 422 is blocked by the second locking surface 418, and under the pulling of the elastic stretching portion, the guide portion 422 is prevented from continuing to move in the pull-out direction of the material box mechanism 20, thereby implementing locking of the material box mechanism 20 after automatic ejection (as shown in FIG. 31).

[0123] A working principle of the material box mechanism 20 from an ejected state to a locked state is described with reference to FIG. 31. After the material box mechanism 20 is ejected and locked, when the material box mechanism 20 needs to be closed, that is, when the material box mechanism 20 needs to be pushed into the housing mechanism 10, the material box mechanism 20 is pushed in the push-in direction of the material box mechanism 20, and the first block rib 4321 disposed on the box cover 22 drives the push rod 4311 of the sliding member 431, so that the sliding member 431 moves in the push-in direction of the material box mechanism 20. A height difference is formed since the surface, located at the releasing end 412, of the first part 413 is sunken, under the abutting of the elastic abutting portion 423, the guide portion 422 is prevented from crossing the second guide surface 417 formed by the sunken surface, located at the releasing end 412, of the first part 413. After the guide portion 422 comes into contact with the second guide surface 417, the track switch 42 rotates about the first rotation axis A by a particular angle, and under the action of the elastic abutting portion 423, the bottom end of the guide portion 422 is detached from the surface of the first part 413 when the guide portion 422 is guided by the second guide surface 417. At the releasing end 412, there is a height difference between the first part 413 and the second part 414, and the track switch 42 rotates about the second rotation axis B by a particular angle, to cause the guide portion 422 to fall in the second part 414, thereby implementing switching of the guide portion 422 from the first part 413 to the second part 414. After the guide portion 422 is switched to the second part 414, under the action of the elastic abutting portion 423 and the external pushing force, the guide portion 422 moves in the push-in direction of the material box mechanism 20 in a manner of being tightly attached to the surface of the second part 414, that is, moves toward the locking end 411. Subsequently, the track switch 42 continues to move in the push-in direction of the material box mechanism 20 in the second part 414 until the guide portion 422 reaches the locking end 411. At the locking end 411, the surface of the second part 414 is sunken and forms the first locking surface 416, so that after the bottom end of the guide portion 422 enters the sunken part of the second part 414, pushing on the material box mechanism 20 is stopped, and the guide portion 422 is blocked by the first locking surface 416 and is prevented from moving in the pull-out direction of the material box mechanism 20 under the pulling of the elastic stretching portion. In this way, a process of closing and locking the material box mechanism 20 is completed.

[0124] An embodiment of the present invention further provides a washing device, and the washing device may include a detergent box assembly 1. The detergent box assembly 1 may use the detergent box assembly 1 according to any embodiment of the present invention. For the structure and working principles of the detergent box assembly 1, reference may be made to the description of any embodiment of the present invention, and details are not described herein again.

[0125] Although specific implementations are described above, the implementations are not intended to limit the scope disclosed in the present invention, even if only a single implementation is described relative to a specific feature. The feature examples provided in the present invention are intended to be illustrative rather than limiting, unless different expressions are made. During specific implementation, according to an actual requirement, in a technically feasible case, the technical features of one or more dependent claims may be combined with the technical features of the independent claims, and the technical features from the corresponding independent claims may be combined in any appropriate way instead of using just specific combinations listed in the claims.

[0126] Although the present invention is disclosed above, the present invention is not limited thereto. A person skilled in the art can make various changes and modifications without departing from the spirit and the scope of the present invention. Therefore, the protection scope of the present invention should be subject to the scope defined by the claims.

Claims

1. A detergent box assembly (1), comprising: a housing mechanism (10), a material box mechanism (20), an ejection mechanism (30), and a locking mechanism, wherein
the housing mechanism (10) is provided with a first accommodation cavity (11), and the first accommodation cavity (11) is configured to accommodate the material box mechanism (20); and
the ejection mechanism (30) is separately coupled to the material box mechanism (20) and the locking mechanism,
characterized in that,
the locking mechanism is separately coupled to the housing mechanism (10) and the material box mechanism (20), and the locking mechanism comprises a track (41), a track switch (42), and an actuating assembly (43), wherein
the track (41) comprises a locking end (411), a releasing end (412), and a first part (413) and a second part (414) respectively connected to the locking end (411) and the releasing end (412) side-by-side to form a loop, and the releasing end (412) is configured to limit a maximum ejection displacement of the material box mechanism (20) relative to the housing mechanism (10);
the track switch (42) comprises a direction changing portion (421) and a guide portion (422); the guide portion (422) slides along the track (41), the direction changing portion (421) adjusts a deflection angle of the guide portion in response to a sliding position of the guide portion (422) on the track (41), and the material box mechanism (20) is in a locked state when the guide portion (422) is located at the locking end (411); and
the actuating assembly (43) is coupled to the ejection mechanism (30), the track switch (42), and the material box mechanism (20) separately, and is configured to be driven by the ejection mechanism (30) to drive the material box mechanism (20) to move relative to the housing mechanism (10).

2. The detergent box assembly (1) according to claim 1, **characterized in that** the actuating assembly (43) comprises a sliding member (431) and a block portion (432), wherein
the sliding member (431) is coupled to the ejection mechanism (30), and the sliding member (431) comprises a push rod (4311);
the block portion (432) is disposed at the material box mechanism (20), and the block portion (432) fits the push rod (4311), and is configured to be pushed by the push rod (4311) to drive the material box mechanism (20) to move relative to the housing mechanism (10) wherein
the housing mechanism (10) is provided with a first opening (12), and the first opening (12) is used for the push rod (4311) to pass through and used for exposing the block portion (432).

3. The detergent box assembly (1) according to claim 2, **characterized in that** the block portion (432) comprises a first block rib (4321) and a second block rib (4322) that are disposed at an interval, and the push rod (4311) is located between the first block rib (4321) and the second block rib (4322).

4. The detergent box assembly (1) according to claim 3, **characterized in that** the first block rib (4321) and the second block rib (4322) are arranged in a push-in direction of the material box mechanism (20), and the second block rib (4322) comprises a first slope (4323) and a second slope (4324) that are disposed opposite to each other, wherein the first slope (4323) faces a pull-out direction of the material box mechanism (20), the second slope (4324) faces the push-in direction of the material box mechanism (20), and a gradient of the first slope (4323) is greater than a gradient of the second slope (4324).

5. The detergent box assembly (1) according to claim 2, **characterized in that** the track switch (42) further comprises an elastic abutting portion (423), wherein the elastic abutting portion (423) applies pressure to the guide portion (422) toward the track (41).

6. The detergent box assembly (1) according to claim 5, **characterized in that** the elastic abutting portion (423) abuts against a side surface, facing the material box mechanism (20), of the sliding member (431).

7. The detergent box assembly (1) according to claim 5, **characterized in that** a side surface, facing the material box mechanism (20), of the sliding member (431) is provided with a pair of third limiting portions (4312), the track switch (42) is located in an accommodation space formed by the pair of third limiting portions (4312), and the pair of third limiting portions (4312) is configured to limit a movement region of the elastic abutting portion (423) relative to the sliding member (431).

8. The detergent box assembly (1) according to claim 2, **characterized in that** the direction changing portion (421) is connected to the sliding member (431), and is rotatable about a first rotation axis (A) and a second rotation axis (B) relative to the sliding member (431), wherein the first rotation axis (A) is perpendicular to the second rotation axis (B).

9. The detergent box assembly (1) according to claim 2, **characterized in that** the housing mechanism (10) further comprises a guide rail upper cover (13) and a guide rail lower cover (14), wherein the guide

rail upper cover (13) is detachably connected to the guide rail lower cover (14) to form a second accommodation cavity (15), at least a part of the ejection mechanism (30) and the locking mechanism is located in the second accommodation cavity (15), and the track (41) is disposed at the guide rail lower cover (14).

10. The detergent box assembly (1) according to claim 9, **characterized in that** a first guide rail is formed after the guide rail lower cover (14) is connected to the guide rail upper cover (13), and the sliding member (431) is slidably connected to the first guide rail.

11. The detergent box assembly (1) according to claim 2, **characterized in that** the ejection mechanism (30) comprises an elastic stretching portion, wherein one end of the elastic stretching portion is connected to the sliding member (431), and the other end of the elastic stretching portion is connected to the housing mechanism (10).

12. The detergent box assembly (1) according to any one of claims 1 to 11, **characterized in that** a sliding path of the guide portion (422) on the track (41) is a path for the guide portion to slide from the locking end (411) along the first part (413) to the releasing end (412) and from the releasing end (412) along the second part (414) to the locking end (411), wherein an end, near the locking end (411), of the second part (414) is provided with a first locking surface (416), and the first locking surface (416) is configured to limit the guide portion (422) to moving along the second part (414) toward the releasing end (412), to cause the material box mechanism (20) to enter the locked state; and the releasing end (412) is provided with a second locking surface (418), and the second locking surface (418) is configured to limit the guide portion (422) to sliding relative to the track (41), to cause the material box mechanism (20) to be at the maximum ejection displacement relative to the housing mechanism (10).

13. The detergent box assembly (1) according to claim 12, **characterized in that** a surface of one end, near the locking end (411), of the second part (414) is sunken, the first locking surface (416) is formed on a side wall of the sunken part, and a surface, near the locking end (411), of the first part (413) is lower than a surface, near the locking end (411), of the second part (414).

14. The detergent box assembly (1) according to claim 12, **characterized in that** the second locking surface (418) is located on a side wall of the releasing end (412) of the track (41).

15. The detergent box assembly (1) according to claim 1, **characterized in that** the locking end (411) comprises a first guide surface (415), and the first guide surface (415) is configured to guide the guide portion (422) to switch from the second part (414) to the first part (413), and/or, the releasing end (412) comprises a second guide surface (417), and the second guide surface (417) is configured to guide the guide portion (422) to switch from the first part (413) to the second part (414).

16. The detergent box assembly (1) according to claim 15, **characterized in that** a surface of one end, near the releasing end (412), of the first part (413) is sunken, the second guide surface (417) is formed on a side wall of the sunken part, and a surface, near the releasing end (412), of the second part (414) is lower than a surface, near the releasing end (412), of the first part (413).

17. The detergent box assembly (1) according to claim 15, **characterized in that** the first guide surface (415) is located on a side wall of the locking end (411) of the track (41).

