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(54) **MOVABLE CONTACT OPERATING MECHANISM OF LEAKAGE CIRCUIT BREAKER**

(57) A movable contact operating mechanism of leakage circuit breaker, comprising a movable contact (6), a bounce buckle (1), a movable contact support (2), a locking spring (3), a locking buckle (4) and a tension spring (5); a long through hole (21) is provided on the movable contact support, a pin shaft (7) is provided in the long through hole, two ends of the pin shaft are arranged on a base and a cover of the leakage circuit breaker; the bounce buckle is hinged on an upper end of the movable contact support, a central part of the locking buckle movably sheathes the pin shaft by means of a provided through hole (41), a contact pin (42) is provided extendingly above the locking buckle, and the contact pin is abutably engagable with the bounce buckle to limit the rotation of the bounce buckle; a driving pin (43) and a resetting pin (44) are provided below the locking buckle; by means of the present operating mechanism, a movable contact operating mechanism of leakage circuit breaker may be provided, which allows the length or width of the leakage circuit breaker to be smaller than that of a product of existing technologies, and therefore better suited to meet a client's requirements.

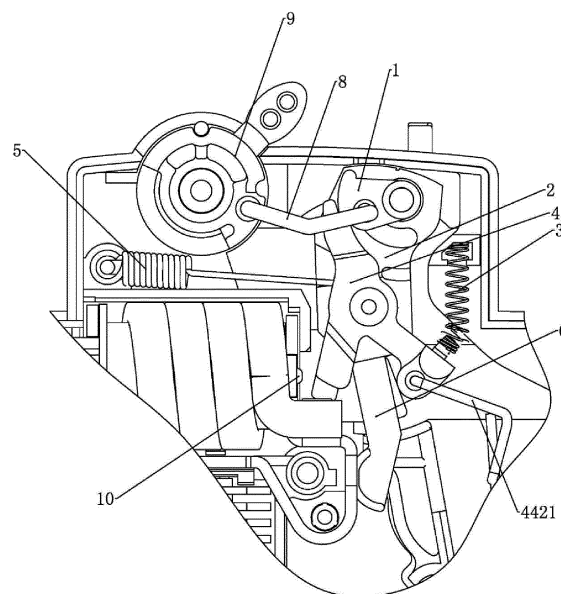


Figure 1

Description**Field of the Invention**

[0001] The invention relates to a low-voltage leakage circuit breaker, and in particular, to a movable contact operating mechanism of leakage circuit breaker.

Background of the Invention

[0002] Leakage circuit breakers are widely used in industrial, commercial, residential and other places, mainly for short-circuit overload protection and leakage protection. The existing 1P+N products generally use widened product width, that is, assembling the leakage module on the basis of the existing miniature leakage circuit breaker; or under the circumstances that the basic structure of the existing miniature circuit breaker is unchanged, the circuit board, the releasing mechanism and the leakage current test device are added on the upper or lower side of the miniature circuit breaker, and the product width is generally large. Or by lengthening the length of the product, that is, the circuit board and the test device releasing mechanism is provided on the upper or lower side of the miniature circuit breaker. Therefore, the length of the leakage circuit breaker must be increased. Now the number of electrical equipment used by users increases, and the number of power distribution circuits increases, therefore, the width of the power distribution box must be increased or lengthened. However, the design space of the power distribution box in the house is generally not easy to be changed, so the existing wider or longer leakage circuit breaker cannot meet the needs of users. There is an urgent need for a leakage circuit breaker of small size and high breaking capacity to fill the domestic gap.

[0003] However, the existing leakage circuit breakers are complicated due to the movable contact operating mechanism, and the realization of the above functions requires a plurality of components to be completed together. The volume of the mechanism is relatively large, and it is difficult to realize miniaturization.

Disclosure of the invention**Technical issue**

[0004] The invention overcomes the defect of the large volume in the existing leakage circuit breaker, and provides a novel movable contact operating mechanism of leakage circuit breaker which can make the length or width of the leakage circuit breaker smaller than the prior art products and can better meet the needs of customers.

Problem solution**Technical solution**

[0005] To achieve the objective above, the invention adopts the technical solution as follows: a movable contact operating mechanism of leakage circuit breaker, comprising a movable contact, a bounce buckle, a movable contact support, a locking spring, a locking buckle and a tension spring, wherein the movable contact is fixedly arranged on the movable contact support, a long through hole is provided on the movable contact support, a pin shaft is provided in the long through hole, two ends of the pin shaft are arranged on a base and a cover of the leakage circuit breaker; one end of the tension spring is connected to the movable contact support, and the connection point with the movable contact support is located above the long through hole; the other end of the tension spring is fixedly connected to the base of the leakage circuit breaker or other components fixedly connected to the base; the bounce buckle is hinged on an upper end of the movable contact support; the bounce buckle is connected to the handle of the leakage circuit breaker through a first linkage; a central part of the locking buckle movably sheathes the pin shaft by means of a provided through hole, a contact pin is provided extending above the locking buckle, and the contact pin is abutably engagable with the bounce buckle to limit the rotation of the bounce buckle; a driving pin and a resetting pin are provided below the locking buckle, wherein the driving pin is correspondingly arranged with the release putter of the leakage circuit breaker, the putter pushes the driving pin to rotate to realize the rotation of the locking buckle, and the locking buckle rotates to unlock the contact between the bounce buckle and the contact pin, then the movable contact support causes the leakage circuit breaker to open under the action of the tension spring; a spring base is provided at the upper end of the resetting pin; one end of the locking spring abuts against the spring base, the other end thereof abuts against the base of the leakage circuit breaker or other components fixedly connected to the base; the locking spring causes the driving pin to rotate towards the side of the release putter of the leakage circuit breaker.

Advantageous effects of the invention**Advantageous effects**

[0006] By adopting the above scheme, the miniaturization of the moving contact operating mechanism of the leakage circuit breaker is realized, which is embodied in that: the rotation of the movable contact is realized by the engagement of the movable contact support and the tension spring, and the process of movement of the movable contact is: when the fixed contact is closed, the contact pin of the locking buckle is abutably engagable with the bounce buckle to limit the rotation of the bounce buck-

le; when a situation action of the leakage circuit breaker occurs, the release putter of the leakage circuit breaker pushes the driving pin to rotate to realize the rotation of the locking buckle, and the locking buckle rotates to unlock the contact between the bounce buckle and the contact pin, then the movable contact support causes the leakage circuit breaker to open under the action of the tension spring; at the same time, the handle is also rotated to the open state. When the fixed contact is closed, the handle is rotated. At this time, the first linkage drives the bounce buckle and the movable contact support to rotate around the pin shaft until the movable contact comes into contact with the fixed contact, and then the handle continues to rotate. At this time, since the movable contact has already come into contact with the fixed contact, and the position will not be changed, so the movable contact support can only move as a whole, which drives the pin shaft to come into contact with the left side of the long through hole, so that the contact between the movable contact and the fixed contact is much closer, and a good contact between them is ensured.

[0007] Further, a cavity is provided on the side of the base below the movable contact support, the upper end of the movable contact is inserted into the cavity to realize the fixed connection with the movable contact support; the long through hole of the movable contact support is located in the cavity portion, a long through hole of the movable contact corresponding to the long through hole of the movable contact support is provided at the upper end of the movable contact, and the pin shaft is provided through the long through hole and the long through hole of the movable contact; a connection hole is provided at the upper end of the resetting pin and is connected with a second linkage, and a bimetal is abuttedly provided on the other end of the second linkage.

