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(54) CIRCUIT BREAKER

(57) A circuit breaker is disclosed. The circuit breaker includes a housing assembly, and a contacting system, a leakage protection mechanism and a leakage testing mechanism arranged in the housing assembly, wherein the contacting system includes a handle, a contact head mechanism and an operating mechanism; when the circuit breaker is closed or opened, the operating mechanism is driven by the handle to close or open the contact head mechanism; the leakage testing mechanism includes a leakage testing button, and a leakage testing loop cooperating with a zero-sequence current transformer of the leakage protection mechanism; the leakage testing loop includes a first test contact point cooperating with the leakage testing button, and a second test contact point cooperating with the contacting system, wherein the second test contact point remains closed, and the contacting system breaks the second test contact point when the circuit breaker is opened; and the contacting system makes way for the second test contact point when the circuit breaker is closed, such that the second test contact point resets and remains closed without affecting contact head parameters of the contact head mechanism, thereby ensuring a contact head pressure when the contact head mechanism is closed.

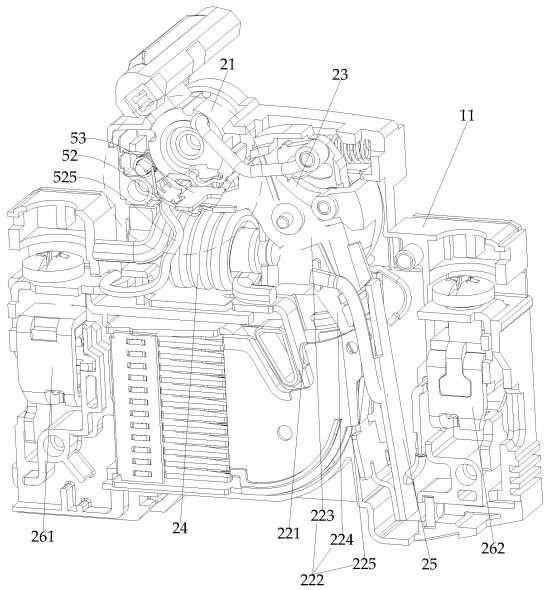


FIG.6

EP 4 068 328 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of low-voltage electrical appliances, and more particularly, to a circuit breaker.

BACKGROUND OF THE INVENTION

[0002] At present, for a circuit breaker with leakage protection on the market, especially an integrated electromagnetic residual current operated circuit breaker, in order to test whether a leakage protection function of the circuit breaker fails, it is necessary to connect the circuit breaker to a circuit and close the circuit breaker first, and then push a testing button to close a contact point of a leakage testing loop. The leakage testing loop simulates a leakage signal and judges whether the leakage protection function is invalid according to whether the circuit breaker can break the circuit.

[0003] However, in the case that the circuit breaker is not closed, that is, when the circuit breaker is in an opened state, if the testing button is pushed to close the contact point of the leakage testing loop, a voltage will be generated at a wire outlet end of the circuit breaker, leaving a serious safety hazard. Due to the trend of miniaturization of low-voltage electrical appliances, the circuit breaker has a relatively small volume and a relatively compact internal structure. If the number of contact points of the leakage testing loop is increased, the problems of increased volume and reduced performance of the circuit breaker are easily caused.

SUMMARY OF THE INVENTION

[0004] An objective of the present invention is to overcome the defects of the prior art and provide a circuit breaker with a simple structure and high contact reliability of a contact head mechanism.

[0005] In order to achieve the above object, the present invention adopts the following technical solutions:

A circuit breaker, comprising a housing assembly, and a contacting system, a leakage protection mechanism and a leakage testing mechanism arranged in the housing assembly, wherein the contacting system comprises a handle, a contact head mechanism and an operating mechanism; the operating mechanism is driven by the handle to close or open the contact head mechanism; the leakage testing mechanism comprises a leakage testing button and a leakage testing loop; the leakage testing loop comprises a first test contact point cooperating with the leakage testing button, and a second test contact point cooperating with the contacting system; the contacting system drives the second test contact point to be broken when the circuit breaker is opened; the contacting system makes way for the second test contact point when the circuit breaker is closed, such that the second test contact point resets and remains closed; the testing button is used to drive the first test contact point to be closed; and the leakage testing loop is turned on when both the first test contact point and the second test contact point are closed.

[0006] Preferably, the leakage testing loop comprises an intermediate connecting member, and a first elastic member and a second elastic member which cooperate with both ends of the intermediate connecting member respectively; the first elastic member and one end of the intermediate connecting member are spaced from each other to form the first test contact point of the leakage testing loop; the leakage testing button can be pushed to drive the first elastic member to contact the intermediate connecting member so as to close the first test contact point; the second elastic member is in contact and cooperation with the other end of the intermediate connecting member to form the second test contact point of the leakage testing loop; the contacting system does not make contact with the second test contact point when the circuit breaker is closed, such that the second test contact point remains closed; and the contacting system drives the second elastic member to be separated from the intermediate connecting member when the circuit breaker is opened, so as to break the second test contact point.

[0007] Preferably, the contact head mechanism comprises a static contact head and a movable contact head which are respectively connected to a circuit; the operating mechanism can drive the static contact head to be in contact with and separated from the movable contact head; the movable contact head comprises a contact head support pivotally mounted in the housing assembly to cooperate with the operating mechanism, and a movable contact plate arranged on the contact head support, wherein a movable contact point cooperating with the static contact head is provided on the movable contact plate; the second test contact point cooperates with the contact head support of the movable contact head, and the contact head support drives the movable contact point to be separated from the static contact head when the circuit breaker is opened, and simultaneously drives the second elastic member to be separated from the intermediate connecting member; and the contact head support drives the movable contact point to be in contact with the static contact head when the circuit breaker is closed, and simultaneously moves away from the second elastic member to reset the second elastic member.

[0008] Preferably, comprising a plurality of circuit breaker units which is arranged side by side, wherein each of the plurality of circuit breaker units comprises a contacting system, and at least one circuit breaker unit comprises a leakage protection mechanism; the first elastic member and the second elastic member of the leakage testing mechanism are respectively arranged in two different circuit breaker units, and respectively connected to the contacting systems of the two circuit breaker units; and the middle part of the intermediate connect-

ing member of the leakage testing mechanism passes through the housing assembly, and both ends of the intermediate connecting member of the leakage testing mechanism extend into the circuit breaker units which correspond to the first elastic member and the second elastic member respectively.

[0009] Preferably, the contacting system comprises a handle, a contact head mechanism, an operating mechanism, a wiring mechanism, a short-circuit protection mechanism and an overload protection mechanism; the wiring mechanism comprises a left wiring terminal and a right wiring terminal which are respectively arranged at both ends of the circuit breaker unit, wherein the left wiring terminal is connected to the static contact head through the short-circuit protection mechanism, and the right wiring terminal is connected to the movable contact plate of the movable contact head through the overload protection mechanism; a second wire connected between the left wiring terminal of each circuit breaker unit and the short-circuit protection mechanism passes through a zero-sequence current transformer; one end of the second elastic member, which is not in cooperation with the intermediate connecting member, is connected to the second wire of the circuit breaker unit provided with the second elastic member; and the first elastic member is connected to the right wiring terminal of the circuit breaker unit provided with the first elastic member through a testing resistor.

[0010] Preferably, the second elastic member comprises a second helical portion pivotally mounted on the housing assembly, and a second contact arm and a second connecting arm which are respectively provided at both ends of the second helical portion; the second helical portion of the second elastic member and the contact head support of the movable contact head are oppositely arranged on both sides of the intermediate connecting member; the middle part of the second contact arm passes through the lower side of the intermediate connecting member and then cooperates with the contact head support; when the contact head support drives the movable contact point to be separated from the static contact head, the second contact arm is pushed to be separated from the intermediate connecting member to break the second test contact point; and when the contact head support drives the movable contact point to be in contact with the static contact head, the second contact arm resets and is in contact with the intermediate connecting member to close the second test contact point.

[0011] Preferably, the second contact arm is of a U-shaped structure; a contact head boss is arranged on the contact head support; one end of the intermediate connecting member is located inside the second contact arm; one end of the second contact arm is connected to the second helical portion; and a second pushing arm which cooperates with the contact head boss is arranged at the other end of the second contact arm.

[0012] Preferably, a conductive sheet is arranged in the housing assembly; the second elastic member is clamped on the conductive sheet; a clamping groove which is in limited cooperation with the second connecting arm is formed in one end of the conductive sheet; and a lower extension sheet for wiring is arranged at the other end of the conductive sheet.

[0013] Preferably, the contacting system further comprises a short-circuit protection mechanism; the second helical portion is arranged above one side of the intermediate connecting member away from the contact head support; the conductive sheet is arranged on one side of the handle, and located above the short-circuit protection mechanism; the conductive sheet comprises a longitudinal sheet and a transverse sheet whose one ends are connected, and an oblique sheet connected to the other end of the transverse sheet, wherein the longitudinal sheet is arranged on the horizontal side of the second helical portion; the side edge of the longitudinal sheet is provided with a clamping groove which is in limited cooperation with the second connecting arm; one end of the transverse sheet is connected to the bottom end of the longitudinal sheet, the other end of the transverse sheet is connected to the top end of the oblique sheet arranged obliquely, and the bottom end of the oblique sheet extends to the upper side of the short-circuit protection mechanism; and a lower extension sheet is arranged on the oblique sheet.

[0014] Preferably, comprising a leakage protection unit and a circuit breaker protection unit which are arranged side by side, wherein the leakage testing mechanism is arranged between the leakage protection unit and the circuit breaker protection unit; each of the leakage protection unit and the circuit breaker protection unit comprises a contacting system, and the contacting systems of the leakage protection unit and the circuit breaker protection unit pass through the zero-sequence current transformer of the leakage testing mechanism; the leakage protection mechanism, the first elastic member of the leakage testing mechanism and the leakage testing button of the leakage testing mechanism are arranged in the leakage protection unit; the second elastic member of the leakage testing mechanism is arranged in the circuit breaker protection unit to cooperate with the operating mechanism of the circuit breaker protection unit; the housing assembly is correspondingly provided with an intermediate partition plate between the leakage protection unit and the circuit breaker protection unit; the intermediate connecting member of the leakage testing mechanism passes through the intermediate partition plate; and one end of the intermediate connecting member extends into the leakage protection unit to cooperate with the first elastic member, and the other end of the intermediate connecting member extends into the circuit breaker protection unit to cooperate with the second elastic member.

