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(54) **INK CARTRIDGE**

(57) The present invention relates to an ink cartridge. The ink cartridge is detachably installed in an installation structure of a printing device, and the ink cartridge includes a housing and a buckle, where the buckle is disposed on the housing, the buckle can be clamped with

a force application component of the printing device to fix the ink cartridge in the installation structure, and the buckle can be separated from the force application component, to unfix the ink cartridge from the printing device.

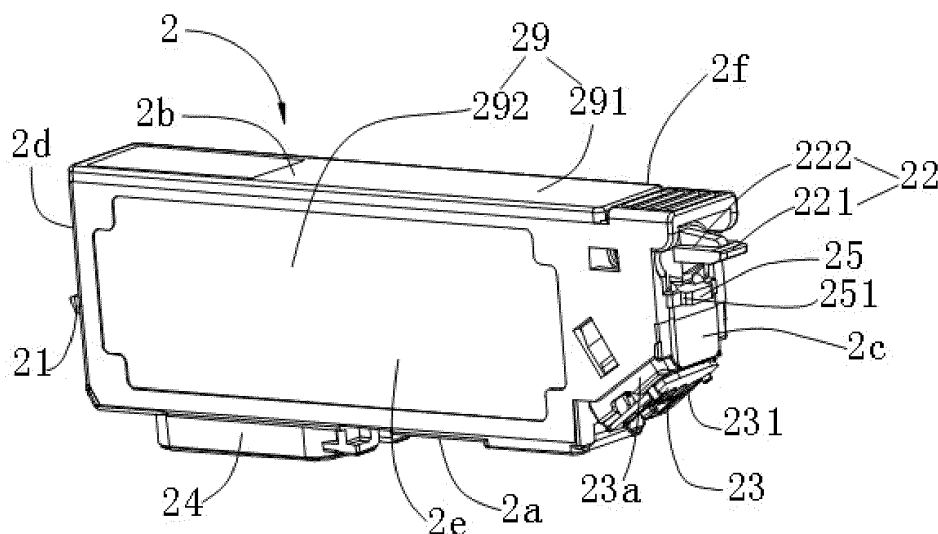


FIG. 2

Description

TECHNICAL FIELD

[0001] The present invention relates to the field of ink-jet printer technologies, and in particular, to an ink cartridge.

RELATED ART

[0002] An ink-jet printer is a relatively common printing appliance. At present, laser printers have become quite popular, but because maintenance costs of the laser printers are relatively high, ink-jet printers still have a massive share of the market, especially in places such as households, shops, and offices. Ink cartridges as consumable appliances for ink-jet printing are also greatly demanded in the market.

[0003] At present, a relatively common ink cartridge is shown in FIG. 1. An ink cartridge 6 is a consumable appliance that is detachably installed in an installation structure (not shown). The ink cartridge 6 includes a handle 61, an engagement portion 62, a chip 63, an ink outlet 64, and a housing 69a. The engagement portion 62 is disposed on the handle 61, the handle 61 extends out of the housing 69a, and the handle 61 is elastic and can rotate around a fulcrum 611. The engagement portion 62 is a part that can be engaged with the installation structure, to prevent the ink cartridge 6 from moving upward, so that the engagement portion 62 is subject to a downward acting force applied by the installation structure, and the handle 61 is subject to a downward acting force. The acting force causes the handle 61 to have a downward rotational torque. Because the handle 61 extends out of the housing 69a, if the torque is applied on the handle 61 for a long time, the handle 61 may have insufficient elasticity or lose the elasticity and cannot be retained at a predetermined position. Consequently, the ink cartridge 6 is fixed at an inaccurate position and cannot be identified by the installation structure, or cannot be fixed in the installation structure. In addition, if the ink cartridge 6 is repeatedly installed multiple times, the handle 61 may lose the elasticity, finally resulting in that the ink cartridge 6 cannot be fixed in the installation structure.

SUMMARY

[0004] The present invention provides an ink cartridge, so that the ink cartridge can be more reliably fixed in an installation structure.

[0005] An ink cartridge is provided. The ink cartridge is detachably installed in an installation structure of a printing device, and the ink cartridge includes a housing and a buckle, where the buckle is disposed on the housing, the buckle can be clamped with a force application component of the printing device to fix the ink cartridge in the installation structure, and the buckle can be separated from the force application component, to unfix the

ink cartridge from the printing device.

[0006] Preferably, the ink cartridge further includes a first elastic component connected to the housing; the engagement portion is located between the first elastic component and the force application component; and when the force application component is subject to an acting force toward the first elastic component that is applied by a user, the force application component drives the buckle to move toward a direction of the first elastic component.

[0007] Preferably, under the action of the force application component, a movement direction of the buckle is a horizontal direction.

[0008] Preferably, the buckle includes the engagement portion and a limited portion; the engagement portion is disposed opposite to the force application component; the force application component can drive the buckle to move; an angle is formed between movement directions of the limited portion and the buckle; a limiting portion is further disposed on the housing at a position opposite to the limited portion; and the limiting portion can be clamped with or separated from the limited portion.

[0009] Preferably, the ink cartridge further includes a pressing portion and a second elastic component, where the limiting portion is connected to the pressing portion; a through hole is provided on the buckle; the through hole forms the limited portion; one end of the pressing portion penetrates through the limited portion; the second elastic component is disposed between the housing and the pressing portion; extension directions of the first elastic component and the second elastic component are perpendicular to each other; the buckle includes a spacing function portion; the pressing portion includes a groove for accommodating the spacing function portion; and the pressing portion can abut against the spacing function portion.

[0010] Preferably, the limiting portion includes a first limiting portion and a second limiting portion, and the first limiting portion is located between the second limiting portion and the force application component; and in a state in which the ink cartridge is installed in the installation structure, the limited portion is separated from the second limiting portion and the limited portion is clamped with the first limiting portion; and in a state in which the ink cartridge is taken out from the installation structure, the limited portion is separated from the first limiting portion and the limited portion is first clamped with the second limiting portion and then separated from the second limiting portion.

[0011] Preferably, the limiting portion includes a first limiting portion and a second limiting portion, and along a direction of the first elastic component toward the force application component, a distance from the first limiting portion to the elastic component is greater than a distance from the second limiting portion to the elastic component; and

in a state in which the ink cartridge is installed in the installation structure, the limited portion is separated from

the second limiting portion and the limited portion is clamped with the first limiting portion; and in a state in which the ink cartridge is taken out from the installation structure, the limited portion is separated from the first limiting portion and the limited portion is first clamped with the second limiting portion and then separated from the second limiting portion.

[0012] Preferably, the ink cartridge further includes a third elastic component; the second limiting portion is a cylinder; the third elastic component is externally sleeved on the second limiting portion; the limited portion includes a protrusion and a recess; the protrusion can stop the first limiting portion; and the recess can match the second limiting portion.

[0013] Preferably, the force application component is installed in the installation structure by using a second elastic component; the second elastic component is disposed opposite to the first elastic component; and along a vertical direction, the second elastic component is located below the first elastic component.

[0014] Preferably, the buckle includes the engagement portion; under the action of an external force, the force application component can rotate toward a direction of the engagement portion in a vertical plane; in a state in which the force application component stops rotating, after the external force is removed, the buckle restores to an original position under the action of the first elastic component, and the force application component restores to an original position under the action of the second elastic component; and acceleration when the force application component restores to the original position is greater than acceleration when the buckle restores to the original position.

[0015] Preferably, the ink cartridge further includes a stressed portion disposed on the buckle.

[0016] Preferably, when the limited portion is clamped at a position of the second limiting portion, an elastic force applied by the first elastic component on the limited portion is greater than an acting force applied by the second limiting portion on the limited portion.

[0017] Preferably, when the limited portion is clamped at a position of the first limiting portion, an elastic force applied by the first elastic component on the limited portion is less than or equal to an acting force applied by the first limiting portion on the limited portion.

[0018] Preferably, the limited portion includes a first limited portion and a second limited portion; the first limited portion and the first limiting portion are disposed opposite to each other and can be clamped with each other or separated from each other; and the second limited portion and the second limiting portion are disposed opposite to each other and can be clamped with each other or separated from each other.

[0019] Preferably, initial acceleration when the force application component restores to the original position is $10\text{--}26.6\text{ m/s}^2$, and initial acceleration when the buckle restores to the original position is $4\text{--}9.6\text{ m/s}^2$.

[0020] Preferably, a mass of the buckle is $0.31\text{--}0.6\text{ g}$,

and a mass of the force application component is $0.45\text{--}0.65\text{ g}$.

[0021] Preferably, an elastic force applied by the first elastic component on the buckle is $2.4\text{--}3\text{ N}$, and an elastic force applied by the second elastic component on the force application component is $6.5\text{--}12\text{ N}$.

[0022] Preferably, the first elastic component has a wire diameter of 0.4 mm , a developed length of 14 mm , a medium diameter of 4.1 mm , an effective coil number of 8 , and a pitch of 1.6 mm .

[0023] Preferably, the ink cartridge according to claim 10, wherein the second elastic component has a wire diameter of 0.4 mm , a developed length of 9 mm , a medium diameter of 2.6 mm , an effective coil number of 9 , and a pitch of 1 mm .

[0024] Preferably, the ink cartridge is detachably installed in the installation structure including a force application component; an engagement portion is disposed on the buckle; a detent and at least one elastic component are disposed on the housing; the elastic component is located above the engagement portion; and the elastic component can abut against or be separated from the lever.

[0025] Preferably, when the ink cartridge is installed in the installation structure, the elastic component and the engagement portion both abut against the force application component.

[0026] Preferably, the ink cartridge further includes an ink outlet, and the ink outlet and the elastic component are located at two sides of an ink cartridge body.

[0027] Preferably, a handle is formed on the ink cartridge body, and the engagement portion and the elastic component are both disposed on the handle.

[0028] Preferably, an engagement hole is provided on the force application component; the buckle includes an engagement protrusion; and the engagement protrusion can abut against the engagement hole, so that during rotation, the force application component can push the buckle to move.

[0029] Preferably, the ink cartridge further includes a stressed portion disposed on the buckle; the buckle includes a connection tongue that extends downward; the connection tongue includes the engagement portion and the connection portion; the force application component includes a first engagement protrusion and a second engagement protrusion; the first engagement protrusion and the second engagement protrusion can abut against the engagement portion; and the pressure application component can interact with the stressed portion, so that the stressed portion drives the buckle to move.

[0030] Preferably, a handle is further disposed on the ink cartridge, and the buckle is disposed on the handle.

[0031] The technical solutions provided in the present invention can achieve the following beneficial effects:

According to the ink cartridge provided in the present invention, the buckle is clamped with or separated from the force application component, so as to install the ink cartridge in the printing device or detach the ink cartridge

from the printing device. A manner of fixing the ink cartridge by using the handle is abandoned. In comparison, after a manner of matching between the buckle and the force application component is used, the ink cartridge is more reliably installed, and it is less prone to a case in which the ink cartridge cannot be fixed or cannot be identified, so that the ink cartridge can be more reliably fixed in the installation structure of the printing device.

[0032] It should be understood that, the foregoing general descriptions and the following detailed descriptions are merely exemplary and are not intended to limit the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033]

FIG. 1 is a schematic diagram of an ink cartridge in the prior art;

FIG. 2 is a schematic structural diagram of an ink cartridge according to Embodiment 1A of the present invention;

FIG. 3 is a schematic structural diagram of the ink cartridge according to Embodiment 1A of the present invention;

FIG. 4 is a schematic structural diagram of the ink cartridge according to Embodiment 1A of the present invention;

FIG. 5 is a schematic structural diagram of an ink cartridge according to Embodiment 2A of the present invention;

FIG. 6 is a schematic diagram when a buckle is located at a second position according to Embodiment 2A of the present invention;

FIG. 7 and FIG. 8 are schematic diagrams of the buckle according to Embodiment 2A of the present invention;

FIG. 9 is a schematic local diagram when the ink cartridge is installed in an installation structure according to Embodiment 2A of the present invention;

FIG. 10 is a schematic diagram of a lever, as a force application component, of the installation structure according to Embodiment 1A and Embodiment 2A of the present invention;

FIG. 11 is a schematic local diagram when an ink cartridge is installed in an installation structure according to Embodiment 3A of the present invention;

FIG. 12 is a schematic diagram of a buckle according

to Embodiment 3A of the present invention;

FIG. 13 is a schematic diagram when an ink cartridge is installed in an installation structure according to Embodiment 4A of the present invention;

FIG. 14 and FIG. 15 are schematic partial diagrams of the ink cartridge according to Embodiment 4A of the present invention;

FIG. 16 is a schematic diagram of an ink cartridge according to Embodiment 5A of the present invention;

FIG. 17 and FIG. 18 are schematic diagrams of a buckle on which a telescopic portion is disposed according to Embodiment 5A of the present invention;

FIG. 19 is a schematic local diagram when the ink cartridge is installed in an installation structure according to Embodiment 5A of the present invention;

FIG. 20a is a schematic diagram of an ink cartridge in the prior art;

FIG. 20b is a schematic diagram of an ink cartridge in the prior art;

FIG. 20c is a schematic diagram when ink cartridge is combined with an installation structure in the prior art;

FIG. 20d is a schematic diagram when an ink cartridge is not correctly installed in an installation structure in the prior art;

FIG. 33 is a schematic structural diagram of an ink cartridge according to a specific implementation of the present utility model;

FIG. 34 is a schematic structural diagram of an installation structure according to Embodiment C of the present utility model;

FIG. 35 and FIG. 36 are schematic structural diagrams of a buckle according to Embodiment C of the present utility model;

FIG. 37 is a schematic structural diagram when the ink cartridge is installed in the installation structure according to Embodiment C of the present utility model;

FIG. 38 is a schematic structural diagram of a first state during separation between the ink cartridge and the installation structure according to Embodiment C of the present utility model;

FIG. 39 is a schematic structural diagram of a second state during separation between the ink cartridge and the installation structure according to Embodiment C of the present utility model;

FIG. 40 is a schematic structural diagram of an installation structure in which a widened force application component is disposed according to Embodiment C of the present utility model;

FIG. 41 and FIG. 42 are schematic diagrams of an installation structure;

FIG. 43 to FIG. 45 are schematic diagrams of an ink cartridge according to Embodiment 1D;

FIG. 46 is a schematic partial diagram of combination between the ink cartridge and an installation structure according to Embodiment 1D;

FIG. 47 is a schematic diagram of a movable lever;

FIG. 48 is a schematic diagram of a torque of the ink cartridge according to Embodiment 1D;

FIG. 49 is a schematic diagram of an ink cartridge according to Embodiment 2D;

FIG. 50 is a schematic partial diagram of combination between the ink cartridge and an installation structure according to Embodiment 2D;

FIG. 51 is a schematic diagram of an ink cartridge according to Embodiment 3D;

FIG. 52 is a schematic partial diagram of combination between the ink cartridge and an installation structure according to Embodiment 3D;

FIG. 53 is a schematic diagram when an ink cartridge is not installed in an installation structure according to Embodiment 1E;

FIG. 54 is a schematic diagram when the ink cartridge is installed in the installation structure according to Embodiment 1E;

FIG. 55 is a schematic diagram after the ink cartridge is taken out from the installation structure according to Embodiment 1E;

FIG. 56 is a schematic local diagram after the ink cartridge is taken out from the installation structure according to Embodiment 1E;

FIG. 57 is a schematic diagram of an installation structure according to Embodiment 2E;

FIG. 58 is another schematic diagram of the installation structure according to Embodiment 2E;

FIG. 59 is a schematic diagram of a force application component according to Embodiment 2E;

FIG. 60 is a schematic diagram of an ink cartridge according to Embodiment 2E;

FIG. 61 is a schematic diagram of matching between the ink cartridge and the installation structure according to Embodiment 2E;

FIG. 62 is another schematic diagram of matching between the ink cartridge and the installation structure according to Embodiment 2E;

FIG. 63 is a schematic diagram of a force application component according to Embodiment 3E;

FIG. 64 is another schematic diagram of matching between the ink cartridge and the installation structure according to Embodiment 3E;

FIG. 65 is a schematic diagram of matching between an ink cartridge and an installation structure according to Embodiment 4E; and

FIG. 66 is a schematic diagram of matching between the ink cartridge and the installation structure according to Embodiment 5E.

[0034] The accompanying drawings herein are included in the specification and form a part of the specification, show embodiments that conform to the present invention, and are used to describe the principle of the present invention together with the specification.

DETAILED DESCRIPTION

[0035] The present invention is further described in detail below by using specific embodiments with reference to the accompanying drawings.

Embodiment 1A

[0036] FIG. 2 and FIG. 3 are schematic diagrams of an ink cartridge according to Embodiment 1A. As shown in FIG. 2 and FIG. 3, an ink cartridge 2 basically has a shape of a cuboid. A person of ordinary skill in the art may understand that, according to an actual requirement, the ink cartridge 2 may have a shape such as an oval or a circle. In this embodiment, the ink cartridge 2 basically has a shape of a cuboid, and the ink cartridge 2 includes six surfaces that are respectively a first surface 2a, a second surface 2b, a third surface 2c, a fourth surface 2d, a fifth surface 2e, and a sixth surface 2f. The first surface 2a is opposite to the second surface 2b; the third

surface 2c and the fourth surface 2d are opposite to each other and are basically perpendicular to the first surface 2a; and the fifth surface 2e and the sixth surface 2f are opposite to each other and are basically perpendicular to the first surface 2a and the third surface 2c.

[0037] The ink cartridge 2 includes a detent 21, a buckle 22, a chip 23, an ink outlet 24, a position limiting portion 25, an elastic component 26 (shown in FIG. 4), a limiting portion 27 (shown in FIG. 4), and a housing 29. The detent 21 is disposed on the fourth surface 2d, and the detent 21 has a detent surface 211, and can be engaged with a corresponding position of an installation structure 3, to prevent the ink cartridge 2 from moving upward. The chip 23 is disposed on a slope that is obliquely disposed between the first surface 2a and the third surface 2c. The chip 23 is fixed on a chip rack 23a, and includes a terminal 231 that is electrically connected to a corresponding part of the installation structure 3. The chip 23 stores information such as ink quantity information, an ink type, and a manufacturer, and can be electrically connected to a contact pin 33 of an installation structure 3 of a printer. The ink outlet 24 is a protrusion disposed on the first surface 2a, and can provide ink to the printer. The position limiting portion 25 has a position limiting surface 251, and can limit movement of the ink cartridge 2 in a left-right direction. The housing 29 includes a chamber 292 and a cover 291. The chamber 292 has an ink chamber 293 that can store ink, and the cover 291 is welded on the chamber 291, so that the ink chamber 293 can be in a sealed state.

[0038] Further, as shown in FIG. 4, the elastic component 26 may be silica gel, an elastic metal sheet, a spring, or the like, and is preferably a spring in this embodiment. The buckle 22 includes an engagement portion 221 and a limited portion 223. The elastic component 26 is connected to the buckle 22 along a stretching direction of the elastic component 26. In this way, the buckle 22 can move along the stretching direction of the elastic component 26 under the action of an external force. Specifically, an angle is formed between movement directions of the limited portion 223 and the buckle 22. When the buckle 22 moves along the stretching direction of the elastic component 26, the limited portion 223 can be clamped with or separated from the limiting portion 27. More specifically, the angle between the movement directions of the limited portion 223 and the buckle 22 may be less than 90 degrees or equal to 90 degrees or greater than 90 degrees, which can all achieve an objective of the present invention. Preferably, the limited portion 223 is inclined toward the elastic component 26 relative to a vertical direction (inclined to the left when seen from FIG. 4). This facilitates movement between the limited portion 223 and the buckle 22.

[0039] A person skilled in the art understands that, during actual application, the ink cartridge is installed in the installation structure, the installation structure is disposed in the printing device, and a force application component (not shown) is disposed at a position in the printing

device (not shown) close to the engagement portion 221. A shape of the force application component may be designed in a matching manner according to a shape of the engagement portion 221. Using the engagement portion 221 shown in FIG. 4 as an example, in this case, the force application component may be set to have a structure including a notch or an engagement hole, so that the engagement portion 221 and the force application component can be clamped, to fix the ink cartridge in the printing device. In some other variant embodiments, the engagement portion 221 may have a regular shape such as a clamping shoulder or a hook. In addition, the force application component is correspondingly changed, to achieve an objective that the engagement portion 221 and the force application component can be engaged. Details are not described herein. Further, under the action of an external force, the force application component may be separated from the engagement portion 221, to unfix the ink cartridge from the printing device, so as to detach the ink cartridge to replace the ink cartridge. For a specific process, refer to the following descriptions.

[0040] Further, the engagement portion 221 is disposed between the elastic component 26 and the force application component. During installation of the ink cartridge, the second surface 2b is pressed to insert the engagement portion 221 into the notch or the engagement hole of the force application component, to complete installation of the ink cartridge. A person skilled in the art understands that, fixing of the ink cartridge on the printing device mainly depends on a connection between the engagement portion 221 and the force application component. Specifically, after the ink cartridge is completely installed, the limited portion 223 is separated from the limiting portion 27, and the limited portion 223 is located between the limiting portion 27 and the force application component.

[0041] Further, during detachment of the ink cartridge, a user applies an external force on the force application component to cause the force application component to move toward a direction of the elastic component 26, so that the buckle 22 moves toward the direction of the elastic component 26 and compresses the elastic component 26. When the limited portion 223 reaches a position of the limiting portion 27, the external force applied on the force application component is removed. In this case, the force application component restores to an original position under the action of an elastic force, and the buckle 22 moves toward a direction of the force application component under the action of a resilience force of the elastic component 26. However, during restoration, the limited portion 223 is clamped with the limiting portion 27 to prevent the buckle 22 from continuing moving toward the direction of the force application component, and the force application component completely restores to the original position and is already separated from the engagement portion 221. In this case, an elastic force applied by the contact pin of the installation structure 3 on the chip 53 causes the ink cartridge 2 to bounce upward

and to be detached from the installation structure 3, so as to unfix the ink cartridge from the printing device, and complete detachment of the ink cartridge. Specifically, during detachment, when the limited portion 223 is clamped with the limiting portion 27, a resilience force applied by the elastic component 26 on the limited portion 223 is greater than an acting force applied by the limiting portion 27, so that after the buckle 22 is clamped by the limiting portion 27 for a short time, the buckle 22 finally restores to a natural state. More specifically, when the ink cartridge is in an installed state, the limited portion 223 is not clamped with the limiting portion 27. When the ink cartridge is taken out, the limited portion 223 is first clamped with the limiting portion 27 and then separated from the limiting portion 27, so that when the user removes the external force, the force application component restores to the original position. The buckle 22 is clamped in the limiting portion 27 for a short time due to the limited portion 223, so that the buckle 22 is separated from the force application component. A person skilled in the art understands that, during movement of the buckle 22 toward the direction of the elastic component 26, a case in which the limited portion 223 exceeds the position of the limiting portion 27 may occur. In this case, after the external force applied on the force application component is removed, the limited portion 223 still reaches the position of the limiting portion 27 during restoration and is clamped with the limiting portion 27 for a short time. This can also achieve the objective of the present invention.

[0042] Embodiment 2A: FIG. 5 is a sectional view of an ink cartridge according to Embodiment 2A. FIG. 5 is a schematic diagram when a buckle 22 is located at a first position (that is, located at a position of a first limiting portion 271). FIG. 6 is a schematic diagram when the buckle 22 is located at a second position (that is, located at a position of a second limiting portion 272). Specifically, the buckle 22 includes an engagement portion 221, a connection portion 222, and a limited portion 223. An elastic component 26 may be silica gel, an elastic metal sheet, a spring, or the like, and is preferably a spring in this embodiment. A limiting portion 27 includes the first limiting portion 271 and the second limiting portion 272, and the first limiting portion 271 is located between the second limiting portion and a force application component. In this embodiment, the limiting portion 27 is a groove disposed on a housing 29. The connection portion 222 abuts against the elastic component 26, the connection portion 222 abuts against the engagement portion 221, and the limited portion 223 abuts against the connection portion 222. A person skilled in the art may understand that, the connection portion 222 may not be disposed on the buckle 22. As shown in FIG. 5, when the limited portion 223 is limited by the first limiting portion 271, the buckle 22 (the limited portion 223) is located at the first position. In this case, an elastic force applied by the elastic component 26 on the buckle 22 is less than or equal to an acting force applied by the first limiting

portion 271 on the limited portion 223. Therefore, the limited portion 223 on the buckle 22 is not detached from the first limiting portion 271 under the action of an elastic force, that is, the buckle 22 may be retained at the first position. As shown in FIG. 6, when the limited portion 223 is limited by the second limiting portion 272, the buckle 22 (the limited portion 223) is located at the second position. In this case, the elastic force applied by the elastic component 26 on the buckle 22 is greater than an acting force applied by the second limiting portion 272 on the limited portion 223. Therefore, when the limited portion 223 on the buckle 22 is located at the second position, the buckle 22 can only be retained at the second position for a short time, and finally, due to the elastic force of the elastic component 26, the buckle 22 (the limited portion 223) restores to the first position. A person of ordinary skill in the art may understand that, there may be one limited portion 223, or there may be multiple limited portions 223 arranged along the circumference of the connection portion 222 on the buckle 22.

[0043] Specifically, a magnitude of the elastic force of the elastic component 26 may have different changes based on designs of materials and shapes. For example, if the elastic component 26 is a metal spiral spring, factors affecting the force include a trimming die amount of a metal material, a wire diameter of the spring, a medium diameter of the spring, and an effective coil number. For another example, if the elastic component 26 is silica gel, the elastic force mainly depends on a coefficient of elasticity of a silica gel material. More specifically, an acting force between the limited portion 223 and the first limiting portion 271 may have different changes by changing material types of the limited portion 223 and the first limiting portion 271 and controlling a depth by which the limited portion 223 is clamped in the first limiting portion 271. For example, if a distance by which the limited portion 223 extends into the first limiting portion 271 becomes longer, the acting force between the limited portion 223 and the first limiting portion 271 becomes larger; on the contrary, the acting force between the limited portion 223 and the first limiting portion 271 becomes smaller. Correspondingly, the acting force between the limited portion 223 and the second limiting portion 272 may have different changes in a similar manner. A person skilled in the art may make different changes on this basis. Details are not described herein.

[0044] FIG. 7 and FIG. 8 are schematic diagrams of the buckle according to Embodiment 2A. To ensure that the buckle 22 can be stably fixed at the first position and to balance the elastic force applied by the elastic component 26, a reinforcement portion may be disposed on the buckle 22. As shown in FIG. 7 and FIG. 8, in this embodiment, a first reinforcement portion 224 and a second reinforcement portion 225 are disposed on the buckle 22. A person of ordinary skill in the art may understand that, there may be one reinforcement portion or two or more reinforcement portions, as long as that the buckle 22 can achieve a force balance at the first position. A

groove matching the reinforcement portions 224 and 225 is provided on a part of the housing that is connected to the reinforcement portions 224 and 225, to satisfy that the reinforcement portion can move in the groove in a process of taking out the ink cartridge 2. A person of ordinary skill in the art may understand that, if it is ensured that the buckle 22 can achieve a force balance, the reinforcement portion may not be disposed.

[0045] FIG. 9 is a schematic local diagram when the ink cartridge is installed in an installation structure according to Embodiment 2A. As shown in FIG. 9, a force application component does not need to be separately disposed in a printing device, but a movable lever 31 included in an installation structure 3 is used as a force application component. The first limiting portion 271 is located between the second limiting portion 272 and the force application component (that is, the lever 31). A distance from the first limiting portion 271 to the elastic component 26 is greater than a distance from the second limiting portion 272 to the elastic component 26, and a distance from the first limiting portion 271 to the lever 31 is less than a distance from the second limiting portion 272 to the lever 31. An elastic force that is applied by the elastic component 26 on the buckle 22 when the limited portion 223 is located at the second position is greater than an elastic force that is applied by the elastic component 26 on the buckle 22 when the limited portion 223 is located at the first position. A schematic diagram of the lever 31 is shown in FIG. 10. The lever 31 includes rotation axes 313 and 314, an engagement hole 311, and a push portion 312. The lever 31 can rotate around the rotation axes 313 and 314. In a state in which the ink cartridge 2 is installed in the installation structure 3, an axial direction of the elastic component 26 (which is preferably a spring) is a horizontal direction. In a state in which the ink cartridge 2 is installed in the installation structure 3, the engagement portion 221 is engaged with the engagement hole 311 of the lever 31, to limit upward movement of the ink cartridge 2. In a process of taking out the ink cartridge 2, first, a user pushes the push portion 312 of the lever 31, the push portion 312 drives the buckle 22 to move toward a direction of the elastic component 26, and the limited portion 223 on the buckle 22 reaches the second limiting portion 272 from the first limiting portion 271, that is, the buckle 22 reaches the second position from the first position. Then, the user releases the push portion 312 of the lever 31. After a push force applied on the push portion 312 is removed, the lever 31 immediately restores to an original position. Because the limited portion 223 is limited by the second limiting portion 272 for a short time (that is, the limited portion 223 is clamped in the second limiting portion 272 for a short time), the buckle 22 can be retained at the second position for a short time. In addition, an elastic force applied by a contact pin 33 on a chip 23 causes the ink cartridge 2 to bounce upward and to be detached from the installation structure 3. Finally, the user can take out the ink cartridge 2 from the installation structure 3.

[0046] A person skilled in the art understands that, the buckle 22 shown in each of FIG. 7 and FIG. 8 and the lever 31 shown in FIG. 10 are also applicable to Embodiment 1A. Details are not described herein. Specifically, in Embodiment 2A, in a state in which the ink cartridge 2 is not installed in the installation structure 3, the limited portion 223 is limited at the first position of the first limiting portion 271 by the limiting portion 27. It may be learned from the foregoing Embodiment 1A and Embodiment 2A that, in the technical solutions of the present invention, a fixed manner of positioning the ink cartridge by using the handle in the Background is abandoned, to prevent a case in which the ink cartridge is fixed at an inaccurate position and cannot be identified by the installation structure or the ink cartridge cannot be fixed in the installation structure.

[0047] In a variant embodiment, the buckle 22 and the housing 29 may be integrally formed or separately formed and then assembled, and a requirement in the technical solution can be met as long as movement of the buckle 22 is not affected. In this embodiment, it may be learned from FIG. 5 and FIG. 9 that, the buckle 22 including the engagement portion 221 and the housing 29 are separate portions. The buckle 22 and the housing 29 may be separately manufactured and then assembled. The buckle 22 has a function of positioning the ink cartridge 2. Therefore, preferably, material hardness of the buckle 22 is higher than that of the housing 29. Preferably, the buckle 22 and the housing 29 are both obtained through injection molding and are both plastic products. Preferably, a material of the buckle 22 is ABS, and a material of the housing 29 is PP.