[0008] By adopting the above solution, the structure of the product is more reasonable. The connection between the movable contact and the movable contact support is convenient, and the long through hole and the long through hole of the movable contact form the connection through hole of the pin shaft, which drives both the movable contact and the movable contact support to receive the force of the pin shaft, and the movement is relatively stable.

[0009] Further, a locking nose is provided on the bounce buckle, a contact shoulder step abuttedly engageable with the locking nose of the bounce buckle is provided on the contact pin; a connection through hole for the connection of the first linkage is provided on the bounce buckle, and an arc-shaped groove is provided above the movable contact support and corresponding to the connection through hole of the bounce buckle; after the first linkage is connected to the bounce buckle, the penetrating end thereof is disposed in the arc-shaped groove and can slip therein.

[0010] By adopting the above solution, the abutted engagement between the bounce buckle and the contact pin is relatively stable. In addition, after the first linkage

is connected to the bounce buckle, the penetrating end thereof is disposed in the arc-shaped groove and can slip therein. Accordingly, the rotation of the bounce buckle and the movable contact support is limited, which makes the engagement of the two more reasonable. Alternatively, the arc-shaped groove may not be provided and the first linkage is not set to be penetrated, and the two are limitedly engageable with each other only by the length of the first linkage.

[0011] Finally, a long hole for the tension spring to be placed is provided above the long through hole on the movable contact support; an arc-shaped convex rib is provided adjacent to the side of the movable contact on the driving pin of the locking buckle; when the locking buckle is pushed to rotate by the release putter of the leakage circuit breaker, the top of the convex rib of the driving pin abuts against the movable contact.

[0012] By adopting the above solution, the long hole is provided to facilitate the connection of the tension spring. In addition, when the locking buckle is pushed to rotate by the release putter of the leakage circuit breaker, the convex rib of the driving pin abuts against the movable contact. Accordingly, on disengagement, the top of the convex rib comes into contact with the movable contact, and the temperature of the movable contact is relatively high, so the top of the convex rib comes into line contact with the moving contact, the contact area is small, and the damage of the locking buckle is small.

[0013] The invention will be further described with reference to the drawings.

Brief Description of the Drawings

Description of the Drawings

[0014]

FIG. 1 is the stereoscopic view illustrating the closed state in the embodiment of the invention;

FIG. 2 is the stereoscopic view illustrating the open state in the embodiment of the invention;

FIG. 3 is the stereoscopic view illustrating the closing process in the embodiment of the invention;

FIG. 4 is the stereoscopic view illustrating the relationship between the movable contact support and the tension spring at the critical points of closing in the embodiment of the invention;

FIG. 5 is the stereoscopic view illustrating the movable contact support in the embodiment of the invention;

FIG. 6 is the schematic view illustrating the rear structure in FIG. 5;

FIG. 7 is the stereoscopic view illustrating the locking buckle in the embodiment of the invention;

FIG. 8 is the schematic view illustrating the rear structure in FIG. 7;

FIG. 9 is the schematic view illustrating the structure of the movable contact;

FIG. 10 is the view illustrating the using status in the embodiment of the invention;

FIG. 11 is the stereoscopic view illustrating the bounce buckle in the embodiment of the invention.

The best embodiment of the invention

Preferred Embodiments of the Invention

[0015] As shown in the figures, a movable contact operating mechanism of leakage circuit breaker, comprising a movable contact 6, a bounce buckle 1, a movable contact support 2, a locking spring 3, a locking buckle 4 and a tension spring 5; the movable contact 6 is fixedly arranged on the movable contact support 2, a long through hole 21 is provided on the movable contact support 2, a pin shaft 7 is provided in the long through hole 21, two ends of the pin shaft 7 are arranged on a base and a cover of the leakage circuit breaker; here, the pin shaft 7 is arranged on the base or the cover, which may be an indirect or a direct arrangement, which mainly means that the pin shaft 7 is fixed relative to the base and the cover. The manner in which the pin 7 is attached to the base and the cover is also common in the prior art. One end of the tension spring 5 is connected to the movable contact support 2, and the connection point with the movable contact support 2 is located above the long through hole 21, wherein the upper side refers to the side close to the first linkage 8; accordingly, the movable contact support 2 rotates around the pin shaft 7 under the pulling of the tension spring 5, and the movable contact 6 below the pin shaft 7 can realize the disconnection motion with the fixed contact. The other end of the tension spring 5 is fixedly connected to the base of the leakage circuit breaker or other components fixedly connected to the base; the bounce buckle 1 is hinged on an upper end of the movable contact support 2; the bounce buckle 1 is connected to the handle 9 of the leakage circuit breaker through a first linkage 8. The function of the first linkage 8 is also found in a conventional circuit breaker, so the function and motion mode of the first linkage 8 are not further described here. A central part of the locking buckle 4 movably sheathes the pin shaft 7 by means of a provided through hole 41, a contact pin 42 is provided extendingly above the locking buckle 4, and the contact pin 42 is abuttedly engagable with the bounce buckle 1 to limit the rotation of the bounce buckle 1; the contact pin 42 realizes the abutted locking or the unlocked engage-

ment on the bounce buckle 1; when the bounce buckle is locked abuttedly, the upper end of the movable contact support 2 is fixed, and the tension spring 5 cannot pull the movable contact 6. A driving pin 43 and a resetting pin 44 are provided below the locking buckle 5, wherein the driving pin 43 is correspondingly arranged with the release putter 10 of the leakage circuit breaker, the putter 10 pushes the driving pin 43 to rotate to realize the rotation of the locking buckle 4, and the locking buckle 4 rotates to unlock the contact between the bounce buckle 1 and the contact pin 43, then the movable contact support 2 causes the leakage circuit breaker to open under the action of the tension spring 5. A spring base 441 is provided at the upper end of the resetting pin 44; one end of the locking spring 3 abuts against the spring base 441, the other end thereof abuts against the base of the leakage circuit breaker or other components fixedly connected to the base; the locking spring 3 causes the driving pin 44 to rotate towards the side of the release putter 10 of the leakage circuit breaker. By adopting the above scheme, the miniaturization of the moving contact operating mechanism of the leakage circuit breaker is realized, which is embodied in that: the rotation of the movable contact 6 is realized by the engagement of the locking buckle 4, bounce buckle 1, movable contact support 2 and tension spring 5, and the swing of the movable contact is realized by such simple components, which is very convenient. The specific process of movement of the movable contact 6 is: when the fixed contact is closed, the contact pin 42 of the locking buckle 4 is abuttedly engagable with the bounce buckle 1 to limit the rotation of the bounce buckle; when a situation action of the leakage circuit breaker occurs, the release putter 10 of the leakage circuit breaker pushes the driving pin 43 to rotate to realize the rotation of the locking buckle 4, and the locking buckle 4 rotates to unlock the contact between the bounce buckle 1 and the contact pin 42, then the movable contact support 2 causes the leakage circuit breaker to open under the action of the tension spring 5; at the same time, the handle 9 is also rotated to the open state. The closing action: when the handle 9 rotates clockwise under the action of an external force, the first linkage 8 is driven to the right; the first linkage 8 pushes the bounce buckle 1 to be abuttedly engagable with the pin shaft correspondingly to right side of the long through hole 21 of the movable contact support 2; when the handle 9 continues to be rotated clockwise, the locking buckle 4 continues to rotate clockwise around the pin shaft 7; meanwhile, the movable contact support 2 and the movable contact 6 rotate clockwise around the contact point of the movable contact 6 and the fixed contact, under the push of the bounce buckle 1 and the pulling of the tension spring 5. At this time, the right side of the long through hole 21 of the movable contact support 2 is separated from the pin shaft to generate the super stroke. When the handle 9 cannot continue to be pushed, the leakage circuit breaker product closes. Accordingly, the contact between the movable contact 6 and the fixed contact is

much closer, and a good contact between the movable contact 6 and the fixed contact is ensured.