18. The detergent box assembly (1) according to claim 1, **characterized by** further comprising a damping mechanism (50), wherein the damping mechanism (50) comprises a damper rack (51) and a rotary damper, wherein the damper rack (51) is connected to the material box mechanism (20), and is configured to mesh with a gear (53) on the rotary damper; and the rotary damper is connected to the housing mechanism (10), and the housing mechanism (10) is provided with a third opening (173) used for exposing the damper rack (51).

19. A washing device, **characterized by** comprising the detergent box assembly (1) according to any one of claims 1 to 18.

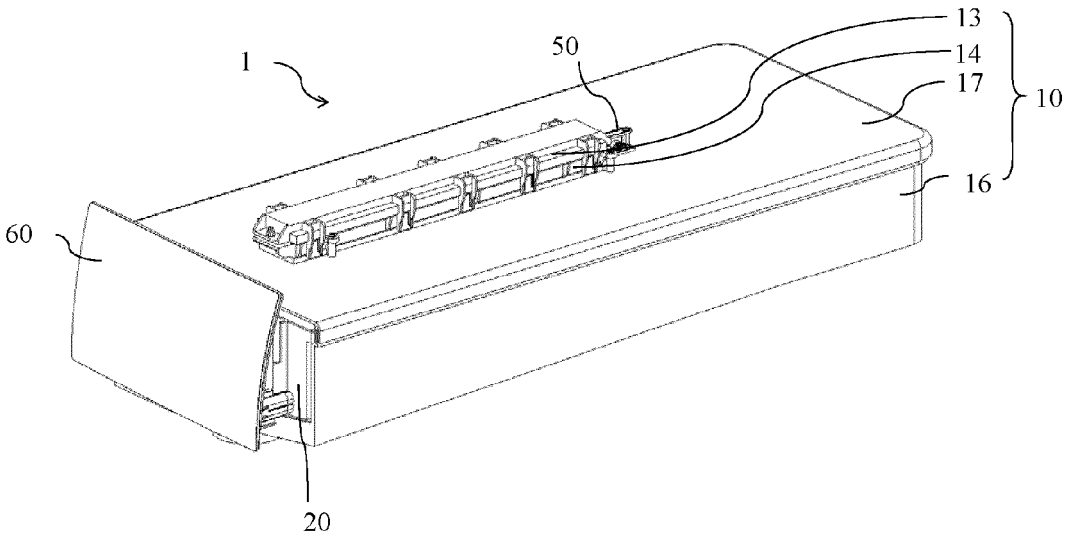
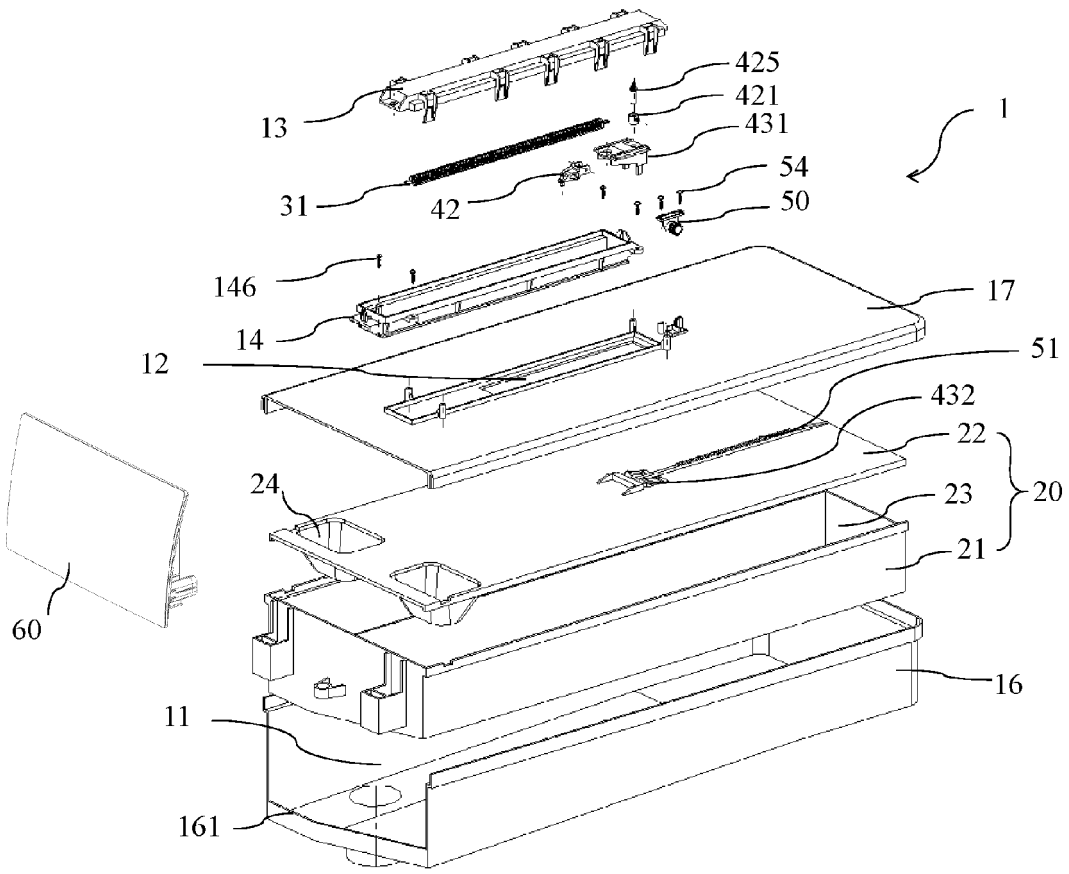


FIG. 1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425
421
431
1
31
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146
17
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12
51
432
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24
23
20
21
60
16
11
161