Embodiment 3A

[0048] FIG. 11 is a schematic local diagram when an ink cartridge 4 is installed in an installation structure 3 according to Embodiment 3A. A buckle 42 includes a first limited portion 423 and a second limited portion 426. A limiting portion 47 includes a first limiting portion 471 and a second limiting portion 472. Along a direction of an elastic component 46 toward a lever 31 (that is, a force application component), a distance from the first limiting portion 471 to the elastic component 46 is greater than a distance from the second limiting portion 472 to the elastic component 46, to ensure that during movement of an engagement portion 421 toward the elastic component 46, first, the first limited portion 423 is clamped with the first limiting portion 471, and then, the second limited portion 426 is clamped with the second limiting portion 472. Specifically, in a state in which the first limited portion 423 is limited by the first limiting portion 471, the buckle 42 is located at a first position. In this case, an elastic force applied by the elastic component 46 on the buckle 42 is less than or equal to an acting force applied by the first limiting portion 471 on the first limited portion 423, that is, the first position is a position at which the buckle 42 achieves a force balance. In a state in which

the second limited portion 426 is limited by the second limiting portion 472, the buckle 42 is located at a second position. In this case, an elastic force of the elastic component 46 is greater than an acting force applied by the second limiting portion 472 on the second limited portion 426, that is, an elastic force applied by the elastic component 46 on the buckle 42 is greater than the acting force applied by the second limiting portion 472 on the second limited portion 426. That is, the buckle 42 is in an unbalanced state, and in the unbalanced state, the second limiting portion 472 is temporarily limited by the second limited portion 426, and the buckle 42 may be temporarily located at the second position, but finally, the buckle 42 restores to the first position (that is, a position of the first limiting portion 423) under the action of the elastic force of the elastic component 46. In a state in which the ink cartridge 4 is not installed in the installation structure 3, the first limited portion 423 is limited at the first position by the limiting portion 47.

[0049] FIG. 12 is a schematic diagram of the buckle according to Embodiment 3A. To ensure that the buckle 42 can be stably fixed at the first position, a reinforcement portion may be disposed on the buckle 42. As shown in FIG. 12, in this embodiment, a first reinforcement portion 424 and a second reinforcement portion 425 are disposed on the buckle 42. A groove matching the reinforcement portions 424 and 425 is provided on a part of the housing that is connected to the reinforcement portions 424 and 425, to satisfy that the reinforcement portion can move in the groove in a process of taking out the ink cartridge 4. The first limited portion 423 is connected to a connection portion 422 by using a first arm 423a, the second limited portion 426 is connected to the connection portion 422 by using a second arm 423a, and similarly, the first reinforcement portion 424 and the second reinforcement portion 425 are also connected to the connection portion 422 by using an arm.

[0050] The first limited portion 423 and the second limited portion 426 on the buckle 42 may be both disposed on a same arm 423a. This also can achieve a technical effect of the technical solution, and the second arm 426a is omitted in this structure.

[0051] In a process of taking out the ink cartridge 4, first, a user pushes a push portion 312 of the lever 31, the push portion 312 drives the buckle 42 to move toward a direction of the elastic component 46, and the buckle 42 reaches the second position from the first position, that is, the first limited portion 423 is separated from the first limiting portion 471, and the second limited portion 426 is engaged with the second limiting portion 472. Then, the user releases the push portion 312 of the lever 31. After a push force applied on the push portion 312 is removed, the lever 31 immediately restores to an original position. Because the second limited portion 426 is limited by the second limiting portion 472 for a short time, the buckle 42 can be retained at the second position for a short time. In addition, an elastic force applied by a contact pin 33 on a chip 53 causes the ink cartridge 4 to

bounce upward and to be detached from the installation structure 3. Finally, the user can take out the ink cartridge 4 from the installation structure 3.

[0052] The remaining part is similar to Embodiment 2A. Repeated descriptions are not provided herein again.

Embodiment 4A

[0053] FIG. 13 is a schematic diagram when an ink cartridge is installed in an installation structure according to Embodiment 4A. FIG. 14 and FIG. 15 are schematic partial diagrams of the ink cartridge according to Embodiment 4A. An ink cartridge 5 includes an elastic component 56, a buckle 52, a first limiting portion 571, a second limiting portion 572, and a second spring 58. Similar to Embodiment 3A, along a direction of the elastic component 56 toward a lever 31 (that is, a force application component), a distance from the first limiting portion 571 to the elastic component 56 is greater than a distance from the second limiting portion 572 to the elastic component 56. The buckle 52 includes a first limited portion 523 and a second limited portion 524. The first limited portion 523 is a protrusion, and can match the first limiting portion 571 on a housing, to cause the ink cartridge to be retained at a first position. The second limited portion 524 is an arcuate recess, and the second limiting portion 572 is a cylinder that has an arcuate end and that matches the second limited portion 524. In a process of taking out the ink cartridge 5, first, a user pushes a push portion 312 of the lever 31, the push portion 312 drives the buckle 52 to move toward a direction of the elastic component 56, and the buckle 52 reaches the second position from the first position, that is, the first limited portion 523 is separated from the first limiting portion 571, and the second limited portion 524 is engaged with the second limiting portion 572. Then, the user releases the push portion 312 of the lever 31. After a push force applied on the push portion 312 is removed, the lever 31 immediately restores to an original position. Because the second limited portion 524 is limited by the second limiting portion 572 for a short time, the buckle 52 can be retained at the second position for a short time. In addition, an elastic force applied by a contact pin 33 on a chip 53 causes the ink cartridge 5 to bounce upward and to be detached from the installation structure 3. Finally, the user can take out the ink cartridge 5 from the installation structure 3.

[0054] The remaining part is similar to Embodiment 3A. Repeated descriptions are not provided herein again.

[0055] A person of ordinary skill in the art may understand that, an axial direction of the elastic component may also be set to a horizontal direction, that is, a direction parallel to the first surface and the second surface, or may also be set to a downward inclined direction, which both can resolve a technical problem to be resolved by the technical solution, and can achieve a technical effect of the technical solution.

Embodiment 5A

[0056] FIG. 16 is a schematic diagram of an ink cartridge 7 according to Embodiment 5A of the present invention. The ink cartridge 7 includes a first surface 7a and a second surface 7b that are opposite to each other, and a third surface 7c and a fourth surface 7d that are opposite to each other. It may be learned from FIG. 16 that, different from the foregoing embodiment, a buckle 72 of the ink cartridge 7 shown in FIG. 16 includes two telescopic portions 726. A person skilled in the art understands that, for compositions of and position relationships between other parts of the ink cartridge 7, refer to FIG. 2 and FIG. 3, and details are not described herein again. Specifically, the buckle 72 includes an engagement portion 721, a connection portion 722, and the telescopic portions 726. The two telescopic portions 726 are located at two sides of the connection portion 722, and along a direction of the second surface 7b toward the first surface 7a, the telescopic portions 726 are located below the engagement portion 721. Specifically, FIG. 17 is a schematic local diagram when the ink cartridge 7 is installed in an installation structure 3. With reference to FIG. 16 and FIG. 17, it may be learned that, the installation structure 3 includes an abutting portion 34 that is disposed opposite to the telescopic portion 726. During installation of the ink cartridge, a user presses the second surface 7b to cause the ink cartridge to move toward directions of the first surface 7a and the third surface 7c. After the telescopic portion 726 abuts against the abutting portion 34, the abutting portion 34 applies, on the telescopic portion 726, a reacting force toward the fourth surface 7d or toward the second surface 7b and the fourth surface 7d, that is, the reacting force applied by the abutting portion 34 is toward a compression direction of an elastic component (not shown in FIG. 16 and FIG. 17). In this case, because pressure applied by the user on the second surface 7b is not removed, the reacting force applied by the abutting portion 34 finally transfers to the elastic component (not shown) and compresses the elastic component. A person skilled in the art understands that, compared with the foregoing embodiment, in this embodiment, it is more labor-saving during installation.

[0057] In another variant embodiment, according to different sizes of the installation structure, the abutting portion that matches the telescopic portion 726 may be another fixing component in the installation structure 3, as long as the abutting portion is opposite to the telescopic portion 726 during installation.

[0058] Further, FIG. 18 and FIG. 19 are schematic diagrams of the buckle 72. The telescopic portion 726 has an inverted-L shape, and the telescopic portion 726 extends downward along a vertical direction. Preferably, the abutting portion 34 is inclined relative to the telescopic portion 726. This more facilitates the abutting portion 34 to apply, on the telescopic portion 726, a reacting force toward the second surface 7b and fourth surface 7d. Pref-

erably, reinforcement portions 724 and 725 are disposed on the buckle 72 and have functions similar to those of the reinforcement portions 224 and 225 shown in FIG. 8. Details are not described herein again. In a change, the abutting portion 34 may be parallel to the telescopic portion 726. In this way, the reacting force applied by the abutting portion 34 on the telescopic portion 726 is toward the fourth surface 7d. This can also achieve an objective of this embodiment. In another change, the telescopic portion 726 is inclined relative to the vertical direction, and correspondingly, the abutting portion 34 may be parallel to the telescopic portion 726 or may be inclined relative to the telescopic portion 726. Details are not described herein again.

Embodiment C

[0059] A person skilled in the art understands that, the ink cartridge involved in the present utility model is disposed in an ink-jet printer. A main outline of the ink cartridge is formed by a housing 2. As shown in FIG. 33, the housing 2 basically has a shape of a cube. Specifically, according to an actual requirement, the housing 2 may have a shape such as an oval or a circle. More specifically, the housing 2 includes six surfaces. A first surface 2a is opposite to a second surface 2b; and a third surface 2c and a fourth surface 2d are opposite to each other and are basically perpendicular to the first surface 2a. More specifically, the housing 2 generally includes a chamber and a cover (not shown). The chamber has an ink chamber that can store ink, and the cover is welded on the chamber, so that the ink chamber can be in a sealed state.

[0060] Further, the ink cartridge includes a first elastic component 41 connected to the housing 2. The first elastic component 41 is connected to a buckle 22 along a stretching direction. The first elastic component 41 may be silica gel, an elastic metal sheet, a spring, or the like, and is preferably a spring in this specific implementation. In this way, the buckle 22 can move along the stretching direction of the first elastic component 41. Specifically, the first elastic component 41 is disposed along a horizontal direction, and the buckle 22 can perform reciprocating movement along the horizontal direction. A specific connection manner of the buckle 22 and the first elastic component 41 is described in detail below.

[0061] Further, the buckle 22 can be engaged with or separated from a force application component 32 on the ink-jet printer. The force application component 32 is connected to the ink-jet printer by using a second elastic component 42. The second elastic component 42 is disposed opposite to the first elastic component 41, and along a vertical direction, the second elastic component 42 is located below the first elastic component 41. The second elastic component 42 may be silica gel, an elastic metal sheet, a spring, or the like, and is preferably a spring in this specific implementation. The second elastic component 42 may be disposed along the horizontal direc-

tion, or may be obliquely disposed relative to the horizontal direction. Specifically, under the action of an external force, the force application component 32 can rotate toward a direction of the buckle 22 in a vertical plane.

[0062] Further, in the vertical direction, a position (referred to as a "first position 321" below) at which the external force is applied on the force application component 32 is basically aligned with a position of the buckle 22, that is, relative to the first surface 2a, a height from the first position 321 to the first surface 2a is basically the same as a height from the buckle 22 to the first surface 2a. In this case, the force application component 32 compresses the buckle 22 to move along a compression direction of the first elastic component 41. Correspondingly, a position (referred to as a "second position 322" below) at which the force application component 32 is connected to the second elastic component 42 moves along a compression direction of the second elastic component 42. In addition, because the first elastic component 41 is disposed opposite to the second elastic component 42, movement directions of the first position 321 and the second position 322 are opposite to each other. Specifically, as shown in FIG. 33, the first position 321 is at the top of the force application component 32, and the second position 322 is at the bottom of the force application component 32. That is, the first position 321 and the second position 322 are at two sides of a rotation axis (not shown) of the force application component 32 along the vertical direction. Therefore, the movement directions of the first position 321 and the second position 322 are opposite to each other. More specifically, when the external force is applied at the first position 321, in a state in which the force application component 32 stops rotating, when the external force is removed, the first position 321 moves toward a direction away from the buckle 22, the buckle 22 rebounds and restores to an original position under the action of the first elastic component 41, and the force application component 32 rebounds and restores to an original position under the action of the second elastic component 42. A movement direction when the buckle 22 restores to the original position is the same as a rotation direction when the force application component 32 restores to the original position.

[0063] In a specific embodiment, as shown in FIG. 34, the ink-jet printer includes an installation structure 3. The force application component 32 is a rotatable lever disposed on the installation structure 3. The second elastic component 42 is disposed on the installation structure 3. The force application component 32 is connected to the installation structure 3 by using the second elastic component 42. Specifically, the ink cartridge includes a chip 23, and the installation structure 3 includes a contact pin 31. The chip 23 (shown in FIG. 37) is disposed opposite to the contact pin 31. When the buckle 22 is engaged with the force application component 32, the chip 23 is in contact with the contact pin 31, and the contact pin 31 applies an upward elastic force along the vertical direction on the chip 23 and the ink cartridge. After the buckle

22 is separated from the force application component 32, the ink cartridge bounces upward under the action of the elastic force of the contact pin 31. More specifically, as shown in FIG. 33, the chip 23 is disposed on a slope that is obliquely disposed between the first surface 2a and the third surface 2c. The chip 23 is fixed on a chip rack 23a. The chip 23 includes a storage unit that stores information such as ink quantity information, an ink type, and a manufacturer, and a terminal, and the terminal can be electrically connected to the contact pin 31 on the installation structure 3. The ink outlet 21 is a protrusion disposed on the first surface 2a, and can provide ink to the ink-jet printer.

[0064] In a connection manner in this specific embodiment, FIG. 35 and FIG. 36 are detailed diagrams of the first elastic component 41 and the buckle 22. With reference to FIG. 33, it may be learned that, one part of the buckle 22 extends into the housing 2 and is clamped in the housing 2. The buckle 22 includes an engagement portion 221 and extends out of the housing 2. The part of the buckle 22 that is located in the housing 2 forms an accommodation groove (not numbered in the figure), and the first elastic component 41 is disposed in the accommodation groove. A person skilled in the art understands that, a size of the accommodation groove is adjusted, so that the size of the accommodation groove matches a size of the first elastic component 41. In this way, the first elastic component 41 may not be fixed on the buckle 22 and the housing 2, but abuts against both the buckle 22 and the housing 2. A person skilled in the art understands that, as shown in FIG. 34, the force application component 32 may be set to have a structure including an engagement hole 323 (or a notch). The engagement portion 221 is engaged with the engagement hole 323 (or the notch), so that the buckle 22 can be engaged with the force application component, so as to fix the ink cartridge in the installation structure 3. In some other variant embodiments, the engagement portion of the buckle 22 may have a regular shape such as a clamping shoulder or a hook. In addition, the force application component 32 is correspondingly changed, to achieve an objective that the engagement portion and the force application component can be engaged. Details are not described herein.

[0065] In a variant connection manner (not shown), the first elastic component 41 is directly fixed on the third surface 2c, and then the buckle 22 is fixedly connected to the first elastic component 41. There are many specific fixing manners, for example, fixing is directly performed through welding; for another example, a fixing block are disposed on each of the third surface 2c and the buckle 22, and then the first elastic component 41 is fixed on the fixing block. These all are the prior art, and details are not described herein.

[0066] Further, during installation of the ink cartridge, the second surface 2b is pressed to cause the ink cartridge to move downward as a whole, until a state shown in FIG. 37 is reached. That is, the buckle 22 is engaged with the force application component 32. In addition, the

chip 23 abuts against the contact pin 31. In this case, the contact pin 31 applies an upward resilience force on the ink cartridge, but because the engagement portion 221 is engaged with the engagement hole 323 (or the notch), the ink cartridge is fixed in the installation structure 3.

[0067] Further, when the ink cartridge needs to be detached, as shown in FIG. 37, an external force F is applied by an operator at the first position 321 of the force application component 32. Under the action of the external force F, the force application component 32 rotates, and the first position 321 of the force application component 32 moves along a direction of the buckle 22. Under the action of the force application component 32, the buckle 22 moves along a compression direction of the first elastic component 41, and the second position 322 of the force application component 32 moves along a compression direction of the second elastic component 42. After the external force is removed, the buckle 22 and the force application component 32 restore to the original positions at the same time, and a movement direction when the buckle 22 restores to the original position is the same as a movement direction when the first position 321 restores to the original position. In this case, provided that it is ensured that acceleration when the force application component 32 restores to the original position is greater than acceleration when the buckle 22 restores to the original position, in a process in which the buckle 22 and the force application component 32 restore to the original positions, a first state during separation between the ink cartridge and the installation structure shown in FIG. 38 can be achieved, that is, the buckle 22 is just separated from the force application component 32, but the contact pin 31 is still not separated from the chip 23.

[0068] Further, after the first state is entered, a second state during separation between the ink cartridge and the installation structure is reached. When the buckle 22 is separated from the force application component 32, the ink cartridge bounces upward under the action of an elastic force of the contact pin 31. As shown in FIG. 39, the chip 23 no longer compress the contact pin 31, and the engagement portion 221 of the buckle 22 and the engagement hole 323 (or the notch) of the force application component 32 are misplaced, to implement complete separation between the buckle 22 and the force application component 32. In addition, the contact pin 31 causes the entire ink cartridge to bounce, and then, the ink cartridge is taken out from the installation structure 3, to complete an entire detachment process.

[0069] Further, a person skilled in the art understands that, magnitudes of the elastic forces of the first elastic component 41 and the second elastic component 42 affect the acceleration when the buckle 22 and the force application component 32 restore to the original positions. Factors affecting the elastic forces include specifications of the first elastic component 41 and the second elastic component 42 and compression degrees of the first elastic component 41 and the second elastic component 42. For example, if the first elastic component 41

and the second elastic component 42 are both metal spiral springs, and preferably, a metal material may select straight carbon steel, stainless iron, or stainless steel, the factors affecting the elastic force include a trimming die amount of the metal material, a wire diameter of the spring, a medium diameter of the spring, and an effective coil number. For another example, if the first elastic component 41 and the second elastic component 42 are both silica gel, the elastic force mainly depends on a coefficient of elasticity of a silica gel material. Further, under a condition that the specifications of the first elastic component 41 and the second elastic component 42 are given, if the first elastic component 41 and the second elastic component 42 are compressed to a higher degree, the elastic forces are larger.

[0070] Further, masses of the buckle 22 and the force application component 32 may be changed in a matching manner to adjust the acceleration when the buckle 22 and the force application component 32 restore to the original positions. A person skilled in the art understands that, a larger elastic force of the first elastic component 41 indicates a smaller mass of the buckle 22 and higher acceleration during restoration to the original position; or a smaller elastic force of the first elastic component 41 indicates a larger mass of the buckle 22 and smaller acceleration during restoration to the original position. Corresponding, a principle of adjusting the acceleration when the force application component 32 restores to the original position is similar to this. Details are not described herein again.

[0071] In a preferred embodiment, initial acceleration when the force application component 32 restores to the original position is greater than initial acceleration when the buckle 22 restores to the original position. This more facilitates fast detachment of the ink cartridge. That is, at an initial stage after the external force is removed, the force application component 32 completes separation from the buckle 22. In this case, the ink cartridge bounces under the action of the elastic force of the contact pin 31, and then the ink cartridge can be taken out. Multiple specific embodiments are provided below. Specifically, in the following multiple embodiments, the first elastic component 41 has a wire diameter of 0.4 mm, a developed length of 14 mm, a medium diameter of 4.1 mm, an effective coil number of 8, and a pitch of 1.6 mm; the second elastic component 42 has a wire diameter of 0.4 mm, a developed length of 9 mm, a medium diameter of 2.6 mm, an effective coil number of 9, and a pitch of 1 mm; and a magnitude of the external force is 8-10 N. A person skilled in the art may derive more implementation solutions with reference to the following embodiments.

[0072] Embodiment 1: The mass of the buckle 22 is 0.31 g, and the mass of the force application component 32 is 0.45 g. After the first elastic component 41 is compressed under the action of the external force, if the external force is removed, an elastic force applied by the first elastic component 41 on the buckle 22 is 3 N, an elastic force applied by the fourth elastic component 42

on the force application component 32 is 12 N, the initial acceleration when the buckle 22 restores to the original position is 9.6 m/s^2 , and the initial acceleration when the force application component 32 restores to the original position is 26.6 m/s^2 .

[0073] Embodiment 2: The mass of the buckle 22 is 0.38 g, and the mass of the force application component 32 is 0.51 g. After the first elastic component 41 is compressed under the action of the external force, if the external force is removed, an elastic force applied by the first elastic component 41 on the buckle 22 is 2.5 N, an elastic force applied by the second elastic component 42 on the force application component 32 is 8 N, the initial acceleration when the buckle 22 restores to the original position is 6.57 m/s^2 , and the initial acceleration when the force application component 32 restores to the original position is 15.69 m/s^2 .

[0074] Embodiment 3: The mass of the buckle 22 is 0.38 g, and the mass of the force application component 32 is 0.51 g. After the first elastic component 41 is compressed under the action of the external force, if the external force is removed, an elastic force applied by the first elastic component 41 on the buckle 22 is 2.5 N, an elastic force applied by the second elastic component 42 on the force application component 32 is 10 N, the initial acceleration when the buckle 22 restores to the original position is 6.57 m/s^2 , and the initial acceleration when the force application component 32 restores to the original position is 19.61 m/s^2 .

[0075] Embodiment 4: The mass of the buckle 22 is 0.38 g, and the mass of the force application component 32 is 0.58g. After the first elastic component 41 is compressed under the action of the external force, if the external force is removed, an elastic force applied by the first elastic component 41 on the buckle 22 is 2.5 N, an elastic force applied by the second elastic component 42 on the force application component 32 is 8 N, the initial acceleration when the buckle 22 restores to the original position is 6.57 m/s^2 , and the initial acceleration when the force application component 32 restores to the original position is 13.79 m/s^2 .

[0076] Embodiment 5: The mass of the buckle 22 is 0.38 g, and the mass of the force application component 32 is 0.58g. After the first elastic component 41 is compressed under the action of the external force, if the external force is removed, an elastic force applied by the first elastic component 41 on the buckle 22 is 2.5 N, an elastic force applied by the second elastic component 42 on the force application component 32 is 10 N, the initial acceleration when the buckle 22 restores to the original position is 6.57 m/s^2 , and the initial acceleration when the force application component 32 restores to the original position is 17.24 m/s^2 .

[0077] Embodiment 6: The mass of the buckle 22 is 0.6 g, and the mass of the force application component 32 is 0.65 g. After the first elastic component 41 is compressed under the action of the external force, if the external force is removed, an elastic force applied by the

first elastic component 41 on the buckle 22 is 2.4 N, the initial acceleration when the buckle restores to the original position is 4 m/s^2 , an elastic force applied by the second elastic component 42 on the force application component 32 is 6.5 N, and the initial acceleration when the force application component 32 restores to the original position is 10 m/s^2 .

[0078] Further, a person skilled in the art understands that, with reference to the foregoing five embodiments, it may be learned that, the elastic force applied by the first elastic component 41 on the buckle is 2.4-3 N, and the elastic force applied by the second elastic component 42 on the force application component 32 is 6.5-12 N. When a value of the mass of the buckle is 0.31-0.6 g, the initial acceleration when the buckle restores to the original position is 4-9.6 m/s^2 , and when the value of the mass of the force application component 32 is 0.45-0.65 g, the initial acceleration when the force application component 32 restores to the original position is 10-26.6 m/s^2 . It may be learned from the above that, a maximum value of the initial acceleration when the buckle restores to the original position is 9.6 m/s^2 , it is still less than a minimum value being 10 m/s^2 of the initial acceleration when the force application component 32 restores to the original position. Therefore, within the foregoing value range, an objective of the present utility model can be achieved. A person skilled in the art understands that, not all experimental data is listed in this specification, but according to the common sense in the art, these experimental solutions can all be implemented, and details are not described herein.

[0079] In another embodiment, the mass of the buckle 22 is 0.4 g, and the mass of the force application component 31 is 0.53 g. After a first elastic component 26 is compressed under the action of the external force, if the external force is removed, an elastic force applied by the first elastic component 26 on the buckle 22 is 2.5 N, an elastic force applied by the second elastic component on the force application component 31 is 10 N, the initial acceleration when the buckle 22 restores to the original position is 6.25 m/s^2 , and the initial acceleration when the force application component 32 restores to the original position is 18.86 m/s^2 .

[0080] Further, when the mass of the force application component 32 needs to be increased, as shown in FIG. 40, preferably, the mass is increased by increasing a width of the first position 321. In this way, the ink cartridge can be more conveniently detached.

Embodiment 1D

[0081] As shown in FIG. 41 and FIG. 42, an installation structure 2 includes a movable lever 21, a first wall 22a, an ink duct 23, and a contact pin 24. The movable lever 21 may rotate around a lever rotation axis 213, and there is a particular rotation area. A person skilled in the art may understand that, a hole or a groove may be provided on the first wall 22a, and a technical effect of the technical

solution is not affected. FIG. 43 to FIG. 45 are schematic diagrams of an ink cartridge according to Embodiment 1. As shown in FIG. 43 to FIG. 45, a shape of the ink cartridge 6 may be a shape of a cuboid, an oval, a cone, or the like. Preferably, in this embodiment, the ink cartridge 6 may have a shape of a cuboid. An ink chamber exists in the ink cartridge 6 and can store a particular quantity of ink. The ink cartridge 6 includes a detent 61, a chip 62, an ink outlet 63, an elastic component 64, a detection portion 65, an ink cartridge body 69, a first surface 6a, a second surface 6b, a third surface 6c, a fourth surface 6d, a fifth surface, and a sixth surface. The fifth surface and the sixth surface are not shown in the schematic diagram. The first surface 6a is opposite to the second surface 6b; the third surface 6c is opposite to the fourth surface 6d; and the third surface 6c and the fourth surface 6d are basically perpendicular to the first surface 6a and the second surface 6b. The ink outlet 63 is disposed on the first surface 6a, and the first surface 6a is a front end surface in an installation direction at which the ink cartridge 6 is installed in the installation structure 2. In a state in which the ink cartridge 6 is installed, the first surface 6a is located below the second surface 6b, that is, the second surface 6b is at a position at the top of the ink cartridge 6. The detent 61 protrudes from the ink cartridge body 69, and can match the movable lever 21 of the installation structure 2, to achieve a function of preventing the ink cartridge 6 from moving upward. As shown in FIG. 43, the detent 61 is located on the third surface 6c. The chip 62 may be electrically connected to the contact pin 24 on the installation structure 2, and may transmit information such as an ink cartridge type, an ink type, and an ink quantity. The ink outlet 63 may provide ink in the ink chamber to a printer, to implement a printing function of the printer. The ink outlet 63 and the detent 61 are located at two sides of the ink cartridge 6. The elastic component 64 may be disposed at the top, an upper part, or the upper half of the ink cartridge 6. In this embodiment, the elastic component 64 is disposed at the upper part of the ink cartridge 6, is close to the second surface 6b, and is located above the detent 61 and above the chip 62. In a state in which the ink cartridge 6 is not installed, the elastic component 64 is in a natural state, and is not compressed or does not extend. The elastic component 64 is a component having elasticity such as a spring or silica gel, and preferably, is a spring. As shown in FIG. 7, the elastic component 64 is disposed at a position at which the third surface 6c joins the second surface 6b, that is, the elastic component 64 is disposed at a position above the ink outlet 63 and away from the ink outlet 63. The detection component 65 is disposed on the first surface 6a, the detection component 65 is preferably a prism, and an ink quantity in the ink chamber is detected by using an optical principle. The ink cartridge body 69 includes a cover 691 and a housing 692. The housing 692 includes an opening, and the ink chamber for storing ink is disposed in the housing 692. The cover 691 can seal the housing 692, so that the ink chamber

is in a sealed state. The detection portion 65 is away from the ink outlet 63 and is close to the chip 62.

[0082] FIG. 46 is a schematic partial diagram of combination between the ink cartridge and the installation structure according to Embodiment 1D. FIG. 47 is a schematic diagram of the movable lever. As shown in FIG. 47, the movable lever 21 includes an engagement portion 211, a force application component 212, and the rotation axis 213. The movable lever 21 can rotate around the rotation axis 213. As shown in FIG. 46, when the ink cartridge 6 is installed in the installation structure 2, the detent 61 is combined with the engagement portion 211 of the movable lever 21, and the elastic component 64 is in contact with the force application component 212 of the movable lever 21. The elastic component 64 in a compressed state is in contact with the force application component 212. Because the elastic component 64 is in contact with the force application component 212, and the elastic component 64 is in the compressed state, the ink cartridge body 69 is subject to an acting force applied by the elastic component 64.

[0083] FIG. 48 is a schematic diagram of a torque of the ink cartridge according to Embodiment 1. As shown in FIG. 48, the elastic component 64 of the ink cartridge 6 is combined with the installation structure 2, and the elastic component 64 is in the compressed state, and applies an upward inclined force on the ink cartridge body 69. The force F1 is inclined relative to the ink cartridge body 69. After the ink cartridge 6 is installed in the installation structure 2, the detent 61 is an engagement point, and the detent 61 is a fixed point. Using the detent 61 as a fulcrum, the force F1 forms a counterclockwise rotating torque M1 for the ink cartridge body 69. Therefore, the first surface 6a has a downward tendency, the ink outlet 63 located on the first surface 6a can be in better contact with the installation structure 2, and the ink outlet 63 can be in contact with the ink duct 23 in the installation structure 2 more firmly.

[0084] Because a second detent in the Background is omitted in the ink cartridge 6, a case in which ink cannot reach a printer due to a wrong contact position of the second detent is prevented. In addition, the elastic component 64 is disposed at the upper part of the ink cartridge 6 and above the detent 61, and in a state in which the ink cartridge 6 is installed, the elastic component 64 is in the compressed state, and the ink cartridge body 69 is subject to a torque M using the detent 61 as a fulcrum and rotating toward a direction of the first surface 6a, so that the ink outlet 63 is in better contact with the ink duct 23, thereby preventing a case in which the ink cannot reach the printer and preventing a case in which printing cannot be performed or a print head is damaged because the print head performs void printing.

[0085] The detection portion 65 is disposed between the ink outlet 63 and the chip 62. As shown in FIG. 48, the detection portion 65 is disposed on the first surface 6a, and is disposed directly below or below the torque M. Therefore, a position offset of the detection portion 65

can be prevented, position accuracy of the detection portion 65 can be ensured, and a detection effect is better.

[0086] A person skilled in the art may understand that, a position of the ink outlet 63 may be any position on the first surface 6a, and is not limited to a position shown in 48. The first surface 6a may also be a step surface or a curved surface, which can both achieve a technical objective and a technical effect to be achieved by the technical solution.

Embodiment 2D

[0087] FIG. 49 is a schematic diagram of an ink cartridge according to Embodiment 2. As shown in FIG. 49, a detent 71 and an elastic component 74 are both located on a handle 76. A person skilled in the art may understand that, the detent 71 may be separately located on the handle 76, or the elastic component 74 may be separately located on the handle 76, which can both resolve a technical problem to be resolved by the technical solution, and can also achieve a technical effect of the technical solution. The elastic component 74 is preferably a spring, and the elastic component 74 has an upward inclined axial direction, and is inclined toward the ink cartridge body 79. FIG. 50 is a schematic diagram when an ink cartridge 7 is combined with an installation structure 2. When the ink cartridge 7 is installed in the installation structure 2, the detent 71 of the ink cartridge 7 is in contact with an engagement portion 211 of a movable lever 21 of the installation structure 2, to achieve a function of preventing the ink cartridge 7 from moving upward. The elastic component 74 in a compressed state applies an upward inclined force F2 on an ink cartridge body 79. After the ink cartridge 7 is installed in the installation structure 2, the detent 71 is an engagement point, and the detent 71 is a fixed point. Using the detent 71 as a fulcrum, the force F2 forms a counterclockwise rotating torque M2 for the ink cartridge 7. Therefore, a first surface 7a has a downward tendency, and can be in better contact with the installation structure 2. An ink outlet 73 can be in contact with an ink duct 23 in the installation structure 2 more firmly.

