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(54) **CONTAINER AND CAP ASSEMBLY**

(57) The present disclosure provides a container and a cap assembly. The container includes a component having an opening, and the cap assembly. The cap assembly includes a cap and an elastic arm. The elastic arm is disposed on the cap and extends obliquely with respect to a radial direction of the cap. At least a portion of the elastic arm is capable of being received in a recess and abuts against a second protrusion to prevent the cap assembly from rotating in a first direction relative to the component having the opening, such that the cap assembly is locked with the component having the opening; and the at least a portion of the elastic arm is capable of being released from the recess to unlock the component having the opening. The cap assembly of the present disclosure is capable of engaging with the component having the opening, such that the cap assembly cannot be unlocked without a specific tool (e.g., an operating tool).

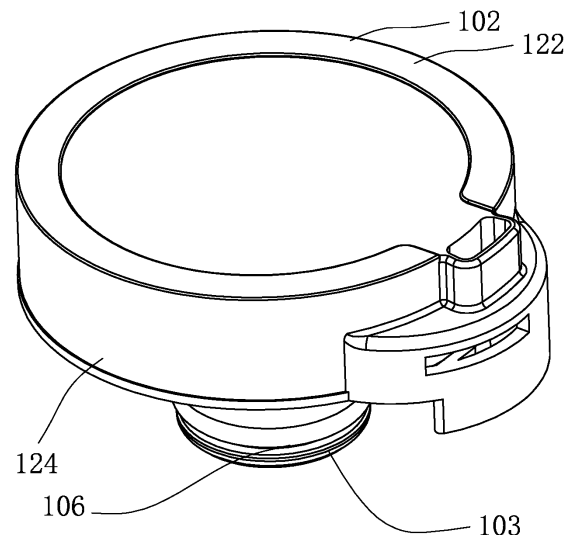


Fig. 1A

## Description

### TECHNICAL FIELD

[0001] The present disclosure relates to the field of containers, and more particularly to a container including a cap assembly.

### BACKGROUND

[0002] Existing vehicles are provided with thermal management systems. The thermal management system includes a container. The container includes a component having an opening, and a cap assembly. A thermal regulation fluid (e.g., coolant) may be introduced into the thermal management system from the opening. The component having the opening needs to engage with the corresponding cap assembly, such that the cap assembly can lock the head of the container and prevent a person from opening it at will.

### SUMMARY OF THE DISCLOSURE

[0003] Exemplary embodiments of the present disclosure can solve at least some of the above problems. The present disclosure provides a container. The container includes a component having an opening, and a cap assembly. The component having the opening includes a body surrounding the opening, and a first protrusion and a second protrusion, the first protrusion and the second protrusion being formed by extending outwardly from the body, a recess being formed between the first protrusion and the second protrusion, and the first protrusion being located upstream of the second protrusion in a first direction. The cap assembly is capable of locking or unlocking the component having the opening, and the cap assembly includes a cap and an elastic arm. The elastic arm is disposed on the cap and extends obliquely with respect to a radial direction of the cap. At least a portion of the elastic arm is capable of being received in the recess and abuts against the second protrusion to prevent the cap assembly from rotating in the first direction relative to the component having the opening, such that the cap assembly is locked with the component having the opening; and the at least a portion of the elastic arm is capable of being released from the recess to unlock the component having the opening.

[0004] According to the container described above, an operating tool is capable of abutting against the elastic arm and removing the elastic arm from the recess to enable the cap assembly to rotate in the first direction relative to the component having the opening to unlock the component having the opening.

[0005] According to the container described above, the elastic arm is provided with a guide portion. The guide portion is configured such that the operating tool is capable of removing the elastic arm from the recess when the operating tool is moved in an axial direction of the cap

assembly and abuts against the elastic arm.

[0006] According to the container described above, the operating tool abuts against the elastic arm, after the cap assembly is rotated relative to the component having the opening by a first predetermined angle in the first direction, the second protrusion abuts against the elastic arm so as to prevent at least part of the elastic arm from being received in the recess.

[0007] According to the container described above, the cap assembly is rotated relative to the component having the opening by a second predetermined angle in a second direction opposite to the first direction, the first protrusion abuts against the elastic arm to remove the elastic arm from the recess, so as to allow the operating tool to be inserted into the recess.

[0008] According to the container described above, the cap assembly further includes a limiting portion formed by extending downwardly from the cap. The first protrusion is higher than the second protrusion in an axial direction of the cap assembly. The limiting portion abuts against the first protrusion when the cap assembly is rotated relative to the component having the opening by the second predetermined angle in the second direction opposite to the first direction, so as to prevent the cap assembly from further rotating relative to the component having the opening in the second direction opposite to the first direction.

[0009] According to the container described above, the cap includes a cap side wall and an additional peripheral portion, the additional peripheral portion being disposed around at least a portion of the cap side wall and connected to the cap side wall to form an accommodating cavity. The elastic arm is disposed in the accommodating cavity and is formed by extending from the additional peripheral portion toward the cap side wall.

[0010] According to the container described above, a free end of the elastic arm is capable of being located in the recess and abuts against the second protrusion to prevent the rotation of the cap assembly in the first direction relative to the component having the opening.

[0011] According to the container described above, the cap assembly further includes an additional top wall connected to the cap side wall and the additional peripheral portion, so as to fully cover the accommodating cavity. A tool receiving through hole is provided in the additional top wall, the tool receiving through hole communicating with the accommodating cavity. The tool receiving through hole extends a distance in a circumferential direction of the cap assembly such that when the operating tool is inserted into the tool receiving through hole and abuts against the elastic arm, the cap assembly is capable of rotating by a first predetermined angle in the first direction relative to the operating tool and the component having the opening.

[0012] According to the container described above, the elastic arm is provided with a tool blocking portion, the tool blocking portion being located above the recess so as to prevent the operating tool from entering the recess

after the operating tool abuts against the elastic arm and removes the elastic arm from the recess.

**[0013]** According to the container described above, the container further includes an additional top wall connected to the cap side wall and the additional peripheral portion, so as to fully cover the accommodating cavity. A tool receiving through hole is provided in the additional top wall, the tool receiving through hole being aligned with the recess and communicating with the accommodating cavity. When the operating tool is inserted into the tool receiving through hole and abuts against the elastic arm, the operating tool is capable of rotating with the cap assembly in the first direction relative to the component having the opening.

**[0014]** According to the container described above, the container further includes a shielding component disposed on the cap and configured to shield the tool receiving through hole. At least a portion of the shielding component is movable relative to the cap, so as to expose the tool receiving through hole.

**[0015]** According to the container described above, the container further includes a shielding component disposed on the cap and configured to cover the tool receiving through hole. The shielding component is configured such that upon the shielding component being separated from the cap, a recognizable separation mark is on the shielding component or the cap.

**[0016]** According to the container described above, the shielding component is provided with a transfer area and is configured such that upon the shielding component being separated from the cap, a text or a pattern in the transfer area is presented on the cap.

**[0017]** According to the container described above, the container further includes a covering component mounted on the cap, at least a portion of the covering component extending into the tool receiving through hole, so as to prevent the operating tool from entering the tool receiving through hole.

**[0018]** According to the container described above, the covering component includes a covering body, an insert piece, and a breakable portion, the covering body being connected to the insert piece by means of the breakable portion, and the covering body being separated from the insert piece when the breakable portion breaks. The covering body is connected to the cap assembly by means of a snap-in structure, and at least a portion of the insert piece extends into the tool receiving through hole when the covering body is connected to the cap assembly.

**[0019]** According to the container described above, the snap-in structure includes a recess provided in the cap assembly and a protrusion provided on the covering body, the protrusion being capable of being accommodated in the recess.

**[0020]** According to the container described above, the cap assembly is provided with an information area for recording information related to opening the cap.

**[0021]** The present disclosure further provides a cap

assembly. The cap assembly is capable of locking and unlocking a component having an opening. The component having the opening includes a body, and a first protrusion and a second protrusion, the first protrusion and the second protrusion being formed by extending outwardly from the body, a recess being formed between the first protrusion and the second protrusion, and the first protrusion being located upstream of the second protrusion in a first direction. The cap assembly includes a cap and an elastic arm. The elastic arm is disposed on the cap and extends obliquely with respect to a radial direction of the cap. At least a portion of the elastic arm is capable of being received in the recess and abuts against the second protrusion to prevent the rotation of the cap assembly in the first direction relative to the component having the opening, such that the cap assembly is locked with the component having the opening; and the at least a portion of the elastic arm is capable of being released from the recess to unlock the component having the opening.

**[0022]** According to the cap assembly described above, the cap includes a cap side wall and an additional peripheral portion, the additional peripheral portion being disposed around at least a portion of the cap side wall and connected to the cap side wall to form an accommodating cavity. The elastic arm is disposed in the accommodating cavity and is formed by extending from the additional peripheral portion toward the cap side wall.

**[0023]** According to the cap assembly described above, a free end of the elastic arm is capable of being located in the recess and abuts against the second protrusion to prevent the rotation of the cap assembly in the first direction relative to the component having the opening.

**[0024]** According to the cap assembly described above, the cap assembly further includes an additional top wall connected to the cap side wall and the additional peripheral portion, so as to fully cover the accommodating cavity. A tool receiving through hole is provided in the additional top wall, the tool receiving through hole communicating with the accommodating cavity. The tool receiving through hole extends a distance in a circumferential direction of the cap assembly such that when the operating tool is inserted into the tool receiving through hole and abuts against the elastic arm, the operating tool and the cap assembly together are capable of rotating by a first predetermined angle in the first direction relative to the component having the opening.

**[0025]** According to the cap assembly described above, the elastic arm is provided with a tool blocking portion, the tool blocking portion being located above the recess so as to prevent an operating tool from entering the recess after the operating tool abuts against the elastic arm and removes the elastic arm from the recess.

**[0026]** According to the cap assembly described above, the tool blocking portion is arranged substantially perpendicular to an axial direction of the cap assembly.

**[0027]** According to the cap assembly described above, the cap assembly further includes an additional

top wall connected to the cap side wall and the additional peripheral portion, so as to fully cover the accommodating cavity. A tool receiving through hole is provided in the additional top wall, the tool receiving through hole being aligned with the recess and communicating with the accommodating cavity. When the operating tool is inserted into the tool receiving through hole and abuts against the elastic arm, the operating tool is capable of rotating with the cap assembly in the first direction relative to the component having the opening.

**[0028]** According to the cap assembly described above, the cap assembly further includes a shielding component disposed on the cap and configured to cover the tool receiving through hole. At least a portion of the shielding component is movable relative to the cap, so as to expose the tool receiving through hole.

**[0029]** According to the cap assembly described above, the cap assembly further includes a shielding component disposed on the cap and configured to cover the tool receiving through hole. The shielding component is configured such that upon the shielding component being separated from the cap, a recognizable separation mark is on the shielding component or the cap.

**[0030]** According to the cap assembly described above, the shielding component is provided with a transfer area and is configured such that upon the shielding component being separated from the cap, a text or a pattern in the transfer area is presented on the cap.

**[0031]** According to the cap assembly described above, the cap assembly further includes a covering component mounted on the cap, at least a portion of the covering component extending into the tool receiving through hole, so as to prevent the operating tool from entering the tool receiving through hole.

**[0032]** According to the cap assembly described above, the covering component includes a covering body, an insert piece, and a breakable portion, the covering body being connected to the insert piece by means of the breakable portion, and the covering body being separated from the insert piece when the breakable portion breaks. The covering body is connected to the cap by means of a snap-in structure, and at least a portion of the insert piece extends into the tool receiving through hole when the covering body is connected to the cap.

**[0033]** According to the cap assembly described above, the snap-in structure includes a recess provided in the cap and a protrusion provided on the covering body, the protrusion being capable of being accommodated in the recess.

**[0034]** According to the cap assembly described above, the cap assembly is provided with an information area for recording information related to the opening of the cap.

**[0035]** The present disclosure provides a cap assembly, which can engage with the component having the opening, such that the cap assembly cannot be unlocked without a specific tool (e.g., an operating tool).

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0036]** The features and advantages of the present disclosure can be better understood by reading the following detailed description with reference to accompanying drawings. In all the accompanying drawings, the same reference numeral represents the same component. In the accompanying drawings:

Figs. 1A and 1B are perspective views of a first embodiment of a cap assembly of the present disclosure as viewed from two directions;

Figs. 1C and 1D are exploded views of the cap assembly shown in Fig. 1A as viewed from two directions;

Fig. 2A is a perspective view of a cap shown in Fig. 1A;

Fig. 2B is a sectional view of the cap shown in Fig. 2A along line A-A (i.e., in a vertical direction);

Fig. 2C is a sectional view of the cap shown in Fig. 2B along line B-B (i.e., in a horizontal direction);

Fig. 3 is a perspective view of a portion of a bottle body;

Fig. 4 is a sectional view of a cap assembly and a bottle head of the present disclosure in a locked state;

Fig. 5A is a horizontal sectional view of an operating tool inserted into a recess with the cap assembly shown in Figs. 1A and 1B and the bottle head in the locked state;

Fig. 5B is a sectional view of the cap assembly shown in Figs. 1A and 1B and the bottle head in an unlocking process;

Fig. 6A is a perspective view of a second embodiment of the cap assembly of the present disclosure;

Fig. 6B is a perspective view of a third embodiment of the cap assembly of the present disclosure;

Fig. 7 is a perspective view of a fourth embodiment of the cap assembly of the present disclosure and a bottle head corresponding thereto;

Fig. 8 is a horizontal sectional view of the cap assembly shown in Fig. 7;

Fig. 9 is a horizontal sectional view of the cap assembly and the bottle head shown in Fig. 7 in a locked state;

Fig. 10A is a horizontal sectional view of an operating tool inserted into a recess with the cap assembly and the bottle head shown in Fig. 7 in the locked state;

Fig. 10B is a vertical sectional view of the operating tool inserted into the recess with the cap assembly and the bottle head shown in Fig. 7 in the locked state;

Fig. 11A is a perspective view of a fifth embodiment of the cap assembly of the present disclosure;

Fig. 11B is a perspective view of a covering component as viewed from the inside;

Fig. 12 is a top view of the covering component;

Fig. 13A is a perspective view of a sixth embodiment

of the cap assembly of the present disclosure;

Fig. 13B is a bottle head engaging with the sixth embodiment of the cap assembly;

Fig. 14A is a horizontal sectional view of the sixth embodiment of the cap assembly rotated relative to the bottle head by a second predetermined angle in a second direction after the cap assembly and the bottle head engaging therewith are in a locked state; Fig. 14B is a horizontal sectional view of the cap assembly shown in Fig. 13A and the bottle head shown in Fig. 13B that are rotated in a first direction after the cap assembly is rotated relative to the bottle head by the second predetermined angle in the second direction;

Fig. 15A is a perspective view of a seventh embodiment of the cap assembly of the present disclosure and a bottle head engaging therewith;

Fig. 15B is a horizontal sectional view of the seventh embodiment of the cap assembly rotated relative to the bottom head by a second predetermined angle in a second direction after the cap assembly and the bottle head engaging therewith are in a locked state; and

Fig. 15C is a horizontal sectional view of the cap assembly shown in Fig. 15A and the bottle head shown in Fig. 15B that are rotated in a first direction after the cap assembly is rotated relative to the bottle head by the second predetermined angle in the second direction.

## DETAILED DESCRIPTION OF EMBODIMENTS

**[0037]** Various specific implementations of the present disclosure are described below with reference to the drawings which constitute part of this specification. It should be understood that, in the following accompanying drawings, the same reference numeral is used for the same component.

**[0038]** Various specific implementations of the present disclosure are described below with reference to the drawings which constitute part of this specification. It should be understood that although the terms indicating directions, such as "upper", "lower", "left", "right", "inner", "outer", and so on are used in the present disclosure to describe structural parts and elements in various examples of the present disclosure, these terms are used herein only for ease of description and are determined based on the exemplary orientations as shown in the accompanying drawings. Since the arrangements in the embodiments disclosed in the present disclosure may be in various directions, these terms indicating directions are only illustrative and should not be considered as limitations.

**[0039]** The present disclosure provides a container, including a cap assembly and a container body. At least a portion of the container body forms a component having an opening. The component having the opening may be any component which has an opening and needs to be

closed, such as a bottle and a pipe. The cap assembly can fully close the opening. Further, the cap assembly of the present disclosure can lock or unlock the component having the opening. For ease of description, in the present disclosure, the bottle is described as an example.

**[0040]** Figs. 1A and 1B are perspective views of a first embodiment of the cap assembly of the present disclosure as viewed from two directions. The cap assembly is used for locking a bottle head 300 of the bottle shown in Fig. 3. As shown in Figs. 1A and 1B, the cap assembly includes a cap 102, a valve body 103, an inner cylinder 104, and a sealing ring 106. The cap 102 includes a cap top 122 and a cap side wall 124. Specifically, the cap top 122 is substantially disk-shaped. The inner cylinder 104 is formed by extending downwardly from a lower surface of the cap top 122. A peripheral portion of the inner cylinder 104 is provided with external threads for engaging with internal threads on the bottle head 300 (see Fig. 3). The cap side wall portion 124 is formed by extending downwardly from an outer periphery of the cap top 122 and is arranged around the inner cylinder 104 to form an annular receiving portion 173. The receiving portion 173 has a downward opening for receiving the bottle head 300. The valve body 103 is disposed below the cap top 122, and is disposed inside the inner cylinder 104. The valve body 103 is connected to the cap top 122. The sealing ring 106 is sleeved over the valve body 103 and is used for engaging with an inner wall of the bottle head 300 to seal the bottle head 300.

