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(54) **ELECTROMAGNETIC RELAY FOR PREVENTING ARC SHORT CIRCUIT**

ELEKTROMAGNETISCHES RELAIS ZUM VERHINDERN EINES LICHTBOGEN-KURZSCHLUSSES

RELAIS ÉLECTROMAGNÉTIQUE POUR LA PRÉVENTION DE COURTS-CIRCUITS D'ARC

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to an electromagnetic relay, in particular to an electromagnetic relay for preventing arc short circuit.

BACKGROUND

[0002] Electromagnetic relay is a kind of relay that uses electromagnetic force to drive relative movement of mechanical parts to produce a predetermined response, and it generally includes a magnetic circuit part, a movable spring part, a stationary spring part, a base and a case. The magnetic circuit part includes an iron core, a bobbin wound with enameled wires, an armature, a yoke, and the like. When the coil (i.e. enameled wire) is energized, an electromagnetic force will be generated, and the armature will be attracted and contact with the pole face at one end of the iron core, thereby driving the movable contact of the movable spring part to contact with or separate from the stationary contact of the stationary spring part; when the current in the coil disappears, the electromagnetic force disappears, and the armature is reset and separated from the pole face at one end of the iron core, so that the movable contact of the movable spring part is separated from or contacted with the stationary contact of the stationary spring part. Through the contact or separation of the movable contact and the stationary contact, the purpose of switching on or switching off the circuit is achieved.

[0003] Some electromagnetic relays in the related art are provided with a plurality of sets of contacts, which can be applied to multi-phase circuits, such as three-phase alternating current. The plurality of sets of contacts of this electromagnetic relay are usually located in separate compartments, the compartment is provided with a lateral opening and is covered by a case. However, due to a gap is existed between the partition plate located between adjacent compartments and the case, when the electromagnetic relay is used to switch multi-phase high currents (such as three-phase 500A short-circuit current), the arc generated by the breaking of contacts in a compartment easily enters the adjacent compartment, resulting in arc short circuit or even explosion.

[0004] Document DE 10 2016 006685 A1 discloses a forcibly guided relay with a housing.

SUMMARY

[0005] In view of the technical problems existing in the related art, the present disclosure provides an electromagnetic relay for preventing arc short circuit, which, by improving the structure, prevents arc short circuit caused by the arc generated by the breaking of the contacts.

[0006] The technical solution adopted by the present disclosure to solve the technical problem is: an electro-

magnetic relay for preventing arc short circuit includes a base, a magnetic circuit part, a contact part, an actuator and a first arc partition plate. The base is provided with a first accommodating cavity, the first accommodating cavity is provided with a plurality of partition plates to divide the first accommodating cavity into a plurality of compartments distributed along a preset direction, a side of the first accommodating cavity is provided with a first opening leading to each of the compartments. The magnetic circuit part installed on the base and comprising an armature. The contact part includes a plurality of contact units corresponding to the plurality of compartments one-to-one, each of the plurality of contact units includes a movable spring part and a stationary spring part, and the movable spring part and the stationary spring part are installed in a corresponding compartment and configured to cooperate with each other. The armature of the magnetic circuit part are cooperated with the movable spring part of each of the contact units by the actuator. The first arc partition plate is configured to close all or part of the first opening, and an inner side of the first arc partition plate is provided with a plurality of first baffles distributed along the preset direction, at least one first baffle is laterally inserted into each compartment, and the first baffle is configured to adjacent to or abut against a partition plate of the compartment to form at least two partition walls located between adjacent compartments. The electromagnetic relay further includes a case with an opening at a bottom, wherein the case is connected with the base, and is configured to accommodate the magnetic circuit part, the contact part, the actuator and the first arc partition plate in a casing cavity of the case.

[0007] According to embodiments of the present disclosure, a side of the first accommodating cavity is further provided with a second opening leading to each compartment, and the second opening and the first opening are located at two opposite sides of the first accommodating cavity, and the first openings and the second openings are distributed in a direction perpendicular to the preset direction; the movable spring part is laterally installed in a corresponding compartment from the first opening, and the stationary spring part is laterally installed in the corresponding compartment from the second opening; the electromagnetic relay further includes a second arc partition plate, the second arc partition plate is configured to close all or part of the second opening, and an inner side of the second arc partition plate is provided with a plurality of second baffles distributed along the preset direction, at least one second baffle is laterally inserted into each compartment, and the second baffle is configured to adjacent to or abut against the baffle plate of the compartment to form at least two arc partition walls located between adjacent compartments.

[0008] According to embodiments of the present disclosure, the first baffles of the first arc partition plate are respectively laterally inserted into a first slot provided in a corresponding compartment, among the plurality of second baffles of the second arc partition plate, every two

second baffles is in a group, and a second slot is formed between the two second baffles of a same group, the second slot is inserted and matched with the partition plate in a corresponding compartment.

[0009] According to embodiments of the present disclosure, the actuator is disposed along the preset direction and fitted at the first opening, the first arc partition plate is located below the actuator; the first opening is provided with a first arc blocking structure at a position above the actuator to limit an arc generated by a breaking of the movable spring part and the stationary spring part from entering an adjacent compartment from a space above the actuator.

[0010] According to embodiments of the present disclosure, the first arc blocking structure includes a plurality of third baffles, and the plurality of third baffles are disposed on an inner side of the case facing the first opening and are arranged at intervals along the preset direction, a top of each of the third baffles is connected to an inner top surface of the case, and at least one third baffle is inserted downward into one compartment from a top of the compartment, and the third baffle is configured to adjacent to or abut against a part of the partition plate of the compartment above the actuator to form at least two arc partition walls located between top portions of adjacent compartments.

[0011] According to embodiments of the present disclosure, the portions of the plurality of partition plates close to the first opening are respectively provided with a first notch for avoiding the actuator; at least one side of each partition plate is provided with a second arc blocking structure, so as to restrict the arc generated by the breaking of the movable spring part and the stationary spring part from entering the adjacent compartment from a gap between the first notch and the actuator.

[0012] According to embodiments of the present disclosure, the second arc blocking structure includes an upper baffle and a lower baffle arranged on a same side of the compartment, the upper baffle is fitted above the actuator, and the lower baffle is fitted below the actuator, one end of the upper baffle and one end of the lower baffle away from the partition plate are respectively inclined toward a direction close to the actuator; the second arc blocking structure further includes a side baffle, the side baffle is located inside the actuator, and an upper end of the side baffle is connected to the upper baffle, and a lower end of the side baffle is connected to the lower baffle.

[0013] According to embodiments of the present disclosure, a plurality of arc blocking portions are provided on a top of the inner side of the first arc partition plate, and bottom ends of the arc blocking portions are respectively connected with the top ends of the plurality of first baffles of the first arc partition plate one by one, top ends of the plurality of arc blocking portions are configured to extend toward a direction close to the actuator; a longitudinal section of the arc blocking portion in the preset direction is an inverted T-shape.

[0014] According to embodiments of the present disclosure, the inner side of the second arc partition plate is provided with a plurality of fourth baffles distributed along the preset direction at intervals, at least one fourth baffle is laterally inserted into one compartment.

[0015] According to embodiments of the present disclosure, the base is further provided with a second accommodating cavity of which upper end is open; the magnetic circuit part includes a coil assembly and the armature, the coil assembly is horizontally disposed in the second accommodating cavity, the armature is located outside the second accommodating cavity and is disposed at one end of the base in the preset direction; the first accommodating cavity and the second accommodating cavity are separated in a direction perpendicular to the preset direction, and the second opening is located below the second accommodating cavity.

[0016] According to embodiments of the present disclosure, the movable spring part includes a movable spring lead-out pin, a rigid spring, a flexible connector and a reaction force spring, the movable spring lead-out pin is laterally inserted into the base, a top of the rigid spring is rotatably connected with a top of the movable spring lead-out pin, the flexible connector is connected between the top of the rigid spring and the top of the movable spring lead-out pin; a movable contact is provided on a side of a bottom of the rigid spring facing away from the movable spring lead-out pin; the reaction force spring is located between the movable spring lead-out pin and the rigid spring, and a bottom of the reaction force spring is fixedly connected with the rigid spring, there is a preset distance between a top of the reaction force spring and the rigid spring; the actuator is provided with a plurality of slots distributed along the preset direction and corresponding to the movable spring part one-to-one, the rigid spring and the reaction force spring of the movable spring part are respectively snapped into corresponding slots.

[0017] According to embodiments of the present disclosure, the electromagnetic relay further includes an auxiliary movable spring provided with an auxiliary movable contact and an auxiliary stationary spring provided with an auxiliary stationary contact, the auxiliary movable spring and the auxiliary stationary spring are respectively configured to insert into the base and are located at a side of the base where the armature is located; one end of the actuator facing the armature is provided with a driving portion, and the driving portion is configured to cooperate with the auxiliary movable spring to drive the auxiliary movable spring to move.

[0018] Compared with the related art, the electromagnetic relay of the embodiments of the present disclosure has the following beneficial effects:

1. The electromagnetic relay of the present disclosure includes a first arc partition plate, the first arc partition plate is configured to close all or part of the first opening, and the inner side of the first arc parti-

tion plate is provided with a plurality of first baffles distributed along the preset direction, at least one first baffle is laterally inserted into each compartment, and the first baffle adjacent to or abuts against the partition plate of the compartment to form at least two partition walls located between adjacent compartments, so that the electromagnetic relay of the present disclosure can prevent the arc generated by the breaking of the movable spring part and the stationary spring part from escaping from the first opening to the adjacent compartment to cause an arc short circuit. In particular, the formed at least two arc partition walls complement each other, the arc isolation effect is good, and the requirements for the machining accuracy of the partition plate, the first arc partition plate and the first baffle are low.

2. A side of the first accommodating cavity is further provided with a second opening, the movable spring part and the stationary spring part can be installed separately from the opposite sides of the base to ensure that the lead-out pin of the movable spring part and the lead-out pin of the stationary spring part have sufficient creepage distance in a limited space to meet the use requirements. At the same time, the electromagnetic relay of the present disclosure further includes a second arc partition plate, which can prevent the arc generated by the breaking of the movable spring part and the stationary spring part from escaping from the second opening to the adjacent compartment to cause an arc short circuit, and the relative sealing of each compartment can be ensured.

3. The arrangement of the actuator being disposed along the preset direction and fitted at the first opening, not only can the arrangement make the installation of the actuator easier, but also enables the force point between the actuator and the movable spring part and the force point between the actuator and the armature to be located on or substantially on the same straight line, the actuator is not easily deformed during the working process, so as to ensure that the service life of the entire electromagnetic relay will not be reduced due to the quality problem of the actuator. At the same time, the first opening is provided with a first arc blocking structure at the position above the actuator to limit the arc generated by the breaking of the movable spring part and the stationary spring part from entering the adjacent compartment from the space above the actuator, so as to ensure the relative sealing of each compartment under the external installation of the actuator.

4. The first arc blocking structure includes a plurality of third baffles, and the plurality of third baffles are disposed on the inner side of the case facing the first opening, and are arranged at intervals along the preset direction, the top of each third baffle is respectively connected to the inner top surface of the case, and at least one third baffle is inserted down-

ward into each compartment from the top of the compartment, and the third baffle is adjacent to or abuts against the part of the partition plate of the compartment above the actuator to form at least two arc partition walls located between the top portions of adjacent compartments, not only can the third baffle be used to effectively seal the gap between the part of the partition plate above the actuator and the case, but also the electromagnetic relay of the present disclosure can be assembled with one component less, thereby simplifying assembly steps.

5. At least one side of the partition plate is provided with a second arc blocking structure, so as to restrict the arc generated by the breaking of the movable spring part and the stationary spring part from entering the adjacent compartment from the gap between the first notch and the actuator, so as to further improve the arc isolation performance of the electromagnetic relay of the present disclosure. A plurality of arc blocking portions are provided on the top of the inner side of the first arc partition plate, which can be further prevent the arc from entering the adjacent compartment from the gap between the first notch and the actuator, thereby further improving the arc isolation performance of the electromagnetic relay of the present disclosure.

[0019] The present disclosure will be further described in detail below with reference to the accompanying drawings and embodiments. However, the electromagnetic relay for preventing arc short circuit of the present disclosure is not limited to the embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

FIG 1 is an exploded schematic diagram of the electromagnetic relay according to the first embodiment of the present disclosure.

FIG 2 is a first schematic perspective diagram showing a configuration of a base (showing a first opening) according to the first embodiment of the present disclosure.

FIG 3 is a second schematic perspective diagram showing a configuration of a base (showing a second opening) according to the first embodiment of the present disclosure.

FIG 4 is a first schematic perspective diagram showing a configuration of a first arc partition plate (showing the inner side) according to the first embodiment of the present disclosure.

FIG 5 is a second schematic perspective diagram showing a configuration of a first arc partition plate (showing the outer side) according to the first embodiment of the present disclosure.

FIG 6 is a first schematic perspective diagram showing a configuration of a second arc partition plate

(showing the inner side) according to the first embodiment of the present disclosure.