[0088] The remaining part is similar to Embodiment 1D. Repeated descriptions are not provided herein again.

Embodiment 3D

[0089] FIG. 51 is a schematic diagram of an ink cartridge according to Embodiment 3D. As shown in FIG. 51, a detent 81 and an elastic component 84 are both located on a handle 86. The elastic component 84 is preferably a spring, and the elastic component 84 has an upward axial direction along a vertical direction. FIG. 52 is a schematic diagram when an ink cartridge 8 is combined with an installation structure 2. When the ink cartridge 8 is installed in the installation structure 2, the detent 81 of the ink cartridge 8 is in contact with an engagement portion 211 of a movable lever 21 of the installation

structure 2, to achieve a function of preventing the ink cartridge 7 from moving upward. The elastic component 84 in a compressed state applies an upward force F3 along the vertical direction on an ink cartridge body 89. After the ink cartridge 8 is installed in the installation structure 2, the detent 81 is an engagement point, and the detent 81 is a fixed point. Using the detent 81 as a fulcrum, the force F3 forms a counterclockwise rotating torque M3 for the ink cartridge 8. Therefore, a first surface 8a has a downward tendency, and can be in better contact with the installation structure 2. An ink outlet 83 can be in contact with an ink duct 23 in the installation structure 2 more firmly.

[0090] The remaining part is similar to Embodiment 1D. Repeated descriptions are not provided herein again.

[0091] A person of ordinary skill in the art may understand that, an axial direction of the elastic component may also be set to a horizontal direction, that is, a direction parallel to the first surface and the second surface, or may also be set to a downward inclined direction, which both can resolve a technical problem to be resolved by the technical solution, and can achieve a technical effect of the technical solution.

Embodiment 1E

[0092] As shown in FIG. 53, in this embodiment, one part of the pressing portion 28 is used as the limiting portion 27, and a through hole on the buckle 22 is used as the limited portion 223. When the ink cartridge 2 is not installed in the installation structure 3, the elastic component 26 abuts against the buckle 22, the elastic component 26 is in a compressed state, and the limiting portion 27 is engaged with the limited portion 223, to ensure that the buckle 22 is not detached from the ink cartridge 2. The limiting portion 27 abuts against the second elastic component 26a, the second elastic component 26a is in a compressed state, and another limiting mechanism (for example, a spacing groove and an active block) is used to ensure that the pressing portion 28 is not detached from the ink cartridge 2.

[0093] When the ink cartridge 2 is installed in the installation structure 3, first, the detent 21 (not shown in FIG. 53) is engaged with a corresponding part of the installation structure 3. Next, the user presses with a hand an upper surface of the pressing portion 28 (referring to an arrow direction in FIG. 53), the pressing portion 28 moves downward, and the limiting portion 27 is separated from a first wall 2231 of the limited portion 223, the buckle 22 moves towards the direction of the force application component 31, the engagement portion 221 is inserted into the engagement hole 311, the limiting portion 27 abuts against the limited portion 2232, and the limiting portion 27 is limited in a state shown in FIG. 54. Then the user releases the hand, and the installation is completed.

[0094] When the ink cartridge 2 needs to be taken out from the installation structure 3, as shown in FIG. 55, the

user pushes the push portion 312 in the force application component 31. The force application component 31 rotates round the rotation axes 313 and 314. A pressure application portion 316 of the force application component 31 pushes and presses the buckle 22 to move toward the direction of the elastic component 26. In addition, when a second wall 2232 of the limited portion 223 is detached from the limiting portion 27, under the action of the elastic force of the second elastic component 26a, the limiting portion 27 moves upward, and abuts against the first wall 2231 of the limited portion 223. In this case, the user releases the hand, the force application component 31 restores to the original position, and the engagement portion 221 on the buckle 22 is detached from the engagement hole 311. In addition, the elastic force applied by the contact pin 33 on the chip 23 causes the ink cartridge 2 to bounce upward and to be detached from the installation structure 3. Finally, the user can take out the ink cartridge 2 from the installation structure 3, to reach a state shown in FIG. 56.

Embodiment 2E

[0095] FIG. 57 is a schematic diagram of another installation structure 3. The installation structure 3 includes a rotational force application component 31, an ink duct 32, and a slot 33. FIG. 58 is a schematic diagram of the force application component 31. In addition to same parts of the force application component in Embodiment 1A to Embodiment 5A, the force application component 31 includes an engagement hole 311 combined by a first engagement hole 3111, a second engagement hole 3112, and a third engagement hole 3113, and an engagement protrusion 315 combined by a first engagement protrusion 3151 and a second engagement protrusion 3152. FIG. 59 is a schematic diagram of the ink cartridge in this embodiment. The buckle 22 includes the connection portion 222 and the engagement portion 221 (including a first engagement portion 2211, a second engagement portion 2212, and a third engagement portion 2213 (which may be respectively engaged with the first engagement hole 3111, the second engagement hole 3112, and the third engagement hole 3113)). FIG. 60 is a schematic diagram when the ink cartridge 2 is installed in the installation structure 3.

[0096] When the ink cartridge 2 needs to be taken out from the installation structure 3, the user pushes the push portion 312 of the force application component 31, the force application component 31 rotates, and the pressure application portion 316 pushes the stressed portion 2221 on the connection portion 222, to drive the buckle 22 to move. Subsequently, a movement process described in Embodiment 1A to Embodiment 5A and Embodiment C is generated.

Embodiment 3E

[0097] The installation structure is the same as the in-

stallation structure in Embodiment 2E.

[0098] FIG. 61 and FIG. 62 are schematic diagrams in this embodiment. The ink cartridge includes a connection tongue 226 that extends downward. The connection tongue 226 is connected to the engagement portion 221 and the connection portion 222. The engagement portion 221 includes a left engagement portion 2211 and a right engagement portion 2212 that are respectively engaged with a first engagement protrusion 3151 and a second engagement protrusion 3152.

[0099] When the ink cartridge 2 needs to be taken out from the installation structure 3, the user pushes the push portion 312 of the force application component 31, the force application component 31 rotates, and the pressure application portion 316 pushes the stressed portion 2221 on the connection portion 222, to drive the buckle 22 to move. Subsequently, a movement process described in Embodiment 1A to Embodiment 5A and Embodiment C is generated.

[0100] An unlocking manner: It may be learned from a figure in FIG. 63 (the force application component 32 in FIG. 62 is separately taken out) that, the pressure application portion 316 and the engagement protrusion 315 are located at a same side of the rotation axis 313. Therefore, when the force application component 31 rotates, movement directions of the pressure application portion 316 and the engagement protrusion 315 are a same direction. When the user releases the hand, refer to a relationship between the limiting portion and the limited portion in Embodiment 1A to Embodiment 5A: The buckle 22 moves to the right, the limiting portion is clamped with the limited portion, the buckle 22 is in a stopped state, the engagement portion 221 is detached from the engagement protrusion 315, and under the action of the elastic force of the contact pin, the ink cartridge 2 bounces, and gets rid of the installation structure 3. Refer to embodiment C: Acceleration for resilience forces of the buckle 22 and the force application component 31 is different. The engagement protrusion 315 restores to the original position before the engagement portion 221, and the two are detached. In addition, because of the acting force of the contact pin, the ink cartridge 2 bounces.

Embodiment 4E

[0101] This is applicable to the installation structure in Embodiment 2E.

[0102] The engagement portion 221 and the connection portion 222 are both disposed on the handle 22. When the ink cartridge 2 needs to be taken out from the installation structure 3, the user pushes the push portion 312 of the force application component 31, the force application component 31 rotates, and the pressure application portion 316 pushes the stressed portion 2221 on the connection portion 222, to drive the handle 22 to rotate. After the user releases the hand, acceleration for a resilience force of the force application component 31 is greater than the acceleration of the engagement portion

221. Therefore, during restoration of the force application component 31 and the handle 22, the two are separated, and under the action of the elastic force of the contact pin, the ink cartridge 2 bounces.

Embodiment 5E

[0103] The structure described in Embodiment 4E is used, is applicable to the installation structure described in Embodiment 1A to Embodiment 5A.

[0104] Process descriptions thereof are the same as those of Embodiment 4E, and only applicable installation structures are different.

[0105] The foregoing Embodiment 4E and Embodiment 5E can resolve the following problem in the Background: Referring to FIG. 3 in the patent application with publication no. CN201620194360.4, the problem in the Background is as following: A position relationship between a pushing portion 21 and a first buffering portion 31 on an installation structure is that the pushing portion 21 is located above the first buffering portion 31, for example, FIG. 13 exemplarily shows a schematic partial diagram of a printer. An ink cartridge 2 and the installation structure 3 are placed inside the printer 50. If the pushing portion 21 is disposed above the first buffering portion 31, intervention between the pushing portion 21 and parts in the printer, for example, a friction or a collision is caused. To prevent generation of such a problem, heights and sizes of the installation structure and the ink cartridge need to be reduced, but a case of insufficient ink in the ink cartridge is caused.

[0106] In addition, in the prior art, an ink cartridge used for an ink-jet printer is shown in FIG. 20a and FIG. 20b. An ink cartridge 5 includes a first detent 51, a second detent 52, and an ink outlet 53. The first detent 51 and the second detent 52 both protrude from a body of the ink cartridge 5, that is, the first detent 51 and the second detent 52 are convex parts disposed on the body of the ink cartridge 5. FIG. 3 is a schematic diagram when the ink cartridge 5 is installed in an installation structure 2. As shown in FIG. 3, the first detent 51 of the ink cartridge 5 is combined with a movable lever 21 of the installation structure 2; the second detent 52 is combined with a positioning hole 22 of the installation structure 2; and the ink outlet 53 is combined with an ink duct 23. After the first detent 51 and the second detent 52 are combined with corresponding parts of the installation structure 2, the ink outlet 53 is in close contact with the ink duct 23, to fix the ink cartridge 5 in the installation structure 2.

[0107] However, it may be learned from FIG. 20b and FIG. 20c that, the second detent 52 is a flat convex part, and the positioning hole 22 corresponding to the second detent 52 is an elongated hole. In addition, the movable lever 21 is rotatable, and has a particular movement area. Due to disposition of such a structure, during installation, if an installation speed of a user is excessively high or due to momentary negligence, a case in which the ink cartridge shown in FIG. 20d is not correctly installed in

the installation structure may occur. Details are as follows: The second detent 5 is in contact with a first wall 22a of the installation structure 2, but is not combined with the positioning hole 22; and the first detent 51 is combined with the movable lever 21, but the ink outlet 53 is not in contact with or is not in close contact with the ink duct 23.

[0108] A person skilled in the art may understand that, the ink cartridge is consumable. After the ink cartridge is used completely, a new ink cartridge needs to be replaced to meet a requirement of performing printing again by the printer. In addition, for generalization of a consumable ink cartridge, an ink cartridge needs to be applicable to different models of printers, and installation structures of different models of printers may be different to some extent. In addition, there may be many printers of a same model at the same time, and installation structures of the printers of the same model may also be different to some extent. Therefore, an ink cartridge needs to be applicable to installation structures of different printers. Because the installation structures are different, in order that the ink cartridge 5 can match different installation structures 2, as shown in FIG. 20c, when the ink cartridge 5 is installed in the installation structure 2, a case in which there is a gap S between the first wall 22a and the body of the ink cartridge 5 may occur. Due to the existence of the gap S, it is more prone to a case in which for the ink cartridge 5, because the second detent 52 is not combined with the positioning hole 22, the ink outlet 53 is not in contact with or is not in close contact with the ink duct 23.

[0109] When the ink outlet 53 is not in contact with or is not in close contact with the ink duct 23, a case in which ink cannot reach a printer, and printing cannot be performed or a print head is damaged because the print head performs void printing is directly caused.

Embodiment 1B

[0110] FIG. 20 and FIG. 21 are schematic diagrams of an ink cartridge according to Embodiment 1. As shown in FIG. 20 and FIG. 21, an ink cartridge 2 basically has a shape of a cuboid. A person of ordinary skill in the art may understand that, according to an actual requirement, the ink cartridge 2 may have a shape such as an oval or a circle. In this embodiment, the ink cartridge 2 basically has a shape of a cuboid, and the ink cartridge 2 includes six surfaces that are respectively a first surface 2a, a second surface 2b, a third surface 2c, a fourth surface 2d, a fifth surface 2e, and a sixth surface 2f. The first surface 2a is opposite to the second surface 2b; the third surface 2c and the fourth surface 2d are opposite to each other and are basically perpendicular to the first surface 2a; and the fifth surface 2e and the sixth surface 2f are opposite to each other and are basically perpendicular to the first surface 2a and the third surface 2c.

[0111] The ink cartridge 2 includes a detent 21, a buckle 22, a chip 23, an ink outlet 24, a position limiting portion 25, an elastic component 26 (shown in FIG. 22), a limiting

portion 27 (shown in FIG. 22), and a housing 29. The detent 21 is disposed on the fourth surface 2d, and the detent 21 has a detent surface 211, and can be engaged with a corresponding position of an installation structure 3, to prevent the ink cartridge 2 from moving upward. The chip 23 is disposed on a slope that is obliquely disposed between the first surface 2a and the third surface 2c. The chip 23 is fixed on a chip rack 23a, and includes a terminal 231 that is electrically connected to a corresponding part of the installation structure 3. The chip 23 stores information such as ink quantity information, an ink type, and a manufacturer, and can be electrically connected to a contact pin 33 of an installation structure 3 of a printer. The ink outlet 24 is a protrusion disposed on the first surface 2a, and can provide ink to the printer. The position limiting portion 25 has a position limiting surface 251, and can limit movement of the ink cartridge 2 in a left-right direction. The housing 29 includes a chamber 292 and a cover 291. The chamber 292 has an ink chamber 293 that can store ink, and the cover 291 is welded on the chamber 291, so that the ink chamber 293 can be in a sealed state.

[0112] FIG. 22 is a sectional view of the ink cartridge according to Embodiment 1B. FIG. 22 is a schematic diagram when the buckle 22 is located at a first position. FIG. 23 is a schematic diagram when the buckle 22 is located at a second position. The buckle 22 includes an engagement portion 221, a connection portion 222, and a limited portion 223. An elastic component 26 may be silica gel, an elastic metal sheet, a spring, or the like, and is preferably a spring in this embodiment. A limiting portion 27 includes the first limiting portion 271 and the second limiting portion 272. In this embodiment, the limiting portion 27 is a groove disposed on a housing 29. The connection portion 222 abuts against the elastic component 26, the connection portion 222 abuts against the engagement portion 221, and the limited portion 223 abuts against the connection portion 222. A person skilled in the art may understand that, the connection portion 222 may not be disposed on the buckle 22. As shown in FIG. 22, when the limited portion 223 is limited by the first limiting portion 271, the buckle 22 (the limited portion 223) is located at the first position. In this case, an elastic force applied by the elastic component 26 on the buckle 22 is less than or equal to an acting force applied by the first limiting portion 271 on the limited portion 223. Therefore, the limited portion 223 on the buckle 22 is not detached from the first limiting portion 271 under the action of an elastic force, that is, the buckle 22 may be retained at the first position. As shown in FIG. 23, when the limited portion 223 is limited by the second limiting portion 272, the buckle 22 (the limited portion 223) is located at the second position. In this case, the elastic force applied by the elastic component 26 on the buckle 22 is greater than an acting force applied by the second limiting portion 272 on the limited portion 223. Therefore, when the limited portion 223 on the buckle 22 is located at the second position, the buckle 22 can only be retained

at the second position for a short time, and finally, due to the elastic force of the elastic component 26, the buckle 22 (the limited portion 223) restores to the first position. A person of ordinary skill in the art may understand that, there may be one limited portion 223, or there may be multiple limited portions 223 arranged along the circumference of the connection portion 222 on the buckle 22.

[0113] FIG. 24 and FIG. 25 are schematic diagrams of the buckle according to Embodiment 1. To ensure that the buckle 22 can be stably fixed at the first position and to balance the elastic force applied by the elastic component 26, a reinforcement portion may be disposed on the buckle 22. As shown in FIG. 24 and FIG. 25, in this embodiment, a first reinforcement portion 224 and a second reinforcement portion 225 are disposed on the buckle 22. A person of ordinary skill in the art may understand that, there may be one reinforcement portion or two or more reinforcement portions, as long as that the buckle 22 can achieve a force balance at the first position. A groove matching the reinforcement portions 224 and 225 is provided on a part of the housing that is connected to the reinforcement portions 224 and 225, to satisfy that the reinforcement portion can move in the groove in a process of taking out the ink cartridge 2. A person of ordinary skill in the art may understand that, if it is ensured that the buckle 22 can achieve a force balance, the reinforcement portion may not be disposed.

[0114] FIG. 26 is a schematic local diagram when the ink cartridge is installed in an installation structure according to Embodiment 1. As shown in FIG. 26, the installation structure 3 includes a movable lever 31. A schematic diagram of the lever 31 is shown in FIG. 27. The lever 31 includes rotation axes 313 and 314, an engagement hole 311, and a push portion 312. The lever 31 can rotate around the rotation axes 313 and 314. In a state in which the ink cartridge 2 is installed in the installation structure 3, an axial direction of the elastic component 26 (which is preferably a spring) is a horizontal direction. In a state in which the ink cartridge 2 is installed in the installation structure 3, the engagement portion 221 is engaged with the engagement hole 311 of the lever 31, to limit upward movement of the ink cartridge 2. In a process of taking out the ink cartridge 2, first, a user pushes the push portion 312 of the lever 31, the push portion 312 drives the buckle 22 to move toward a direction of the elastic component 26, and the limited portion 223 on the buckle 22 reaches the second limiting portion 272 from the first limiting portion 271, that is, the buckle 22 reaches the second position from the first position. Then, the user releases the push portion 312 of the lever 31. After a push force applied on the push portion 312 is removed, the lever 31 immediately restores to an original position. Because the limited portion 223 is limited by the second limiting portion 272 for a short time, the buckle 22 can be retained at the second position for a short time. In addition, an elastic force applied by a contact pin 33 on a chip 23 causes the ink cartridge 2 to bounce upward and to be detached from the installation structure 3. Finally, the

user can take out the ink cartridge 2 from the installation structure 3.

[0115] In a state in which the ink cartridge 2 is not installed in the installation structure 3, the limited portion 223 is limited at the first position by the limiting portion 27.

[0116] In the technical solution, a fixed manner of positioning the ink cartridge by using the handle in the Background is abandoned, to prevent a case in which the ink cartridge is fixed at an inaccurate position and cannot be identified by the installation structure or the ink cartridge cannot be fixed in the installation structure.

[0117] The buckle 22 and the housing 29 may be integrally formed or separately formed and then assembled, and a requirement in the technical solution can be met as long as movement of the buckle 22 is not affected. In this embodiment, it may be learned from FIG. 22 and FIG. 26 that, the buckle 22 including the engagement portion 221 and the housing 29 are separate portions. The buckle 22 and the housing 29 may be separately manufactured and then assembled. The buckle 22 has a function of positioning the ink cartridge 2. Therefore, preferably, material hardness of the buckle 22 is higher than that of the housing 29. Preferably, the buckle 22 and the housing 29 are both obtained through injection molding and are both plastic products. Preferably, a material of the buckle 22 is ABS, and a material of the housing 29 is PP.

Embodiment 2B

[0118] FIG. 28 is a schematic local diagram when the ink cartridge is installed in an installation structure according to Embodiment 2B. The buckle 42 includes a first limited portion 423 and a second limited portion 426. In a state in which the first limited portion 423 is limited by the first limiting portion 471, the buckle 42 is located at a first position. The first position is a position at which the buckle 42 achieves a force balance. In a state in which the second limited portion 426 is limited by the second limiting portion 472, the buckle 42 is located at a second position. When the buckle 42 is located at the second position, an elastic force of the elastic component 46 is greater than an acting force applied by the second limiting portion 472 on the second limited portion 426, that is, an elastic force applied by the elastic component 46 on the buckle 42 is greater than the acting force applied by the second limiting portion 472 on the second limited portion 426. The buckle 42 is in an unbalanced state, and the second limiting portion 472 is temporarily limited by the second limited portion 426, and the buckle 42 may be temporarily located at the second position, but finally, the buckle 42 restores to the first position. In a state in which the ink cartridge 4 is not installed in the installation structure 3, the limited portion 423 is limited at the first position by the limiting portion 47.

[0119] FIG. 29 is a schematic diagram of the buckle according to Embodiment 2. To ensure that the buckle 42 can be stably fixed at the first position, a reinforcement

portion may be disposed on the buckle 42. As shown in FIG. 29, in this embodiment, a first reinforcement portion 424 and a second reinforcement portion 425 are disposed on the buckle 42. A groove matching the reinforcement portions 424 and 425 is provided on a part of the housing that is connected to the reinforcement portions 424 and 425, to satisfy that the reinforcement portion can move in the groove in a process of taking out the ink cartridge 4. The first limited portion 423 is connected to a connection portion 422 by using a first arm 423a, the second limited portion 426 is connected to the connection portion 422 by using a second arm 423a, and similarly, the first reinforcement portion 424 and the second reinforcement portion 425 are also connected to the connection portion 422 by using an arm.

[0120] The first limited portion 423 and the second limited portion 426 on the buckle 42 may be both disposed on a same wall 423a. This also can achieve a technical effect of the technical solution, and the second arm 426a is omitted in this structure.

[0121] In a process of taking out the ink cartridge 4, first, a user pushes a push portion 312 of the lever 31, the push portion 312 drives the buckle 42 to move toward a direction of the elastic component 46, and the buckle 42 reaches the second position from the first position, that is, the first limited portion 423 is separated from the first limiting portion 471, and the second limited portion 426 is engaged with the second limiting portion 472. Then, the user releases the push portion 312 of the lever 31. After a push force applied on the push portion 312 is removed, the lever 31 immediately restores to an original position. Because the second limited portion 426 is limited by the second limiting portion 472 for a short time, the buckle 42 can be retained at the second position for a short time. In addition, an elastic force applied by a contact pin 33 on a chip 53 causes the ink cartridge 4 to bounce upward and to be detached from the installation structure 3. Finally, the user can take out the ink cartridge 4 from the installation structure 3.

[0122] The remaining part is similar to Embodiment 1B. Repeated descriptions are not provided herein again.

Embodiment 3B

[0123] FIG. 30 is a schematic diagram when an ink cartridge is installed in an installation structure according to Embodiment 3B. FIG. 31 and FIG. 32 are schematic partial diagrams of the ink cartridge according to Embodiment 3B. An ink cartridge 5 includes an elastic component 56, a buckle 52, a first limiting portion 571, a second limiting portion 572, and a second spring 58. The buckle 52 includes a first limited portion 523 and a second limited portion 524. The first limited portion 523 is a protrusion, and can match the first limiting portion 571 on a housing, to cause the ink cartridge to be retained at a first position. The second limited portion 524 is an arcuate recess, and the second limiting portion 572 is an arcuate cylinder that matches the second limited portion 524. In a process of

taking out the ink cartridge 5, first, a user pushes a push portion 312 of the lever 31, the push portion 312 drives the buckle 52 to move toward a direction of the elastic component 56, and the buckle 52 reaches the second position from the first position, that is, the first limited portion 523 is separated from the first limiting portion 571, and the second limited portion 524 is engaged with the second limiting portion 572. Then, the user releases the push portion 312 of the lever 31. After a push force applied on the push portion 312 is removed, the lever 31 immediately restores to an original position. Because the second limited portion 524 is limited by the second limiting portion 572 for a short time, the buckle 52 can be retained at the second position for a short time. In addition, an elastic force applied by a contact pin 33 on a chip 53 causes the ink cartridge 5 to bounce upward and to be detached from the installation structure 3. Finally, the user can take out the ink cartridge 5 from the installation structure 3.

[0124] The remaining part is similar to Embodiment 1B. Repeated descriptions are not provided herein again.

[0125] A person of ordinary skill in the art may understand that, an axial direction of the elastic component may also be set to a horizontal direction, that is, a direction parallel to the first surface and the second surface, or may also be set to a downward inclined direction, which both can resolve a technical problem to be resolved by the technical solution, and can achieve a technical effect of the technical solution.

[0126] The foregoing embodiments are only preferred embodiments of the present invention, and are not intended to limit the present invention, and for a person skilled in the art, modifications and changes can be made to the present invention. Any modification, equivalent replacement, or improvement made without departing from the spirit and principle of the present invention shall fall within the protection scope of the present invention.

Claims

1. An ink cartridge, wherein the ink cartridge is detachably installed in an installation structure of a printing device, and the ink cartridge comprises a housing and a buckle, wherein the buckle is disposed on the housing, the buckle can be clamped with a force application component of the printing device to fix the ink cartridge in the installation structure, and the buckle can be separated from the force application component, to unfix the ink cartridge from the printing device.
2. The ink cartridge according to claim 1, wherein the ink cartridge further comprises a first elastic component connected to the housing; the engagement portion is located between the first elastic component and the force application component; and when the force application component is subject to an acting force toward the first elastic component that is applied by a user, the force application component drives the buckle to move toward a direction of the first elastic component.
3. The ink cartridge according to claim 1, wherein under the action of the force application component, a movement direction of the buckle is a horizontal direction.
4. The ink cartridge according to claim 2, wherein the buckle comprises the engagement portion and a limited portion; the engagement portion is disposed opposite to the force application component; the force application component can drive the buckle to move; an angle is formed between movement directions of the limited portion and the buckle; a limiting portion is further disposed on the housing at a position opposite to the limited portion; and the limiting portion can be clamped with or separated from the limited portion.
5. The ink cartridge according to claim 4, further comprising a pressing portion and a second elastic component, wherein the limiting portion is connected to the pressing portion; a through hole is provided on the buckle; the through hole forms the limited portion; one end of the pressing portion penetrates through the limited portion; the second elastic component is disposed between the housing and the pressing portion; extension directions of the first elastic component and the second elastic component are perpendicular to each other; the buckle comprises a spacing function portion; the pressing portion comprises a groove for accommodating the spacing function portion; and the pressing portion can abut against the spacing function portion.
6. The ink cartridge according to claim 4, wherein the limiting portion comprises a first limiting portion and a second limiting portion, and the first limiting portion is located between the second limiting portion and the force application component; and in a state in which the ink cartridge is installed in the installation structure, the limited portion is separated from the second limiting portion and the limited portion is clamped with the first limiting portion; and in a state in which the ink cartridge is taken out from the installation structure, the limited portion is separated from the first limiting portion and the limited portion is first clamped with the second limiting portion and then separated from the second limiting portion.
7. The ink cartridge according to claim 4, wherein the limiting portion comprises a first limiting portion and a second limiting portion, and along a direction of the first elastic component toward the force applica-

- tion component, a distance from the first limiting portion to the elastic component is greater than a distance from the second limiting portion to the elastic component; and
 in a state in which the ink cartridge is installed in the installation structure, the limited portion is separated from the second limiting portion and the limited portion is clamped with the first limiting portion; and in a state in which the ink cartridge is taken out from the installation structure, the limited portion is separated from the first limiting portion and the limited portion is first clamped with the second limiting portion and then separated from the second limiting portion.
8. The ink cartridge according to claim 7, wherein the ink cartridge further comprises a third elastic component; the second limiting portion is a cylinder; the third elastic component is externally sleeved on the second limiting portion; the limited portion comprises a protrusion and a recess; the protrusion can stop the first limiting portion; and the recess can match the second limiting portion.
 9. The ink cartridge according to claim 2, wherein the force application component is installed in the installation structure by using a second elastic component; the second elastic component is disposed opposite to the first elastic component; and along a vertical direction, the second elastic component is located below the first elastic component.
 10. The ink cartridge according to claim 9, wherein the buckle comprises the engagement portion; under the action of an external force, the force application component can rotate toward a direction of the engagement portion in a vertical plane; in a state in which the force application component stops rotating, after the external force is removed, the buckle restores to an original position under the action of the first elastic component, and the force application component restores to an original position under the action of the second elastic component; and acceleration when the force application component restores to the original position is greater than acceleration when the buckle restores to the original position.
 11. The ink cartridge according to any one of claims 6, 7 and 8, wherein the ink cartridge further comprises a stressed portion disposed on the buckle.
 12. The ink cartridge according to either of claims 6 and 7, wherein when the limited portion is clamped at a position of the second limiting portion, an elastic force applied by the first elastic component on the limited portion is greater than an acting force applied by the second limiting portion on the limited portion.
 13. The ink cartridge according to claim 12, wherein when the limited portion is clamped at a position of the first limiting portion, an elastic force applied by the first elastic component on the limited portion is less than or equal to an acting force applied by the first limiting portion on the limited portion.
 14. The ink cartridge according to claim 12, wherein the limited portion comprises a first limited portion and a second limited portion; the first limited portion and the first limiting portion are disposed opposite to each other and can be clamped with each other or separated from each other; and the second limited portion and the second limiting portion are disposed opposite to each other and can be clamped with each other or separated from each other.
 15. The ink cartridge according to claim 10, wherein initial acceleration when the force application component restores to the original position is $10\text{--}26.6\text{ m/s}^2$, and initial acceleration when the buckle restores to the original position is $4\text{--}9.6\text{ m/s}^2$.
 16. The ink cartridge according to claim 10, wherein a mass of the buckle is $0.31\text{--}0.6\text{ g}$, and a mass of the force application component is $0.45\text{--}0.65\text{ g}$.
 17. The ink cartridge according to claim 10, wherein an elastic force applied by the first elastic component on the buckle is $2.4\text{--}3\text{ N}$, and an elastic force applied by the second elastic component on the force application component is $6.5\text{--}12\text{ N}$.
 18. The ink cartridge according to claims 4 to 8, wherein the first elastic component has a wire diameter of 0.4 mm , a developed length of 14 mm , a medium diameter of 4.1 mm , an effective coil number of 8, and a pitch of 1.6 mm .
 19. The ink cartridge according to claim 10, wherein the second elastic component has a wire diameter of 0.4 mm , a developed length of 9 mm , a medium diameter of 2.6 mm , an effective coil number of 9, and a pitch of 1 mm .
 20. The ink cartridge according to claim 1, wherein the ink cartridge is detachably installed in the installation structure comprising a force application component; an engagement portion is disposed on the buckle; a detent and at least one elastic component are disposed on the housing; the elastic component is located above the engagement portion; and the elastic component can abut against or be separated from the lever.
 21. The ink cartridge according to claim 20, wherein when the ink cartridge is installed in the installation structure, the elastic component and the engage-

ment portion both abut against the force application component.