FIG. 2

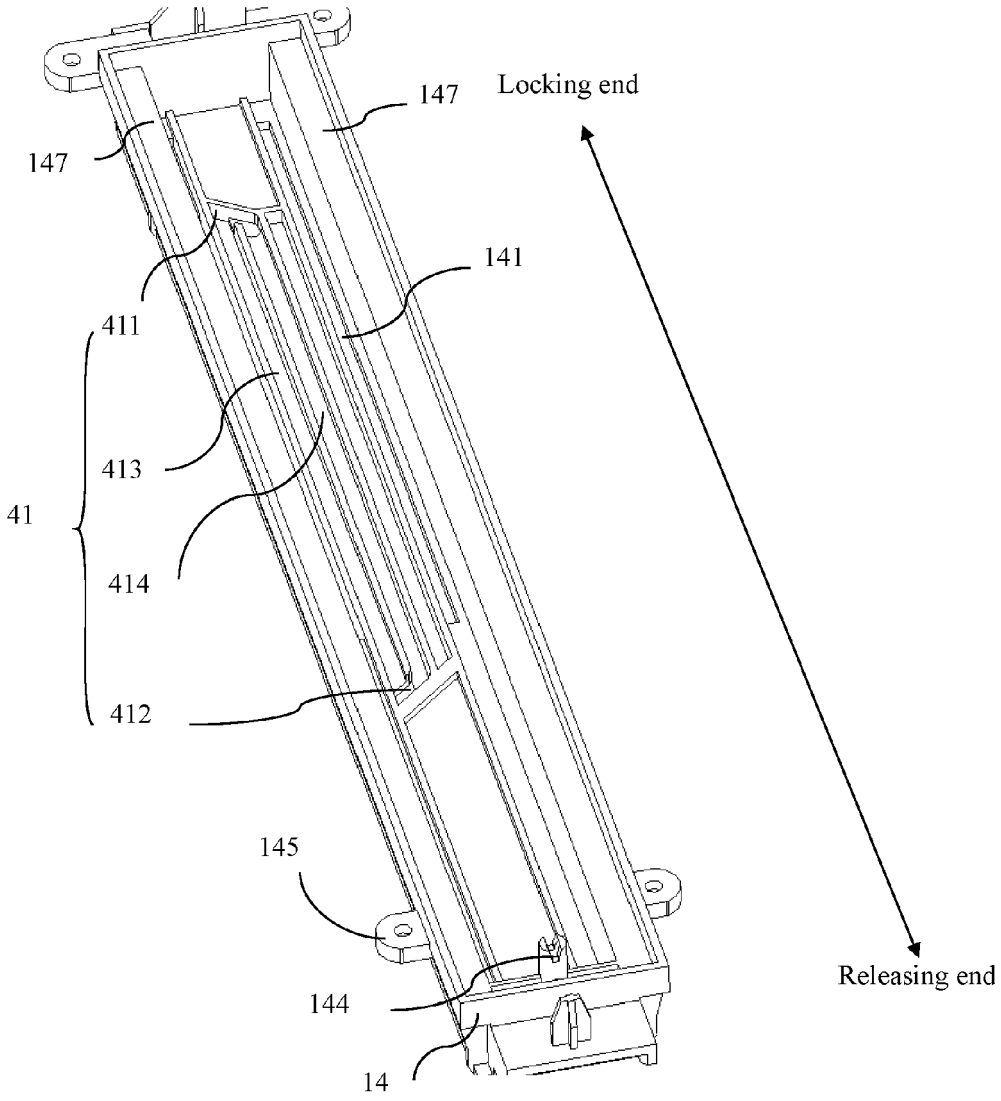

147
Locking end
147
141
411
413
41
414
412
145
144
14
Releasing end

FIG. 3

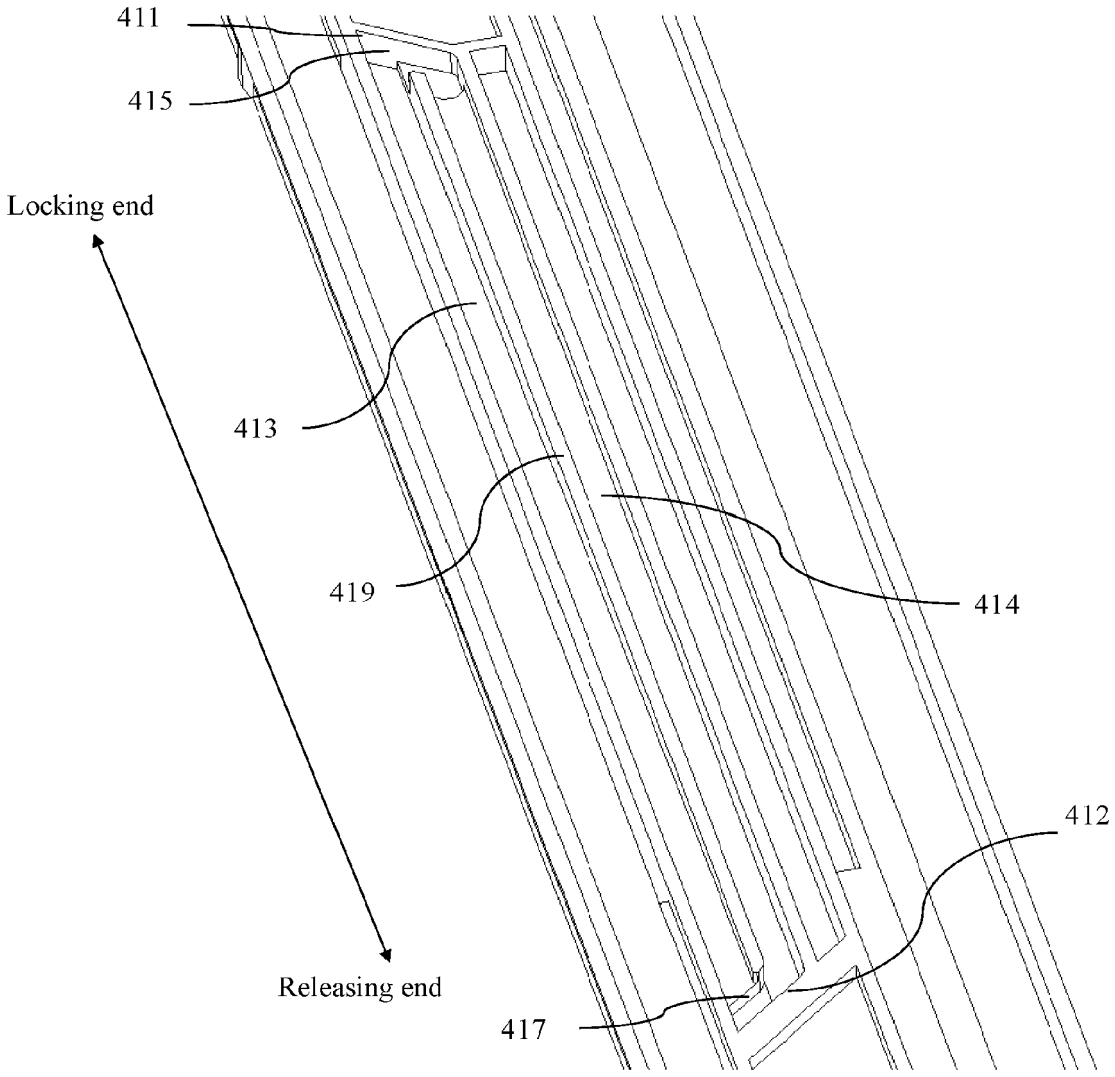


FIG. 4

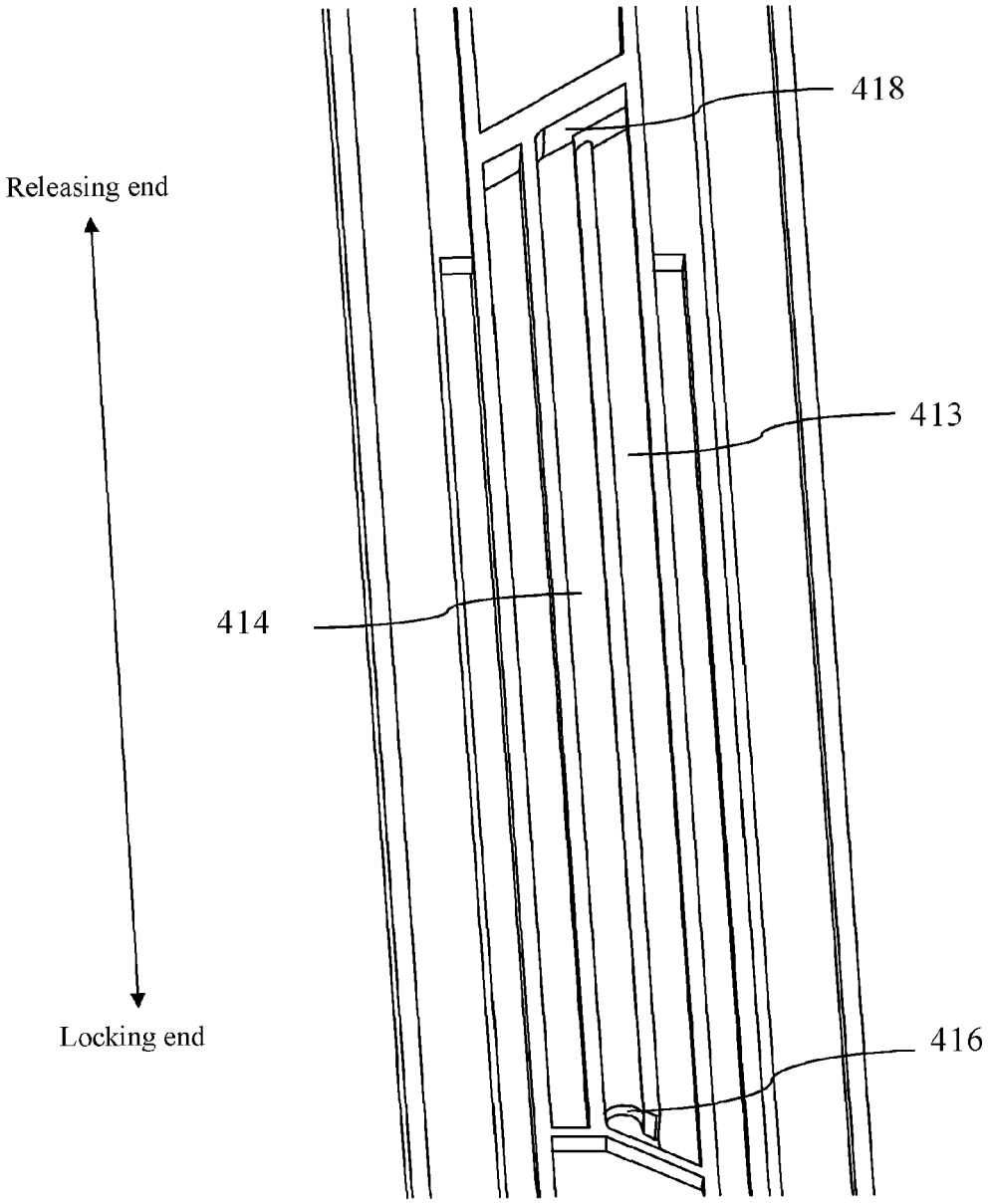


FIG. 5

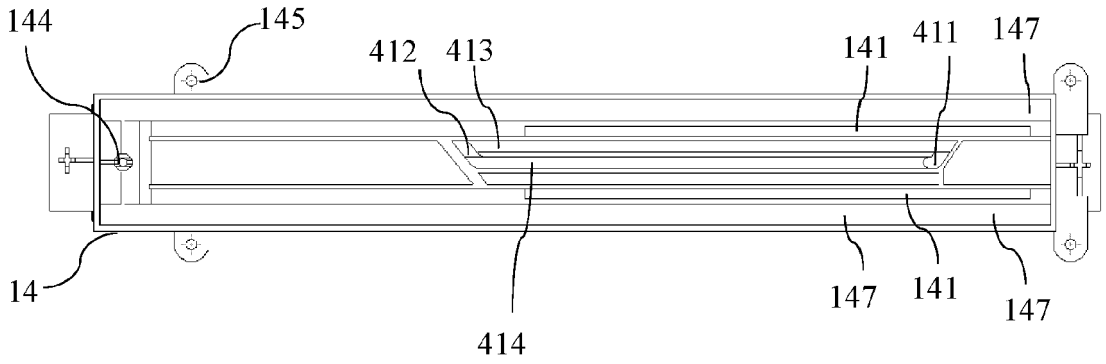


FIG. 6

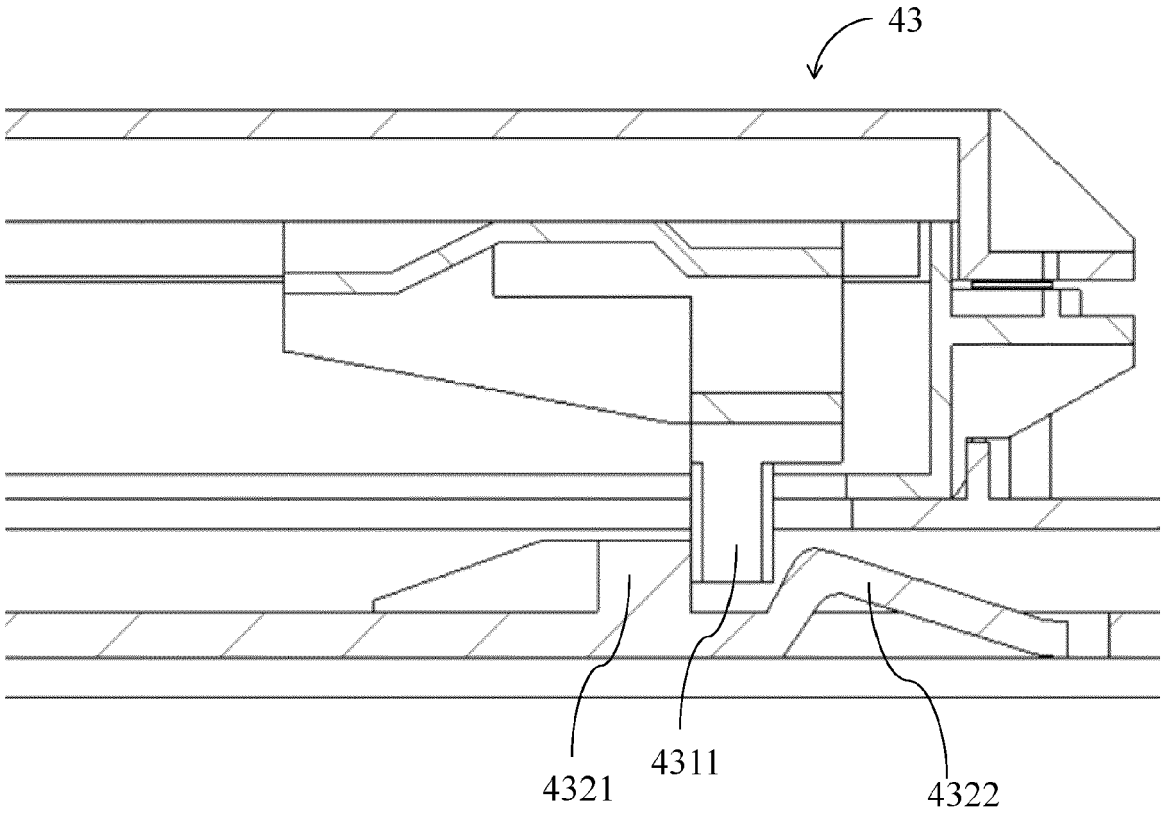


FIG. 7

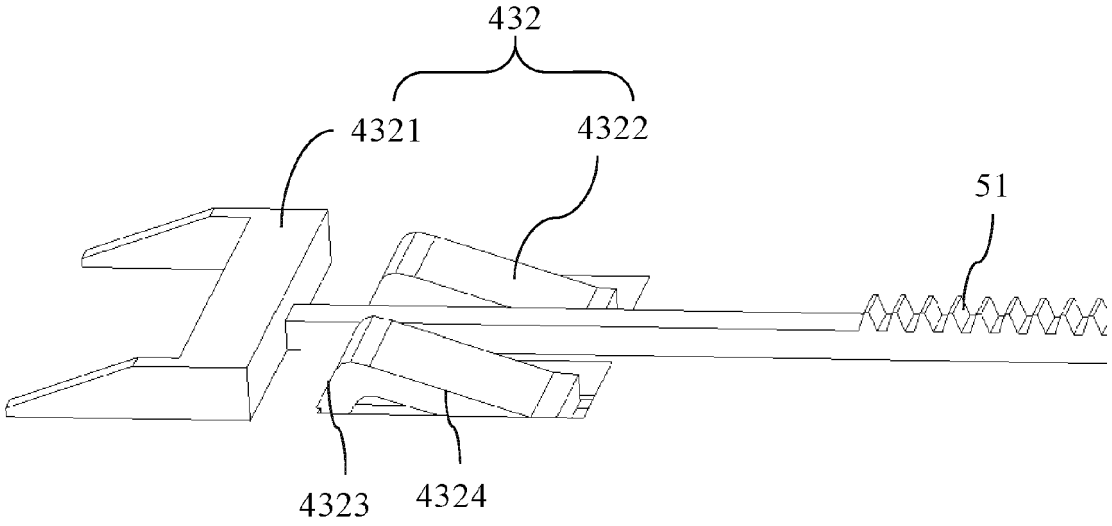


FIG. 8