[0016] In the embodiment of the invention, a cavity 22 is provided on the side of the base below the movable contact support 2, the upper end of the movable contact 6 is inserted into the cavity 22 to realize the fixed connection with the movable contact support 2; accordingly, the connection between the movable contact 6 and the movable contact support 2 is convenient. The long through hole 21 of the movable contact support 2 is located in the cavity 22 portion, a long through hole 61 of the movable contact corresponding to the long through hole 21 of the movable contact support 2 is provided at the upper end of the movable contact 6, and the pin shaft 7 is provided through the long through hole 21 and the long through hole 61 of the movable contact, which drives both the movable contact 6 and the movable contact support 2 to receive the force of the pin shaft 7, and the movement is relatively stable. A connection hole 442 is provided at the upper end of the resetting pin 44 of the locking buckle 4 and is connected with a second linkage 4421, and a bimetal 4422 is abuttedly provided on the other end of the second linkage 4421; accordingly, the bimetal 4422 can control the movement of the locking buckle 4 to realize the overload protection.

[0017] In the embodiment of the invention, a locking nose 11 is provided on the bounce buckle 1, a contact shoulder step 421 abuttedly engagable with the locking nose 11 of the bounce buckle is provided on the contact pin 42 of the locking buckle 4; here, the engagement of the locking nose 11 or contact shoulder step 421 can also be implemented in other ways, such as the abutted engagement with the beveled surface, etc., the purpose of which is to facilitate the abutted engagement between the two, and to fix the upper end of the movable contact support when needed. A connection through hole 12 for the connection of the first linkage 8 is provided on the bounce buckle 1, and an arc-shaped groove 23 is provided above the movable contact support 2 and corresponding to the connection through hole 12 of the bounce buckle; after the first linkage 8 is connected to the bounce buckle 1, the penetrating end thereof is disposed in the arc-shaped groove 23 and can slip therein. Accordingly, the rotation of the bounce buckle 1 and the movable contact support 2 is limited, which makes the engagement of the two more reasonable. Alternatively, the arc-shaped groove 23 may not be provided and the first linkage 8 is not set to be penetrated, and the two are limitedly engagable with each other only by the length of the first linkage 8.

[0018] In the embodiment of the invention, a long through 24 for the tension spring to be placed is provided above the long through hole 21 on the movable contact support 2, which is convenient for the connection of the tension spring 5; an arc-shaped convex rib 431 is provided adjacent to the side of the movable contact 6 on the driving pin 43 of the locking buckle 4; when the locking buckle 4 is pushed to rotate by the release putter 10 of

the leakage circuit breaker, the top of the convex rib 431 of the driving pin 43 abuts against the movable contact 6. At this time, the temperature of the movable contact is relatively high, so the top of the convex rib 431 comes into line contact with the moving contact 6, the contact area is small, and the damage of the locking buckle 4 is small.

[0019] What has been disclosed in the invention is merely one of the preferred embodiments. Any partial changes or modifications originated from the technical idea of the invention that are easily deduced by those skilled in the art shall all fall within the protection scope of the invention.

15 Invention embodiment

Embodiments of the invention

Industrial applicability

Sequence table free content

Claims

1. A movable contact operating mechanism of leakage circuit breaker, comprising a movable contact, a bounce buckle, a movable contact support, a locking spring, a locking buckle and a tension spring, wherein the movable contact is fixedly arranged on the movable contact support, a long through hole is provided on the movable contact support, a pin shaft is provided in the long through hole, two ends of the pin shaft are arranged on a base and a cover of the leakage circuit breaker; one end of the tension spring is connected to the movable contact support, and the connection point with the movable contact support is located above the long through hole; the other end of the tension spring is fixedly connected to the base of the leakage circuit breaker or other components fixedly connected to the base; the bounce buckle is hinged on an upper end of the movable contact support; the bounce buckle is connected to the handle of the leakage circuit breaker through a first linkage; a central part of the locking buckle movably sheathes the pin shaft by means of a provided through hole, a contact pin is provided extendingly above the locking buckle, and the contact pin is abuttedly engagable with the bounce buckle to limit the rotation of the bounce buckle; a driving pin and a resetting pin are provided below the locking buckle, wherein the driving pin is correspondingly arranged with the release putter of the leakage circuit breaker, the putter pushes the driving pin to rotate to realize the rotation of the locking buckle, and the locking buckle rotates to unlock the contact between the bounce buckle and the contact pin, then the movable contact support causes the leakage circuit breaker

to open under the action of the tension spring; one end of the locking spring abuts against the spring base, the other end thereof abuts against the base of the leakage circuit breaker or other components fixedly connected to the base; the locking spring causes the driving pin to rotate towards the side of the release putter of the leakage circuit breaker.

ed adjacent to the side of the movable contact on the driving pin of the locking buckle; when the locking buckle is pushed to rotate by the release putter of the leakage circuit breaker, the top of the convex rib of the driving pin abuts against the movable contact.

2. The movable contact operating mechanism of leakage circuit breaker according to claim 1, wherein a cavity is provided on the side of the base below the movable contact support, the upper end of the movable contact is inserted into the cavity to realize the fixed connection with the movable contact support; the long through hole of the movable contact support is located in the cavity portion, a long through hole of the movable contact corresponding to the long through hole of the movable contact support is provided at the upper end of the movable contact, and the pin shaft is provided through the long through hole and the long through hole of the movable contact; a connection hole is provided at the upper end of the resetting pin, the connection hole is connected with a second linkage, and a bimetal is abuttedly provided on the other end of the second linkage.
3. The movable contact operating mechanism of leakage circuit breaker according to claim 1 or claim 2, wherein a locking nose is provided on the bounce buckle, a contact shoulder step abuttedly engagable with the locking nose of the bounce buckle is provided on the contact pin; a connection through hole for the connection of the first linkage is provided on the bounce buckle, and an arc-shaped groove is provided above the movable contact support and corresponding to the connection through hole of the bounce buckle; after the first linkage is connected to the bounce buckle, the penetrating end thereof is disposed in the arc-shaped groove and can slip therein.
4. The movable contact operating mechanism of leakage circuit breaker according to claim 1 or claim 2, wherein a long hole for the tension spring to be placed is provided above the long through hole on the movable contact support; an arc-shaped convex rib is provided adjacent to the side of the movable contact on the driving pin of the locking buckle; when the locking buckle is pushed to rotate by the release putter of the leakage circuit breaker, the top of the convex rib of the driving pin abuts against the movable contact.
5. The movable contact operating mechanism of leakage circuit breaker according to claim 3, wherein a long hole for the tension spring to be placed is provided above the long through hole on the movable contact support; an arc-shaped convex rib is provided