- 22.** The ink cartridge according to claim 20 or 21, wherein the ink cartridge further comprises an ink outlet, and the ink outlet and the elastic component are located at two sides of an ink cartridge body. 5
- 23.** The ink cartridge according to claim 22, wherein a handle is formed on the ink cartridge body, and the engagement portion and the elastic component are both disposed on the handle. 10
- 24.** The ink cartridge according to claim 20, wherein an engagement hole is provided on the force application component; the buckle comprises an engagement protrusion; and the engagement protrusion can abut against the engagement hole, so that during rotation, the force application component can push the buckle to move. 15 20
- 25.** The ink cartridge according to claim 10, wherein the ink cartridge further comprises a stressed portion disposed on the buckle; the buckle comprises a connection tongue that extends downward; the connection tongue comprises the engagement portion and the connection portion; the force application component comprises a first engagement protrusion and a second engagement protrusion; the first engagement protrusion and the second engagement protrusion can abut against the engagement portion; and the pressure application component can interact with the stressed portion, so that the stressed portion drives the buckle to move. 25 30 35
- 26.** The ink cartridge according to claim 10, wherein a handle is further disposed on the ink cartridge, and the buckle is disposed on the handle. 40

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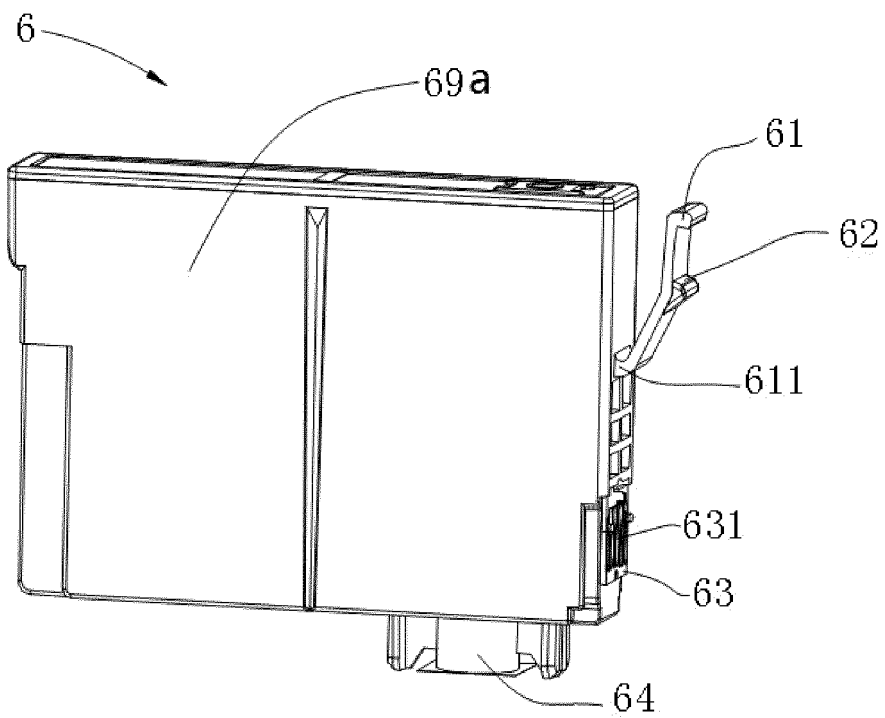