**[0041]** Figs. 1C and 1D are exploded views of the cap assembly shown in Fig. 1A as viewed from two directions. As shown in Figs. 1C and 1D, the valve body 103 is connected to the cap top 122 by means of a snap-in structure. Specifically, the snap-in structure includes a connection recess 133 provided on a peripheral outer wall of the valve body 103 and a connection protrusion 135 provided on a peripheral inner wall of the inner cylinder 104. The connection recess 133 can receive the connection protrusion 135 such that the valve body 103 is connected to the cap top 122. In other embodiments, the valve body 103 may be connected to the cap top 122 by means of other connection structures (e.g., welding, and integrated forming).

**[0042]** Fig. 2A is a perspective view of the cap 102 shown in Fig. 1A; Fig. 2B is a sectional view of the cap 102 shown in Fig. 2A along line A-A (i.e., in a vertical direction); and Fig. 2C is a sectional view of the cap 102 shown in Fig. 2B along line B-B (i.e., in a horizontal direction). As shown in Figs. 2A to 2C, the cap 102 further includes an additional peripheral portion 202, an additional top wall 204, and an extension post 206. The additional peripheral portion 202 is substantially in an arc shape and is disposed on the cap side wall 124. The additional peripheral portion 202 is disposed around at least a portion of the cap side wall 124 and encloses an accommodating cavity 208 with a portion of the cap side wall 124. The additional top wall 204 is connected to the additional peripheral portion 202 and the cap side wall 124 so as

to form a top wall of the accommodating cavity 208. The extension post 206 is formed by extending upwardly from the additional top wall 204 and is connected to the cap side wall 124. The top of the additional top wall 204 is flush with the cap top 122. A tool receiving through hole 210 extends vertically and runs through the additional top wall 204 and the extension post 206. The tool receiving through hole 210 communicates with the accommodating cavity 208 for receiving an operating tool 500 (see Fig. 5). In this embodiment, the tool receiving through hole 210 extends a distance in a circumferential direction of the cap 102.

**[0043]** As shown in Figs. 2B and 2C, the cap assembly further includes an elastic arm 212. The elastic arm 212 is used for engaging with the bottle head 300 to lock or unlock the bottle head 300. The elastic arm 212 is disposed in the accommodating cavity 208 and is formed by extending inwardly from the additional peripheral portion 202. Specifically, the elastic arm 212 extends obliquely with respect to a radial direction of the cap 102 and is substantially in an arc shape. A free end of the elastic arm 212 is used for engaging with a first protrusion 304, a second protrusion 305, and a recess 306 of the bottle head 300 (see Fig. 3) to lock or unlock the bottle.

**[0044]** In addition, as shown in Fig. 2B, the elastic arm 212 is provided with a guide portion 222. The guide portion 222 is configured such that the operating tool 500 can remove the elastic arm 212 from the recess 306 (see Fig. 3) when the operating tool 500 (see Fig. 5) is moved downwardly in a vertical direction and abuts against the elastic arm 212. In this embodiment, the guide portion 222 is disposed at an upper portion of the free end of the elastic arm 212. The guide portion 222 is an inclined surface, to transform a vertical downward movement of the operating tool 500 (in an axial direction of the cap assembly) into an axial movement of the elastic arm 212 away from the cap assembly.

**[0045]** The cap assembly of the present disclosure can engage with a corresponding bottle to lock or unlock the bottle.

**[0046]** Fig. 3 is a perspective view of a portion of a bottle body. Specifically, Fig. 3 shows the bottle head 300 defining a bottle neck, to engage with the cap assembly of the present disclosure. The rest of the bottle body is shown schematically in dashed lines. As shown in Fig. 3, the bottle head 300 includes a bottle head body 302. The bottle head body 302 is substantially annular and defines an opening 303. An inside wall of the bottle head body 302 is provided with internal threads. The bottle head body 302 can be accommodated in the receiving portion 173 of the cap assembly. The bottle head 300 is provided with the recess 306. In this embodiment, the bottle head 300 includes the first protrusion 304 and the second protrusion 305. The first protrusion 304 and the second protrusion 305 are formed by extending outwardly from the bottle head body 302. In a first direction (e.g., in a counterclockwise direction), the first protrusion 304 is located upstream of the second protrusion 305.

The recess 306 includes a recess between the first protrusion 304 and the second protrusion 305 for receiving at least a portion of the elastic arm 212. The cap assembly is configured such that the at least a portion of the elastic arm 212 can be located in the recess 306 and abuts against a side wall of the recess 306 to prevent the rotation of the cap assembly in the first direction relative to the bottle head, thereby locking the bottle head. In addition, the recess 306 is further configured to be capable of accommodating the operating tool 500 (see Fig. 5).

**[0047]** Fig. 4 is a sectional view of a cap assembly and a bottle head of the present disclosure in a locked state. As shown in Fig. 4, the bottle head 300 is locked by the cap assembly when the cap assembly and the bottle head 300 are in the locked state. Specifically, the free end of the elastic arm 212 of the cap assembly is accommodated in the recess 306. In this case, the free end of the elastic arm 212 abuts against the second protrusion 305 to prevent the rotation of the cap assembly in the first direction (e.g., in the counterclockwise direction) relative to the bottle, such that the cap assembly is locked to the bottle.

**[0048]** It should be noted that although in the present disclosure, the elastic arm 212 is substantially in an arc shape, elastic arms 212 in any other shapes fall within the scope of protection of the present disclosure. In addition, although in this embodiment the free end of the elastic arm 212 is configured to engage with the first protrusion 304, the second protrusion 305, and the recess 306 (see Fig. 3) of the bottle head 300 to lock the bottle, in other embodiments, at least a portion of the elastic arm 212 can abut against the second protrusion 305 to prevent the rotation of the cap assembly in the first direction relative to the bottle.

**[0049]** In addition, with reference to Figs. 4 and 2A, the tool receiving through hole 210 extends a distance in the circumferential direction of the cap 102 such that a portion of the tool receiving through hole 210 is always aligned with the recess 306 during the rotation of the cap assembly relative to the bottle head by a first predetermined angle.

**[0050]** Since the elastic arm 212 of the cap assembly can abut against the second protrusion 305 to prevent the rotation of the cap assembly in the first direction relative to the bottle, the bottle head 300 is locked by the cap assembly. When the bottle head 300 needs to be unlocked, it is necessary to use the operating tool 500 to engage with the cap assembly, such that the elastic arm 212 is removed from the recess 306 to unlock the bottle head 300. In other words, the operating tool 500 enables the elastic arm 212 to be released from the recess 306 to unlock the bottle head 300.

**[0051]** Referring to Figs. 5A and 5B, the process of unlocking the bottle head 300 by the cooperation of the operating tool 500 and the cap assembly will be described below.

**[0052]** Fig. 5A is a horizontal sectional view of the

operating tool 500 inserted into the recess 306 with the cap assembly shown in Figs. 1A and 1B and the bottle head 300 in the locked state. As shown in Fig. 5A, the operating tool 500 is a hex key. When needing to unlock the bottle head, an operator inserts the operating tool 500 into the tool receiving through hole 210. During a vertical downward movement of the operating tool 500 along the axis of the cap assembly, the operating tool 500 abuts against the guide portion 222 of the elastic arm 212 to enable the operating tool 500 to enter the recess 306. During the process of the operating tool 500 entering the recess 306, the operating tool 500 abuts against the elastic arm 212 and removes the elastic arm 212 from the recess 306. Therefore, the second protrusion 305 no longer blocks the path through which the elastic arm 212 rotates in the first direction such that the cap assembly can be rotated in the first direction relative to the bottle head 300. The bottle head is no longer locked by the cap assembly, and the operator can drive the cap assembly to make it rotate in the first direction relative to the bottle head.

**[0053]** Fig. 5B is a sectional view of the cap assembly shown in Figs. 1A and 1B and the bottle head 300 in an unlocking process. Compared to the cap assembly shown in Fig. 5A, the cap assembly shown in Fig. 5B is rotated relative to the bottle head 300 by a first predetermined angle in the first direction. As shown in Fig. 5B, the operating tool 500 is inserted into the recess 306 and abuts against the elastic arm 212, after the cap assembly is rotated relative to the bottle head 300 by the first predetermined angle in the first direction, the second protrusion 305 abuts against the elastic arm 212, so as to prevent at least a portion of the elastic arm 212 from being received in the recess 306. At this point, the bottle head 300 is unlocked from the cap assembly. The operator may withdraw the operating tool 500 and continue to rotate the cap assembly, thereby separating the cap assembly from the bottle head 300.

**[0054]** It should be noted that as shown in Figs. 5A and 5B, during the rotation of the cap assembly relative to the bottle head 300 by the first predetermined angle in the first direction, the operating tool 500 is always inserted into the recess 306 and abuts against the elastic arm 212. In other words, the operating tool 500 does not move relative to the bottle head 300. That is, the cap assembly is rotated relative to the bottle head 300 and the operating tool 500 by the first predetermined angle in the first direction.

**[0055]** In this way, the present disclosure provides a cap assembly, which can engage with the component having the opening (e.g., the bottle body) such that the cap assembly cannot be unlocked without a specific tool (e.g., the operating tool 500).

**[0056]** Fig. 6A is a perspective view of a second embodiment of the cap assembly of the present disclosure. The similarities between the cap assembly shown in Fig. 6A and the cap assembly shown in Figs. 1A and 1B will not be repeated here. The cap assembly shown in Fig. 6A

differs from the cap assembly shown in Figs. 1A and 1B in that the cap assembly shown in Fig. 6A further includes a shielding component 602. The shielding component 602 is disposed on the cap 102 and is configured to shield a through hole 164, thereby preventing the operator from observing the elastic arm 212 through the through hole 164. Specifically, at least a portion of the shielding component 602 can move relative to the cap 102, so as to expose the through hole 164. In the present disclosure, the shielding component 602 includes a shield body 612 and a tongue 614. The shield body 612 is substantially circular. The tongue 614 is connected to the shield body 612 and is formed by extending radially outwardly from the shield body 612. The shield body 612 is connected to the cap 102, and the tongue 614 is configured to covering the through hole 164. As an example, the shielding component 602 is a deformable plastic sheet. The shield body 612 is adhered to a top surface of the cap top 122 so as to be connected to the cap 102. When no external force is applied to the shielding component 602, the shield body 612 and the tongue 614 are substantially in a plane. When there is an external force applied to the tongue 614, the tongue 614 can expose the through hole 164 to allow the operating tool 500 to be inserted into the through hole 164.

**[0057]** It can be understood that in other embodiments, the shielding component 602 may be disposed on the cap 102 in other manners. For example, the shielding component 602 is rotatably connected to cap 102 and covers the through hole 164. When the through hole 164 is needed to be exposed, the operator rotates the shielding component 602 by an angle.

**[0058]** In addition, as shown in Fig. 6A, the shielding component 602 is provided with an information area 622. The information area 622 is used for recording information related to the opening of the cap 102. For example, the information area records "unauthorized opening of the cap is not permitted". In one embodiment, the information area records information about the bottle and/or a fluid stored in the bottle. In another embodiment, the configuration of the information area brings convenience for a user to record information. For example, the user may fill in information in the information area.

**[0059]** Fig. 6B is a perspective view of a third embodiment of the cap assembly of the present disclosure. The similarities between the cap assembly shown in Fig. 6B and the cap assembly shown in Fig. 6A will not be repeated here. The cap assembly shown in Fig. 6B differs from the cap assembly shown in Fig. 6A in that the shielding component 602 in the cap assembly shown in Fig. 6B is configured to shield the tool receiving through hole 210, and the shielding component 602 is configured such that upon the shielding component 602 being separated from the cap, there is a recognizable separation mark on the shielding component 602 or the cap 102, so as to remind the operator that the tool receiving through hole 210 has been exposed. That is, the recognizable separation mark can remind the operator that the cap

assembly may have been opened. For example, the shielding component 602 is made of a material similar to a glass film, the shielding component 602 will be slightly folded during separation of the shielding component 602 from the cap, and cracks similar to glass fragments will be present on the shielding component 602 to remind the operator.

**[0060]** In this embodiment, the shielding component 602 is provided with a transfer area 632. A text or a pattern is presented in the transfer area 632. Upon the shielding component 602 being separated from the cap, the text or the pattern in the transfer area 632 is presented on the cap 102 to remind the operator. The text or the pattern in the transfer area 632 is formed by using a certain adhesive and an acrylic adhesive.

**[0061]** Fig. 7 is a perspective view of a fourth embodiment of the cap assembly of the present disclosure and a bottle head 700 corresponding thereto. The similarities between the cap assembly shown in Fig. 7 and the cap assembly shown in Figs. 1A and 1B and the similarities between the bottle head 700 shown in Fig. 7 and the bottle head 300 shown in Fig. 3 will not be repeated here. The bottle head 700 shown in Fig. 7 differs from the bottle head 300 shown in Fig. 3 in that the second protrusion 305 of the bottle head 700 shown in Fig. 7 is provided with an additional recess 702. The recess 306 includes the additional recess 702 and a recess between the first protrusion 304 and the second protrusion 305. The additional recess 702 communicates with the recess between the first protrusion 304 and the second protrusion 305. The additional recess 702 has a first wall 702 extending in a radial direction, a second wall 704 extending perpendicular to the first wall 702 and in an axial direction of the bottle head 700, and a third wall 706 perpendicular to the first wall 702 and the second wall 704. The additional recess 702 is configured to engage with the elastic arm 212. The difference between the cap assembly shown in Fig. 7 and the cap assembly shown in Figs. 1A and 1B will be described primarily with reference to Fig. 8.

**[0062]** Fig. 8 is a horizontal sectional view of the cap assembly shown in Fig. 7. As shown in Fig. 8, the elastic arm 212 is provided with a tool blocking portion 802. The tool blocking portion 802 is disposed substantially perpendicular to an axial direction of the cap assembly. That is, the tool blocking portion 802 extends in a direction perpendicular to the extension direction of the elastic arm 212. When the free end of the elastic arm 212 is accommodated in the recess 306, the tool blocking portion 802 is located above the recess 306 and is configured to prevent the operating tool 500 from entering the recess 306.

**[0063]** Fig. 9 is a horizontal sectional view of the cap assembly and the bottle head 700 shown in Fig. 7 in a locked state. As shown in Fig. 9, the bottle head 700 is locked by the cap assembly when the cap assembly and the bottle head 700 are in the locked state. Specifically, the free end of the elastic arm 212 of the cap assembly is accommodated in the additional recess 702. In this case,

the free end of the elastic arm 212 abuts against the second protrusion 305 to prevent the rotation of the cap assembly in the first direction (e.g., in the counterclockwise direction) relative to the bottle. When the cap assembly and the bottle head 700 are in the locked state, the tool blocking portion 802 is located above the recess 306.

**[0064]** Since the elastic arm 212 of the cap assembly can abut against the second protrusion 305 to prevent the rotation of the cap assembly in the first direction relative to the bottle, the bottle head 300 is locked by the cap assembly. When the bottle head 300 needs to be unlocked, it is necessary to engage the operating tool 500 with the cap assembly, such that the elastic arm 212 is removed from the recess 306 to unlock the bottle head 300. In other words, the operating tool 500 enables the elastic arm 212 to be released from the recess 306 to unlock the bottle head 300.

**[0065]** Referring to Figs. 10A and 10B, the process of unlocking the bottle head 300 by the cooperation between the operating tool 500 and the fourth embodiment of the cap assembly will be described below.

**[0066]** Fig. 10A is a horizontal sectional view of the operating tool 500 inserted into the recess 306 with the cap assembly shown in Fig. 7 and the bottle head 700 in the locked state. Fig. 10B is a vertical sectional view of the operating tool 500 inserted into the recess 306 with the cap assembly and the bottle head 700 shown in Fig. 7 in the locked state. As shown in Figs. 10A and 10B, the operating tool 500 is a hex key. When it is needed to unlock the bottle head 700, an operator inserts the operating tool 500 into the tool receiving through hole 210. During the process of the operating tool 500 moving vertically downwardly along the axis of the cap assembly until it comes into contact with the tool blocking portion 802, the operating tool 500 abuts against the guide portion 222 of the elastic arm 212 so as to remove the elastic arm 212 from the additional recess 702 of the recess 306. Therefore, the second protrusion 305 no longer blocks the path through which the elastic arm 212 rotates in the first direction. The bottle head 700 is no longer locked by the cap assembly, and the operator can drive the cap assembly to rotate in the first direction relative to the bottle head 700 so as to unlock the bottle head 700.

**[0067]** It should be noted that the tool blocking portion 802 is located above the recess 306 so as to prevent the operating tool 500 from entering the recess 306 after the operating tool 500 abuts against elastic arm 212 and removes the elastic arm 212 from the additional recess 702.

**[0068]** It should be further noted that during the rotation of the cap assembly relative to the bottle head 700 by the first predetermined angle in the first direction, the operating tool 500 together with the cap cover is rotated in the first direction relative to the bottle head 700. In other words, the tool receiving through hole 210 provided in the cap assembly shown in Fig. 7 is configured to accommodate the operating tool 500.