[0015] Preferably, the contacting system of the leakage protection unit has the same structure as the contacting system of the circuit breaker protection unit; each of the contacting systems of the leakage protection unit

and the circuit breaker protection unit comprises a handle, a contact head mechanism, an operating mechanism, a wiring mechanism, a short-circuit protection mechanism and an overload protection mechanism; the contact head mechanism comprises a static contact head and a movable contact head which are opposite to each other; the movable contact head comprises a contact head support pivotally mounted in the housing assembly and cooperating with the operating mechanism, and a movable contact plate on the contact head support; the movable contact plate is provided with a movable contact point cooperating with the static contact head; the wiring mechanism comprises a left wiring terminal and a right wiring terminal respectively arranged at both ends of the circuit breaker unit, wherein the left wiring terminal is connected to the static contact head through the short-circuit protection mechanism, and the right wiring terminal is connected to the movable contact plate of the movable contact head through the overload protection mechanism; the second wire connected between the left wiring terminal of the circuit breaker protection unit and the short-circuit protection mechanism passes through the zero-sequence current transformer; the second elastic member of the leakage testing loop is connected to the second wire connected between the left wiring terminal of the circuit breaker protection unit and the short-circuit protection mechanism; and the first elastic member of the leakage testing loop is connected to the right wiring terminal of the leakage protection unit through the testing resistor.

[0016] Preferably, the housing assembly is correspondingly provided with an intermediate partition plate between the circuit breaker protection unit and the leakage protection unit; a protruding structure is arranged on one side of the partition plate close to the leakage protection unit, and a space for accommodating the short-circuit protection mechanism of the contacting system in the circuit breaker protection unit is formed on one side of the protruding structure close to the circuit breaker protection unit; one end of the intermediate connecting member, which cooperates with the second elastic member, is arranged above the short-circuit protection mechanism in the circuit breaker protection unit; and one end of the intermediate connecting member, which cooperates with the first elastic member, passes through the intermediate partition plate and extends to the top side of the protruding structure for cooperation.

[0017] Preferably, the intermediate connecting member is of a Z-shaped structure; the intermediate connecting member comprises a connecting plate, and a first contact plate and a second contact plate respectively connected to both ends of the connecting plate, wherein the connecting plate and the second contact plate are arranged on one side of the intermediate partition plate close to the circuit breaker protection unit; the intermediate partition plate is provided with a make-way hole for making way for the first contact plate, and a limiting groove for fixing the intermediate connecting member is formed in the intermediate partition plate; a limiting plate that protrudes outward and is in limited cooperation with the limiting groove is arranged on the side edge of the connecting plate; and a limiting rib that is in limited cooperation with the side surface of the limiting plate is arranged inside the limiting groove.

[0018] Preferably, the first elastic member comprises a first helical portion pivotally mounted on the housing assembly, and a first contact arm and a first connecting arm respectively arranged at both ends of the first helical portion; the first contact arm extends between the intermediate connecting member and the leakage testing button; and the first connecting arm is connected to the right wiring terminal of the leakage protection unit through the testing resistor.

[0019] Preferably, the first helical portion is arranged below the leakage testing button; the first contact arm is of a Z-shaped structure; the first contact arm comprises a lower transverse arm and an upper transverse arm, and a longitudinal arm connected between one end of the lower transverse arm and one end of the upper transverse arm, wherein one end of the lower transverse arm is connected to the first helical portion; one end of the lower transverse arm, which is connected to the longitudinal arm, is inclined upward and then cooperates with the bottom of the leakage testing button; the longitudinal arm extends toward the upper side of the intermediate connecting member and is then connected to one end of the upper transverse arm; the other end of the upper transverse arm extends toward a direction close to the intermediate connecting member and is then connected to a bent arm; the bent arm is located above one end of the intermediate connecting member and is bent to one side away from the intermediate connecting member; and the leakage testing button can push the lower transverse arm to drive a bent surface outside the bent arm to contact one end of the intermediate connecting member.

[0020] According to the circuit breaker of the present invention, the leakage testing loop has two contact points, i.e., the first test contact point and the second test contact point. The second test contact point remains closed when the circuit breaker is closed, and the contacting system drives the second test contact point to be broken when the circuit breaker is opened, which can not only effectively avoid the danger caused by pushing the leakage testing button when the circuit breaker is opened, but also not affect contact head parameters of the contact head mechanism since the second test contact point is not in contact with the contacting system when the circuit breaker is closed, thereby ensuring a contact head pressure of the contact head mechanism in the closing process.

[0021] In addition, two ends of the intermediate connecting member cooperate with the first elastic member and the second elastic member respectively, which can effectively utilize a limited space in the circuit breaker, and increase the volume of the circuit breaker. Moreover,

the second elastic member keeps contact with the intermediate connecting member through its own elasticity to form a normally closed contact point structure, which has the characteristics of simple structure and low cost.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

FIG. 1 is a schematic structural diagram of a circuit breaker according to an embodiment of the present invention;

FIG. 2 is a schematic structural diagram of a circuit breaker unit according to an embodiment of the present invention;

FIG. 3 is sectional view of a circuit breaker according to an embodiment of the present invention;

FIG. 4 is a schematic structural diagram of a leakage testing loop according to an embodiment of the present invention;

FIG. 5 is a top view of the leakage testing loop according to an embodiment of the present invention;

FIG. 6 is a schematic structural diagram of one side of a circuit breaker protection unit away from a leakage protection unit according to an embodiment of the present invention;

FIG. 7 is a schematic structural diagram of one side of the circuit breaker protection unit close to the leakage protection unit according to an embodiment of the present invention;

FIG. 8 is a partially enlarged view of FIG. 6 according to an embodiment of the present invention;

FIG. 9 is a schematic structural diagram of one side of the leakage protection unit away from the circuit breaker protection unit according to an embodiment of the present invention; and

FIG. 10 is a schematic structural diagram of one side of the leakage protection unit close to the circuit breaker protection unit according to an embodiment of the present invention.

DETAILED DESCRIPTION OF SOME EMBODIMENTS

[0023] The specific implementation of the circuit breaker of the present invention will be further described below with reference to the embodiments given in FIGS. 1 to 10. The circuit breaker of the present invention is not limited to the description of the following embodiments.

[0024] As shown in FIGS. 1 to 2, and 6, a circuit breaker of the utility model includes a housing assembly, and a contacting system, a leakage protection mechanism and a leakage testing mechanism arranged in the housing assembly, wherein the contacting system includes a handle 21, a contact head mechanism, an operating mechanism 23 and a wiring mechanism; the contact head mechanism includes a static contact head 221 and a movable contact head 222 which are connected to a circuit respectively; and the operating mechanism 23 is driven by the handle 21 to close or open the contact head mechanism when the circuit breaker is closed and opened.

[0025] The leakage protection mechanism includes a zero-sequence current transformer 41. When the zero-sequence current transformer 41 detects that there is a leakage fault in the circuit, the leakage protection mechanism triggers the operating mechanism 23 to trip. The operating mechanism 23 drives the static contact head 221 and the movable contact head 222 to be separated to break the circuit after losing its balance.

[0026] As shown in FIGS. 4 to 5, the leakage testing mechanism includes a leakage testing button 50 and a leakage testing loop cooperating with the zero-sequence current transformer 41 of the leakage protection mechanism; the leakage testing loop includes a first test contact point T1 cooperating with the leakage testing button 50, and a second test contact point T2 cooperating with the contacting system; and the second test contact point T2 is normally closed (it can be understood as a normally closed contact point). The contacting system breaks the second test contact point T2 when the circuit breaker is opened. The contacting system makes way for the second test contact point T2 when the circuit breaker is closed, such that the second test contact point T2 is reset and remained closed. The testing button 50 is used to drive the first test contact point T1 to be closed. When both the first test contact point T1 and the second test contact point T2 are closed, the leakage testing loop is turned on and a leakage fault signal is generated. At this time, if the circuit breaker can trip to break the circuit, the leakage protection of the circuit breaker can be effective, otherwise the leakage protection function of the circuit breaker will fail.

[0027] According to the circuit breaker of the present invention, the leakage testing loop has two contact points, i.e., the first test contact point T1 and the second test contact point T2. The second test contact point T2 remains closed when the circuit breaker is closed, and the contacting system drives the second test contact point T2 to be broken when the circuit breaker is opened, which can not only effectively avoid the danger caused by pushing the leakage testing button when the circuit breaker is opened, but also not affect contact head parameters of the contact head mechanism since the second test contact point T2 is not in contact with the contacting system when the circuit breaker is closed, thereby ensuring a contact head pressure of the contact head mechanism in the closing process.

[0028] As shown in FIGS. 4 to 5, the leakage testing loop of the present invention includes an intermediate connecting member 53, and a first elastic member 51 and a second elastic member 52 which cooperate with both ends of the intermediate connecting member respectively; the first elastic member 51 and one end of the intermediate connecting member 53 are spaced from each other to form the first test contact point T1 of the leakage testing loop; the leakage testing button 50 can

be pushed to drive the first elastic member 51 to contact the intermediate connecting member 53 so as to close the first test contact point T1; the second elastic member 52 is in contact and cooperation with the other end of the intermediate connecting member 53 to form the second test contact point T2 of the leakage testing loop; the contacting system does not make contact with the second test contact point T2 when the circuit breaker is closed, such that the second test contact point T2 remains closed; and the contacting system drives the second elastic member 52 to be separated from the intermediate connecting member 53 when the circuit breaker is opened, so as to break the second test contact point T2. Both ends of the intermediate connecting member 53 cooperate with the first elastic member 51 and the second elastic member 52 respectively, which can effectively utilize a limited space in the circuit breaker, and increase the volume of the circuit breaker. Moreover, the second elastic member 52 keeps contact with the intermediate connecting member 53 through its own elasticity to form a normally closed contact point structure, which has the characteristics of simple structure and low cost. Obviously, two independent connecting members may also be used to cooperate with the first elastic member 51 and the second elastic member 52 respectively, and are both connected to the leakage testing loop. In addition, the first elastic member 51 and the second elastic member 52 may be two independent elastic members, or may be of two elastic structures of the same elastic member, for example, the first elastic member 51 and the second elastic member 52 are two ends of a torsion spring respectively, which all fall within the protection scope of the present invention.