FIG. 1

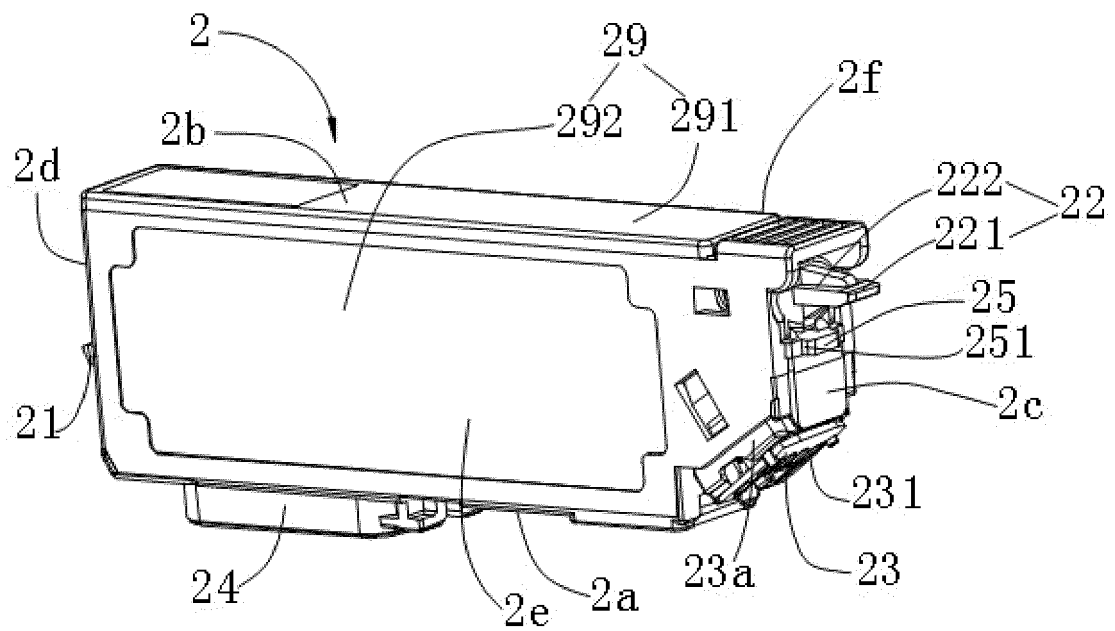


FIG. 2

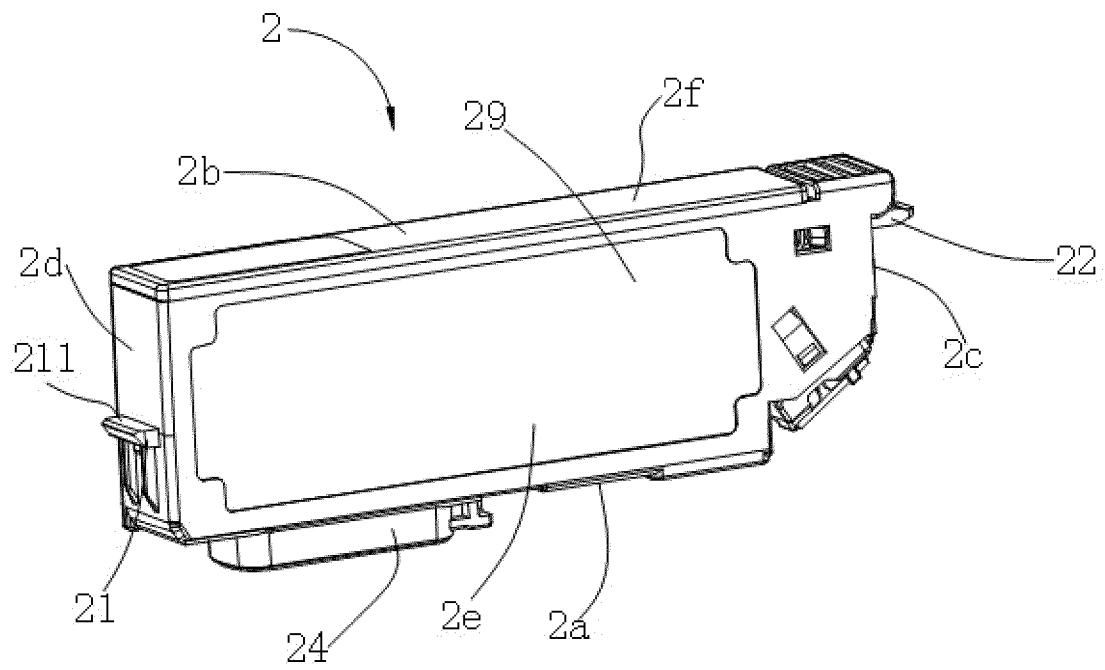


FIG. 3

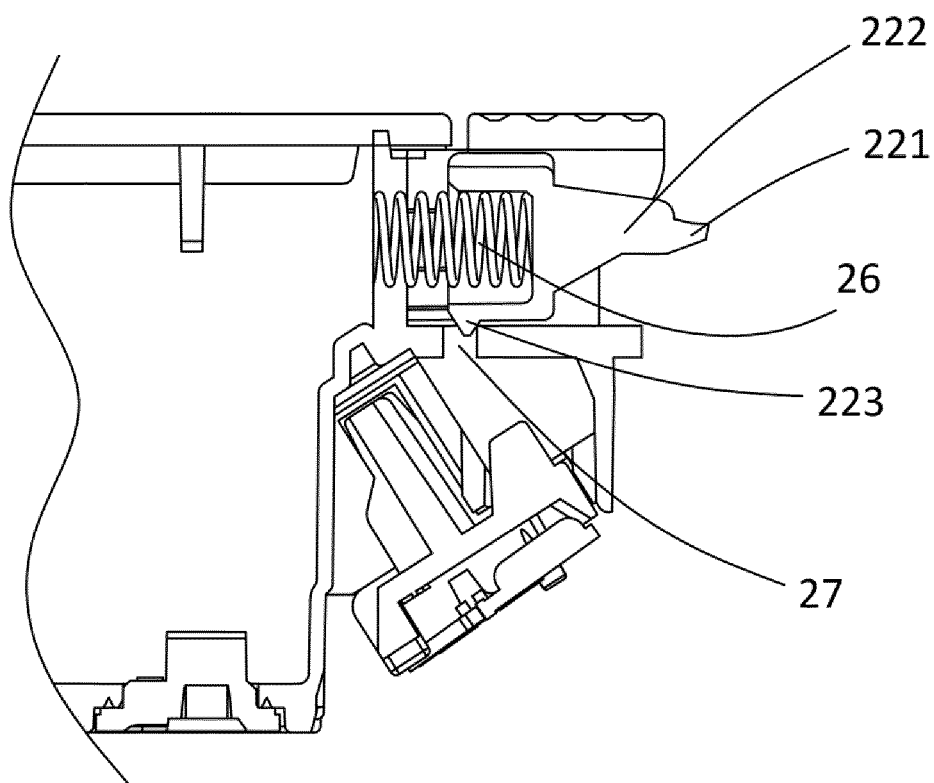


FIG. 4

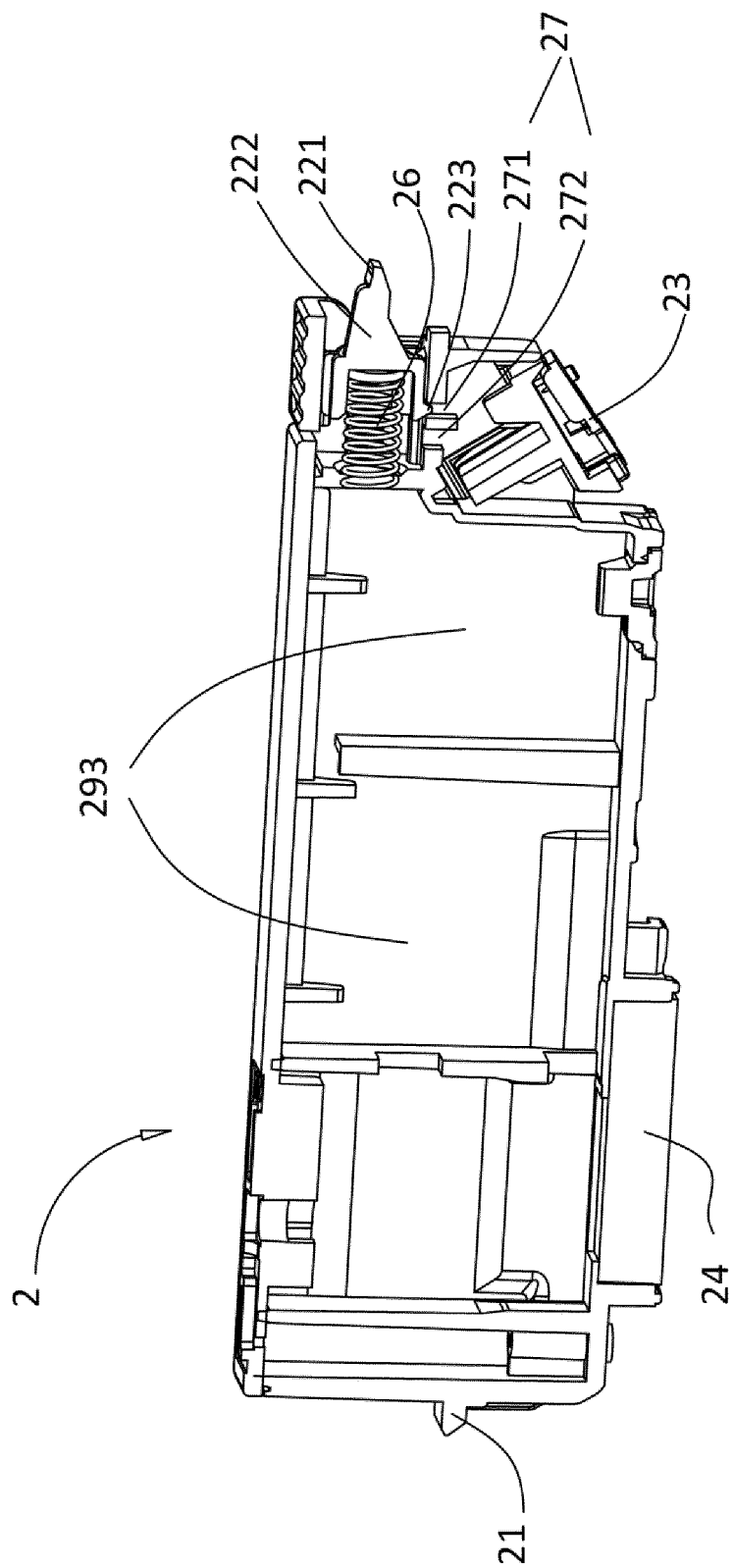


FIG. 5

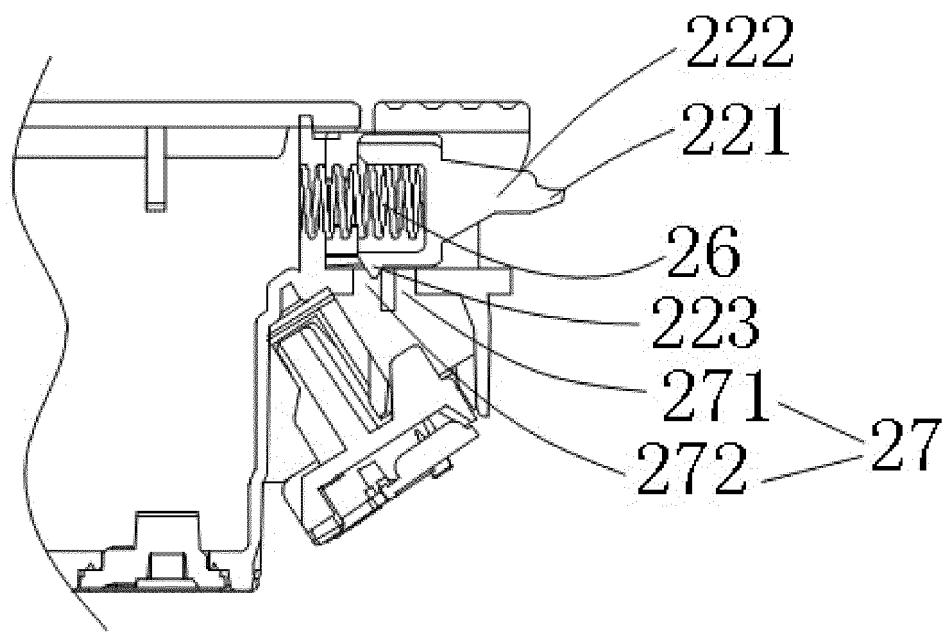


FIG. 6

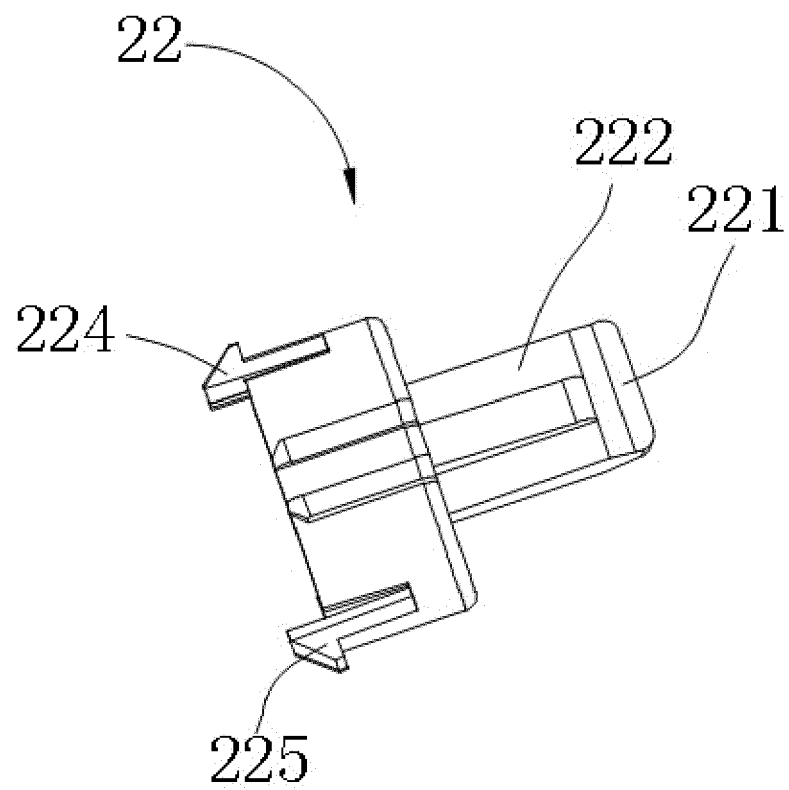


FIG. 7

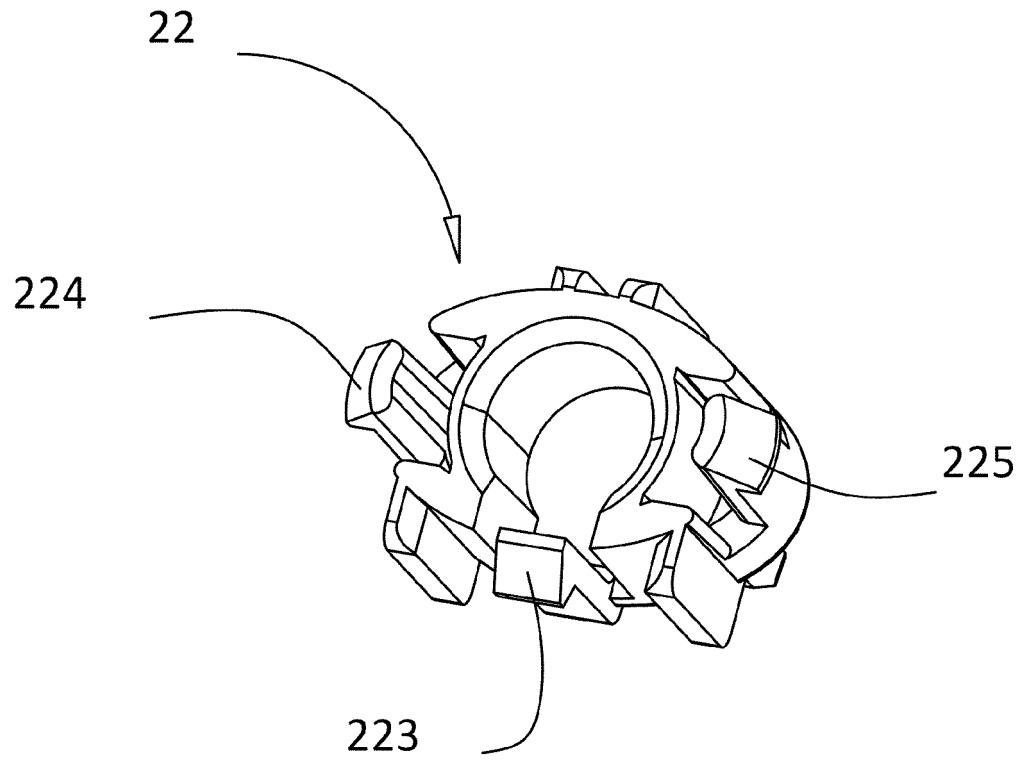


FIG. 8

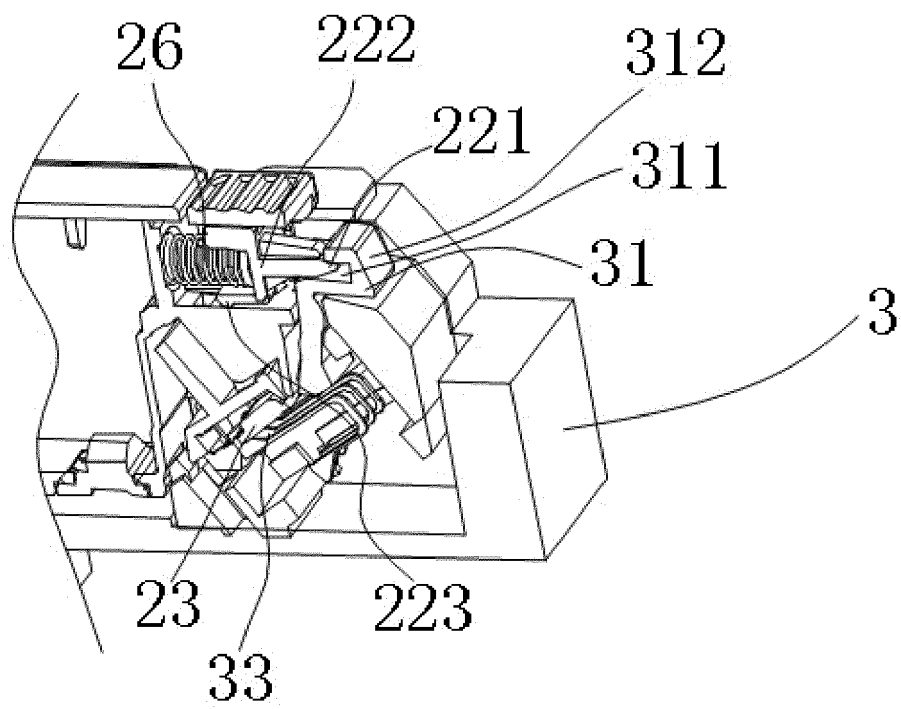


FIG. 9

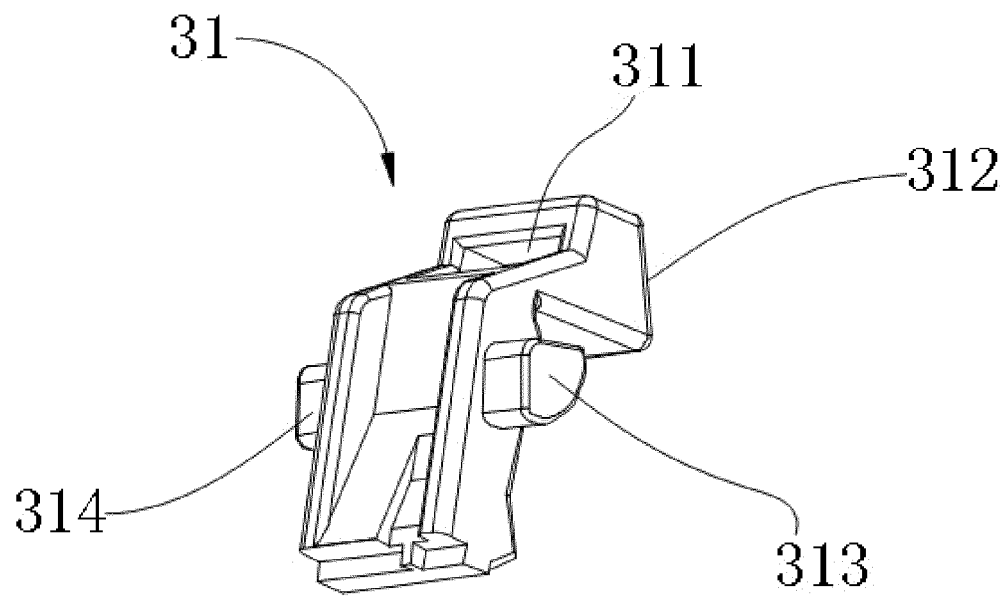


FIG. 10

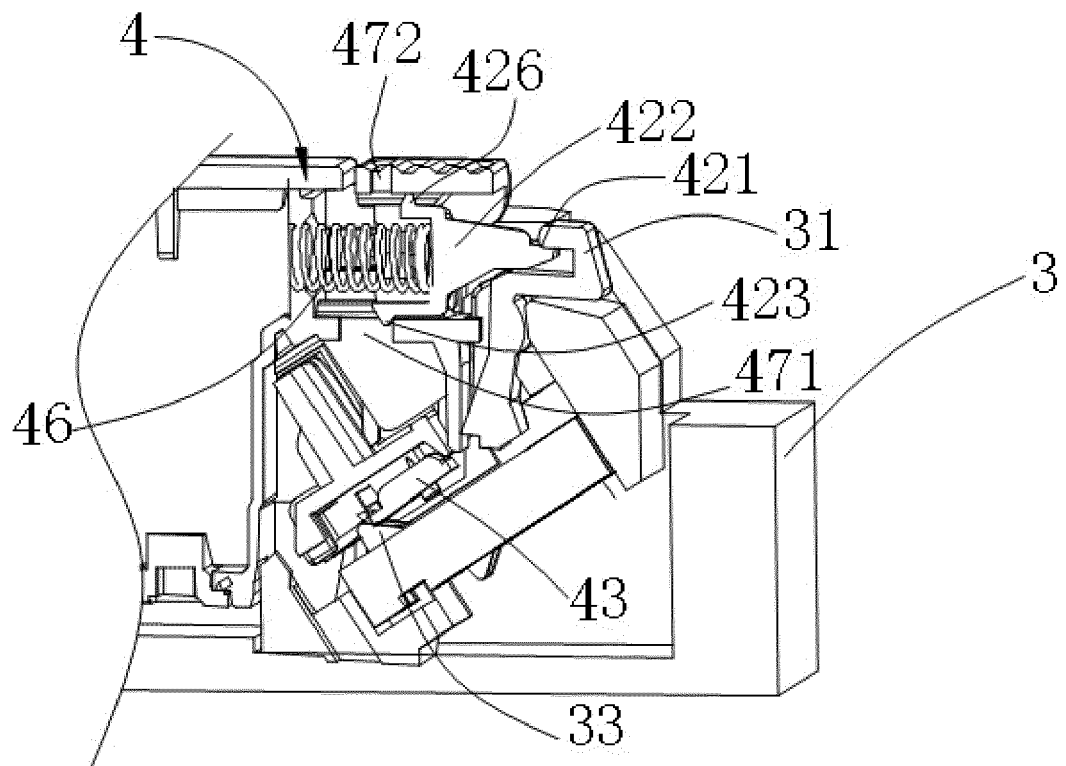


FIG. 11

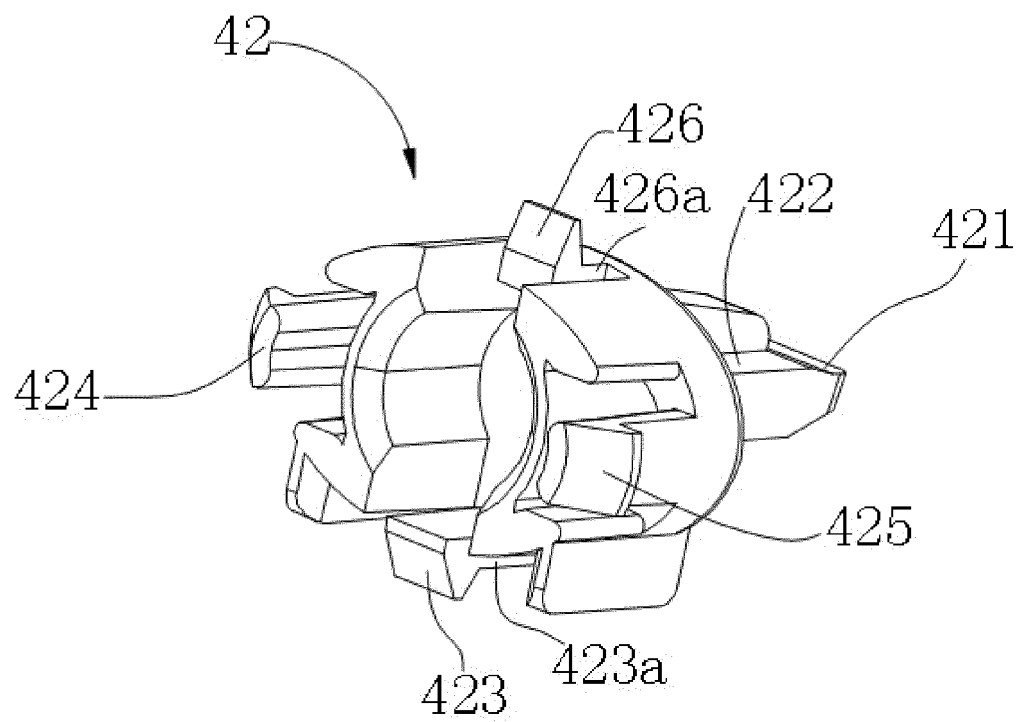


FIG. 12

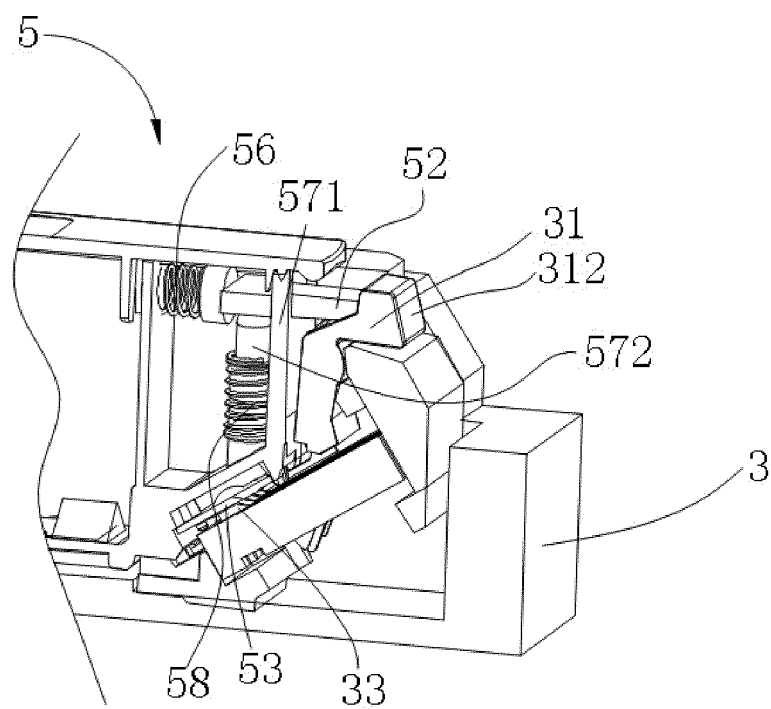


FIG. 13

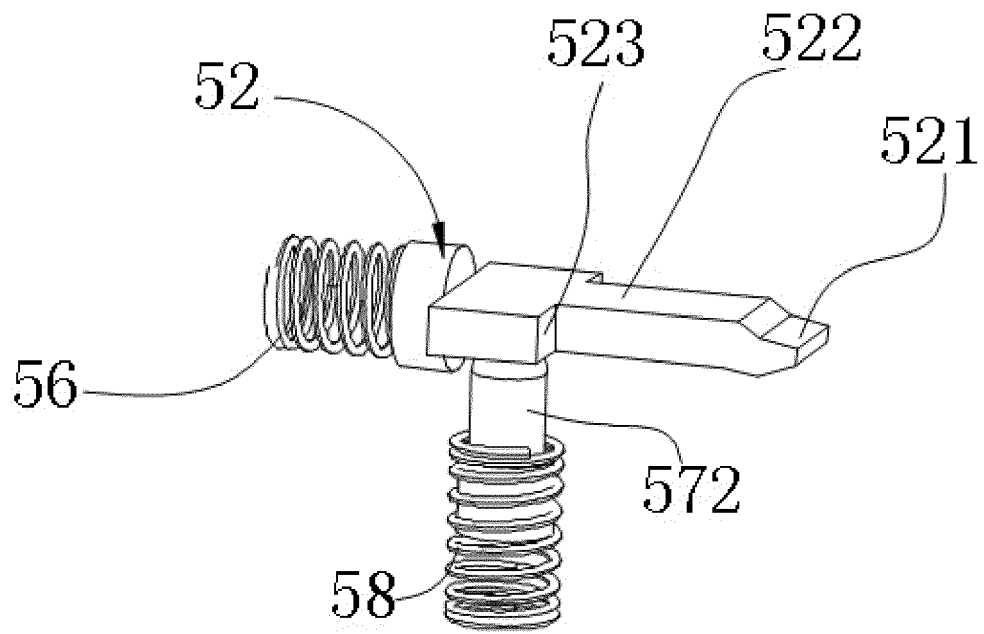


FIG. 14

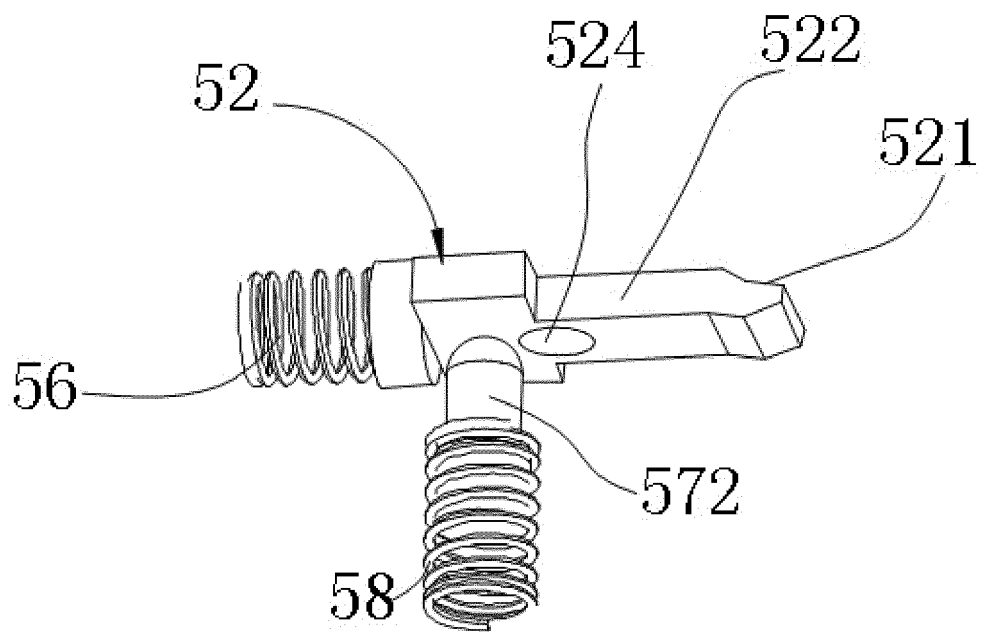


FIG. 15

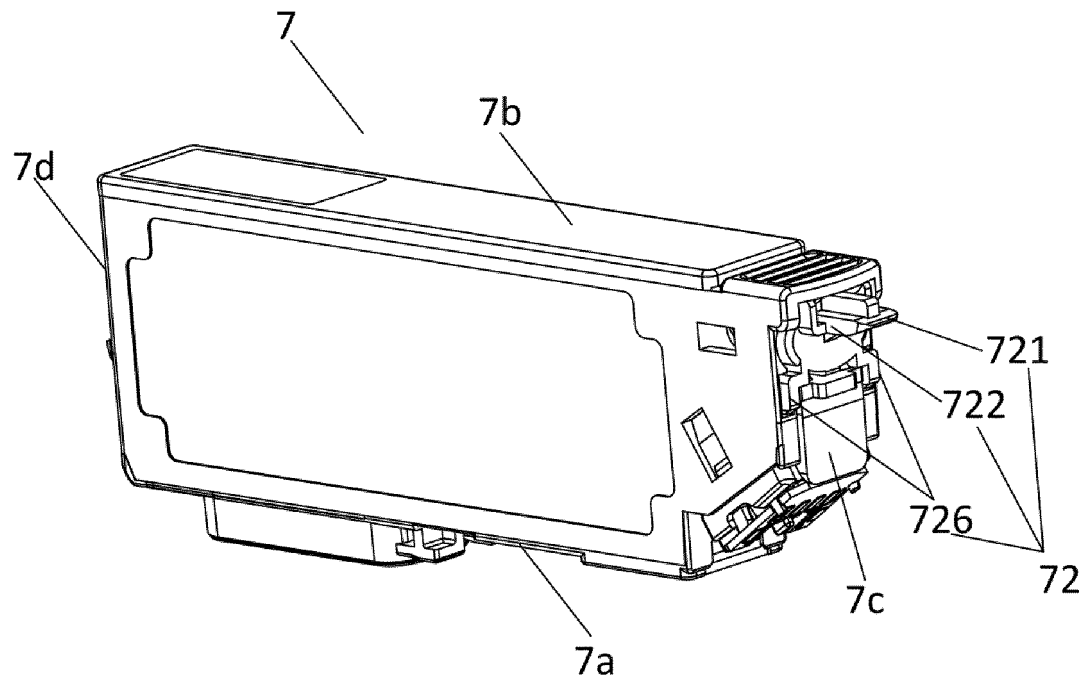


FIG. 16

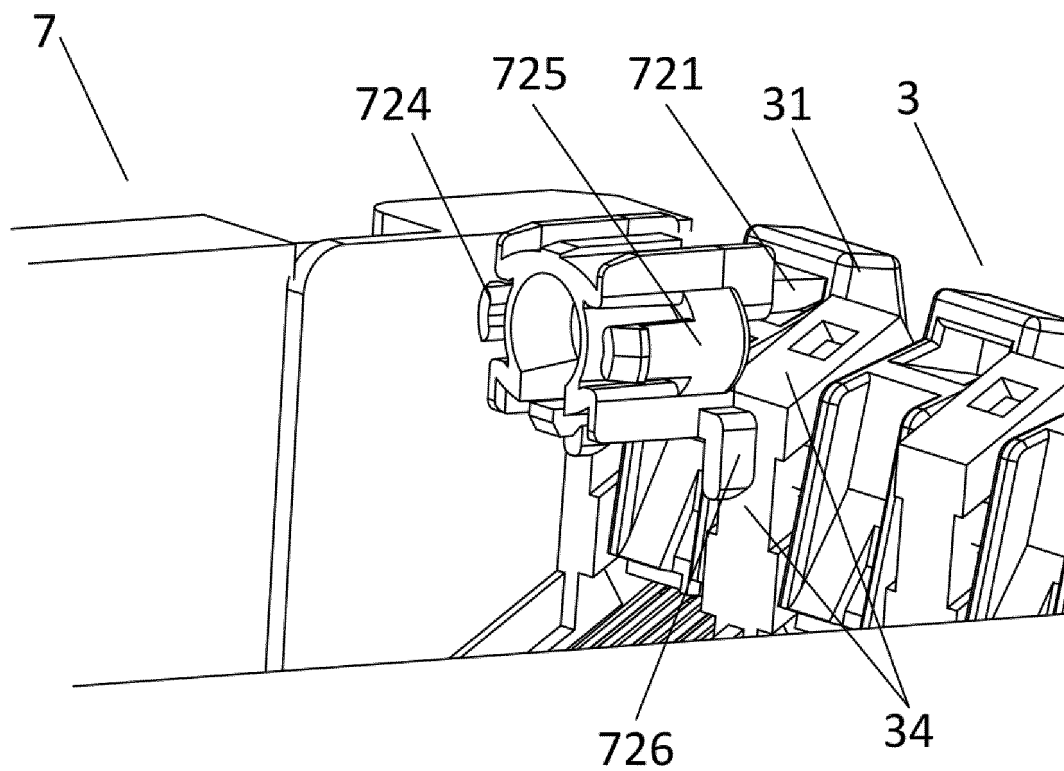


FIG. 17

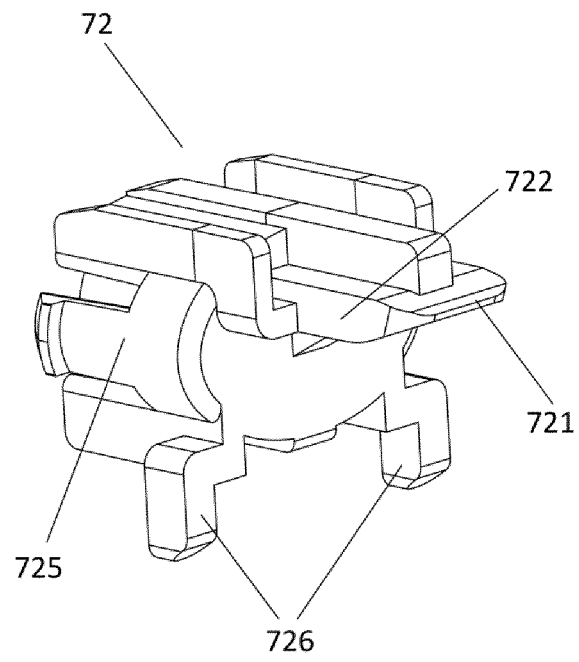


FIG. 18

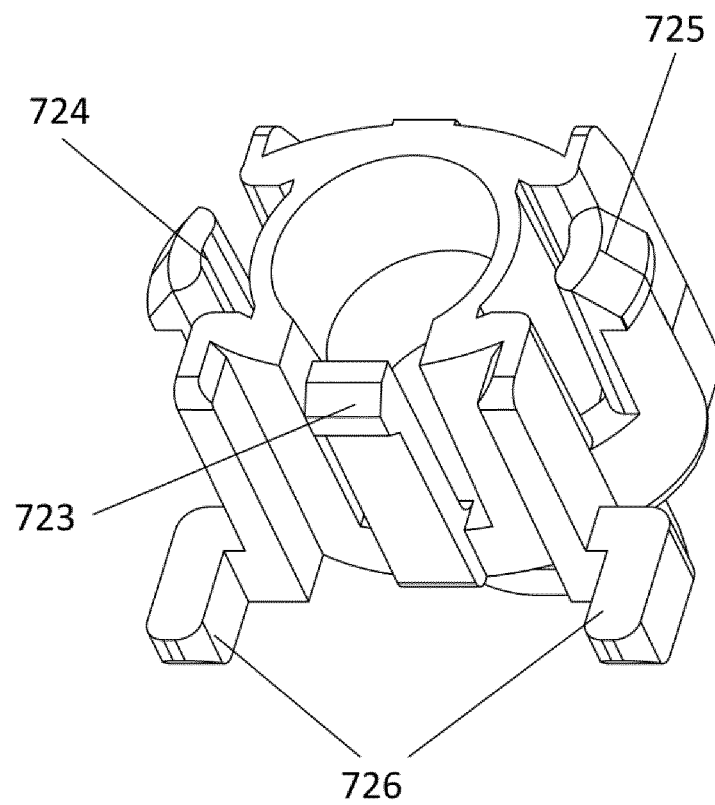


FIG. 19

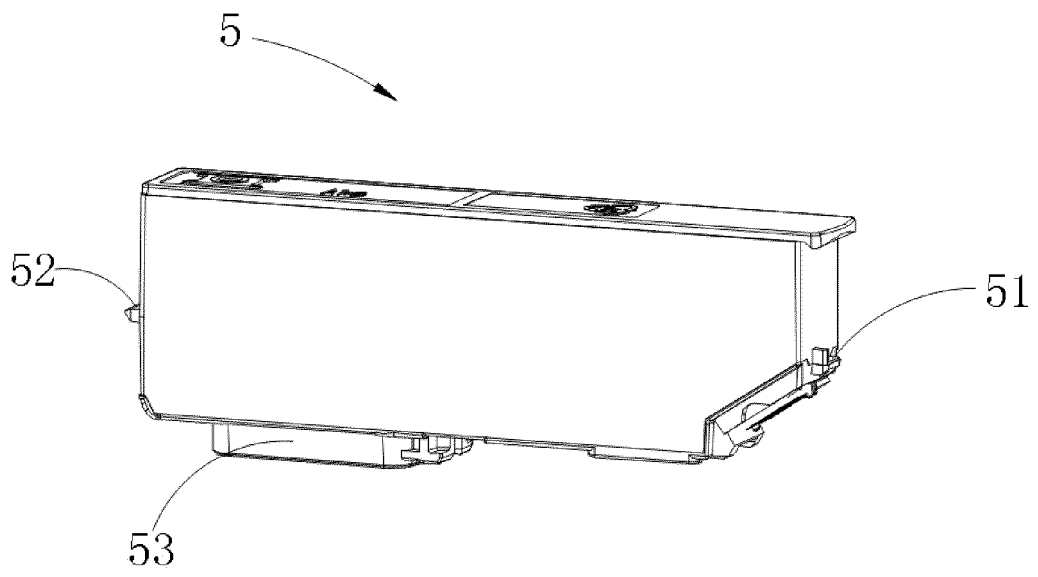


FIG. 20a

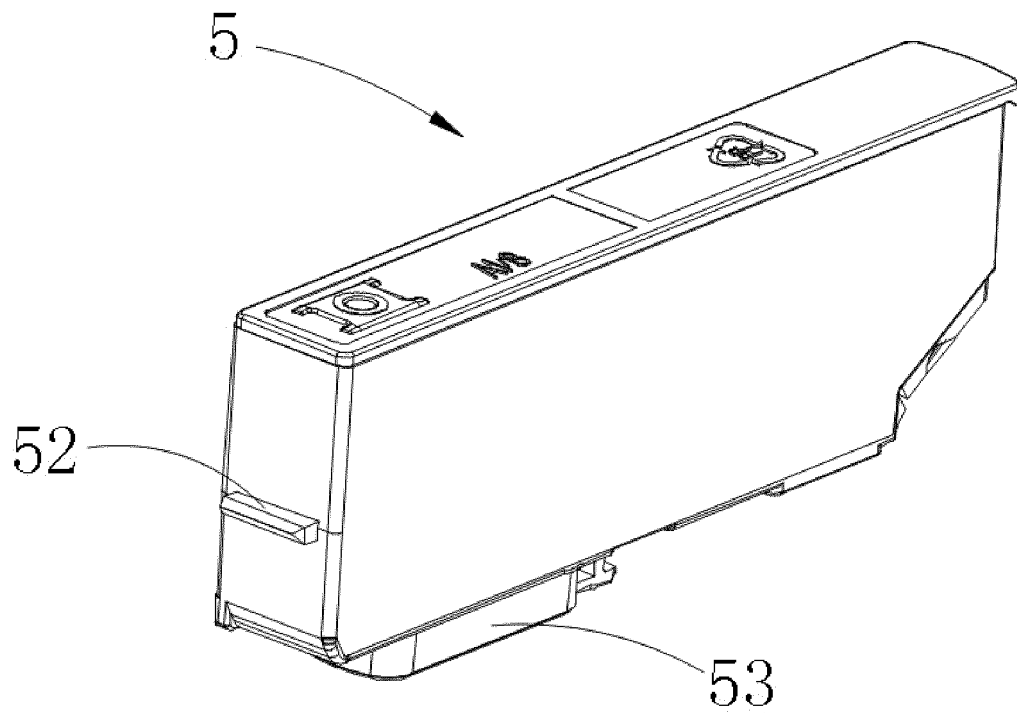


FIG. 20b

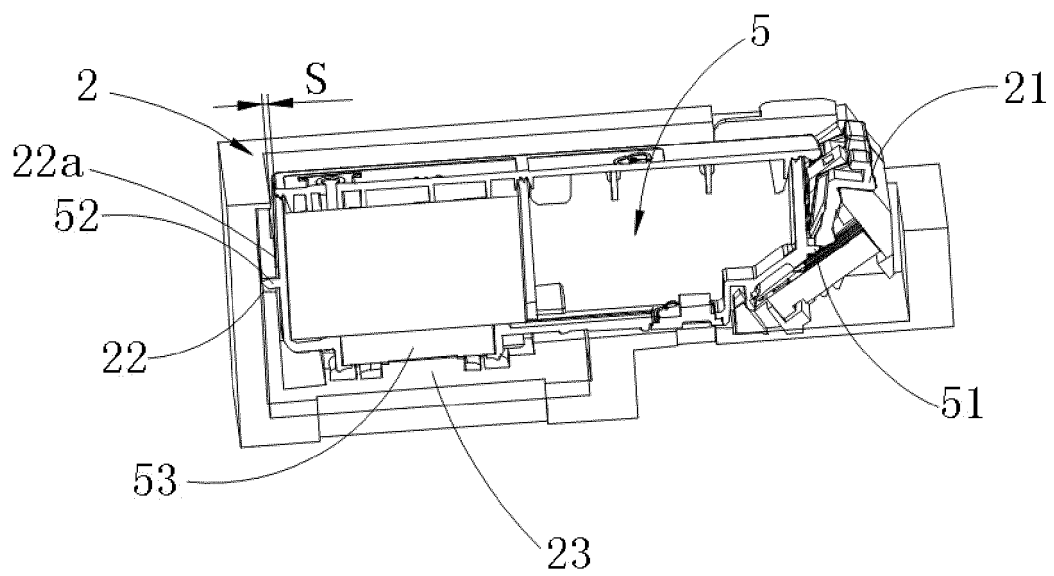


FIG. 20c

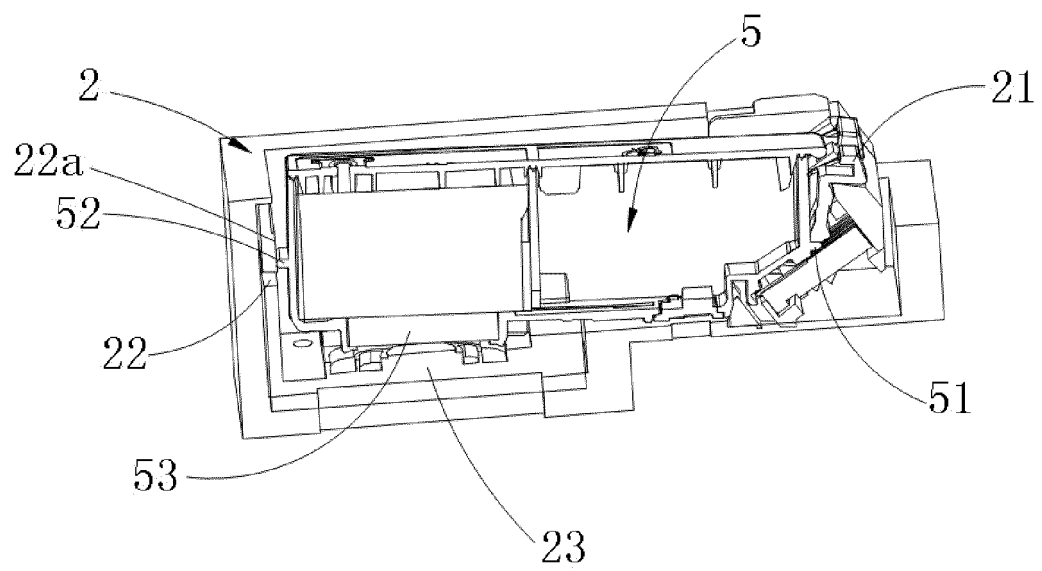


FIG. 20d

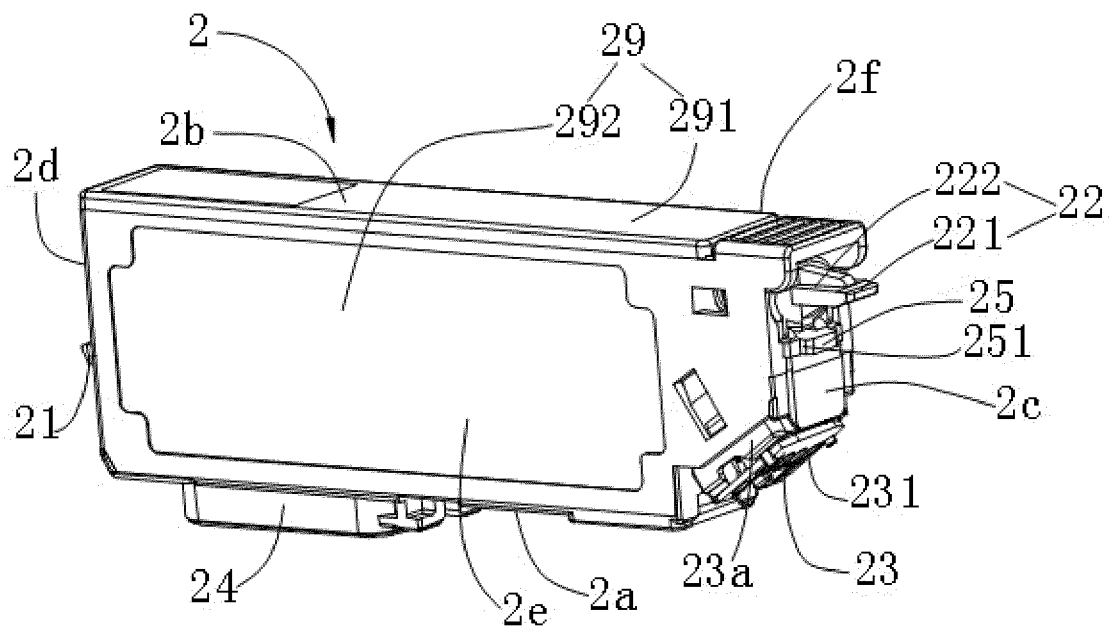


FIG. 20

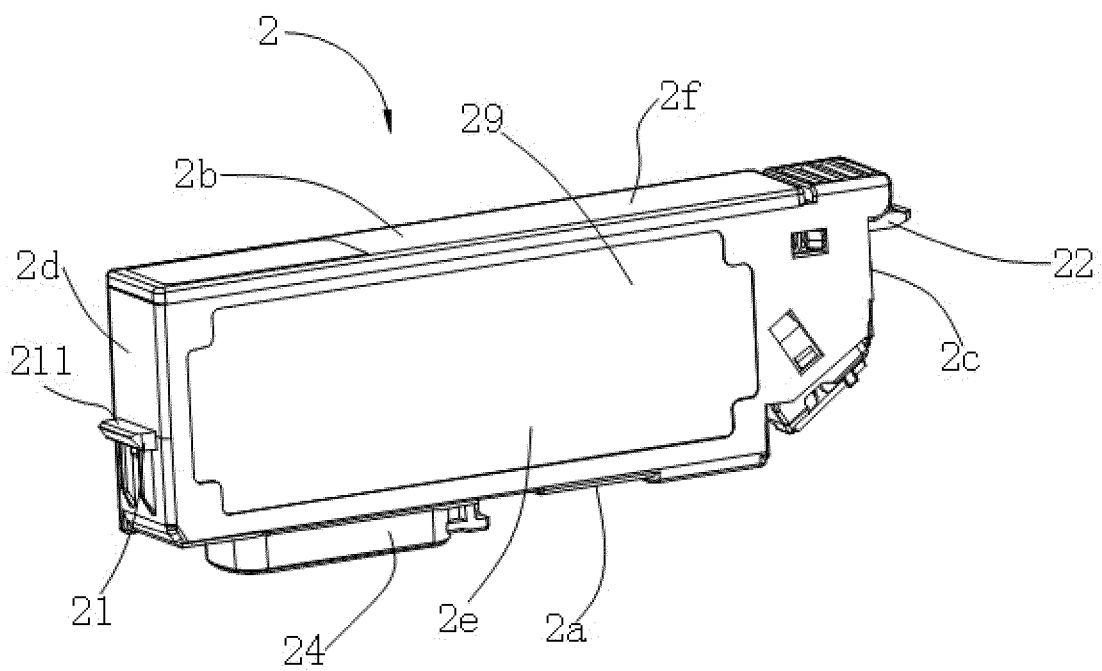


FIG. 21

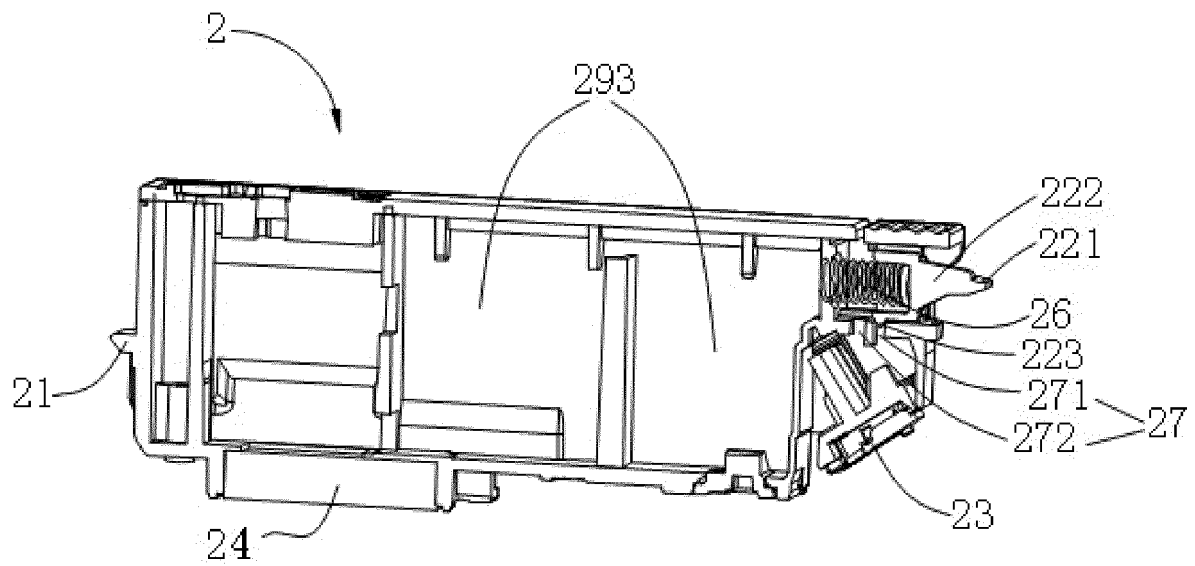


FIG. 22

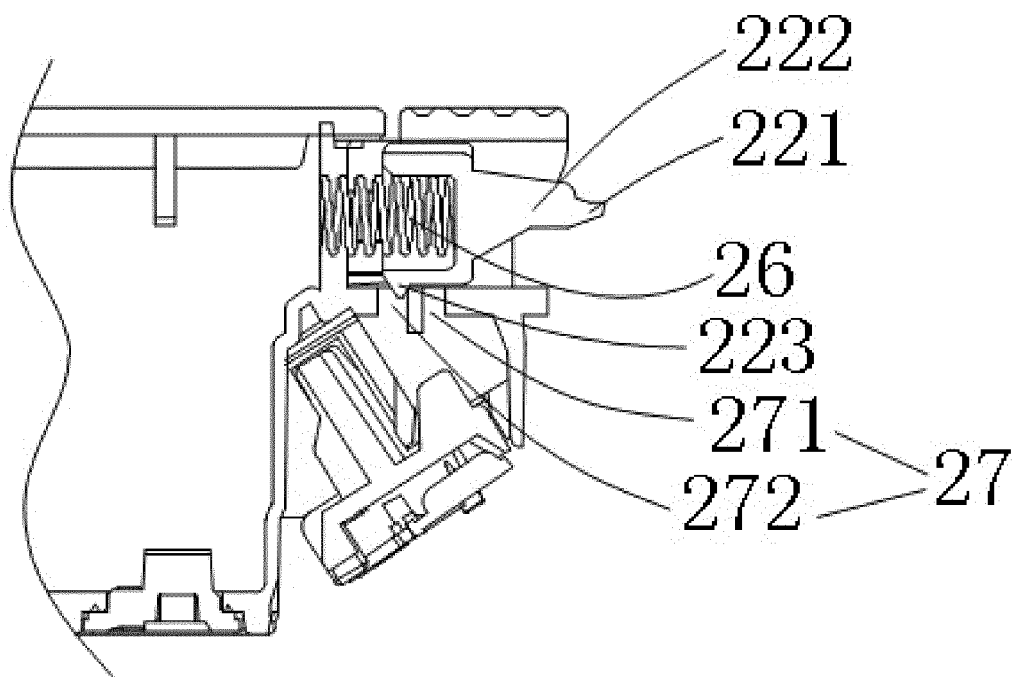


FIG. 23

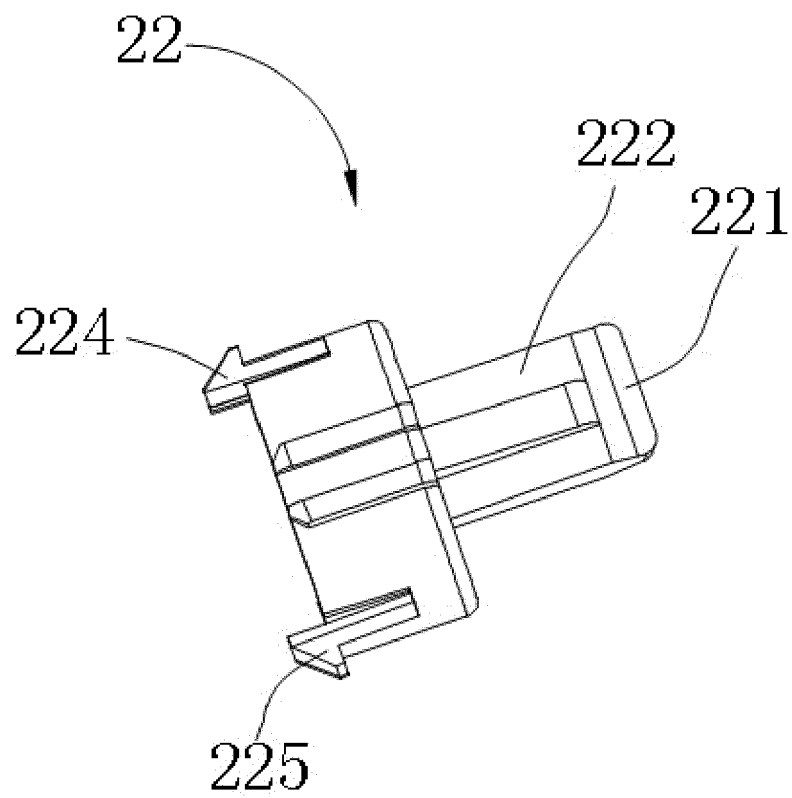


FIG. 24

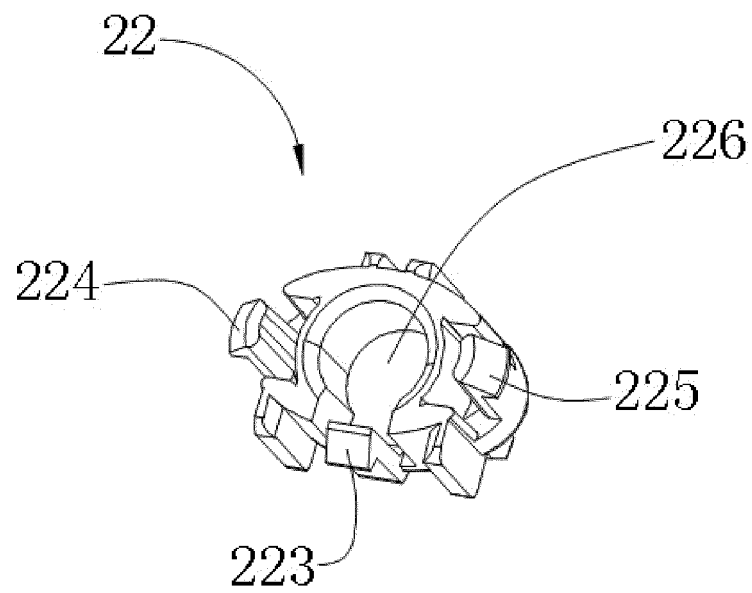


FIG. 25

