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(54) CIRCUIT BREAKER WITH A MAGNETIC BLOW OUT ASSEMBLY

(57) The present utility model provides a circuit breaker. The circuit breaker includes a base extending at least partially in a horizontal direction, and further includes an arc extinguishing chamber, a static contactor, a movable contactor, and a magnetization assembly. The magnetization assembly includes a first magnetization chamber and a second magnetization chamber both made of a non-electrically and non-magnetically conductive material. The first magnetization chamber and the second magnetization chamber are arranged opposite to each other on two lateral sides of the reverse base body. The first magnetization chamber and the second magnetization chamber extend and cover at least part of the static contact in a longitudinal direction of the reverse base body, and extend vertically at least beyond the static contact. The magnetization assembly further includes a magnetically conductive material filled in cavities of the first magnetization chamber and the second magnetization chamber. The circuit breaker having the configuration described above is capable of applying, on a side of an arc facing away from the arc extinguishing chamber, to the arc an electromagnetic force towards the arc extinguishing chamber, thereby further urging the arc to move towards the arc extinguishing chamber.

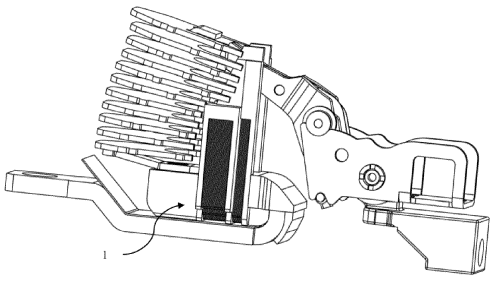

FIG. 2

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Description

TECHNICAL FIELD

[0001] The present utility model relates to a low-voltage electrical appliance, and in particular to a circuit breaker.

BACKGROUND

[0002] Circuit breakers are used in the field of electrical distribution. A circuit breaker mainly includes a base, and a movable contactor, a static contactor, and an arc extinguishing chamber mounted on the base. In the circuit breaker, a movable contact of the movable contactor is connected to or disconnected from a static contact of the static contactor, so that a current is allowed to pass or is cut off. When a circuit is overloaded or a short circuit occurs, the movable contactor separates from the static contactor under the action of a protection unit, thereby generating an arc.

[0003] In order to rapidly extinguish the generated arc, it is desired that the arc is quickly transferred from a position between the movable contactor and the static contactor to the arc extinguishing chamber. The above objective is usually achieved by means of magnetic blow-out, a gas blast, and the like in the prior art. However, a device or material for magnetic blow-out and a gas blast is usually arranged on a side of an arc to be generated close to an arc extinguishing chamber, for example, in the arc extinguishing chamber. In this way, the arc needs to move by a certain distance before being affected by a magnetic field or a gas. Although such an arrangement also achieves the objective of accelerating arc extinguishing, it is still desirable to achieve a better magnetic blow-out and gas blast effect, thereby further improving the breaking index of the circuit breaker.

SUMMARY

[0004] In order to solve the above problems, the present utility model provides a circuit breaker. In the circuit breaker, a magnetization assembly applies, on a side of an arc facing away from an arc extinguishing chamber, to the arc an electromagnetic force towards the arc extinguishing chamber, so as to further urge the arc to move towards the arc extinguishing chamber, thereby improving a speed at which the arc is transferred from a contactor to the arc extinguishing chamber.

[0005] The present utility model provides a circuit breaker. The circuit breaker comprises a base extending at least partially in a horizontal direction, and further comprises an arc extinguishing chamber, a static contactor, a movable contactor, and a magnetization assembly. The arc extinguishing chamber is fixedly mounted to the base. The static contactor comprises a forward base body extending in a longitudinal direction and fixedly connected, below the arc extinguishing chamber, to a horizontally extending region of the base, the static contactor further comprises a reverse base body extending upwards from one longitudinal end of the forward base body, and then extending, opposite to the forward base body, until a free end thereof reaches a side of the arc extinguishing chamber, wherein a static contact is provided on an upper surface of the reverse base body, and an arc guiding member leading to the arc extinguishing chamber is mounted at the free end of the reverse base body. The movable contactor comprises a movable contact, and is designed to be rotatably arranged above the reverse base body relative to the base by means of a driving mechanism and a transmission mechanism so as to engage with or disengage from the static contact by means of the movable contact. The magnetization assembly comprises a first magnetization chamber and a second magnetization chamber both made of a non-electrically and non-magnetically conductive material, the first magnetization chamber and the second magnetization chamber being arranged opposite each other on two lateral sides of the reverse base body, the first magnetization chamber and the second magnetization chamber extending and covering at least part of the static contact in a longitudinal direction of the reverse base body and extending vertically at least beyond the static contact so as to allow at least part of an arc generated between the static contact and the movable contact to fall into a space defined by the first magnetization chamber and the second magnetization chamber, the magnetization assembly further comprising a magnetically conductive material, and the magnetically conductive material being arranged in cavities of the first magnetization chamber and the second magnetization chamber. The circuit breaker having the configuration described above is capable of applying, on a side of an arc facing away from the arc extinguishing chamber, to the arc an electromagnetic force towards the arc extinguishing chamber, and is capable of applying a greater Ampere force to the arc.

[0006] Preferably, the magnetization assembly further comprises a third magnetization chamber, the third magnetization chamber being also made of a non-electrically and non-magnetically conductive material, and the third magnetization chamber being designed to be arranged vertically between the forward base body and the reverse base body and arranged between the first magnetization chamber and the second magnetization chamber in a lateral direction of the reverse base body so as to connect the first magnetization chamber and the second magnetization chamber, wherein cavities of the first magnetization chamber, the second magnetization chamber, and the third magnetization chamber communicate with each other and collectively constitute a U-shaped cavity, and the magnetically conductive material is superposed in the form of a U-shaped magnetization sheet in the longitudinal direction of the reverse base body, and is conformably accommodated in the U-shaped cavity. The third magnetization cavity is capable of further enhancing magnetic field intensity in an arc region.

[0007] Preferably, the magnetization assembly further comprises a support portion also made of a non-electrically and non-magnetically conductive material, the support portion comprising a support main body designed to extend from the third magnetization chamber towards the other longitudinal end of the forward base body until reaching or beyond the free end of the reverse base body, wherein the support main body is vertically dimensioned to allow a lower surface thereof to rest against an upper surface of the forward base body and to allow a lower surface of the reverse base body to rest against an upper surface thereof. The support portion having the configuration described above is capable of preventing the free end of the reverse base body from deforming vertically.

[0008] Preferably, the support portion further comprises two lateral limiting protrusions extending from the upper surface of the support main body, a lateral dimension between the two lateral limiting protrusions being designed to allow at least the free end of the reverse base body to be accommodated therein to prevent lateral displacement of the free end of the reverse base body, the support portion further comprising a positioning boss extending from the lower surface of the support main body, and a positioning notch being provided on the upper surface of the forward base body, wherein the positioning notch is dimensioned to allow the positioning boss to be inserted therein so as to limit displacement of the support portion relative to the static contactor. The support portion having the configuration described above is capable of preventing the free end of the reverse base body from deforming laterally.

[0009] Preferably, at least part of a housing of one or more of the first magnetization chamber, the second magnetization chamber, and the third magnetization chamber is made of a gas-producing material.

[0010] Preferably, the first magnetization chamber, the second magnetization chamber, the third magnetization chamber, and the support portion are a unitary piece, wherein insulation paper is provided between the magnetization assembly and the upper surface of the forward base body.