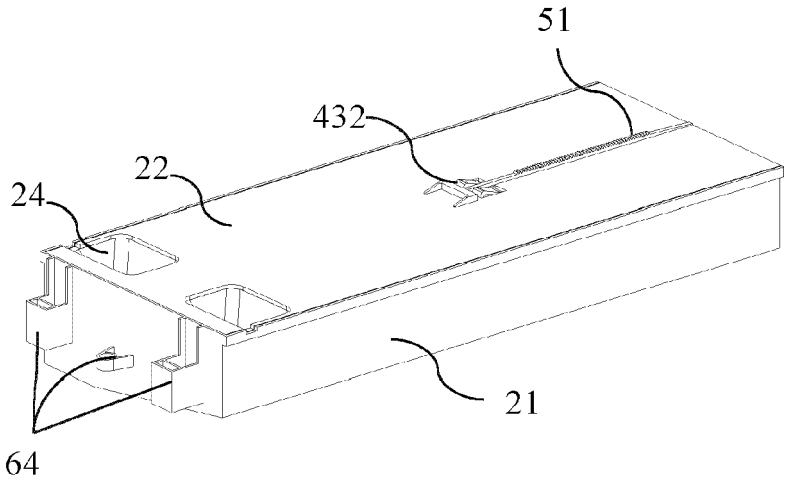
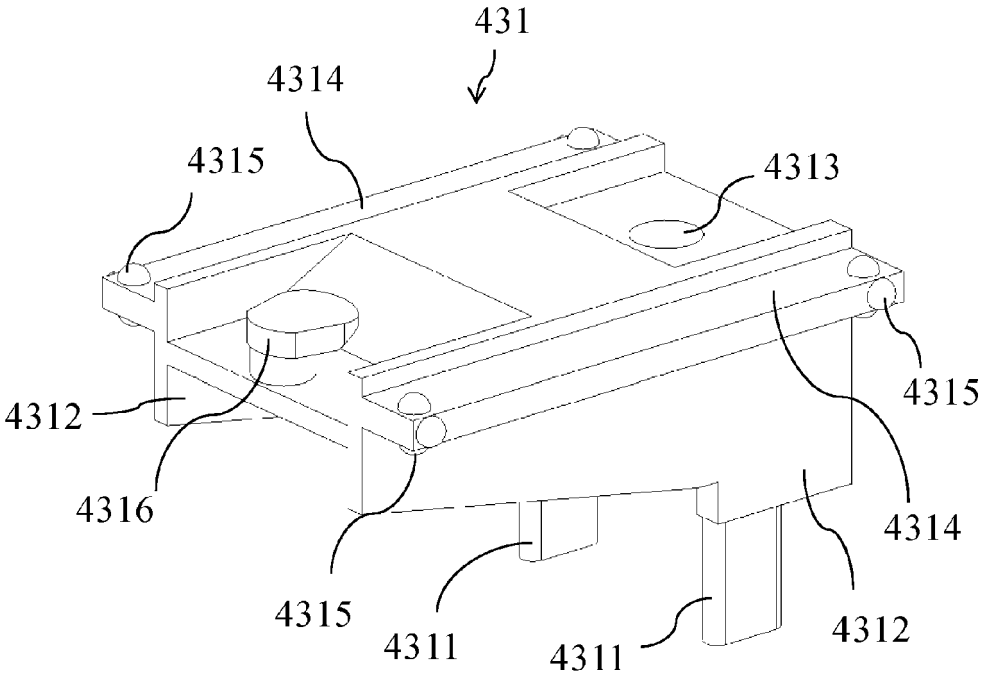


FIG. 9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4314
4315
4313
4312
4316
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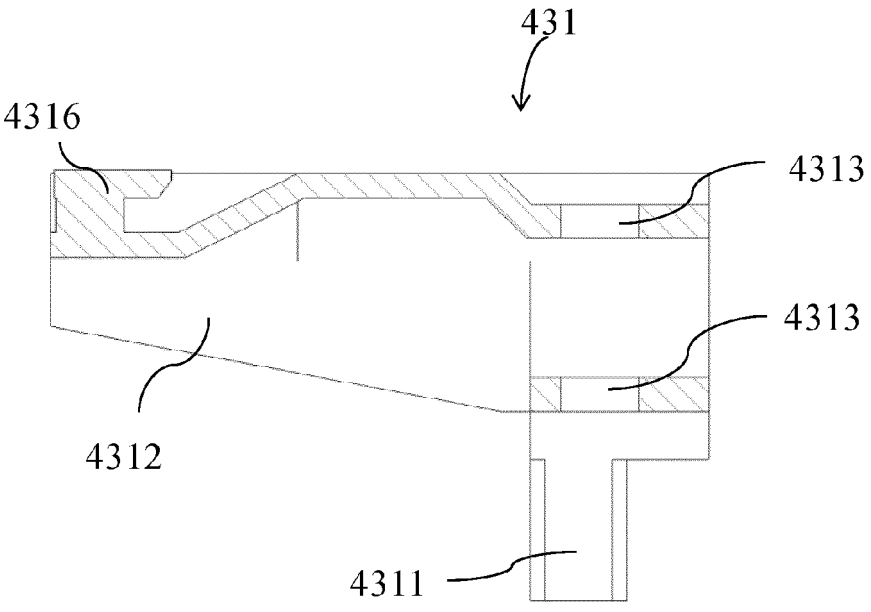
4314
4315
4311
4311
4312

FIG. 10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4313
4313
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4311