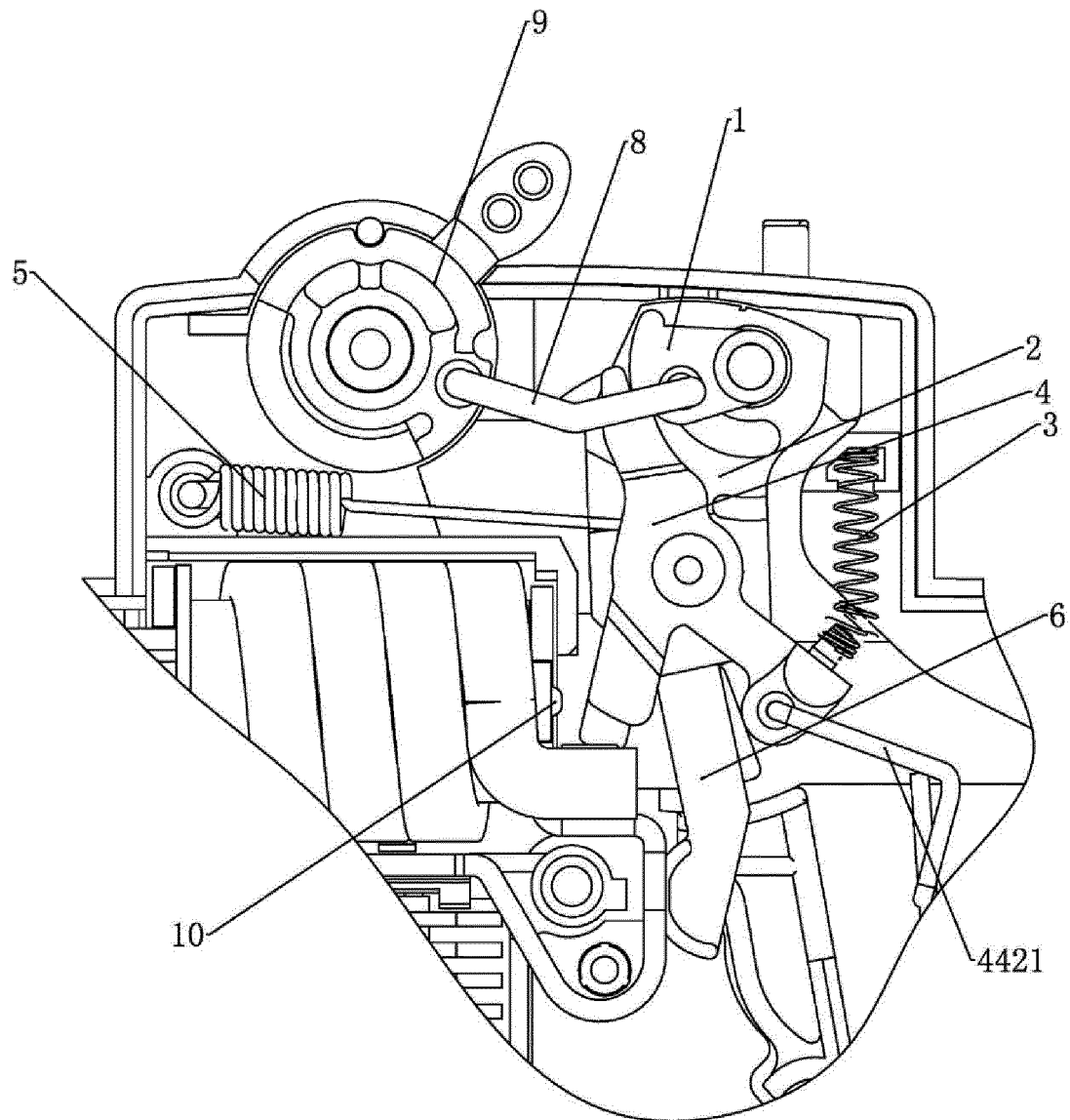


Figure 1

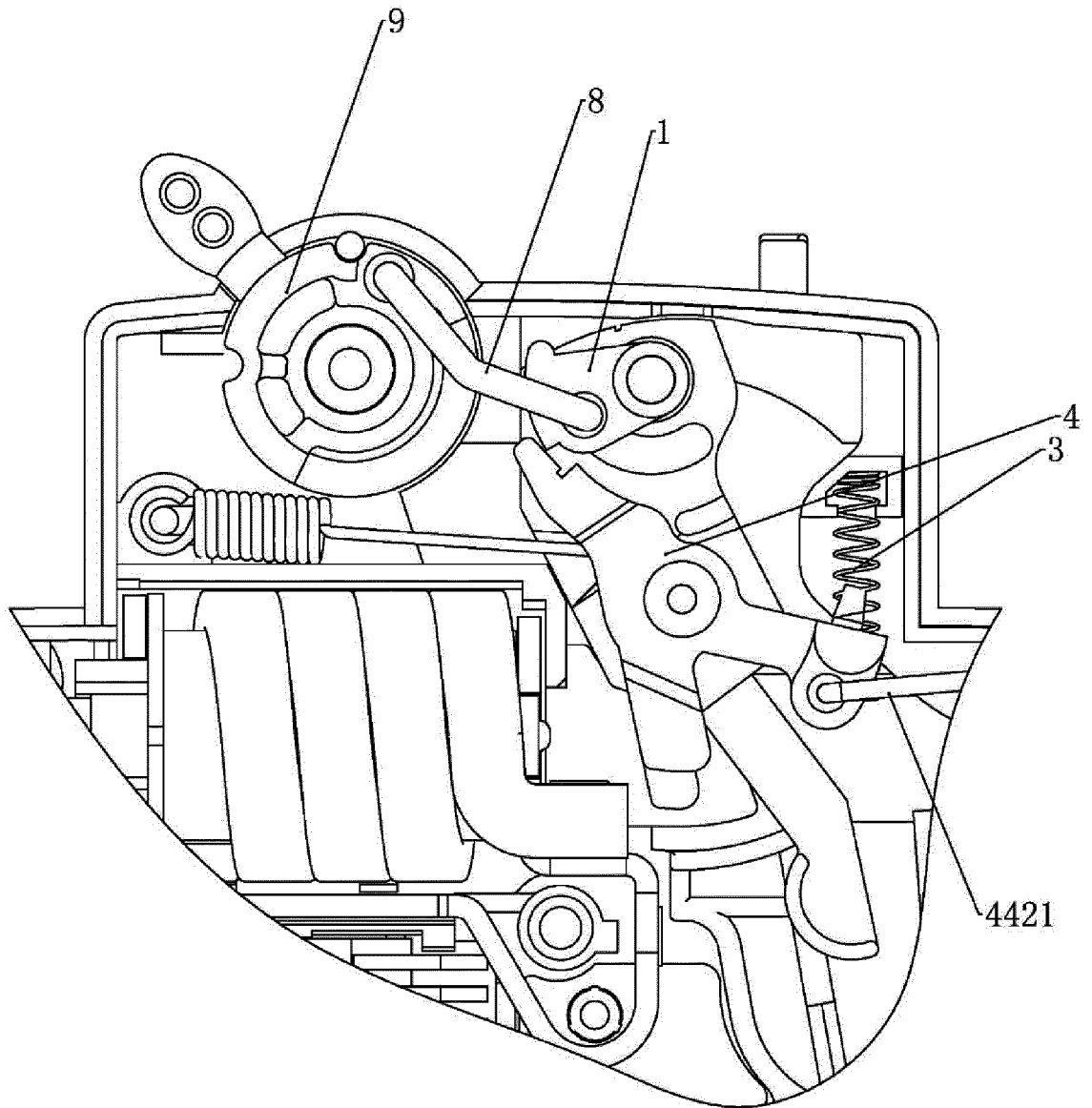


Figure 2

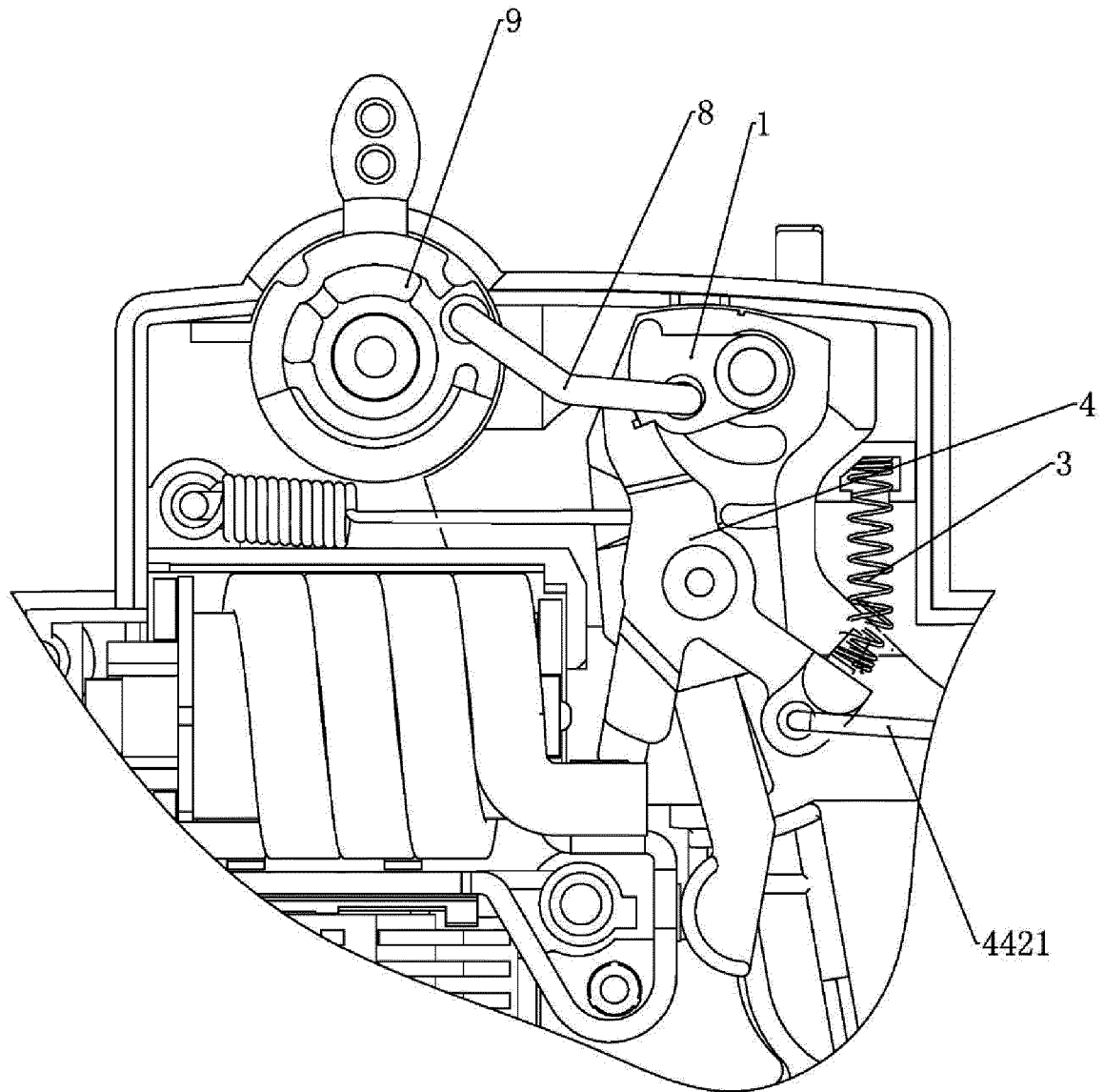


Figure 3

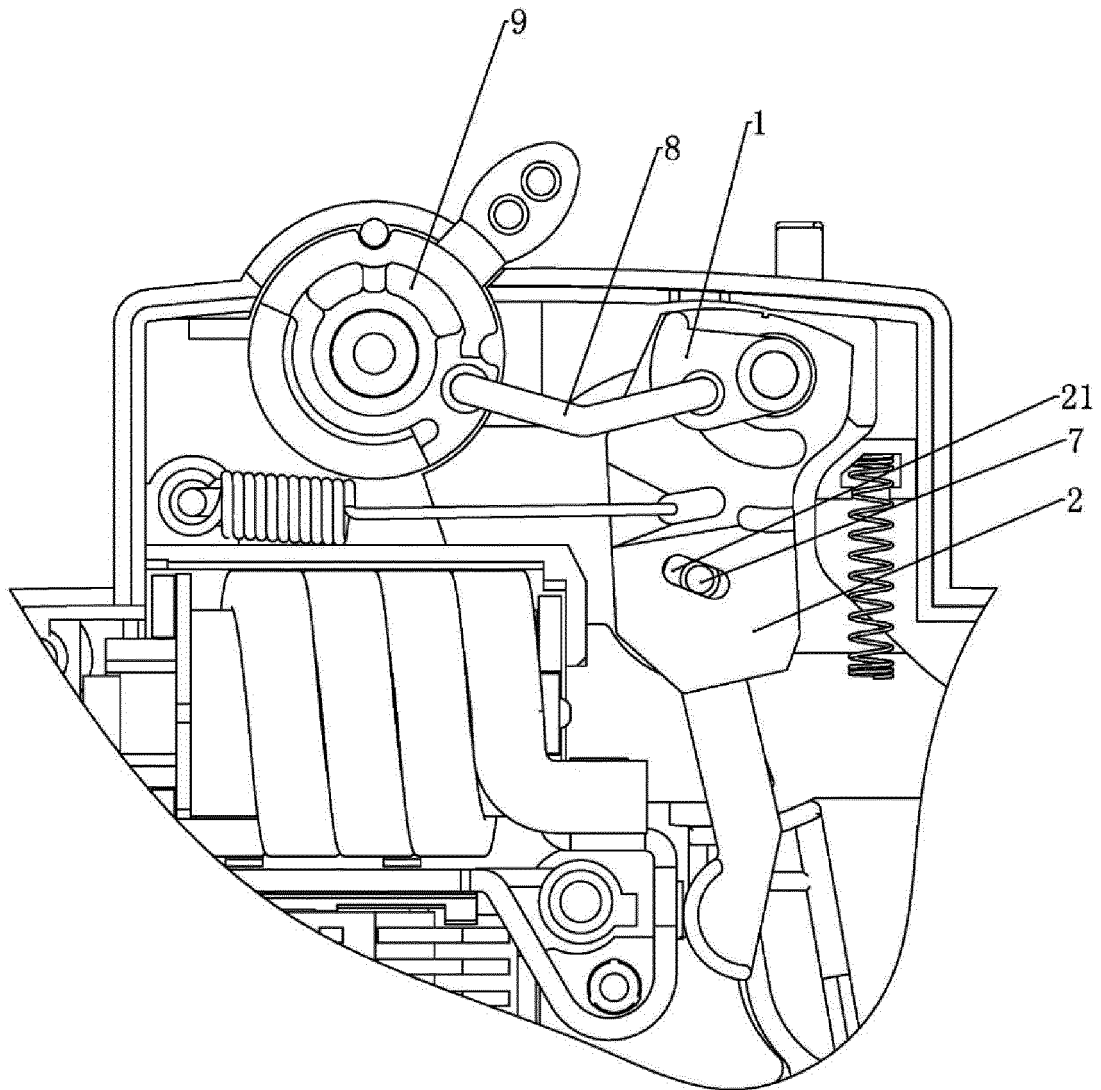


Figure 4

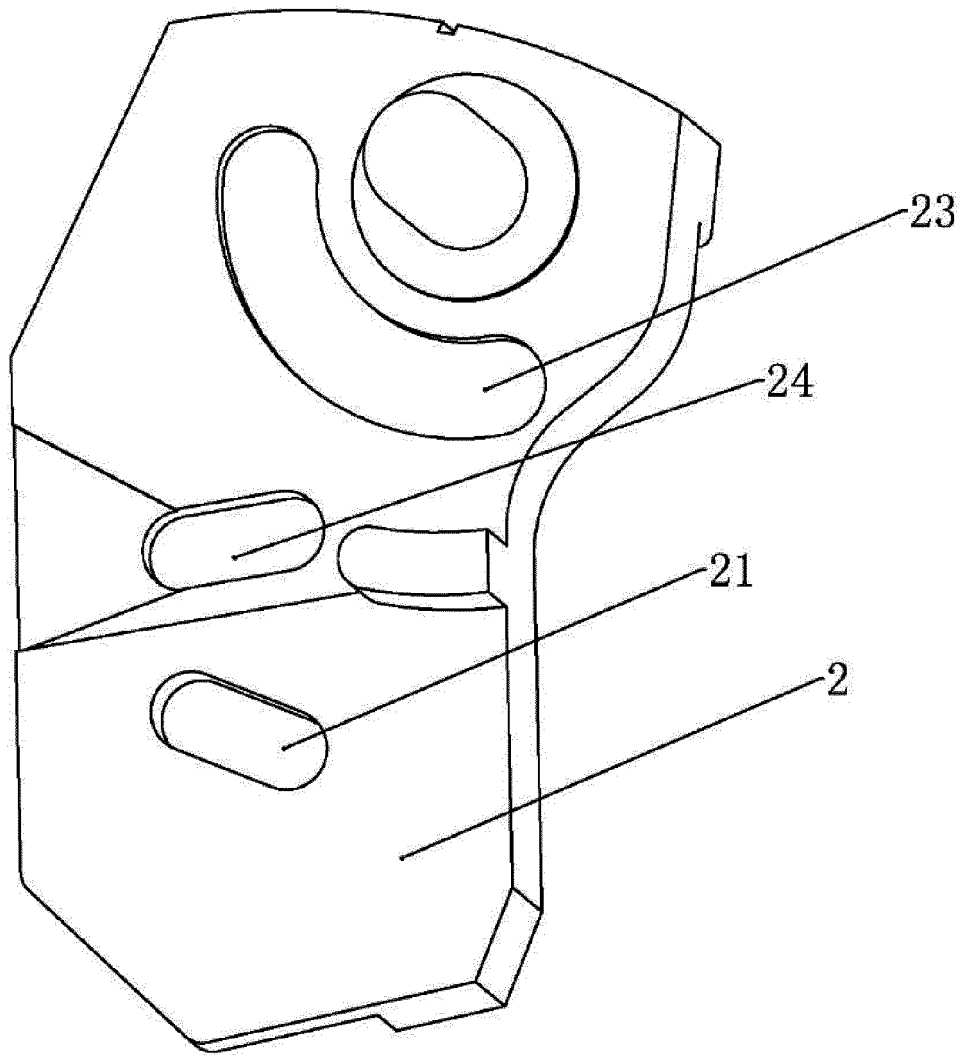


Figure 5

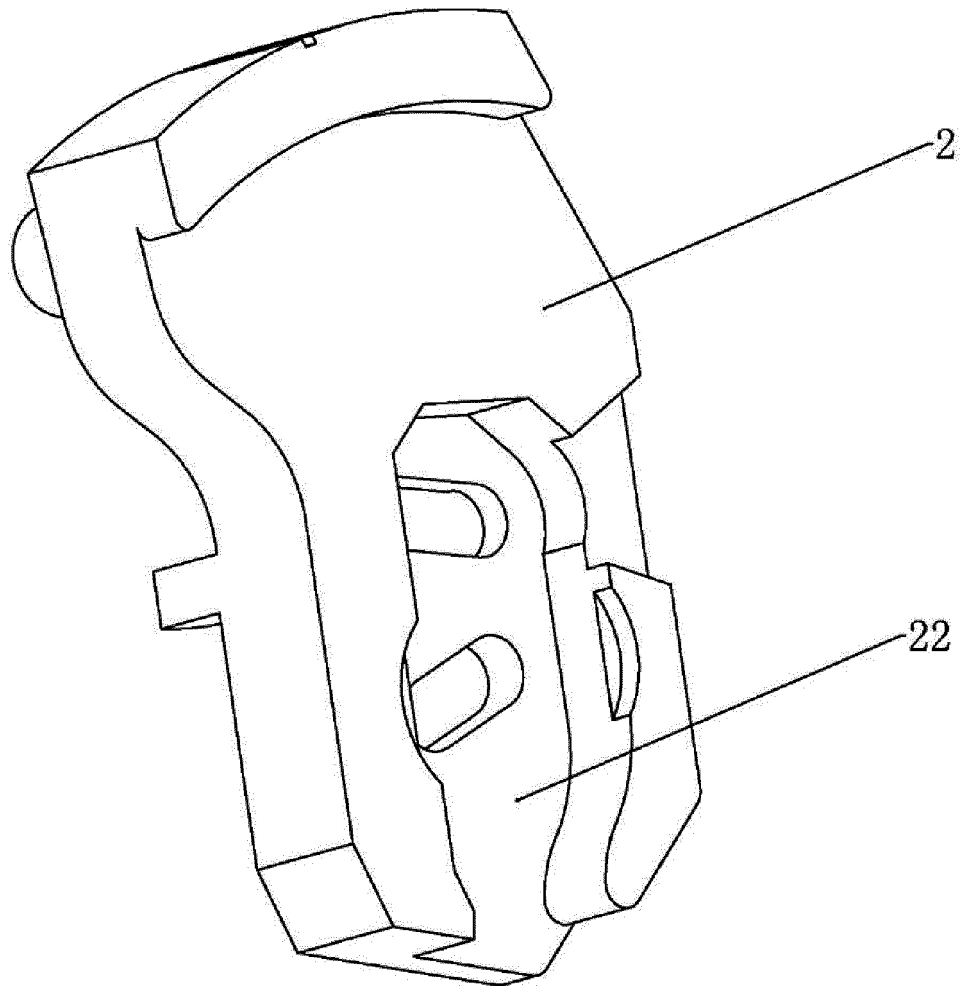


Figure 6

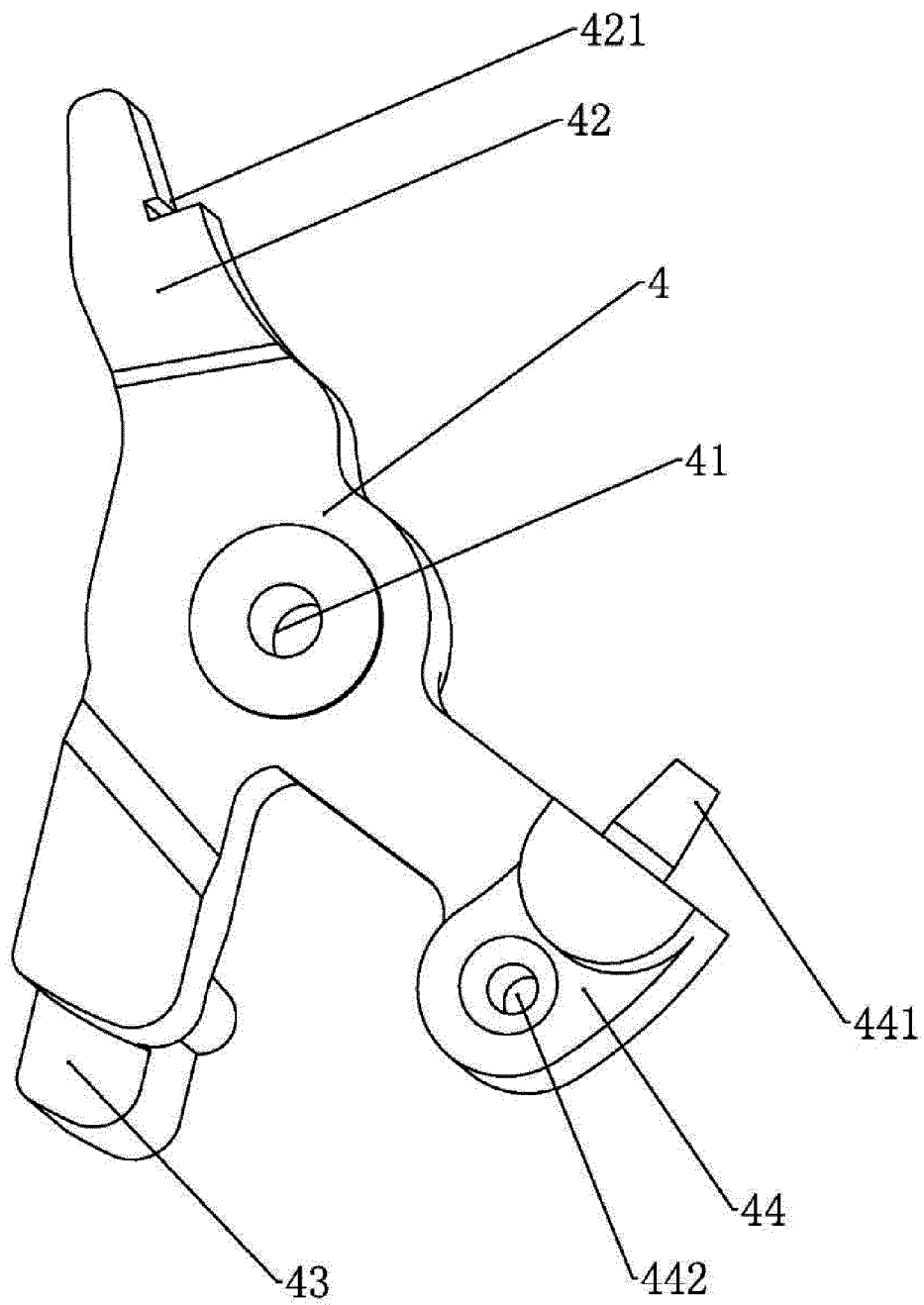


Figure 7

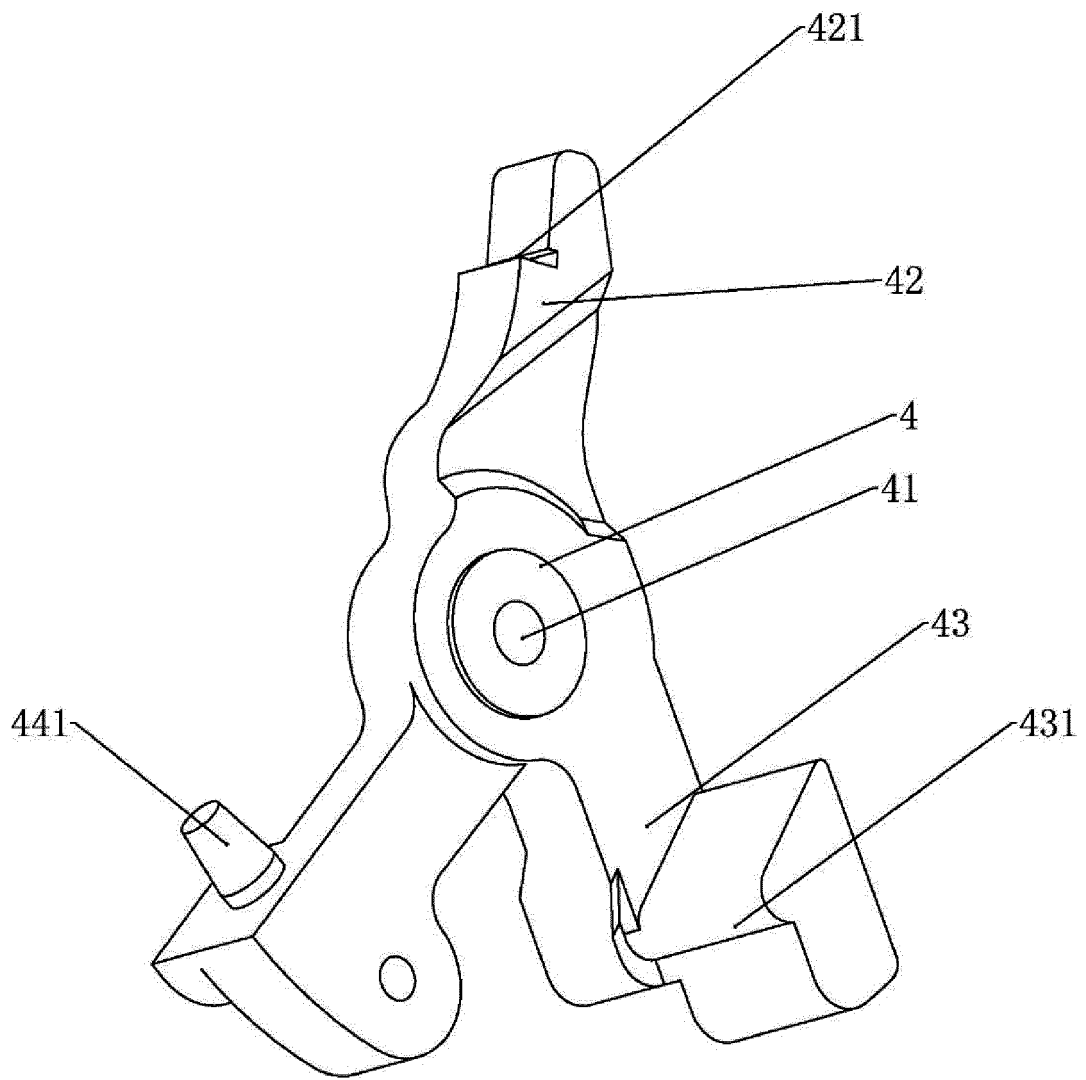