FIG 7 is a second schematic perspective diagram showing a configuration of a second arc partition plate (showing the outer side) according to the first embodiment of the present disclosure.

FIG 8 is a schematic perspective diagram showing a configuration of a case (showing the third baffle) according to the first embodiment of the present disclosure.

FIG 9 is a schematic perspective diagram showing a configuration of the base after being installed with a magnetic circuit part and a contact part according to the first embodiment of the present disclosure.

FIG 10 is a schematic perspective diagram showing a configuration of the base after being installed with a magnetic circuit part, a contact part and an actuator according to the first embodiment of the present disclosure.

FIG 11 is a schematic perspective diagram showing a configuration of the base after being installed with the first partition plate and the like (showing the front side) according to the first embodiment of the present disclosure.

FIG 12 is a schematic perspective diagram showing a configuration of the base after being installed with other partition plate and the like (showing the back side) according to the first embodiment of the present disclosure.

FIG 13 is a schematic perspective diagram showing a configuration of the base after being installed with the two partition plates and the like according to the first embodiment of the present disclosure.

FIG 14 is a top view of the base after being installed with the two partition plates and the like according to the first embodiment of the present disclosure.

FIG 15 is a side view of the base after being installed with the two partition plates and the like according to the first embodiment of the present disclosure.

FIG 16 is a schematic perspective diagram showing a configuration of the electromagnetic relay according to the first embodiment of the present disclosure.

FIG 17 is first cross-sectional view of the electromagnetic relay according to the first embodiment of the present disclosure.

FIG 18 is second cross-sectional view of the electromagnetic relay according to the first embodiment of the present disclosure.

FIG 19 is third cross-sectional view of the electromagnetic relay according to the first embodiment of the present disclosure.

FIG 20 is fourth cross-sectional view of the electromagnetic relay according to the first embodiment of the present disclosure.

FIG 21 is a schematic perspective diagram showing a configuration of a second arc partition plate according to the second embodiment of the present disclosure.

FIG 22 is a cross-sectional view of the electromagnetic relay according to the second embodiment of the present disclosure.

5 DETAILED DESCRIPTION

First embodiment

[0021] Please refer to FIGS. 1 to 20, an electromagnetic relay for preventing arc short circuit of the present disclosure includes a case 1 with an opening at the bottom, a base 2, a magnetic circuit part 3, a contact part and an actuator 4, and the magnetic circuit part 3 is horizontally installed on the base 2; the base 2 is provided with a first accommodating cavity 21 for accommodating the contact part, the first accommodating cavity 21 is provided with a plurality of partition plates 211 to divide the first accommodating cavity 21 into a plurality of compartments 212 distributed along a preset direction D1, a side of the first accommodating cavity 21 is provided with a first opening 213 leading to each compartment 212; the contact part includes a plurality of contact units corresponding to the plurality of compartments 212 one-to-one, each contact unit includes a movable spring part 5 and a stationary spring part 6, and the movable spring part 5 and the stationary spring part 6 are installed in a corresponding compartment 212 and configured to cooperate with each other; the armature 34 of the magnetic circuit part 3 cooperates with the movable spring part 5 of each contact unit by the actuator 4. The electromagnetic relay of the present disclosure further includes a first arc partition plate 8, the first arc partition plate 8 closes all or part of the first opening 213, and the inner side of the first arc partition plate 8 is provided with a plurality of first baffles 81 distributed along the preset direction D1, and each of the first baffles 81 is vertical. At least one first baffle 81 is laterally inserted into each compartment 212, and the first baffle 81 is adjacent to or abuts against the partition plate 211 of the compartment 212 to form at least two partition walls located between adjacent compartments; the bottom end of the case 1 is connected to the base 2 and accommodates the magnetic circuit part 3, the contact part, the actuator 4 and the first arc partition plate 8 in its casing cavity. The preset direction D1 is specifically the length direction of the base 2, but is not limited thereto. In other embodiments, the preset direction D1 is the width direction of the base 2. The magnetic circuit part 3 is lying on the base 2 along the preset direction D1. The inner side of the first arc partition plate 8 refers to a side surface of the first arc partition plate 8 facing the inside of the first accommodating cavity 21.

[0022] In the embodiment, a side of the first accommodating cavity 21 is further provided with a second opening 215 leading to each compartment 212, and the second opening 215 and the first opening 213 are located at two opposite sides of the first accommodating cavity 21, and the first openings 213 and the second openings 215 are distributed in a direction perpendicular

to the preset direction D1. The movable spring part 5 is laterally installed in the corresponding compartment 212 from the first opening 213, and the stationary spring part 6 is laterally installed in the corresponding compartment 212 from the second opening 215. In this way, it is ensured that the lead-out pin of the movable spring part 5 located under the base 2 and the lead-out pin of the stationary spring part 6 located under the base 2 are far away from each other, so as to ensure that the clearance between the both meets the requirements for use. The electromagnetic relay of the present disclosure further includes a second arc partition plate 9, the second arc partition plate 9 closes the second opening 215, and the inner side of the second arc partition plate 9 is provided with a plurality of second baffles 91 distributed along the preset direction D1, at least one second baffle 91 is laterally inserted into each compartment 212, and the second baffle 91 is adjacent to or abuts against the partition plate 211 of the compartment 212 to form at least two arc partition walls located between adjacent compartments 212. The second arc partition plate 9 is located in the case 1, and the inner side of the second arc partition plate 9 refers to a side surface of the second arc partition plate 9 facing the inside of the first accommodating cavity 21. In other embodiments, the electromagnetic relay of the present disclosure is not provided with the second opening 215, and the movable spring part 5 and the stationary spring part 6 are both installed in the corresponding compartment 212 from the first opening 213.

[0023] In the embodiment, as shown in FIG 2, the first baffles 81 of the first arc partition plate 8 are respectively laterally inserted into the first slot 214 provided in the corresponding compartment 212, as shown in FIG 6, among the plurality of second baffles 91 of the second arc partition plate 9, every two second baffles 91 is in a group, and a second slot 92 is formed between the two second baffles 91 of the same group, the second slots 92 are inserted and matched with the partition plates 211 in the corresponding compartments. In this way, the first arc partition plate 8 and the second arc partition plate 9 can be pre-positioned when they are inserted laterally. The periphery or part of the periphery of the first arc partition plate 8 and the second arc partition plate 9 can be further fixed with the base 2 by dispensing glue. In addition, a first sealing rib 83 may be provided on all or part of the periphery of the inner side of the first arc partition plate 8, and a second sealing rib 93 may be provided on all or part of the periphery of the inner side of the second arc partition plate 9, so that the stability of the first arc partition plate 8 and the second arc partition plate 9 can be ensured, and the leakage of the arc can be further avoided.

[0024] In the embodiment, as shown in FIG 1 and FIG 10, the actuator 4 is in an arrangement that the actuator 4 is disposed along the preset direction D1 and fitted at the first opening 213, not only can the arrangement of the actuator 4 make the installation of the actuator 4 easier,

but also enables the force point between the actuator 4 and the movable spring part 5 and the force point between the actuator 4 and the armature 34 to be located on or substantially on the same straight line, the actuator 4 is not easily deformed during the working process, so as to ensure that the service life of the entire electromagnetic relay will not be reduced due to the quality problem of the actuator 4. Specifically, as shown in FIG 11, the actuator 4 is approximately located in the middle of the first opening 213 in the up-down direction, and the first arc partition plate 8 is located below the actuator 4. Therefore, the first arc partition plate 8 closes the lower portion of the first opening 213, as shown in FIG 13, and the second arc partition plate 9 closes the entire second opening 215. The first opening 213 is provided with a first arc blocking structure at the position above the actuator 4 to limit the arc generated by the breaking of the movable spring part 5 and the stationary spring part 6 from entering the adjacent compartment 212 from the space above the actuator 4. In other embodiments, the actuator is fitted at the inner side of each movable spring part 5, or the actuator 4 is located inside the first arc partition plate 8, in this case, the first arc partition plate 8 can be further enlarged to close the first opening 213, so that the first arc blocking structure can be eliminated.

[0025] In the embodiment, as shown in FIG 8, the first arc blocking structure includes a plurality of third baffles 11, and the plurality of third baffles 11 are disposed on the inner side of the case 1 facing the first opening 213, and are arranged at intervals along the preset direction D1, the top of each third baffle 11 is respectively connected to the inner top surface of the case 1, and at least one third baffle 11 is inserted downward into each compartment 212 from the top of the compartment 212, and the third baffle 11 is adjacent to or abuts against the part of the partition plate 211 of the compartment 212 above the actuator 4 to form at least two arc partition walls located between the top portions of adjacent compartments 212. As shown in FIG 2, the plurality of third baffles 11 are respectively inserted downward into the third slots 217 provided in the upper portions of the corresponding compartments 212. Therefore, the top wall of each compartment 212 is respectively provided with a second notch 216 to avoid the third baffle 11 when it is inserted downward. In other embodiments, the first arc blocking structure and the case 1 are separate components, and the first arc blocking structure includes a third arc partition plate, a plurality of third baffles are provided on the inner side of the third arc partition plate 11, and the third arc partition plate closes the portion of the first opening 213 above the actuator 4.

[0026] In the embodiment, as shown in FIG 2, the portions of the plurality of partition plates 211 close to the first opening 213 are respectively provided with a first notch 2111 for avoiding the actuator 4. At least one side of each partition plate 211 is provided with a second arc blocking structure, so as to restrict the arc generated by the breaking of the movable spring part 5 and the sta-

tionary spring part 6 from entering the adjacent compartment 212 from the gap between the first notch 2111 and the actuator 4.

[0027] In the embodiment, as shown in FIG 2, the second arc blocking structure includes an upper baffle 2112 and a lower baffle 2113 arranged on the same side of the compartment 212, the upper baffle 2112 is approximately Z-shaped and fits above the actuator 4, and the lower baffle 2113 is inclined and fits below the actuator 4, as shown in FIG 2 and FIG 15, the upper baffle 2112 and the lower baffle 2113 are configured to extend obliquely from the partition plate 211 in the direction close to the actuator 4. One end of the upper baffle 2112 and one end of the lower baffle 2113 away from the first opening 213 are respectively connected to the inner side of the compartment 212. The second arc blocking structure further includes a side baffle 2114, the side baffle 2114 is located inside the actuator 4, and the upper end of the side baffle 2114 is connected to the upper baffle 2112, and the lower end of the side baffle 2114 is connected to the lower baffle 2113; one end of the side baffle 2114 facing away from the actuator 4 is respectively connected to the inner side of the compartment 212. The cross section of the actuator 4 is in a shape of a horizontal T. As shown in FIG 17, the upper baffle 2112 and the lower baffle 2113 are respectively located at the upper and lower sides of the position corresponding to the horizontal portion of the horizontal T shape of the actuator 4.

[0028] In the embodiment, as shown in FIG 4, a plurality of arc blocking portions 82 are provided on the top of the inner side of the first arc partition plate 8, and the bottom ends of the arc blocking portions 82 are respectively connected with the top ends of the plurality of first baffles 81 of the first arc partition plate 8 one by one, the top ends of the plurality of arc blocking portions 82 extend toward the direction close to the actuator 4, and are located below the lower baffle 2113; the longitudinal section of the arc blocking portion 82 in the preset direction D1 is an inverted T-shape.

[0029] In the embodiment, as shown in FIG 3, the base 2 is further provided with a second accommodating cavity 22 of which upper end is open, as shown in FIG 13, the magnetic circuit part 3 includes a coil assembly and the armature 34, the coil assembly is horizontally disposed in the second accommodating cavity 22, the armature 34 is located outside the second accommodating cavity 22, and is disposed at one end of the base 2 in the preset direction D1; the first accommodating cavity 21 and the second accommodating cavity 22 are separated in a direction perpendicular to the preset direction D1 (i.e., the width direction of the base 2), and the second opening 215 is located below the second accommodating cavity 22.

[0030] In the embodiment, as shown in FIGS. 13 to 14 and FIG 17, the coil assembly of the magnetic circuit part 3 includes a bobbin 31, an iron core 35, an enameled wire 32, and a yoke 33, and the iron core 35 is inserted into the bobbin 31, and two ends of the iron core 35 are exposed,

the enameled wire 32 is wound outside the bobbin 31, and the yoke 33 is L-shaped and includes a first yoke portion 331 and a second yoke portion 332. The first yoke portion 331 is fixedly connected to the end of the iron core 35 away from the armature 34 (or the first yoke portion 331 and the iron core 35 can also be integrally formed), and the second yoke portion 332 is fitted at a side of the bobbin 31 after the enameled wire 32 is wound. The armature 34 is specifically limited at the knife edge of the second yoke portion 332 of the yoke 33 by the return spring 10, the knife edge is a notch at the end of the second yoke portion 332 away from the first yoke portion 331 (not shown in the figure), and the notch is used to insert the armature 34. The knife edge of the yoke 33 is a well-known technical term in the art, and will not be repeated here.