FIG. 11

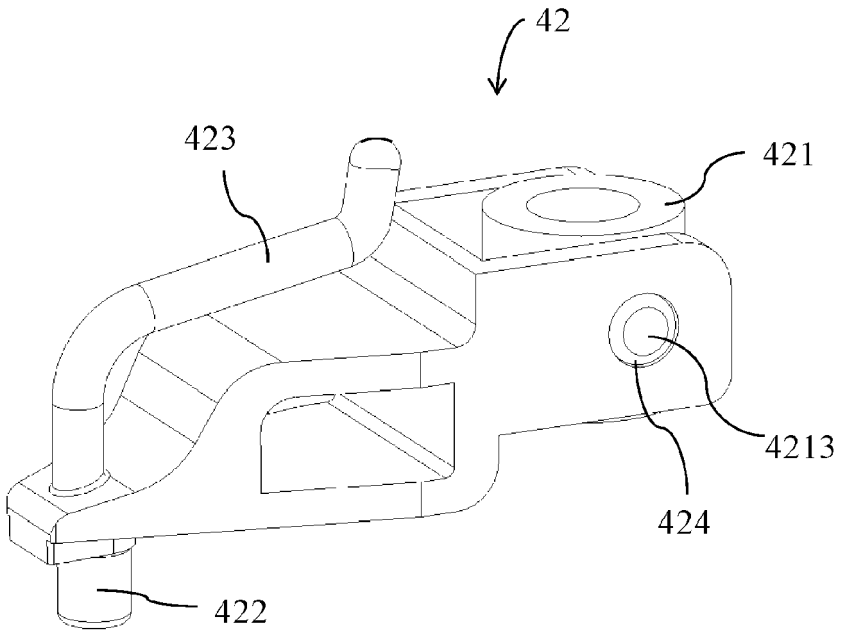


FIG. 12

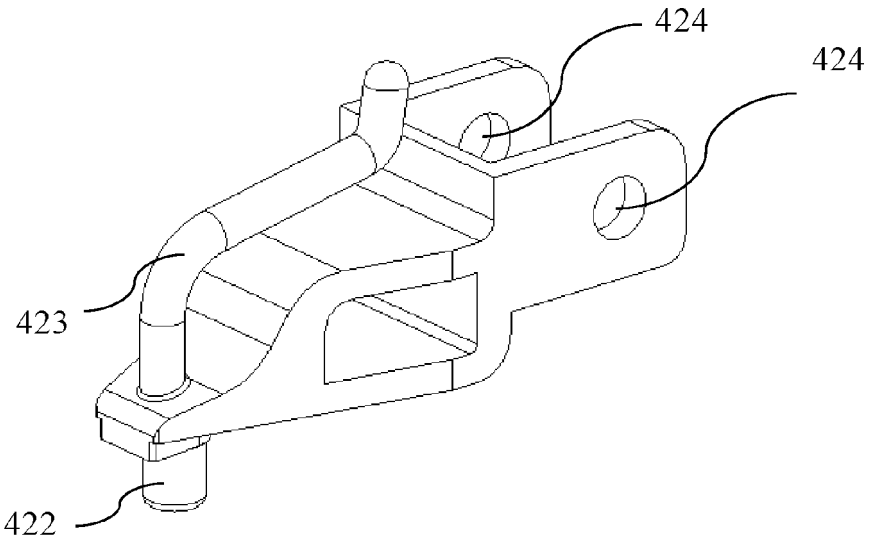


FIG. 13

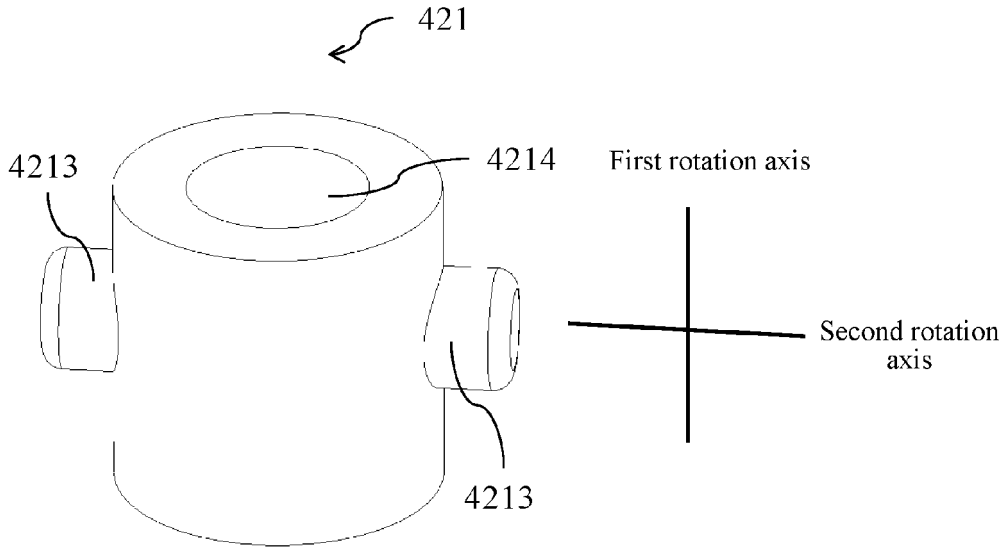
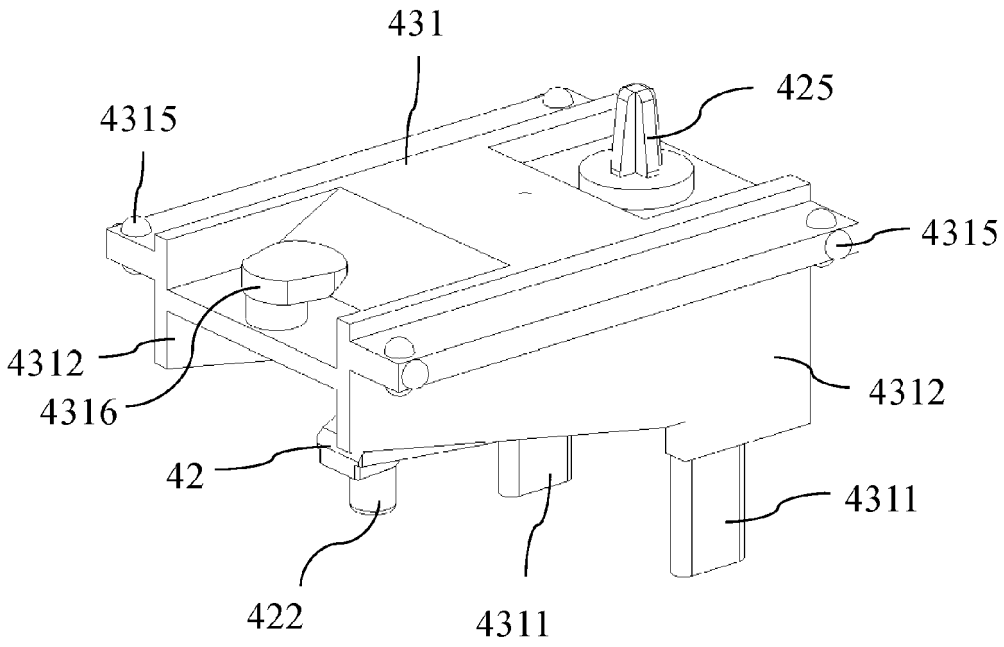

421
4213
4214
First rotation axis
Second rotation axis
4213

FIG. 14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425
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FIG. 15

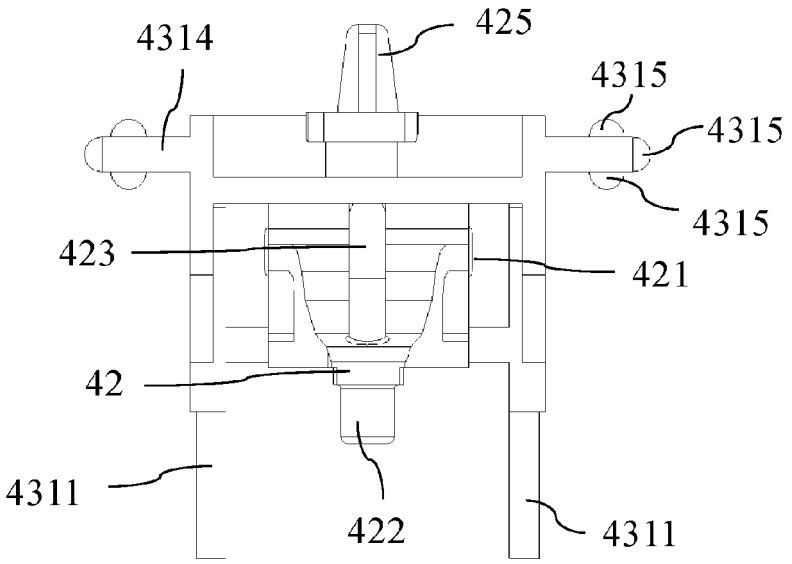
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FIG. 16

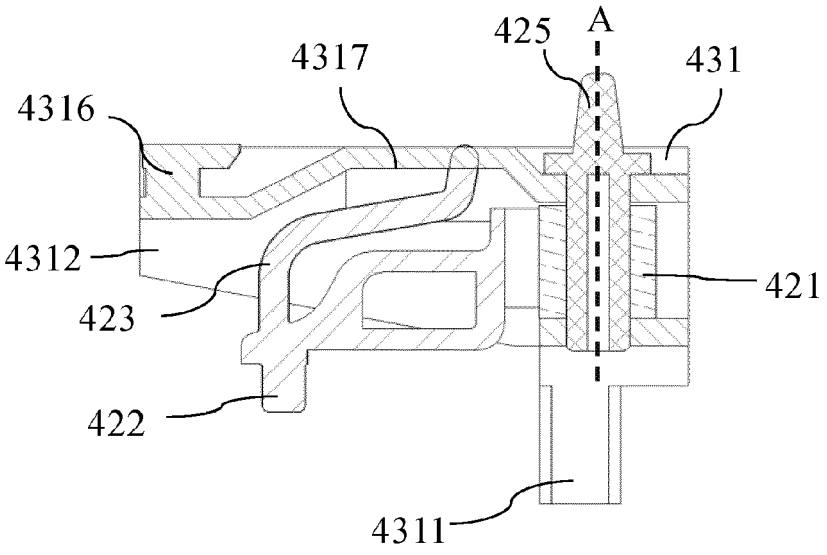
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FIG. 17

