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(54) RESIDUAL CURRENT OPERATED CIRCUIT-BREAKER WITH WIDTH OF 18 MM

(57) The present invention relates to the field of low-voltage electrical appliances, in particular to a 18mm width residual current-operated circuit breaker. In the projection perpendicular to the width direction of a circuit breaker housing, the circuit breaker housing comprises first-to-fifth areas disposed therein; the residual current-operated 18mm-width circuit breaker further comprises an operating mechanism and a leak electricity test mechanism disposed in the first area, a short-circuit instantaneous tripping mechanism, a L-pole contact system and a N-pole contact system disposed in the second area, an arc extinguishing system disposed in the third area, an overload tripping mechanism comprising a bimetallic strip disposed in the fourth area, and a zero-sequence current transformer and a magnetic flux trip disposed in the fifth area; the L-pole contact system and the N-pole contact system are arranged side by side along the width direction of the circuit breaker housing; the zero-sequence current transformer and the magnetic flux trip are arranged side by side along the length direction of the circuit breaker housing, and opposite the second area and the third area, respectively. The residual current-operated circuit breaker has reasonable internal arrangement and compact structure.

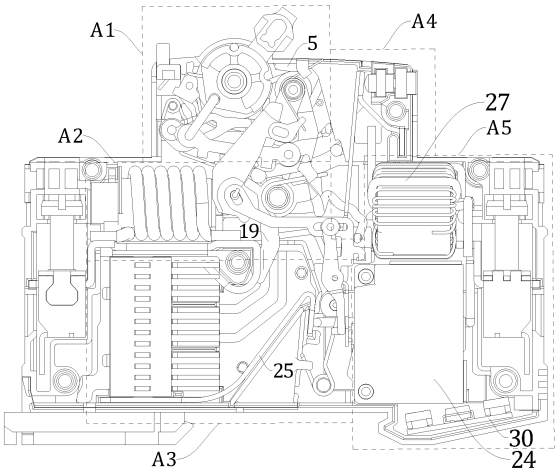

Fig.1

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Description

TECHNICAL FIELD

[0001] The present invention relates to the field of low-voltage electrical appliances, in particular to a residual current-operated circuit breaker.

BACKGROUND ART

[0002] The residual current-operated circuit breaker whose action function is independent of the power supply voltage makes using of the residual current to directly drive the magnetic flux trip to act, and then drive the tripping mechanism of the circuit breaker to trip, so as to disconnect the circuit, therefore, in the product structure, it is necessary to arrange a zero-sequence current transformer that senses the residual current and a magnetic flux trip that is directly actuated by the residual current, but these two components take up a lot of space, making it difficult to miniaturize the product. The existing miniature circuit breakers are typically sized in 18mm for one modulus, the residual current-operated circuit breaker having the zero-sequence current transformer and the magnetic flux trip needs to be typically sized in 27mm for one and a half modulus, or in 36 mm for two modulus, so they cannot be installed in a space with one modulus as 18mm.

SUMMARY OF THE INVENTION

[0003] The objective of the present invention is to overcome the shortcomings of the prior art, providing a 18mm-width residual current-operated circuit breaker with reasonable internal layout and compact structure.

[0004] In order to achieve the above object, the technical scheme adopted in the present invention is as follows:

A 18mm-width residual current-operated circuit breaker comprising a circuit breaker housing, in a projection perpendicular to a width direction of the circuit breaker housing, the circuit breaker housing comprises a first area, a second area, a third area, a fourth area and a fifth area disposed therein; the 18 mm-width residual current-operated circuit breaker further comprises an operating mechanism and a leak electricity test mechanism disposed in the first area, a short-circuit instantaneous tripping mechanism, a L-pole contact system and a N-pole contact system disposed in the second area, an arc extinguishing system disposed in the third area, an overload tripping mechanism comprising a bimetallic strip disposed in the fourth area, and a zero-sequence current transformer and a magnetic flux trip disposed in the fifth area; the L-pole contact system and the N-pole contact system are arranged side by side along the width direction of the circuit breaker housing; the zero-sequence current transformer and the magnetic flux trip are arranged side by side along a length direction of the circuit breaker housing, and opposite the second area and the third area respectively.

[0005] Further, the first area, the second area and the third area are arranged in the length direction of the circuit breaker housing in proper order and positioned at one end of a height direction of the circuit breaker housing, and the fourth area and the fifth area are positioned at another end of the height direction of the circuit breaker housing; the second area, the third area and the fifth area are arranged side by side along the height direction of the circuit breaker housing; the first area, the second area and the fourth area are arranged side by side along the height direction of the circuit breaker housing; part of the fourth area is located between the second area and the fifth area; the zero-sequence current transformer and the magnetic flux trip are arranged opposite the second area and the third area, respectively.

[0006] Further, the fourth area is an L-shaped structure, of which one end is located between the second area and the fifth area, and another end and the fifth area are arranged side by side along the length direction of the circuit breaker housing.

[0007] Further, the operating mechanism comprises a handle, a jump buckle, a lock buckle and a lever respectively disposed on the circuit breaker housing, and a first connecting rod and a second connecting rod; of the connecting rod one end articulates with the handle, another end articulates with one end of the second connecting rod and is slidingly inserted in a jump buckle rounded-long-hole of the jump buckle, and another end of the second connecting rod articulates with the lever, the lever is respectively drivingly connected to a N-pole moving contact of the N-pole contact system and a L-pole moving contact of the L-pole contact system, the jump buckle and the lock buckle are in locking fit with each other, the lock buckle is driven by the short-circuit instantaneous tripping mechanism, an overload tripping mechanism or a magnetic flux trip to release its locking fit with the jump buckle, so that the operating mechanism is tripped.

[0008] Further, the circuit breaker further comprises a first partition plate, the short-circuit instantaneous tripping mechanism, the L-pole contact system and the arc extinguishing system respectively with the N-pole contact system are located on both sides of the first partition plate;

[0009] Further, the lever comprises a lever partition, the L-pole moving contact and the N-pole moving contact are respectively located on both sides of the lever partition, the lever partition is misaligned and overlaps with the first partition plate, which at least partially extends into the interspace between the L-pole moving contact and the N-pole moving contact; when the L-pole moving contact and the N-pole moving contact move together with the lever, the lever partition and the first partition plate always maintain at least partial overlap.

[0010] Further, the short-circuit instantaneous tripping mechanism directly drivingly cooperates with the lock buckle; the operating mechanism further comprises a

transmission rod, of which one end articulates with the lock buckle, and another end drivingly cooperates with the bimetallic strip and the magnetic flux trip, respectively.

[0011] Further, one end of the lock buckle is rotationally disposed on the circuit breaker housing, and another end is provided with a driven surface and a striking portion, the driven surface drivingly cooperates with the short-circuit instantaneous tripping mechanism, and the striking portion drivingly cooperates with the L-pole moving contact; when the movable surface is struck by the short-circuit instantaneous tripping mechanism to rotate the lock buckle, the striking portion strikes the L-pole moving contact, so that it separates from a L-pole stationary contact of the L-pole contact system.

[0012] Further, the leak electricity test mechanism comprises a test button, and a switch torsion spring and an electric conduction-coordinating structure successively connected in series between a L-pole circuit and a N-pole circuit of the residual current-operated circuit breaker, the test button, the switch torsion spring and the electric conduction-coordinating structure are all located on one side of a handle of the operating mechanism, and the test button and the handle are arranged side by side along a height direction of the circuit breaker housing;

[0013] Further, two ends of the switch torsion spring are a switch arm and a connecting arm, respectively, the switch arm drivingly cooperates with the test button, and the connecting arm is fixedly disposed; the electric conduction-coordinating structure comprises a coordinating torsion spring, two ends of the coordinating torsion spring are a coordinating arm and a fixed arm, respectively, the coordinating arm drivingly cooperates with the operating mechanism, and the fixed arm is fixedly disposed; the short-circuit instantaneous tripping mechanism is an electromagnetic trip, comprising a magnetic yoke and a coil assembly, the magnetic yoke is electrically connected to the L-pole contact system; the coordinating arm is disconnected from the magnetic yoke when the circuit breaker is in a break-contact state; the operating mechanism drives the coordinating arm to connect the magnetic yoke when the circuit breaker switches from the break-contact state to a make-contact state; the switch arm and the electric conduction-coordinating structure remain in a normal disconnected state, pressing the test button enables it to drive the switch arm to contact with the electric conduction-coordinating structure for electric conduction.

[0014] Further, in the circuit breaker further comprises an anti-misoperation apparatus disposed within the first area, which comprises a position-restriction structure that can be switched between a first position and a second position; when a handle of the residual current-operated circuit breaker is positioned in a break-contact position, the handle cooperates with the position-restriction structure to restrict it in the first position, and the position-restriction structure blocks a test button of the leak electricity test mechanism from being pressed to a test position; when the circuit breaker is in a make-contact state, external force presses the test button to the test position, the position-restriction structure acts to the second position, blocking the handle from rotating to the break-contact position;

[0015] Further, after the test button is released, the position-restriction structure is driven by the handle to reset from the second position to the first position, and the handle rotates to the break-contact position.

[0016] Further, two ends of the bimetallic strip are a bimetal-installing end and a bimetal-cooperated end, the bimetal-installing end is opposite the first area, and the bimetal-cooperated end is located between the second area and the fifth area and drivingly cooperates with the operating mechanism.

[0017] Further, the overload tripping mechanism further comprises an adjustment structure, which comprises an adjusting screw, an adjusting nut and an insulation adjustment knob, the adjusting nut is fixedly disposed, the adjusting screw threadedly cooperates with the adjusting nut, of the adjusting screw one end cooperates with the bimetallic strip, another end cooperates with the insulation adjustment knob, and the adjusting screw rotates synchronously with the insulation adjustment knob.

[0018] Further, the 18mm-width residual current-operated circuit breaker further comprises a second partition plate and a bimetal-supporting piece arranged in the fourth area, the bimetal-installing end is disposed on the bimetal-supporting piece, which is fixed between the second partition plate and the circuit breaker housing, the adjusting nut is fixed on the second partition plate, and the insulation adjustment knob is rotationally arranged on the second partition plate around its own axis.

[0019] Further, the 18mm-width residual current-operated circuit breaker further comprises a first partition plate, the first partition plate further comprises an air passage disposed on one side thereof, which is a labyrinth passage, comprising at least two reverse zig-like passages, of the air passage one end is opposite the N-pole contact system, and another end is provided with at least one exhaust opening.

[0020] Further, the 18mm-width residual current-operated circuit breaker further comprises a circuit board disposed in the fifth area, the circuit board, the magnetic flux trip and the zero-sequence current transformer are arranged side by side in proper order along the length direction of the circuit breaker housing.

[0021] Further, the 18mm-width residual current-operated circuit breaker further comprises a shielding cover and a L-pole current input wiring board disposed within the fifth area, and a L-pole arc-striking plate disposed within the third area.

[0022] Further, the L-pole current input wiring board and the L-pole arc-striking plate are positioned on both sides of the magnetic flux trip respectively, the L-pole arc-striking plate is electrically connected to the L-pole current input wiring board through a first wire; the shielding cover comprises a shielding cover top plate and a

shielding cover back plate, the shielding cover top plate is positioned between the zero-sequence current transformer and the magnetic flux trip, the shielding cover back plate is located between the first wire and the magnetic flux trip.