[0029] Further, the second test contact point T2 cooperates with the contact head mechanism of the contacting system, and the contact head mechanism breaks and makes way for the second test contact point T2. The contact head mechanism includes a static contact head 221 and a movable contact head 222 which are respectively connected to a circuit; the operating mechanism 23 can drive the static contact head 221 to be in contact and separated from the movable contact head 222; the movable contact head 222 includes a contact head support 223 pivotally mounted in the housing assembly to cooperate with the operating mechanism 23, and a movable contact plate 224 arranged on the contact head support 223, wherein a movable contact point 225 cooperating with the static contact head 221 is provided on the movable contact plate 224; the second test contact point T2 cooperates with the contact head support 223 of the movable contact head 222, and the contact head support 223 drives the movable contact point 225 to be separated from the static contact head 221 when the circuit breaker is opened, and simultaneously drives the second elastic member 52 to be separated from the intermediate connecting member 53; and the contact head support 223 drives the movable contact point 225 to be in contact with the static contact head 221 when the circuit breaker is closed, and simultaneously moves away from the second elastic member 52 to reset the second elastic member 52. Of course, the second test contact point T2 may also cooperate with the handle 21 or the operating mechanism 23 or the movable contact plate 224 of the contacting system, which all fall within the protection scope of the present invention.

[0030] As shown in FIGS. 1 to 3, the circuit breaker of the present invention includes a plurality of circuit breaker units which is arranged side by side, wherein each of the plurality of circuit breaker units includes a contacting system, and at least one circuit breaker unit includes a leakage protection mechanism; the first elastic member 51 and the second elastic member 52 of the leakage testing mechanism are respectively arranged in two different circuit breaker units, and respectively connected to the contacting systems of the two circuit breaker units; and the middle part of the intermediate connecting member 53 of the leakage testing mechanism passes through the housing assembly, and both ends of the intermediate connecting member 53 of the leakage testing mechanism extend into the circuit breaker units which correspond to the first elastic member 51 and the second elastic member 52 respectively. The first elastic member 51 and the second elastic member 52 in this embodiment are respectively connected to the contacting systems of two circuit breaker units. When the first elastic member 51 and the second elastic member 52 are respectively in contact with both ends of the intermediate connecting member 53, a passage can be formed between two circuits and a leakage fault signal can be simulated, which has the characteristic of simple structure.

[0031] As shown in FIGS. 6 and 9, the contacting system includes a handle 21, a contact head mechanism, an operating mechanism 23, a wiring mechanism, a short-circuit protection mechanism 24 and an overload protection mechanism 25; the wiring mechanism includes a left wiring terminal 261 and a right wiring terminal 262 which are respectively arranged at both ends of the circuit breaker unit, wherein the left wiring terminal 261 is connected to the static contact head 221 through the short-circuit protection mechanism 24, and the right wiring terminal 262 is connected to the movable contact plate 224 of the movable contact head 222 through the overload protection mechanism 25; a second wire 242 connected between the left wiring terminal 261 of each circuit breaker unit and the short-circuit protection mechanism 24 passes through a zero-sequence current transformer 41; one end of the second elastic member 52, which is not in cooperation with the intermediate connecting member 53, is connected to the second wire 242 of the circuit breaker unit provided with the second elastic member 52; and the first elastic member 51 is connected to the right wiring terminal 262 of the circuit breaker unit provided with the first elastic member 51 through a testing resistor 54. Preferably, an elastic sheet 524 is arranged in the housing assembly, and the second elastic member 52 is connected to the second wire 242 through the elastic

sheet 524. The second elastic member 52 is clamped on the elastic sheet 524, and the other end of the elastic sheet 524 is connected to the second wire 242 through the testing wire 525.

[0032] According to a specific embodiment of the circuit breaker of the present invention shown in FIGS. 6 to 10, the circuit breaker in this embodiment includes two circuit breaker units which are arranged side by side, wherein the two circuit breaker units are a leakage protection unit A and a circuit breaker protection unit B respectively; each of the contacting systems of the leakage protection unit A and the circuit breaker protection unit B passes through the zero-sequence current transformer 41 of the leakage testing mechanism; the leakage protection mechanism, the first elastic member 51 of the leakage testing mechanism and the leakage testing button 50 of the leakage testing mechanism are arranged in the leakage protection unit A; the second elastic member 52 of the leakage testing mechanism is arranged in the circuit breaker protection unit B to cooperate with the operating mechanism 23 of the circuit breaker protection unit B; the housing assembly is correspondingly provided with an intermediate partition plate 11 between the leakage protection unit A and the circuit breaker protection unit B; the middle part of the intermediate connecting member 53 of the leakage testing mechanism passes through the intermediate partition plate 11; and one end of the intermediate connecting member 53 extends into the leakage protection unit A to cooperate with the first elastic member 51, and the other end of the intermediate connecting member 53 extends into the circuit breaker protection unit B to cooperate with the second elastic member 52. Generally, the first elastic member 51 and the second elastic member 52 at two breakpoints of the leakage testing mechanism are both arranged in the leakage protection unit A. However, there is a certain risk in the linkage between the newly added breakpoint and the operating mechanism of the leakage protection unit A. Because artificially breaking a main current loop only needs to open the handle of the circuit breaker protection unit B, and the leakage protection unit A is not opened at this time, which will cause the second test contact point T2 to remain closed. According to the present invention, the first elastic member 51 and the second elastic member 52 are arranged in the leakage protection unit A and the circuit breaker protection unit B respectively, which is safe and reliable.

[0033] As shown in FIGS. 5 and 8, the contacting system of the leakage protection unit A in this embodiment has the same structure as the contacting system of the circuit breaker protection unit B; each of the contacting systems of the leakage protection unit A and the circuit breaker protection unit B includes a handle 21, a contact head mechanism, an operating mechanism 23, a wiring mechanism, a short-circuit protection mechanism 24 and an overload protection mechanism 25;

the contact head mechanism includes a static contact head 221 and a movable contact head 222 which are opposite to each other; the movable contact head 222 includes a contact head support 223 pivotally mounted in the housing assembly and cooperating with the operating mechanism 23, and a movable contact plate 224 on the contact head support 223; the movable contact plate 224 is provided with a movable contact point 225 cooperating with the static contact head 221; the wiring mechanism includes a left wiring terminal 261 and a right wiring terminal 262 respectively arranged at both ends of the circuit breaker unit, wherein the left wiring terminal 261 is connected to the static contact head 221 through the short-circuit protection mechanism 24, and the right wiring terminal 262 is connected to the movable contact plate 224 of the movable contact head 222 through the overload protection mechanism 25; and both the second wire 242 connected between the left wiring terminal 261 of the circuit breaker protection unit B and the short-circuit protection mechanism 24 and the first wire 241 connected between the left wiring terminal 261 of the leakage protection unit A and the short-circuit protection mechanism 24 pass through the zero-sequence current transformer 41; the second elastic member 52 of the leakage testing loop is connected to the second wire 242 connected between the left wiring terminal 261 of the circuit breaker protection unit B and the short-circuit protection mechanism 24; and the first elastic member 51 of the leakage testing loop is connected to the right wiring terminal 262 of the leakage protection unit A through the testing resistor 54.

[0034] As shown in FIG. 10, the leakage protection mechanism includes a zero-sequence current transformer 41, a leakage operating mechanism 42, a leakage release 43, a circuit board 44 and a leakage handle 45. A working principle of the leakage operating mechanism 42 is similar to that of the operating mechanism 23 of the contacting system. In addition, the leakage handle 45 is connected to the handle 21 of the circuit breaker unit, but the leakage operating mechanism 42 is not connected to the movable contact head 222.

[0035] The operating mechanism 23 and the leakage operating mechanism 42 respectively include a rocker arm pivotally mounted in the housing assembly, an energy storage member connected to the rocker arm, and a jump buckle and a lock catch which are pivotally arranged on the rocker arm respectively. In addition, the jump buckle and the lock interlock and cooperate with each other, and an unlocking lever 10 is arranged between the operating mechanism 23 and the leakage operating mechanism 42.

[0036] The handle 21 is connected to the leakage handle 45. The handle 21 and the leakage handle 45 can respectively compress the respective energy storage members as they rotate, and drive the respective jump buckles and the lock catchs to lock.

[0037] The short-circuit protection mechanism 24 and the overload protection mechanism 25 unlock the jump buckle and lock catch of the operating mechanism 23 respectively when the circuit is short-circuited and overloaded. The leakage protection mechanism unlocks the leakage operating mechanism 42 when leakage occurs in the circuit. When the jump buckle and the lock catch of the leakage operating mechanism 42 are unlocked, the unlocking lever 10 drives the jump buckle and the lock catch of the operating mechanism 23 to be unlocked. When the jump buckle and the lock catch of the operating mechanism 23 are unlocked, the jump buckle and the lock catch of the leakage protection mechanism 42 are driven by the unlocking lever 10 to be unlocked.

[0038] In the case of a plurality of circuit breaker units, when the jump buckle and the lock catch of the leakage operating mechanism 42 are unlocked, the jump buckles and lock catchs of the operating mechanisms 23 of all circuit breaker units are driven by the unlocking lever 10 to be unlocked. When the jump buckle and the lock catch of the operating mechanism 23 of any circuit breaker unit are unlocked, the unlocking lever 10 drives the operating mechanisms 23 of all other circuit breaker units as well as the jump buckles and lock catchs of the leakage operating mechanisms 42 to be unlocked, thereby breaking all circuits.

[0039] As shown in FIGS. 6 to 7, the housing assembly is correspondingly provided with an intermediate partition plate 11 between the circuit breaker protection unit B and the leakage protection unit A; a protruding structure 111 is arranged on one side of the partition plate 11 close to the leakage protection unit A, and a space for accommodating the short-circuit protection mechanism 24 of the contacting system in the circuit breaker protection unit B is formed on one side of the protruding structure 111 close to the circuit breaker protection unit B; and

one end of the intermediate connecting member 53, which cooperates with the second elastic member 52, is arranged above the short-circuit protection mechanism 24 in the circuit breaker protection unit B; and one end of the intermediate connecting member 53, which cooperates with the first elastic member 51, passes through the intermediate partition plate 11 and extends to the top side of the protruding structure 111 for cooperation. One end of the intermediate connecting member 53, which cooperates with the first elastic member 51, extends to the top side of the protruding structure 111 for cooperation. When the first elastic member 51 is in contact with the intermediate connecting member 53, the top side of the protruding structure 111 provides support for the intermediate connecting member 53, thereby avoiding the deformation of the intermediate connecting member 53. Preferably, the intermediate connecting member 53 is lengthened, such that one end of the intermediate connecting member 53, which cooperates with the first elastic member 51, protrudes out of the protruding structure 111 and is suspended.