**[0069]** In addition, in this embodiment, the second protrusion 305 is provided with the additional recess 702 which forms the recess 306 together with the recess between the first protrusion 304 and the second protrusion 305, but in other embodiments, no additional recess 702 can be provided in the bottle head 700.

**[0070]** Fig. 11A is a perspective view of a fifth embodiment of the cap assembly of the present disclosure. Fig. 11B is a perspective view of a covering component 1102 as viewed from the inside. The similarities between the fifth embodiment of the cap assembly and the fourth embodiment of the cap assembly will not be repeated here. The primary difference lies in that the cap assembly shown in Figs. 11A and 11B further includes the covering component 1102. The covering component 1102 is mounted on the cap 102, and at least a portion of the covering component 702 can extend into the tool receiving through hole 210 so as to prevent the operating tool 500 from entering the tool receiving through hole 210. Specifically, the covering component 1102 includes a covering body 1104 and an insert piece 1106. The covering body 1104 is connected to the cap 102 by means of a snap-in structure. The snap-in structure includes a recess 1110 provided on the cap assembly and a protrusion 1112 provided on the covering body 1104. The recess 1110 is provided on the additional peripheral portion 202 and is formed by extending inwardly from the additional peripheral portion 202. The protrusion 1112 is formed by extending from the covering body 1104 toward the cap assembly. The protrusion 1112 can be inserted into the recess 1110 such that the covering body 1104 is connected to the cap 102.

**[0071]** Fig. 12 is a top view of the covering component 1102. As shown in Fig. 12, the covering body 1104 is provided with a through hole 1204. The insert piece 1106 can be inserted into the through hole 1204. The covering component 1102 further includes two breakable portions 1224. The two breakable portions 1224 are disposed on opposite sides of the insert piece 1106. The covering body 1104 is connected to the insert piece 1106 by means of the breakable portions 1224, and the covering body 1104 is separated from the insert piece 1106 when the breakable portions 1224 break. The top of the insert piece 1106 is provided with a counter bore 1214. The counter bore 1214 is configured to receive at least a portion of the operating tool 500. In this embodiment, that counter bore 1214 is substantially hexagonal in shape for receiving the hex key. When the cap assembly and the bottle head are in the locked state, the operator may insert the insert piece 1106 of the covering component 1102 into the tool receiving through hole 210 while connecting the covering component 1102 to the cap assembly by means of the snap-in structure such that at least a portion (e.g., a lower end) of the insert piece 1106 extends into the tool receiving through hole 210. Before unlocking the bottle head, the operator inserts the operating tool 500 into the counter bore 1214 and rotates the insert piece 1106 such that the breakable portions 1224 break and the insert piece

1106 is separated from the covering body 1104. After the operator removes the insert piece 1106, the operator can insert the operating tool 500 into the tool receiving through hole 210 so as to unlock the cap assembly.

**[0072]** Fig. 13A is a perspective view of a sixth embodiment of the cap assembly of the present disclosure. The similarities between the cap assembly shown in Fig. 13A and the cap assembly shown in Figs. 1A and 1B will not be repeated here. The sixth embodiment of the cap assembly shown in Fig. 13A differs from the first embodiment of the cap assembly shown in Fig. 3 in that the cap assembly shown in Fig. 13A further includes a limiting portion 1302. The limiting portion 1302 is formed by extending downwardly from the cap side wall 124 of the cap 102 and configured to engage with a bottle head corresponding thereto.

**[0073]** Fig. 13B is a perspective view of the bottle head 1300 engaging with the sixth embodiment of the cap assembly. The similarities between the bottle head 1300 shown in Fig. 13B and the bottle head 300 shown in Fig. 3 will not be repeated here. The bottle head 1300 shown in Fig. 13B differs from the bottle head 300 shown in Fig. 3 in that the first protrusion 304 is higher than the second protrusion 305 in the axial direction of the cap assembly. More specifically, an upper surface of the first protrusion 304 is higher than an upper surface of the second protrusion 305, so that when the cap assembly is rotated relative to the bottle head 1300 by a second predetermined angle in a second direction (e.g., the clockwise direction) opposite to the first direction, the limiting portion 1302 can pass over the second protrusion 305 and abut against the first protrusion 304 in the circumferential direction of the assembly, thereby preventing the cap assembly from further rotating in the second direction relative to the bottle head 1300.

**[0074]** Referring to Figs. 14A and 14B, part of the process of unlocking the bottle head 1300 by the cooperation between the cap assembly of the sixth embodiment, the operating tool 500 and the bottle head 1300 will be described below.

**[0075]** Fig. 14A is a horizontal sectional view of the cap assembly shown in Fig. 13A rotated relative to the bottle head 1300 shown in Fig. 13B by a second predetermined angle in a second direction after the cap assembly and the bottle head 1300 are in a locked state. Fig. 14B is a horizontal sectional view of the cap assembly shown in Fig. 13A and the bottle head 1300 shown in Fig. 13B that are rotated in a first direction after the cap assembly is rotated relative to the bottle head 1300 by the second predetermined angle in the second direction. As shown in Fig. 14A, when it is needed to unlock the bottle head 1300, the operator rotates the cap assembly relative to the bottle head 1300 by the second predetermined angle in the second direction. During the rotation of the cap assembly in the second direction relative to the bottle head 1300, the first protrusion 304 abuts against the elastic arm 212 to remove the elastic arm 212 from the recess 306, so as to allow the operating tool 500 to be

inserted into the recess 306.

**[0076]** After the cap assembly is rotated relative to the bottle head 1300 by the second predetermined angle in the second direction, referring to Figs. 13A and 13B, the limiting portion 1302 abuts against the first protrusion 304 to prevent the cap assembly from further rotating in the second direction relative to the bottle head 1300. In this case, the operator inserts the operating tool 500 into the recess 306 through the tool receiving through hole 210. In this way, the operating tool 500 can abut against the elastic arm 212 to prevent the elastic arm 212 from entering the recess 306.

**[0077]** Then, as shown in Fig. 14B, the operator may rotate the cap assembly in the first direction relative to the bottle head 1300. In this case, the second protrusion 305 no longer blocks the path through which the elastic arm 212 rotates in the first direction such that the cap assembly can be rotated in the first direction relative to the bottle head 1300, and the bottle head 1300 is no longer locked by the cap assembly.

**[0078]** Fig. 15A is a perspective view of a seventh embodiment of the cap assembly of the present disclosure and a bottle head engaging therewith. The similarities between the cap assembly shown in Fig. 15A and the fourth embodiment of the cap assembly shown in Fig. 7 and the similarities between the bottle head shown in Fig. 15A and the bottle head shown in Fig. 7 will not be repeated here. The seventh embodiment of the cap assembly shown in Fig. 15A differs from the fourth embodiment of the cap assembly shown in Fig. 7 in that the cap assembly shown in Fig. 15A further includes a limiting portion (not shown) formed by extending downwardly from the cap side wall 124 of the cap 102, and the first protrusion 304 on the bottle head is higher than the second protrusion 305 in the axial direction of the cap assembly. For details, reference may be made to the sixth embodiment. In this way, when the cap assembly is rotated relative to the bottle head by a second predetermined angle in a second direction (e.g., the clockwise direction) opposite to a first direction, the limiting portion can pass over the second protrusion 305 and abut against the first protrusion 304, thereby preventing the cap assembly from further rotating in the second direction relative to the bottle head.

**[0079]** Referring to Figs. 15B and 15C, part of the process of unlocking the bottle head by the cooperation between the seventh embodiment of the cap assembly, the operating tool 500 and the bottle head will be described below.

**[0080]** Fig. 15B is a horizontal sectional view of the cap assembly rotated relative to the bottle head by the second predetermined angle in the second direction after the cap assembly and the bottle head shown in Fig. 15A are in a locked state. Fig. 15C is a horizontal sectional view of the cap assembly shown in Fig. 15A and the bottle head shown in Fig. 15B that are rotated in the first direction after the cap assembly is rotated relative to the bottle head by the second predetermined angle in the second

direction. As shown in Fig. 15B, when it is needed to unlock the bottle head, the operator rotates the cap assembly relative to the bottle head by the second predetermined angle in the second direction. During the rotation of the cap assembly in the second direction relative to the bottle head, the first protrusion 304 abuts against the elastic arm 212 to remove the elastic arm 212 from the additional recess 702 of the recess 306, so as to allow the operating tool 500 to be inserted into the recess 306.

**[0081]** After the cap assembly is rotated relative to the bottle head by the second predetermined angle in the second direction, referring to Fig. 15B, the limiting portion abuts against the first protrusion 304 (not shown) to prevent the cap assembly from further rotating in the second direction relative to the bottle head. In this case, the operator inserts the operating tool 500 into the tool receiving through hole 210. In this case, the operating tool 500 can abut against the elastic arm 212.

**[0082]** Then, as shown in Fig. 15C, the operator may rotate the cap assembly and the operating tool 500 in the first direction relative to the bottle head. In this case, the operating tool 500 keeps abutting against the elastic arm 212, the second protrusion 305 cannot prevent the elastic arm 212 from rotating in the first direction such that the cap assembly can be rotated in the first direction relative to the bottle head, and the bottle head is no longer locked by the cap assembly.

**[0083]** Although the present disclosure is described with reference to the examples of the embodiments outlined above, various alternatives, modifications, variations, improvements and/or substantial equivalents, which are known or can be anticipated at present or to be anticipated before long, may be obvious to those of at least ordinary skill in the art. In addition, the technical effects and/or technical problems described in this specification are exemplary rather than limiting; Therefore, the disclosure in this specification may be used to solve other technical problems and have other technical effects and/or may solve other technical problems. Accordingly, the examples of the embodiments of the present disclosure as set forth above are intended to be illustrative rather than limiting. Various changes may be made without departing from the spirit or scope of the present disclosure. Therefore, the present disclosure is intended to embrace all known or earlier disclosed alternatives, modifications, variations, improvements and/or substantial equivalents.

**[0084]** Certain embodiments of the invention are described in the following clauses:

Clause 1. A container, comprising:

a component having an opening, the component having the opening comprising a body surrounding the opening, and a first protrusion and a second protrusion, the first protrusion and the second protrusion being formed by extending

outwardly from the body, a recess being formed between the first protrusion and the second protrusion, and the first protrusion being located upstream of the second protrusion in a first direction; and

a cap assembly capable of locking or unlocking the component having the opening, the cap assembly comprising:

a cap; and  
an elastic arm disposed on the cap and extending obliquely with respect to a radial direction of the cap;

wherein at least a portion of the elastic arm is capable of being received in the recess and abuts against the second protrusion to prevent the cap assembly from rotating in the first direction relative to the component having the opening, such that the cap assembly is locked with the component having the opening; and wherein the at least a portion of the elastic arm is capable of being released from the recess to unlock the component having the opening.

Clause 2. The container according to clause 1, wherein

an operating tool is capable of abutting against the elastic arm and removing the elastic arm from the recess to enable the cap assembly to rotate in the first direction relative to the component having the opening to unlock the component having the opening.

Clause 3. The container according to clause 2, wherein

the elastic arm is provided with a guide portion; wherein the guide portion is configured such that the operating tool is capable of removing the elastic arm from the recess when the operating tool is moved in an axial direction of the cap assembly and abuts against the elastic arm.

Clause 4. The container according to clause 2, wherein

the operating tool abuts against the elastic arm, after the cap assembly has been rotated relative to the component having the opening by a first predetermined angle in the first direction, the second protrusion abuts against the elastic arm so as to prevent at least part of the elastic arm from being received in the recess.

Clause 5. The container according to clause 2, wherein

after the cap assembly has been rotated relative to the component having the opening by a second

predetermined angle in a second direction opposite to the first direction, the first protrusion abuts against the elastic arm to remove the elastic arm from the recess, so as to allow the operating tool to be inserted into the recess.

Clause 6. The container according to clause 5, wherein

the cap assembly further comprises a limiting portion formed by extending downwardly from the cap; and  
the first protrusion is higher than the second protrusion in an axial direction of the cap assembly;  
wherein the limiting portion abuts against the first protrusion when the cap assembly is rotated relative to the component having the opening by the second predetermined angle in the second direction opposite to the first direction, so as to prevent the cap assembly from further rotating relative to the component having the opening in the second direction opposite to the first direction.

Clause 7. The container according to clause 2, wherein

the cap comprises a cap side wall and an additional peripheral portion, the additional peripheral portion being disposed around at least a portion of the cap side wall and connected to the cap side wall to form an accommodating cavity; and  
the elastic arm is disposed in the accommodating cavity and is formed by extending from the additional peripheral portion toward the cap side wall.

Clause 8. The container according to clause 1, wherein

a free end of the elastic arm is capable of being located in the recess and abuts against the second protrusion to prevent the cap assembly from rotating in the first direction relative to the component having the opening.

Clause 9. The container according to clause 7, wherein the cap assembly further comprises:

an additional top wall connected to the cap side wall and the additional peripheral portion, so as to fully cover the accommodating cavity; and  
a tool receiving through hole is provided in the additional top wall, the tool receiving through hole communicating with the accommodating cavity;  
wherein the tool receiving through hole extends

a distance in a circumferential direction of the cap assembly such that when the operating tool is inserted into the tool receiving through hole and abuts against the elastic arm, the cap assembly is capable of rotating by a first predetermined angle in the first direction relative to the operating tool and the component having the opening.

Clause 10. The container according to clause 7, wherein

the elastic arm is provided with a tool blocking portion, the tool blocking portion being located above the recess so as to prevent the operating tool from entering the recess after the operating tool abuts against the elastic arm and removes the elastic arm from the recess.

Clause 11. The container according to clause 10, further comprising:

an additional top wall connected to the cap side wall and the additional peripheral portion, so as to fully cover the accommodating cavity; wherein

a tool receiving through hole is provided in the additional top wall, the tool receiving through hole being aligned with the recess and communicating with the accommodating cavity; wherein after the operating tool is inserted into the tool receiving through hole and abuts against the elastic arm, the operating tool is capable of rotating with the cap assembly in the first direction relative to the component having the opening.

Clause 12. The container according to clause 9 or 11, further comprising:

a shielding component disposed on the cap and configured to shield the tool receiving through hole; wherein

at least a portion of the shielding component is movable relative to the cap, so as to expose the tool receiving through hole.

Clause 13. The container according to clause 9 or 11, further comprising:

a shielding component disposed on the cap and configured to shield the tool receiving through hole; wherein

the shielding component is configured such that upon the shielding component being separated from the cap, a recognizable separation mark is on the shielding component or the cap.

Clause 14. The container according to clause 9 or 11,

further comprising:

a covering component mounted on the cap, at least a portion of the covering component extends into the tool receiving through hole, so as to prevent the operating tool from entering the tool receiving through hole.

Clause 15. The container according to clause 14, wherein

the covering component comprises a covering body, an insert piece, and a breakable portion, the covering body being connected to the insert piece by means of the breakable portion, and the covering body being separated from the insert piece when the breakable portion breaks; and the covering body is connected to the cap assembly by means of a snap-in structure, and at least a portion of the insert piece extends into the tool receiving through hole when the covering body is connected to the cap assembly.

Clause 16. The container according to clause 15, wherein

the snap-in structure comprises a recess provided in the cap assembly and a protrusion provided on the covering body, the protrusion being capable of being accommodated in the recess.

Clause 17. A cap assembly, the cap assembly being capable of locking and unlocking a component having an opening, the component having the opening comprising a body, and a first protrusion and a second protrusion, the first protrusion and the second protrusion being formed by extending outwardly from the body, a recess being formed between the first protrusion and the second protrusion, and the first protrusion being located upstream of the second protrusion in a first direction, the cap assembly comprising:

a cap; and

an elastic arm disposed on the cap and extending obliquely with respect to a radial direction of the cap;

wherein at least a portion of the elastic arm is capable of being received in the recess and abuts against the second protrusion to prevent the cap assembly from rotating in the first direction relative to the component having the opening, such that the cap assembly is locked with the component having the opening; and wherein the at least a portion of the elastic arm is capable of being released from the recess to unlock the component having the opening.

Clause 18. The cap assembly according to clause 17, wherein

the cap comprises a cap side wall and an additional peripheral portion, the additional peripheral portion being disposed around at least a portion of the cap side wall and connected to the cap side wall to form an accommodating cavity; and  
the elastic arm is disposed in the accommodating cavity and is formed by extending from the additional peripheral portion toward the cap side wall.

Clause 19. The cap assembly according to clause 17, wherein  
a free end of the elastic arm is capable of being located in the recess and abuts against the second protrusion to prevent the cap assembly from rotating in the first direction relative to the component having the opening.

Clause 20. The cap assembly according to clause 18, wherein the cap assembly further comprises:

an additional top wall connected to the cap side wall and the additional peripheral portion, so as to fully cover the accommodating cavity; and  
a tool receiving through hole is provided in the additional top wall, the tool receiving through hole communicating with the accommodating cavity;  
wherein the tool receiving through hole extends a distance in a circumferential direction of the cap assembly such that when the operating tool is inserted into the tool receiving through hole and abuts against the elastic arm, the operating tool and the cap assembly together are capable of rotating by a first predetermined angle in the first direction relative to the component having the opening.

Clause 21. The cap assembly according to clause 18, wherein  
the elastic arm is provided with a tool blocking portion, the tool blocking portion being located above the recess so as to prevent an operating tool from entering the recess after the operating tool abuts against the elastic arm and removes the elastic arm from the recess.