[0023] Further, the 18mm-width residual current-operated circuit breaker further comprises a magnetic flux trip resetting structure, which comprises a poking rod and a pushing rod respectively rotationally arranged on the circuit breaker housing, and a resetting spring;

[0024] Further, when the magnetic flux trip acts, a ejector rod of the magnetic flux trip props up to drive the pushing rod to rotate, the pushing rod drives the operating mechanism to be tripped; after the residual current-operated circuit breaker is tripped and breaks contact under the action of the magnetic flux trip, the resetting spring drives the poking rod to rotate, meanwhile the poking rod drives the pushing rod to rotate toward the direction, in which the pushing rod rotates to reset the ejector rod; when the residual current-operated circuit breaker makes contact, the operating mechanism drives the poking rod to rotate to separate it from the pushing rod.

[0025] The 18mm-width residual current-operated circuit breaker according to the present invention optimizes the spatial distribution of each component, makes the internal layout reasonable and compact, conduces to the miniaturization of products, furthermore actualizes the action function of the residual current-operated circuit breaker independent of the power supply voltage in a limited space (such as the space of 18mm-width).

[0026] In addition, the operating mechanism is a cam-and-five-bar linkage mechanism, its structure is compact in its entirety, and the space occupied by the moving components in its entirety in different states is small, conducing to further saving the internal space of the circuit breaker housing; moreover, the tripping mechanism composed of the jump buckle and the lock buckle is a mechanism separate and independent from and of the operating mechanism, when the operating mechanism executes normal make-contact or break-contact operation, the tripping mechanism is in a static state, thereby ensuring the overall reliability of the operating mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027]

FIG.1 is a projection structure diagram of the residual current-operated circuit breaker according to the present invention;

FIG.2 is an exploded structure diagram of the residual current-operated circuit breaker according to the present invention;

FIG.3a is a partial structure diagram of the residual current-operated circuit breaker according to the present invention in a make-contact state, showing the anti-misoperation apparatus and the leak electricity test mechanism;

FIG.3b is a structure diagram of the anti-misoperation after the residual current-operated circuit breaker trips to be in a break-contact state according to the present invention, showing the position-restriction structure is in the second position, and the handle is between the break-contact position and the make-contact position;

FIG.4a is a cooperation structure diagram of the overload tripping mechanism, the magnetic flux trip, the magnetic flux trip resetting structure and the operating mechanism when the residual current-operated circuit breaker according to the present invention is in a break-contact state;

FIG.4b is a cooperation structure diagram of the magnetic flux trip and the magnetic flux trip resetting structure when the residual current-operated circuit breaker according to the present invention is in a make-contact state;

FIG.5a is a cooperation structure diagram of the first partition plate and the lever according to the present invention;

FIG.5b is a cooperation structure diagram of the first partition plate and the lever according to the present invention, showing the N-pole contact system and the air passage of the first partition plate;

FIG.6 is a structure diagram of the contact system according to the present invention;

FIG.7 is a structure diagram of the magnetic flux trip, the shielding cover, the circuit board, the zero-sequence current transformer and the L-pole arc-striking plate according to the present invention;

FIG. 8 is a structure diagram of the lock buckle according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0028] We shall further describe the specific embodiments of the residual current-operated circuit breaker of the present invention in combination with the examples given in FIGs.1-8 as follows. The residual current-operated circuit breaker according to the present invention are not limited to the description of the following examples.

[0029] As shown in FIG. 1, the 18mm-width residual current-operated circuit breaker according to the present invention comprises the circuit breaker housing 1, in the projection perpendicular to the width direction of the circuit breaker housing 1, the circuit breaker housing 1 comprises the first area A1, the second area A2, the third area A3, the fourth area A4 and the fifth area A5 disposed therein; the 18mm-width residual current-operated circuit breaker further comprises the operating mechanism 5 and the leak electricity test mechanism disposed in the first area A1, the short-circuit instantaneous tripping mechanism 3, the L-pole contact system and the N-pole contact system disposed in the second area A2, the arc

extinguishing system 4 disposed in the third area A3, the overload tripping mechanism comprising the bimetallic strip 13 disposed in the fourth area A4, and the zero-sequence current transformer 27 and the magnetic flux trip 24 disposed in the fifth area A5; the L-pole contact system and the N-pole contact system are arranged side by side along the width direction of the circuit breaker housing 1; the zero-sequence current transformer 27 and the magnetic flux trip 24 are arranged side by side along the length direction of the circuit breaker housing 1. Further, the first area A1, the second area A2 and the third area A3 are arranged along the length direction of the circuit breaker housing 1 in proper order and positioned at one end of the height direction of the circuit breaker housing 1, and the fourth area A4 and the fifth area A5 are positioned at the other end of the height direction of the circuit breaker housing 1; the second area A2, the third area A3 and the fifth area A5 are arranged side by side along the height direction of the circuit breaker housing 1; the first area A1, the second area A2 and the fourth area A4 are arranged side by side along the height direction of the circuit breaker housing 1; part of the fourth area A4 is located between the second area A2 and the fifth area A5; the zero-sequence current transformer 27 and the magnetic flux trip 24 are arranged opposite the second area A2 and the third area A3, respectively. Further, the fourth area A4 is an L-shaped structure, of which one end is located between the second area A2 and the fifth area A5, and the other end and the fifth area A5 are arranged side by side along the length of the circuit breaker housing 1.

[0030] The 18mm-width residual current-operated circuit breaker according to the present invention optimizes the spatial distribution of each component, makes the internal layout reasonable and compact, conduces to the miniaturization of products, furthermore actualizes the action function of the residual current-operated circuit breaker independent of the power supply voltage in a limited space (such as the space of 18mm).

[0031] The left-right direction of FIG.1 is the height direction of the circuit breaker housing 1, the direction perpendicular to the paper surface of FIG.1 is the width direction of the circuit breaker housing 1, and the up-down direction of FIG. 1 is the length direction of the circuit breaker housing 1. It should be pointed out that the "height direction", "length direction" and "width direction" are used to indicate the 3D spatial arrangement of the circuit breaker housing 1, so as to facilitate better understanding of the internal structure layout of the residual current-operated circuit breaker, and do not impose any limitations on the actual use direction or orientation of the residual current-operated circuit breaker described in the present invention.

[0032] Specifically, as shown in the direction in FIG. 1, in the residual current-operated circuit breaker according to the present invention, the first area A1, the second area A2 and the third area A3 are arranged in proper order from top to bottom and located at the left end of the circuit breaker housing 1, the fourth area A4 and the fifth area A5 are arranged in proper order from top to bottom and located at the right end of the circuit breaker housing 1; the first area A1 and the second area A2 are arranged opposite the fourth area A4; the second area A2 and the third are A3 are arranged opposite the fifth area A5; part of the fourth area A4 is located between the second area A2 and the fifth area A5; the zero-sequence current transformer 27 and the magnetic flux trip 24 are arranged side by side from top to bottom within the fifth area A5; the operating mechanism 5 and the leak electricity test mechanism are arranged within the first area A1, the overload tripping mechanism is arranged within the fourth area A4, the short-circuit instantaneous tripping mechanism 3 is arranged within the second area A2, the arc extinguishing system 4 is arranged within the third area A3, the short-circuit instantaneous tripping mechanism 3 is an electromagnetic tripping mechanism, which is arranged side by side with the arc extinguishing system 4 (that is, the short-circuit instantaneous tripping mechanism 3 and the arc extinguishing system 4 are arranged side by side along the length direction of the circuit breaker); the operating mechanism 5 may partially extend to the second area A2, extending to the interspace between the short-circuit instantaneous tripping mechanism 3 and the overload tripping mechanism, the L-pole contact system is located between the short-circuit instantaneous tripping mechanism 3 and the zero-sequence current transformer 27, of course, the portion of the L-pole contact system and the N-pole contact system provided with contacts may extend to the third area A3 to cooperate with the arc extinguishing system 4.

[0033] The circuit breaker housing 1 is shaped into an approximate convex structure, comprising a main part and a protruding part protruding on the upper side of the main part, the first area A1 and most of the fourth area A4 are located on the protruding part, one end of the bimetallic strip 13 of the overload tripping mechanism in the fourth area A4 extends to the interspace between the second area A2 and the fifth area A5. The second area A2, the third area A3 and the fifth area A5 are located on the main part, and a group of connecting terminals are respectively arranged on both sides of the main part, and the short-circuit instantaneous tripping mechanism 3, the arc extinguishing system 4, the zero-sequence current transformer 27 and the magnetic flux trip 24 are arranged between the two groups of connecting terminals. The short-circuit instantaneous tripping mechanism 3 and the zero-sequence current transformer 27 are arranged at intervals relative to each other along the height direction of the circuit breaker housing 1, the L-pole contact system and the N-pole contact system are located between the short-circuit instantaneous tripping mechanism 3 and the zero-sequence current transformer 27, part of the operating mechanism extends to the interspace between the short-circuit instantaneous tripping mechanism 3 and the zero-sequence current transformer 27, the arc extinguishing system 4 and the magnetic flux trip 24 are ar-

ranged at intervals relative to each other along the height direction of the circuit breaker housing 1, and at least part of the L-pole contact system extends to the interspace between the arc extinguishing system 4 and the magnetic flux trip 24.

[0034] As shown in FIGs. 1 and 2, the operating mechanism 5 comprises the handle 5-0, the jump buckle 5-3, the lock buckle 5-4 and the lever 5-5 respectively rotationally disposed on the circuit breaker housing 1, and the first connecting rod 5-1 and the second connecting rod 5-2; of the first connecting rod 5-1 one end articulates with the handle 5-0, the other end articulates with one end of the second connecting rod 5-2 and is slidingly inserted in a jump buckle rounded-long-hole of the jump buckle 5-3, and the other end of the second connecting rod 5-2 articulates with the lever 5-5, the lever 5-5 is respectively drivingly connected to the N-pole moving contact 38 of the N-pole contact system and the L-pole moving contact 19 of the L-pole contact system, so as to synchronously drive the N-pole contact system and the L-pole contact system to make contact or break contact, the jump buckle 5-3 and the lock buckle 5-4 are in locking fit with each other, the lock buckle 5-4 is driven by the short-circuit instantaneous tripping mechanism 3, the overload tripping mechanism or the magnetic flux trip 24 to release its locking fit with the jump buckle 5-3, so that the operating mechanism is tripped. Further, the lock buckle 5-4 is coaxial arranged with the lever 5-5. The operating mechanism is a cam-and-five-bar linkage mechanism, its structure is compact in its entirety, and the space occupied, in different states, by the moving of the components in its entirety is small, conducing to further saving the internal space of the circuit breaker housing; moreover, the tripping mechanism composed of the jump buckle and the lock buckle is a mechanism separate and independent from and of the operating mechanism, when the operating mechanism executes normal make-contact or break-contact operation, the tripping mechanism is in a static state, thereby ensuring the overall reliability of the operating mechanism. Further, of the jump buckle 5-3 one end is rotationally disposed on the circuit breaker housing 1, and the other end is in locking fit with the lock buckle 5-4, the jump buckle rounded-long-hole is located in the middle of the jump buckle 5-3; when the operating mechanism 5 is in a make-contact state, the moment of force applied to the jump buckle 5-3 under one end of the first connecting rod 5-1 inserted in the jump buckle rounded-long-hole is equal to the moment of force applied to the jump buckle 5-3 under the lock buckle 5-4 and opposite in direction, but the arm of force applied to the jump buckle 5-3 under the lock buckle 5-4 is bigger than the arm of force applied to the jump buckle 5-3 under one end of the first connecting rod 5-1 inserted in the jump buckle rounded-long-hole, therefore, such structure is conducive to reducing the tripping force of the operating mechanism, ensuring that the magnetic flux trip 24 can reliably push the tripping mechanism to trip.