[0011] Preferably, the transmission mechanism comprises a mounting chassis, a movable contactor support, a spring, an upper spring shaft, a lower spring shaft, and a mounting screw, wherein the mounting chassis comprises a fixed portion fixedly connected to the base and an annular mounting member extending from the fixed portion towards the movable contactor support, the movable contactor support is configured to comprise a first support plate and a second support plate arranged on two sides of the annular mounting member and extending parallel to each other, an end portion of the movable contactor distal to the movable contact thereof is arranged between the first support plate and the annular mounting member and/or between the second support plate and the annular mounting member, a movable contactor rotating hole is provided at the end portion of the movable contactor distal to the movable contact thereof, a first rotating hole is provided on the first support plate, a second rotating hole being provided on the second support plate, and the movable contactor rotating hole, the first rotating hole, and the second rotating hole is relatively rotatably and closely connected to the annular mounting member by means of the mounting screw.

[0012] Preferably, an upper edge of the first support plate comprises a first upper curved recessed section and a first upper arc-shaped protruding section extending immediately following the first upper curved recessed section; a lower edge of the first support plate comprises a first lower arc-shaped recessed section; an upper edge of the second support plate comprises a second upper curved recessed section and a second upper arc-shaped protruding section extending immediately following the second upper curved recessed section; a lower edge of the second support plate comprises a second lower arc-shaped recessed section; the movable contactor is provided with a slot between the movable contact and the movable contactor rotating hole; the upper spring shaft is designed to pass through the slot and have two ends overlapping with the first upper curved recessed section and the second upper curved recessed section; the lower spring shaft is designed to be accommodated in the first lower arc-shaped recessed section edge and the second lower arc-shaped recessed section; the lower spring shaft is connected to the upper spring shaft by means of the spring; wherein the first upper arc-shaped protruding section and the second upper arc-shaped protruding section are dimensioned to allow, when the movable contactor rotates relative to the movable contactor support, the upper spring shaft to disengage from the first upper curved recessed section and the second upper curved recessed section and continue to move along the first upper arc-shaped protruding section and the second upper arc-shaped protruding section, and the first upper arc-shaped protruding section and the second upper arc-shaped protruding section are respectively concentric with the first lower arc-shaped recessed section and the second lower arc-shaped recessed section. The movable contactor support having the configuration described above is capable of preventing the movable contactor from being repelled and falling back.

[0013] Preferably, the first upper curved recessed section and the second upper curved recessed section are arranged symmetrically about the annular mounting member; the first upper arc-shaped protruding section and the second upper arc-shaped protruding section are arranged symmetrically about the annular mounting member; the first lower arc-shaped recessed section and the second lower arc-shaped recessed section are arranged symmetrically about the annular mounting member.

[0014] Preferably, the movable contactor comprises a first movable contactor element and a second movable contactor element, wherein an end portion of the first movable contactor element distal to the movable contact thereof is clamped between the first support plate and

the annular mounting member; an end portion of the second movable contactor element distal to the movable contact thereof is clamped between the second support plate and the annular mounting member; the spring is arranged between the first movable contactor element and the second movable contactor element; shaft sleeves are respectively provided at two ends of the upper spring shaft; a first driving hole and a second driving hole are respectively provided on the first support plate and the second support plate; the driving mechanism drives, by means of the first driving hole and the second driving hole, the movable contactor support to rotate relative to the mounting chassis.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a schematic diagram of a circuit breaker according to the present utility model, wherein a magnetization assembly is omitted;

FIG. 2 is a schematic diagram of a circuit breaker according to the present utility model, wherein a magnetization assembly is shown;

FIG. 3 is a schematic diagram of assembly of a magnetization assembly and a static contactor viewed from an angle;

FIG. 4 is a schematic diagram of assembly of a magnetization assembly and a static contactor viewed from another angle;

FIG. 5 is a schematic diagram of a magnetization assembly viewed from one angle;

FIG. 6 is a schematic diagram of a magnetization assembly viewed from another angle;

FIG. 7 is a schematic diagram of assembly of a movable contactor and a transmission mechanism;

FIG. 8 is a schematic diagram of a first movable contactor element or a second movable contactor element;

FIG. 9 is a schematic diagram of a movable contactor support; and

FIG. 10 is a schematic diagram of a first support plate. List of reference numerals:

[0016] 1. magnetization assembly; 11. first magnetization chamber; 12. second magnetization chamber; 13. third magnetization chamber; 14. support portion; 141. support main body; 142. lateral limiting protrusion; 143. positioning boss; 15. U-shaped magnetization sheet; 16. gas-producing material; 2. static contactor; 21. forward base body; 22. reverse base body; 23. static contact; 24. arc guiding member; 25. positioning notch; 26. insulation paper; 3. movable contactor; 31. first movable contactor element; 32. second movable contactor element; 33. movable contact; 34. movable contactor rotating hole; 35. slot; 4. arc extinguishing chamber; 5. mounting chassis; 51. fixed portion; 52. annular mounting member; 6. movable contactor support; 61. first support plate; 611. first rotating hole; 612. first upper curved recessed section; 613. first upper arc-shaped protruding section; 614. first lower arc-shaped recessed section; 615. first driving hole; 62. second support plate; 621. second upper curved recessed section; 622. second upper arc-shaped protruding section; 63. mounting screw; 7. spring; 8. upper spring shaft; 9. lower spring shaft; 10. shaft sleeve.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0017] A schematic scheme of the disclosed structure is described in detail with reference to the accompanying drawings. Although providing the accompanying drawings is to present some embodiments of the present utility model, the accompanying drawings do not need to be drawn according to the size of the specific embodiments, and certain features can be enlarged, shrunk, or removed to better illustrate and explain the disclosure of the present utility model.

[0018] Some directional terms used in the following to describe the accompanying drawings shall be construed as having normal meanings thereof and refer to those directions involved when the accompanying drawings are viewed normally. "Longitudinal direction" refers to a lengthwise direction of an object; "lateral direction" refers to a widthwise direction of an object; "up" and "down" refer to above and below approximately viewed at an angle in 1.

[0019] The present utility model provides a circuit breaker. The circuit breaker includes a base (not shown), an arc extinguishing chamber 4, a static contactor 2, and a movable contactor 3, and reference may be made to FIG. 1 for positions where the four components are arranged. The arc extinguishing chamber 4 mainly includes an arc extinguishing grate sheet and a mounting side plate. For clarity of illustration, the mounting side plate is not shown herein. Specifically, the arc extinguishing chamber 4 is fixedly mounted to the base. The static contactor 2 includes a forward base body 21 and a reverse base body 22. The base has at least one region extending horizontally. The forward base body 21 is arranged below the arc extinguishing chamber 4, and is fixedly connected to the horizontally extending region of the base. The forward base body 21 extends in a longitudinal direction thereof. The reverse base body 22 extends upwards from one longitudinal end of the forward base body 21, and then extends opposite to the forward base body 21 until a free end thereof reaches a side of the arc extinguishing chamber 4. It is noted here that the reverse base body 22 extending opposite to the forward base body 21 does not indicate that extension directions of the reverse base body 22 and the forward base body 21 are absolutely parallel. The reverse base body 22 may be inclined upwards or downwards relative to the forward base body 21, and an acute angle may be formed therebetween. An arc guiding member 24 leading to the arc extinguishing chamber 4 is mounted at the free end of the reverse base body 22, and facilitates guiding of an arc generated

between the static contactor 2 and the movable contactor 3 into the arc extinguishing chamber 4. The static contactor 23 is arranged on an upper surface of the reverse base body 22 so as to contact a movable contact 33 of the movable contactor 3.