[0031] The cross-section of the armature 34 is generally in a shape of a line segment, and the part of the armature 34 that configured to cooperate with the pole surface 351 of the iron core 35 is bent in an inclined shape toward the side away from the iron core 35. In this way, the rotation angle of the armature 34 is made larger, so that the stroke of actuator 4 is larger. Therefore, the contact clearance between the movable spring part 5 and the stationary spring part 6 in the cut-off state is larger, so that the safety performance of the electromagnetic relay of the present disclosure in the cut-off state can be improved. In the embodiment, as shown in FIGS. 9 and 19, the movable spring part 5 is configured as a structure resistant to short-circuit current, which includes a movable spring lead-out pin 51, a rigid spring 52, a flexible connector 53 and a reaction force spring 54, the movable spring lead-out pin 51 is laterally inserted into the base 2 from the first opening 213, and its bottom is located below the base 2, and forms the lead-out pin of the movable spring part 5, the top of the rigid spring 52 is rotatably connected with the top of the movable spring lead-out pin 51, so that the rigid spring 52 can rotate in a direction away from or close to the movable spring lead-out pin 51, the flexible connector 53 is connected between the top of the rigid spring 52 and the top of the movable spring lead-out pin 51; a movable contact 55 is provided on the side of the bottom of the rigid spring 52 facing away from the movable spring lead-out pin 51; the reaction force spring 54 is located between the movable spring lead-out pin 51 and the rigid spring 52, and the bottom of the reaction force spring 54 is fixedly connected with the rigid spring 52, there is a preset distance between the top of the reaction force spring 54 and the rigid spring 52; the actuator 4 is provided with a plurality of slots distributed along the preset direction D1 and corresponding to the movable spring parts 5 one-to-one. The rigid springs 52 and the reaction force springs 54 of the movable spring parts 5 are respectively snapped into the corresponding slots. In this way, the actuator 4 drives the rigid spring 52 to move toward the direction close to the stationary spring part 6 by pushing the reaction force spring 54, thereby generating an overstroke. The stationary spring part 6

includes a stationary spring 61 and a stationary contact 62 disposed on one end of the stationary spring 61, and the other end of the stationary spring 61 is integrally formed with a lead-out pin.

[0032] In the embodiment, as shown in FIG. 10, the present disclosure includes a plurality of limiting members 7, through which the actuator 4 is restricted from sliding out of the first opening 213 to the outside. Each limiting member 7 is approximately in a shape of a "└", that is, the limiting member 7 may include a first portion, a second portion and a third portion connected in sequence, the first portion and the third portion are substantially parallel, and the two ends of the second portion are respectively connected to the ends of the first portion and the third portion at the same side, the other ends of the first portion and the third portion are free ends so that the limiting member 7 forms a lateral opening. The middle side (i.e., the second portion) of the limiting member 7 is located at the outside of the actuator 4, and the remaining two sides (i.e., the first portion and the third portion) are fitted at the upper and lower sides of the actuator 4 respectively, and are inserted into the sockets provided on the corresponding partition plate 211. The top of the first arc partition plate 8 is provided with third notches 85 for avoiding the portions of the limiting member 7. As shown in FIGS. 4 and 5, a plurality of first grooves 84 spaced along the preset direction D1 are provided at the bottom of the first arc partition plate 8, the plurality of first grooves 84 are inserted and matched with the plurality of first protrusions 23 located on the bottom of the base 2 and protruding outward from the first opening 213 (as shown in FIG 2), so that the first arc partition plate 8 can be pre-positioned. Similarly, as shown in FIG. 6 and FIG. 7, the bottom of the second arc partition plate 9 is also provided with a plurality of second grooves 93 spaced along the preset direction D1, the plurality of second grooves 93 are inserted and matched with the plurality of second protrusions 24 located on the bottom of the base 2 and protruding outward from the second opening 215 (as shown in FIG 3), so that the second arc partition plate 9 can be pre-positioned.

[0033] In the embodiment, as shown in FIGS. 13 and 15, the electromagnetic relay of the embodiment of the present disclosure further includes an auxiliary movable spring 20 provided with an auxiliary movable contact and an auxiliary stationary spring 30 provided with an auxiliary stationary contact, the two are respectively configured to insert into the base 2 and are located at the side where the armature 34 is located; one end of the actuator 4 facing the armature 34 is provided with a driving portion 41, and the driving portion 41 is configured to cooperate with the auxiliary movable spring 20 to drive the auxiliary movable spring 20 to move; the moving state of the auxiliary movable spring 20 is opposite to the moving state of the movable spring part 5. That is, when the movable spring part 5 moves in the direction of attracting to the stationary spring part 6, the auxiliary movable spring 20 moves in the direction of separating from the

stationary spring part 6, which is opposite to the direction when the movable spring part 5 is attracted to the stationary spring part 6, when the movable spring part 5 moves in the direction of separating from the stationary spring part 6, the auxiliary movable spring 20 moves in the direction of attracting to the stationary spring part 6, which is opposite to the direction when the movable spring part 5 is separated from the stationary spring part 6.

[0034] In the electromagnetic relay for preventing arc short circuit of the present disclosure, the number of contact units is specifically four, but not limited thereto. Therefore, the electromagnetic relay of the present disclosure can be applied to a three-phase four-wire circuit, where each group of contact units can reach a current carrying capacity of 40A and can withstand a short-circuit current of 3kA.

[0035] The operating principle of the electromagnetic relay of the present disclosure is: when the coil (i.e., the enameled wire 32) is energized, the armature 34 rotates around the knife edge of the yoke 33, attracts and engages with the pole surface 351 of the iron core 35, and at the same time drives the actuator 5 to move along the length direction of the base 2, and drives the reaction force spring 54 and the rigid spring 52 of the movable spring part 5 to move to realize the movable contact 55 and the stationary contact 62 are in a close state. When the movable contact 55 and the stationary contact 62 just come into contact, the reaction force spring 54 begins to be deformed, after the armature 34 is in full contact with the pole surface 351 of the iron core 35, the deformation of the reaction force spring 54 ends, and the overstroke is mainly realized by the elastic deformation of the reaction force spring 54. The rigid spring 52 is only responsible for conducting electricity, and is not responsible for deforming to achieve the over-travel function. When the coil (i.e., the enameled wire 32) is de-energized, the armature 23 is reset under the action of the return spring 10, and at the same time drives the actuator 5 to move in the opposite direction, and drives the reaction force spring 54 and the rigid spring 52 of each movable spring part 5 to move in the opposite direction, so that the movable contact 55 and the stationary contact 65 are in a cut-off state. When the movable contact 55 of one group of the movable spring part 5 and the corresponding stationary contact 62 are stuck, the actuator 4 cannot be reset, so that the movable contacts 55 of the remaining groups of the movable spring parts 5 cannot be disconnected from the corresponding stationary contacts 62, thereby achieving a forced guiding function.

[0036] The disconnection between the auxiliary movable contact of the auxiliary movable spring 20 and the auxiliary stationary contact of the auxiliary stationary spring 30 is realized by the driving portion 41 of the actuator 4 pushing the head of the auxiliary movable spring 20. The connection between the auxiliary movable contact and the auxiliary stationary contact is realized by the reaction force of the auxiliary movable spring 20. High

insulation is achieved between the auxiliary contact part and the main contact part (namely contact unit). The auxiliary contact part can monitor the state of the main contact part, no matter which main contact is stuck, the auxiliary contact can't be closed, so as to realize the blocking function.

[0037] When the current is short-circuited, Holm force will be generated on the surfaces of the movable contact 55 and the stationary contact 62, and the Holm force will cause the movable contact 55 and the stationary contact 6 to repel and separate; the U-shaped structure formed by the movable spring lead-out pin 51, the rigid spring 52 and the flexible connector 53 will generate Lorentz force, the Lorentz force will cause the movable contact 55 to move closer to the stationary contact 62, thereby restricting the movable contact 55 and the stationary contact 62 from repelling each other and separating.

[0038] In the electromagnetic relay for preventing arc short circuit of the present disclosure, at the side where the movable spring part 5 is located, the first baffle 81 of the first arc partition plate 8 and the partition plate 211 form two arc partition walls at the lower portion of the compartment 212, the third baffle 11 on the inner side of the case 1 and the partition plate 211 form two arc partition walls located at the upper portion of the compartment 212, combined with the design of the upper baffle 2112, the lower baffle 2113 and the arc blocking portion 82, the electromagnetic relay of the present disclosure forms two large arc partition walls A, B that can completely separate the adjacent compartments 212 at the side where the movable spring part 5 is located, as shown in FIG 19, the lines indicated by A and B in the figure indicate the directions of the large arc partition walls A and B, respectively. At the side where the stationary spring part 6 is located, since there is no actuator 4 installed, and the second opening 215 is smaller, it is completely closed by the second arc partition plate 9, the second baffle 91 of the second arc partition plate 9 and the partition plate 211 form three small arc partition walls C, D, and E, as shown in FIG 20. Therefore, each compartment 212 of the present disclosure is in a relatively closed state. In addition, the two large arc partition walls A, B/three small arc partition walls C, D, and E complement each other respectively, even if one of the large arc partition walls or one of the small arc partition walls is not effective for arc partition, the other large arc partition wall or other small arc partition walls can be used to further isolate the arc. When the movable spring part 5 and the stationary spring part 6 are disconnected to generate an arc, the arc will not enter the adjacent compartment 212, thereby not causing an arc short circuit and ensuring the safety of the electromagnetic relay of the present disclosure during operation.

[0039] In the electromagnetic relay for preventing arc short circuit of the present disclosure, the first arc partition plate 8 and the second arc partition plate 9 are both laterally inserted, so that the assembly sequence is simple, and automation is facilitated. In particular, the first

baffle 81 of the first arc partition plate 8 and the second baffle 91 of the second arc partition plate 9 are respectively plugged into the opposite baffle plate 211, so that the sealing manner between the first arc partition plate 8 and the baffle plate 211 and the sealing manner between the second arc partition plate 9 and the baffle plate 211 are simplified, and no arc leakage gap is ensured. The third baffle 11 is directly formed on the case 1, so that the electromagnetic relay of the present disclosure can reduce the steps of assembling the third baffle 11, thereby simplifying the assembly steps, similarly, the third baffle 11 is plugged into the opposite partition plate 211 to ensure that there is no arc leakage gap between the inner side of the case 1 and the partition plate 211. The arrangement of the second arc blocking structure and/or the arc blocking portion 82 can ensure that there is no arc leakage gap between the adjacent compartments 212 at the first notches 2111, thereby further improving the arc isolation effect of the electromagnetic relay of the present disclosure.

Second embodiment

[0040] Please refer to FIG 21 and FIG. 22, the electromagnetic relay for preventing arc short circuit of the present disclosure is different from the first embodiment described above in that: the inner side of the second arc partition plate 9 is further provided with a plurality of vertical fourth baffles 94 distributed along the preset direction D1 at intervals, at least one fourth baffle 94 is laterally inserted into one compartment 212, respectively. Specifically, two fourth baffles 94 are laterally inserted into one compartment 212, respectively. The dimension of the fourth baffle 94 in the depth direction of the second opening 215 is larger than the dimension of the first baffle 91 in the depth direction of the second opening 215. The depth direction of the second opening 215 may be a direction perpendicular to the preset direction D1, when the preset direction D1 is the length direction of the base 2, the depth direction is the width direction of the base 2. The fourth baffle 94 can be used to increase the creepage distance between the movable spring part 5 and the stationary spring part 6, thereby improving the insulation of the electromagnetic relay of the present disclosure.

Claims

1. An electromagnetic relay for preventing arc short circuit, comprising:

a base (2) provided with a first accommodating cavity (21), wherein the first accommodating cavity (21) is provided with a plurality of partition plates (211) to divide the first accommodating cavity (21) into a plurality of compartments (212) distributed along a preset direction (D1), a side of the first accommodating cavity (21) is pro-

vided with a first opening (213) leading to each of the compartments (212);

a magnetic circuit part (3) installed on the base (2) and comprising an armature (34);

a contact part comprising a plurality of contact units corresponding to the plurality of compartments (212) one-to-one, wherein each of the plurality of contact units comprises a movable spring part (5) and a stationary spring part (6), and the movable spring part (5) and the stationary spring part (6) are installed in a corresponding compartment (212) and configured to cooperate with each other;

an actuator (4), wherein the armature (34) of the magnetic circuit part (3) are cooperated with the movable spring part (5) of each of the contact units by the actuator (4);

a first arc partition plate (8) configured to close all or part of the first opening (213), wherein an inner side of the first arc partition plate (8) is provided with a plurality of first baffles (81) distributed along the preset direction (D1), at least one first baffle (81) is laterally inserted into each compartment (212), and the first baffle (81) is configured to adjacent to or abut against a partition plate (211) of the compartment (212) to form at least two partition walls located between adjacent compartments (212), **characterised by** comprising:

a case (1) with an opening at a bottom, wherein the case (1) is connected with the base (2), and is configured to accommodate the magnetic circuit part (3), the contact part, the actuator (4) and the first arc partition plate (8) in a casing cavity of the case (1).