[0035] As shown in FIGs. 1-2, 4a, and 5a-5b, the 18mm-width residual current-operated circuit breaker according to the present invention further comprises the first partition plate 2, the short-circuit instantaneous tripping mechanism 3, the L-pole contact system and the arc extinguishing system 4 respectively with the N-pole contact system are located on both sides of the first partition plate 2.

[0036] As shown in FIGs.1-2, 4a and 5a-5b, the lever 5-5 comprises the lever partition 5-50, the L-pole moving contact 19 and the N-pole moving contact 38 are respectively located on both sides of the lever partition 5-50, the lever partition 5-50 is misaligned and overlaps with the first partition plate 2, which at least partially extends into the interspace between the L-pole moving contact 19 and the N-pole moving contact 38; when the L-pole moving contact 19 and the N-pole moving contact 38 move together with the lever 5-5, the lever partition 5-50 and the first partition plate 2 always maintain at least partial overlap, the lever partition 5-50 and the first overlap 2 cooperate with each other, increasing the insulation gap and creepage distance between the L-pole circuit and the N-pole circuit of the residual current-operated circuit breaker. Further, a thin plate represents the lever partition 5-50. The handle 5-0, the jump buckle 5-3, the lock buckle 5-4, the lever 5-5, the first connecting rod 5-1 and the second connecting rod 5-2 are located within the first area A1 in their entirety, part of the lock buckle 5-4 extends into the second area A2, and cooperates with the short-circuit instantaneous tripping mechanism 3, the overload tripping mechanism and the magnetic flux trip 24, part of the lever 5-5 extends into the second area A2 for installation of the N-pole moving contact 38 of the N-pole contact system and the L-pole moving contact 19 of the L-pole contact system.

[0037] As shown in FIG.2, the first partition plate 2 comprises a partition plate body and a partition plate extension portion, the lateral edge of the side where the partition plate body and the partition plate extension portion are misaligned and overlap with each other is a lateral edge body, the partition plate extension portion is convexly disposed on the lateral edge body and extends towards the lever 5-5, the partition plate extension portion overlaps with the lever partition 5-50 and extends into the interspace between the two moving contacts; the lever 5-5 comprises two lever shafts 5-51 respectively disposed on its two sides and connected to the moving contact, both lever shafts 5-51 are located in a right-angle notch enclosed by the partition plate extension portion and the lateral edge body.

[0038] As shown in FIG.8, of the lock buckle 5-4 one end is rotationally disposed on the circuit breaker housing 1, and the other end is provided with the driven surface 61 and the striking portion 62, the driven surface 61 drivingly cooperates with the short-circuit instantaneous tripping mechanism 3, and the striking portion 62 drivingly cooperates with the L-pole moving contact 19; when the movable surface 61 is struck by the short-circuit instantaneous tripping mechanism 3 to rotate the lock buckle

5-4, the striking portion 62 strikes the L-pole moving contact 19, so that it separates from the L-pole stationary contact 3-2 of the L-pole contact system, so as to enable the L-pole moving contact 19 and L pole stationary contact 3-2 to open a certain opening distance before the tripping and resetting of the operating mechanism and accelerate arc movement, thereby improving the current-limiting ability for short-circuit current. Further, the striking portion 62 and the driven surface 61 is located on both sides of the width direction of the lock buckle 5-4.

[0039] As shown in FIGs.1-2, the short-circuit instantaneous tripping mechanism 3 directly drivingly cooperates with the lock buckle 5-4; the operating mechanism further comprises the transmission rod 5-7, of which one end articulates with the lock buckle 5-4, and the other end drivingly cooperates with the bimetallic strip 13 and the magnetic flux trip 24, respectively. Further, the transmission rod 5-7 is disposed within the second area A2, extending along the height direction of the circuit breaker housing 1.

[0040] As shown in FIGs. 1 and 3a-3b, the leak electricity test mechanism comprises the test button 32, and the switch torsion spring 34 and the electric conduction-coordinating structure successively connected in series between the L-pole circuit and the N-pole circuit of the residual current-operated circuit breaker, the test button 32, the switch torsion spring 34 and the electric conduction-coordinating structure are all located on one side of the handle 5-0 of the operating mechanism 5, and the test button 32 and the handle 5-0 are arranged side by side at one end of the circuit breaker housing 1 along the height direction of the circuit breaker housing 1. Further, the switch torsion spring 34 comprises a switch arm and a connecting arm, the switch arm drivingly cooperates with the test button 32, and the connecting arm is fixedly disposed; the electric conduction-coordinating structure comprises the coordinating torsion spring 31, the two ends of the coordinating torsion spring 31 are a coordinating arm and a fixed arm, respectively, the coordinating arm drivingly cooperates with the operating mechanism, and the fixed arm is fixedly disposed; the short-circuit instantaneous tripping mechanism 3 is an electromagnetic trip, comprising the magnetic yoke 3-0 and the coil assembly 3-1, the magnetic yoke 3-0 is electrically connected to the L-pole contact system; the coordinating arm is disconnected from the magnetic yoke 3-0 when circuit breaker is in a break-contact state; the operating mechanism drives the coordinating arm to connect the magnetic yoke 3-0 when the circuit breaker switches from the break-contact state to the make-contact state; the switch arm and the electric conduction-coordinating structure remain in a normal disconnected state, pressing the test button 32 enables it to drive the switch arm to contact with the electric conduction-coordinating structure for electric conduction.

[0041] As shown in FIGs. 2 and 6, the magnetic yoke 3-0 is electrically connected to the L-pole stationary contact 3-2 of the L-pole contact system, and the magnetic yoke 3-0 and the L-pole static contact 3-2 are preferably an integrally-molded piece. Further, the magnetic yoke 3-0 comprises a magnetic yoke baseplate, a first magnetic yoke arm and a second magnetic yoke arm, the first yoke arm and the second yoke arm are arranged opposite to each other and crookedly connected with both ends of the magnetic yoke baseplate, respectively, the first magnetic yoke arm cooperates with the coordinating arm of the coordinating torsion spring 31, the L-pole stationary contact 3-2 and the first magnetic yoke arm are connected to the same end of the magnetic yoke baseplate 70 and bend toward both sides of the magnetic yoke baseplate 70, respectively.

[0042] As shown in FIGs.1 and 3a, the axis of the switch torsion spring 34 and the coordinating torsion spring 31 are arranged at intervals parallel to each other, the test button 32 and the handle 5-0 are arranged side by side at intervals, and the direction of movement of the test button 32 is perpendicular to the axial direction of the switch torsion spring 34 and the coordinating torsion spring 31.

[0043] As shown in FIG.1, the electric conduction-coordinating structure comprises a coordinating torsion spring shaft, the coordinating torsion spring 31 is disposed on the coordinating torsion spring shaft; pressing the test button 32 enables it to drive the switch arm of the switch torsion spring 34 to contact with the coordinating torsion spring shaft for electric conduction.

[0044] As shown in FIG.3a, one end of the first connecting rod 5-1 of the operating mechanism 5 connected to the second connecting rod 5-2 drivingly cooperates with the coordinating arm of the coordinating torsion spring 31, when the residual current-operated circuit breaker switches from the break-contact state to the make-contact state, the coordinating arm is driven to be electrically connected with the magnetic yoke 3-0.

[0045] As shown in FIGs.1-3a, the residual current-operated circuit breaker according to the present invention comprises the current-limiting resistor 36, which is connected in series between the connecting arm of the switch torsion spring 34 and the N-pole connecting terminal of the residual current-operated circuit breaker, and the zero-sequence current transformer 27 is connected in series between the magnetic yoke 3-0 and the L-pole connecting terminal of the residual current-operated circuit breaker. Further, the current-limiting resistor 36 is electrically connected to the N-pole connecting terminal of the residual current-operated circuit breaker via a second wire 37.

[0046] As shown in FIGs.1 and 3a-3b, the 18mm-width residual current-operated circuit breaker according to the present invention further comprises an anti-misoperation apparatus disposed within the first area A1, which comprises the position-restriction structure 33 that can be switched between the first position and the second position; when the handle 5-0 of the residual current-operated circuit breaker is positioned in a break-contact position, the handle 5-0 cooperates with the position-restriction

structure 33 to restrict it in the first position, and the position-restriction structure 33 blocks the test button 32 from being pressed to a test position; when the residual current-operated circuit breaker is in a make-contact state and the handle 5-0 is positioned in a make-contact position, the residual current-operated circuit breaker is tripped when external force presses the test button 32 to a test position, in this way the test button 32 drives the position-restriction structure 33 to act from the first position to the second position, then the handle 5-0 is restricted by the position-restriction structure 33 in the process of rotating from the make-contact position to the break-contact position, and blocks the handle 5-0 from rotating to the break-contact position, so that the handle 5-0 is kept in the intermediate temporarily-stopping position between the make-contact position and the break-contact position. Further, after the test button 32 is released and reset by the test position, the position-restriction structure 33 is reset from the second position to the first position, and the handle 5-0 rotates to the break-contact position. Further, after the test button 32 is released and reset by the test position, the position-restriction structure 33 is driven by the handle 5-0 to be reset from the second position to the first position.

[0047] The anti-misoperation apparatus can avoid the occurrence of the user's hand being hit by the handle of the operating mechanism when the user presses the test button for a leak electricity test, and avoid the occurrence of the operator being afraid of operating the test button due to the fear arising from being hit by the handle.

[0048] As shown in FIGs. 1 and 3a-3b, the position-restriction structure 33 is rotationally arranged, and the position-restriction structure 33 rotates to switch between the first position and second position.

[0049] Referring to FIGs.1 and 3a-3b, when the test button 32 is released and reset by the test position, at the same time the handle 5-0 rotates to the break-contact position and drives the position-restriction mechanism 33 to be reset from the second position to the first position.

[0050] As shown in FIGs.1 and 3a-3b, the position-restriction structure 33 is located between the test button 32 and the handle 5-0.

[0051] As shown in FIG.3b, the position-restriction structure 33 is rotationally arranged, and comprises the first boss 33-0 and the second boss 33-1. Referring to FIGs.1 and 3a-3b, when the handle 5-0 is in a break-contact position, the handle 5-0 restrictively cooperates with the second boss 33-1 to restrict the position-restriction structure 33 in the first position, the first boss 33-0 cooperates with the test button 32 to block the test button 32 from moving to the test position; when the test button 32 is in a test position, the test button 32 restrictively cooperates with the first boss 33-0 to restrict the position-restriction structure 33 in the second position, and the second boss 33-1 restrictively cooperates with the handle 5-0 to block the handle 5-0 from rotating to the break-contact position.