[0020] The movable contactor 3 is also mounted to the base, is arranged above the reverse base body 22 by means of a driving mechanism (not shown) and a transmission mechanism that will be described in detail below, and can rotate about the base. The movable contactor 3 has the movable contact 33. The movable contactor 3 rotates about the base, so that the movable contact 33 can contact or be separated from the static contact 23, so as to cause a circuit to be closed or open.

[0021] In order to cause an arc generated between the static contact 23 and the movable contact 33 to enter the arc extinguishing chamber 4 more quickly, the present utility model provides a magnetization assembly 1. The magnetization assembly 1 can apply to the arc an electromagnetic force on a side surface of the arc distal to the arc extinguishing chamber 4 when the generated arc is used as a demarcation line, so as to urge the arc enter the arc extinguishing chamber 4.

[0022] Specifically, with reference to FIGs. 2 to 6, the magnetization assembly 1 is configured to include at least a first magnetization chamber 11 and a second magnetization chamber 12, and both of the two chambers are made of a non-electrically and non-magnetically conductive material (e. g., thermoplastic or thermoset). Referring particularly to FIG. 3, the first magnetization chamber 11 and the second magnetization chamber 12 are arranged on two lateral sides of the reverse base body 22, and are opposite each other. In order to ensure that an as great as possible Ampere force can be applied to the generated arc, at least part of the arc needs to fall into a space defined by the first magnetization chamber 11 and the second magnetization chamber 12. To accomplish this, the first magnetization chamber 11 and the second magnetization chamber 12 need to extend and cover at least part of the static contact 23 in a longitudinal direction of the reverse base body 22, and in addition, the first magnetization chamber 11 and the second magnetization chamber 12 need to extend vertically at least beyond the static contact 23, preferably extend vertically beyond the static contact as much as possible, and most preferably cover the movable contactor repelled from the static contactor. When only the first magnetization chamber 11 and the second magnetization chamber 12 are present, the first magnetization chamber 11 and the second magnetization chamber 12 can be connected to the static contactor 2 by means of, for example, an additional securing means.

[0023] The magnetization assembly 1 also includes a magnetically conductive material, such as a silicon steel sheet, and the magnetically conductive material is arranged in cavities of the first magnetization chamber 11 and the second magnetization chamber 12. The magnetically conductive material can concentrate an ambient magnetic field, and apply the same to an arc section falling within the space defined by the first magnetization chamber 11 and the second magnetization chamber 12. The magnetically conductive material can be placed in the cavities of the first magnetization chamber 11 and the second magnetization chamber 12 in the form of, for example, a grate sheet (also referred to as a magnetization sheet), granules, blocks, or the like.

[0024] Also preferably, in order to further enhance magnetic field intensity in the arc region, the magnetization assembly further includes a third magnetization chamber 13 also made of a non-electrically and non-magnetically conductive material. The third magnetization chamber 13 is arranged vertically between the forward base body 21 and the reverse base body 22, and is arranged between the first magnetization chamber 11 and the second magnetization chamber 12 in a lateral direction of the reverse base body 22 so as to cause the first magnetization chamber 11 and the second magnetization chamber 12 to be connected to each other. Referring particularly to FIG. 5, outer profiles of the first magnetization chamber 11, the second magnetization chamber 12, and the third magnetization chamber 13 can collectively form a U shape. The third magnetization chamber 13 likewise can be filled with a magnetically conductive material. Cavities of the first magnetization chamber 11, the second magnetization chamber 12, and the third magnetization chamber 13 communicate with each other, and collectively constitute a U-shaped cavity, so that at least part of the arc is enclosed by the U-shaped cavity. The magnetically conductive material is preferably designed to be in the form of a U-shaped magnetization sheet 15. For example, referring to FIG. 4, a plurality of U-shaped magnetization sheets 15 can be superposed in the longitudinal direction of the reverse base body 22, and is conformably accommodated in the U-shaped cavity.

[0025] It is also preferred that the magnetization assembly 1 further includes a support portion 14. Referring particularly to FIG. 3 and FIG. 5, the support portion 14 is likewise made of a non-electrically and non-magnetically conductive material. The support portion 14 is designed to include a support main body 141, two lateral limiting protrusions 142 respectively extending upwards and downwards from the support main body 141, and a positioning boss 143.

[0026] Specifically, the support main body 141 is also arranged between the forward base body 21 and the reverse base body 22, and serves to fill a vertical space between the forward base body 21 and the reverse base body 22. The support main body 141 extends from the third magnetization chamber 13 towards the other longitudinal end of the forward base body 21 until reaching or even beyond the free end of the reverse base body 22. A lower surface of the support main body 141 vertically rests against an upper surface of the forward base body 21, and a lower surface of the reverse base body 22 can also rest against an upper surface of the support main

body 141.

[0027] When the movable contactor and the static contactor are connected to each other or the movable contactor is repelled to cause an arc to exert a great force on the free end of the reverse base body 22, the free end of the reverse base body 22 is highly prone to deform, and for example, the reverse base body 22 is displaced a certain distance vertically towards the forward base body 21. The support main body 141 can support the reverse base body 22 from vertically below the reverse base body 22, thereby preventing vertical downward displacement of the free end of the reverse base body 22.

[0028] The two lateral limiting protrusions 142 extend from the upper surface of the reverse base body 22. A lateral distance between the two lateral limiting protrusions 142 needs be designed to allow the reverse base body 22, in particular the free end of the reverse base body 22, to be accommodated therein. The two lateral sides of the reverse base body 22 can respectively rest against the two lateral limiting protrusions 142, thereby limiting lateral displacement of the reverse base body 22.

[0029] The first magnetization chamber 11, the second magnetization chamber 12, the third magnetization chamber 13, and the support portion 14 are preferably a unitary piece. The positioning boss 143 described above extends from the lower surface of the support main body 141. A positioning notch 25 (see FIG. 1) is also correspondingly provided on the upper surface of the forward base body 21. This positioning notch 25 is positioned and dimensioned to allow the positioning boss 143 to be inserted therein, thereby limiting movement of the support portion 14 relative to the static contactor, and further limiting movement of the entire magnetization assembly 1 relative to the static contactor 2.

[0030] In addition, for example, referring to FIG. 2, housings of the first, second, and third magnetization chambers distal to the reverse base body 22 may be partially open, and the U-shaped magnetization sheet 15 may be exposed to the outside, thereby simplifying a structure and a mounting process. In this case, an insulation material such as an insulation tape needs to be wrapped around the U-shaped magnetization sheet from the outside of the housing so as to prevent the U-shaped magnetization sheet from directly contacting the static contactor. It is also preferred that insulation paper26 is provided between the magnetization assembly 1 and the upper surface of the forward base body 21 so as to further prevent the magnetization sheet from directly contacting the static contactor 2, thereby increasing an electrical gap of a product. In addition, even in cases where the U-shaped magnetization sheet 15 is not exposed to the outside of the housing, the insulation paper 26 may also be provided to protect the static contactor below the arc extinguishing chamber from arc ablation.