Clause 22. The cap assembly according to clause 21, wherein  
the tool blocking portion is arranged substantially perpendicular to an axial direction of the cap assembly.

Clause 23. The cap assembly according to clause 21, further comprising:

an additional top wall connected to the cap side

wall and the additional peripheral portion, so as to fully cover the accommodating cavity; wherein

a tool receiving through hole is provided in the additional top wall, the tool receiving through hole being aligned with the recess and communicating with the accommodating cavity;  
wherein after the operating tool is inserted into the tool receiving through hole and abuts against the elastic arm, the operating tool is capable of rotating with the cap assembly in the first direction relative to the component having the opening.

Clause 24. The cap assembly according to clause 20 or 23, further comprising:

a shielding component disposed on the cap and configured to shield the tool receiving through hole;  
at least a portion of the shielding component is movable relative to the cap, so as to expose the tool receiving through hole.

Clause 25. The cap assembly according to clause 20 or 23, further comprising:

a covering component mounted on the cap, at least a portion of the covering component extending into the tool receiving through hole, so as to prevent the operating tool from entering the tool receiving through hole.

Clause 26. The cap assembly according to clause 25, wherein

the covering component comprises a covering body, an insert piece, and a breakable portion, the covering body being connected to the insert piece by means of the breakable portion, and the covering body being separated from the insert piece when the breakable portion breaks; and  
the covering body is connected to the cap by a snap-in structure, and at least a portion of the insert piece extends into the tool receiving through hole when the covering body is connected to the cap.

Clause 27. The cap assembly according to clause 26, wherein

the snap-in structure comprises a recess provided in the cap and a protrusion provided on the covering body, the protrusion being capable of being accommodated in the recess.

## Claims

1. A container, comprising:

a component having an opening, the component having the opening comprising a body surrounding the opening, and a first protrusion and a second protrusion, the first protrusion and the second protrusion being formed by extending 5  
outwardly from the body, a recess being formed between the first protrusion and the second protrusion, and the first protrusion being located upstream of the second protrusion in a first direction; and 10  
a cap assembly capable of locking or unlocking the component having the opening, the cap assembly comprising:

a cap; and 15  
an elastic arm disposed on the cap and extending obliquely with respect to a radial direction of the cap;

wherein at least a portion of the elastic arm is 20  
capable of being received in the recess and abuts against the second protrusion to prevent the cap assembly from rotating in the first direction relative to the component having the opening, such that the cap assembly is locked with 25  
the component having the opening; and wherein the at least a portion of the elastic arm is capable of being released from the recess to unlock the component having the opening. 30

2. The container according to claim 1, wherein an operating tool is capable of abutting against the elastic arm and removing the elastic arm from the recess to enable the cap assembly to rotate in the first direction relative to the component having the opening to unlock the component having the opening. 35

3. The container according to claim 2, wherein 40

the elastic arm is provided with a guide portion; wherein the guide portion is configured such that the operating tool is capable of removing the elastic arm from the recess when the operating tool is moved in an axial direction of the cap assembly and abuts against the elastic arm, or wherein 45  
the operating tool abuts against the elastic arm, after the cap assembly has been rotated relative to the component having the opening by a first predetermined angle in the first direction, the second protrusion abuts against the elastic arm so as to prevent at least part of the elastic arm from being received in the recess. 50

4. The container according to claim 2, wherein 55

after the cap assembly has been rotated relative

to the component having the opening by a second predetermined angle in a second direction opposite to the first direction, the first protrusion abuts against the elastic arm to remove the elastic arm from the recess, so as to allow the operating tool to be inserted into the recess, and optionally wherein

the cap assembly further comprises a limiting portion formed by extending downwardly from the cap; and

the first protrusion is higher than the second protrusion in an axial direction of the cap assembly;

wherein the limiting portion abuts against the first protrusion when the cap assembly is rotated relative to the component having the opening by the second predetermined angle in the second direction opposite to the first direction, so as to prevent the cap assembly from further rotating relative to the component having the opening in the second direction opposite to the first direction.

5. A cap assembly, the cap assembly being capable of locking and unlocking a component having an opening, the component having the opening comprising a body, and a first protrusion and a second protrusion, the first protrusion and the second protrusion being formed by extending outwardly from the body, a recess being formed between the first protrusion and the second protrusion, and the first protrusion being located upstream of the second protrusion in a first direction, the cap assembly comprising:

a cap; and  
an elastic arm disposed on the cap and extending obliquely with respect to a radial direction of the cap;

wherein at least a portion of the elastic arm is capable of being received in the recess and abuts against the second protrusion to prevent the cap assembly from rotating in the first direction relative to the component having the opening, such that the cap assembly is locked with the component having the opening; and wherein the at least a portion of the elastic arm is capable of being released from the recess to unlock the component having the opening.

6. The container according to claim 2 or the cap assembly according to claim 5, wherein

the cap comprises a cap side wall and an additional peripheral portion, the additional peripheral portion being disposed around at least a portion of the cap side wall and connected to the cap side wall to form an accommodating cavity; and

the elastic arm is disposed in the accommodating cavity and is formed by extending from the additional peripheral portion toward the cap side wall.

7. The container according to claim 1 or the cap assembly according to claim 5, wherein a free end of the elastic arm is capable of being located in the recess and abuts against the second protrusion to prevent the cap assembly from rotating in the first direction relative to the component having the opening.

8. The container or the cap assembly according to claim 6, wherein the cap assembly further comprises:

an additional top wall connected to the cap side wall and the additional peripheral portion, so as to fully cover the accommodating cavity; and a tool receiving through hole is provided in the additional top wall, the tool receiving through hole communicating with the accommodating cavity; wherein the tool receiving through hole extends a distance in a circumferential direction of the cap assembly such that when the operating tool is inserted into the tool receiving through hole and abuts against the elastic arm, the operating tool and the cap assembly together are capable of rotating by a first predetermined angle in the first direction relative to the component having the opening.

9. The container or the cap assembly according to claim 6, wherein the elastic arm is provided with a tool blocking portion, the tool blocking portion being located above the recess so as to prevent an operating tool from entering the recess after the operating tool abuts against the elastic arm and removes the elastic arm from the recess.

10. The cap assembly according to claim 9, wherein the tool blocking portion is arranged substantially perpendicular to an axial direction of the cap assembly.

11. The container or the cap assembly according to claim 9, further comprising:

an additional top wall connected to the cap side wall and the additional peripheral portion, so as to fully cover the accommodating cavity; wherein

a tool receiving through hole is provided in the additional top wall, the tool receiving through hole being aligned with the recess and commu-

nicating with the accommodating cavity; wherein after the operating tool is inserted into the tool receiving through hole and abuts against the elastic arm, the operating tool is capable of rotating with the cap assembly in the first direction relative to the component having the opening.

12. The container or the cap assembly according to claim 8 or 11, further comprising:

a shielding component disposed on the cap and configured to shield the tool receiving through hole;

at least a portion of the shielding component is movable relative to the cap, so as to expose the tool receiving through hole.

13. The container according to claim 8 or 11, further comprising:

a shielding component disposed on the cap and configured to shield the tool receiving through hole; wherein

the shielding component is configured such that upon the shielding component being separated from the cap, a recognizable separation mark is on the shielding component or the cap.

14. The container or the cap assembly according to claim 8 or 11, further comprising:

a covering component mounted on the cap, at least a portion of the covering component extending into the tool receiving through hole, so as to prevent the operating tool from entering the tool receiving through hole.

15. The container or the cap assembly according to claim 14, wherein

the covering component comprises a covering body, an insert piece, and a breakable portion, the covering body being connected to the insert piece by means of the breakable portion, and the covering body being separated from the insert piece when the breakable portion breaks; and the covering body is connected to the cap by a snap-in structure, and at least a portion of the insert piece extends into the tool receiving through hole when the covering body is connected to the cap, and optionally wherein the snap-in structure comprises a recess provided in the cap and a protrusion provided on the covering body, the protrusion being capable of being accommodated in the recess.