[0052] As shown in FIG.3b, the handle 5-0 comprises a handle-operated portion and a handle-installing portion, of the handle-operated portion one end protrudes outside the circuit breaker housing 1 for operation, the other end is connected to the handle-installing portion, the handle-installing portion is rotationally arranged on the circuit breaker housing 1, the handle-installing portion cooperates with the second boss 33-1. Further, the handle-installing portion comprises the circumferential sidewall 5-01 and the position-restriction boss 5-02; when the handle 5-0 is in a break-contact position, the circumferential sidewall 5-01 restrictively cooperates with the second boss 33-1; when the test button 32 is in a test position and the position-restriction structure 33 is in the second position, the second boss 33-1 restrictively cooperates with the position-restriction boss 5-02.

[0053] As shown in FIG. 1, the two ends of the bimetallic strip 13 are a bimetal-installing end and a bimetal-cooperated end, the bimetal-installing end is opposite the first area A1, and the bimetal-cooperated end is located between the second area A2 and the fifth area A5 and drivingly cooperates with the operating mechanism 5. Further, the bimetal-cooperated end drivingly cooperates with the lock buckle 5-4 of the operating mechanism 5 by means of the transmission rod 5-7.

[0054] As shown in FIG.2, the 18mm-width residual current-operated circuit breaker according to the present invention further comprises the second partition plate 15 and the bimetal-supporting piece 14 arranged in the fourth area A4, the bimetal-installing end of the bimetallic strip 13 is disposed on the bimetal-supporting piece 14, which is fixed between the second partition plate 15 and the circuit breaker housing 1 and restrictively cooperates with the second partition plate 15 and the circuit breaker housing 1. The adjusting nut 16-1 is fixed on the second partition plate 15, and the insulation adjustment knob 17 is rotationally arranged on the second partition plate 15 around its own axis. Further, referring to FIGs. 1 and 3a, the current-limiting resistor 36 is disposed on one side of the second partition plate 15, the bimetallic strip 13, the bimetal-supporting piece 14 and the adjustment structure are disposed on the other side of the partition plate 15.

[0055] As shown in FIG.1, the overload tripping mechanism further comprises an adjustment structure, which comprises the adjusting screw 16-0, the adjusting nut 16-1 and the insulation adjustment knob 17, the adjusting nut 16-1 is fixedly disposed, the adjusting screw 16-0 threadedly cooperates with the adjusting nut 16-1, of the adjusting screw 16-0 one end cooperates with the bimetallic strip 13, the other end cooperates with the insulation adjustment knob 17, the adjusting screw 16-0 rotates synchronously with the insulation adjustment knob 17, the insulation adjustment knob 17 increases the insulation gap and the creepage distance between the adjusting screw 16-0 and the outside of the residual current-operated circuit breaker, improving safety. Further, as shown in FIG.2, the insulation adjustment knob 17 comprises an adjustment knob boss, an adjustment knob in-

stalling portion, and an adjustment knob operating portion, all connected with each other in proper order, the adjusting screw 16-0 is provided with a screw-inserting hole for plugging of the adjustment knob boss, the outer diameter of the adjustment knob installing portion is greater than the outer diameters of the adjustment knob boss and the adjustment knob operating portion, the adjustment knob installing portion is rotationally arranged on the second partition plate 15. Further, the adjustment knob boss is a polygonal boss, and the screw-inserting hole is a polygon hole.

[0056] As shown in FIG.5b, the first partition plate 2 further comprises an air passage 2-20 disposed on one side thereof, which is a labyrinth passage, comprising at least two reverse zig-like passages, of the air passage 2-20 one end is opposite the N-pole contact system, and the other end is provided with at least one exhaust opening; the air passage 2-20 avoids excessively-long arc-jet distance. Further, the air passage 2-20 is provided with two exhaust openings, which are the first exhaust opening 2-10 and the second exhaust opening 2-13, respectively. Further, the first exhaust opening 2-10 and the second exhaust opening 2-13 are respectively oriented in two directions perpendicular to each other.

[0057] As shown in FIG.5b, the residual current-operated circuit breaker according to the present invention further comprises the N-pole arc-striking plate 39, which is arranged opposite the N-pole stationary contact 20 of the N-pole contact system, N-pole moving contact 38 is positioned between the N-pole arc-striking plate 39 and the N-pole stationary contact 20, the interspace between the N-pole arc-striking plate 39 and the N-pole stationary contact 20 is arranged opposite the inlet end of the air passage 2-20.

[0058] As shown in FIGs. 1 and 7, the residual current-operated circuit breaker according to the present invention further comprises the circuit board 30 disposed within the fifth area A5, the circuit board 30, the magnetic flux trip 24 and the zero-sequence current transformer 27 are arranged side by side in proper order along the length direction of the circuit breaker housing 1.

[0059] Referring to FIGs. 1 and 7, the residual current-operated circuit breaker according to the present invention further comprises the shielding cover 26 and the L-pole current input wiring board 29 disposed in the fifth area A5, and the L-pole arc-striking plate 25 disposed in the third area A3; the L-pole current input wiring board 29 and the L-pole arc-striking plate 25 are positioned on both sides of the magnetic flux trip 24, respectively, the L-pole arc-striking plate 25 is electrically connected to the L-pole current input wiring board 29 through the first wire 28; the shielding cover 26 comprises a shielding cover top plate and a shielding cover back plate, the shielding cover top plate is positioned between the zero-sequence current transformer 27 and the magnetic flux trip 24, the shielding cover back plate is located between the first wire 28 and the magnetic flux trip 24; the shielding cover 26 can effectively shield the influence of the strong magnetic field generated by the short-circuit current, avoiding the magnetic steel of the magnetic flux trip 24 from demagnetizing. Further, as shown in FIG.7, the L-pole current input wiring board 29 is provided with a groove, one end of the coil of the zero-sequence current transformer 27 cooperates with the groove of the L-pole current input wiring board 29, so as to ensure that the two are reliably soldered.

[0060] As shown in FIGs. 1-2 and 4a-4b, the 18mm-width residual current-operated circuit breaker according to the present invention further comprises a magnetic flux trip resetting structure, which comprises the poking rod 21 and the pushing rod 22 respectively rotationally arranged on the circuit breaker housing 1, and a resetting spring 23; when the magnetic flux trip 24 acts, the ejector rod of the magnetic flux trip 24 props up to drive the pushing rod 22 to rotate, the pushing rod 22 drives the operating mechanism 5 to be tripped; after the residual current-operated circuit breaker is tripped and breaks contact under the action of the magnetic flux trip 24, the resetting spring 23 drives the poking rod 21 to rotate, meanwhile the poking rod 21 drives the pushing rod 22 to rotate toward the direction, in which the pushing rod 22 rotates to reset the ejector rod; when the residual current-operated circuit breaker makes contact, the operating mechanism 5 drives the poking rod 21 to rotate to separate it from the pushing rod 22. Further, when the magnetic flux trip 24 acts, the pushing rod 22 drives the lock buckle 5-4 of the operating mechanism 5 to rotate, so as to enable the latter to release its locking fit with the jump buckle 5-3 to make the operating mechanism 5 to be tripped. Further, when the magnetic flux trip 4 acts, the pushing rod 22 drives the lock buckle 5-4 to rotate by means of the transmission rod 5-7. Further, as shown in FIG.1, the magnetic flux trip resetting structure is arranged between the arc extinguishing system 4 and the magnetic flux trip 24.

[0061] As shown in FIGs.1-2 and 4a-4b, the middle of the pushing rod 22 is rotationally arranged on the circuit breaker housing 1, one end cooperates with the transmission rod 8a, and the other end cooperates with the poking rod 21 and the magnetic flux trip 24, respectively.

[0062] As shown in FIGs.1-2 and 4a-4b, the magnetic flux trip resetting structure further comprises the drawbar 18, which is slidingly disposed on the circuit breaker housing 1, and the lever 5-5 of the operating mechanism 5 drivingly cooperates with the poking rod 21 by means of the drawbar 18. Further, the lever shaft 5-51 of the lever 5-5 cooperates with the poking rod 21 by means of the drawbar 18. Further, of the poking rod 21 one end is rotationally arranged on the circuit breaker housing 1, the middle cooperates with the drawbar 18, and the other end drivingly cooperates with the pushing rod 22.

[0063] We have made further detailed description of the present invention mentioned above in combination with specific preferred embodiments, but it is not deemed that the specific embodiments of the present invention is only limited to these descriptions. A person skilled in the

art can also, without departing from the concept of the present invention, make several simple deductions or substitutions, which all be deemed to fall within the protection scope of the present invention.

Claims

1. A 18 mm-width residual current-operated circuit breaker comprising a circuit breaker housing (1), in a projection perpendicular to a width direction of the circuit breaker housing (1), the circuit breaker housing (1) comprises a first area (A1), a second area (A2), a third area (A3), a fourth area (A4) and a fifth area (A5) disposed therein; the 18mm-width residual current-operated circuit breaker further comprises an operating mechanism (5) and a leak electricity test mechanism disposed in the first area (A1), a short-circuit instantaneous tripping mechanism (3), a L-pole contact system and a N-pole contact system disposed in the second area (A2), an arc extinguishing system (4) disposed in the third area (A3), an overload tripping mechanism comprising a bimetallic strip (13) disposed in the fourth area (A4), and a zero-sequence current transformer (27) and a magnetic flux trip (24) disposed in the fifth area (A5); the L-pole contact system and the N-pole contact system are arranged side by side along the width direction of the circuit breaker housing (1); the zero-sequence current transformer (27) and the magnetic flux trip (24) are arranged side by side along a length direction of the circuit breaker housing (1) and opposite the second area (A2) and the third area (A3) respectively.

2. The 18 mm-width residual current-operated circuit breaker according to claim 1, wherein the first area (A1), the second area (A2) and the third area (A3) are arranged in the length direction of the circuit breaker housing (1) in proper order and positioned at one end of a height direction of the circuit breaker housing (1), and the fourth area (A4) and the fifth area (A5) are positioned at another end of the height direction of the circuit breaker housing (1); the second area (A2), the third area (A3) and the fifth area (A5) are arranged side by side along the height direction of the circuit breaker housing (1); the first area (A1), the second area (A2) and the fourth area (A4) are arranged side by side along the height direction of the circuit breaker housing (1); part of the fourth area (A4) is located between the second area (A2) and the fifth area (A5); the zero-sequence current transformer (27) and the magnetic flux trip (24) are arranged opposite the second area (A2) and the third area (A3), respectively.

3. The 18 mm-width residual current-operated circuit breaker according to claim 2, wherein the fourth area (A4) is an L-shaped structure, of which one end is located between the second area (A2) and the fifth area (A5), and another end and the fifth area (A5) are arranged side by side along the length direction of the circuit breaker housing (1).