[0031] Additionally, part of the housing of one or more of the first magnetization chamber 11, the second magnetization chamber 12, and the third magnetization chamber 13 may be made of a gas-producing material 16, for example nylon, and reference may be made to FIG. 5 for an exemplary position thereof. It is also preferred that all of the entire housing of the first magnetization chamber 11, the second magnetization chamber 12, and the third magnetization chamber 13 is made of the gas-producing material. Under the action of an arc, the gas-producing material 16 produces a gas, thereby blowing the arc to move towards the arc extinguishing chamber 4. Additionally, the produced gas can also effectively cool the arc, lengthen the arc, and raise the arc voltage, thereby facilitating extinguishing of the arc.

[0032] The transmission mechanism is a mechanism designed to be driven by the driving mechanism so as to drive the movable contactor 3 to rotate relative to the base, and has another function herein, that is, holding the repelled movable contactor 3. Specifically, referring to FIGs. 7 to 9, the transmission mechanism mainly includes a mounting chassis 5, a movable contactor support 6, a spring 7, an upper spring shaft 8, a lower spring shaft 9, and a mounting screw 63.

[0033] The mounting chassis 5 includes a fixed portion 51 and an annular mounting member 52. The fixed portion 51 is fixedly connected to the base, in particular a portion of the base extending horizontally. The annular mounting member 52 is designed to extend from the fixed portion 51 towards the movable contactor support 6 so that the movable contactor 3 and the movable contactor support 6 are connected thereto.

[0034] The movable contactor support 6 mainly includes a first support plate 61 and a second support plate 62. The first support plate 61 and the second support plate 62 extend parallel to each other, and are arranged on two sides of the annular mounting member 52. The movable contactor 3 is arranged between the first support plate 61 and the second support plate 62. More specifically, when the movable contactor 3 is designed as shown in FIG. 7 to have two elements, namely a first movable contactor element 31 and a second movable contactor element 32, an end portion of the first movable contactor element 31 distal to the movable contact 33 is held between the first support plate 61 and the annular mounting member 52, and an end portion of the second movable contactor element 32 distal to the movable contact 33 is held between the second support plate 62 and the annular mounting member 52.

[0035] A movable contactor rotating hole 34 is provided at an end portion of the movable contactor 3 (the first movable contactor element 31 and/or the second movable contactor element 32) distal to the movable contact 33. A first rotating hole 611 is provided on the first support plate 61. A second rotating hole is provided on the second support plate 62. In this case, a mounting screw 63 is provided. The movable contactor rotating hole 34, the first rotating hole 611, and the second rotating hole can be connected to each other by means of the mounting screws 63 respectively passing therethrough, so that the first support plate 61, the second support plate 62, the movable contactor 3, and the annular mounting member

52 are connected to each other, and can rotate relative to each other. In addition, in order to ensure in particular that the annular mounting member 52 and the movable contactor 3 are electrically connected to each other, the mounting screws 63 needs to be tightened sufficiently to ensure that the first support plate 61, the second support plate 62, the movable contactor 3, and the annular mounting member 52 are closely connected to each other. In the prior art, a connection between the movable contactor 3 and the annular mounting member 52 is mostly a soft connection. The soft connection generates great resistance to movement of the movable contactor 3. A hard screw is used herein, thereby achieving the technical effect of increasing an activation speed of the movable contactor 3.

[0036] Referring particularly to FIG. 9, an upper edge of the first support plate 61 includes a first upper curved recessed section 612 and a first upper arc-shaped protruding section 613. The first upper arc-shaped protruding section 613 extends immediately following the first upper curved recessed section 612. An upper edge of the second support plate 62 includes a second upper curved recessed section 621 and a second upper arc-shaped protruding section 622. The second upper arc-shaped protruding section 622 extends immediately following the second upper curved recessed section 621. A lower edge of the first support plate 61 includes a first lower arc-shaped recessed section 614. The first lower arc-shaped recessed section 614 and the first upper arc-shaped protruding section 613 are designed to be concentric, as schematically illustrated in FIG. 10. In addition, a lower edge of the second support plate 62 includes a second lower arc-shaped recessed section (not shown), and the second lower arc-shaped recessed section and the second upper arc-shaped protruding section 622 are also designed to be concentric.

[0037] The movable contactor 3 is provided with a slot 35 between the movable contact 33 and the movable contactor rotating hole 34. Referring particularly to FIG. 8, the upper spring shaft 8 can pass through the slot 35 of the movable contactor 3, and has two ends overlapping with the first upper curved recessed section 612 and the second upper curved recessed section 621. The lower spring shaft 9 is accommodated in the first lower arc-shaped recessed section 614 and the second lower arc-shaped recessed section. The lower spring shaft 9 is connected to the upper spring shaft 8 by means of the spring 7. When the movable contactor 3 includes the first movable contactor element 31 and the second movable contactor element 32, the spring 7 can be arranged between the first movable contactor element 31 and the second movable contactor element 32.

[0038] When switching on or off is performed normally, the upper spring shaft 8 moves within the first upper curved recessed section 612 and the second upper curved recessed section 621. When the movable contactor 3 rotates relative to movable contactor support 6 due to a repulsive force from an arc, the first upper arc-shaped protruding section 613 may be dimensioned to allow the upper spring shaft 8 to disengage from the first upper curved recessed section 612 and continue to move along the first upper arc-shaped protruding section 613. Likewise, the second upper arc-shaped protruding section 622 may be dimensioned to allow the upper spring shaft 8 to disengage from the second upper curved recessed section 621 and continue to move along the second upper arc-shaped protruding section 622. The lower spring shaft 9 is always located in the first lower arc-shaped recessed section 614 and the second lower arc-shaped recessed section, and the first upper arc-shaped protruding section 613 and the second upper arc-shaped protruding section 622 are respectively concentric with the first lower arc-shaped recessed section 614 and the second lower arc-shaped recessed section, so that when the upper spring shaft 8 moves onto the first upper arc-shaped protruding section 613 and the second upper arc-shaped protruding section 622, a stretched length of the spring 7 remains unchanged during movement of the upper spring shaft 8 along the first upper arc-shaped protruding section 613 and the second upper arc-shaped protruding section 622. Therefore, both the magnitude and direction (pointing to an axis of the lower spring shaft 9) of the force exerted by the spring 7 to the movable contactor 3 within this stage remain unchanged, so that the movable contactor 3 does not move reversely again into the first upper curved recessed section 612 and the second upper curved recessed section 621 under the drive of the spring 7.

[0039] In addition, the configuration of the first support plate 61 does not need to be identical to the configuration of the second support plate 62. However, at least the following requirements need to be met: the first upper curved recessed section 612 and the second upper curved recessed section 621 need to be symmetrical about the annular mounting member 52; the first upper arc-shaped protruding section 613 and the second upper arc-shaped protruding section 622 need to be symmetrical about the annular mounting member 52; the first lower arc-shaped recessed section 614 and the second lower arc-shaped recessed section need to be symmetrical about the annular mounting member 52. Such a symmetrical structure causes the upper spring shaft and the lower spring shaft to be respectively subjected to forces in a balanced manner on the first support plate and the second support plate.