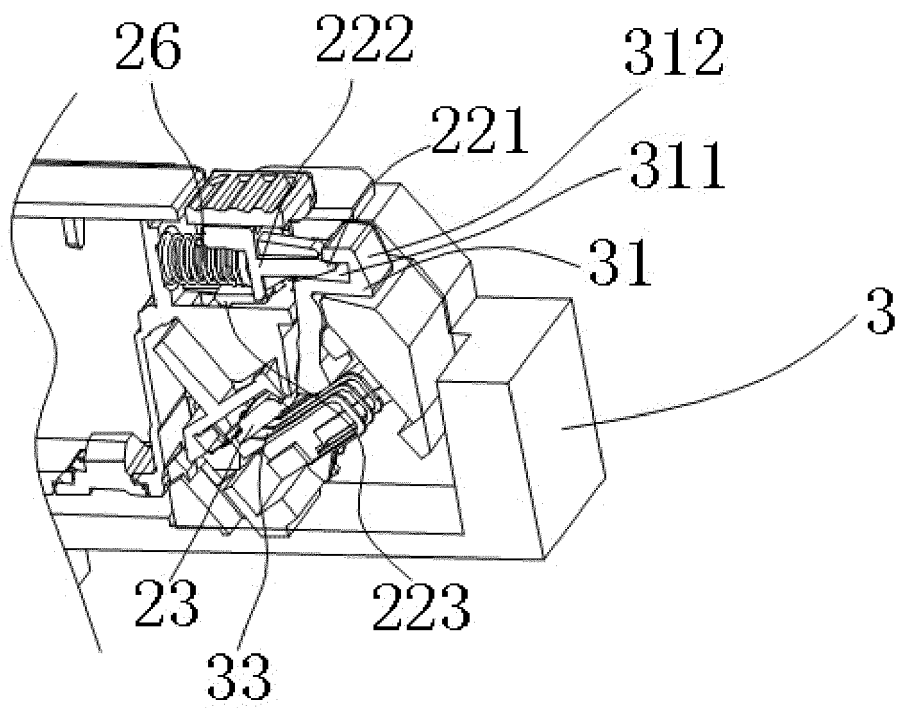


FIG. 26

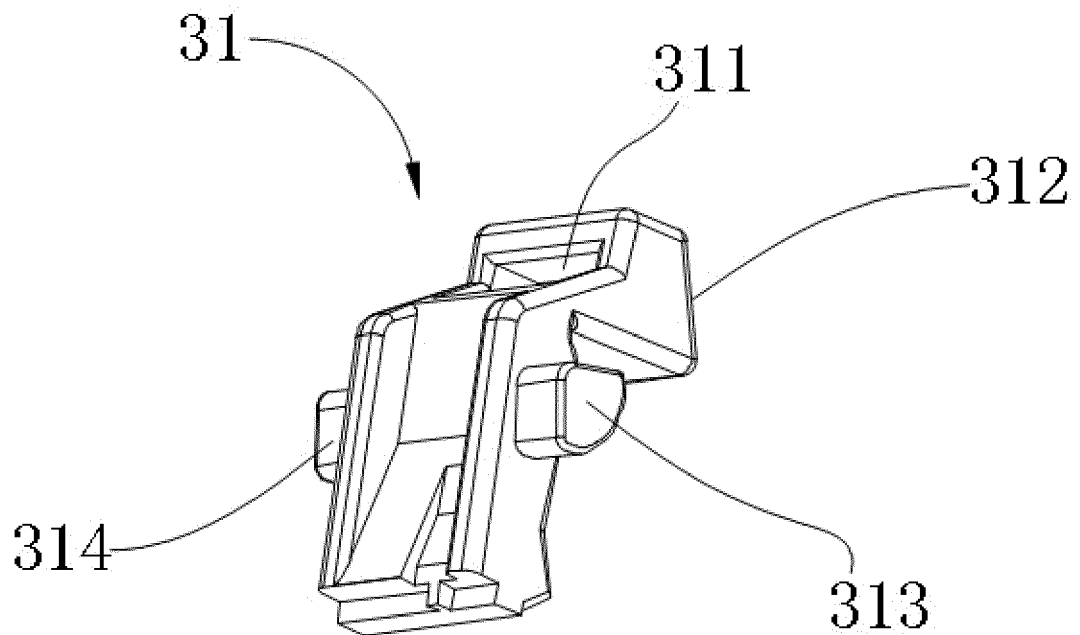


FIG. 27

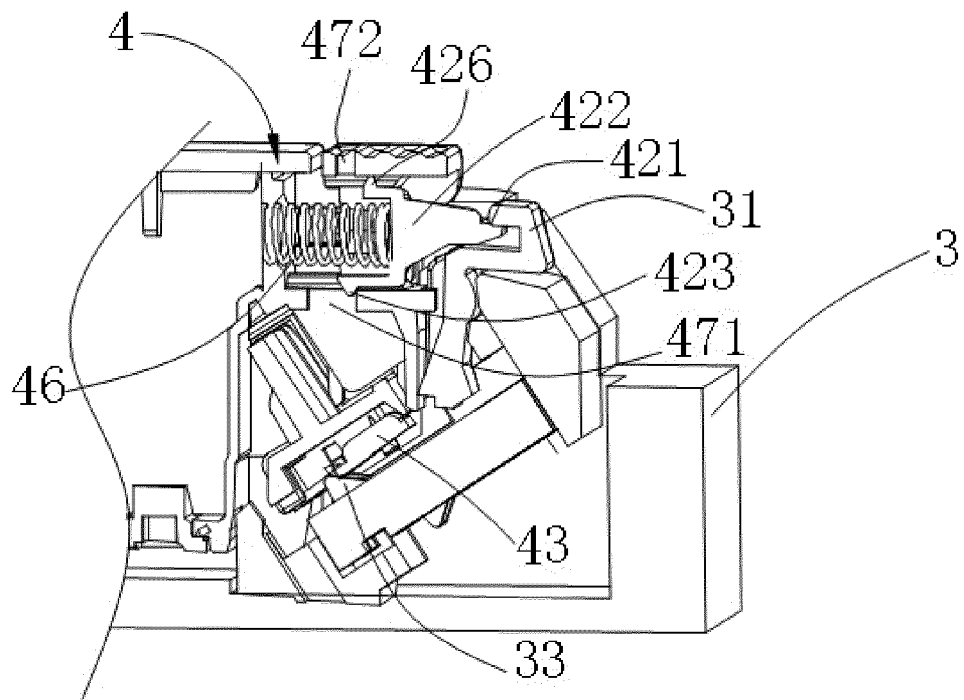


FIG. 28

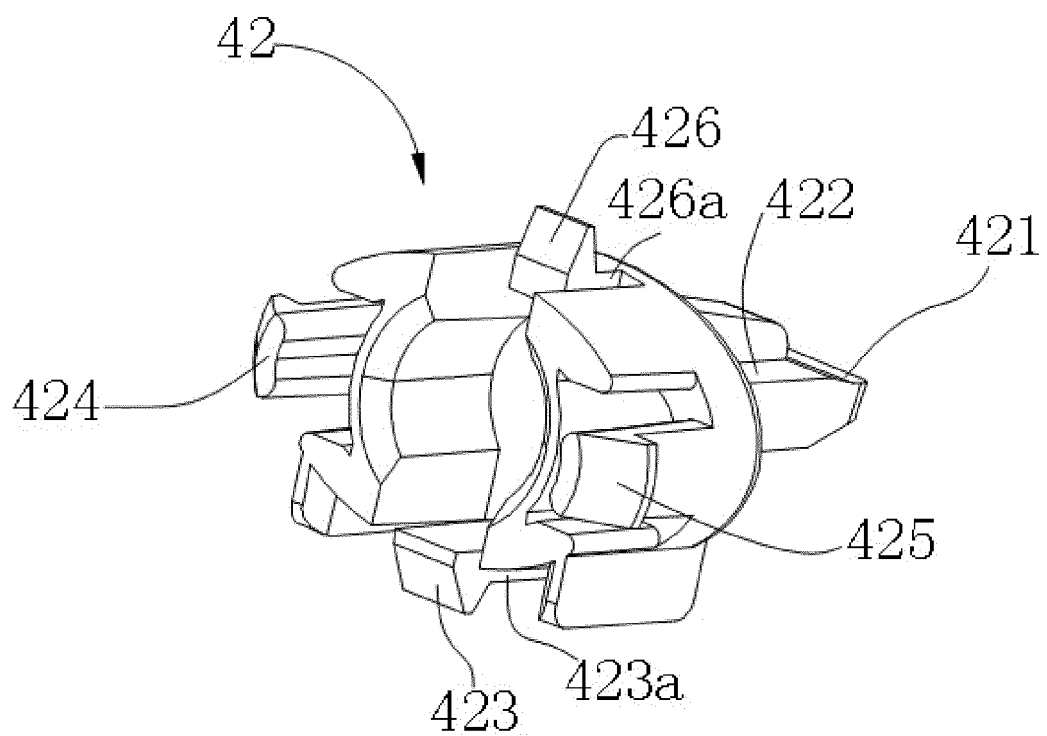


FIG. 29

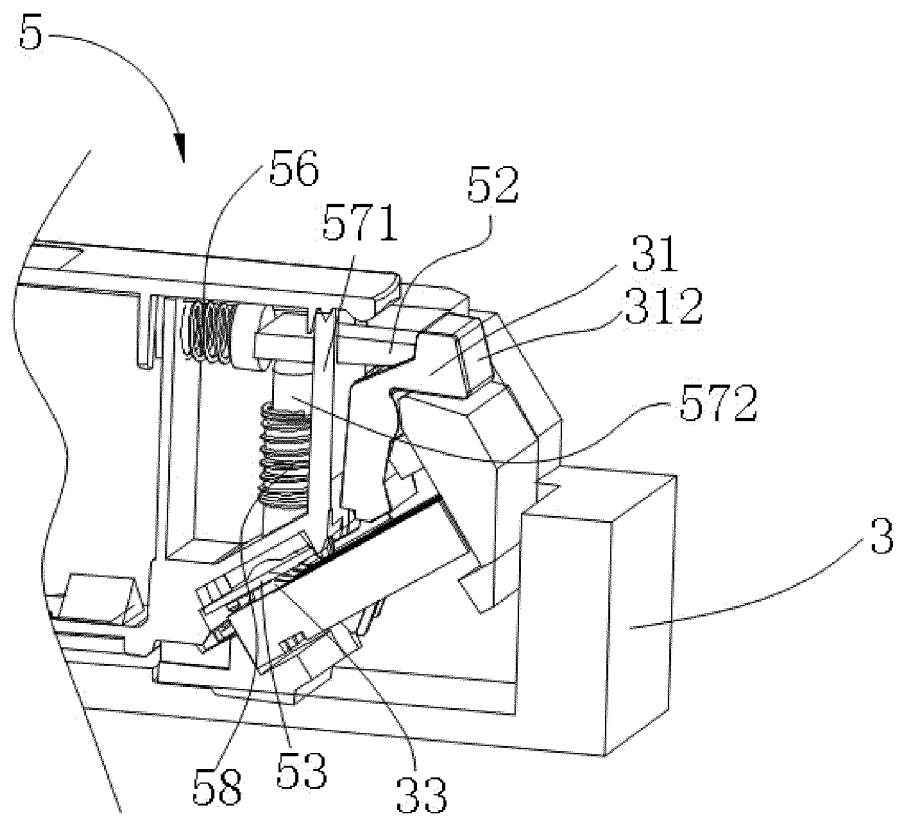


FIG. 30

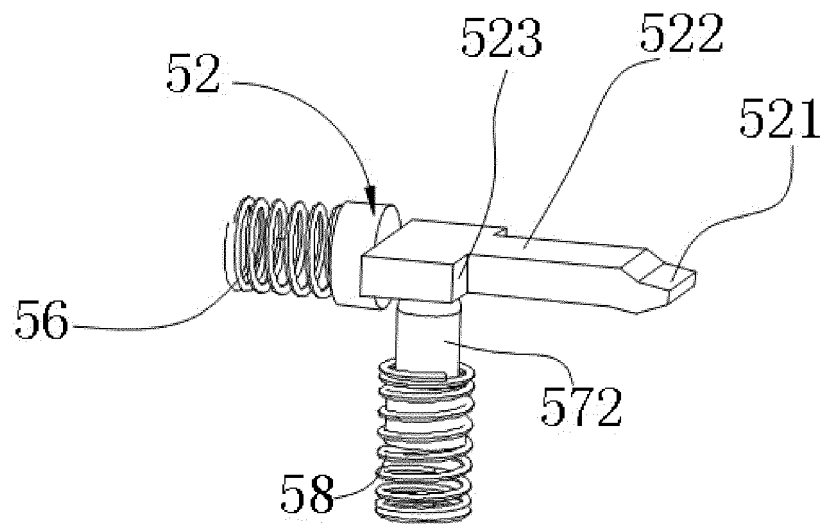


FIG. 31

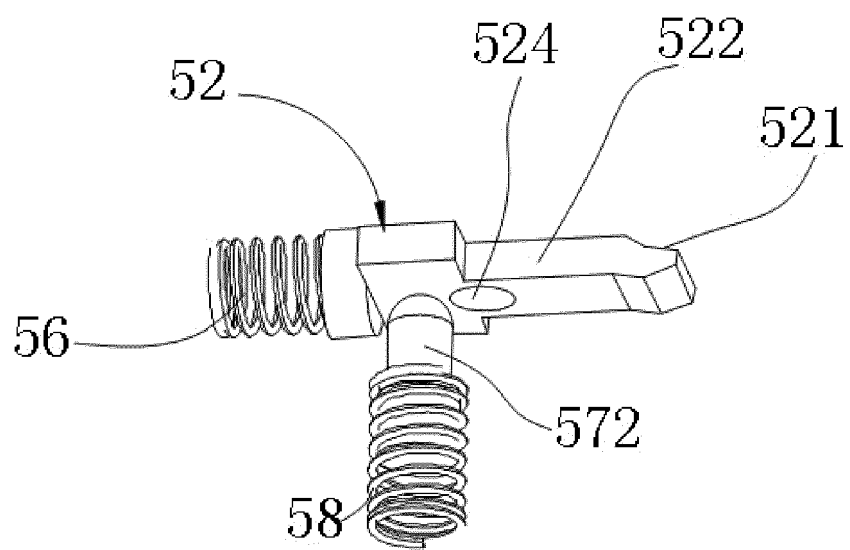


FIG. 32

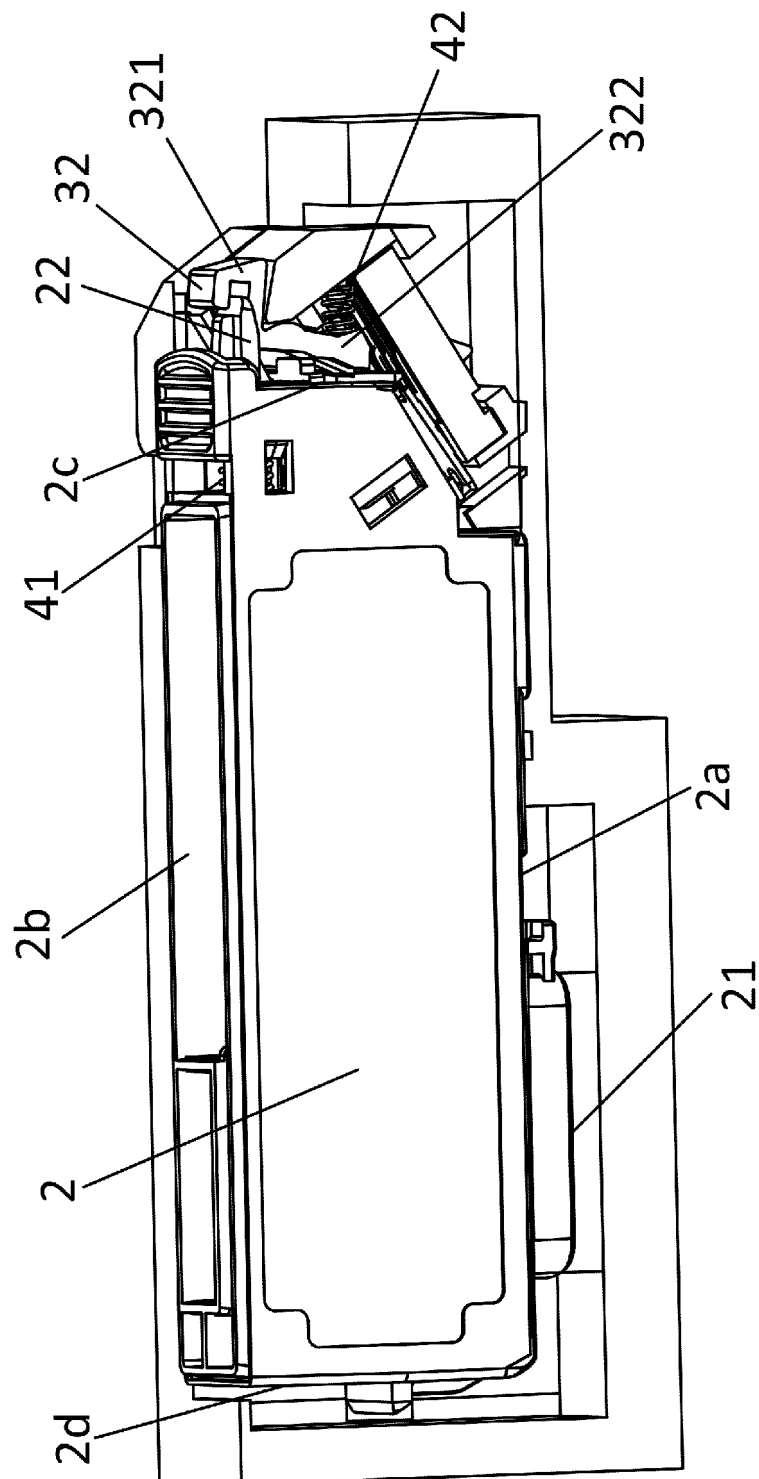


FIG. 33

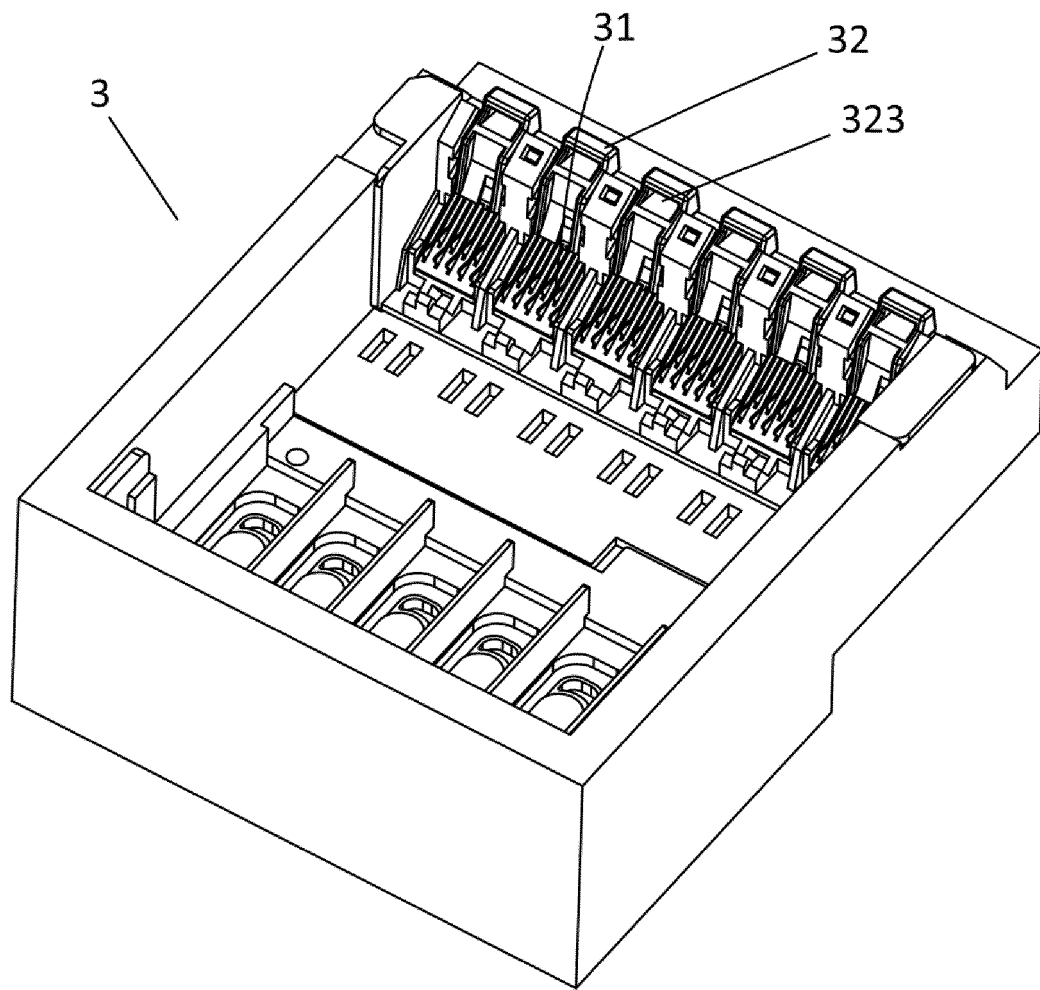


FIG. 34

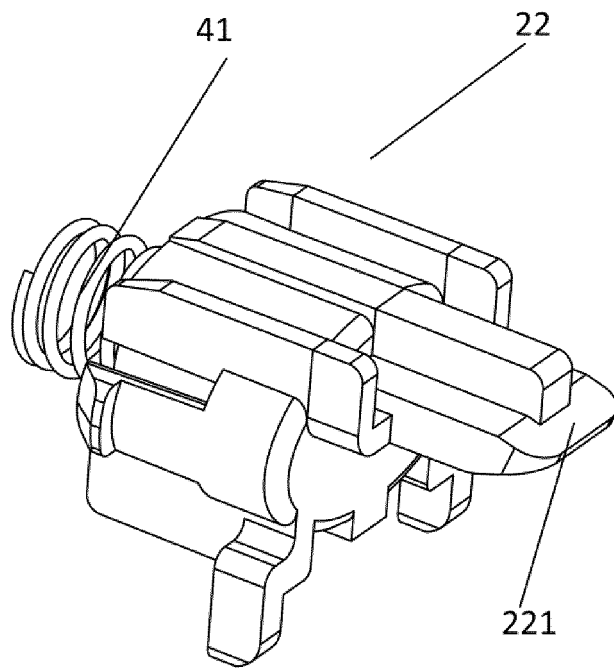


FIG. 35

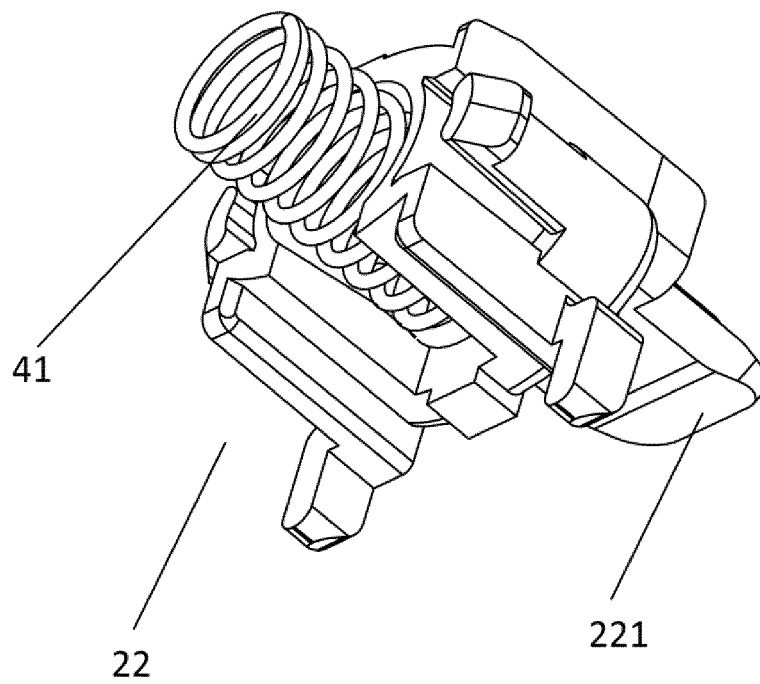


FIG. 36

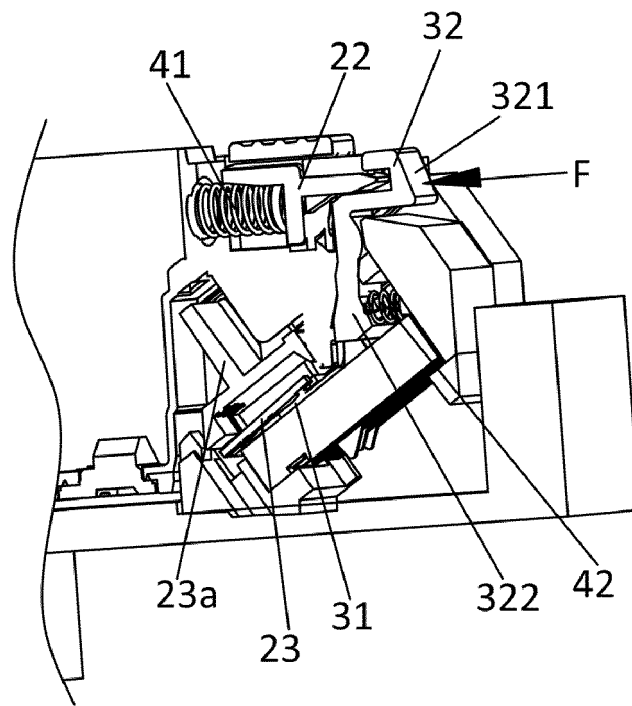


FIG. 37

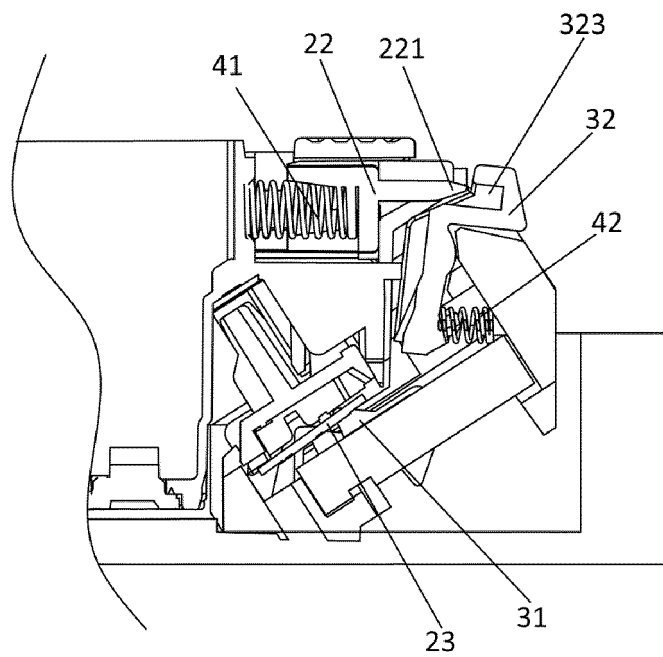


FIG. 38

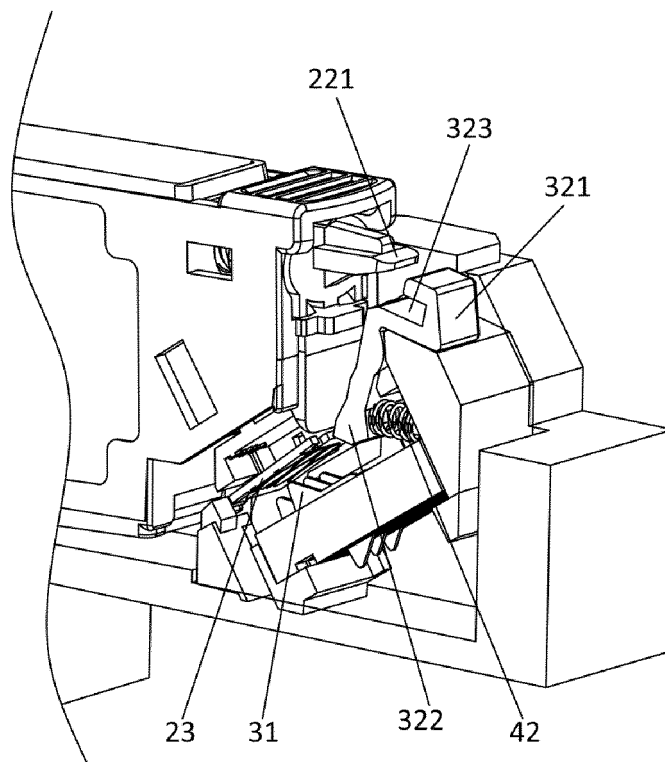


FIG. 39

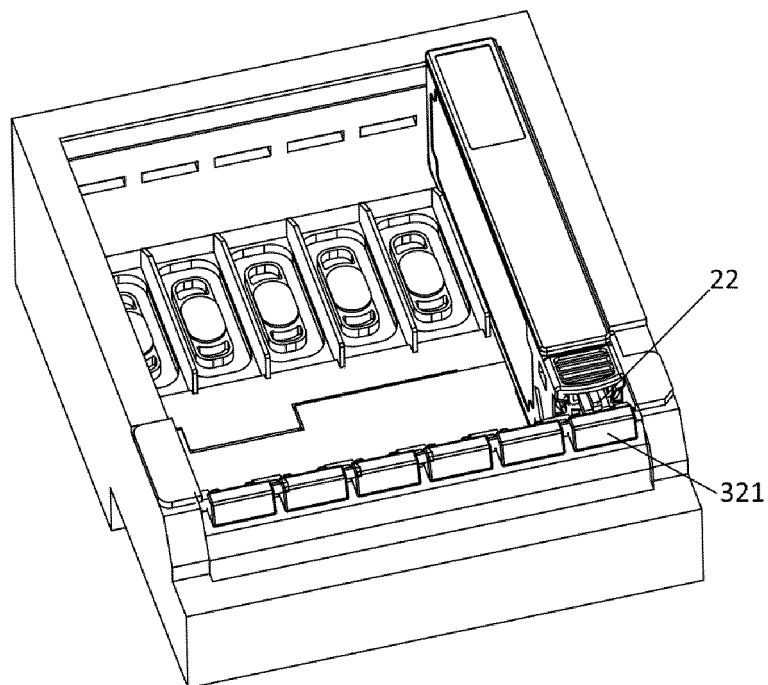


FIG. 40

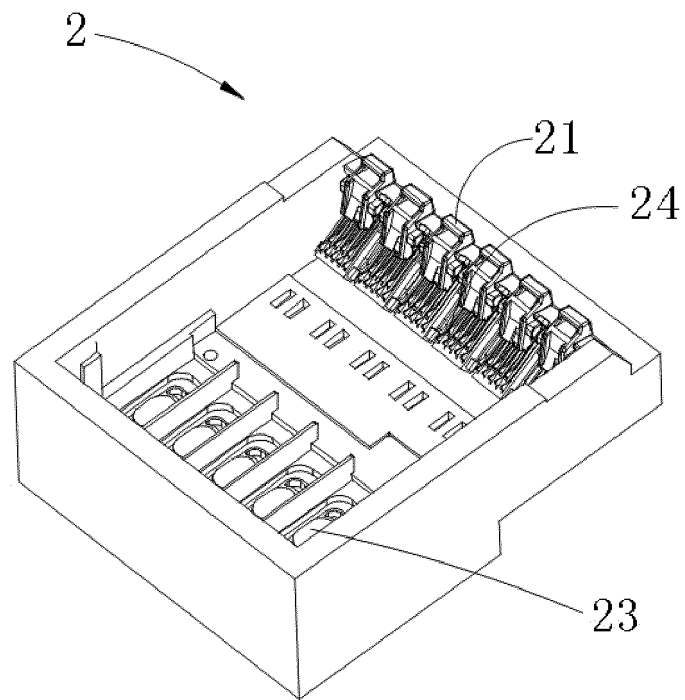


FIG. 41

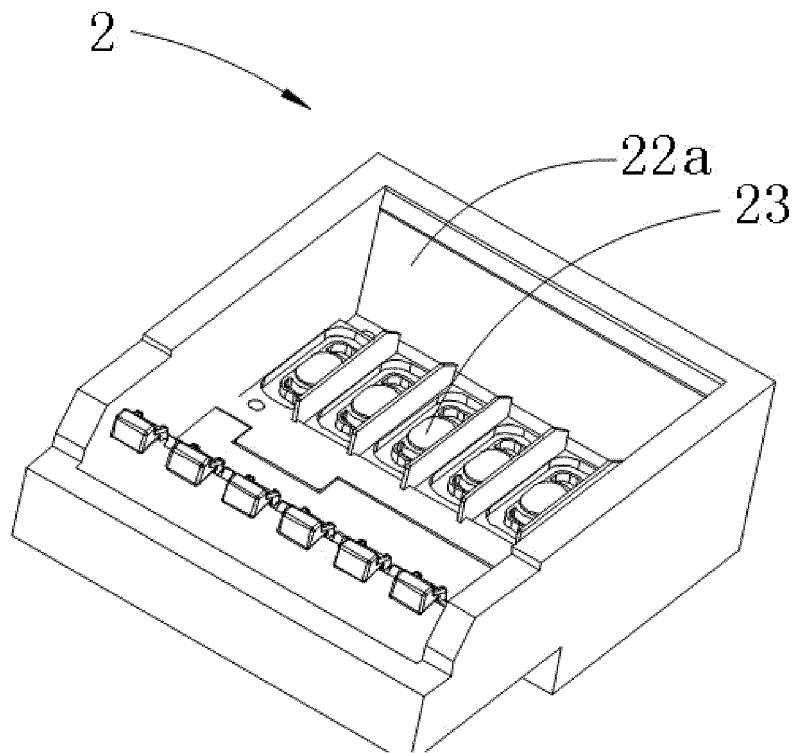


FIG. 42

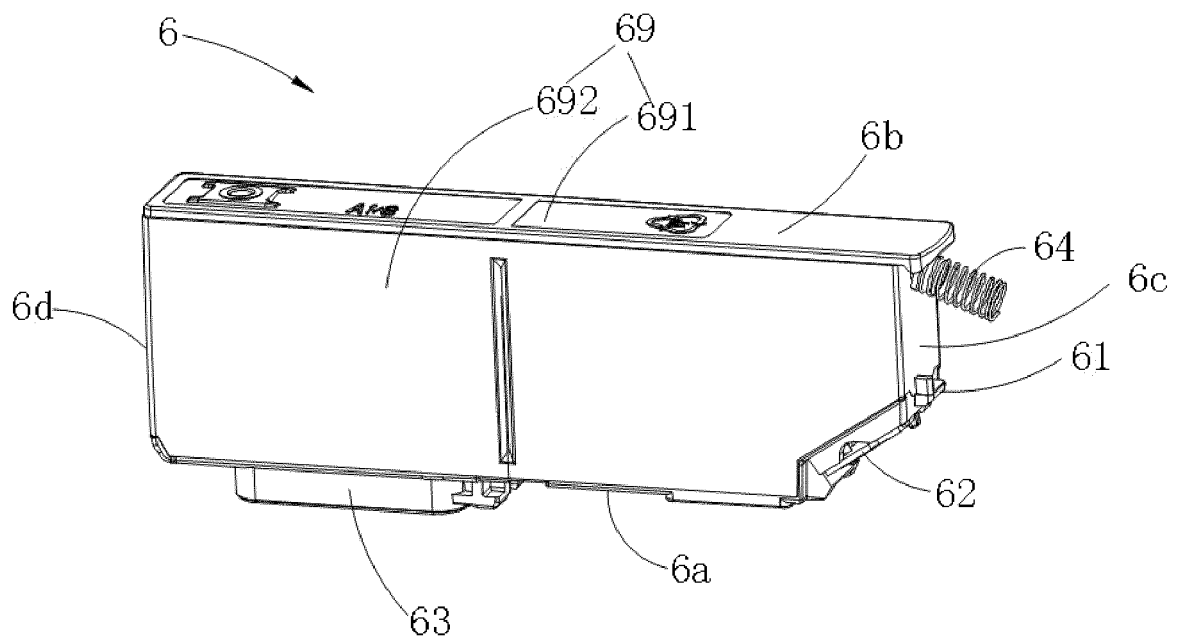


FIG. 43

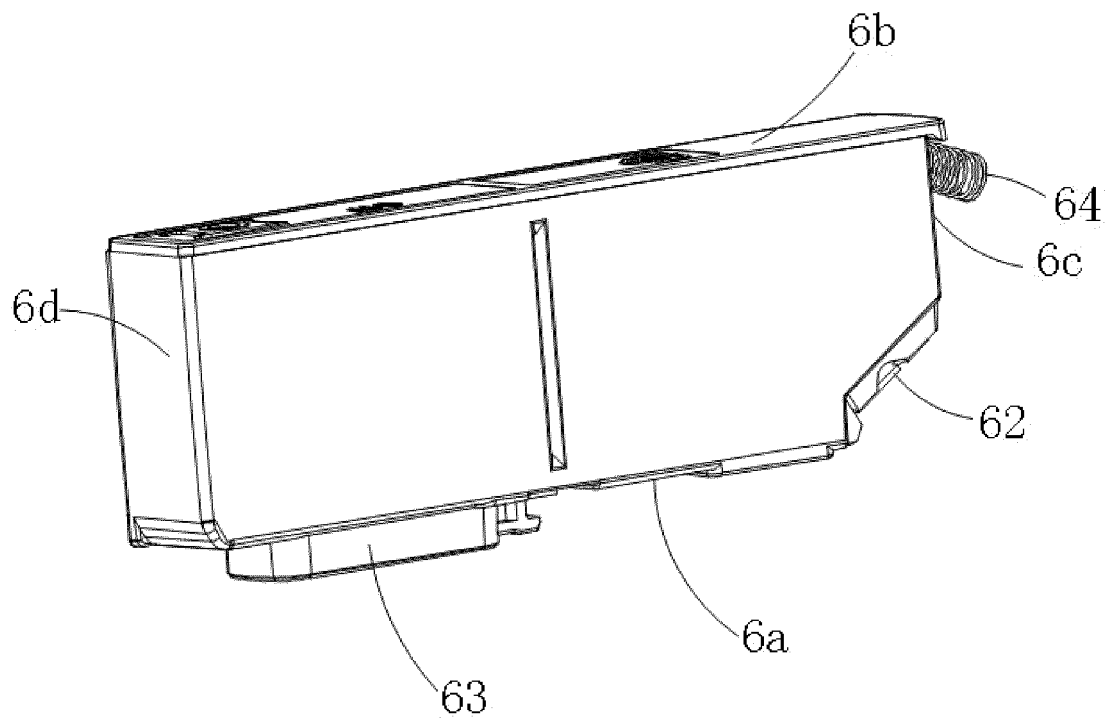


FIG. 44

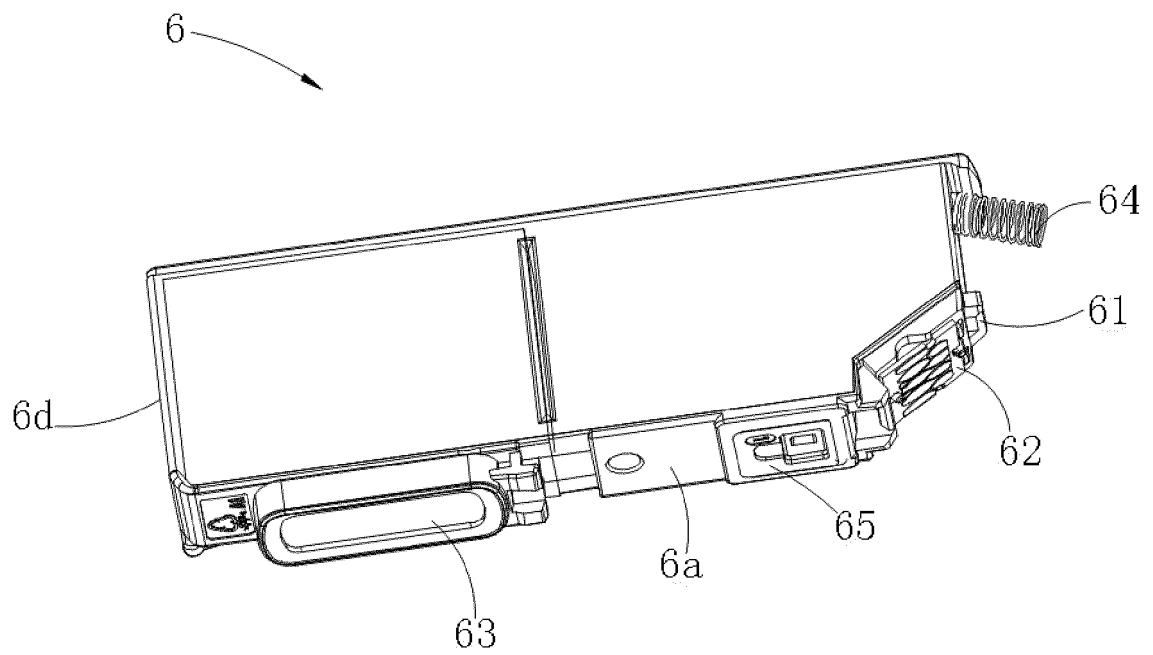


FIG. 45

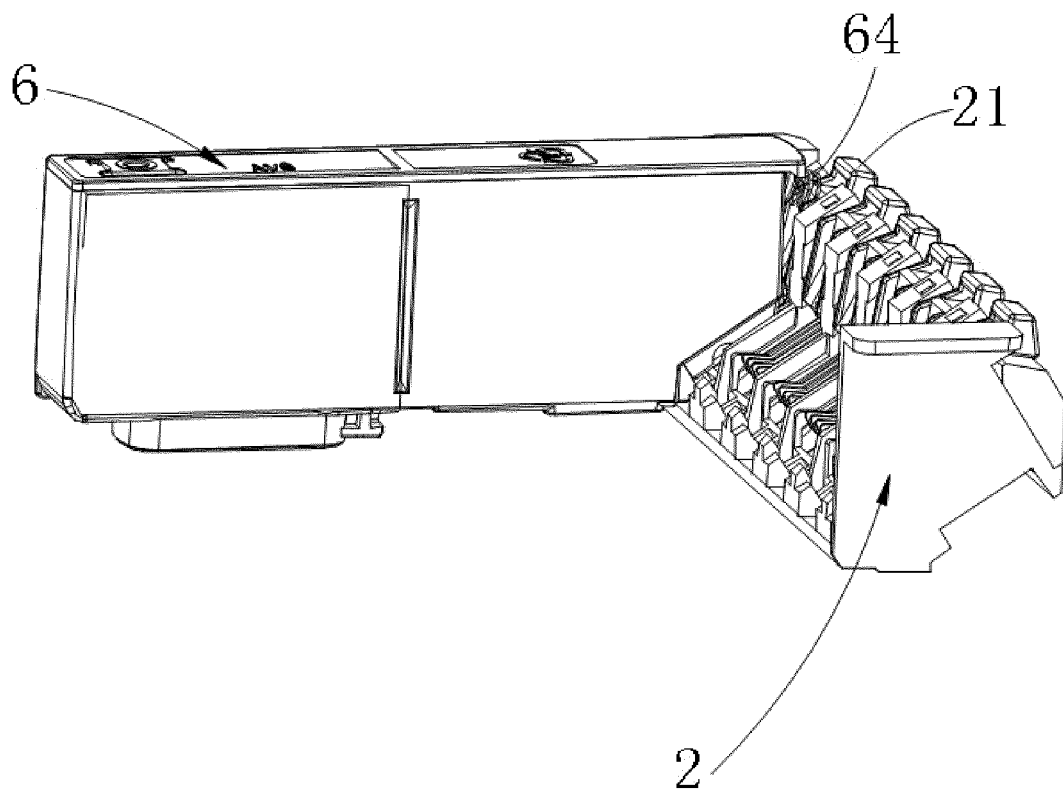


FIG. 46

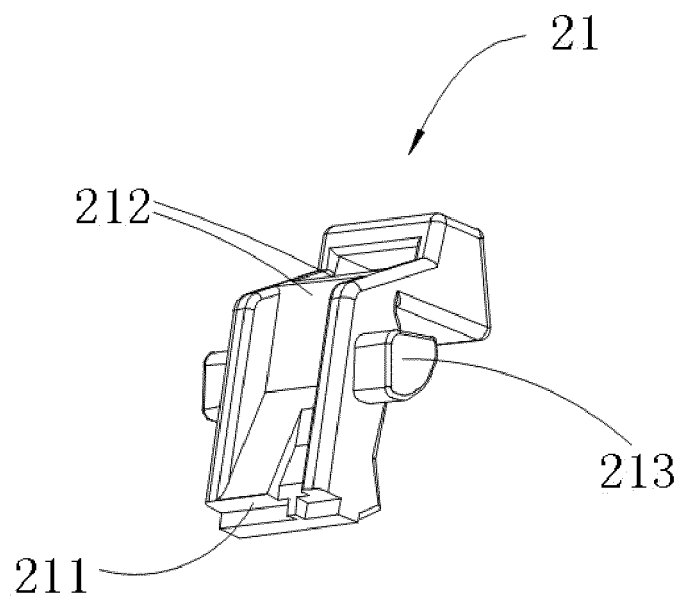


FIG. 47

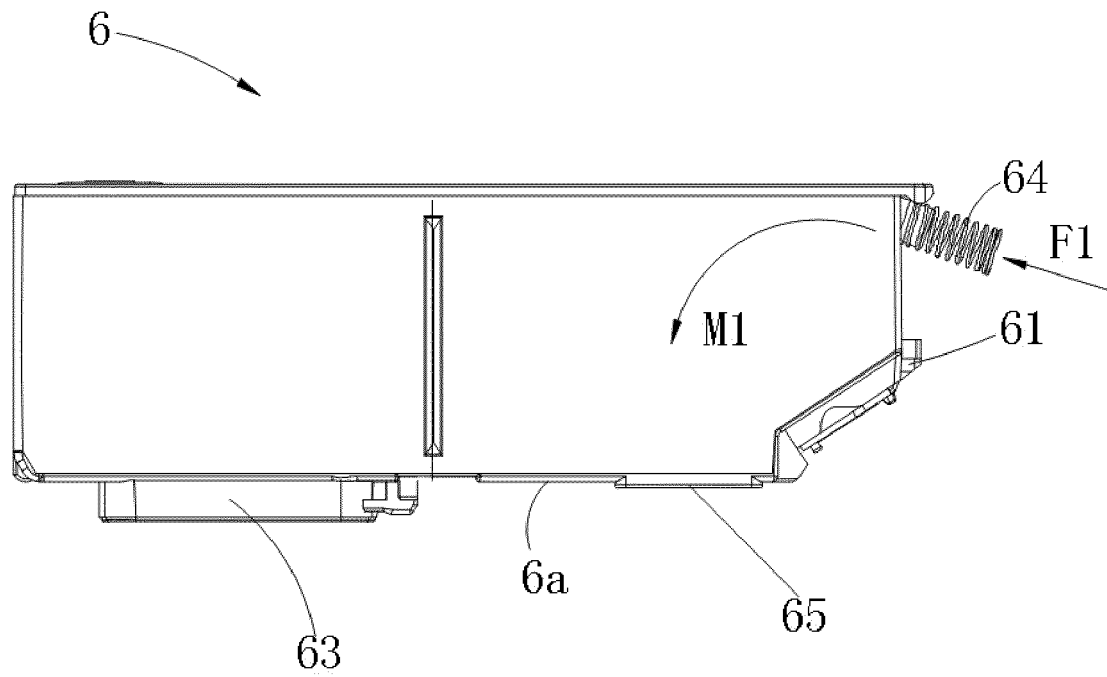


FIG. 48

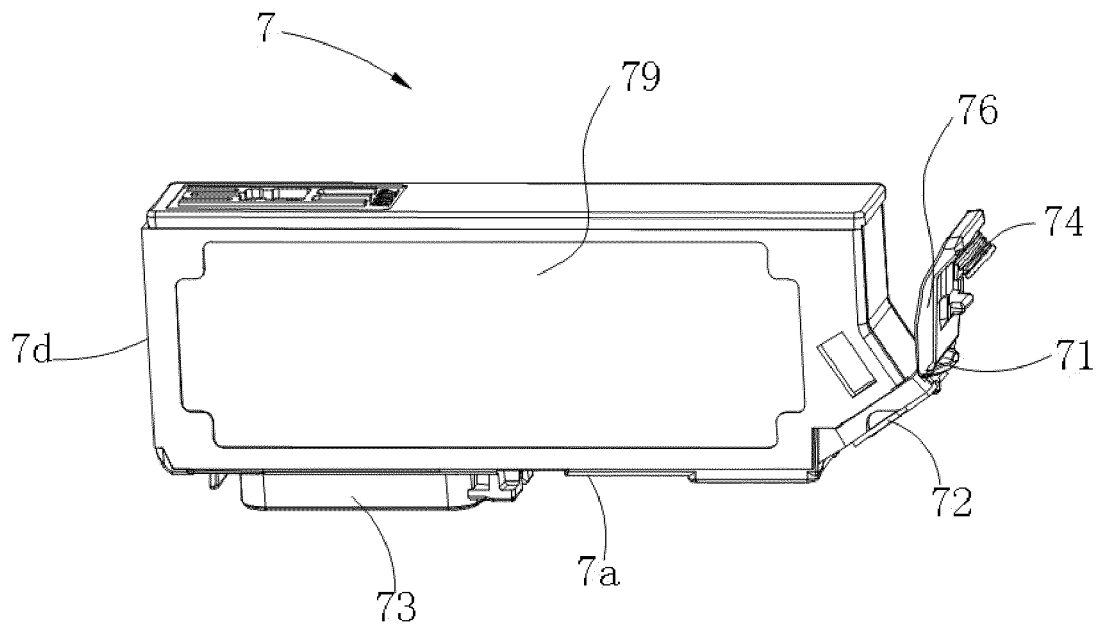


FIG. 49

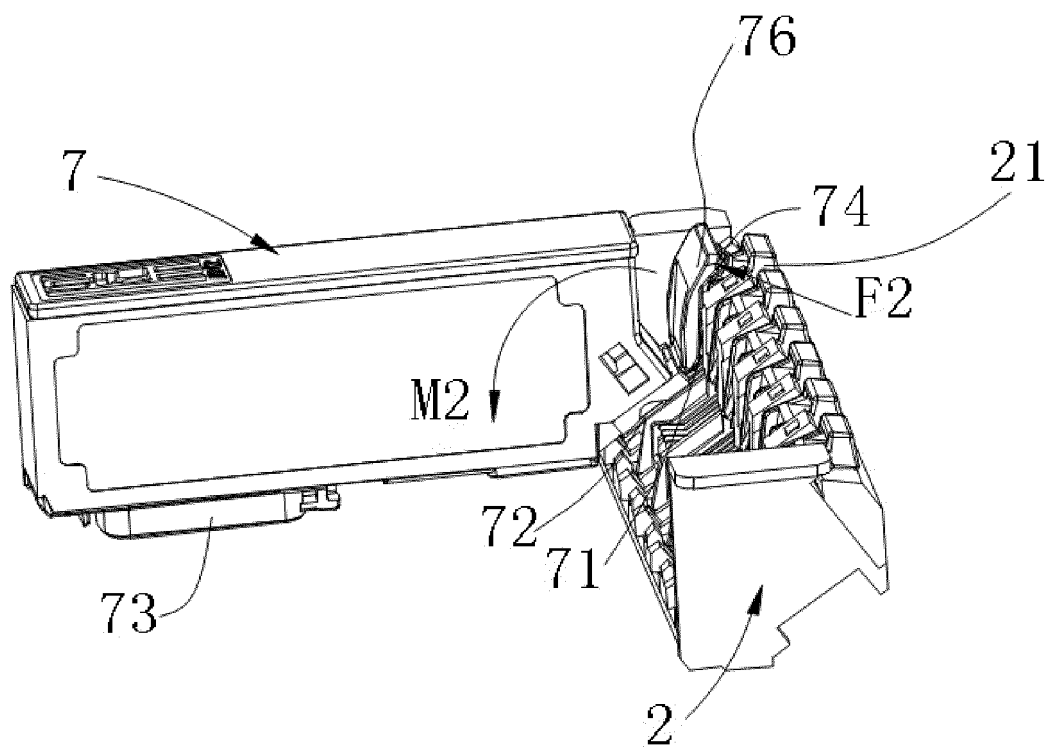


FIG. 50

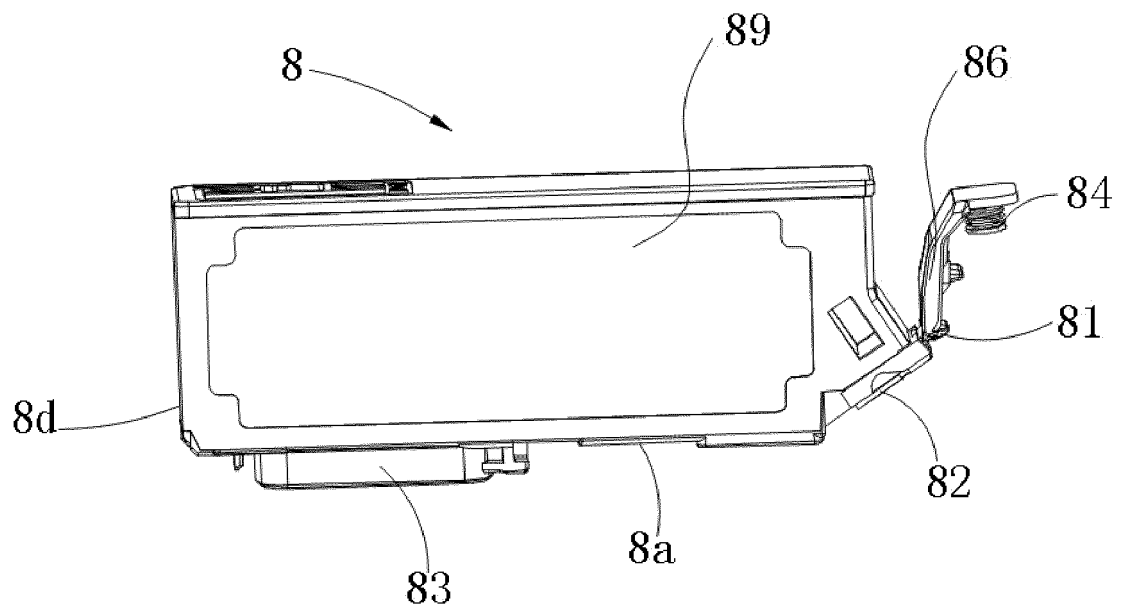


FIG. 51

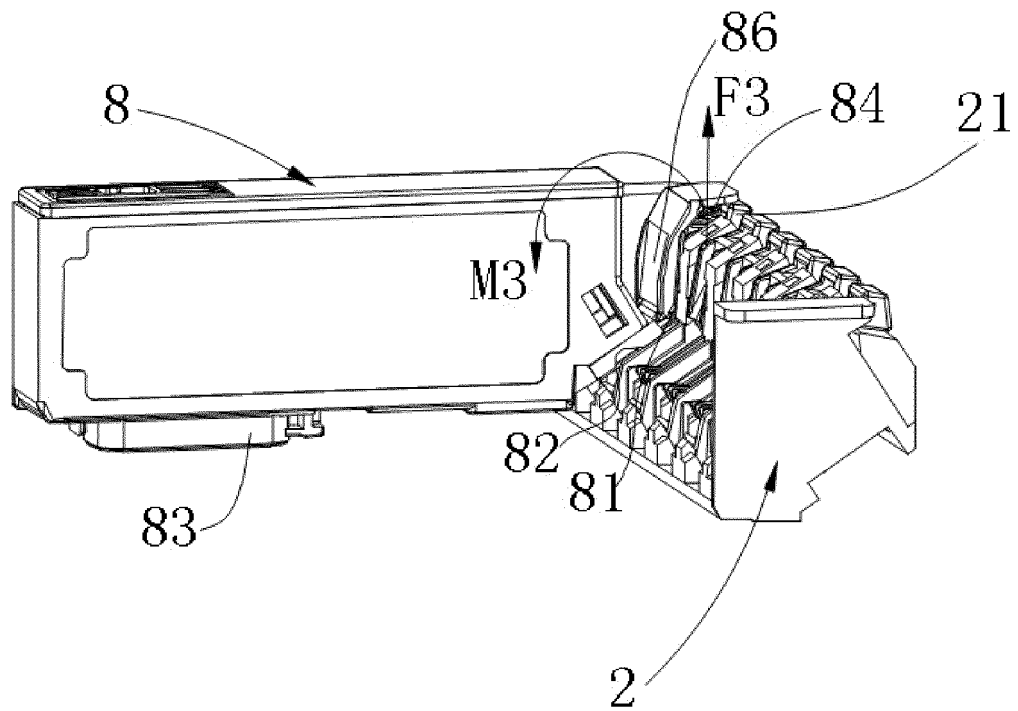


FIG. 52

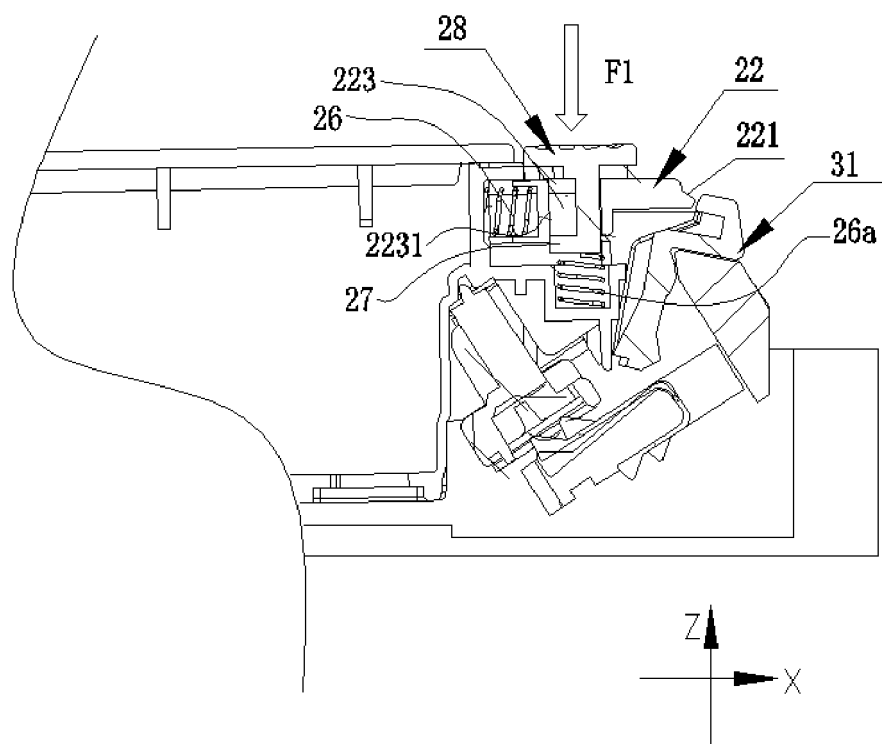


FIG. 53

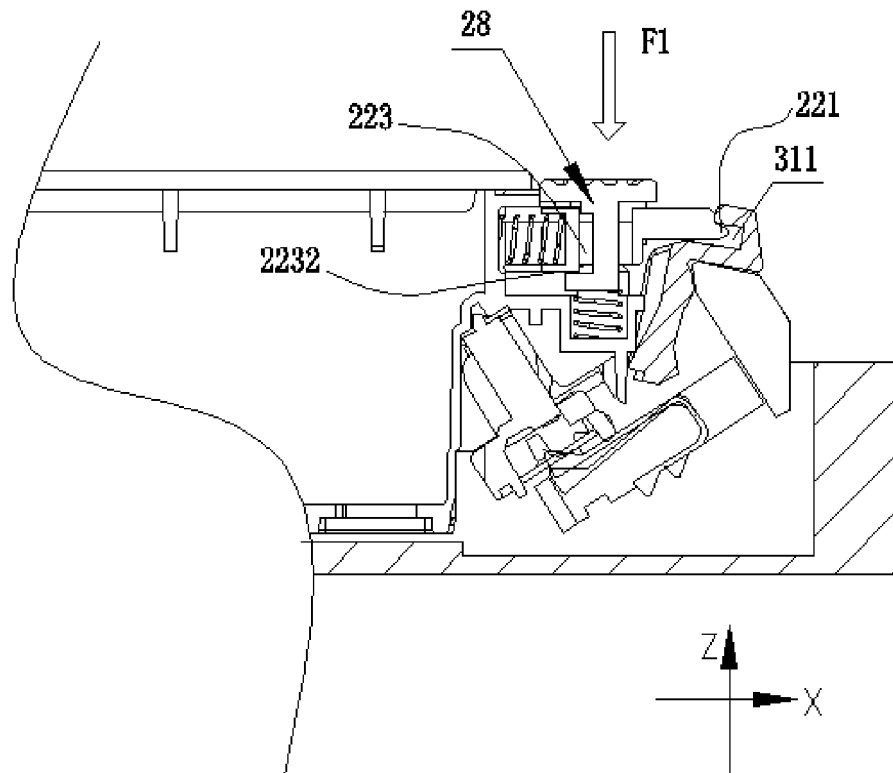