[0040] According to a specific structure of the intermediate connecting member shown in FIGS. 3 to 5, and 8, the intermediate connecting member 53 is of a Z-shaped structure; the intermediate connecting member 53 includes a connecting plate 533, and a first contact plate 531 and a second contact plate 532 respectively connected to both ends of the connecting plate 533, wherein the connecting plate 533 and the second contact plate 532 are arranged on one side of the intermediate partition plate 11 close to the circuit breaker protection unit B; the intermediate partition plate 11 is provided with a makeway hole for making way for the first contact plate 531, and a limiting groove 112 for limiting the intermediate connecting member 53; and a limiting plate 534 that protrudes outward and is in limited cooperation with the limiting groove 112 is arranged on the side edge of the connecting plate 533.

[0041] Further, a limiting rib 113 that is in limited cooperation with the side surface of the limiting plate 534 is arranged inside the limiting groove 112.

[0042] According to a specific structure of the second elastic member 52 shown in FIGS. 3 to 5, and 8, the second elastic member 52 includes a second helical portion 521 pivotally mounted on the housing assembly, and a second contact arm 522 and a second connecting arm 522 which are respectively provided at both ends of the second helical portion 521; the second helical portion 521 of the second elastic member 52 and the contact head support 223 of the movable contact head 22 are oppositely arranged on both sides of the intermediate connecting member 53; the middle part of the second contact arm 522 passes through the lower side of the intermediate connecting member 53 and then cooperates with the contact head support 223; when the contact head support 223 drives the movable contact point 225 to be separated from the static contact head 221, the second contact arm 522 is pushed to be separated from the intermediate connecting member 53 to break the second test contact point T2; and when the contact head support 223 drives the movable contact point 225 to be in contact with the static contact head 221, the second contact arm 522 resets and is in contact with the intermediate connecting member 53 to close the second test contact point T2.

[0043] Further, the second contact arm 522 is of a U-shaped structure; a contact head boss 226 is arranged on the contact head support 223; one end of the intermediate connecting member 53 is located inside the second contact arm 522; one end of the second contact arm 522 is connected to the second helical portion 521; and a second pushing arm 227 which cooperates with the contact head boss 226 is arranged at the other end of the second contact arm 522.

[0044] Referring to FIG. 6, when the contact head support 223 drives the movable contact point 225 to be separated from the static contact head 221, the contact head support 223 rotates counterclockwise to drive the movable contact point 225 to move to the right, and meanwhile, the contact head boss 226 moves downward to

push the second contact arm 522 to be separated from the intermediate contacting member 53. When the contact head support 223 drives the movable contact point 225 to be in contact with the static contact head 221, the contact head support 223 rotates clockwise to drive the movable contact point 225 to move to the left, and meanwhile, the contact head boss 226 moves upward to make way for the second contact arm 522, and the second contact arm 522 is in contact with the intermediate contacting member 53 under the action of its own elastic force. Of course, the second contact arm 522 may also be arranged between the intermediate connecting member 53 and the contact head support 223, and the contact head boss 226 pushes the second contact arm 522 to be in contact with the intermediate connecting member 53 when the contact head support 223 drives the movable contact point 225 to be in contact with the static contact head 221, which all fall within the protection scope of the present invention.

[0045] Further, the second connecting arm 523 is connected to one end of the elastic sheet 524, and the other end of the elastic sheet 524 is connected to the second wire 242, which passes through the zero-sequence current transformer 41, via the testing wire 525. A clamping groove 5230 which is in limited cooperation with the second connecting arm 523 is formed in one end of the elastic sheet 524; and a lower extension sheet 5250 connected to the testing wire 525 is arranged at the other end of the elastic sheet 524.

[0046] Further, the second helical portion 521 is arranged above one side of the intermediate connecting member 53 away from the contact head support 223; the elastic sheet 524 is arranged on one side of the handle 21, and located above the short-circuit protection mechanism 24; the elastic sheet 524 includes a longitudinal sheet 5241 and a transverse sheet 5242 whose one ends are connected, and an oblique sheet 5243 connected to the other end of the transverse sheet 5242, wherein the longitudinal sheet 5241 is arranged on the horizontal side of the second helical portion 521; the side edge of the longitudinal sheet 5241 is provided with a clamping groove 5230 which is in limited cooperation with the second connecting arm 523; one end of the transverse sheet 5242 is connected to the bottom end of the longitudinal sheet 5241, the other end of the transverse sheet 5242 is connected to the top end of the oblique sheet 5243 arranged obliquely, and the bottom end of the oblique sheet 5243 extends to the upper side of the short-circuit protection mechanism 24 of the circuit breaker protection unit B; a lower extension sheet 5250 connected to the testing wire 525 is arranged on the oblique sheet 5243; and the testing wire 525 extends to one end of the short-circuit protection mechanism 24 after passing through the side surface of the short-circuit protection mechanism 24 of the circuit breaker protection unit B.

[0047] According to a specific structure of the first elastic member 51 shown in FIGS. 3 to 5, and 10, the first elastic member 51 includes a first helical portion 511 pivotally mounted on the housing assembly, and a first contact arm 512 and a first connecting arm 513 respectively arranged at both ends of the first helical portion 511; the first contact arm 512 extends between the intermediate connecting member 53 and the leakage testing button 50; the first connecting arm 513 is connected to the right wiring terminal 262 of the leakage protection unit A through the testing resistor 54; the first helical portion 511 is arranged below the leakage testing button 50; the first contact arm 512 is of a Z-shaped structure; the first contact arm 512 includes a lower transverse arm 5121 and an upper transverse arm 5123, and a longitudinal arm 5122 connected between one end of the lower transverse arm 5121 and one end of the upper transverse arm 5123, wherein one end of the lower transverse arm 5121 is connected to the first helical portion 5121; one end of the lower transverse arm 5121, which is connected to the longitudinal arm 5122, is inclined upward and then cooperates with the bottom of the leakage testing button 50; the longitudinal arm 5122 extends toward the upper side of the intermediate connecting member 53 and is then connected to one end of the upper transverse arm 5123; the other end of the upper transverse arm 5123 extends toward a direction close to the intermediate connecting member 53 and is then connected to a bent arm 5114; the bent arm 5114 is located above one end of the intermediate connecting member 53 and is bent to one side away from the intermediate connecting member 53; and the leakage testing button 50 can push the lower transverse arm 5121 to drive a bent surface outside the bent arm 5114 to contact one end of the intermediate connecting member 53.

[0048] The above content is a further detailed description of the present invention in conjunction with specific preferred embodiments, and it cannot be considered that the specific embodiments of the present invention are limited to these descriptions. For those of ordinary skill in the technical field to which the present invention belongs, several simple deductions or substitutions can be made without departing from the concept of the present invention, which should be regarded as falling within the protection scope of the present invention.

Claims

1. A circuit breaker, comprising a housing assembly, and a contacting system, a leakage protection mechanism and a leakage testing mechanism arranged in the housing assembly, wherein the contacting system comprises a handle (21), a contact head mechanism and an operating mechanism (23); the operating mechanism (23) is driven by the handle (21) to close or open the contact head mechanism; the leakage testing mechanism comprises a leakage testing button (50) and a leakage testing loop; the leakage testing loop comprises a first test contact point (T1) cooperating with the leakage testing button (50), and

a second test contact point (T2) cooperating with the contacting system; the contacting system drives the second test contact point (T2) to be broken when the circuit breaker is opened; the contacting system makes way for the second test contact point (T2) when the circuit breaker is closed, such that the second test contact point (T2) resets and remains closed; the testing button (50) is used to drive the first test contact point (T1) to be closed; and the leakage testing loop is turned on when both the first test contact point (T1) and the second test contact point (T2) are closed.

2. The circuit breaker according to claim 1, wherein the leakage testing loop comprises an intermediate connecting member (53), and a first elastic member (51) and a second elastic member (52) which cooperate with both ends of the intermediate connecting member respectively; the first elastic member (51) and one end of the intermediate connecting member (53) are spaced from each other to form the first test contact point (T1) of the leakage testing loop; the leakage testing button (50) can be pushed to drive the first elastic member (51) to contact the intermediate connecting member (53) so as to close the first test contact point (T1); the second elastic member (52) is in contact and cooperation with the other end of the intermediate connecting member (53) to form the second test contact point (T2) of the leakage testing loop; the contacting system does not make contact with the second test contact point (T2) when the circuit breaker is closed, such that the second test contact point (T2) remains closed; and the contacting system drives the second elastic member (52) to be separated from the intermediate connecting member (53) when the circuit breaker is opened, so as to break the second test contact point (T2).

3. The circuit breaker according to claim 2, wherein the contact head mechanism comprises a static contact head (221) and a movable contact head (222) which are respectively connected to a circuit; the operating mechanism (23) can drive the static contact head (221) to be in contact with and separated from the movable contact head (222); the movable contact head (222) comprises a contact head support (223) pivotally mounted in the housing assembly to cooperate with the operating mechanism (23), and a movable contact plate (224) arranged on the contact head support (223), wherein a movable contact point (225) cooperating with the static contact head (221) is provided on the movable contact plate (224); the second test contact point (T2) cooperates with the contact head support (223) of the movable contact head (222), and the contact head support (223) drives the movable contact point (225) to be separated from the static contact head (221) when the circuit breaker is opened, and simultaneously drives the second elastic member (52) to be separated from the intermediate connecting member (53); and the contact head support (223) drives the movable contact point (225) to be in contact with the static contact head (221) when the circuit breaker is closed, and simultaneously moves away from the second elastic member (52) to reset the second elastic member (52).

4. The circuit breaker according to claim 2, comprising a plurality of circuit breaker units which is arranged side by side, wherein each of the plurality of circuit breaker units comprises a contacting system, and at least one circuit breaker unit comprises a leakage protection mechanism; the first elastic member (51) and the second elastic member (52) of the leakage testing mechanism are respectively arranged in two different circuit breaker units, and respectively connected to the contacting systems of the two circuit breaker units; and the middle part of the intermediate connecting member (53) of the leakage testing mechanism passes through the housing assembly, and both ends of the intermediate connecting member (53) of the leakage testing mechanism extend into the circuit breaker units which correspond to the first elastic member (51) and the second elastic member (52) respectively.