Figure 8

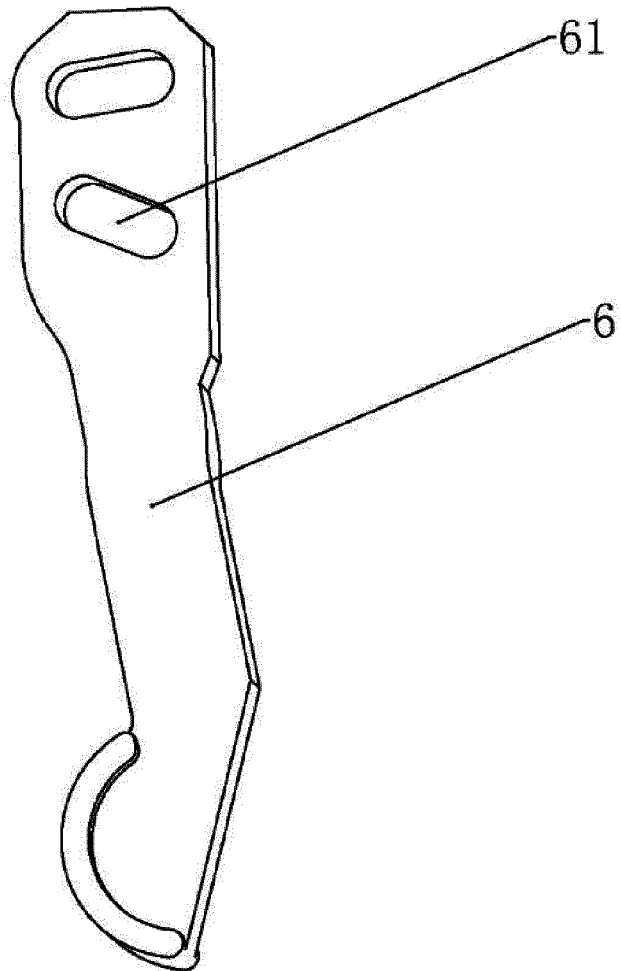


Figure 9

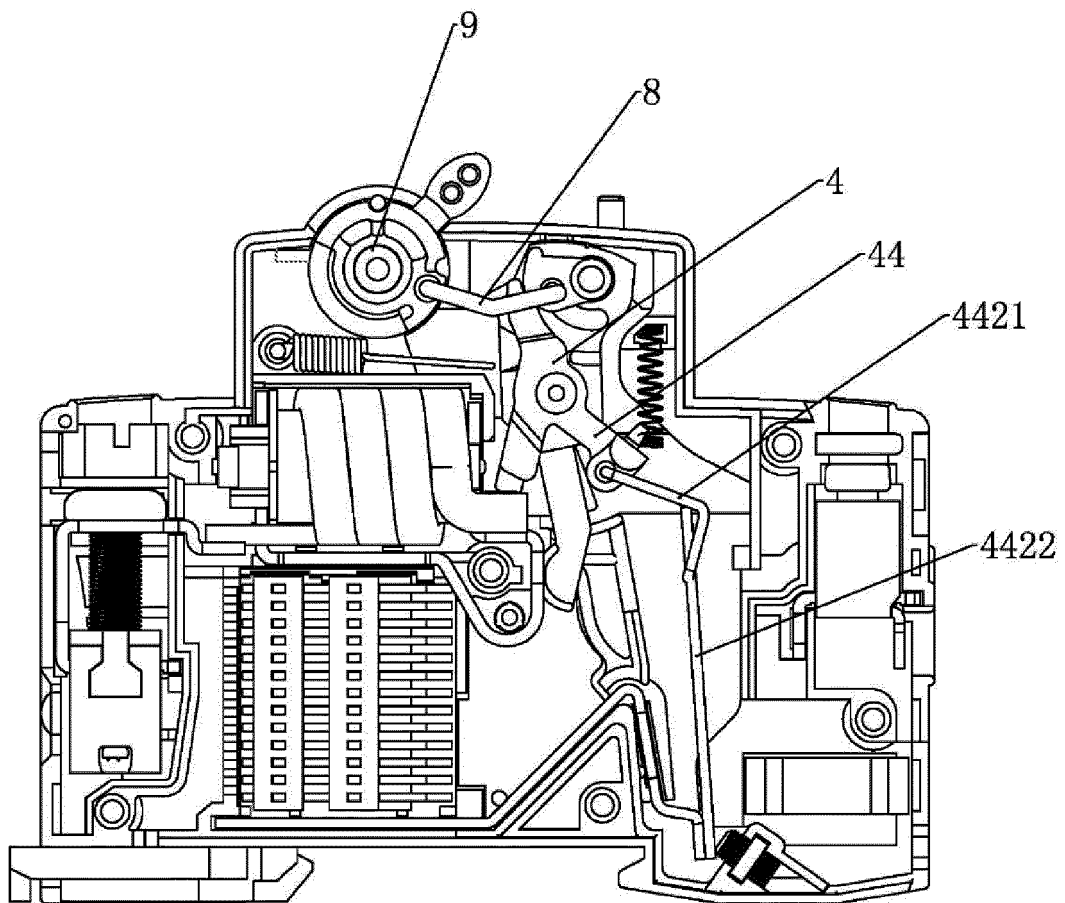


Figure 10

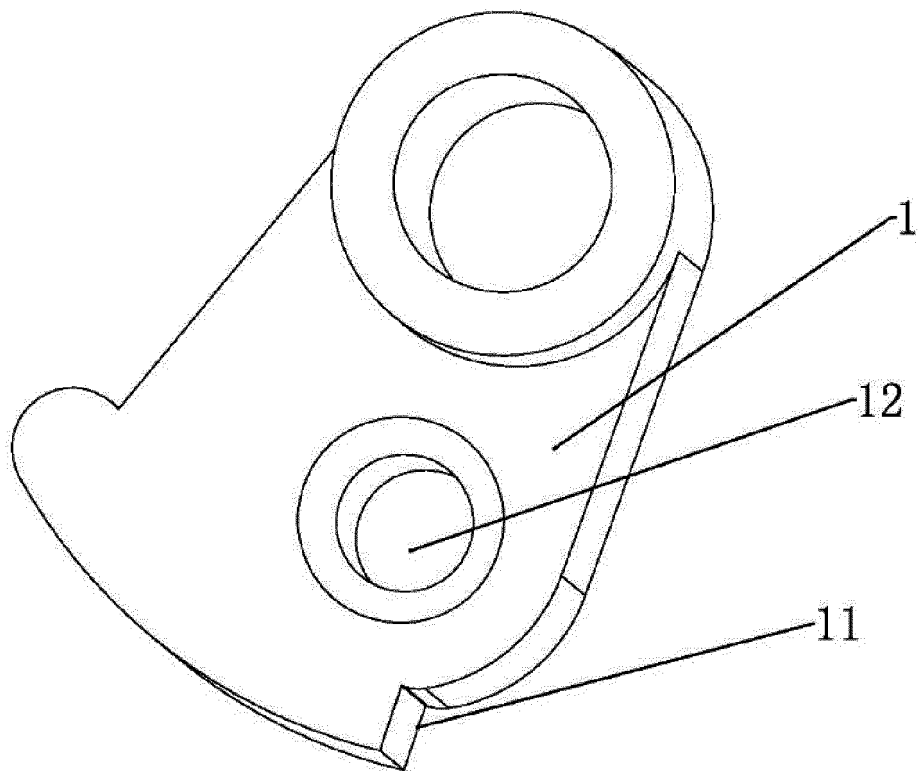


Figure 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/078222

A. CLASSIFICATION OF SUBJECT MATTER

H01H 71/12 (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)

H01H

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)

ask

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 103745892 A (XU, Bo) 23 April 2014 (23.04.2014) description, paragraphs [0015]-[0017], and figures 1-5	1-5
PX	CN 105762033 A (YUEQING YEWEI ELECTRIC CO., LTD.) 13 July 2016 (13.07.2016) claims 1-5, description, paragraphs [0015]-[0018], and figures 1-11	1-5
PX	CN 205564679 U (YUEQING YEWEI ELECTRIC CO., LTD.) 07 September 2016 (07.09.2016) claims 1-5, description, paragraphs [0025]-[0028], and figures 1-11	1-5

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

* Special categories of cited documents:

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Date of the actual completion of the international search

04 May 2017

Date of mailing of the international search report

16 June 2017

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Facsimile No. (86-10) 62019451

Authorized officer

GU, Yun

Telephone No. (86-10) 62089923

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/078222

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 103745892 A	23 April 2014	CN 103745892 B	20 January 2016
CN 105762033 A	13 July 2016	None	
CN 205564679 U	07 September 2016	None	