FIG. 54

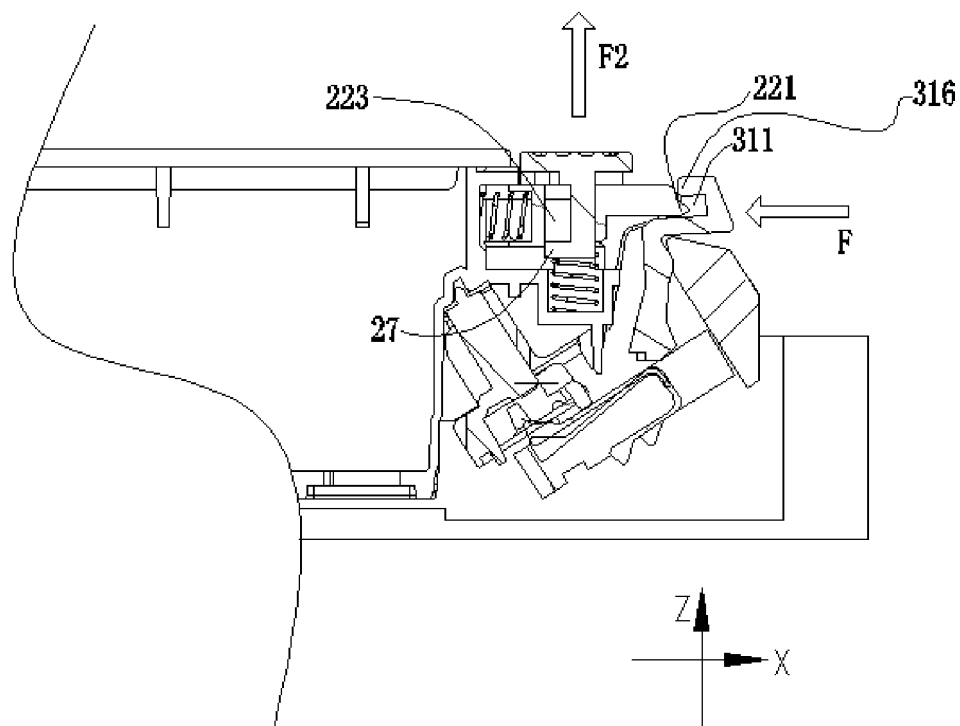


FIG. 55

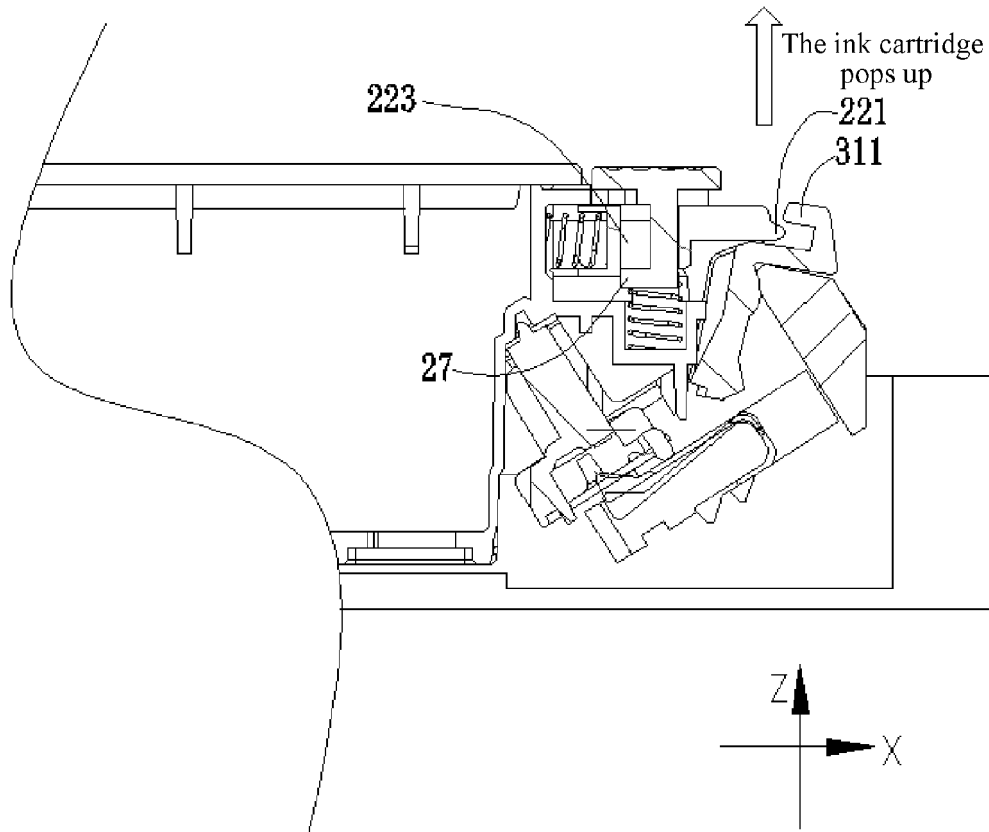


FIG. 56

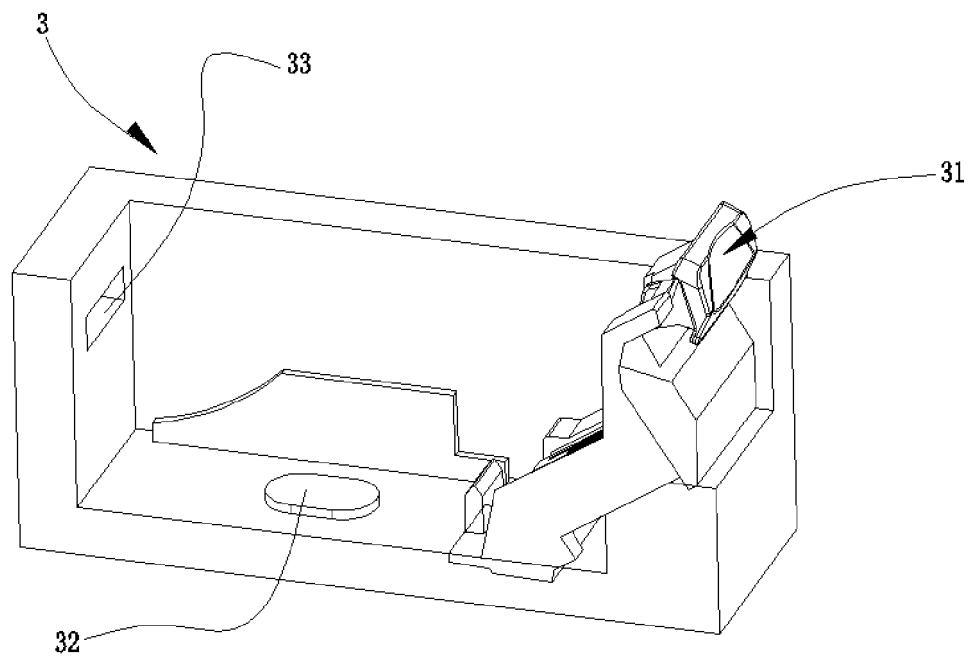


FIG. 57

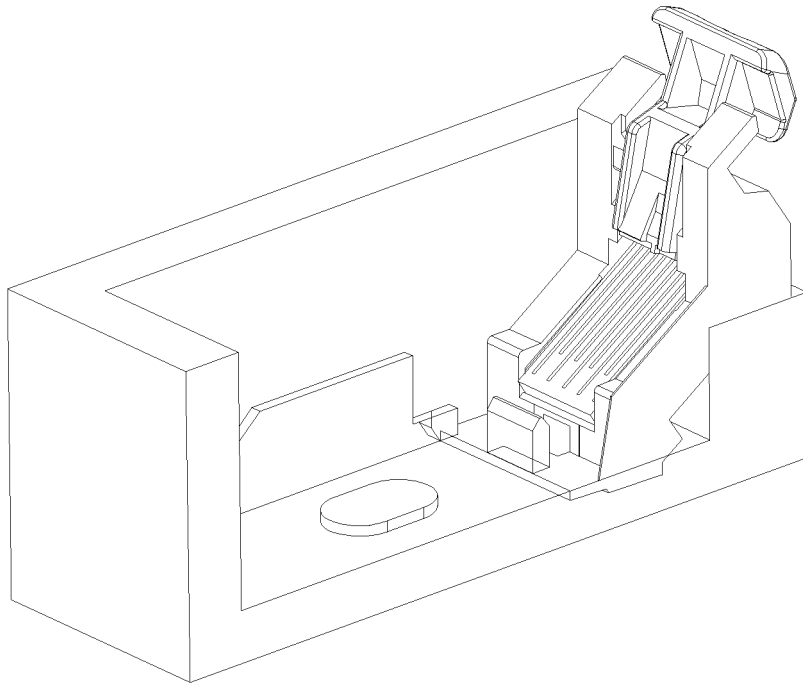


FIG. 58

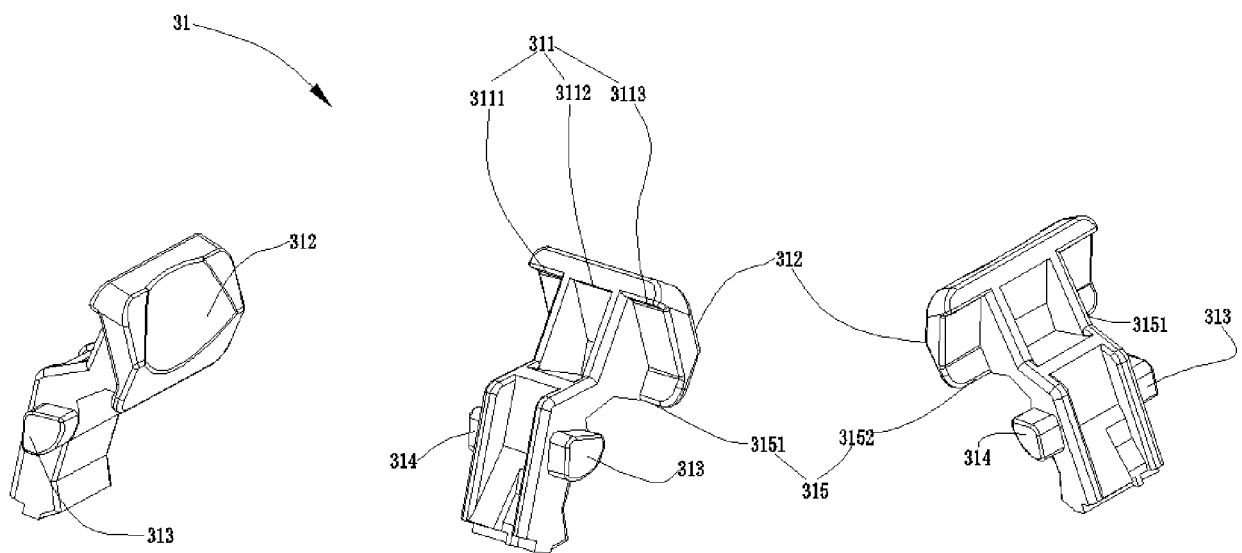


FIG. 59

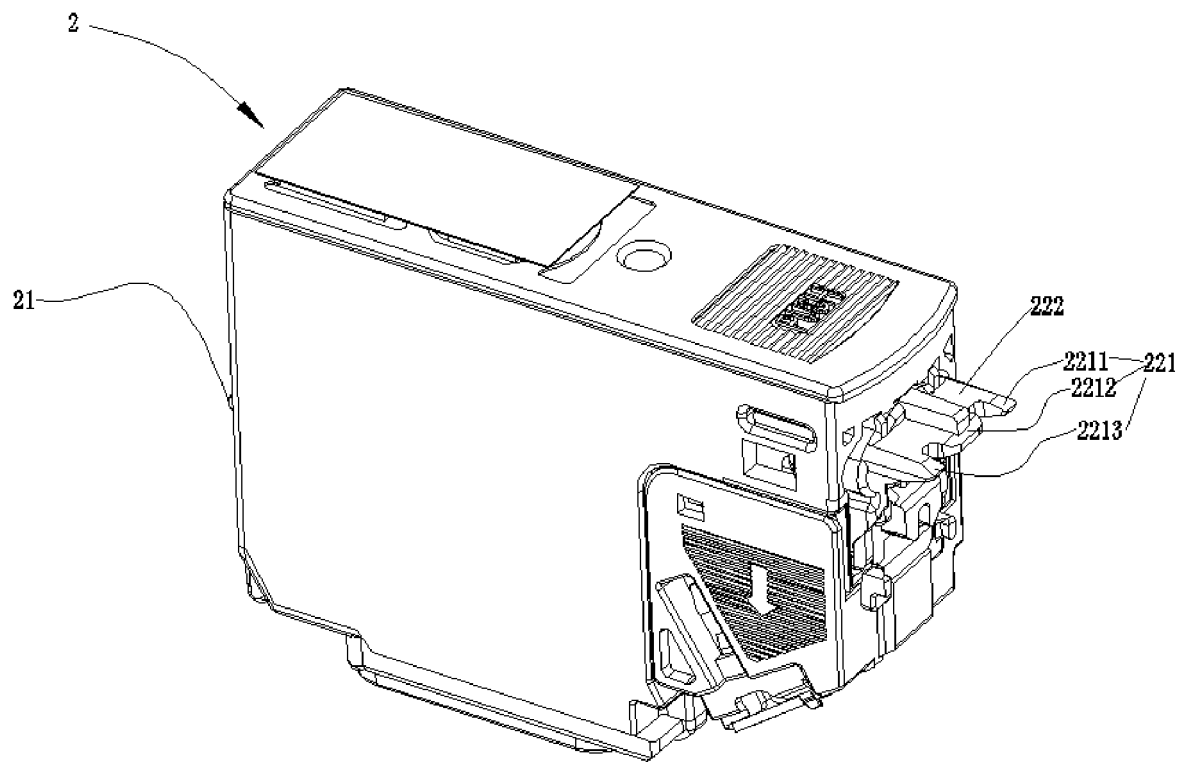


FIG. 60

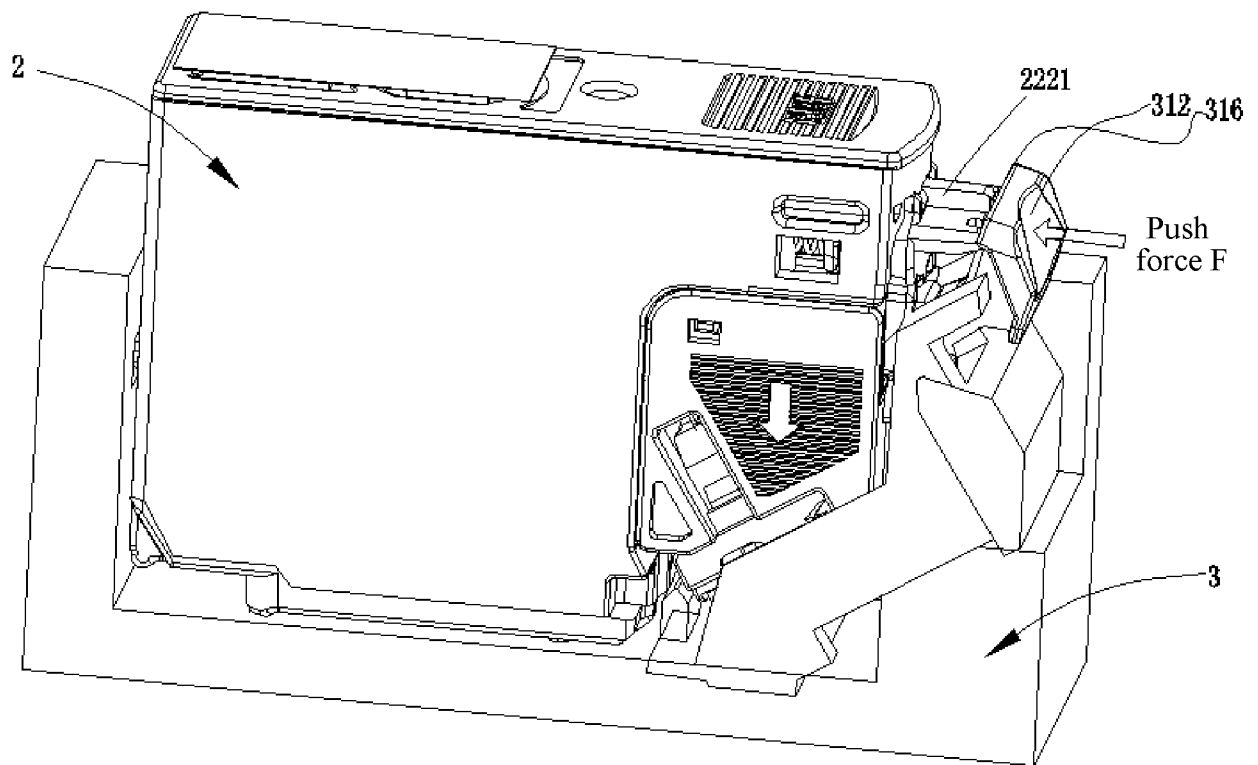


FIG. 61

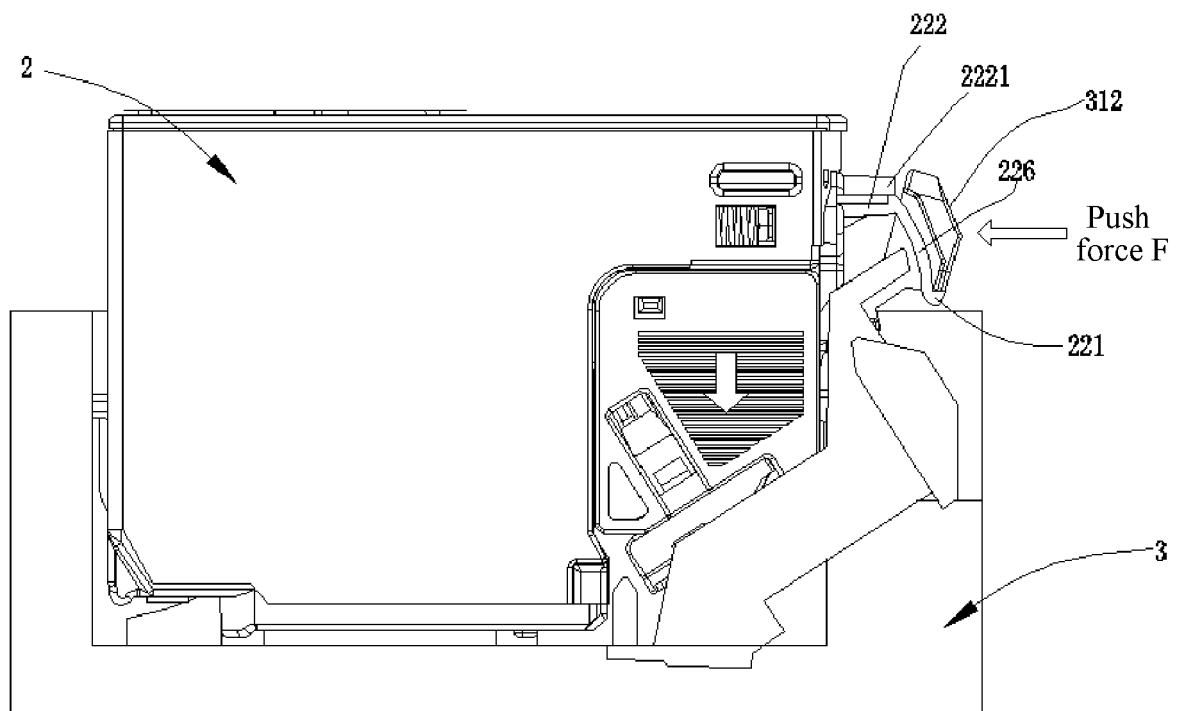


FIG. 62

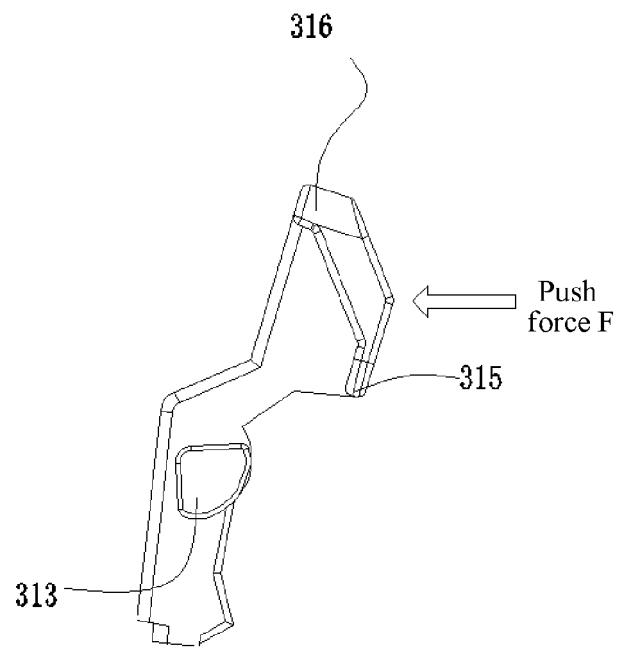


FIG. 63

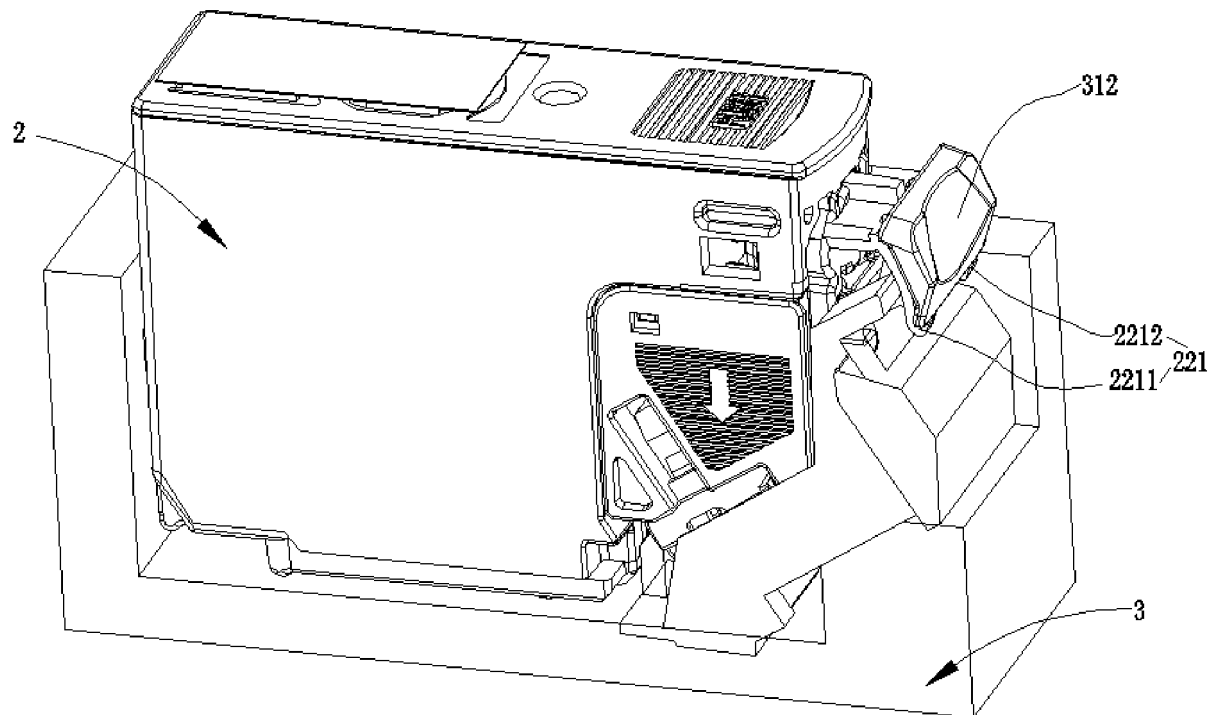


FIG. 64

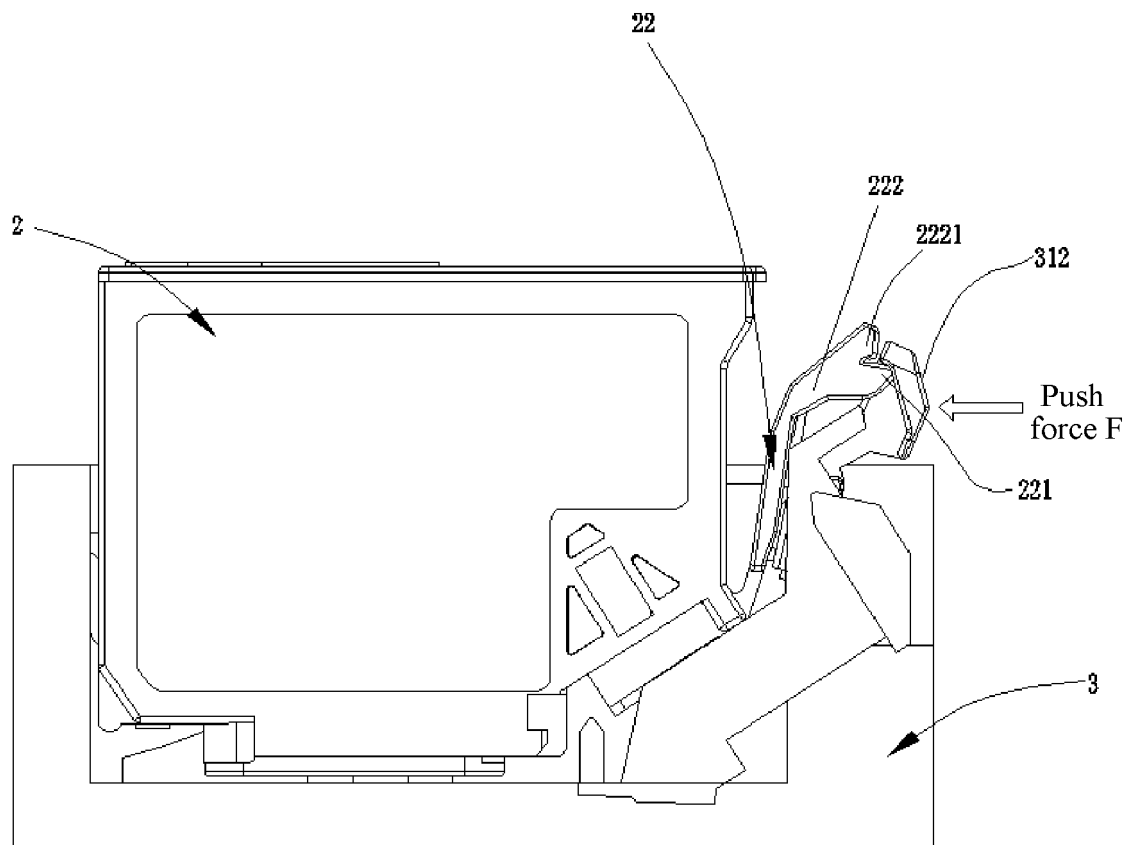


FIG. 65

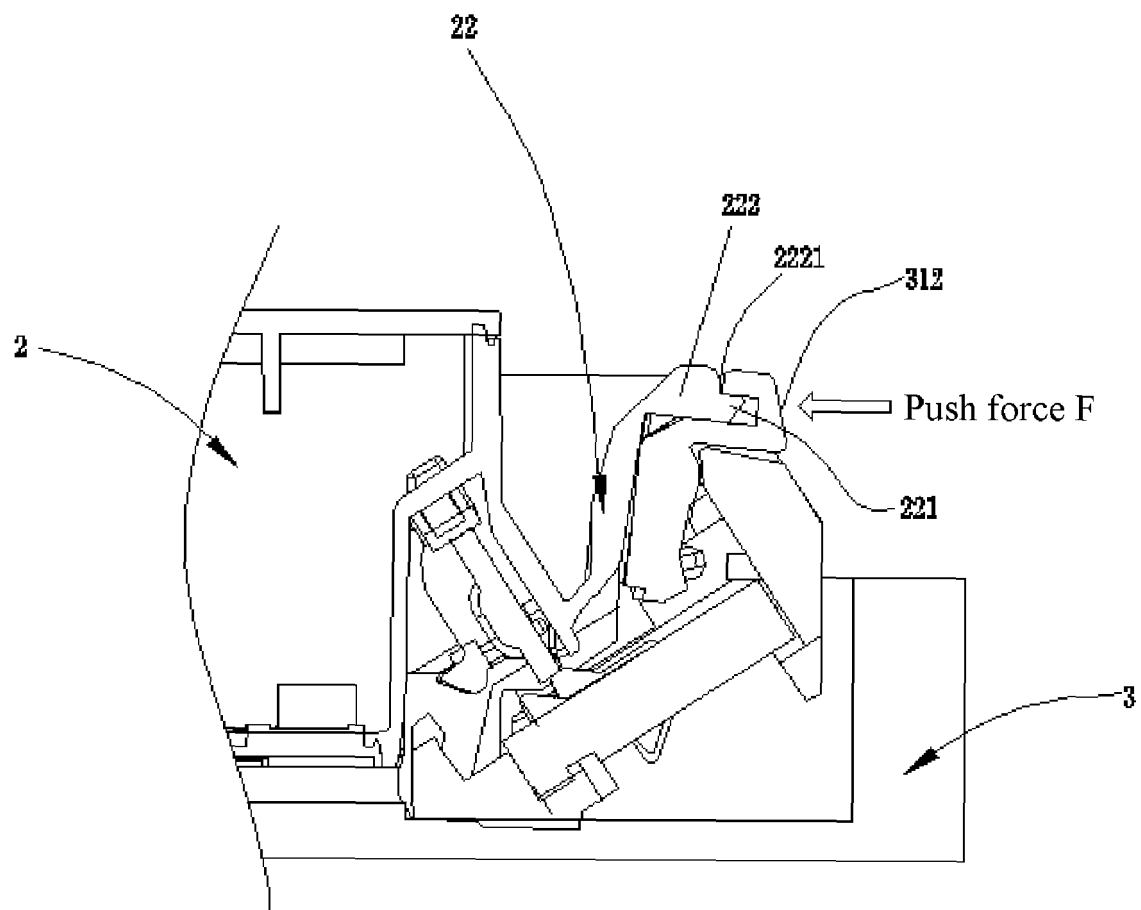


FIG. 66

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2017/073011

A. CLASSIFICATION OF SUBJECT MATTER

B41J 2/175 (2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B41J 2/175

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CPRSABS; CNTXT; CNABS; VEN; CNKI: ink box, buckle, limit, mount+, dismount+, remov+, attach+, detach+, engag+, disengag+, releas+, separat+, spring, elastic+, bias+, reservoir, tank, box, cartridge, holder, containment, clamp, liquid, ink

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 205523077 U (ZHUHAI NASIDA ENTERPRISE MANAGEMENT CO., LTD.), 31 August 2016 (31.08.2016), description, paragraphs [0042]-[0067], and figures 1-19	1-4, 6-8, 12-14
PX	CN 205768080 U (ZHUHAI NASIDA ENTERPRISE MANAGEMENT CO., LTD.), 07 December 2016 (07.12.2016), description, paragraphs [0028]-[0048], and figures 1-9	1-3, 9-10, 15-17, 19