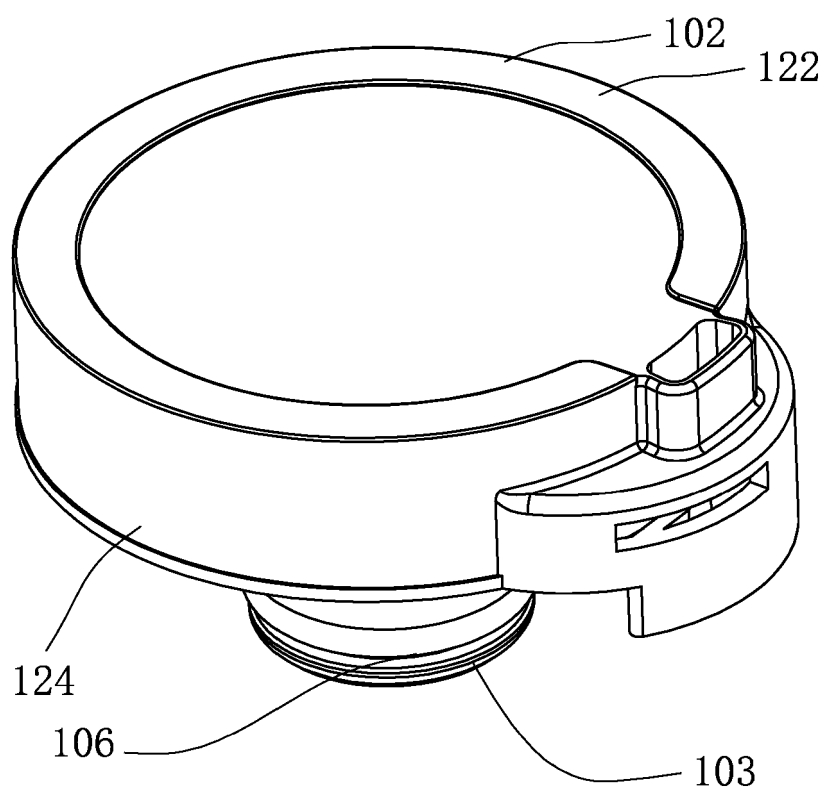


Fig. 1A



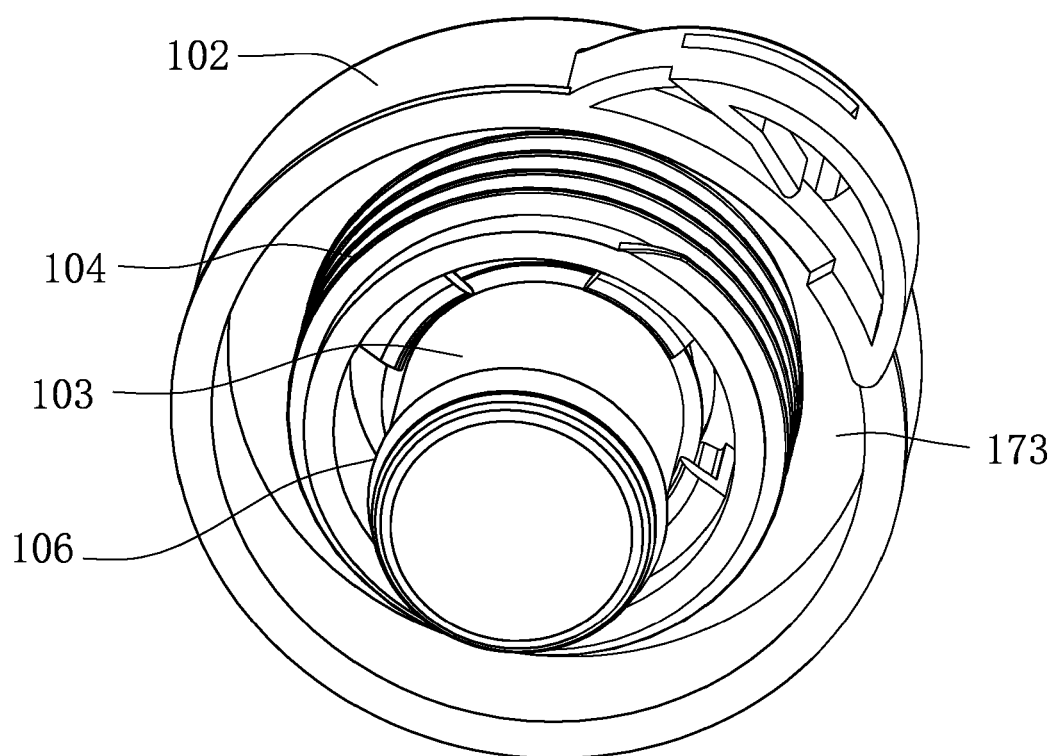


Fig. 1B

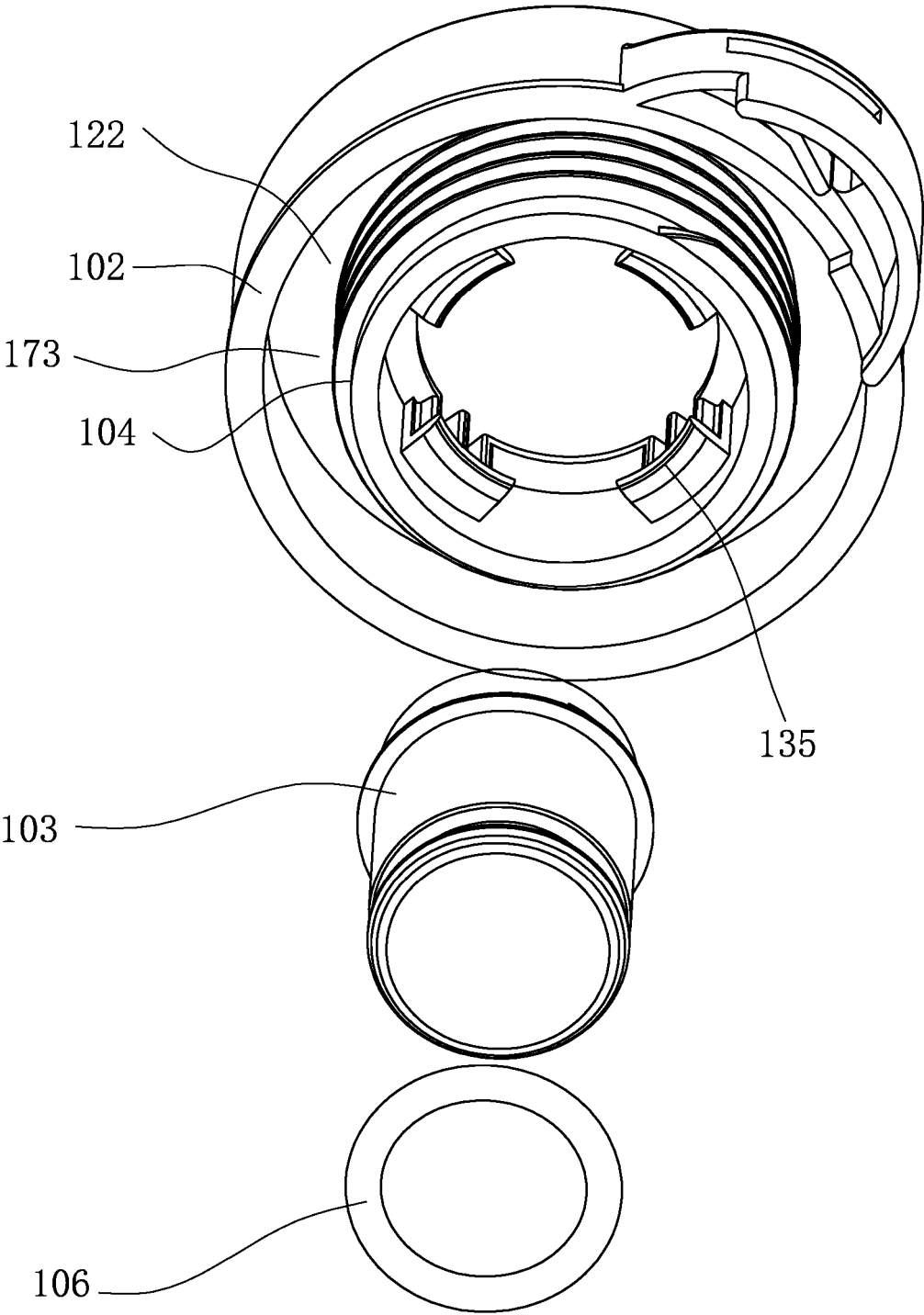


Fig. 1C

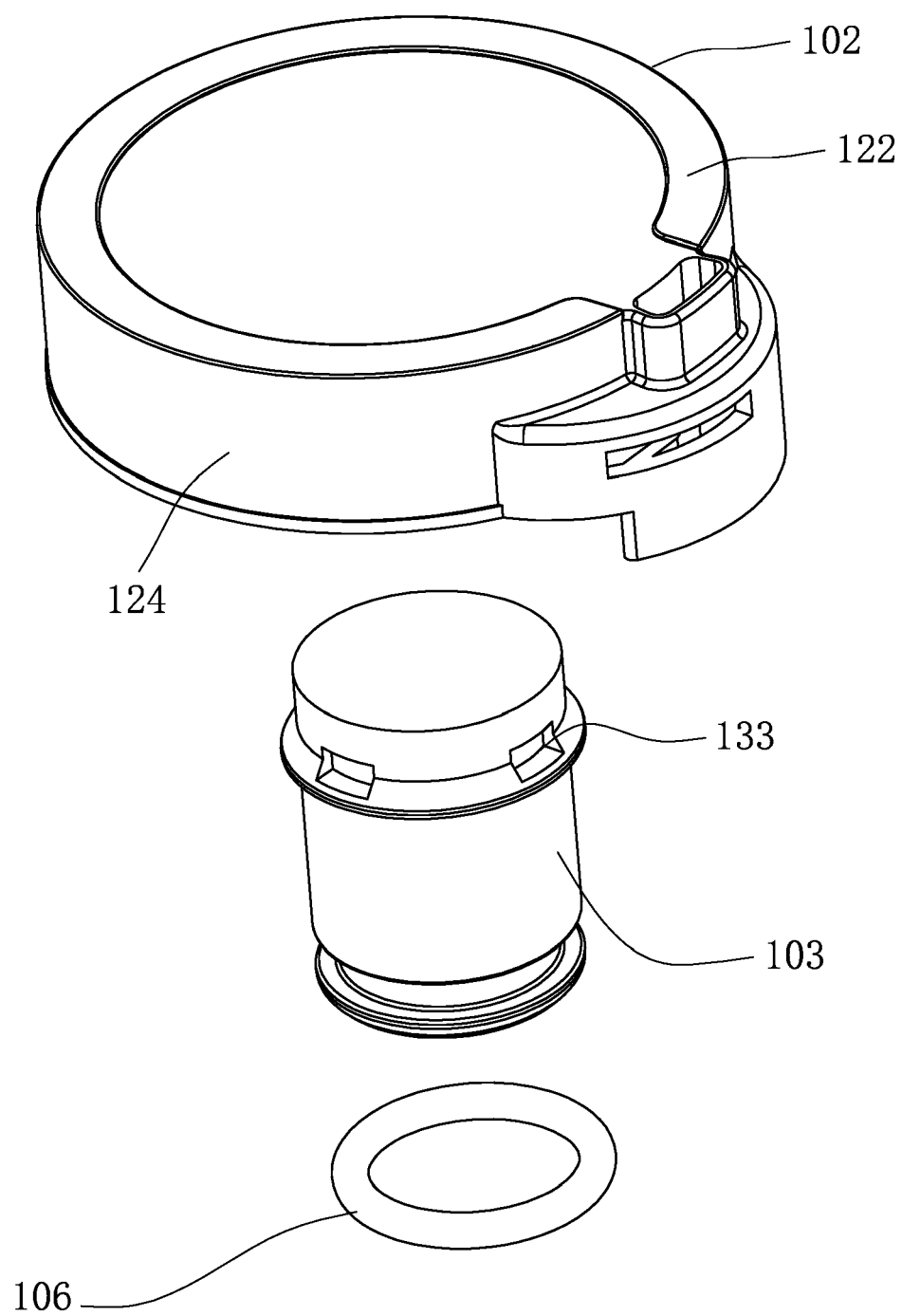


Fig. 1D

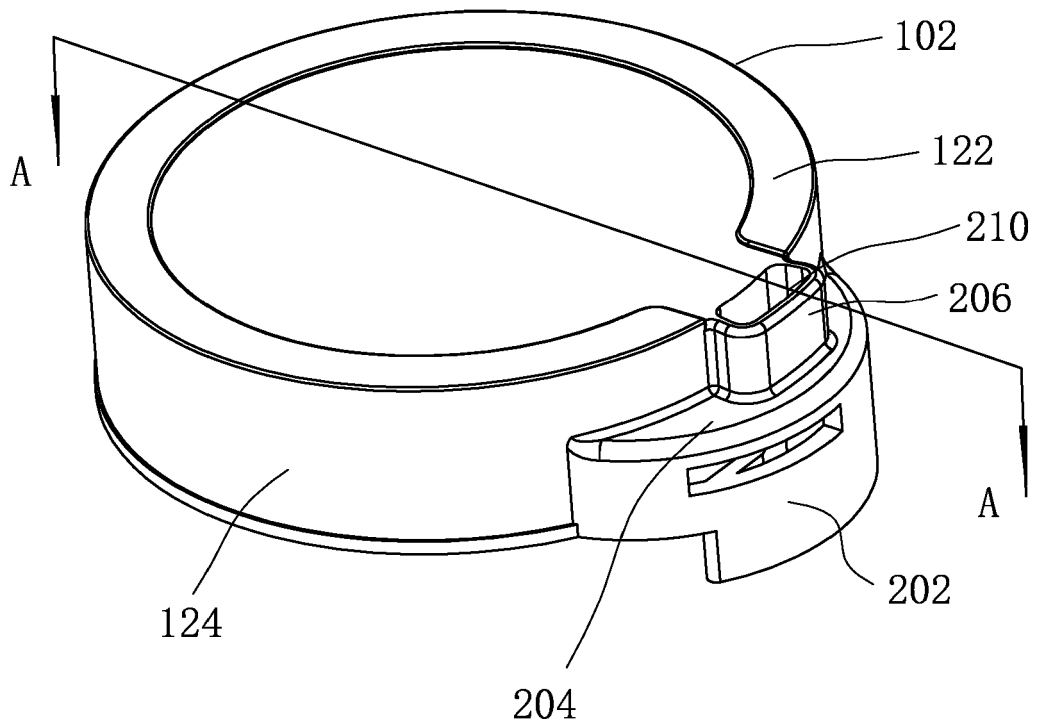


Fig. 2A

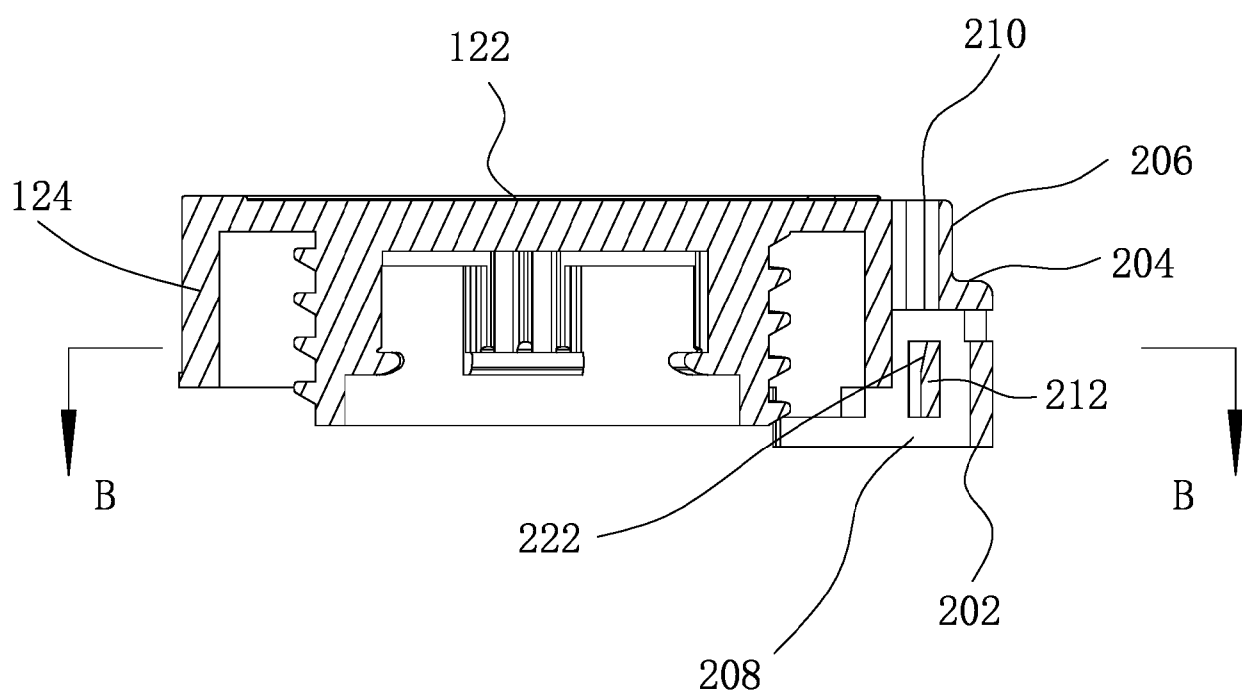


Fig. 2B

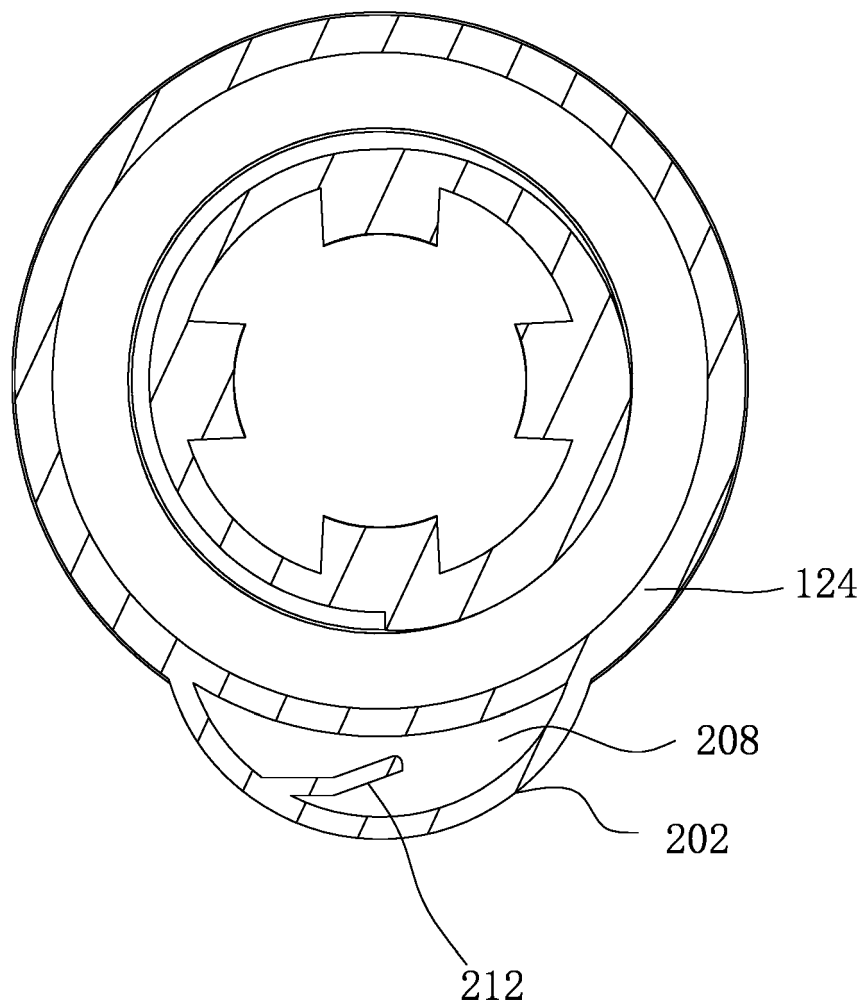


Fig. 2C

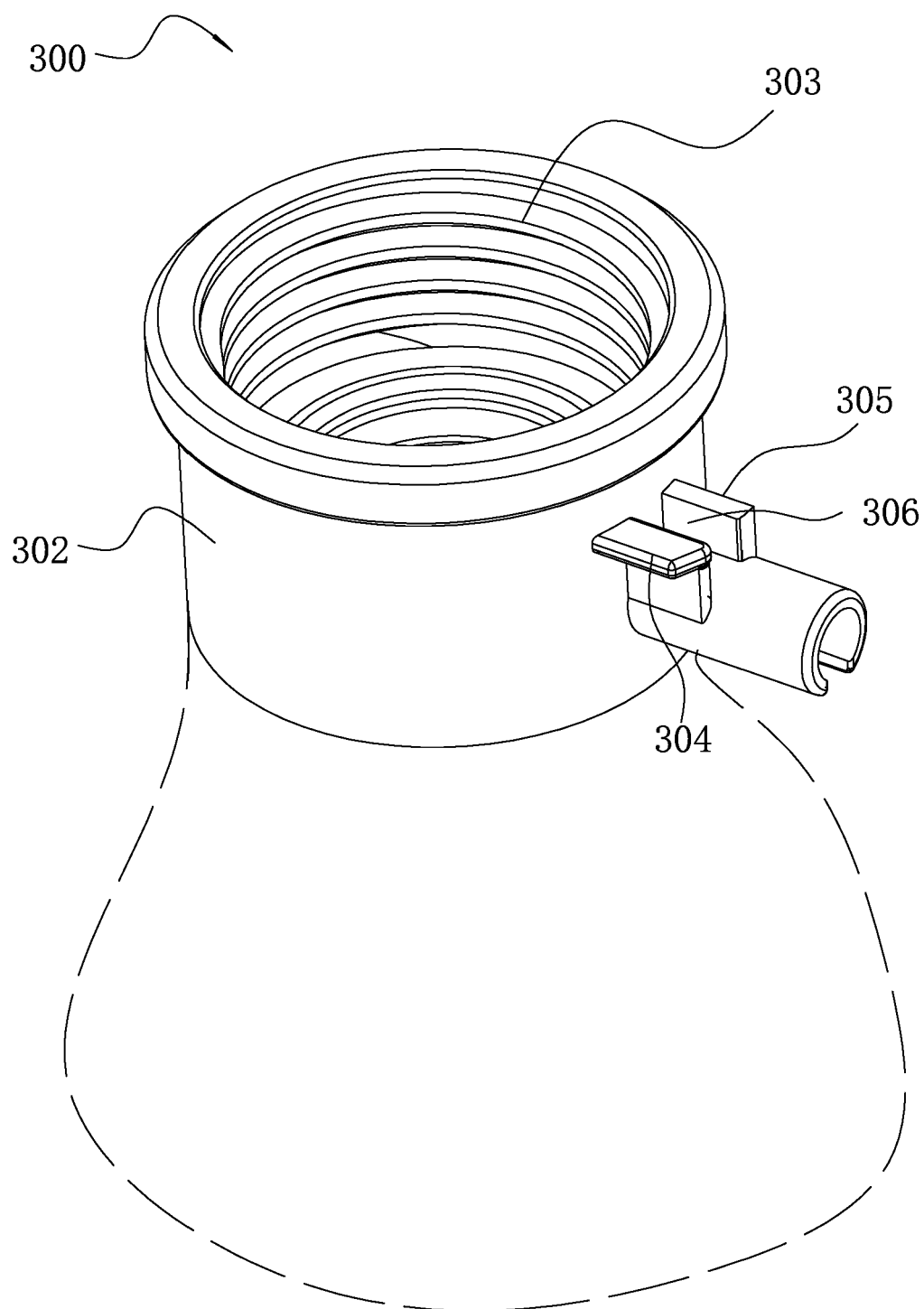


Fig. 3

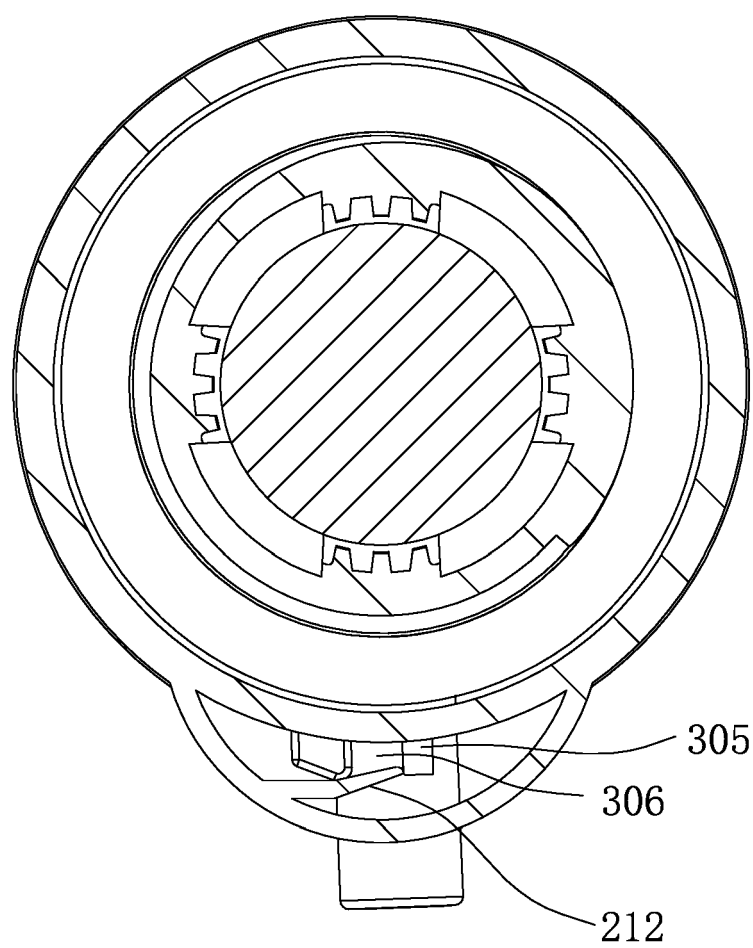


Fig. 4



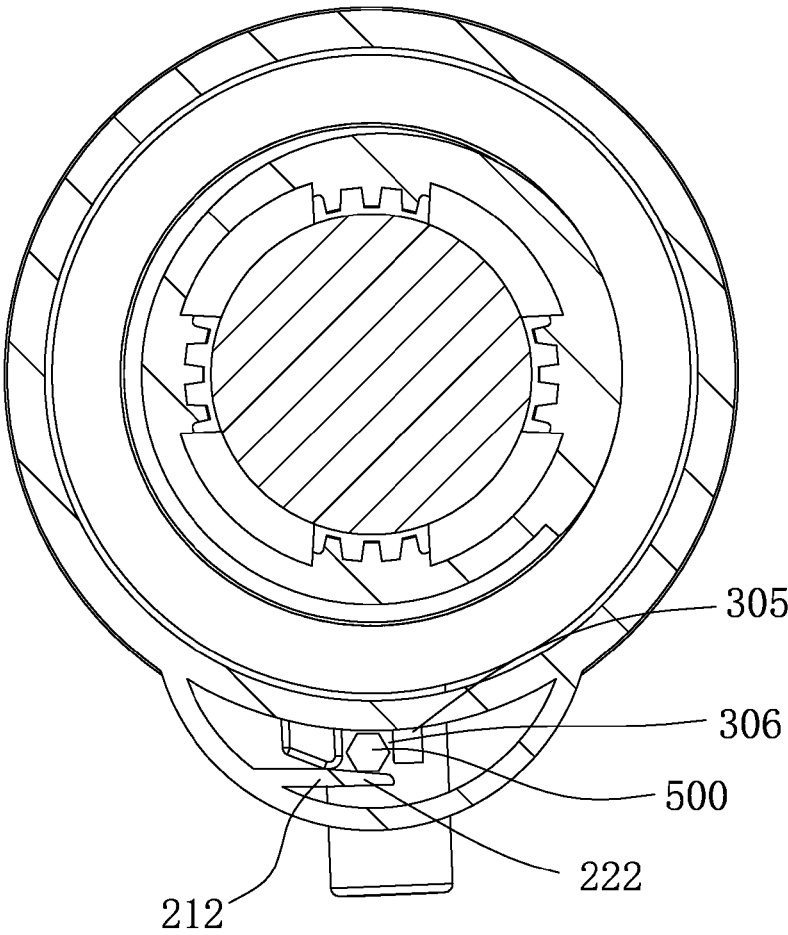


Fig. 5A

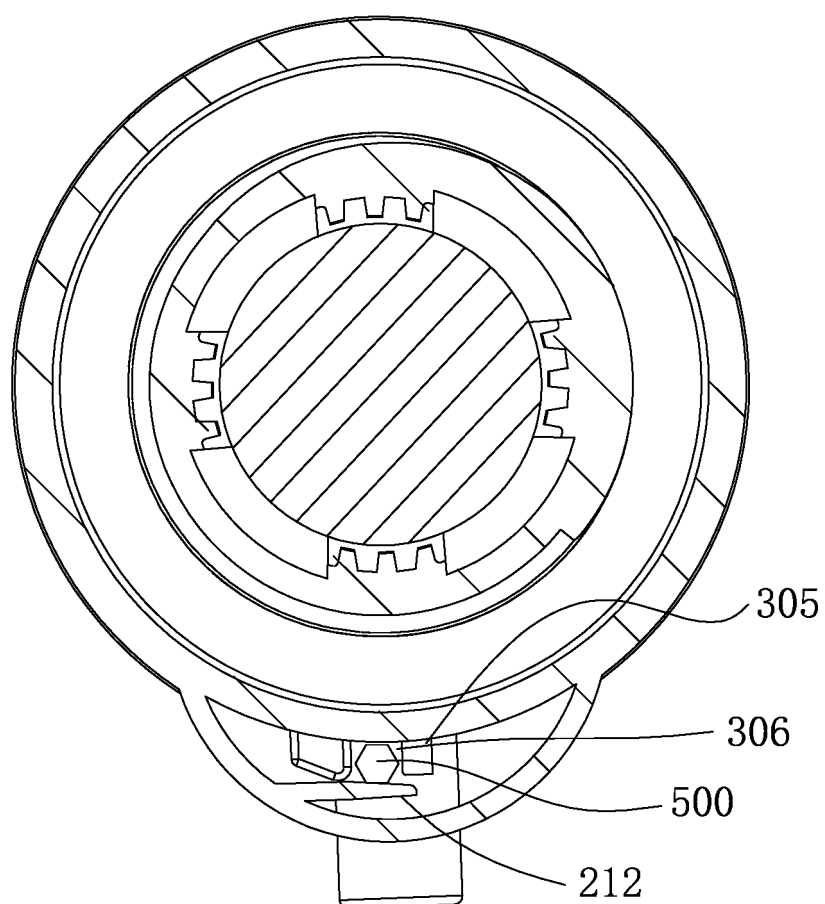


Fig. 5B

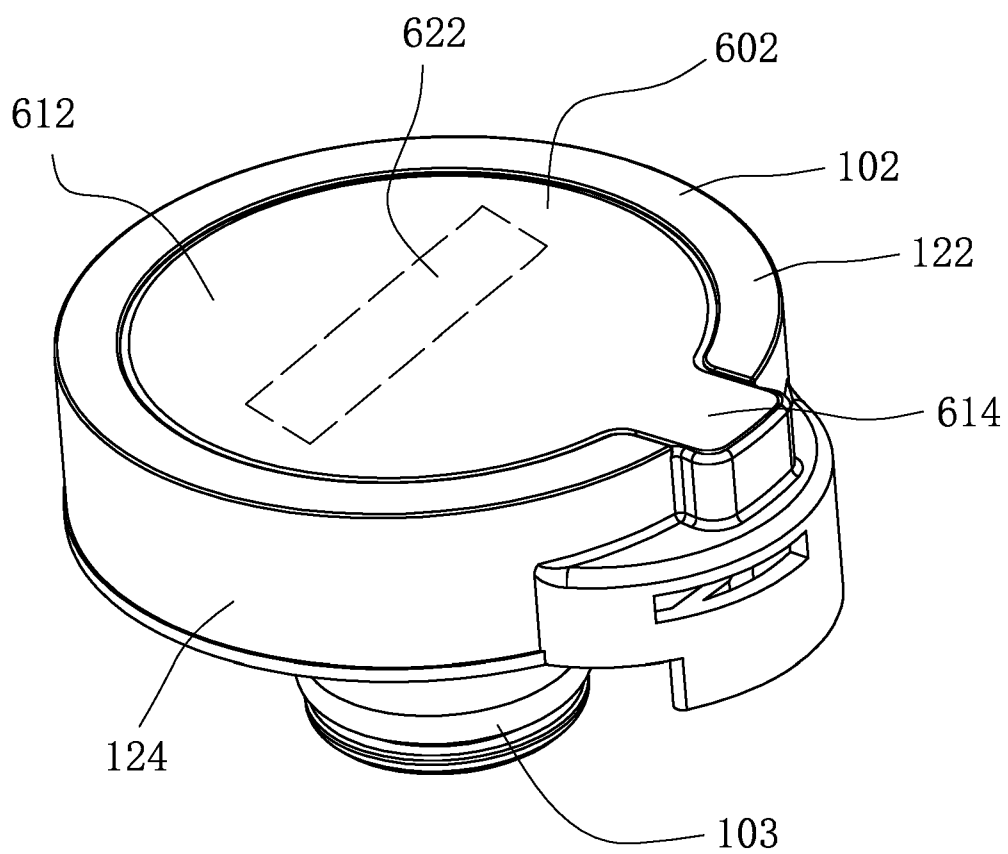


Fig. 6A

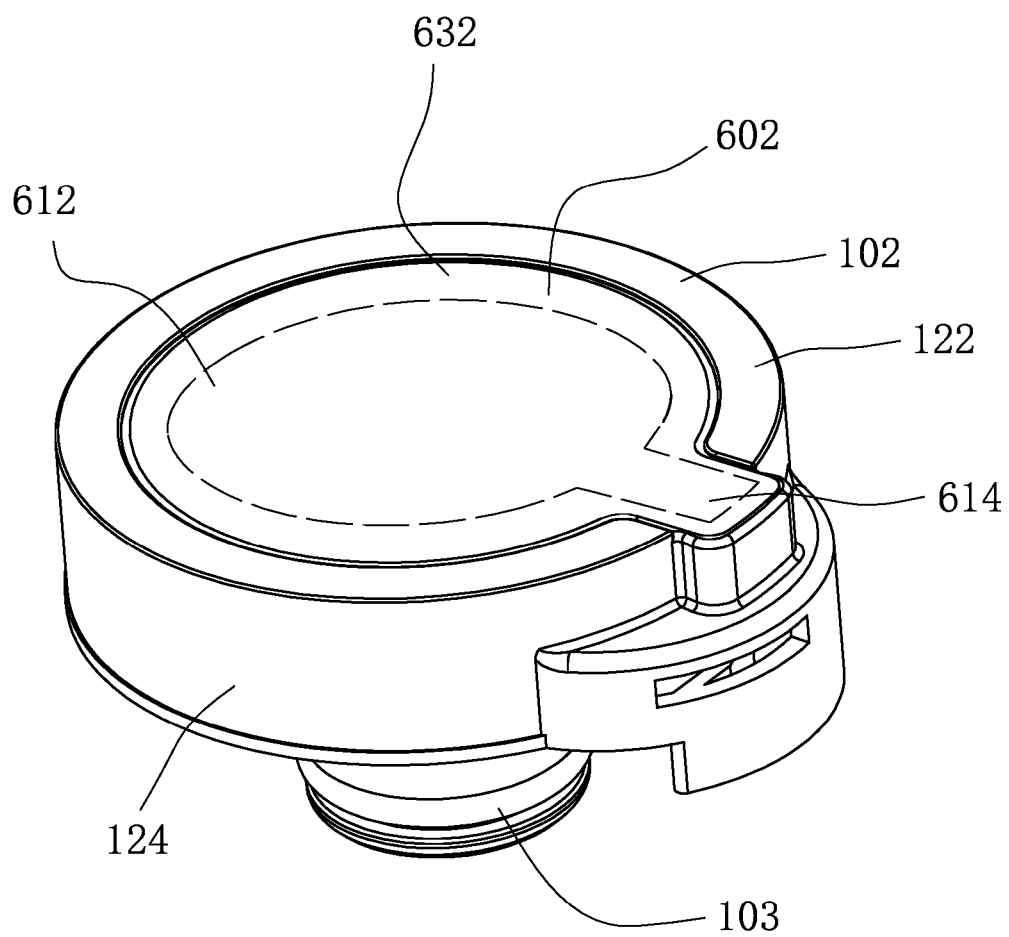


Fig. 6B

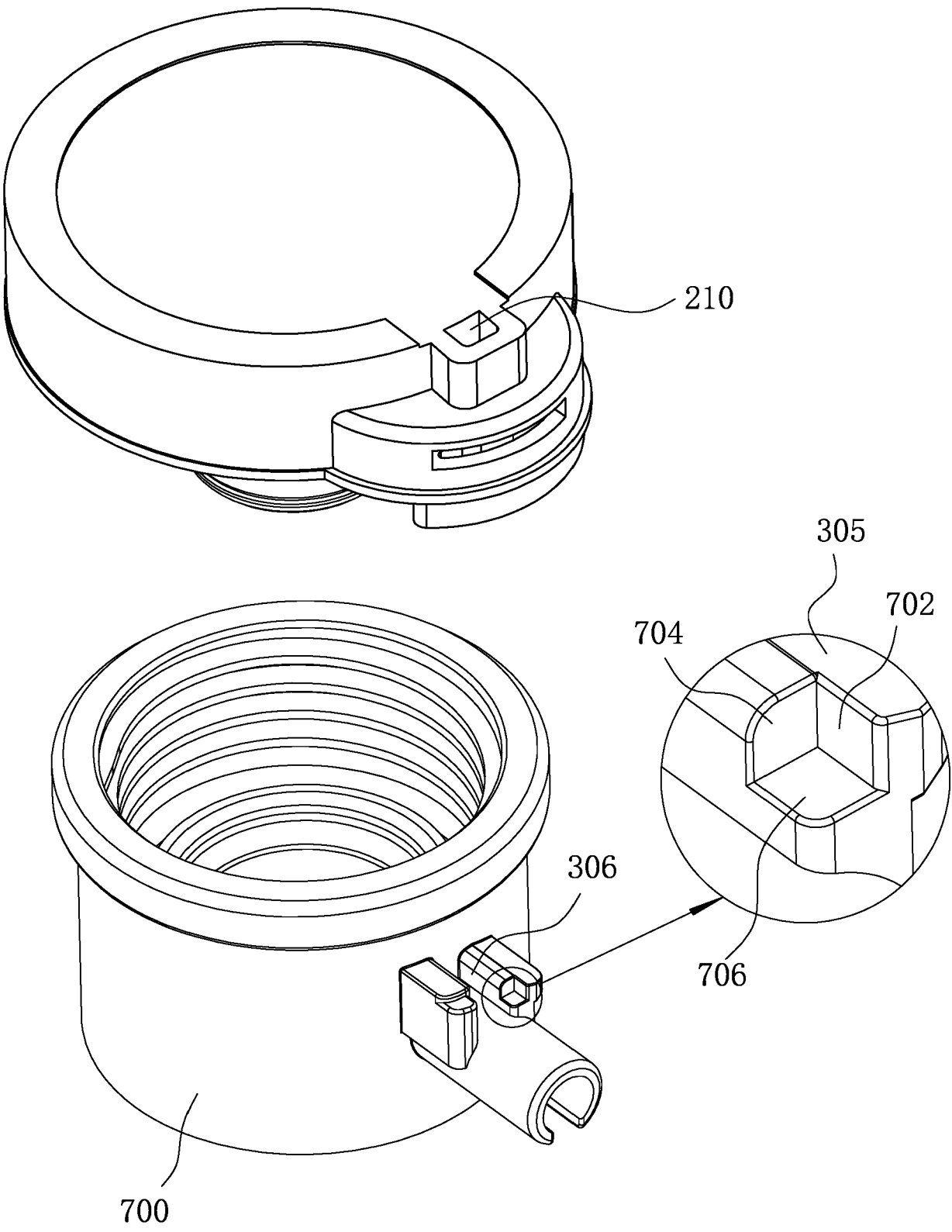