4. The 18 mm-width residual current-operated circuit breaker according to any one of claims 1-3, wherein the operating mechanism (5) comprises a handle (5-0), a jump buckle (5-3), a lock buckle (5-4) and a lever (5-5) respectively disposed on the circuit breaker housing (1), and a first connecting rod (5-1) and a second connecting rod (5-2); of the first connecting rod (5-1) one end articulates with the handle (5-0), another end articulates with one end of the second connecting rod (5-2) and is slidingly inserted in a jump buckle rounded-long-hole of the jump buckle (5-3), and another end of the second connecting rod (5-2) articulates with the lever (5-5), the lever (5-5) is respectively drivingly connected to a N-pole moving contact (38) of the N-pole contact system and a L-pole moving contact (19) of the L-pole contact system, the jump buckle (5-3) and the lock buckle (5-4) are in locking fit with each other, the lock buckle (5-4) is driven by the short-circuit instantaneous tripping mechanism (3), an overload tripping mechanism or a magnetic flux trip (24) to release its locking fit with the jump buckle (5-3), such that the operating mechanism is tripped.

5. The 18 mm-width residual current-operated circuit breaker according to claims 4, wherein the circuit breaker further comprises a first partition plate (2), the short-circuit instantaneous tripping mechanism (3), the L-pole contact system and the arc extinguishing system (4) respectively with the N-pole contact system are located on both sides of the first partition plate (2);
the lever (5-5) comprises a lever partition (5-50), the L-pole moving contact (19) and the N-pole moving contact (38) are respectively located on both sides of the lever partition (5-50), the lever partition (5-50) is misaligned and overlaps with the first partition plate (2), which at least partially extends into the interspace between the L-pole moving contact (19) and the N-pole moving contact (38); when the L-pole moving contact (19) and the N-pole moving contact (38) move together with the lever (5-5), the lever partition (5-50) and the first partition plate (2) always maintain at least partial overlap.

6. The 18 mm-width residual current-operated circuit breaker according to claims 4, wherein the short-circuit instantaneous tripping mechanism (3) directly drivingly cooperates with the lock buckle (5-4); the operating mechanism further comprises a transmission rod (5-7), of which one end articulates with the lock buckle (5-4), and another end drivingly cooper-

ates with the bimetallic strip (13) and the magnetic flux trip (24), respectively.

7. The 18 mm-width residual current-operated circuit breaker according to claims 4, wherein of the lock buckle (5-4) one end is rotationally disposed on the circuit breaker housing (1), and another end is provided with a driven surface (61) and a striking portion (62), the driven surface (61) drivingly cooperates with the short-circuit instantaneous tripping mechanism (3), and the striking portion (62) drivingly cooperates with the L-pole moving contact (19); when the movable surface (61) is struck by the short-circuit instantaneous tripping mechanism (3) to rotate the lock buckle (5-4), the striking portion (62) strikes the L-pole moving contact (19), so that it separates from a L-pole stationary contact (3-2) of the L-pole contact system.

8. The 18 mm-width residual current-operated circuit breaker according to any one of claims 1-3, wherein the leak electricity test mechanism comprises a test button (32), and a switch torsion spring (34) and an electric conduction-coordinating structure successively connected in series between a L-pole circuit and a N-pole circuit of the residual current-operated circuit breaker, the test button (32), the switch torsion spring (34) and the electric conduction-coordinating structure are all located on one side of a handle (5-0) of the operating mechanism (5), and the test button (32) and the handle (5-0) are arranged side by side along a height direction of the circuit breaker housing (1);

two ends of the switch torsion spring (34) are a switch arm and a connecting arm respectively, the switch arm drivingly cooperates with the test button (32), and the connecting arm is fixedly disposed; the electric conduction-coordinating structure comprises a coordinating torsion spring (31), two ends of the coordinating torsion spring (31) are a coordinating arm and a fixed arm respectively, the coordinating arm drivingly cooperates with the operating mechanism, and the fixed arm is fixedly disposed; the short-circuit instantaneous tripping mechanism (3) is an electromagnetic trip, comprising a magnetic yoke (3-0) and a coil assembly (3-1), the magnetic yoke (3-0) is electrically connected to the L-pole contact system; the coordinating arm is disconnected from the magnetic yoke (3-0) when the circuit breaker is in a break-contact state; the operating mechanism drives the coordinating arm to connect the magnetic yoke (3-0) when the circuit breaker switches from the break-contact state to a make-contact state; the switch arm and the electric conduction-coordinating structure remain in a normal disconnected state, pressing the test button (32) enables it to drive the switch arm to contact with the electric conduction-coordinating structure for electric conduction.

9. The 18 mm-width residual current-operated circuit breaker according to any one of claims 1-3, wherein the 18 mm-width residual current-operated circuit breaker further comprises an anti-misoperation apparatus disposed within the first area (A1), which comprises a position-restriction structure (33) that can be switched between a first position and a second position; when a handle (5-0) of the residual current-operated circuit breaker is positioned in a break-contact position, the handle (5-0) cooperates with the position-restriction structure (33) to restrict it in the first position, and the position-restriction structure (33) blocks a test button (32) of the leak electricity test mechanism from being pressed to a test position; when the circuit breaker is in a make-contact state, external force presses the test button (32) to the test position, the position-restriction structure (33) acts to the second position, blocking the handle (5-0) from rotating to the break-contact position;

after the test button (32) is released, the position-restriction structure (33) is driven by the handle (5-0) to reset from the second position to the first position, and the handle (5-0) rotates to the break-contact position.

10. The 18 mm-width residual current-operated circuit breaker according to any one of claims 1-3, wherein two ends of the bimetallic strip (13) are a bimetal-installing end and a bimetal-cooperated end, the bimetal-installing end is opposite the first area (A1), and the bimetal-cooperated end is located between the second area (A2) and the fifth area (A5) and drivingly cooperates with the operating mechanism (5).

11. The 18 mm-width residual current-operated circuit breaker according to claim 10, wherein the overload tripping mechanism further comprises an adjustment structure, which comprises an adjusting screw (16-0), an adjusting nut (16-1) and an insulation adjustment knob (17), the adjusting nut (16-1) is fixedly disposed, the adjusting screw (16-0) threadedly cooperates with the adjusting nut (16-1), of the adjusting screw (16-0) one end cooperates with the bimetallic strip (13), another end cooperates with the insulation adjustment knob (17), and the adjusting screw (16-0) rotates synchronously with the insulation adjustment knob (17);

the 18 mm-width residual current-operated circuit breaker further comprises a second partition plate (15) and a bimetal-supporting piece (14) arranged in the fourth area (A4), the bimetal-installing end is disposed on the bimetal-supporting piece (14), which is fixed between the second partition plate (15) and the circuit breaker housing (1), the adjusting nut (16-1) is fixed on the second partition plate (15), and the insulation adjustment knob (17) is rotationally arranged on the second partition plate (15) around its own axis.

12. The 18 mm-width residual current-operated circuit breaker according to any one of claims 1-3, wherein the circuit breaker further comprises a first partition plate (2), the first partition plate (2) further comprises an air passage (2-20) disposed on one side thereof, which is a labyrinth air passage, comprising at least two reverse zig-like passages, of the air passage (2-20) one end is opposite the N-pole contact system, and another end is provided with at least one exhaust opening.

13. The 18 mm-width residual current-operated circuit breaker according to any one of claims 1-3, wherein the 18 mm-width residual current-operated circuit breaker further comprises a circuit board (30) disposed in the fifth area (A5), the circuit board (30), the magnetic flux trip (24) and the zero-sequence current transformer (27) are arranged side by side in proper order along the length direction of the circuit breaker housing (1).

14. The 18 mm-width residual current-operated circuit breaker according to any one of claims 1-3, wherein the 18 mm-width residual current-operated circuit breaker further comprises a shielding cover (26) and a L-pole current input wiring board (29) disposed within the fifth area (A5), and a L-pole arc-striking plate (25) disposed within the third area (A3);
the L-pole current input wiring board (29) and the L-pole arc-striking plate (25) are positioned on both sides of the magnetic flux trip (24) respectively, the L-pole arc-striking plate (25) is electrically connected to the L-pole current input wiring board (29) through a first wire (28); the shielding cover (26) comprises a shielding cover top plate and a shielding cover back plate, the shielding cover top plate is positioned between the zero-sequence current transformer (27) and the magnetic flux trip (24), the shielding cover back plate is located between the first wire (28) and the magnetic flux trip (24).

15. The 18 mm-width residual current-operated circuit breaker according to any one of claims 1-3, wherein the 18 mm-width residual current-operated circuit breaker further comprises a magnetic flux trip resetting structure, which comprises a poking rod (21) and a pushing rod (22) respectively rotationally arranged on the circuit breaker housing (1), and a resetting spring (23);
when the magnetic flux trip (24) acts, a ejector rod of the magnetic flux trip (24) props up to drive the pushing rod (22) to rotate, the pushing rod (22) drives the operating mechanism (5) to be tripped; after the residual current-operated circuit breaker is tripped and breaks contact under the action of the magnetic flux trip (24), the resetting spring (23) drives the poking rod (21) to rotate, meanwhile the poking rod (21) drives the pushing rod (22) to rotate toward the direction, in which the pushing rod (22) rotates to reset the ejector rod; when the residual current-operated circuit breaker makes contact, the operating mechanism (5) drives the poking rod (21) to rotate to separate it from the pushing rod (22).