2. The electromagnetic relay according to claim 1, wherein a side of the first accommodating cavity (21) is further provided with a second opening (215) leading to each compartment (212), and the second opening (215) and the first opening (213) are located at two opposite sides of the first accommodating cavity (21), and the first openings (213) and the second openings (215) are distributed in a direction perpendicular to the preset direction (D1);

the movable spring part (5) is laterally installed in a corresponding compartment (212) from the first opening (213), and the stationary spring part (6) is laterally installed in the corresponding compartment (212) from the second opening (215);

the electromagnetic relay further comprises a second arc partition plate (9), the second arc partition plate (9) is configured to close all or part of the second opening (215), and an inner side of the second arc partition plate (9) is provided with a plurality of second baffles (91) distributed

along the preset direction (D1), at least one second baffle (91) is laterally inserted into each compartment (212), and the second baffle (91) is configured to adjacent to or abut against the baffle plate (211) of the compartment (212) to form at least two arc partition walls located between adjacent compartments (212).

3. The electromagnetic relay according to claim 2, wherein the first baffles (81) of the first arc partition plate (8) are respectively laterally inserted into a first slot (214) provided in a corresponding compartment (212), among the plurality of second baffles (91) of the second arc partition plate (9), every two second baffles (91) is in a group, and a second slot (92) is formed between the two second baffles (91) of a same group, the second slot (92) is inserted and matched with the partition plate (211) in a corresponding compartment (212).
4. The electromagnetic relay according to any one of claims 1 to 3, wherein the actuator (4) is disposed along the preset direction (D1) and fitted at the first opening (213), the first arc partition plate (8) is located below the actuator (4); the first opening (213) is provided with a first arc blocking structure at a position above the actuator (4) to limit an arc generated by a breaking of the movable spring part (5) and the stationary spring part (6) from entering an adjacent compartment (212) from a space above the actuator (4).
5. The electromagnetic relay according to claim 4, wherein, the first arc blocking structure comprises a plurality of third baffles (11), and the plurality of third baffles (11) are disposed on an inner side of the case (1) facing the first opening (213) and are arranged at intervals along the preset direction (D1), a top of each of the third baffles (11) is connected to an inner top surface of the case (1), and at least one third baffle (11) is inserted downward into one compartment (212) from a top of the compartment (212), and the third baffle (11) is configured to adjacent to or abut against a part of the partition plate (211) of the compartment (212) above the actuator (4) to form at least two arc partition walls located between top portions of adjacent compartments (212).
6. The electromagnetic relay according to claim 4, wherein portions of the plurality of partition plates (211) close to the first opening (213) are respectively provided with a first notch (2111) for avoiding the actuator (4); at least one side of each partition plate (211) is provided with a second arc blocking structure, so as to restrict the arc generated by the breaking of the movable spring part (5) and the stationary spring part (6) from entering the adjacent compartment (212) from a gap between the first notch (2111)

and the actuator (4).

7. The electromagnetic relay according to claim 6, wherein the second arc blocking structure comprises an upper baffle (2112) and a lower baffle (2113) arranged on a same side of the compartment (212), the upper baffle (2112) is fitted above the actuator (4), and the lower baffle (2114) is fitted below the actuator (4), the upper baffle (2112) and the lower baffle (2113) are configured to extend obliquely from the partition plate (211) in a direction close to the actuator (4); the second arc blocking structure further comprises a side baffle (2114), the side baffle (2114) is located inside the actuator (4), and an upper end of the side baffle (2114) is connected to the upper baffle (2112), and a lower end of the side baffle (2114) is connected to the lower baffle (2113).
8. The electromagnetic relay according to claim 6, wherein a plurality of arc blocking portions (82) are provided on a top of the inner side of the first arc partition plate (8), and bottom ends of the arc blocking portions (82) are respectively connected with top ends of the plurality of first baffles (81) of the first arc partition plate (8) one by one, the top ends of the plurality of arc blocking portions (82) are configured to extend toward a direction close to the actuator (4); a longitudinal section of an arc blocking portion (82) in the preset direction (D1) is an inverted T-shape.
9. The electromagnetic relay according to claim 2 or 3, wherein the inner side of the second arc partition plate (9) is provided with a plurality of fourth baffles (94) distributed along the preset direction (D1) at intervals, at least one fourth baffle (94) is laterally inserted into one compartment (212).
10. The electromagnetic relay according to claim 2 or 3, wherein the base (2) is further provided with a second accommodating cavity (22) of which upper end is open; the magnetic circuit part (3) comprises a coil assembly and the armature (34), the coil assembly is horizontally disposed in the second accommodating cavity (22), the armature (34) is located outside the second accommodating cavity (22) and is disposed at one end of the base (2) in the preset direction (D1); the first accommodating cavity (21) and the second accommodating cavity (22) are separated in a direction perpendicular to the preset direction (D1), and the second opening (215) is located below the second accommodating cavity (22).
11. The electromagnetic relay according to claim 10, wherein the movable spring part (5) comprises a movable spring lead-out pin (51), a rigid spring (52), a flexible connector (53) and a reaction force

spring (54), the movable spring lead-out pin (51) is laterally inserted into the base (2), a top of the rigid spring (52) is rotatably connected with a top of the movable spring lead-out pin (51), the flexible connector (53) is connected between the top of the rigid spring (52) and the top of the movable spring lead-out pin (51);

a movable contact (55) is provided on a side of a bottom of the rigid spring (52) facing away from the movable spring lead-out pin (51); the reaction force spring (54) is located between the movable spring lead-out pin (51) and the rigid spring (52), and a bottom of the reaction force spring (54) is fixedly connected with the rigid spring (52), there is a preset distance between a top of the reaction force spring (54) and the rigid spring (52); the actuator (4) is provided with a plurality of slots distributed along the preset direction (D1) and corresponding to the movable spring part (5) one-to-one, the rigid spring (52) and the reaction force spring (54) of the movable spring part (5) are respectively snapped into corresponding slots.

12. The electromagnetic relay according to claim 11, further comprising an auxiliary movable spring (20) provided with an auxiliary movable contact and an auxiliary stationary spring (30) provided with an auxiliary stationary contact, the auxiliary movable spring (20) and the auxiliary stationary spring (30) are respectively configured to insert into the base (2) and are located at a side of the base (2) where the armature (34) is located; one end of the actuator (4) facing the armature (34) is provided with a driving portion (41), and the driving portion (41) is configured to cooperate with the auxiliary movable spring (20) to drive the auxiliary movable spring (20) to move.

Patentansprüche

1. Elektromagnetisches Relais zum Verhindern eines Lichtbogenkurzschlusses, aufweisend:

einen Grundkörper (2), der mit einem ersten Aufnahmehohlraum (21) versehen ist, wobei der erste Aufnahmehohlraum (21) mit einer Mehrzahl von Trennplatten (211) versehen ist, um den ersten Aufnahmehohlraum (21) in eine Mehrzahl von Kammern (212) zu unterteilen, die entlang einer vorgegebenen Richtung (D1) verteilt sind, wobei eine Seite des ersten Aufnahmehohlraums (21) mit einer ersten Öffnung (213) versehen ist, die zu jeder der Kammern (212) führt;

ein Magnetkreisteil (3), das an dem Grundkörper (2) angebracht ist und einen Anker (34) aufweist;

ein Kontaktteil, das eine Mehrzahl von Kontakt-

einheiten aufweist, die der Mehrzahl von Kammern (212) eins zu eins zugeordnet sind, wobei jede der Mehrzahl von Kontakteinheiten ein bewegliches Federteil (5) und ein stationäres Federteil (6) aufweist, und das bewegliche Federteil (5) und das stationäre Federteil (6) in einer entsprechenden Kammer (212) angebracht sind und konfiguriert sind, um miteinander zusammenzuwirken;
 einen Aktuator (4), wobei der Anker (34) des Magnetkreisteils (3) mit dem beweglichen Federteil (5) jeder der Kontakteinheiten durch den Aktuator (4) zusammenwirkt;
 eine erste Lichtbogentrennplatte (8), die konfiguriert ist, um die gesamte oder einen Teil der ersten Öffnung (213) zu schließen, wobei eine Innenseite der ersten Lichtbogentrennplatte (8) mit einer Mehrzahl von ersten Ablenkplatten (81) versehen ist, die entlang der vorgegebenen Richtung (D1) verteilt sind, wobei mindestens eine erste Ablenkplatte (81) seitlich in jede Kammer (212) eingesetzt ist, und die erste Ablenkplatte (81) konfiguriert ist, um an eine Trennplatte (211) der Kammer (212) anzugrenzen oder an diese anzustoßen, um mindestens zwei Trennwände zu bilden, die zwischen angrenzenden Kammern (212) angeordnet sind, **dadurch gekennzeichnet, dass** es aufweist:
 ein Gehäuse (1) mit einer Öffnung an einem Boden, wobei das Gehäuse (1) mit dem Grundkörper (2) verbunden ist und konfiguriert ist, um das Magnetkreisteil (3), das Kontaktteil, den Aktuator (4) und die erste Lichtbogentrennplatte (8) in einem Gehäusehohlraum des Gehäuses (1) aufzunehmen.

2. Elektromagnetisches Relais nach Anspruch 1, wobei eine Seite des ersten Aufnahmehohlraums (21) ferner mit einer zweiten Öffnung (215) versehen ist, die zu jeder Kammer (212) führt, und die zweite Öffnung (215) und die erste Öffnung (213) an zwei gegenüberliegenden Seiten des ersten Aufnahmehohlraums (21) angeordnet sind, und die ersten Öffnungen (213) und die zweiten Öffnungen (215) in einer Richtung senkrecht zu der vorgegebenen Richtung (D1) verteilt sind;

das bewegliche Federteil (5) seitlich in einer entsprechenden Kammer (212) von der ersten Öffnung (213) angebracht ist, und das stationäre Federteil (6) seitlich in der entsprechenden Kammer (212) von der zweiten Öffnung (215) angebracht ist;
 das elektromagnetische Relais ferner eine zweite Lichtbogentrennplatte (9) aufweist, wobei die zweite Lichtbogentrennplatte (9) konfiguriert ist, um die gesamte oder einen Teil der zweiten Öffnung (215) zu schließen, und eine Innenseite

der zweiten Lichtbogentrennplatte (9) mit einer Mehrzahl von zweiten Ablenkplatten (91) versehen ist, die entlang der vorgegebenen Richtung (D1) verteilt sind, wobei mindestens eine zweite Ablenkplatte (91) seitlich in jede Kammer (212) eingesetzt ist, und die zweite Ablenkplatte (91) konfiguriert ist, um an die Ablenkplatte (211) der Kammer (212) anzugrenzen oder an diese anzustoßen, um mindestens zwei Lichtbogentrennwände zu bilden, die zwischen angrenzenden Kammern (212) angeordnet sind.

3. Elektromagnetisches Relais nach Anspruch 2, wobei die ersten Ablenkplatten (81) der ersten Lichtbogentrennplatte (8) jeweils seitlich in einen ersten Schlitz (214) eingesetzt sind, der in einer entsprechenden Kammer (212) unter der Mehrzahl von zweiten Ablenkplatten (91) der zweiten Lichtbogentrennplatte (9) vorgesehen ist, jeweils zwei zweite Ablenkplatten (91) in einer Gruppe angeordnet sind, und ein zweiter Schlitz (92) zwischen den zwei zweiten Ablenkplatten (91) einer gleichen Gruppe gebildet ist, und der zweite Schlitz (92) in die Trennplatte (211) in einer entsprechenden Kammer (212) eingesetzt ist und mit dieser zusammenpasst.
4. Elektromagnetisches Relais nach einem der Ansprüche 1 bis 3, wobei der Aktuator (4) entlang der vorgegebenen Richtung (D1) angeordnet ist und an der ersten Öffnung (213) angebracht ist, die erste Lichtbogentrennplatte (8) unter dem Aktuator (4) angeordnet ist; die erste Öffnung (213) mit einer ersten Lichtbogenblockierstruktur an einer Position über dem Aktuator (4) versehen ist, um einen Lichtbogen, der durch ein Brechen des beweglichen Federteils (5) und des stationären Federteils (6) erzeugt wird, daran zu hindern, in eine angrenzende Kammer (212) von einem Raum über dem Aktuator (4) einzutreten.
5. Elektromagnetisches Relais nach Anspruch 4, wobei die erste Lichtbogenblockierstruktur eine Mehrzahl von dritten Ablenkplatten (11) aufweist, und die Mehrzahl von dritten Ablenkplatten (11) an einer Innenseite des Gehäuses (1) angeordnet sind, die der ersten Öffnung (213) zugewandt ist, und in Abständen entlang der vorgegebenen Richtung (D1) angeordnet sind, eine Oberseite jeder der dritten Ablenkplatten (11) mit einer inneren oberen Fläche des Gehäuses (1) verbunden ist, und mindestens eine dritte Ablenkplatte (11) von einer Oberseite der Kammer (212) nach unten in eine Kammer (212) eingesetzt ist, und die dritte Ablenkplatte (11) konfiguriert ist, um an einen Teil der Trennplatte (211) der Kammer (212) über dem Aktuator (4) anzugrenzen oder an diesen anzustoßen, um mindestens zwei Lichtbogentrennwände zu bilden, die zwischen oberen Abschnitten angrenzender Kammern (212) an-

geordnet sind.