[0040] It is also preferred that shaft sleeves 10 are respectively provided at two ends of the upper spring shaft 8. The upper spring shaft 8 moves along the first upper curved recessed section 612 and the second upper curved recessed section 621 as well as the first upper arc-shaped protruding section 613 and the second upper arc-shaped protruding section 622 by means of the shaft sleeves 10. Providing the shaft sleeve 10 allows the diameter of the upper spring shaft to be designed to be smaller to conserve material, and smooths movement of the upper spring shaft relative to the movable contactor

support. In addition, the shaft sleeve 10 can also limit displacement of the upper spring shaft 8 relative to the movable contactors in, for example, a lateral direction, so as to prevent the moving upper spring shaft from disengaging from the slot of the movable contactor.

[0041] In addition, a first driving hole 615 and a second driving hole (not shown) are respectively provided on the first support plate 61 and the second support plate 62. The driving mechanism (not shown) can drive, by means of the first driving hole 615 and the second driving hole, the movable contactor support 6 to rotate relative to the mounting chassis 5 in a direction causing the movable contactor 3 to engage with the static contactor 2, for example, in a counterclockwise direction in FIG. 9. In this case, under the action of spring 7, the movable contactor 3 rotates synchronously with the movable contactor support 6.

[0042] When the movable contactor 3 is repelled, the transmission mechanism causes the movable contactor 3 to be held by the movable contactor support, thereby preventing the movable contactor 3 from falling back, and preventing the arc from re-burning.

[0043] In addition, it is also possible for the movable contactor 3 to have only one element, such as including only the first movable contactor element 31 or the second movable contactor element 32, and in this case, structures of the other components do not need to be changed, and only one of the movable contactor elements needs to be omitted directly, such as maintaining only the first movable contactor element 31 located between the first support plate 61 and the annular mounting member 52 or only the second movable contactor element 32 located between the second support plate 62 and the annular mounting member 52.

Claims

1. A circuit breaker, comprising a base extending at least partially in a horizontal direction, further comprising:

   an arc extinguishing chamber (4), fixedly mounted to the base;
   a static contactor (2), comprising a forward base body (21) extending in a longitudinal direction and fixedly connected, below the arc extinguishing chamber (4), to a horizontally extending region of the base, the static contactor (2) further comprising a reverse base body (22) extending upwards from one longitudinal end of the forward base body (21), and then extending, opposite to the forward base body (21), until a free end thereof reaches a side of the arc extinguishing chamber (4), wherein a static contact (23) is provided on an upper surface of the reverse base body (22), and an arc guiding member (24) leading to the arc extinguishing chamber (4) is mounted at the free end of the reverse base body (22); and
   a movable contactor (3), comprising a movable contact (33) and being designed to be rotatably arranged above the reverse base body (22) relative to the base by means of a driving mechanism and a transmission mechanism so as to engage with or disengage from the static contact (23) by means of the movable contact (33);
   characterized by further comprises a magnetization assembly (1), wherein the magnetization assembly (1) comprises a first magnetization chamber (11) and a second magnetization chamber (12) both made of a non-electrically and non-magnetically conductive material, the first magnetization chamber (11) and the second magnetization chamber (12) are arranged opposite each other on two lateral sides of the reverse base body (22), the first magnetization chamber (11) and the second magnetization chamber (12) extend and cover at least part of the static contact (23) in a longitudinal direction of the reverse base body (22) and extend vertically at least beyond the static contact so as to allow at least part of an arc generated between the static contact (23) and the movable contact (33) to fall into a space defined by the first magnetization chamber (11) and the second magnetization chamber (12), the magnetization assembly (1) further comprises a magnetically conductive material filled in cavities of the first magnetization chamber (11) and the second magnetization chamber (12).

2. The circuit breaker according to claim 1, wherein the magnetization assembly further comprises a third magnetization chamber also made of a non-electrically and non-magnetically conductive material, and the third magnetization chamber is designed to be arranged vertically between the forward base body and the reverse base body and arranged between the first magnetization chamber and the second magnetization chamber in a lateral direction of the reverse base body so as to connect the first magnetization chamber and the second magnetization chamber, wherein cavities of the first magnetization chamber, the second magnetization chamber, and the third magnetization chamber communicate with each other and collectively constitute a U-shaped cavity, and the magnetically conductive material is superposed in the form of a U-shaped magnetization sheet in the longitudinal direction of the reverse base body, and is conformably accommodated in the U-shaped cavity.

3. The circuit breaker according to claim 2, wherein the magnetization assembly further comprises a support portion also made of a non-electrically and non-mag-

netically conductive material, the support portion comprises a support main body designed to extend from the third magnetization chamber towards the other longitudinal end of the forward base body until reaching or beyond the free end of the reverse base body, wherein the support main body is vertically dimensioned to allow a lower surface thereof to rest against an upper surface of the forward base body and to allow a lower surface of the reverse base body to rest against an upper surface thereof.

4. The circuit breaker according to claim 3, wherein the support portion further comprises two lateral limiting protrusions extending from the upper surface of the support main body, a lateral dimension between the two lateral limiting protrusions being designed to allow at least the free end of the reverse base body to be accommodated therein to prevent lateral displacement of the free end of the reverse base body, the support portion further comprises a positioning boss extending from the lower surface of the support main body, and a positioning notch is provided on the upper surface of the forward base body, wherein the positioning notch is dimensioned to allow the positioning boss to be inserted therein so as to limit displacement of the support portion relative to the static contactor.

5. The circuit breaker according to claim 1, wherein at least part of a housing of one or more of the first magnetization chamber, the second magnetization chamber, and the third magnetization chamber is made of a gas-producing material.

6. The circuit breaker according to claim 4, wherein the first magnetization chamber, the second magnetization chamber, the third magnetization chamber, and the support portion are a unitary piece, wherein insulation paper is provided between the magnetization assembly and the upper surface of the forward base body.

7. The circuit breaker according to claim 1, wherein the transmission mechanism comprises a mounting chassis, a movable contactor support, a spring, an upper spring shaft, a lower spring shaft, and a mounting screw, wherein the mounting chassis comprises a fixed portion fixedly connected to the base and an annular mounting member extending from the fixed portion towards the movable contactor support, the movable contactor support is configured to comprise a first support plate and a second support plate arranged on two sides of the annular mounting member and extending parallel to each other, an end portion of the movable contactor distal to the movable contact thereof is arranged between the first support plate and the annular mounting member and/or between the second support plate and the annular mounting member, a movable contactor rotating hole is provided at the end portion of the movable contactor distal to the movable contact thereof, a first rotating hole is provided on the first support plate, a second rotating hole is provided on the second support plate, and the movable contactor rotating hole, the first rotating hole, and the second rotating hole is relatively rotatably and closely connected to the annular mounting member by means of the mounting screw.

8. The circuit breaker according to claim 7, wherein an upper edge of the first support plate comprises a first upper curved recessed section and a first upper arc-shaped protruding section extending immediately following the first upper curved recessed section; a lower edge of the first support plate comprises a first lower arc-shaped recessed section; an upper edge of the second support plate comprises a second upper curved recessed section and a second upper arc-shaped protruding section extending immediately following the second upper curved recessed section; a lower edge of the second support plate comprises a second lower arc-shaped recessed section; the movable contactor is provided with a slot between the movable contact and the movable contactor rotating hole; the upper spring shaft is designed to pass through the slot and have two ends overlapping with the first upper curved recessed section and the second upper curved recessed section; the lower spring shaft is designed to be accommodated in the first lower arc-shaped recessed section edge and the second lower arc-shaped recessed section; the lower spring shaft is connected to the upper spring shaft by means of the spring; wherein the first upper arc-shaped protruding section and the second upper arc-shaped protruding section are dimensioned to allow, when the movable contactor rotates relative to the movable contactor support, the upper spring shaft to disengage from the first upper curved recessed section and the second upper curved recessed section and continue to move along the first upper arc-shaped protruding section and the second upper arc-shaped protruding section, and the first upper arc-shaped protruding section and the second upper arc-shaped protruding section are respectively concentric with the first lower arc-shaped recessed section and the second lower arc-shaped recessed section.