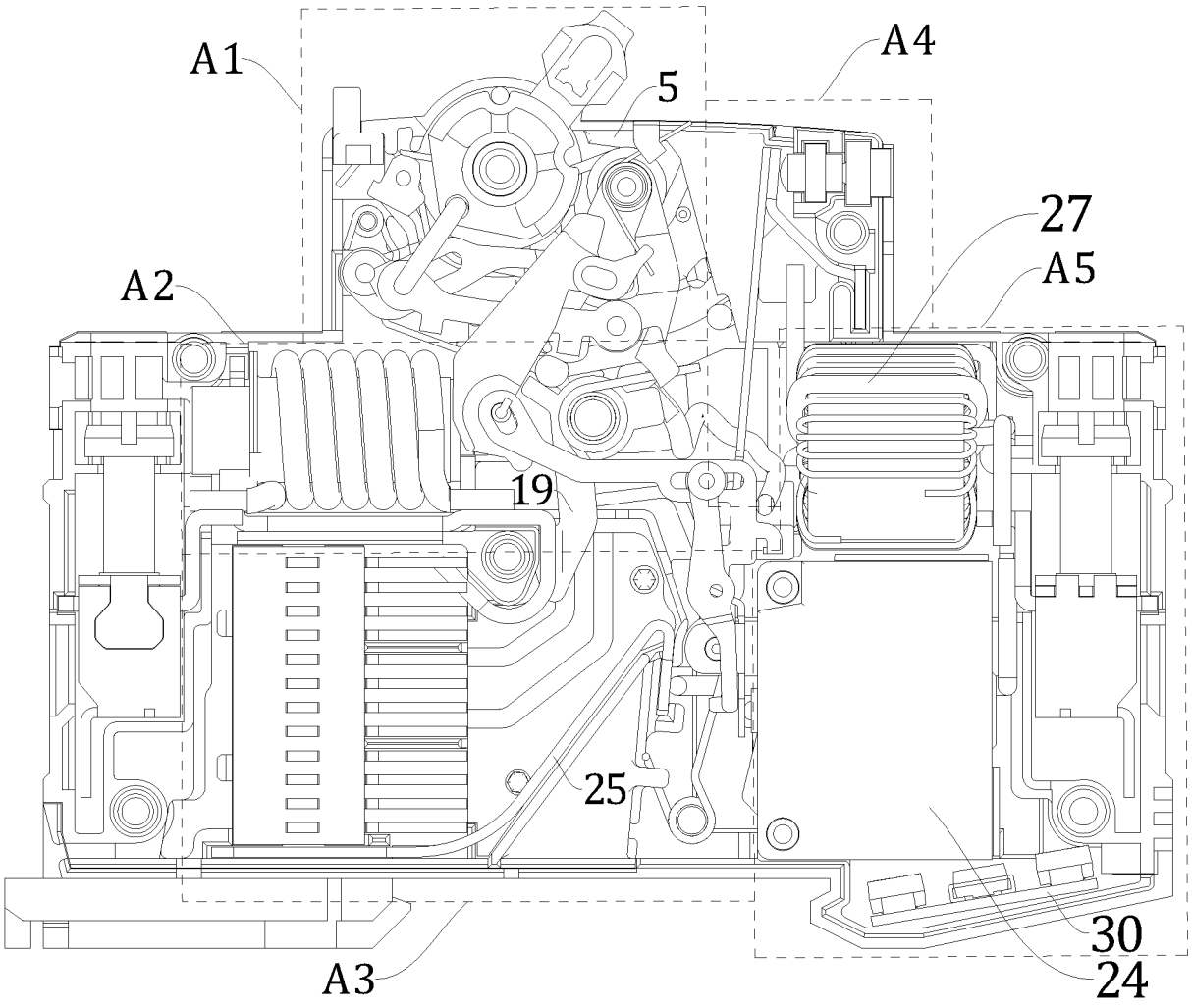

Fig.1

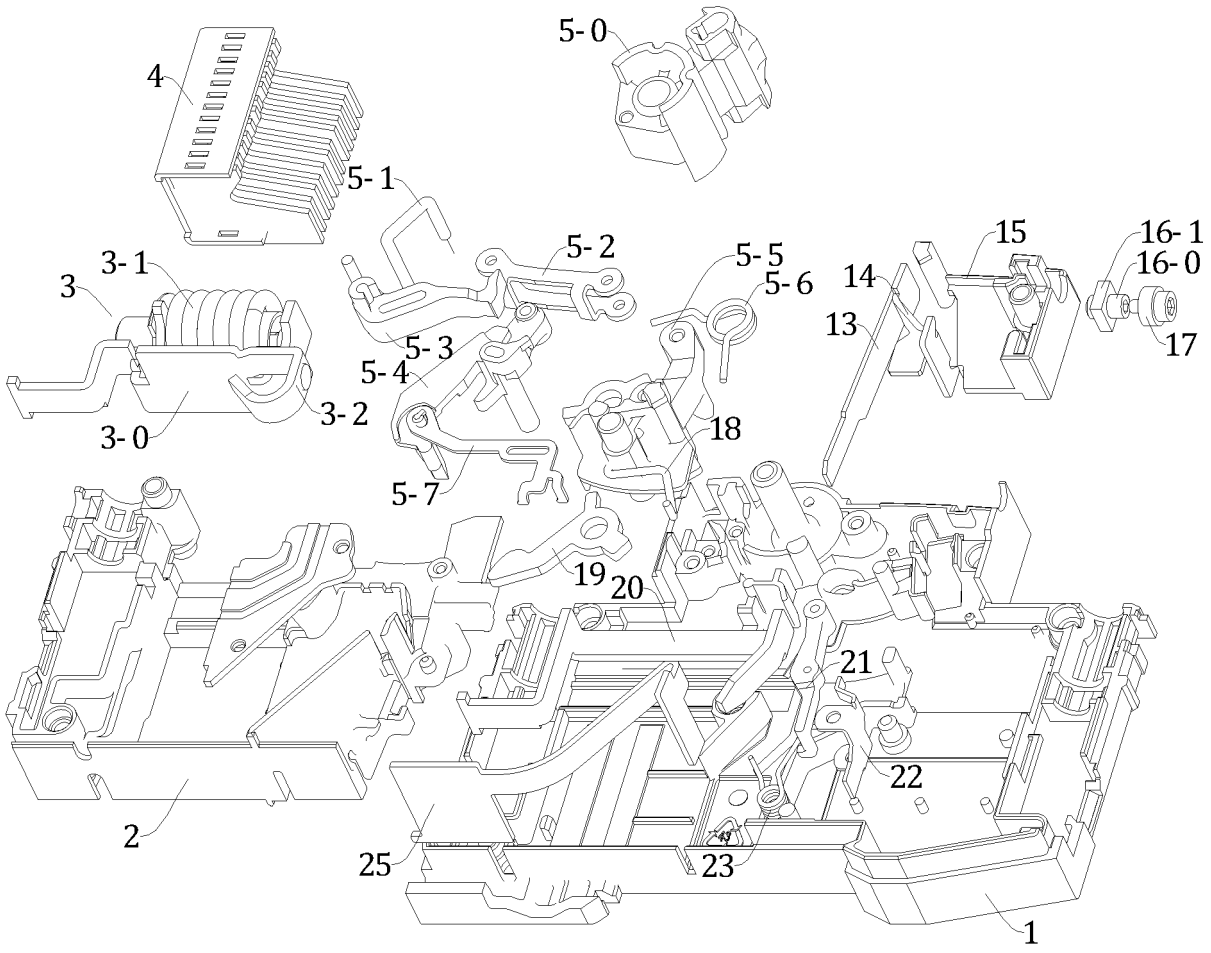
5-0
4
5-1
5-2
5-5
5-6
15
16-1
16-0
14
13
17
3-1
3
5-3
5-4
3-2
3-0
18
5-7
19
20
21
22
2
25
23
1