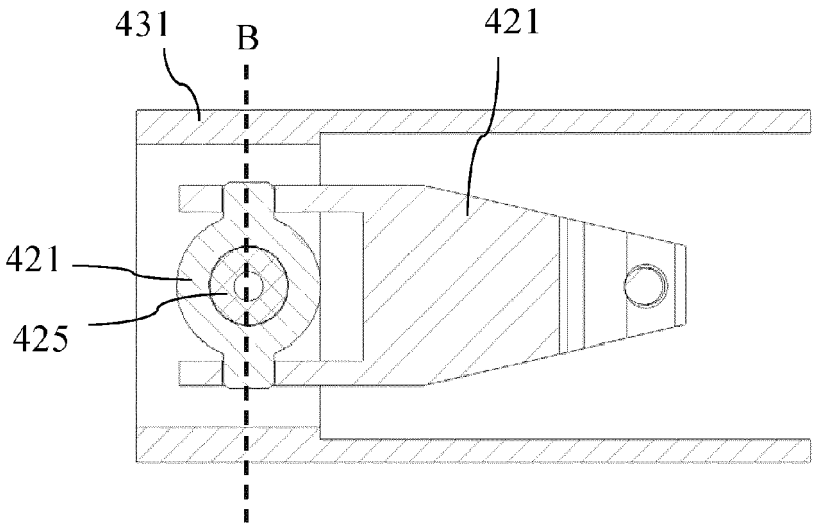

FIG. 18

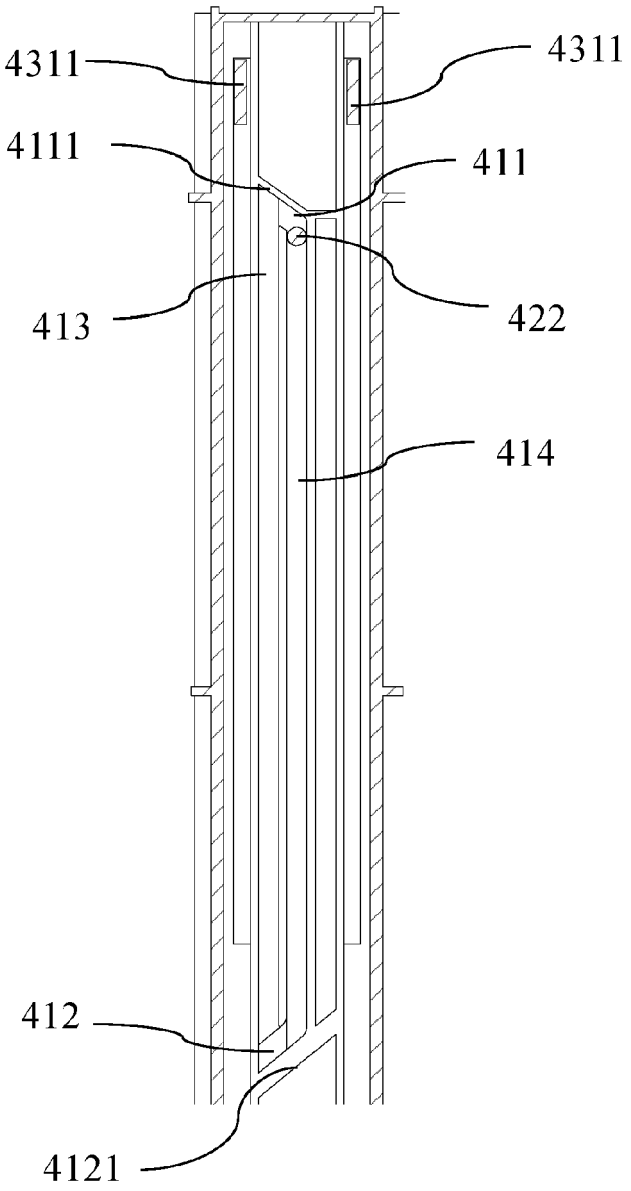

FIG. 19

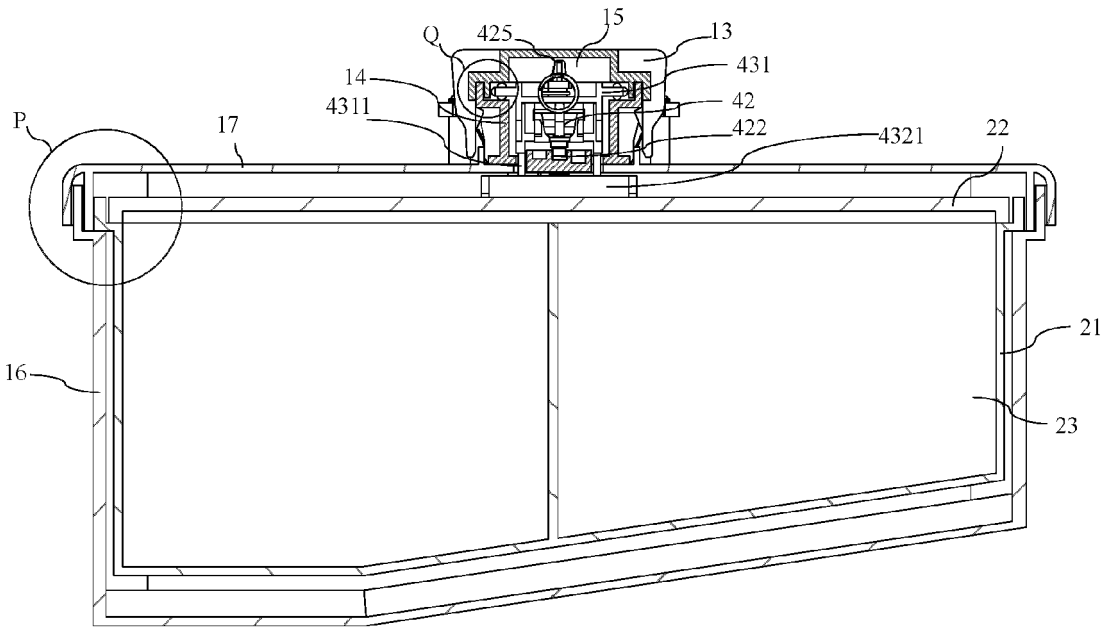
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FIG. 20

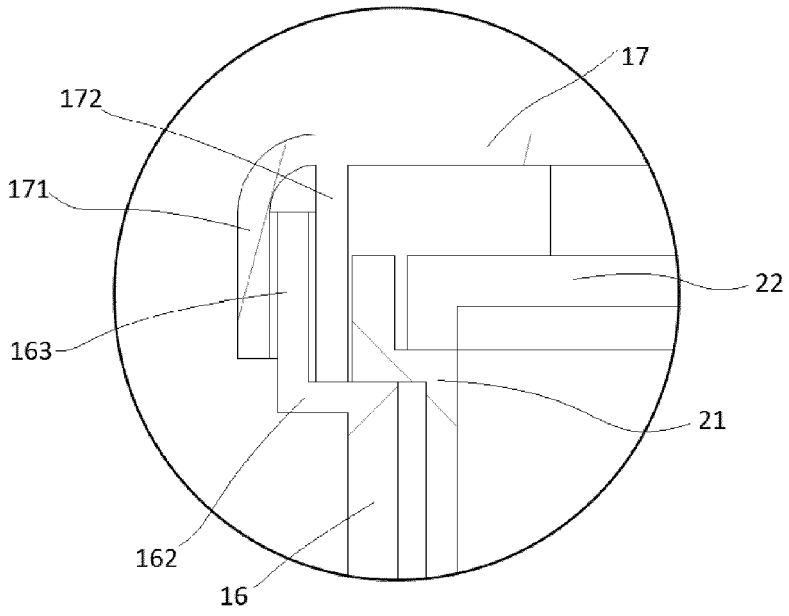
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FIG. 21