6. Elektromagnetisches Relais nach Anspruch 4, wobei Abschnitte der Mehrzahl von Trennplatten (211) nahe der ersten Öffnung (213) jeweils mit einer ersten Kerbe (2111) versehen sind, um den Aktuator (4) zu umgehen; mindestens eine Seite jeder Trennplatte (211) mit einer zweiten Lichtbogenblockierstruktur versehen ist, um den Lichtbogen, der durch das Brechen des beweglichen Federteils (5) und des stationären Federteils (6) erzeugt wird, daran zu hindern, in die angrenzende Kammer (212) von einem Spalt zwischen der ersten Kerbe (2111) und dem Aktuator (4) einzutreten. 5

7. Elektromagnetisches Relais nach Anspruch 6, wobei die zweite Lichtbogenblockierstruktur eine obere Ablenkplatte (2112) und eine untere Ablenkplatte (2113) aufweist, die auf einer gleichen Seite der Kammer (212) angeordnet sind, die obere Ablenkplatte (2112) über dem Aktuator (4) angebracht ist, und die untere Ablenkplatte (2114) unter dem Aktuator (4) angebracht ist, die obere Ablenkplatte (2112) und die untere Ablenkplatte (2113) konfiguriert sind, um sich schräg von der Trennplatte (211) in einer Richtung nahe dem Aktuator (4) zu erstrecken; die zweite Lichtbogenblockierstruktur ferner eine Seitenablenkplatte (2114) aufweist, die Seitenablenkplatte (2114) innerhalb des Aktuators (4) angeordnet ist, und ein oberes Ende der Seitenablenkplatte (2114) mit der oberen Ablenkplatte (2112) verbunden ist, und ein unteres Ende der Seitenablenkplatte (2114) mit der unteren Ablenkplatte (2113) verbunden ist. 10

8. Elektromagnetisches Relais nach Anspruch 6, wobei eine Mehrzahl von Lichtbogenblockierabschnitten (82) auf einer Oberseite der Innenseite der ersten Lichtbogentrennplatte (8) vorgesehen ist, und untere Enden der Lichtbogenblockierabschnitte (82) jeweils mit oberen Enden der Mehrzahl von ersten Ablenkplatten (81) der ersten Lichtbogentrennplatte (8) einzeln verbunden sind, die oberen Enden der Mehrzahl von Lichtbogenblockierabschnitten (82) konfiguriert sind, um sich in eine Richtung nahe dem Aktuator (4) zu erstrecken; und ein Längsschnitt eines Lichtbogenblockierabschnitts (82) in der vorgegebenen Richtung (D1) eine umgekehrte T-Form ist. 15

9. Elektromagnetisches Relais nach Anspruch 2 oder 3, wobei die Innenseite der zweiten Lichtbogentrennplatte (9) mit einer Mehrzahl von vierten Ablenkplatten (94) versehen ist, die entlang der vorgegebenen Richtung (D1) in Abständen verteilt sind, wobei mindestens eine vierte Ablenkplatte (94) seitlich in eine Kammer (212) eingesetzt ist. 20

10. Elektromagnetisches Relais nach Anspruch 2 oder 3, wobei der Grundkörper (2) ferner mit einem zweiten Aufnahmehohlraum (22) versehen ist, dessen oberes Ende offen ist; das Magnetkreisteil (3) eine Spulenordnung und den Anker (34) aufweist, die Spulenordnung horizontal in dem zweiten Aufnahmehohlraum (22) angeordnet ist, der Anker (34) außerhalb des zweiten Aufnahmehohlraums (22) angeordnet ist und an einem Ende des Grundkörpers (2) in der vorgegebenen Richtung (D1) angeordnet ist; der erste Aufnahmehohlraum (21) und der zweite Aufnahmehohlraum (22) in einer Richtung senkrecht zu der vorgegebenen Richtung (D1) separiert sind, und die zweite Öffnung (215) unter dem zweiten Aufnahmehohlraum (22) angeordnet ist. 25

11. Elektromagnetisches Relais nach Anspruch 10, wobei das bewegliche Federteil (5) einen beweglichen Federführungsstift (51), eine starre Feder (52), einen flexiblen Verbinder (53) und eine Reaktionskraftfeder (54) aufweist, der bewegliche Federführungsstift (51) seitlich in den Grundkörper (2) eingesetzt ist, eine Oberseite der starren Feder (52) drehbar mit einer Oberseite des beweglichen Federführungsstifts (51) verbunden ist, der flexible Verbinder (53) zwischen der Oberseite der starren Feder (52) und der Oberseite des beweglichen Federführungsstifts (51) verbunden ist; ein beweglicher Kontakt (55) auf einer Seite eines Bodens der starren Feder (52) vorgesehen ist, die von dem beweglichen Federführungsstift (51) abgewandt ist; die Reaktionskraftfeder (54) zwischen dem beweglichen Federführungsstift (51) und der starren Feder (52) angeordnet ist, und ein Boden der Reaktionskraftfeder (54) fest mit der starren Feder (52) verbunden ist, ein vorgegebener Abstand zwischen einer Oberseite der Reaktionskraftfeder (54) und der starren Feder (52) vorhanden ist; der Aktuator (4) mit einer Mehrzahl von Schlitzen versehen ist, die entlang der vorgegebenen Richtung (D1) verteilt sind und dem beweglichen Federteil (5) eins zu eins zugeordnet sind, die starre Feder (52) und die Reaktionskraftfeder (54) des beweglichen Federteils (5) jeweils in entsprechende Schlitze eingeschnappt sind. 30

12. Elektromagnetisches Relais nach Anspruch 11, ferner aufweisend eine bewegliche Hilfsfeder (20), die mit einem beweglichen Hilfskontakt versehen ist, und eine stationäre Hilfsfeder (30), die mit einem stationären Hilfskontakt versehen ist, wobei die bewegliche Hilfsfeder (20) und die stationäre Hilfsfeder (30) jeweils konfiguriert sind, um in den Grundkörper (2) eingesetzt zu werden, und an einer Seite des Grundkörpers (2) angeordnet sind, wo der Anker (34) angeordnet ist; ein Ende des Aktuators (4), das dem Anker (34) zugewandt ist, mit einem An- 35

triebsabschnitt (41) versehen ist, und der Antriebsabschnitt (41) konfiguriert ist, um mit der beweglichen Hilfsfeder (20) zusammenzuwirken, um die bewegliche Hilfsfeder (20) anzutreiben, um sich zu bewegen.

Revendications

1. Relais électromagnétique pour empêcher les courts-circuits d'arc, comprenant :

une base (2) pourvue d'une première cavité de logement (21), dans lequel la première cavité de logement (21) est pourvue d'une pluralité de plaques de séparation (211) pour diviser la première cavité de logement (21) en une pluralité de compartiments (212) répartis le long d'une direction prédéfinie (D1), un côté de la première cavité de logement (21) est pourvu d'une première ouverture (213) menant à chacun des compartiments (212) ;

une partie de circuit magnétique (3) installée sur la base (2) et comprenant un induit (34) ;

une partie de contact comprenant une pluralité d'unités de contact correspondant à la pluralité de compartiments (212) de façon biunivoque, dans lequel chacune de la pluralité d'unités de contact comprend une partie de ressort mobile (5) et une partie de ressort immobile (6), et la partie de ressort mobile (5) et la partie de ressort immobile (6) sont installées dans un compartiment correspondant (212) et configurées pour coopérer l'une avec l'autre ;

un actionneur (4), dans lequel l'induit (34) de la partie de circuit magnétique (3) coopère avec la partie de ressort mobile (5) de chacune des unités de contact par l'actionneur (4) ;

une première plaque de séparation d'arc (8) configurée pour fermer tout ou partie de la première ouverture (213), dans lequel un côté intérieur de la première plaque de séparation d'arc (8) est pourvu d'une pluralité de premiers déflecteurs (81) répartis le long de la direction prédéfinie (D1), au moins un premier déflecteur (81) est inséré latéralement dans chaque compartiment (212), et le premier déflecteur (81) est configuré pour être adjacent ou venir en butée contre une plaque de séparation (211) du compartiment (212) pour former au moins deux parois de séparation situées entre des compartiments adjacents (212), **caractérisé en ce qu'il** comprend :

un boîtier (1) avec une ouverture au fond, dans lequel le boîtier (1) est relié à la base (2), et est configuré pour loger la partie de circuit magnétique (3), la partie de contact, l'actionneur (4) et la première plaque de séparation d'arc (8) dans

une cavité de boîtier du boîtier (1).

2. Relais électromagnétique selon la revendication 1, dans lequel un côté de la première cavité de logement (21) est en outre pourvu d'une seconde ouverture (215) menant à chaque compartiment (212), et la seconde ouverture (215) et la première ouverture (213) sont situées sur deux côtés opposés de la première cavité de logement (21), et les premières ouvertures (213) et les secondes ouvertures (215) sont réparties dans une direction perpendiculaire à la direction prédéfinie (D1) ;

la partie de ressort mobile (5) est installée latéralement dans un compartiment correspondant (212) à partir de la première ouverture (213), et la partie de ressort immobile (6) est installée latéralement dans le compartiment correspondant (212) à partir de la seconde ouverture (215) ;

le relais électromagnétique comprend en outre une seconde plaque de séparation d'arc (9), la seconde plaque de séparation d'arc (9) est configurée pour fermer tout ou partie de la seconde ouverture (215), et un côté intérieur de la seconde plaque de séparation d'arc (9) est pourvu d'une pluralité de deuxièmes déflecteurs (91) répartis le long de la direction prédéfinie (D1), au moins un deuxième déflecteur (91) est inséré latéralement dans chaque compartiment (212), et le deuxième déflecteur (91) est configuré pour être adjacent ou venir en butée contre la plaque de déflecteur (211) du compartiment (212) pour former au moins deux parois de séparation d'arc situées entre des compartiments adjacents (212).

3. Relais électromagnétique selon la revendication 2, dans lequel les premiers déflecteurs (81) de la première plaque de séparation d'arc (8) sont respectivement insérés latéralement dans une première fente (214) prévue dans un compartiment correspondant (212), parmi la pluralité de deuxièmes déflecteurs (91) de la seconde plaque de séparation d'arc (9), tous les deux deuxièmes déflecteurs (91) sont dans un groupe, et une seconde fente (92) est formée entre les deux deuxièmes déflecteurs (91) d'un même groupe, la seconde fente (92) est insérée et mise en correspondance avec la plaque de séparation (211) dans un compartiment correspondant (212).

4. Relais électromagnétique selon l'une quelconque des revendications 1 à 3, dans lequel l'actionneur (4) est disposé le long de la direction prédéfinie (D1) et monté au niveau de la première ouverture (213), la première plaque de séparation d'arc (8) est située au-dessous de l'actionneur (4) ; la première ouver-

ture (213) est pourvue d'une première structure de blocage d'arc à une position au-dessus de l'actionneur (4) de manière à empêcher un arc généré par une rupture de la partie de ressort mobile (5) et de la partie de ressort immobile (6) de pénétrer dans un compartiment adjacent (212) à partir d'un espace au-dessus de l'actionneur (4).

5. Relais électromagnétique selon la revendication 4, dans lequel la première structure de blocage d'arc comprend une pluralité de troisièmes déflecteurs (11), et la pluralité de troisièmes déflecteurs (11) sont disposés sur un côté intérieur du boîtier (1) faisant face à la première ouverture (213) et sont agencés à des intervalles le long de la direction prédéfinie (D1), un sommet de chacun des troisièmes déflecteurs (11) est relié à une surface supérieure intérieure du boîtier (1), et au moins un troisième déflecteur (11) est inséré vers le bas dans un compartiment (212) à partir d'un sommet du compartiment (212), et le troisième déflecteur (11) est configuré pour être adjacent à ou venir en butée contre une partie de la plaque de séparation (211) du compartiment (212) au-dessus de l'actionneur (4) pour former au moins deux parois de séparation d'arc situées entre des parties supérieures de compartiments adjacents (212).
6. Relais électromagnétique selon la revendication 4, dans lequel des parties de la pluralité de plaques de séparation (211) proches de la première ouverture (213) sont respectivement pourvues d'une première encoche (2111) pour éviter l'actionneur (4); au moins un côté de chaque plaque de séparation (211) est pourvu d'une seconde structure de blocage d'arc, de manière à empêcher l'arc généré par la rupture de la partie de ressort mobile (5) et de la partie de ressort fixe (6) de pénétrer dans le compartiment adjacent (212) à partir d'un espace entre la première encoche (2111) et l'actionneur (4).
7. Relais électromagnétique selon la revendication 6, dans lequel la seconde structure de blocage d'arc comprend un déflecteur supérieur (2112) et un déflecteur inférieur (2113) agencés sur un même côté du compartiment (212), le déflecteur supérieur (2112) est monté au-dessus de l'actionneur (4), et le déflecteur inférieur (2114) est monté au-dessous de l'actionneur (4), le déflecteur supérieur (2112) et le déflecteur inférieur (2113) sont configurés pour s'étendre obliquement à partir de la plaque de séparation (211) dans une direction proche de l'actionneur (4); la seconde structure de blocage d'arc comprend en outre un déflecteur latéral (2114), le déflecteur latéral (2114) est situé à l'intérieur de l'actionneur (4), et une extrémité supérieure du déflecteur latéral (2114) est reliée au déflecteur supérieur (2112), et une extré-

mité inférieure du déflecteur latéral (2114) est reliée au déflecteur inférieur (2113).