5. The circuit breaker according to claim 4, wherein the contacting system comprises a handle (21), a contact head mechanism, an operating mechanism (23), a wiring mechanism, a short-circuit protection mechanism (24) and an overload protection mechanism (25); the wiring mechanism comprises a left wiring terminal (261) and a right wiring terminal (262) which are respectively arranged at both ends of the circuit breaker unit, wherein the left wiring terminal (261) is connected to the static contact head (221) through the short-circuit protection mechanism (24), and the right wiring terminal (262) is connected to the movable contact plate (224) of the movable contact head (222) through the overload protection mechanism (25); a second wire (242) connected between the left wiring terminal (261) of each circuit breaker unit and the short-circuit protection mechanism (24) passes through a zero-sequence current transformer (41); one end of the second elastic member (52), which is not in cooperation with the intermediate connecting member (53), is connected to the second wire (242) of the circuit breaker unit provided with the second elastic member (52); and the first elastic member (51) is connected to the right wiring terminal (262) of the circuit breaker unit provided with the first elastic member (51) through a testing resistor (54).

6. The circuit breaker according to claim 2, wherein the second elastic member (52) comprises a second helical portion (521) pivotally mounted on the housing

assembly, and a second contact arm (522) and a second connecting arm (523) which are respectively provided at both ends of the second helical portion (521); the second helical portion (521) of the second elastic member (52) and the contact head support (223) of the movable contact head (22) are oppositely arranged on both sides of the intermediate connecting member (53); the middle part of the second contact arm (522) passes through the lower side of the intermediate connecting member (53) and then cooperates with the contact head support (223); when the contact head support (223) drives the movable contact point (225) to be separated from the static contact head (221), the second contact arm (522) is pushed to be separated from the intermediate connecting member (53) to break the second test contact point (T2); and when the contact head support (223) drives the movable contact point (225) to be in contact with the static contact head (221), the second contact arm (522) resets and is in contact with the intermediate connecting member (53) to close the second test contact point (T2).

7. The circuit breaker according to claim 6, wherein the second contact arm (522) is of a U-shaped structure; a contact head boss (226) is arranged on the contact head support (223); one end of the intermediate connecting member (53) is located inside the second contact arm (522); one end of the second contact arm (522) is connected to the second helical portion (521); and a second pushing arm (227) which cooperates with the contact head boss (226) is arranged at the other end of the second contact arm (522).

8. The circuit breaker according to claim 6, wherein a conductive sheet (524) is arranged in the housing assembly; the second elastic member (52) is clamped on the conductive sheet (524); a clamping groove (5230) which is in limited cooperation with the second connecting arm (523) is formed in one end of the conductive sheet (524); and a lower extension sheet (5250) for wiring is arranged at the other end of the conductive sheet (524).

9. The circuit breaker according to claim 8, wherein the contacting system further comprises a short-circuit protection mechanism (24); the second helical portion (521) is arranged above one side of the intermediate connecting member (53) away from the contact head support (223); the conductive sheet (524) is arranged on one side of the handle (21), and located above the short-circuit protection mechanism (24); the conductive sheet (524) comprises a longitudinal sheet (5241) and a transverse sheet (5242) whose one ends are connected, and an oblique sheet (5243) connected to the other end of the transverse sheet (5242), wherein the longitudinal sheet (5241) is arranged on the horizontal side of the second helical portion (521); the side edge of the longitudinal sheet (5241) is provided with a clamping groove (5230) which is in limited cooperation with the second connecting arm (523); one end of the transverse sheet (5242) is connected to the bottom end of the longitudinal sheet (5241), the other end of the transverse sheet (5242) is connected to the top end of the oblique sheet (5243) arranged obliquely, and the bottom end of the oblique sheet (5243) extends to the upper side of the short-circuit protection mechanism (24); and a lower extension sheet (5250) is arranged on the oblique sheet (5243).

10. The circuit breaker according to claim 2, comprising a leakage protection unit (A) and a circuit breaker protection unit (B) which are arranged side by side, wherein the leakage testing mechanism is arranged between the leakage protection unit (A) and the circuit breaker protection unit (B); each of the leakage protection unit (A) and the circuit breaker protection unit (B) comprises a contacting system, and the contacting systems of the leakage protection unit (A) and the circuit breaker protection unit (B) pass through the zero-sequence current transformer (41) of the leakage testing mechanism; the leakage protection mechanism, the first elastic member (51) of the leakage testing mechanism and the leakage testing button (50) of the leakage testing mechanism are arranged in the leakage protection unit (A); the second elastic member (52) of the leakage testing mechanism is arranged in the circuit breaker protection unit (B) to cooperate with the operating mechanism (23) of the circuit breaker protection unit (B); the housing assembly is correspondingly provided with an intermediate partition plate (11) between the leakage protection unit (A) and the circuit breaker protection unit (B); the intermediate connecting member (53) of the leakage testing mechanism passes through the intermediate partition plate (11); and one end of the intermediate connecting member (53) extends into the leakage protection unit (A) to cooperate with the first elastic member (51), and the other end of the intermediate connecting member (53) extends into the circuit breaker protection unit (B) to cooperate with the second elastic member (52).

11. The circuit breaker according to claim 10, wherein the contacting system of the leakage protection unit (A) has the same structure as the contacting system of the circuit breaker protection unit (B); each of the contacting systems of the leakage protection unit (A) and the circuit breaker protection unit (B) comprises a handle (21), a contact head mechanism, an operating mechanism (23), a wiring mechanism, a short-circuit protection mechanism (24) and an overload protection mechanism (25); the contact head mechanism comprises a static contact head (221) and a movable contact head (222) which are opposite to

each other; the movable contact head (222) comprises a contact head support (223) pivotally mounted in the housing assembly and cooperating with the operating mechanism (23), and a movable contact plate (224) on the contact head support (223); the movable contact plate (224) is provided with a movable contact point (225) cooperating with the static contact head (221); the wiring mechanism comprises a left wiring terminal (261) and a right wiring terminal (262) respectively arranged at both ends of the circuit breaker unit, wherein the left wiring terminal (261) is connected to the static contact head (221) through the short-circuit protection mechanism (24), and the right wiring terminal (262) is connected to the movable contact plate (224) of the movable contact head (222) through the overload protection mechanism (25); the second wire (242) connected between the left wiring terminal (261) of the circuit breaker protection unit (B) and the short-circuit protection mechanism (24) passes through the zero-sequence current transformer (41); the second elastic member (52) of the leakage testing loop is connected to the second wire (242) connected between the left wiring terminal (261) of the circuit breaker protection unit (B) and the short-circuit protection mechanism (24); and the first elastic member (51) of the leakage testing loop is connected to the right wiring terminal (262) of the leakage protection unit (A) through the testing resistor (54).

12. The circuit breaker according to claim 10, wherein the housing assembly is correspondingly provided with an intermediate partition plate (11) between the circuit breaker protection unit (B) and the leakage protection unit (A); a protruding structure (111) is arranged on one side of the partition plate (11) close to the leakage protection unit (A), and a space for accommodating the short-circuit protection mechanism (24) of the contacting system in the circuit breaker protection unit (B) is formed on one side of the protruding structure (111) close to the circuit breaker protection unit (B); one end of the intermediate connecting member (53), which cooperates with the second elastic member (52), is arranged above the short-circuit protection mechanism (24) in the circuit breaker protection unit (B); and one end of the intermediate connecting member (53), which cooperates with the first elastic member (51), passes through the intermediate partition plate (11) and extends to the top side of the protruding structure (111) for cooperation.

13. The circuit breaker according to claim 12, wherein the intermediate connecting member (53) is of a Z-shaped structure; the intermediate connecting member (53) comprises a connecting plate (533), and a first contact plate (531) and a second contact plate (532) respectively connected to both ends of the connecting plate (533), wherein the connecting plate (533) and the second contact plate (532) are arranged on one side of the intermediate partition plate (11) close to the circuit breaker protection unit (B); the intermediate partition plate (11) is provided with a make-way hole for making way for the first contact plate (531), and a limiting groove (112) for fixing the intermediate connecting member (53) is formed in the intermediate partition plate (11); a limiting plate (534) that protrudes outward and is in limited cooperation with the limiting groove (112) is arranged on the side edge of the connecting plate (533); and a limiting rib (113) that is in limited cooperation with the side surface of the limiting plate (534) is arranged inside the limiting groove (112).

14. The circuit board according to claim 10, wherein the first elastic member (51) comprises a first helical portion (511) pivotally mounted on the housing assembly, and a first contact arm (512) and a first connecting arm (513) respectively arranged at both ends of the first helical portion (511); the first contact arm (512) extends between the intermediate connecting member (53) and the leakage testing button (50); and the first connecting arm (513) is connected to the right wiring terminal (262) of the leakage protection unit (A) through the testing resistor (54).

15. The circuit breaker according to claim 14, wherein the first helical portion (511) is arranged below the leakage testing button (50); the first contact arm (512) is of a Z-shaped structure; the first contact arm (512) comprises a lower transverse arm (5121) and an upper transverse arm (5123), and a longitudinal arm (5122) connected between one end of the lower transverse arm (5121) and one end of the upper transverse arm (5123), wherein one end of the lower transverse arm (5121) is connected to the first helical portion (5121); one end of the lower transverse arm (5121), which is connected to the longitudinal arm (5122), is inclined upward and then cooperates with the bottom of the leakage testing button (50); the longitudinal arm (5122) extends toward the upper side of the intermediate connecting member (53) and is then connected to one end of the upper transverse arm (5123); the other end of the upper transverse arm (5123) extends toward a direction close to the intermediate connecting member (53) and is then connected to a bent arm (5114); the bent arm (5114) is located above one end of the intermediate connecting member (53) and is bent to one side away from the intermediate connecting member (53); and the leakage testing button (50) can push the lower transverse arm (5121) to drive a bent surface outside the bent arm (5114) to contact one end of the intermediate connecting member (53).