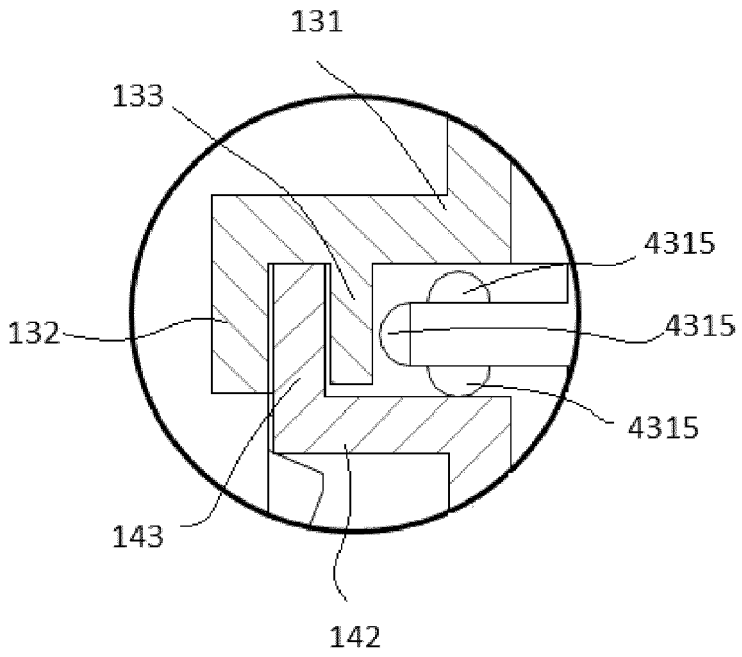


FIG. 22

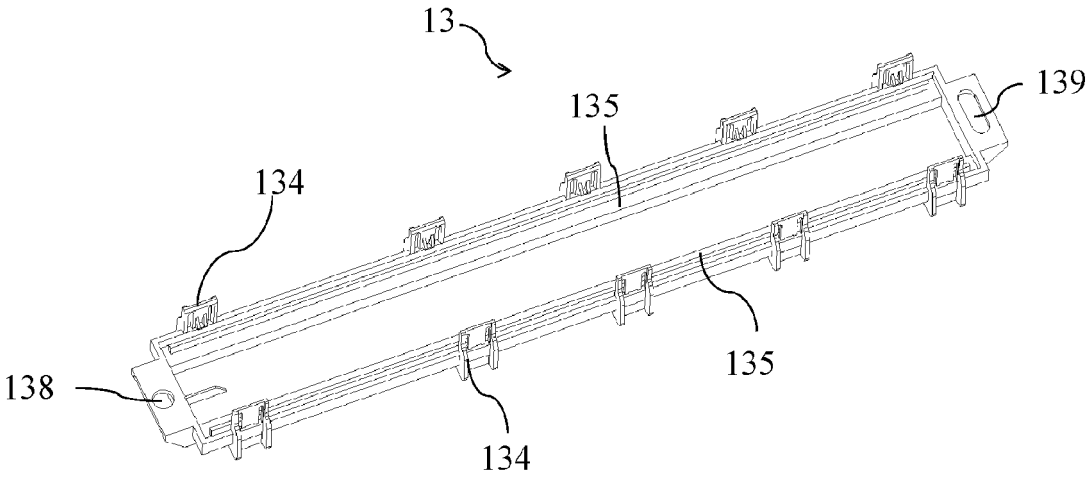


FIG. 23

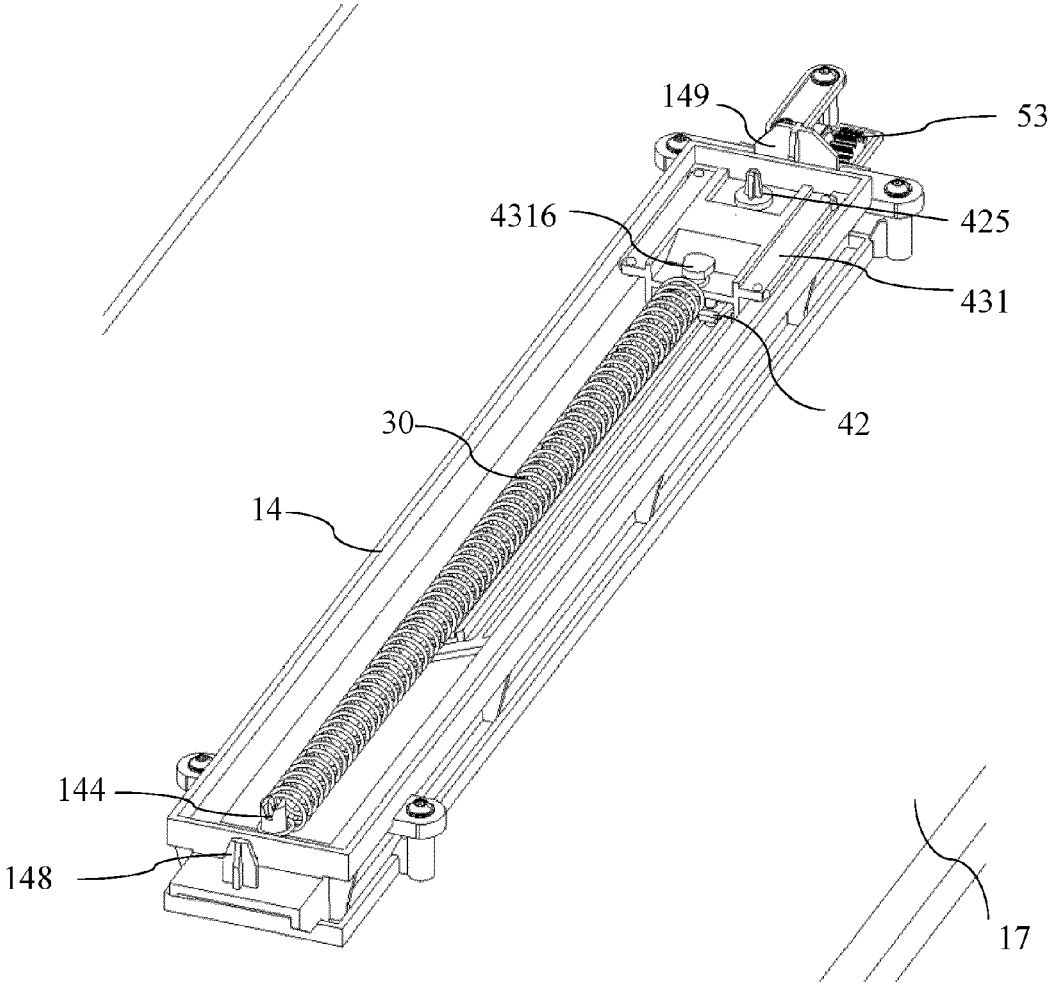


FIG. 24

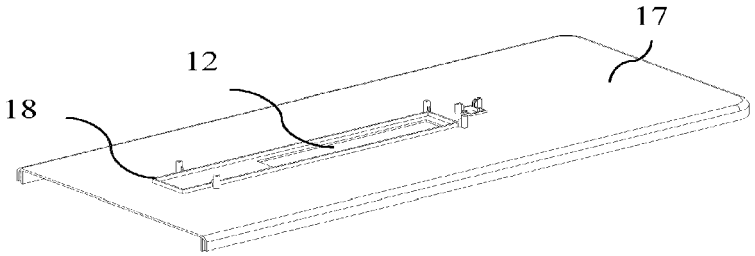


FIG. 25

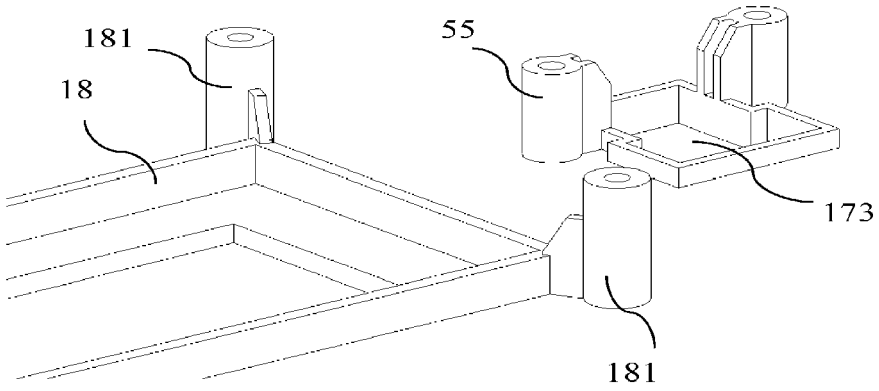


FIG. 26

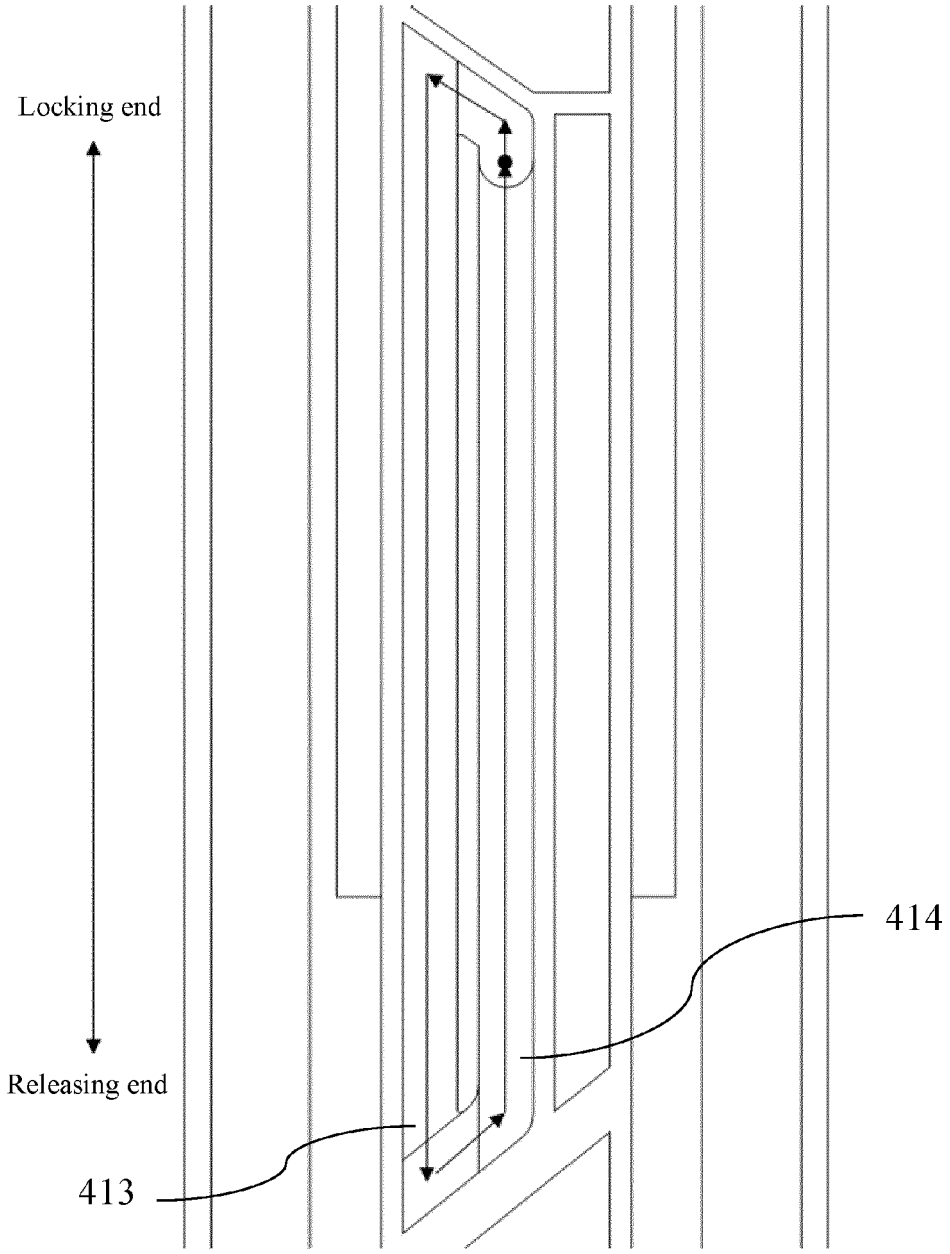


FIG. 27

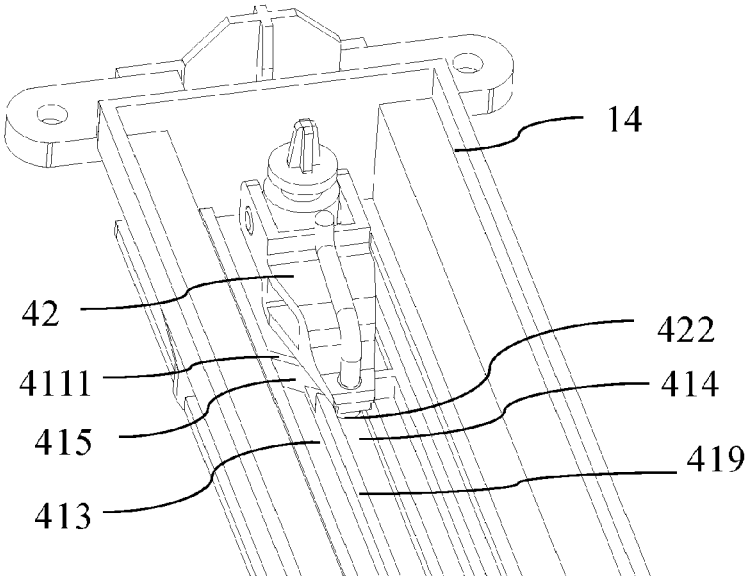


FIG. 28

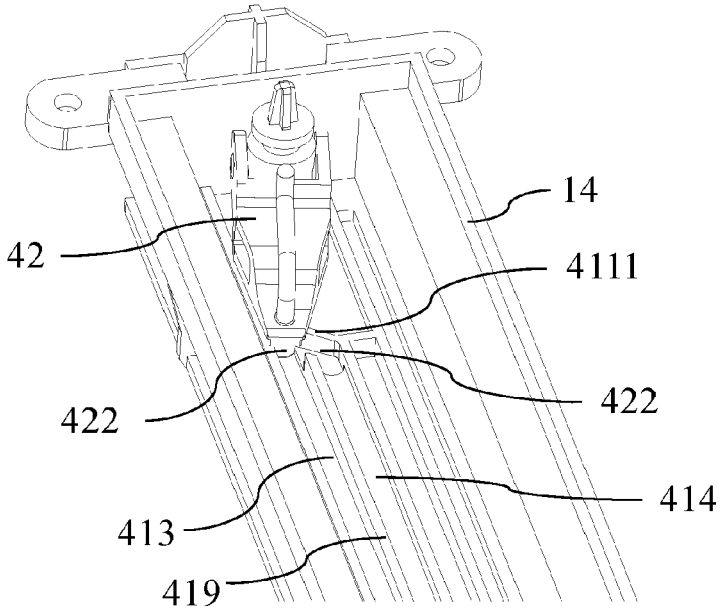


FIG. 29

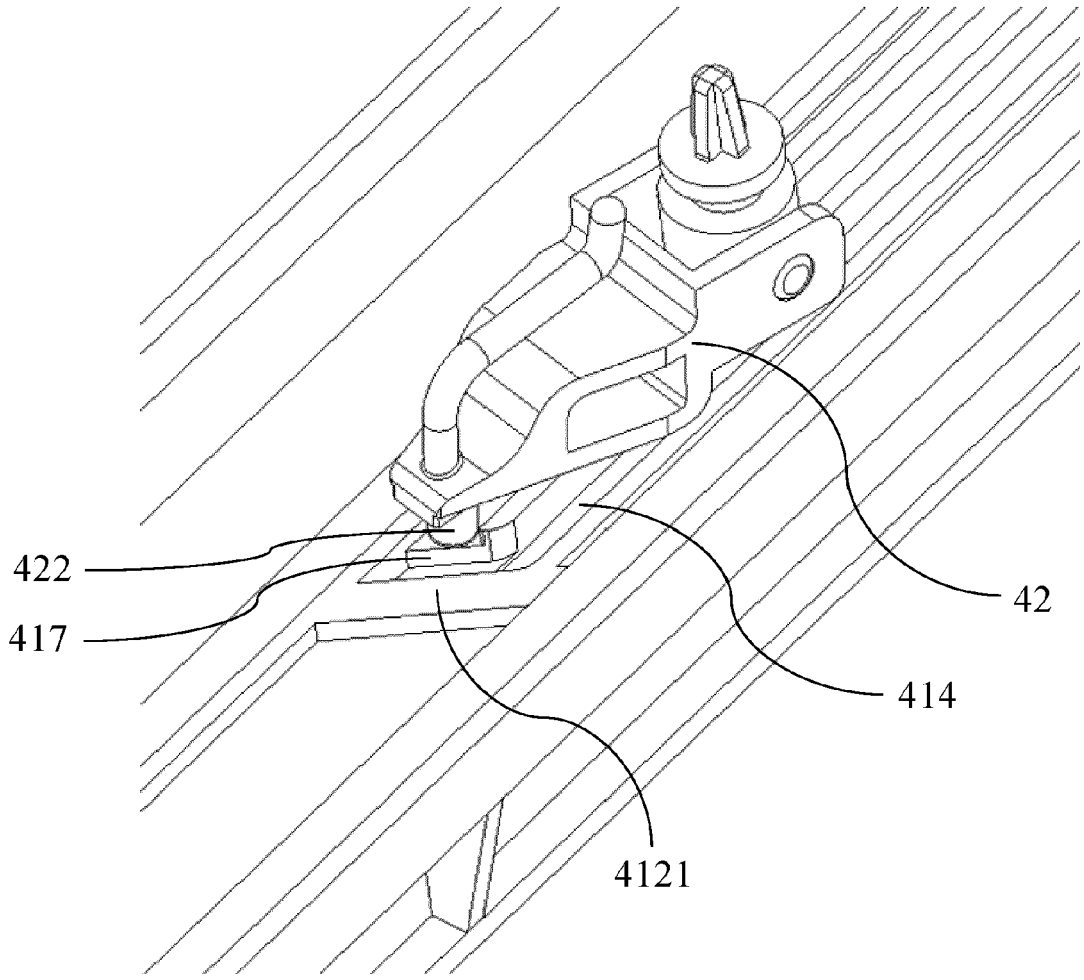


FIG. 30

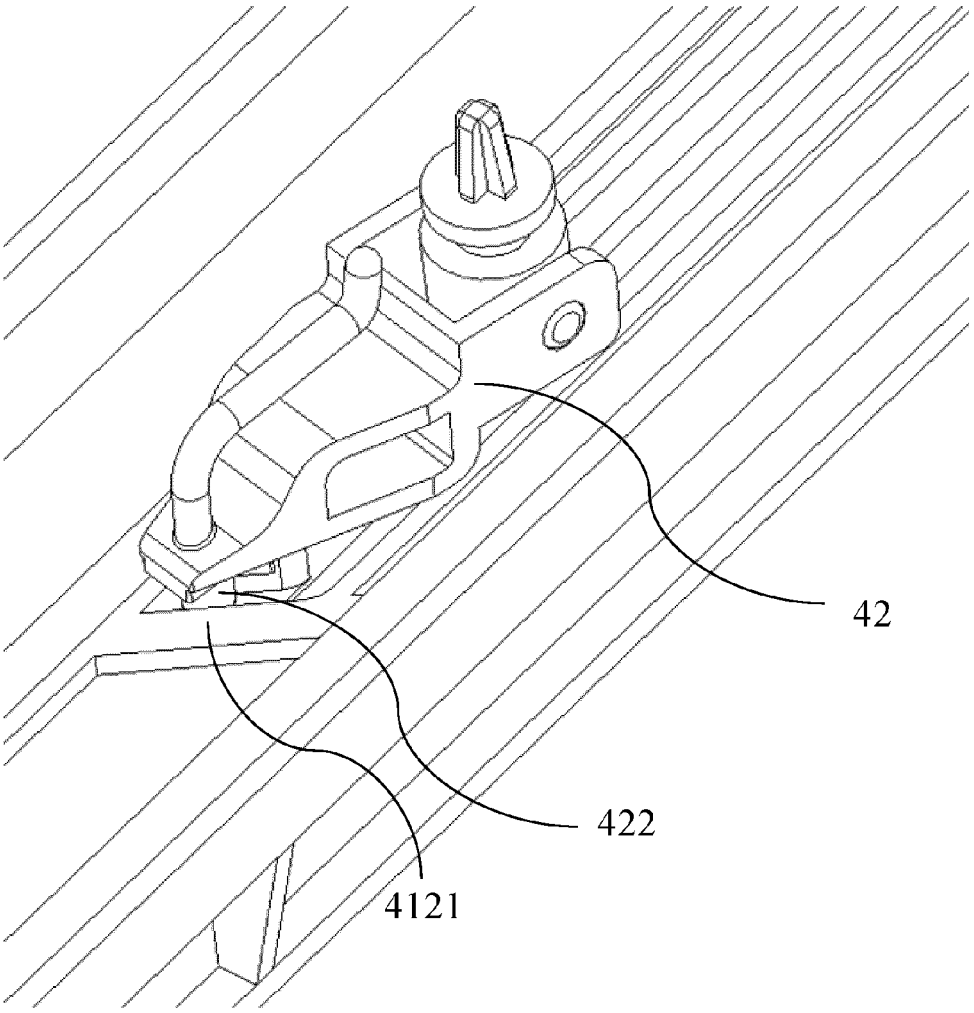
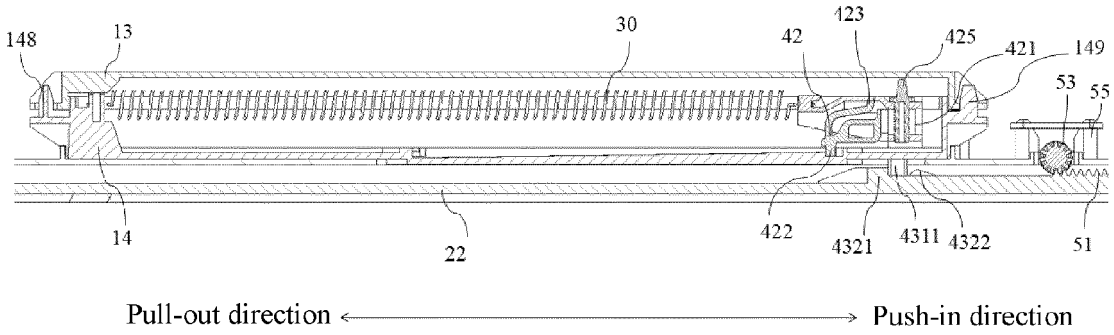


FIG. 31


148
13
30
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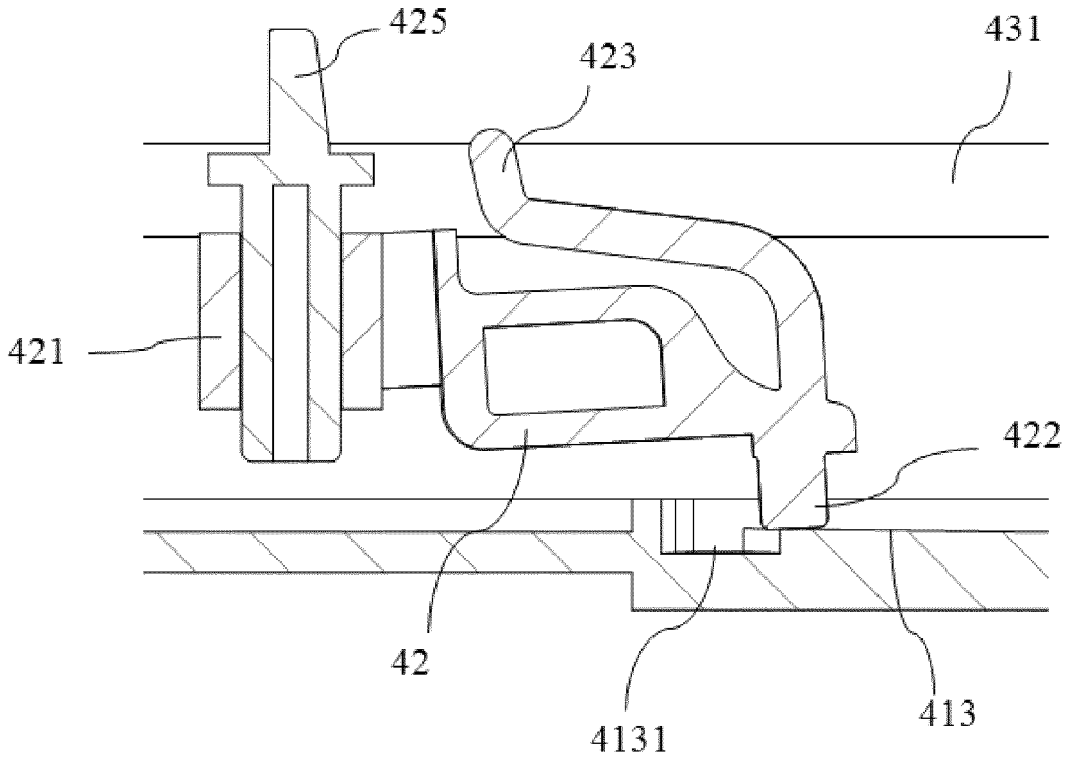
423
425
421
149
53
55
14
22
422
4321
4311
4322
51
Pull-out direction
Push-in direction

FIG. 32


425
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421
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4131
413

FIG. 33

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European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 21 17 7338

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 207 998 729 U (PANASONIC CORP ET AL.) 23 October 2018 (2018-10-23)	1,15-19	INV. D06F39/02
Y	* abstract *	12-14	
A	* paragraphs [0045] - [0071]; claims *	2-11	

Y	FR 2 947 295 A1 (ITW FASTEX FRANCE [FR]) 31 December 2010 (2010-12-31) * abstract * * page 7, line 21 - page 15, line 15; figures *	12-14	

X	US 2008/072630 A1 (JE BYOUNG S [KR] ET AL) 27 March 2008 (2008-03-27)	1,15-19	
A	* abstract; figures * * paragraphs [0023] - [0029], [0042] - [0060] *	2-14	

TECHNICAL FIELDS SEARCHED (IPC)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 October 2021	Prosig, Christina

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EPO FORM 1503 03.82 (P04C01)

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18-10-2021

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FR 2947295 A1	31-12-2010	NONE	
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82