Fig.2

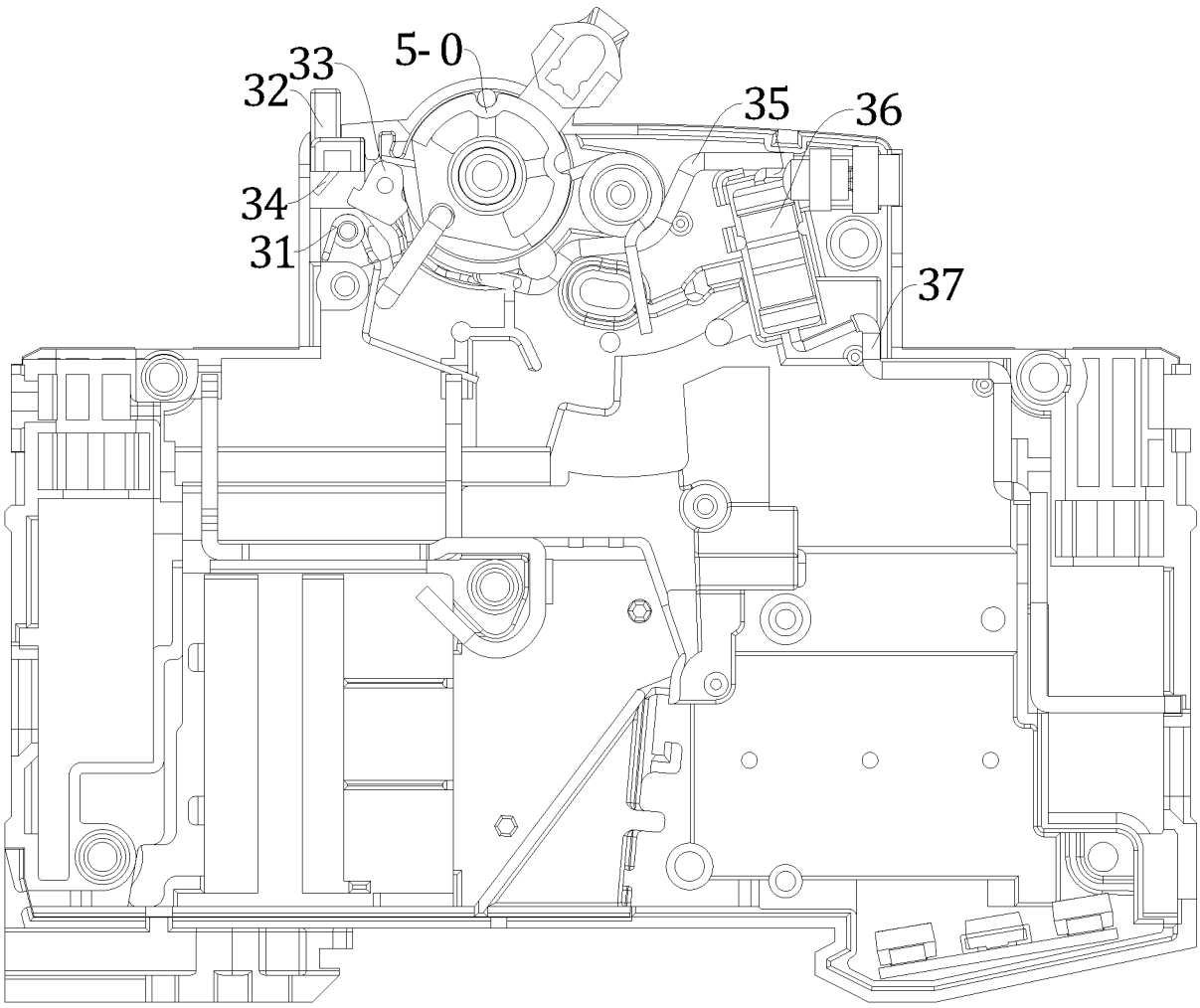

Fig.3a

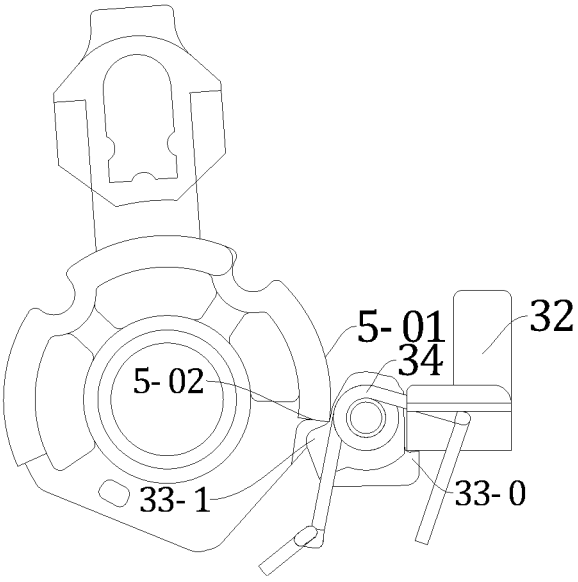

Fig.3b

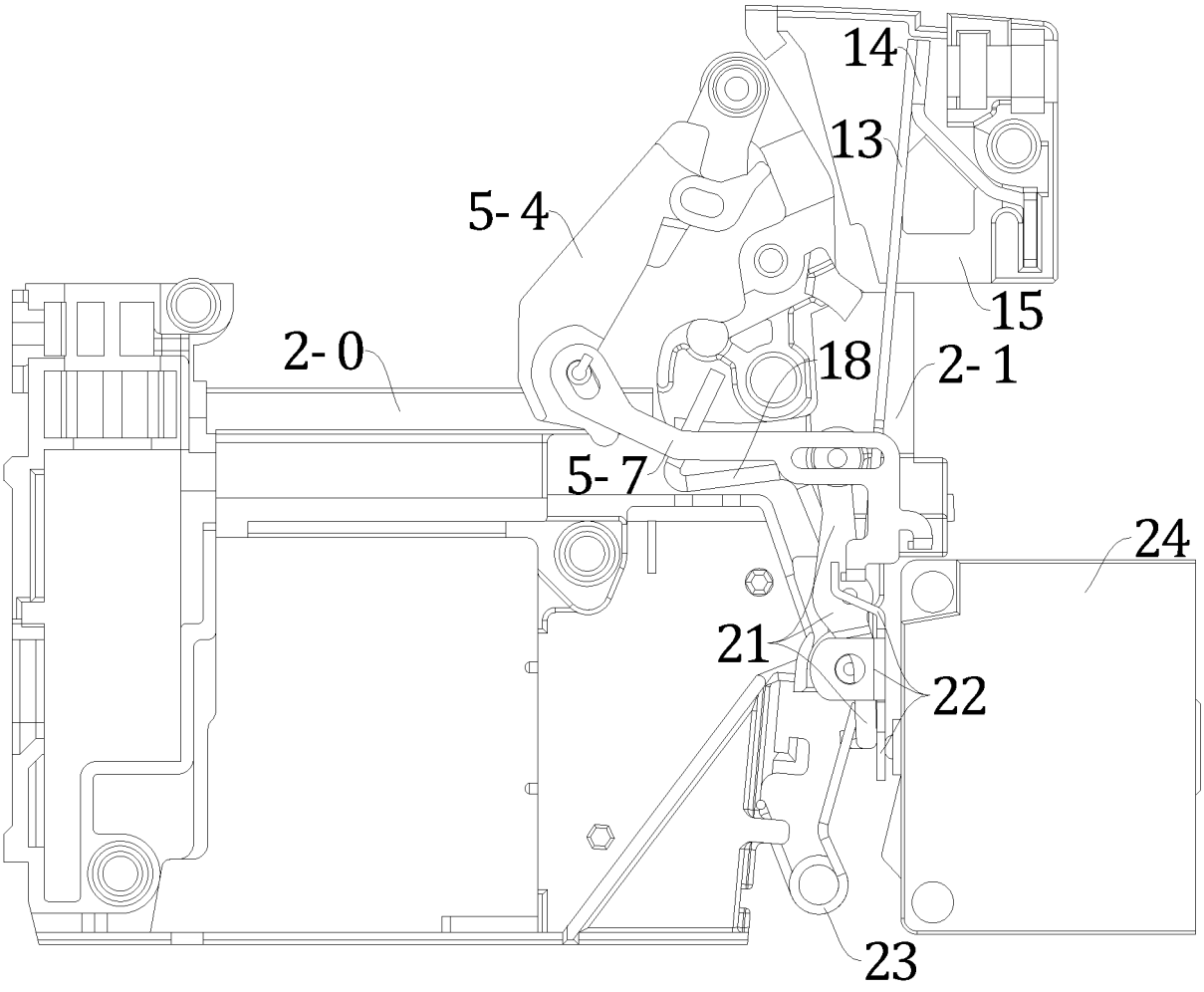

Fig.4a

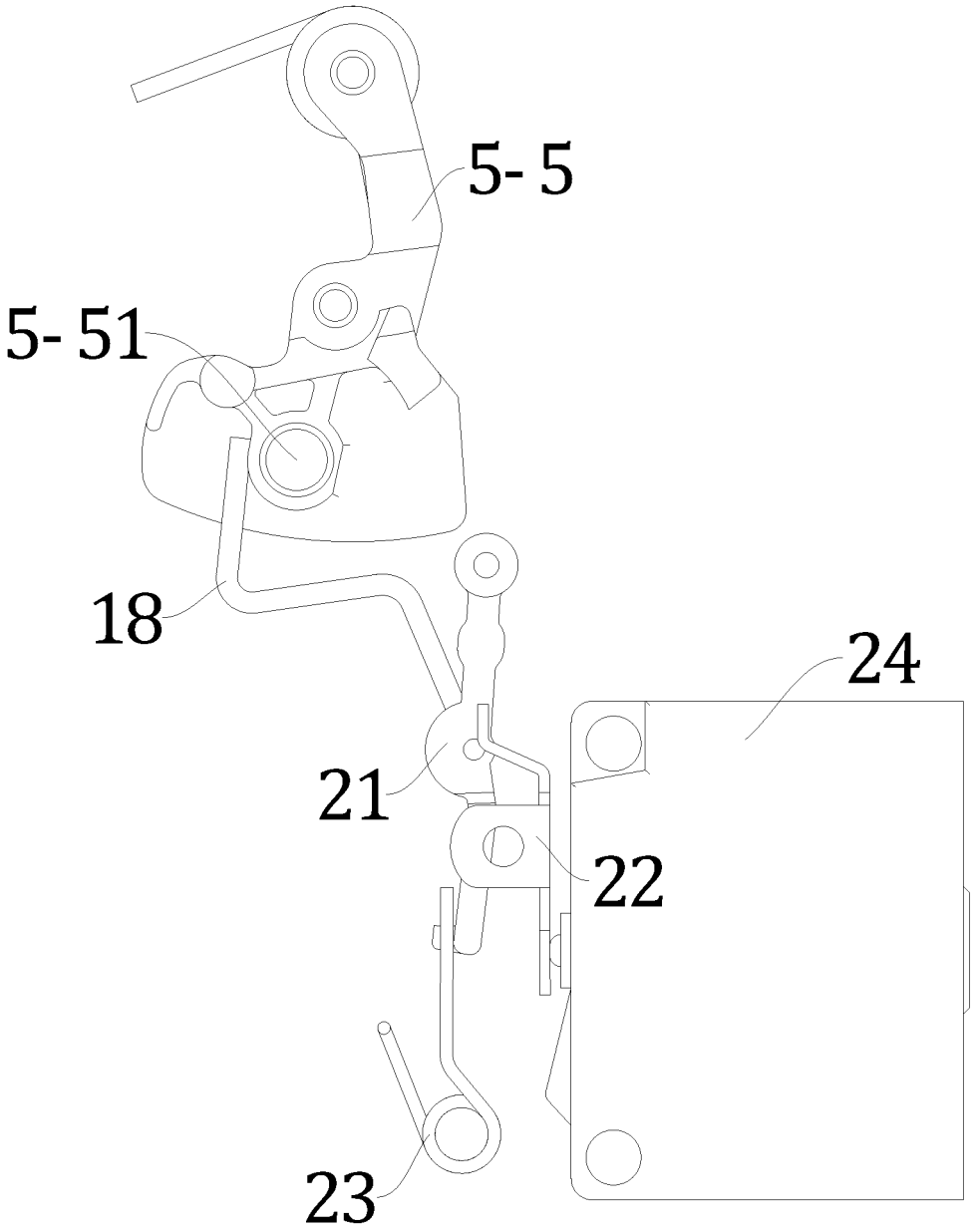

Fig.4b

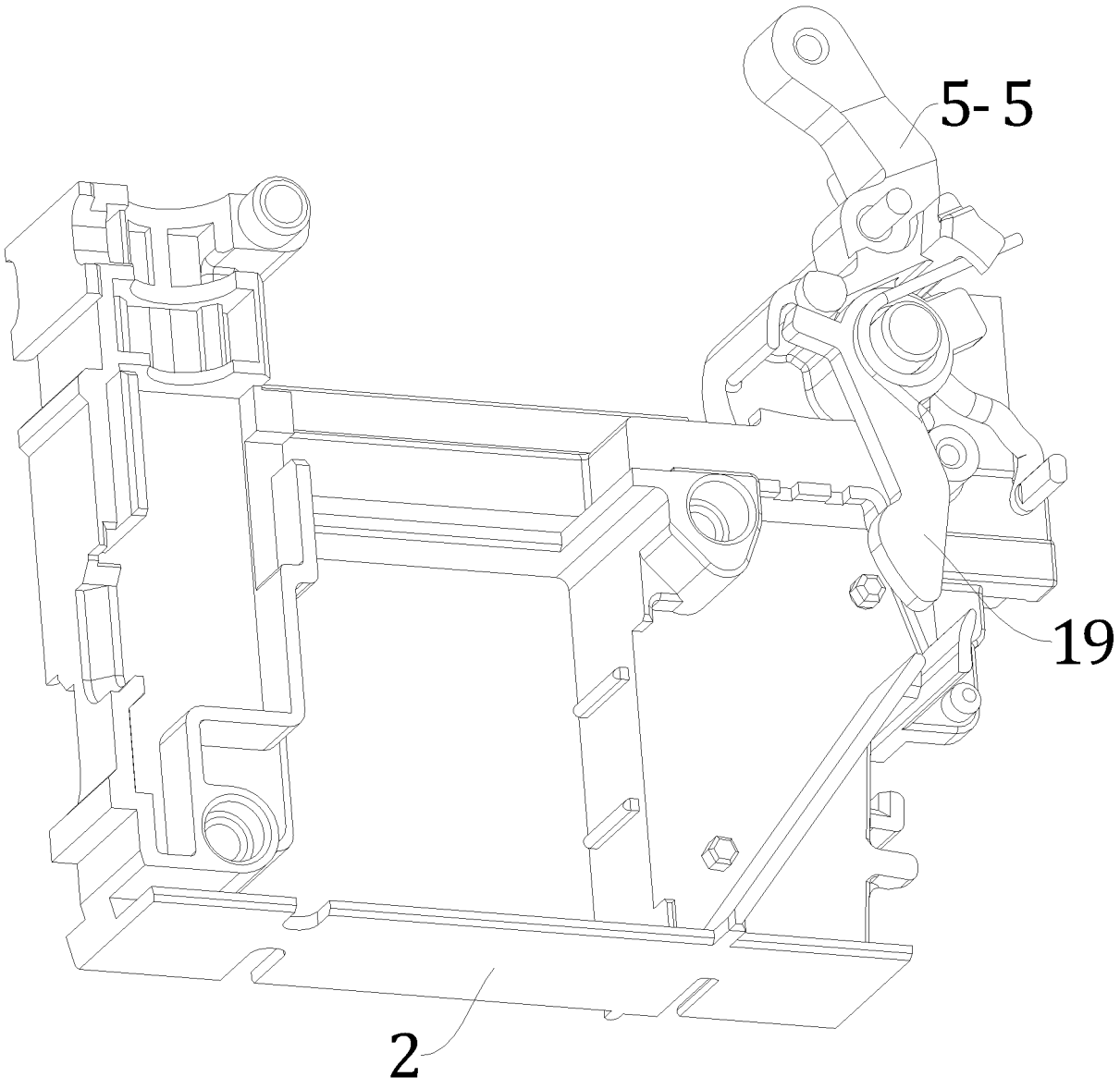

Fig.5a

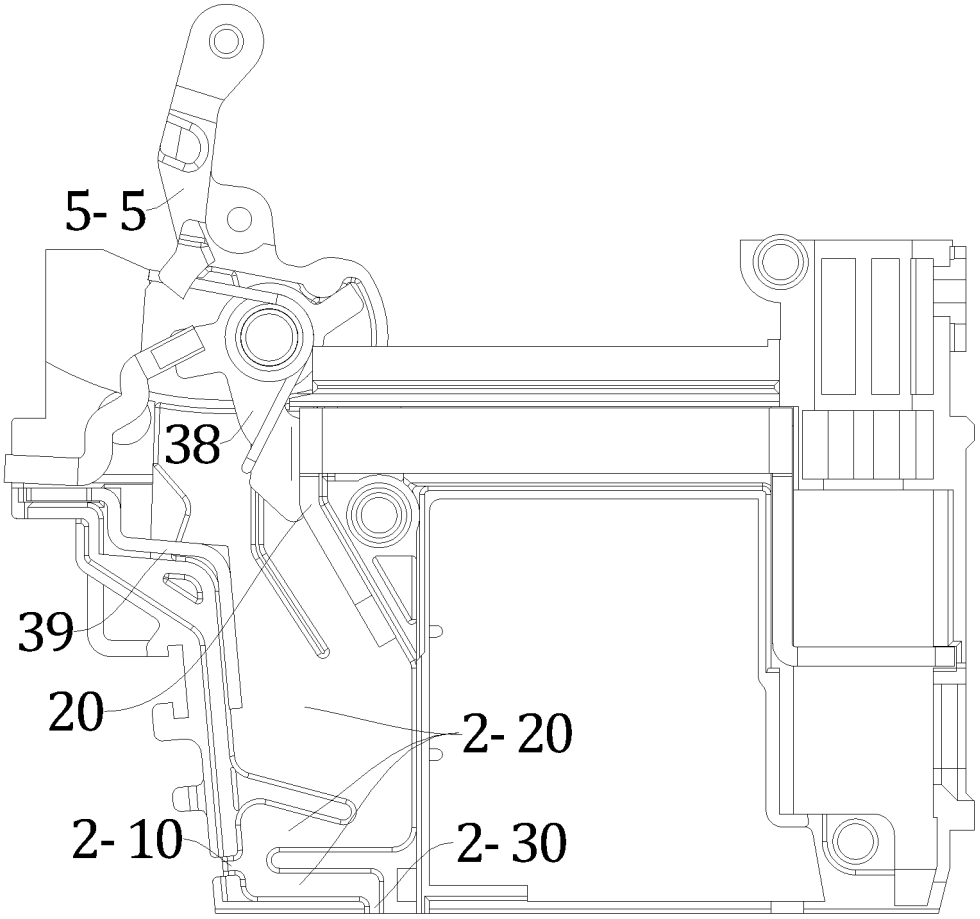

Fig.5b

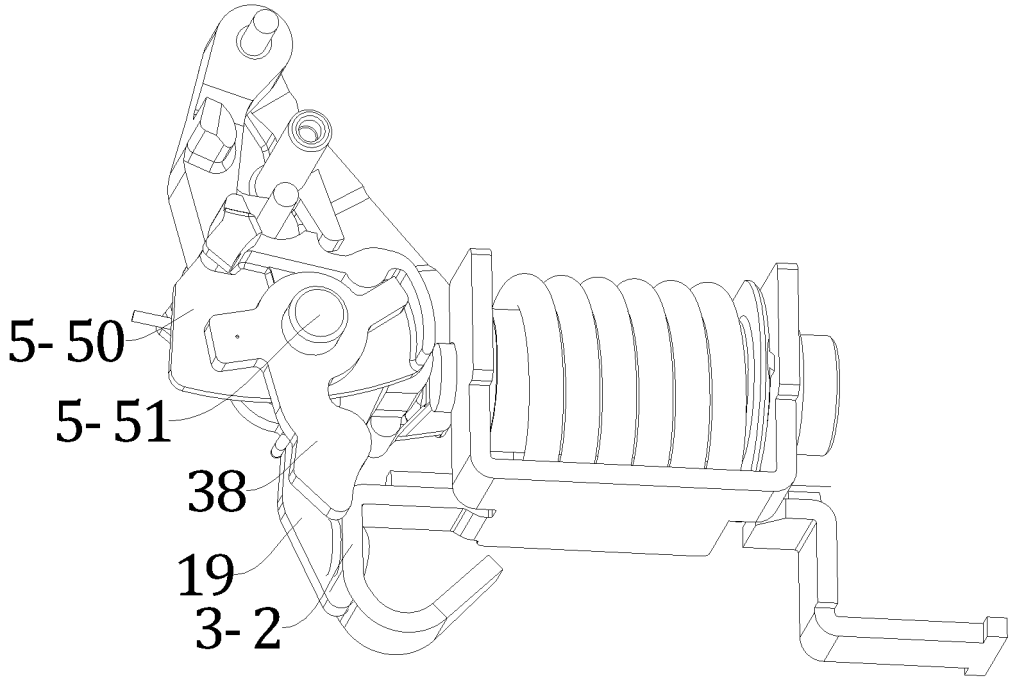

Fig.6

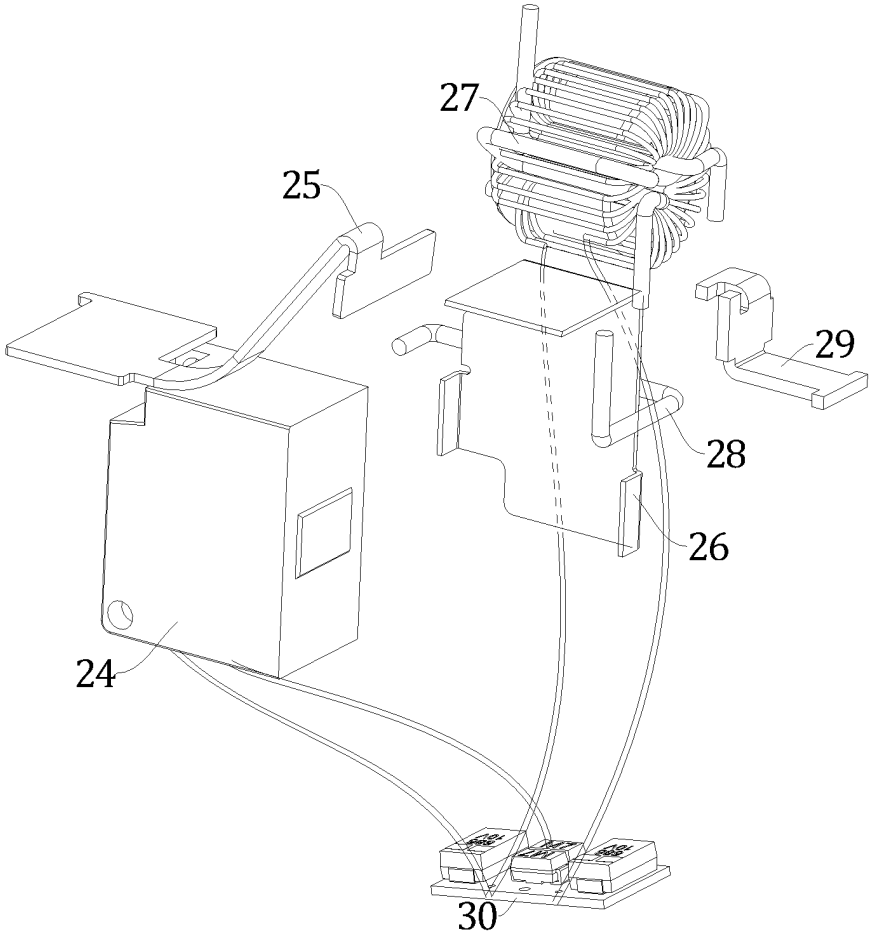

Fig.7

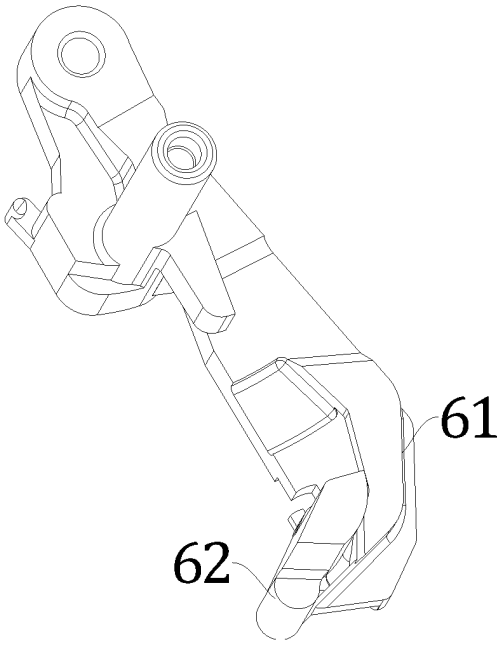

Fig.8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/125618

A. CLASSIFICATION OF SUBJECT MATTER

H01H 71/02(2006.01)i; H01H 71/10(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)

CNPAT, CNKI, WPI, EPODOC: 断路器, 剩余电流, 操作, 手柄, 灭弧, 触头, 脱扣器, 漏电, 短路, 过载, breaker, residual current, operation, handle, arc extinguishing, contact, release, leakage, short, overload

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 207250433 U (ZHEJIANG CHINT ELECTRICS CO., LTD.) 17 April 2018 (2018-04-17) description, paragraphs [0026]-[0035], and figures 1-9	1, 13
Y	CN 212783318 U (ZHEJIANG CHINT ELECTRICS CO., LTD.) 23 March 2021 (2021-03-23) description, paragraphs [0034]-[0059], and figures 1-13	1, 13