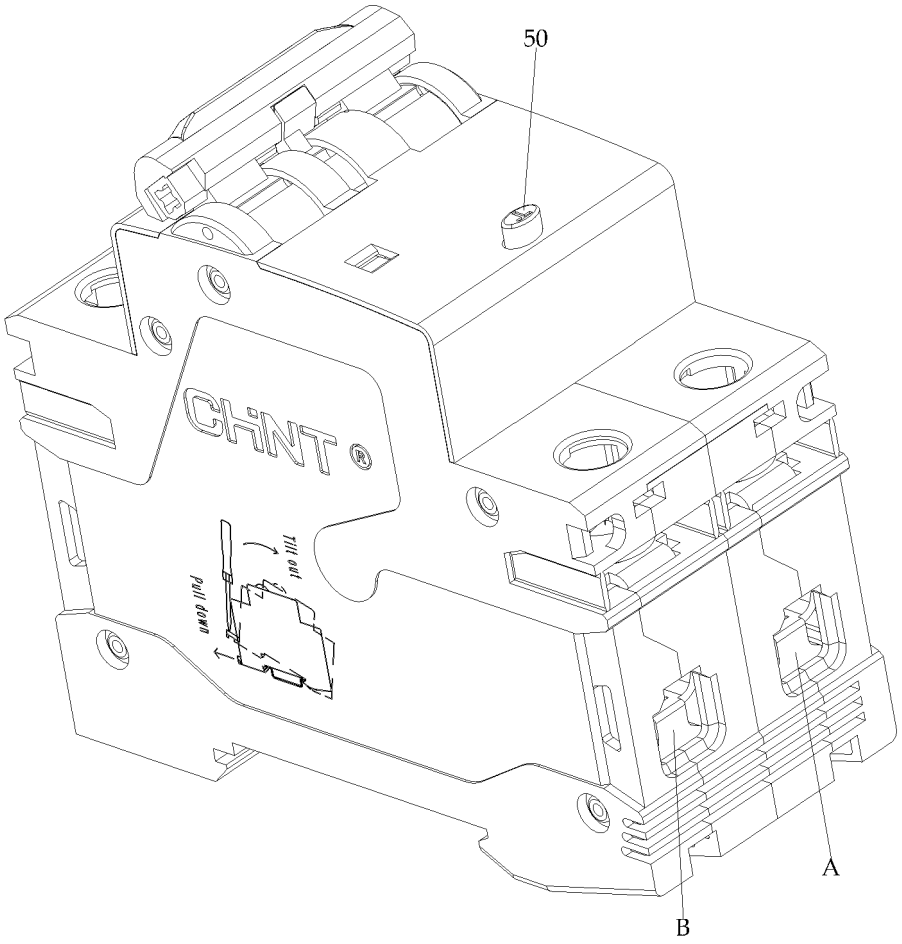


FIG.1

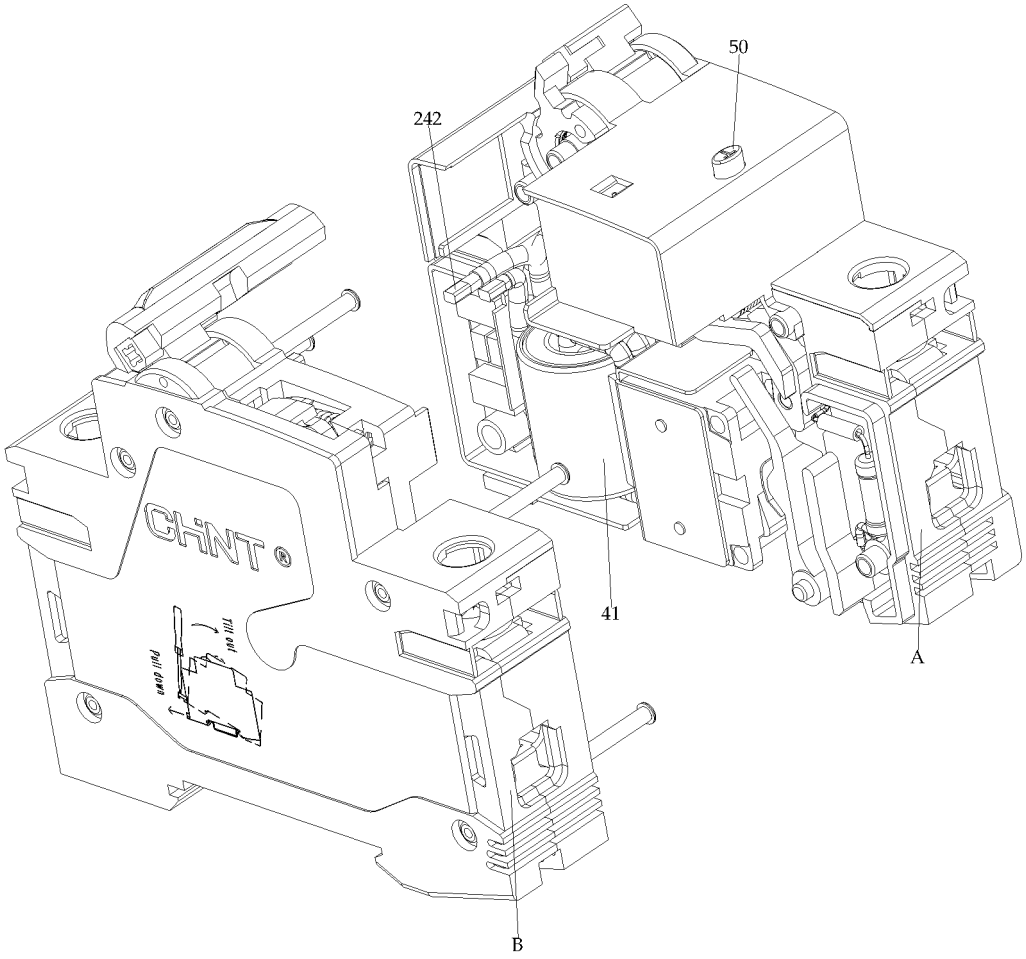


FIG.2

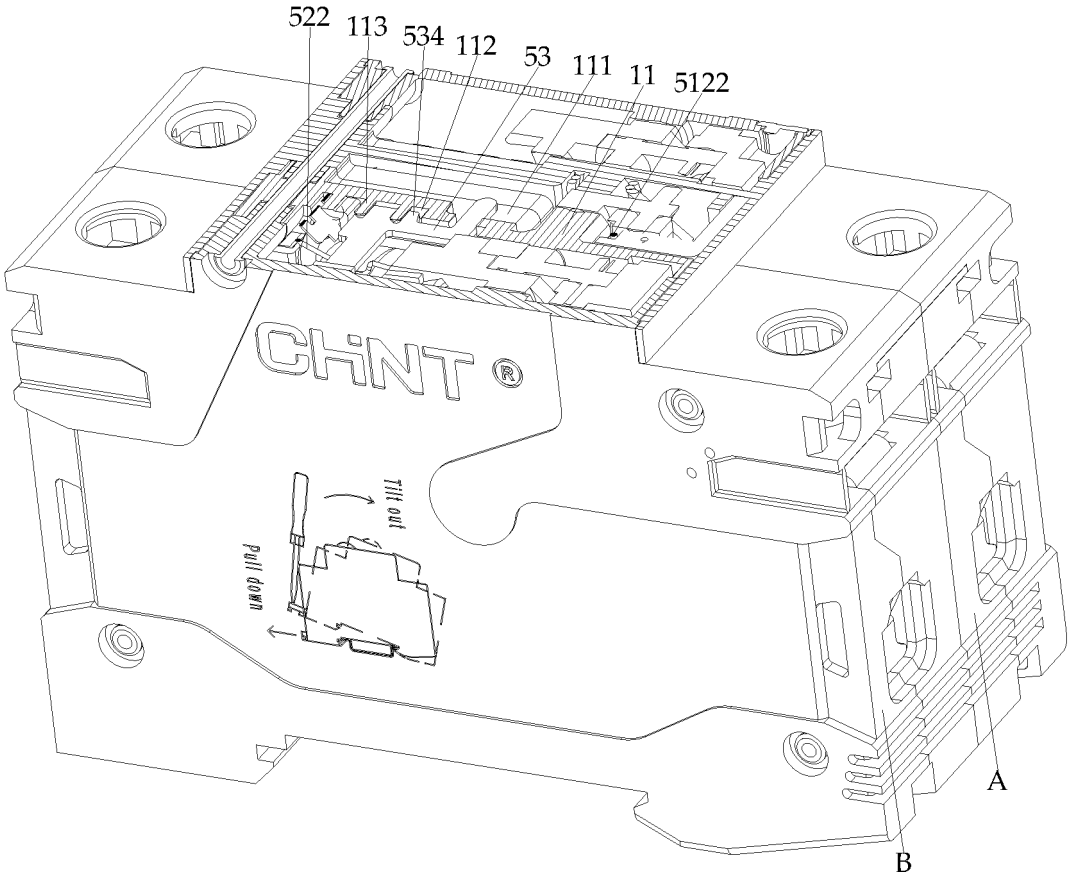
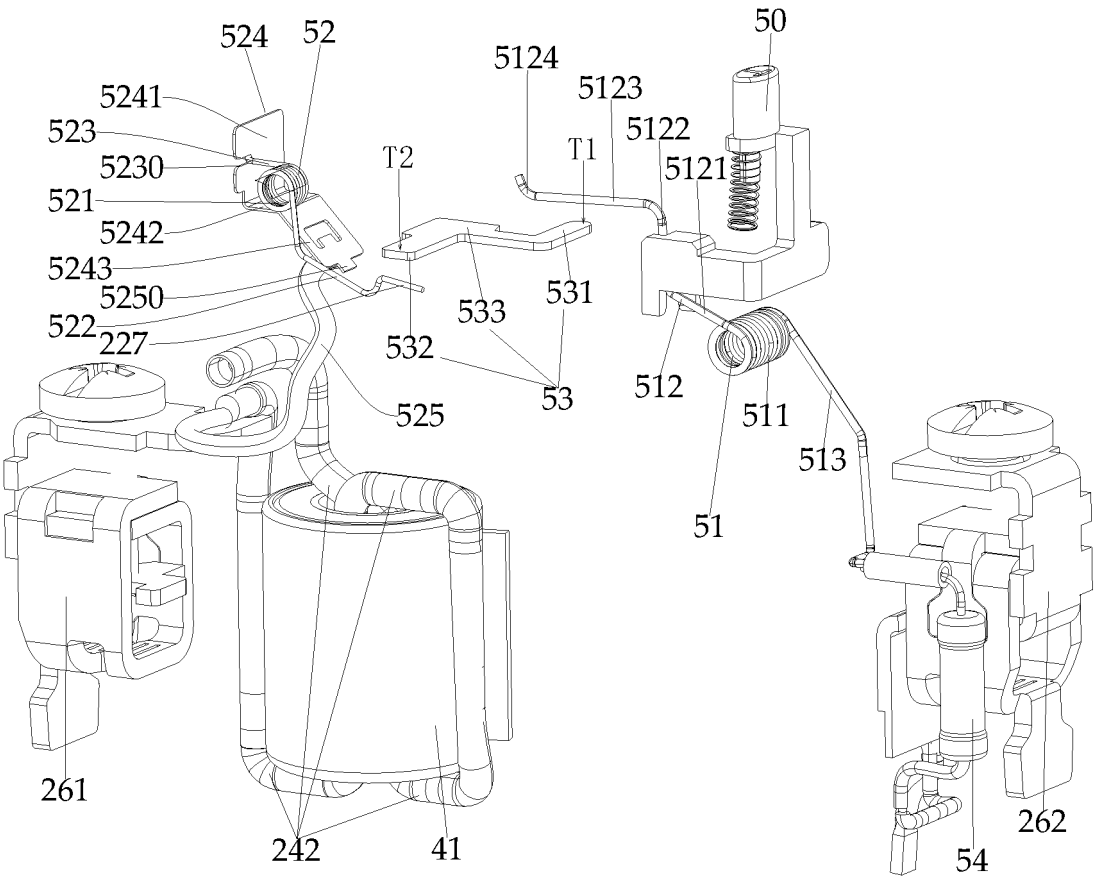