8. Relais électromagnétique selon la revendication 6, dans lequel une pluralité de parties de blocage d'arc (82) sont prévues sur un sommet du côté intérieur de la première plaque de séparation d'arc (8), et les extrémités inférieures des parties de blocage d'arc (82) sont respectivement reliées aux extrémités supérieures de la pluralité de premiers déflecteurs (81) de la première plaque de séparation d'arc (8) de façon biunivoque, les extrémités supérieures de la pluralité de parties de blocage d'arc (82) sont configurées pour s'étendre vers une direction proche de l'actionneur (4); une section longitudinale d'une partie de blocage d'arc (82) dans la direction prédéfinie (D1) est en forme de T inversé.
9. Relais électromagnétique selon la revendication 2 ou 3, dans lequel le côté intérieur de la seconde plaque de séparation d'arc (9) est pourvu d'une pluralité de quatrièmes déflecteurs (94) répartis le long de la direction prédéfinie (D1) à intervalles, au moins un quatrième déflecteur (94) est inséré latéralement dans un compartiment (212).
10. Relais électromagnétique selon la revendication 2 ou 3, dans lequel la base (2) est en outre pourvue d'une seconde cavité de logement (22) dont l'extrémité supérieure est ouverte; la partie de circuit magnétique (3) comprend un ensemble de bobines et l'induit (34), l'ensemble de bobines est disposé horizontalement dans la seconde cavité de logement (22), l'induit (34) est situé à l'extérieur de la seconde cavité de logement (22) et est disposé à une extrémité de la base (2) dans la direction prédéfinie (D1); la première cavité de logement (21) et la seconde cavité de logement (22) sont séparées dans une direction perpendiculaire à la direction prédéfinie (D1), et la seconde ouverture (215) est située sous la seconde cavité de logement (22).
11. Relais électromagnétique selon la revendication 10, dans lequel la partie de ressort mobile (5) comprend une broche de sortie de ressort mobile (51), un ressort rigide (52), un connecteur flexible (53) et un ressort de force de réaction (54), la broche de sortie de ressort mobile (51) est insérée latéralement dans la base (2), un sommet du ressort rigide (52) est relié de manière rotative à un sommet de la broche de sortie de ressort mobile (51), le connecteur flexible (53) est relié entre le sommet du ressort rigide (52) et le sommet de la broche de sortie de ressort mobile (51); un contact mobile (55) est prévu sur un côté d'un fond du ressort rigide (52) tourné à l'opposé de la broche de sortie de ressort mobile (51); le ressort de

force de réaction (54) est situé entre la broche de sortie de ressort mobile (51) et le ressort rigide (52), et un fond du ressort de force de réaction (54) est relié de manière fixe au ressort rigide (52), il existe une distance prédéfinie entre un sommet du ressort de force de réaction (54) et le ressort rigide (52) ; l'actionneur (4) est pourvu d'une pluralité de fentes réparties le long de la direction prédéfinie (D1) et correspondant à la partie de ressort mobile (5) de façon biunivoque, le ressort rigide (52) et le ressort de force de réaction (54) de la partie de ressort mobile (5) sont respectivement encliquetés dans des fentes correspondantes.

12. Relais électromagnétique selon la revendication 11, comprenant en outre un ressort mobile auxiliaire (20) pourvu d'un contact mobile auxiliaire et un ressort immobile auxiliaire (30) pourvu d'un contact immobile auxiliaire, le ressort mobile auxiliaire (20) et le ressort immobile auxiliaire (30) sont respectivement configurés pour s'insérer dans la base (2) et sont situés sur un côté de la base (2) où se trouve l'induit (34) ; une extrémité de l'actionneur (4) faisant face à l'induit (34) est pourvue d'une partie d'entraînement (41), et la partie d'entraînement (41) est configurée pour coopérer avec le ressort mobile auxiliaire (20) pour amener le ressort mobile auxiliaire (20) à se déplacer.

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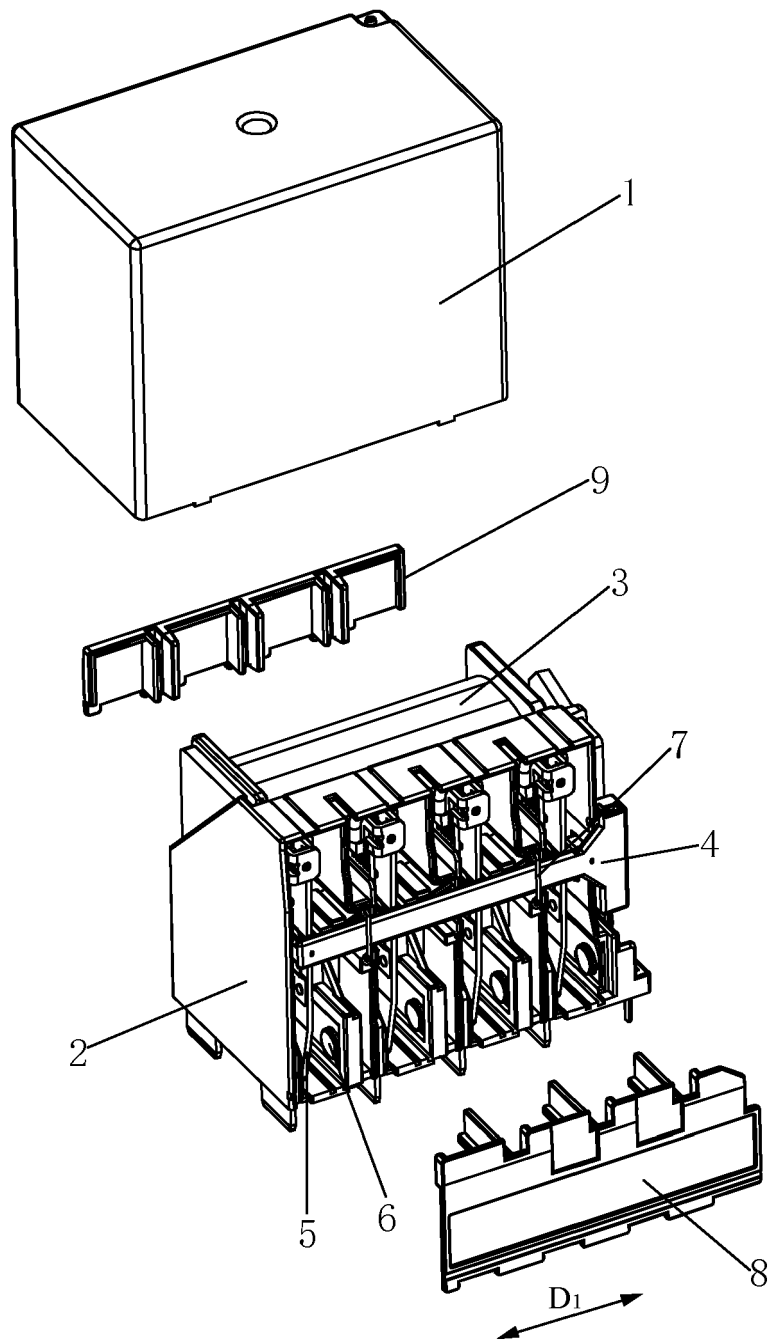