A	CN 112466726 A (SHANGHAI CHINT INTELLIGENT TECHNOLOGY CO., LTD.) 09 March 2021 (2021-03-09) entire document	1-15
A	CN 209658114 U (QUANZHOU YIXING ELECTRIC POWER CO., LTD. et al.) 19 November 2019 (2019-11-19) entire document	1-15
A	CN 212783272 U (ZHEJIANG CHINT ELECTRICS CO., LTD.) 23 March 2021 (2021-03-23) entire document	1-15
A	CN 207441590 U (ZHEJIANG DAZHAN ELECTRICAL CO., LTD.) 01 June 2018 (2018-06-01) entire document	1-15

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 December 2022	**26 December 2022**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/125618

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6172586 B1 (SIEMENS ENERGY & AUTOMATION INC.) 09 January 2001 (2001-01-09) entire document	1-15

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/125618

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 207250433 U	17 April 2018	None	
CN 212783318 U	23 March 2021	None	
CN 112466726 A	09 March 2021	None	
CN 209658114 U	19 November 2019	None	
CN 212783272 U	23 March 2021	None	
CN 207441590 U	01 June 2018	None	
US 6172586 B1	09 January 2001	EP 1098342 A2	09 May 2001

Form PCT/ISA/210 (patent family annex) (January 2015)