Fig. 7

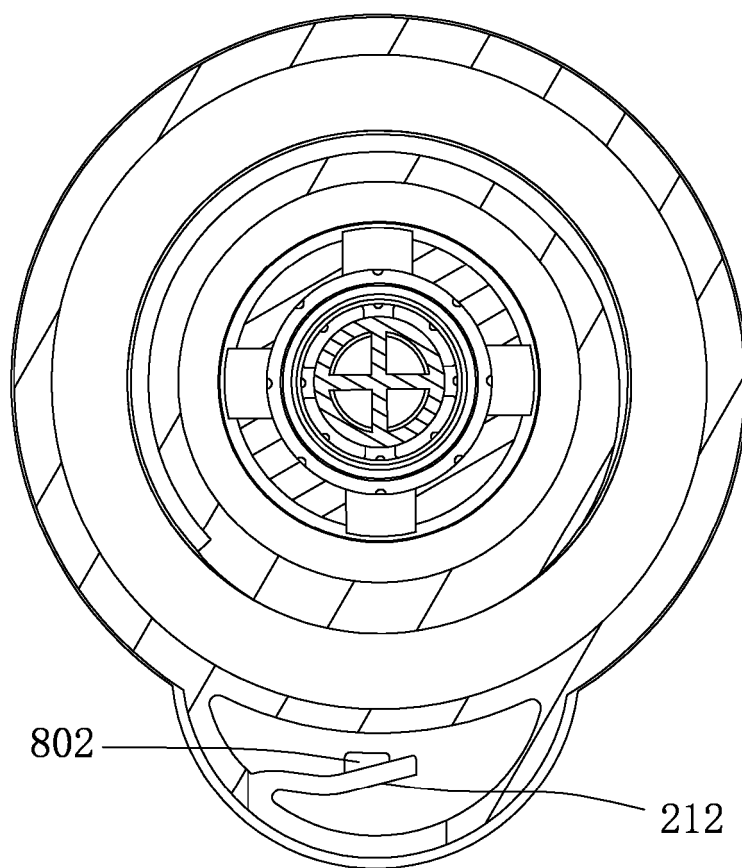


Fig. 8

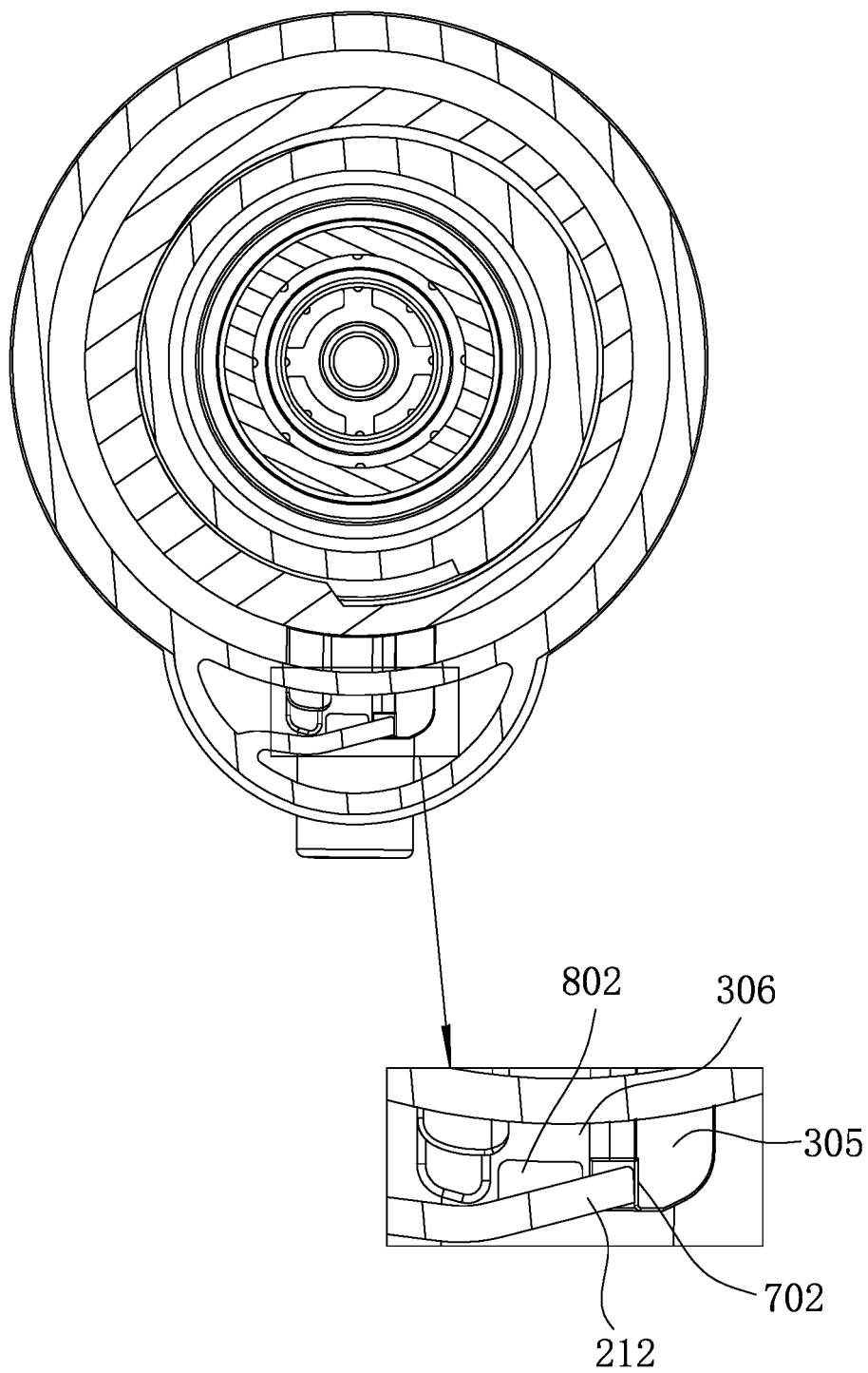


Fig. 9

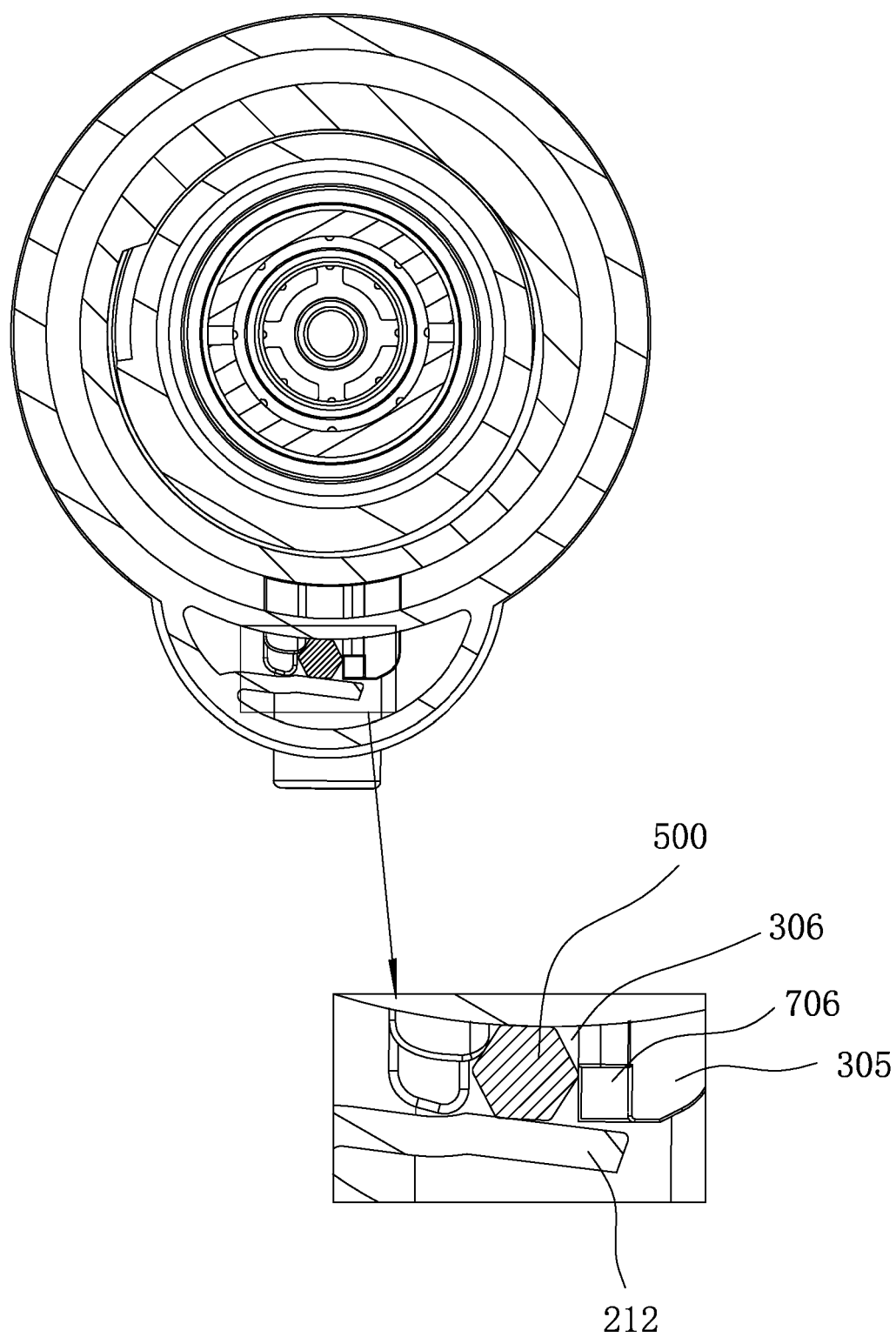


Fig. 10A



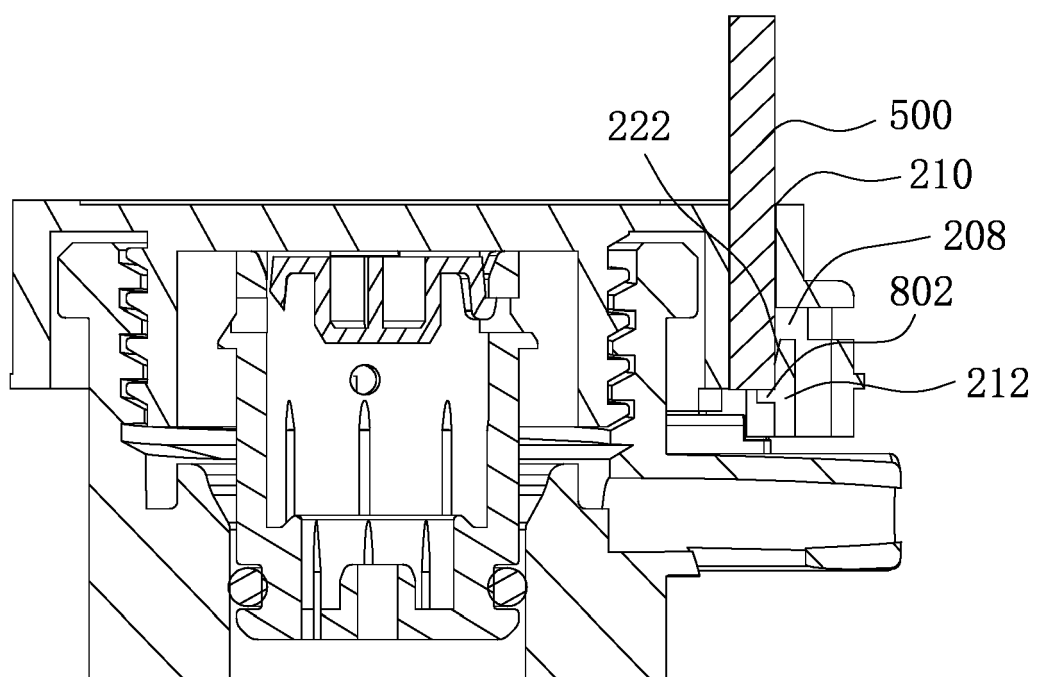


Fig. 10B

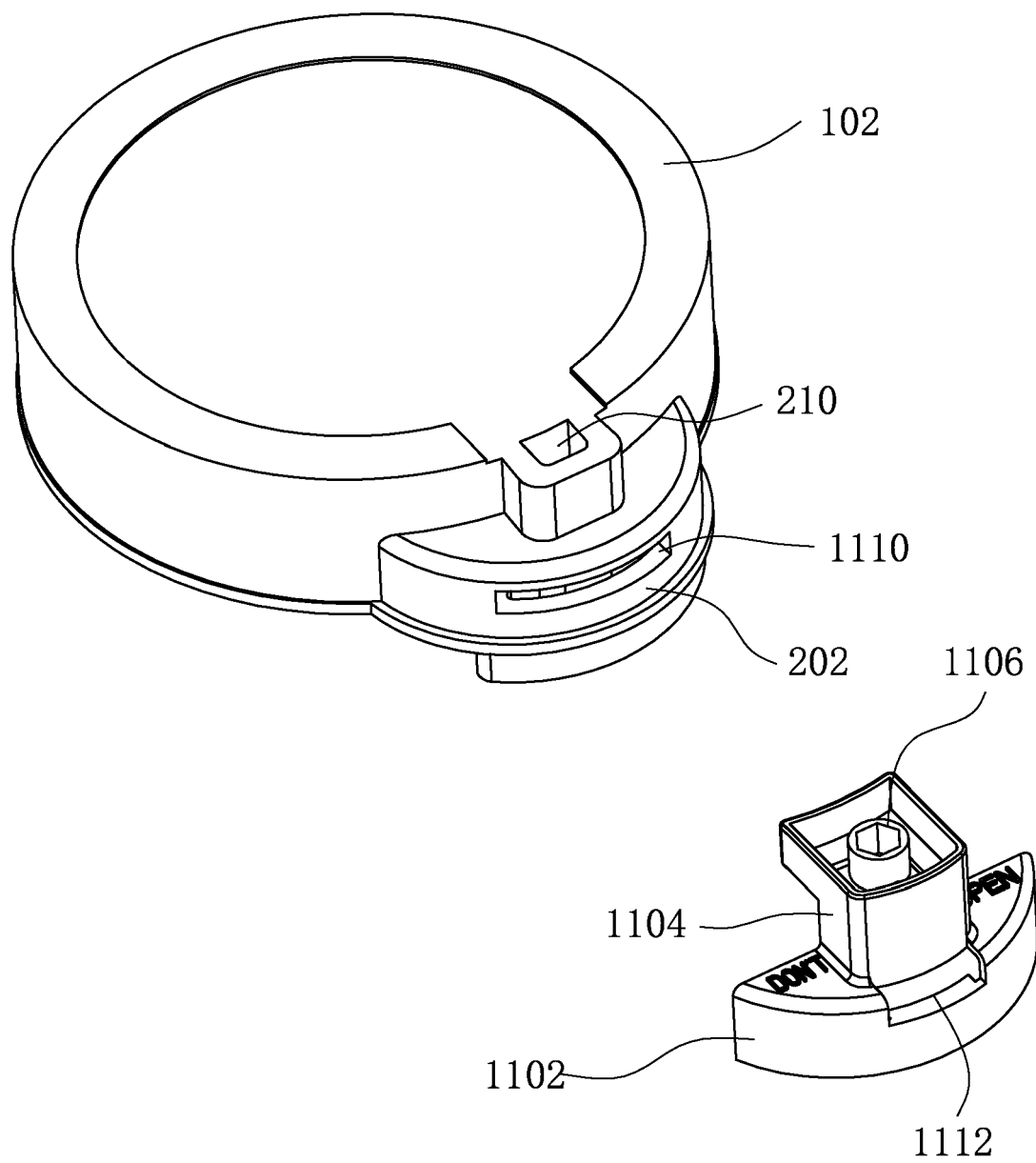


Fig. 11A

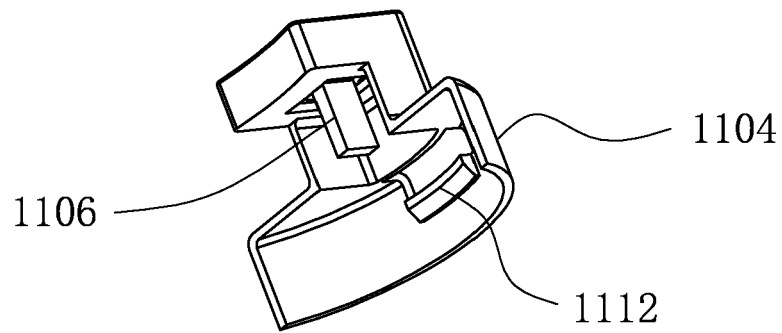


Fig. 11B

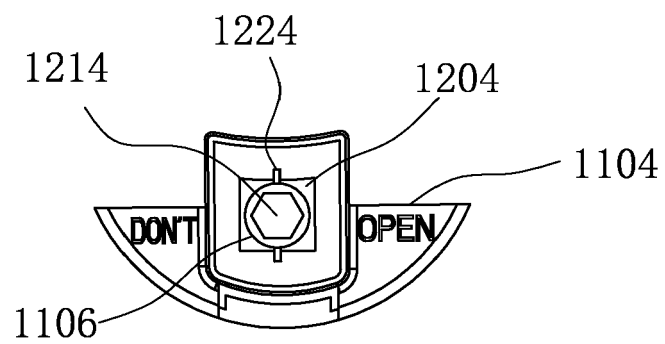


Fig. 12

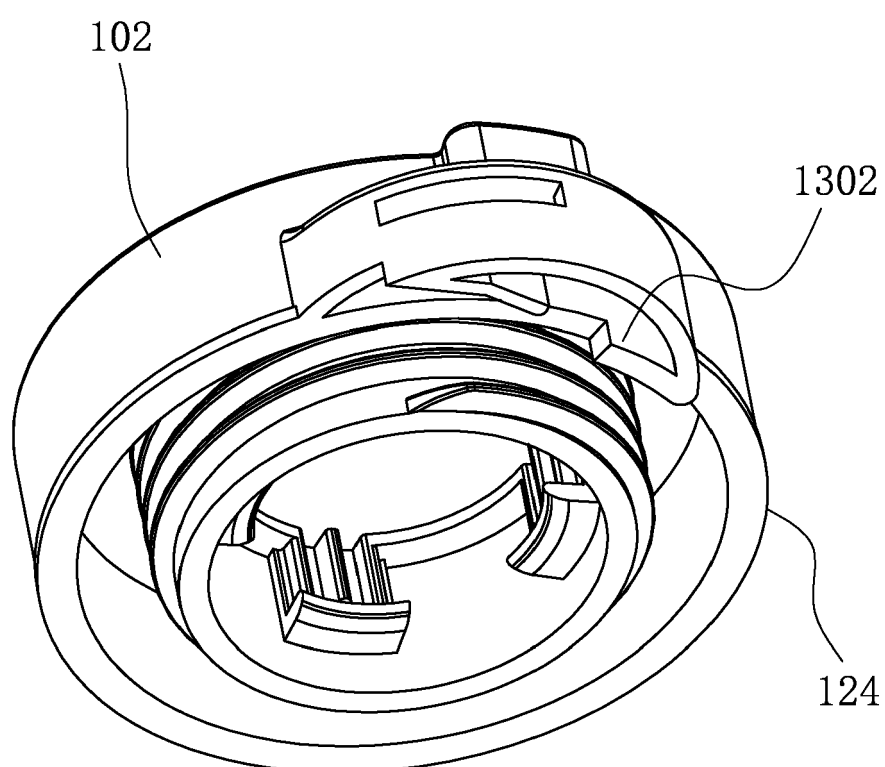


Fig. 13A

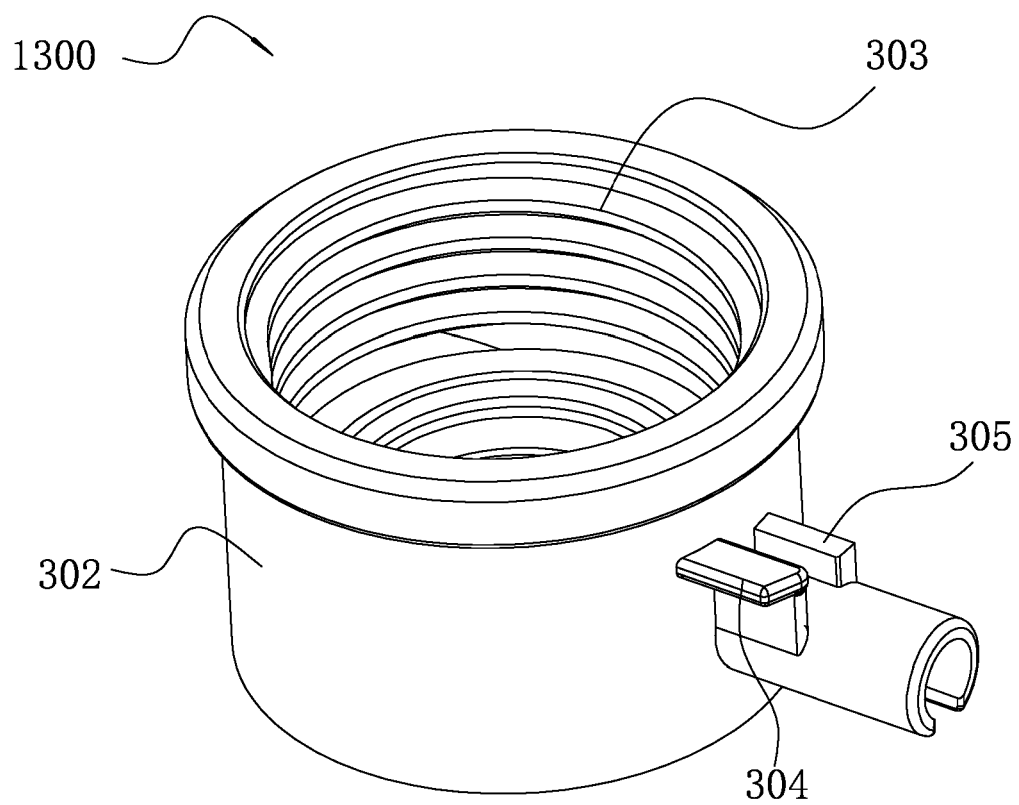


Fig. 13B

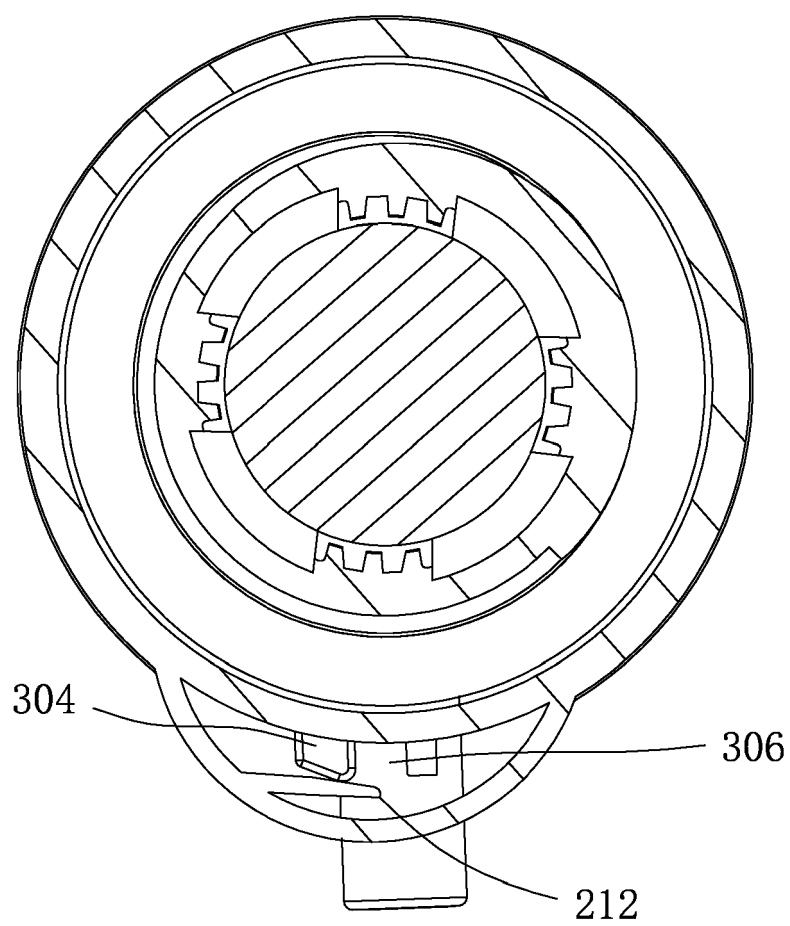


Fig. 14A

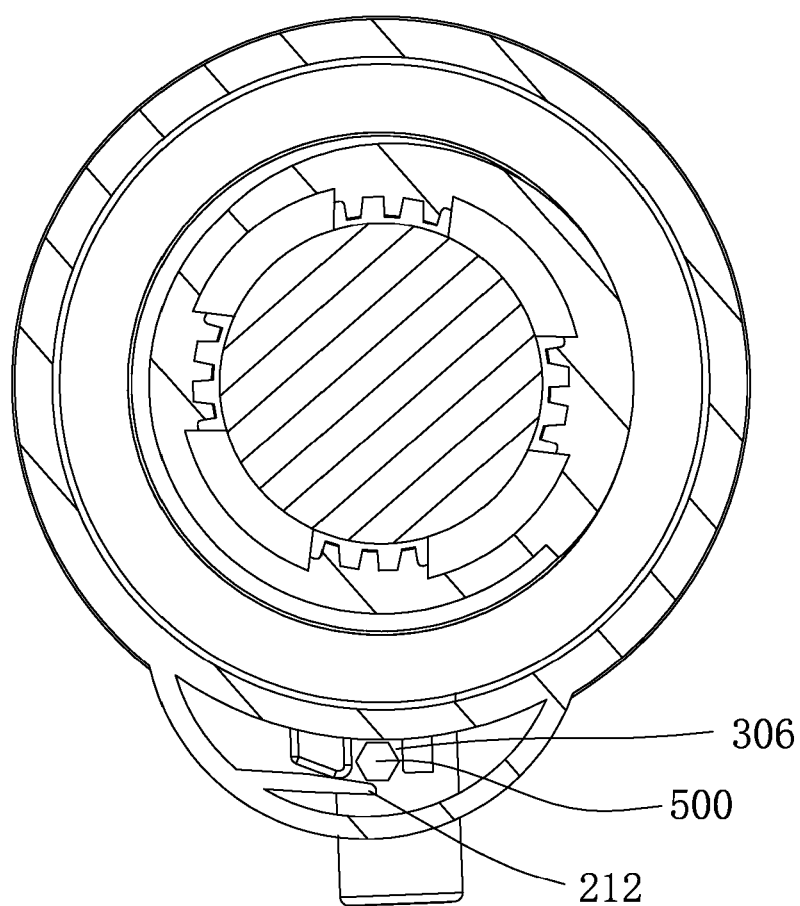


Fig. 14B

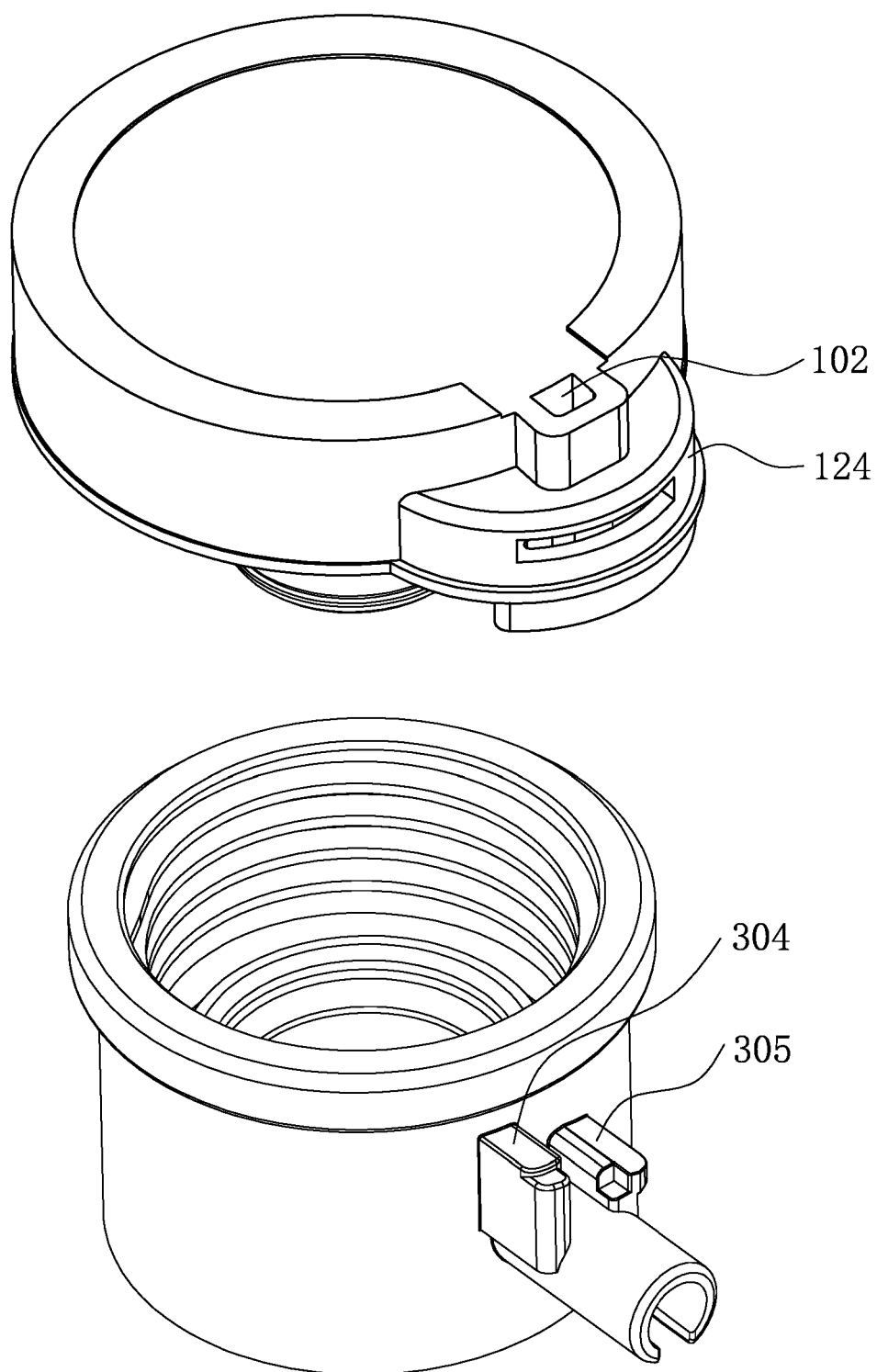


Fig. 15A



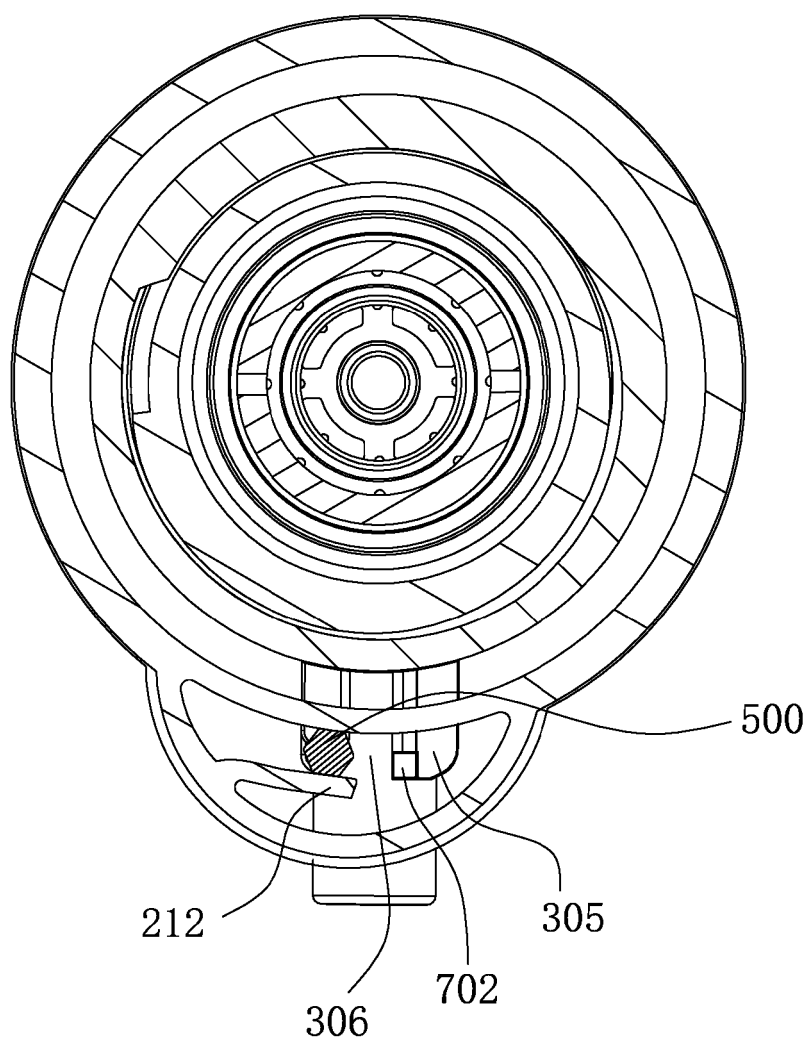


Fig. 15B

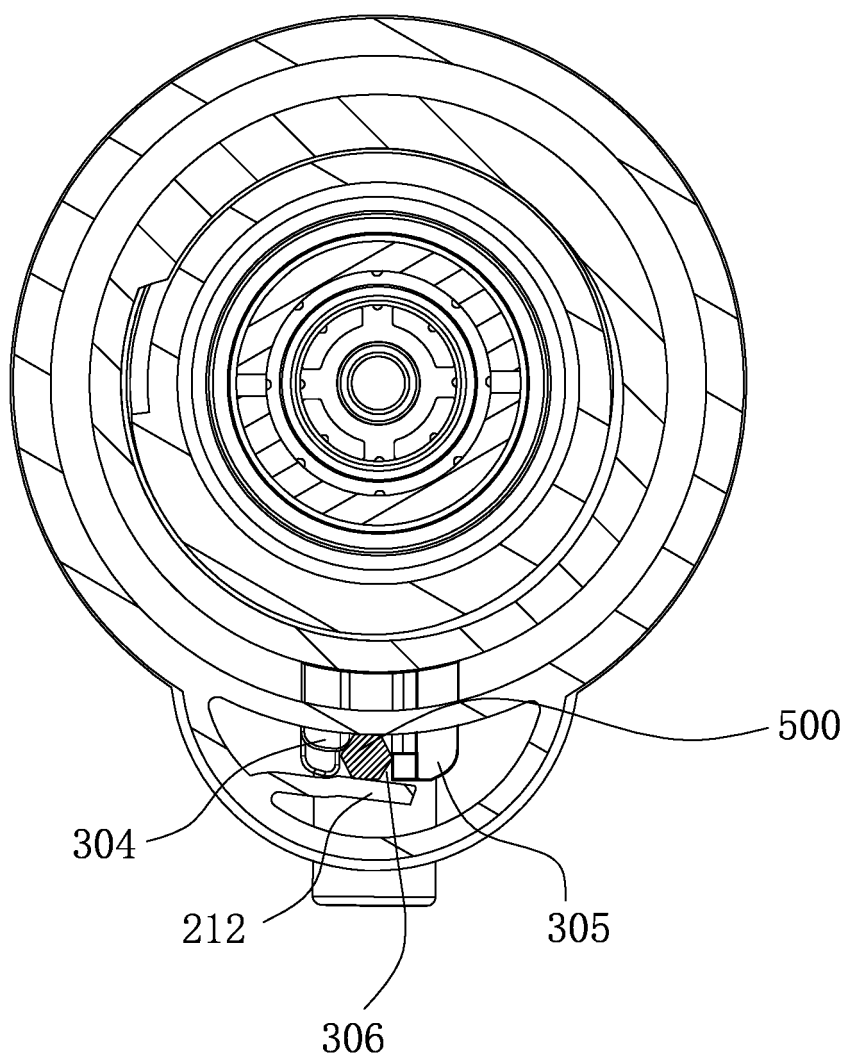