FIG.1

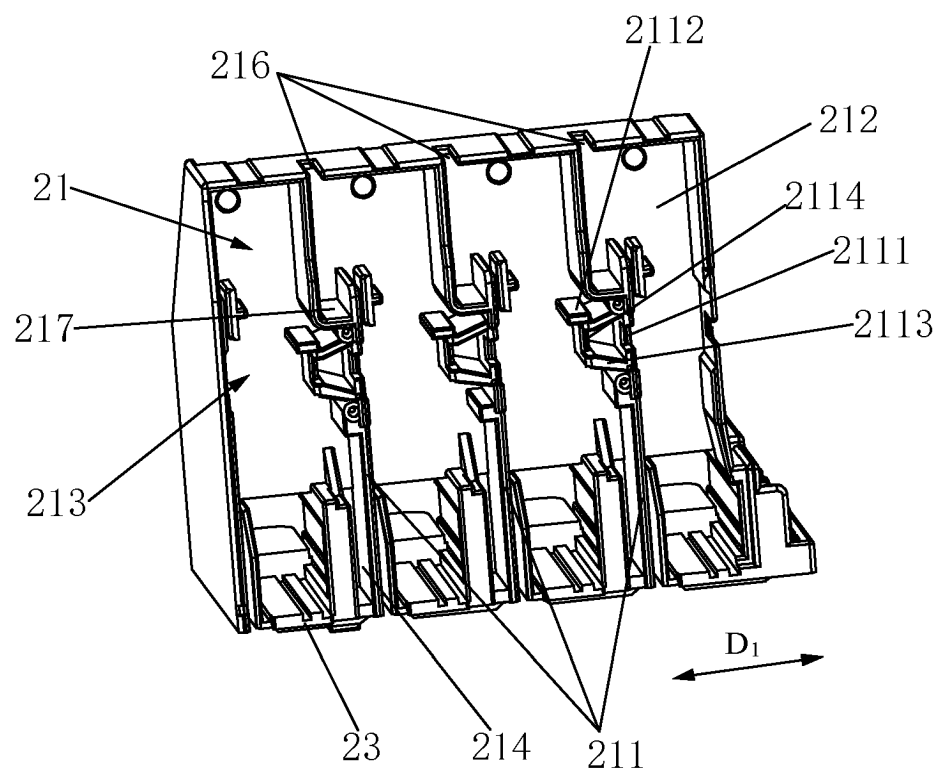


FIG. 2

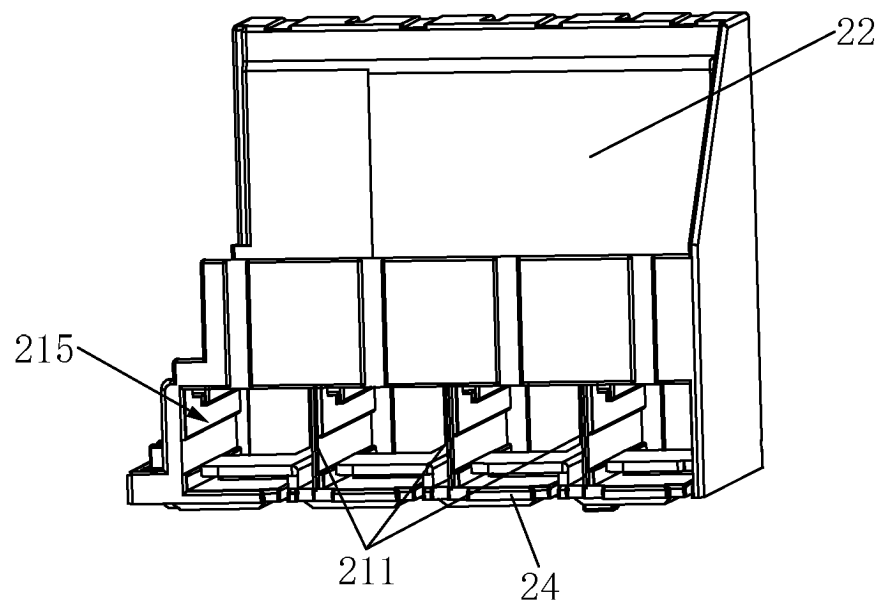


FIG. 3

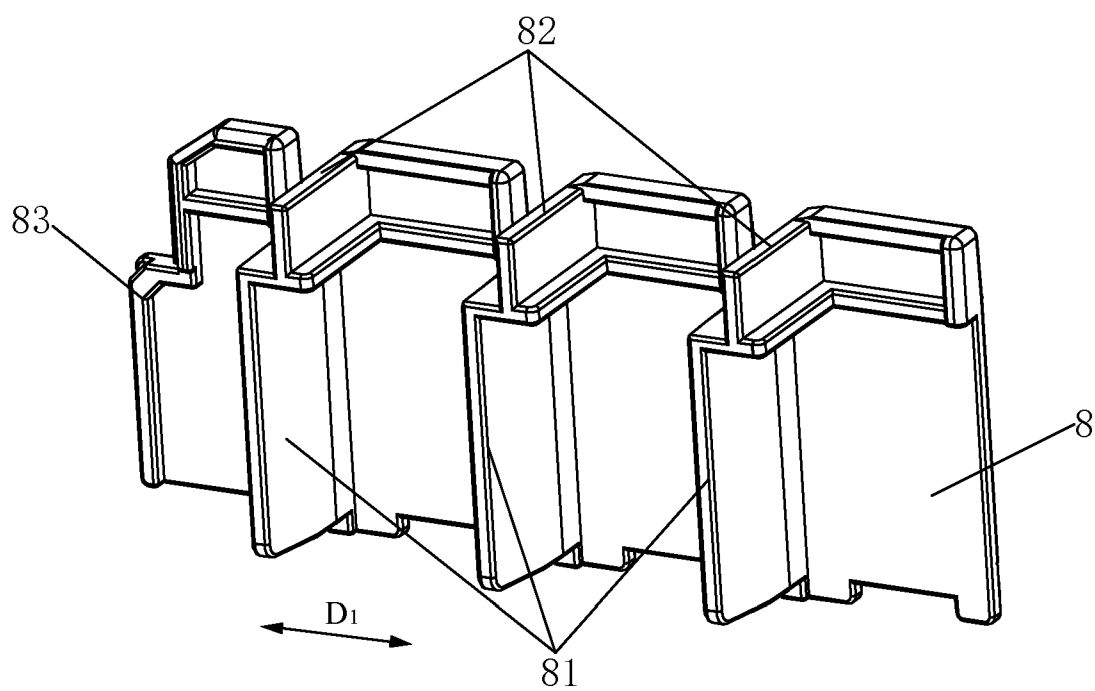


FIG. 4

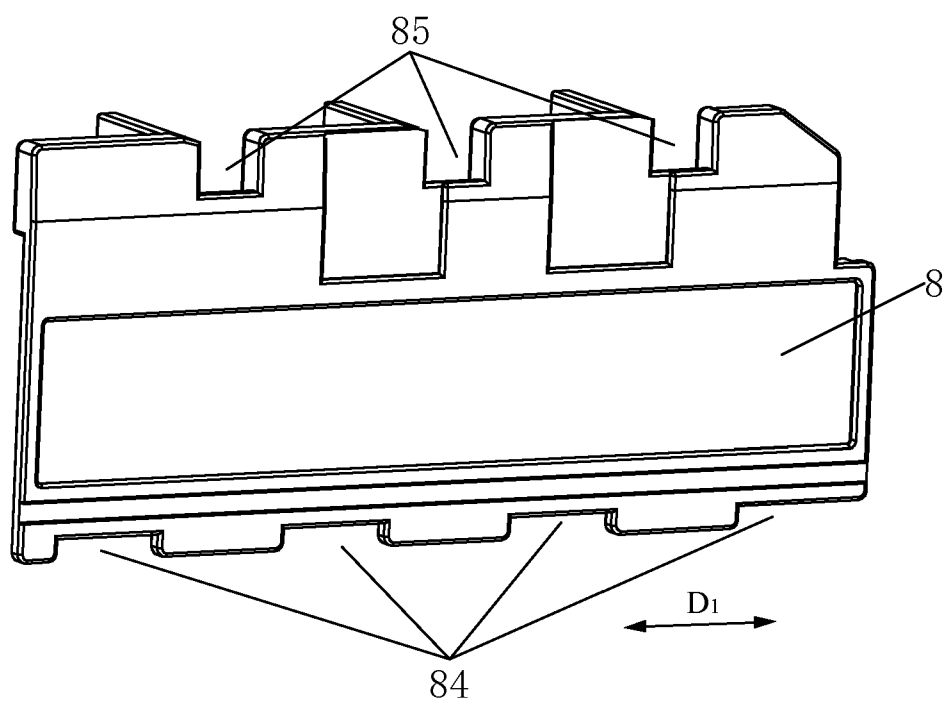


FIG. 5

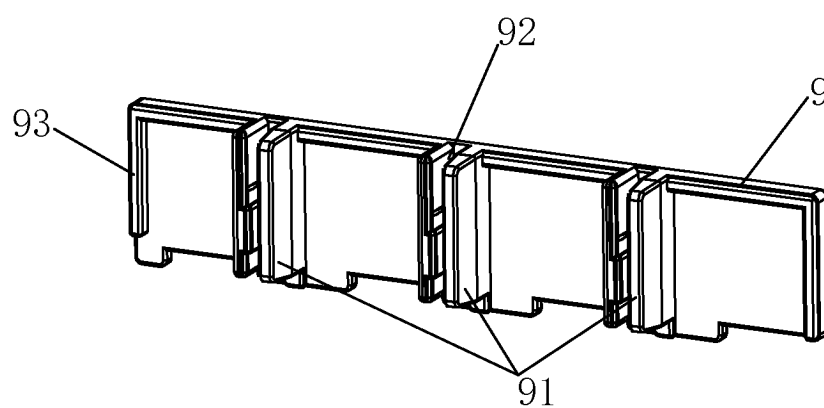


FIG. 6

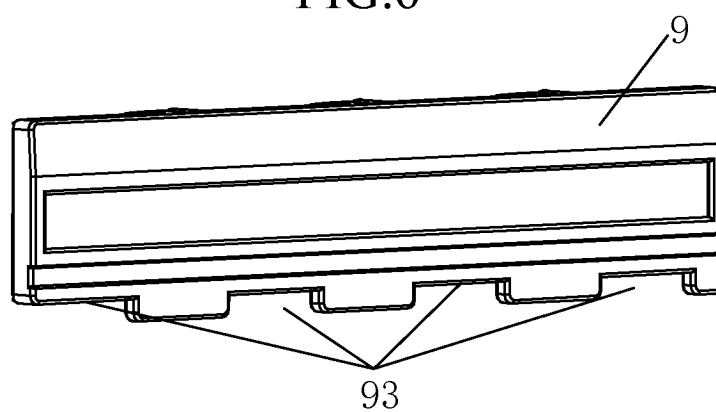


FIG. 7

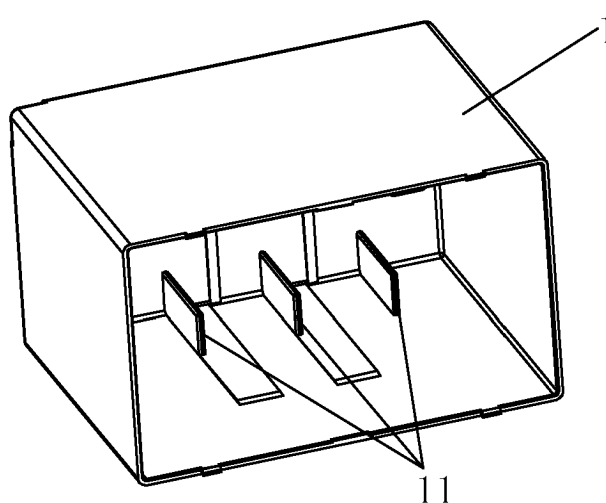


FIG. 8

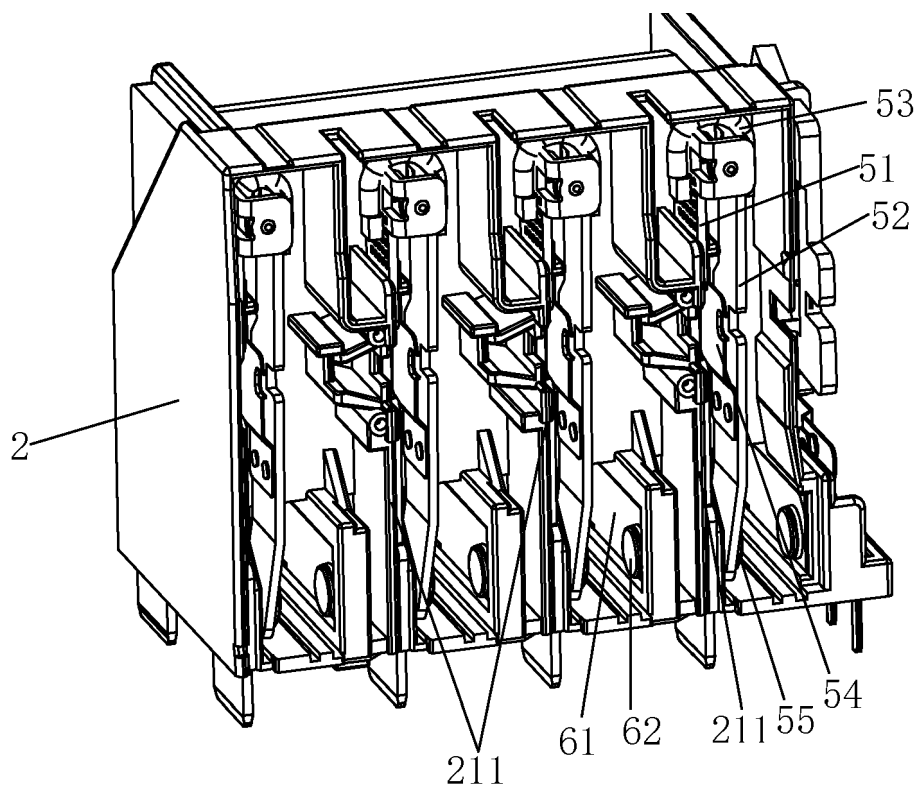


FIG. 9