FIG.3


524
52
50
5124
5241
5123
523
5122
T2
T1
5230
5121
521
5242
5243
531
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227
532
53
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525
511
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51
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242
41
262
54

FIG.4

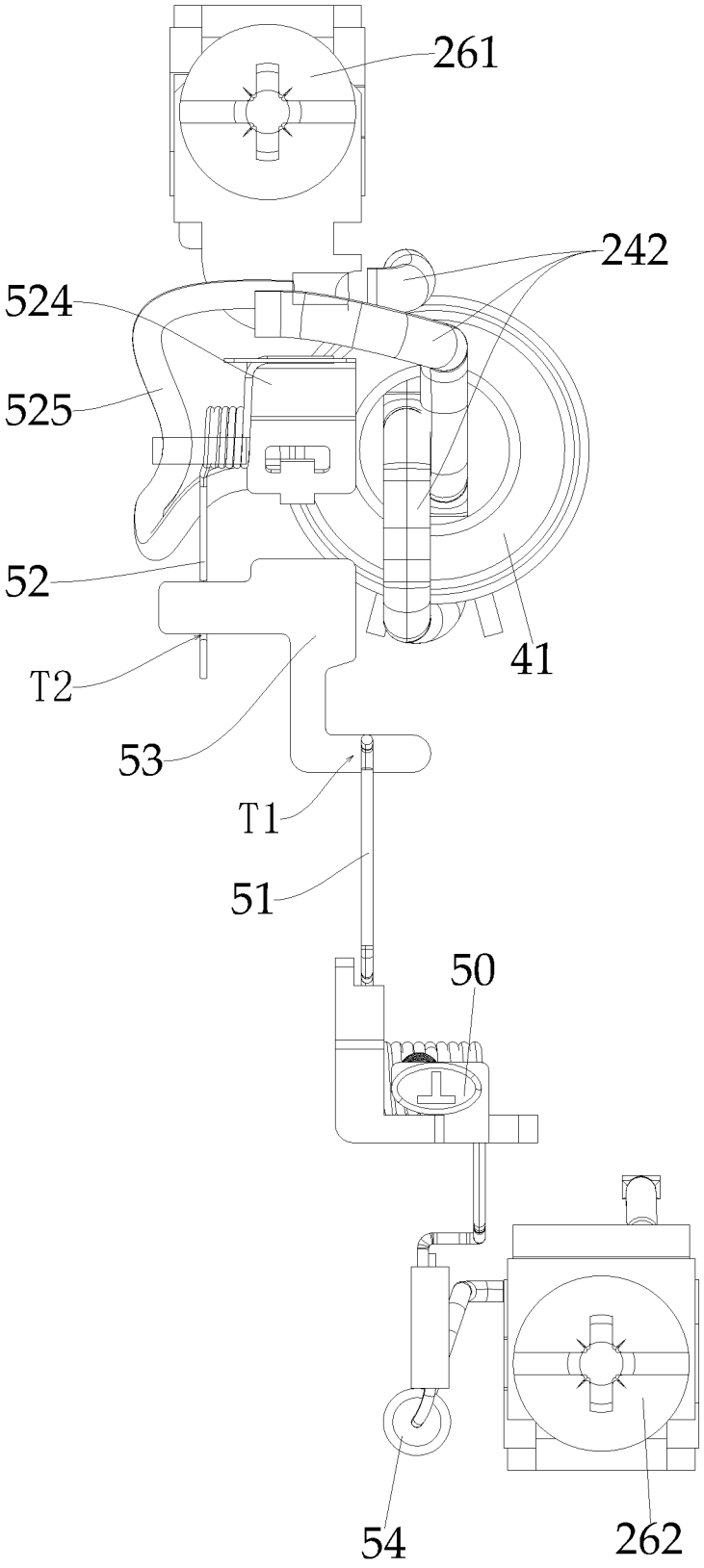

FIG.5

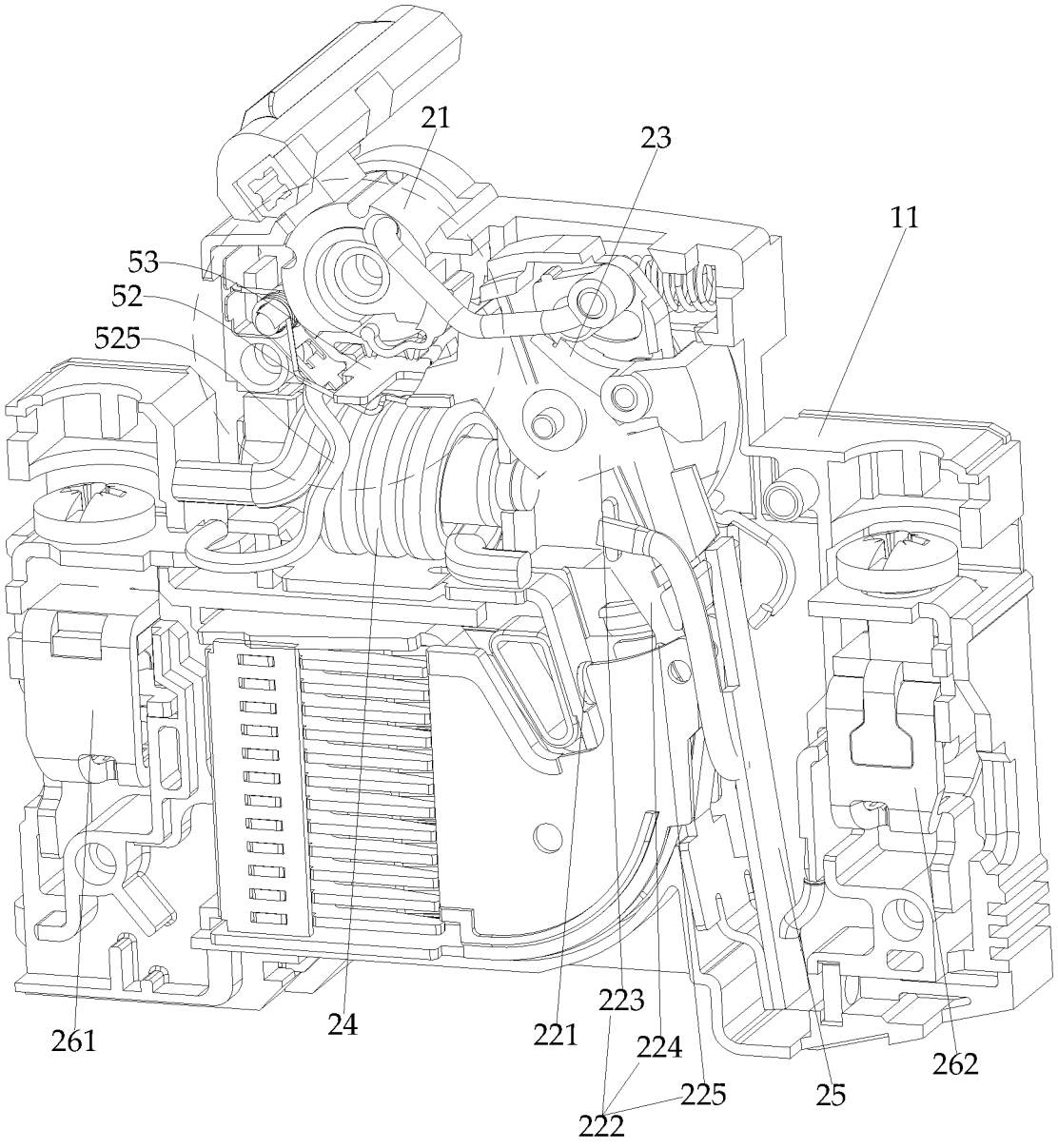

FIG.6

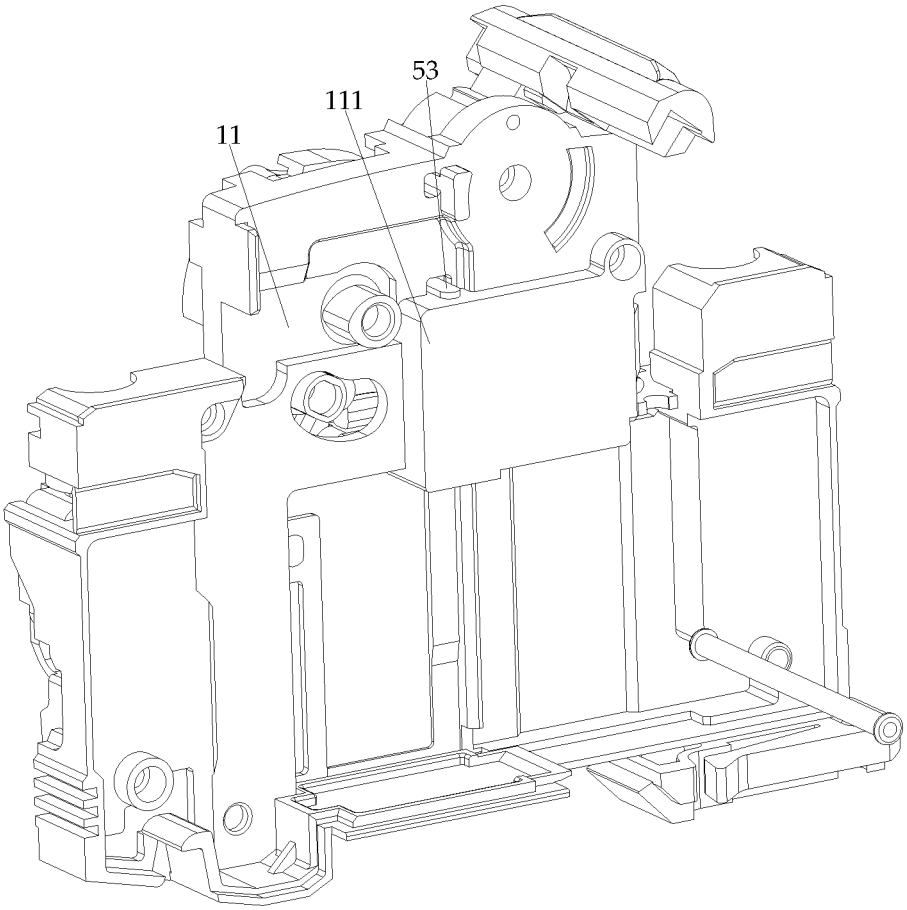

FIG.7

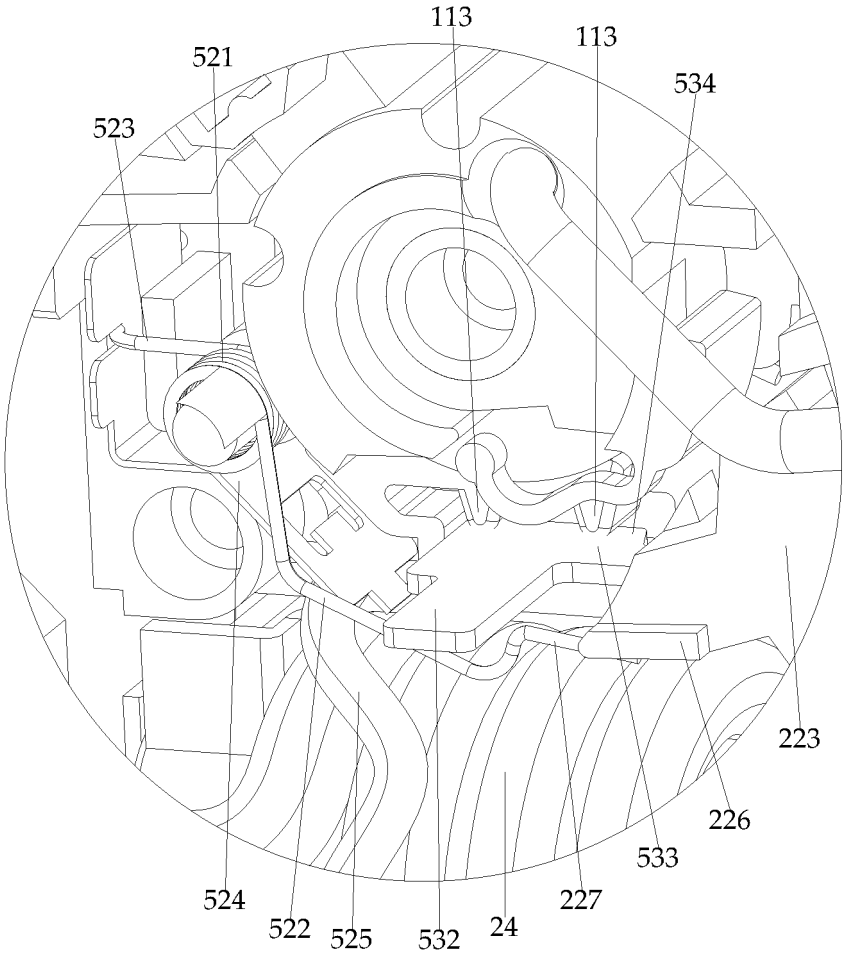

FIG.8

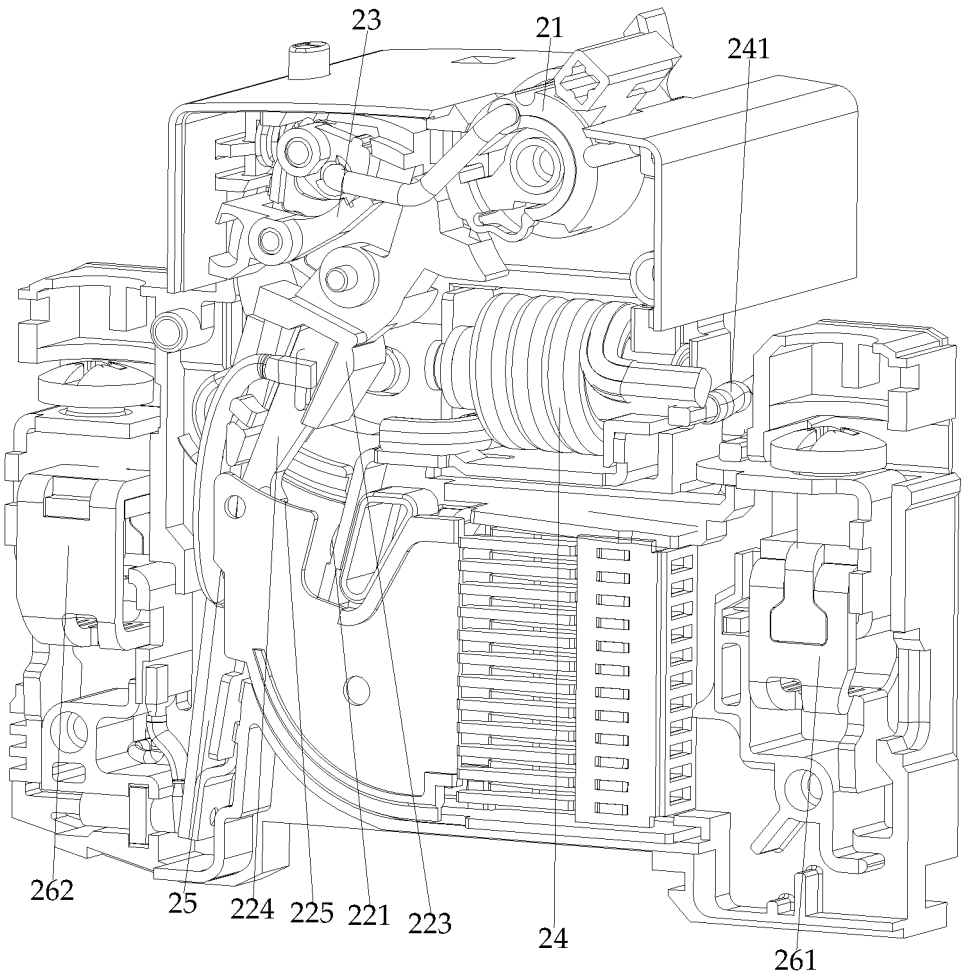

FIG.9

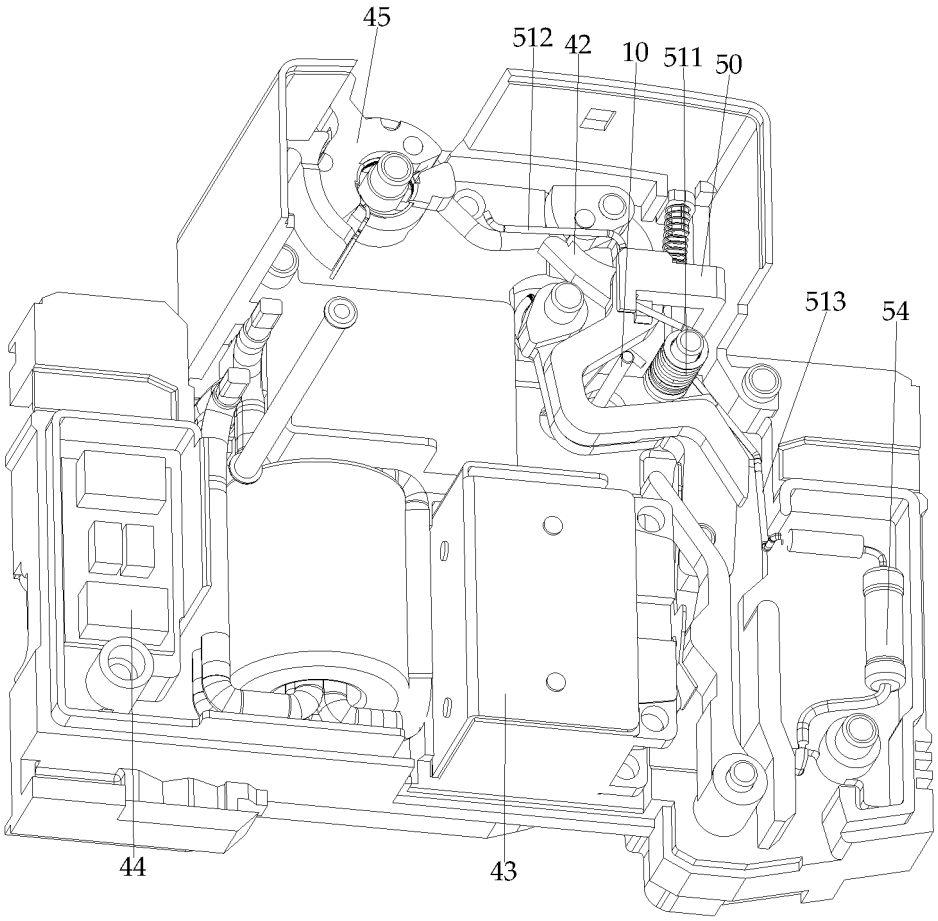

FIG.10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/128888

A. CLASSIFICATION OF SUBJECT MATTER

H01H 83/04(2006.01)i; H01H 71/02(2006.01)i; H01H 71/08(2006.01)i; H01H 73/04(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)

WPI, EPODOC, CNPAT, CNKI: 断路器, 漏电保护, 测试, 试验, 自检, 按钮, 避让, 触头, 触片, 触点, breaker, circuit, leakage, test+, button, contact

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 209544274 U (ZHEJIANG CHINT ELECTRIC APPLIANCE CO., LTD.) 25 October 2019 (2019-10-25) description, paragraphs [0005]-[0070], and figures 1-18	1-15
A	CN 207883638 U (SEARI ELECTRICAL APPARATUS TECHNOLOGY CO., LTD. et al.) 18 September 2018 (2018-09-18) entire document	1-15
A	CN 207852601 U (ZHE JIANG SINGI ELECTRIC LLC) 11 September 2018 (2018-09-11) entire document	1-15
A	JP 2014164799 A (NITTO KOGYO K.K.) 08 September 2014 (2014-09-08) entire document	1-15
A	KR 102011273 B1 (DOO WON CO., LTD.) 21 October 2019 (2019-10-21) entire document	1-15

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
03 February 2021	**19 February 2021**

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