Fig. 15C



## EUROPEAN SEARCH REPORT

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X	WO 97/44259 A1 (MHD CORP [US]) 27 November 1997 (1997-11-27) * abstract * * figures 6-15 * * page 2 - page 10 * -----	1-15	
X	US 2005/173435 A1 (WELLMAN CRAIG [AU] ET AL) 11 August 2005 (2005-08-11) * abstract * * figures 7, 8, 9C, 12C, 26C * * paragraph [0001] - paragraph [0092] * -----	1-10	
X	US 2023/313731 A1 (IAFRATE SERGE [FR] ET AL) 5 October 2023 (2023-10-05) * abstract * * figures 1-24 * * paragraph [0002] - paragraph [0116] * -----	1-15	
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X	DE 20 2013 001553 U1 (ROECHLING AUTOMOTIVE AG & CO [DE]) 26 February 2013 (2013-02-26) * abstract * * figures 1-5 * * paragraph [0001] - paragraph [0047] * -----  - / - -	1-15	TECHNICAL FIELDS SEARCHED (IPC)  F01P B65D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		1 April 2025	Juvenelle, Cyril
CATEGORY OF CITED DOCUMENTS		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	
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			



## EUROPEAN SEARCH REPORT

Application Number  
EP 24 21 4582

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The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>1 April 2025</b>	Examiner <b>Juvenelle, Cyril</b>
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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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