PX	CN 105751705 A (SEIKO EPSON CORPORATION), 13 July 2016 (13.07.2016), description, paragraphs [0051]-[0118], and figures 1-24	1-3
X	CN 203093328 U (ZHUHAI NASIDA ENTERPRISE MANAGEMENT CO., LTD.), 31 July 2013 (31.07.2013), description, paragraphs [0042]-[0054], and figures 6-9	1, 3
X	US 8529033 B2 (BROTHER KOGYO KK), 10 September 2013 (10.09.2013), figures 1-8	1, 3
A	JP 2004114702 A (NINESTAR IMAGE CO., LTD.), 15 April 2004 (15.04.2004), the whole document	1-26

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

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"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search
17 March 2017 (17.03.2017)Date of mailing of the international search report
04 May 2017 (04.05.2017)Name and mailing address of the ISA/CN:
State Intellectual Property Office of the P. R. China
No. 6, Xitucheng Road, Jimenqiao
Haidian District, Beijing 100088, China
Facsimile No.: (86-10) 62019451

Authorized officer

SUN, LanxiangTelephone No.: (86-10) **62089249**

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2017/073011

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2002254670 A (SEIKO EPSON CORPORATION), 11 September 2002 (11.09.2002), the whole document	1-26

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2017/073011

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REFERENCES CITED IN THE DESCRIPTION

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