9. The circuit breaker according to claim 8, wherein the first upper curved recessed section and the second upper curved recessed section are arranged symmetrically about the annular mounting member; the first upper arc-shaped protruding section and the second upper arc-shaped protruding section are arranged symmetrically about the annular mounting member; the first lower arc-shaped recessed section

and the second lower arc-shaped recessed section are arranged symmetrically about the annular mounting member.

10. The circuit breaker according to claim 9, wherein the movable contactor comprises a first movable contactor element and a second movable contactor element, wherein an end portion of the first movable contactor element distal to the movable contact thereof is clamped between the first support plate and the annular mounting member; an end portion of the second movable contactor element distal to the movable contact thereof is clamped between the second support plate and the annular mounting member; the spring is arranged between the first movable contactor element and the second movable contactor element; shaft sleeves are respectively provided at two ends of the upper spring shaft; a first driving hole and a second driving hole are respectively provided on the first support plate and the second support plate; the driving mechanism drives, by means of the first driving hole and the second driving hole, the movable contactor support to rotate relative to the mounting chassis.

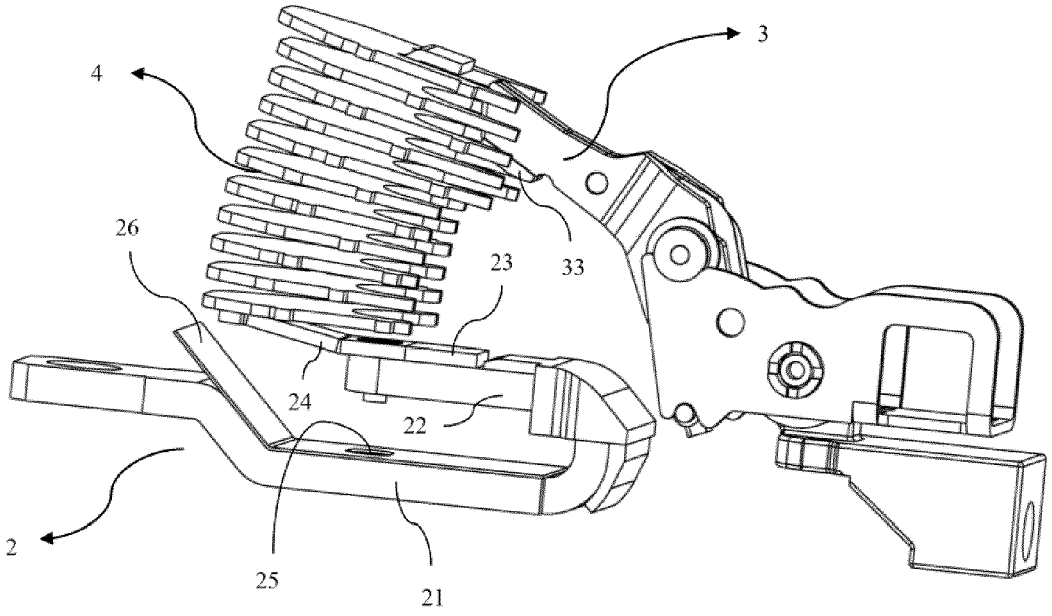

FIG. 1

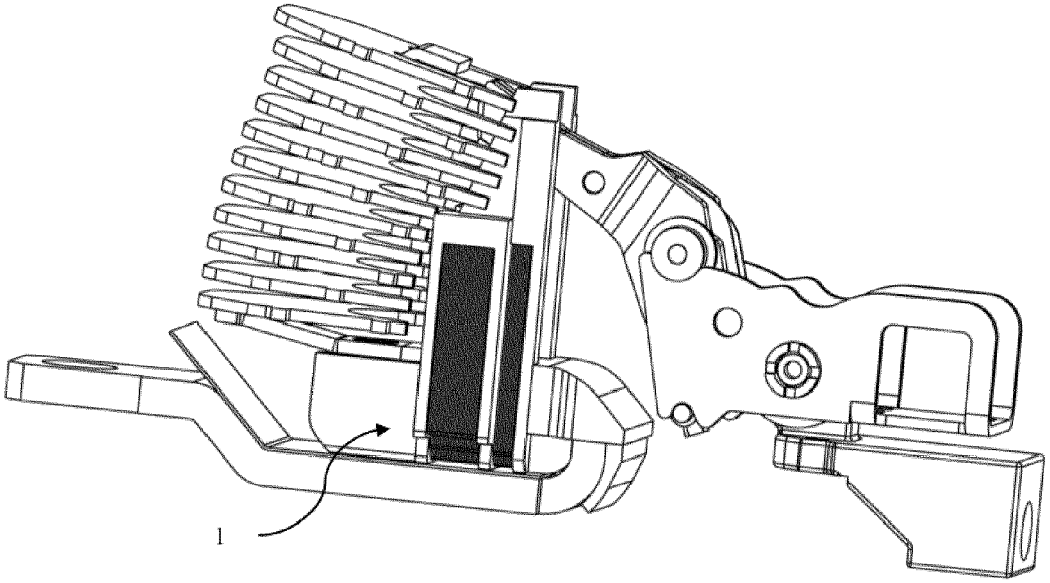

FIG. 2

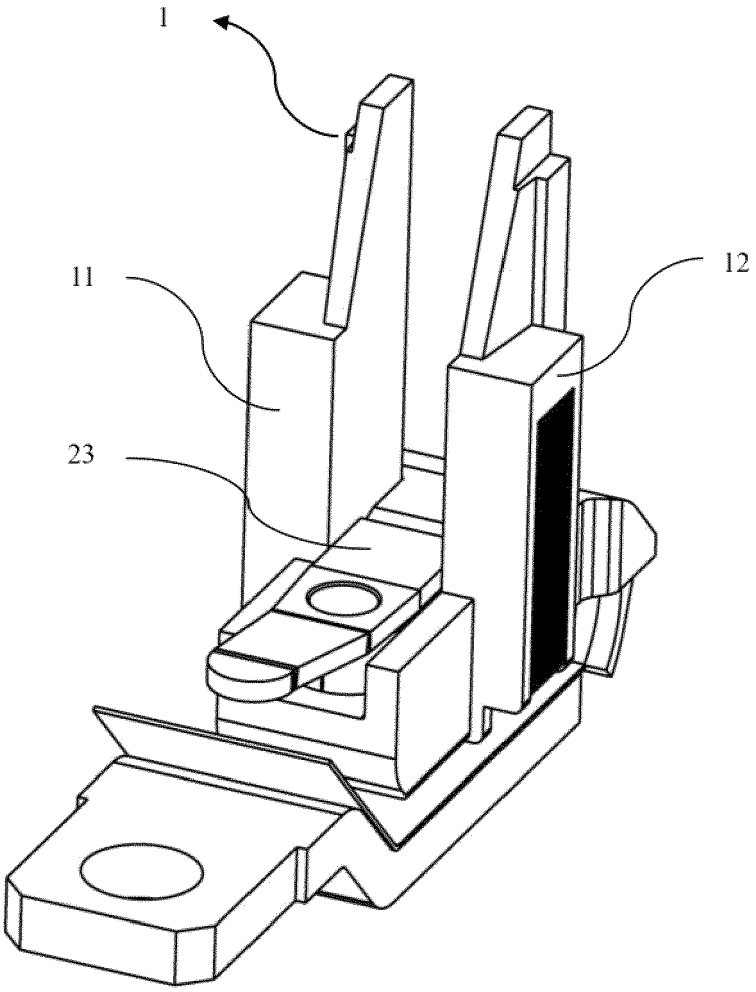

FIG. 3

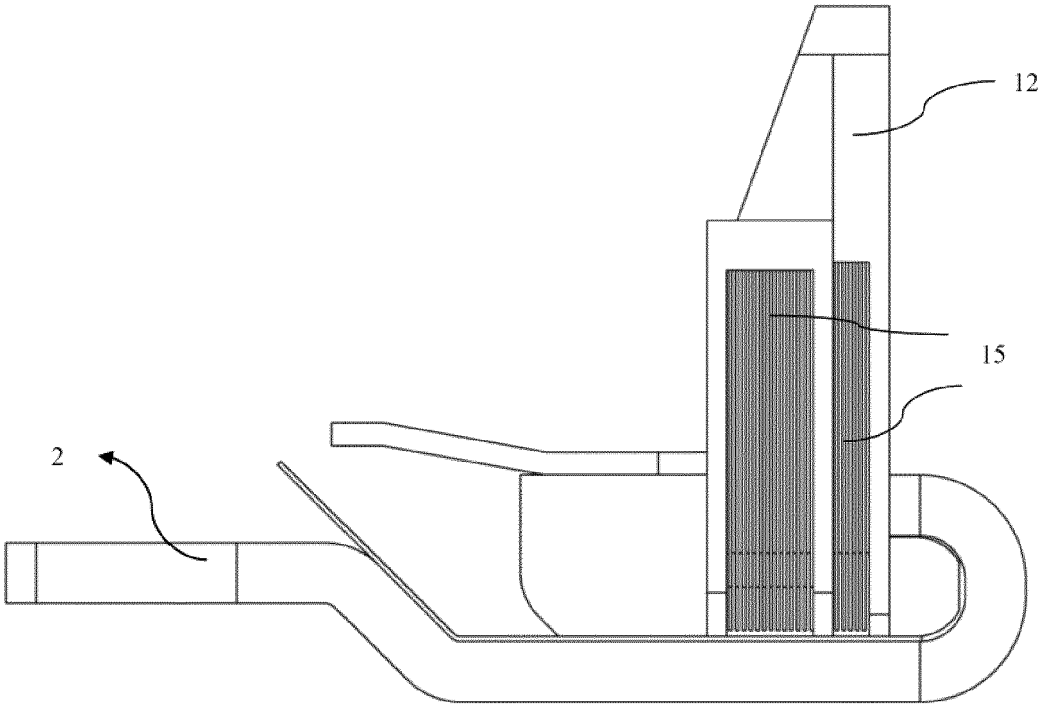

FIG. 4

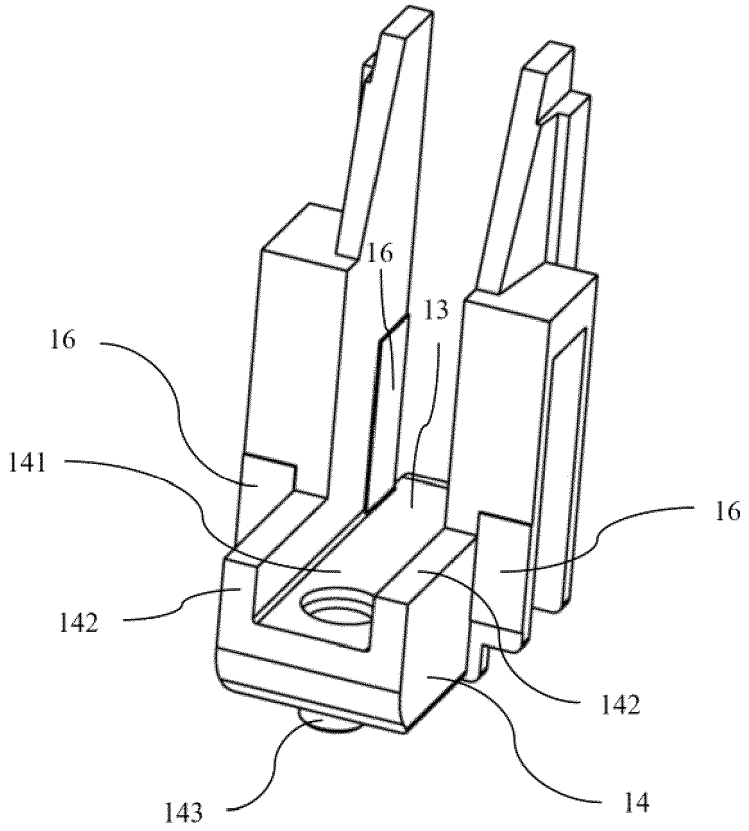

FIG. 5

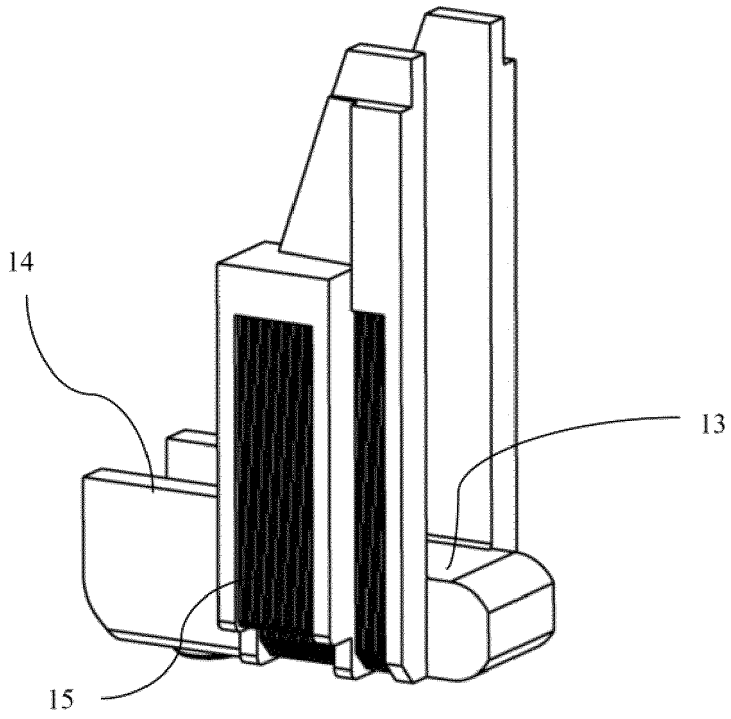

FIG. 6

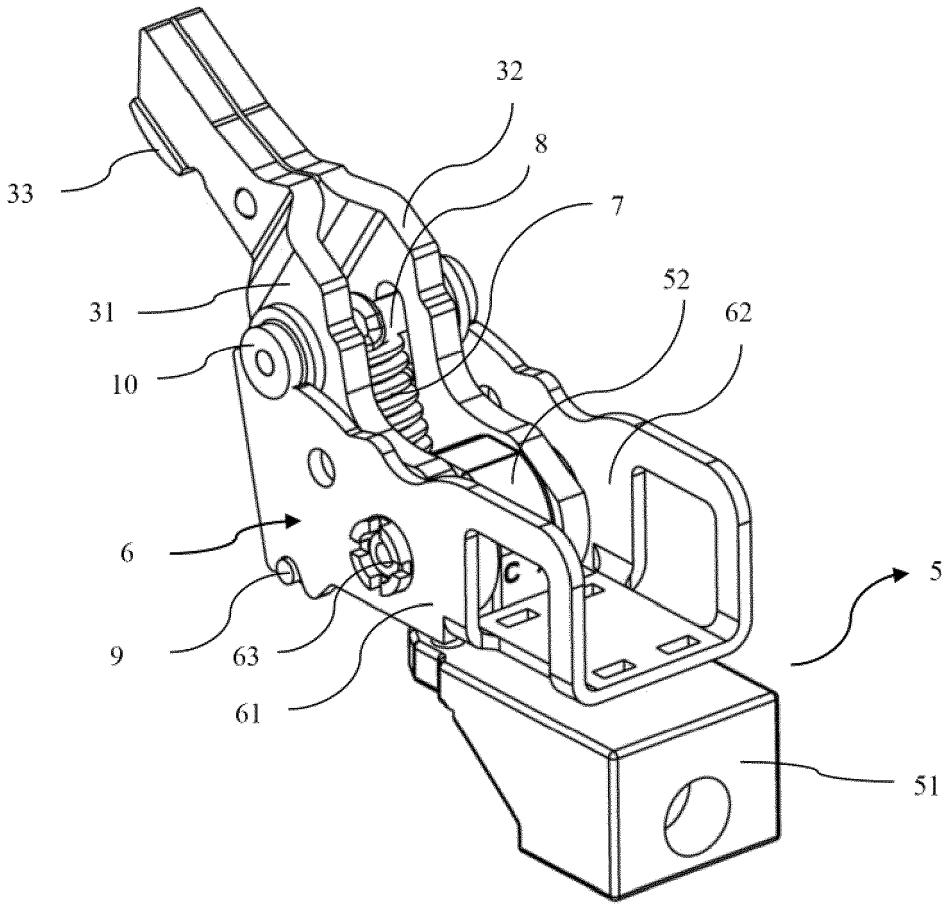

FIG. 7

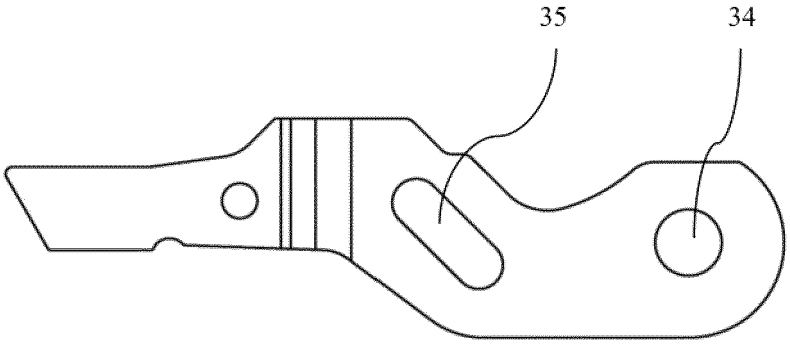

FIG. 8

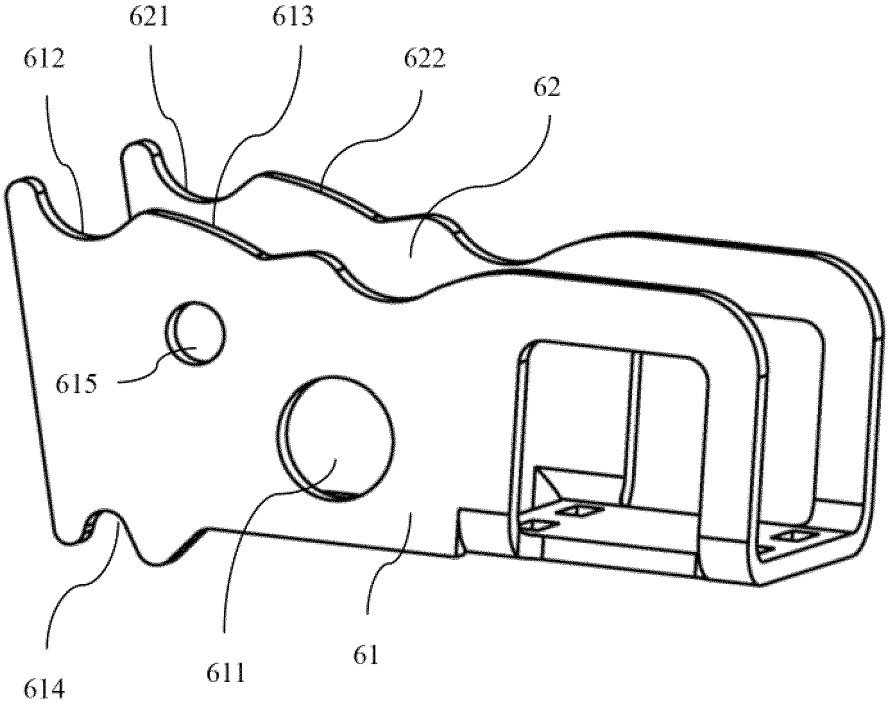

FIG. 9

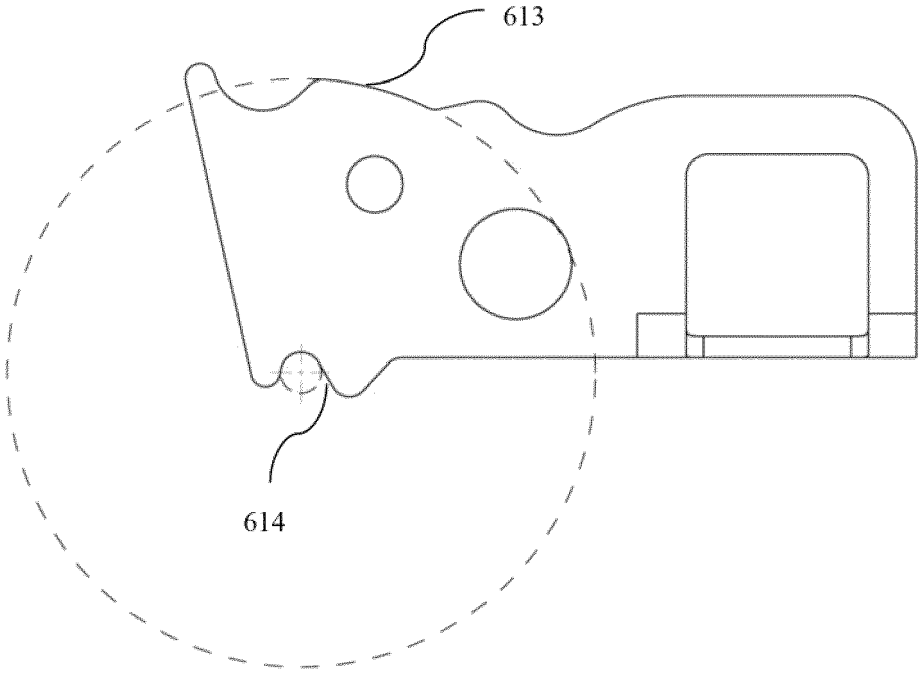

FIG. 10