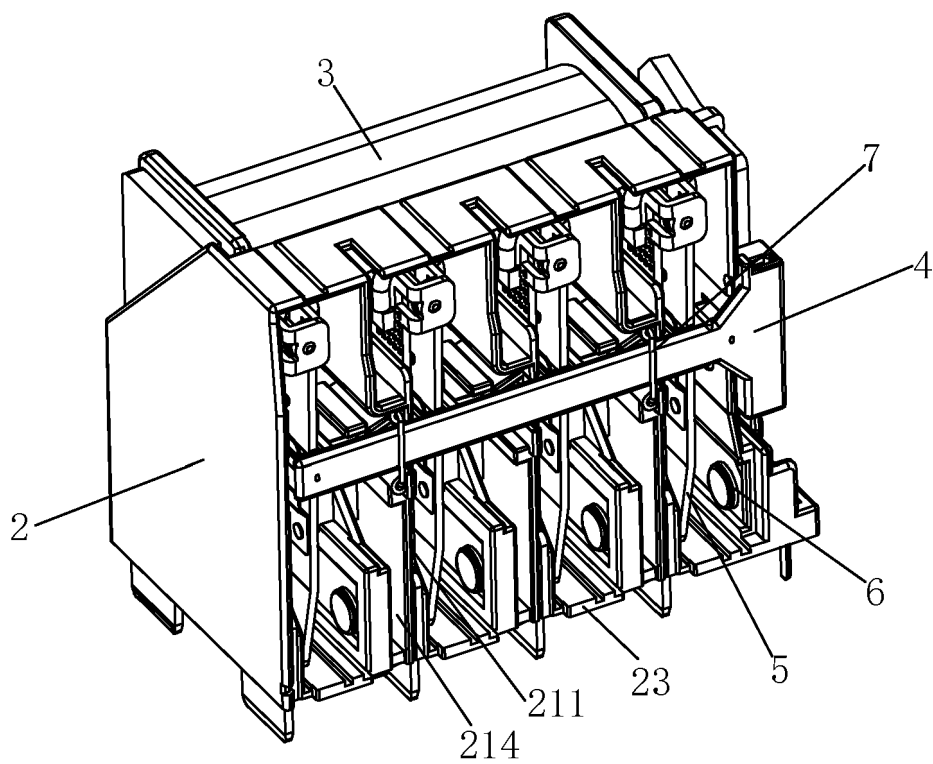


FIG. 10

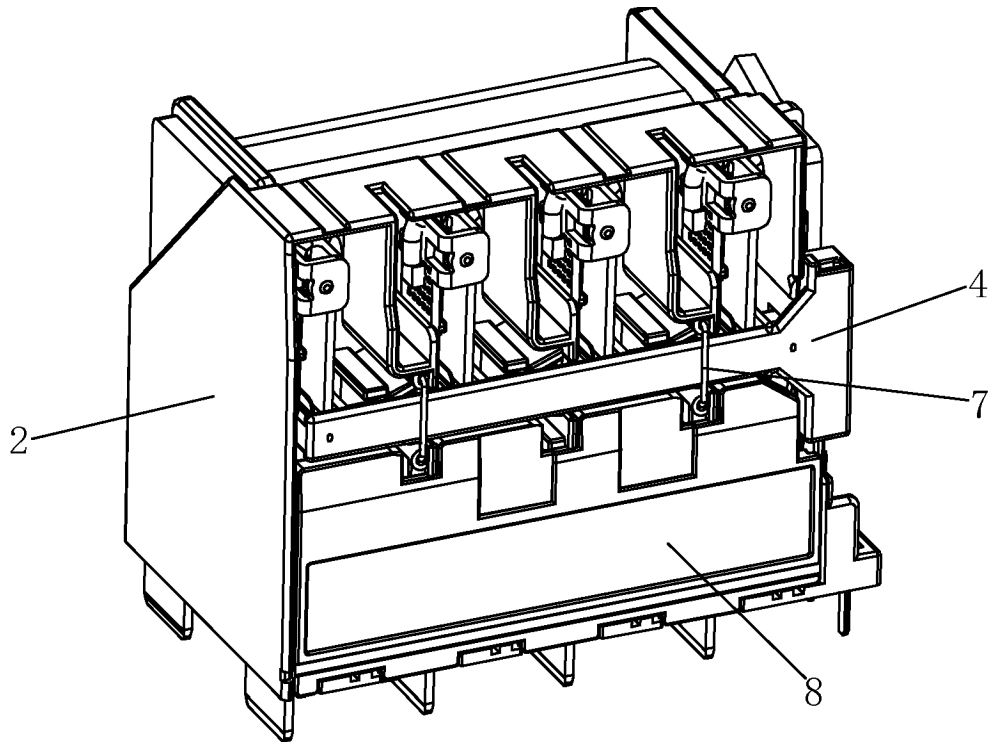


FIG.11

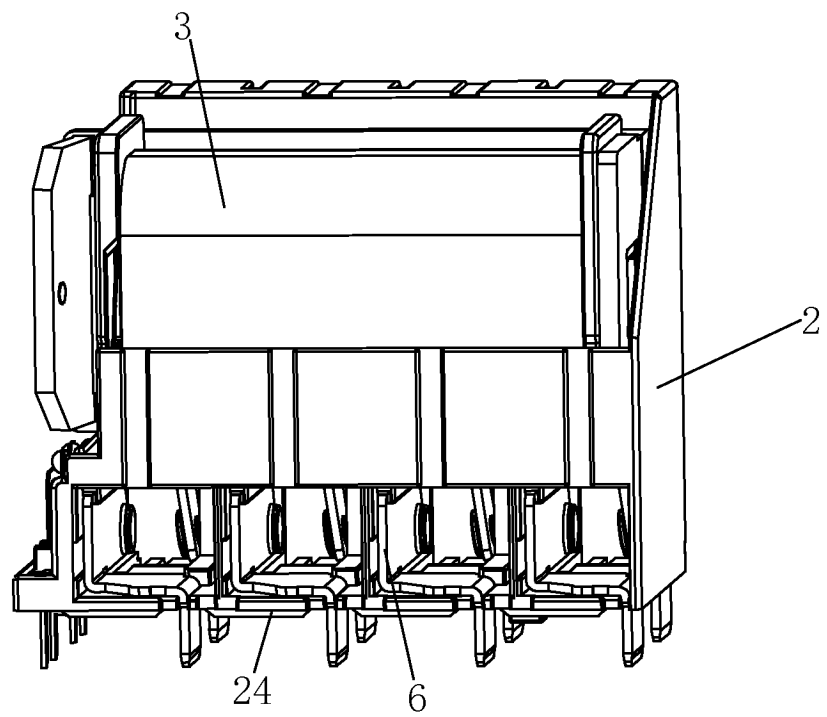


FIG.12

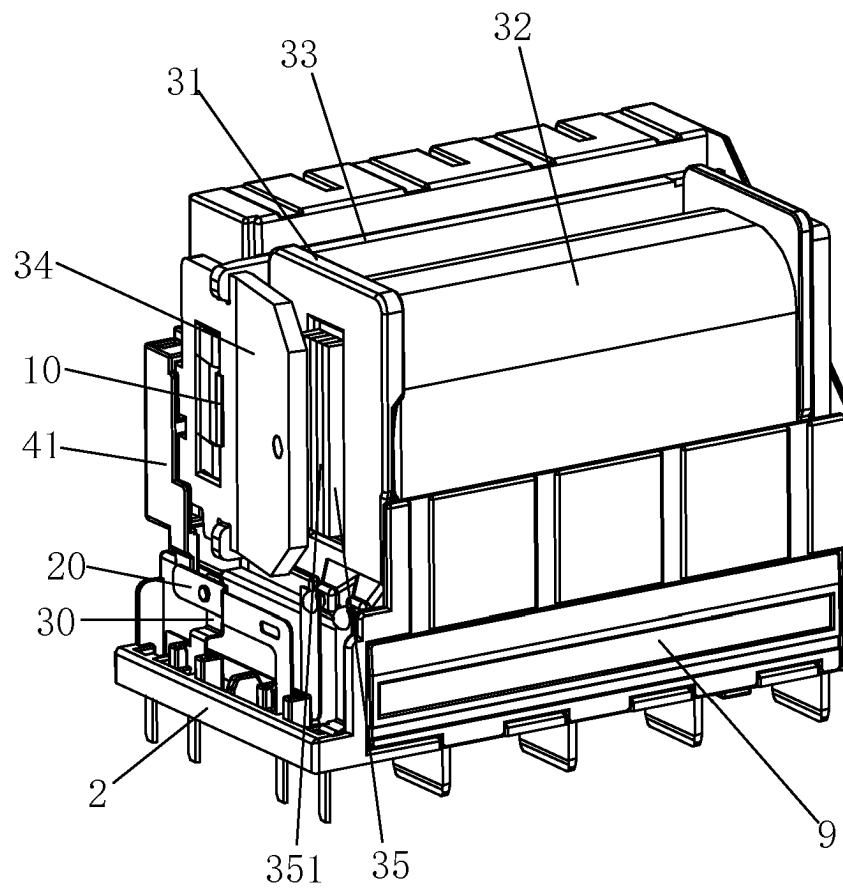


FIG.13

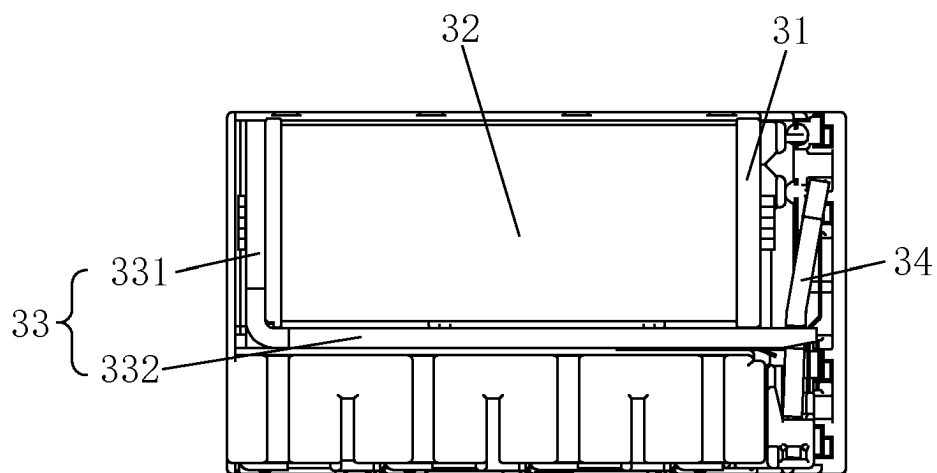


FIG.14

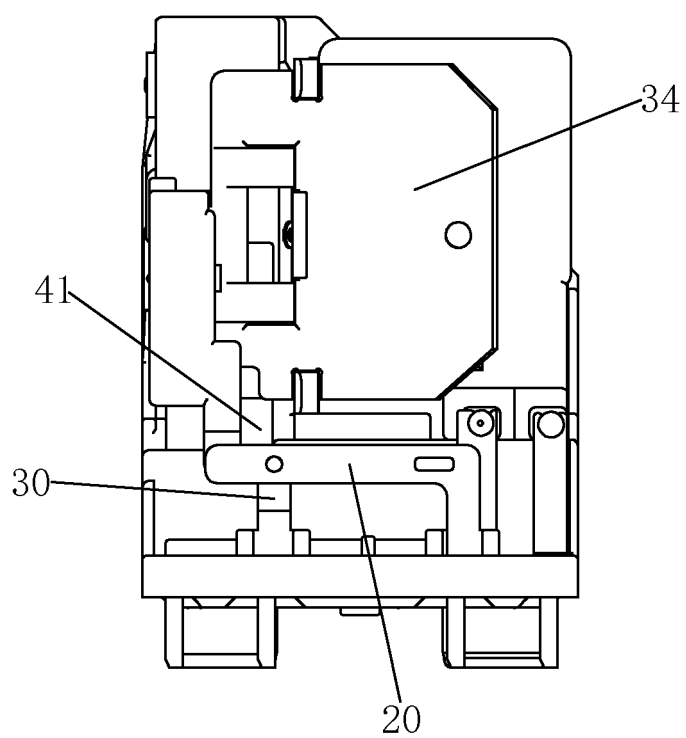


FIG.15

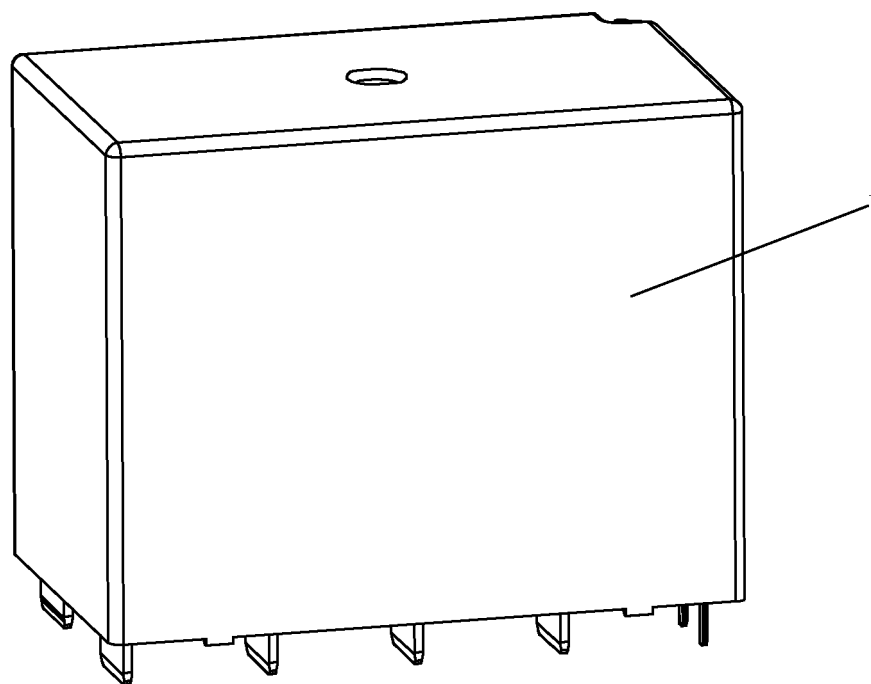


FIG.16

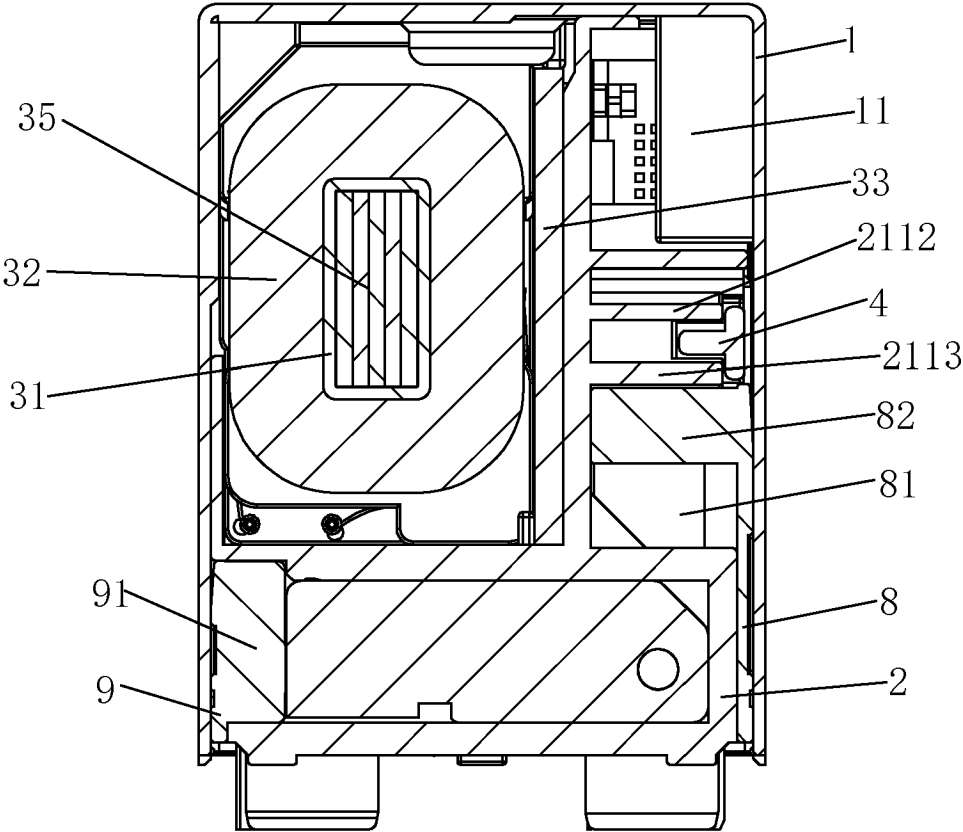


FIG.17

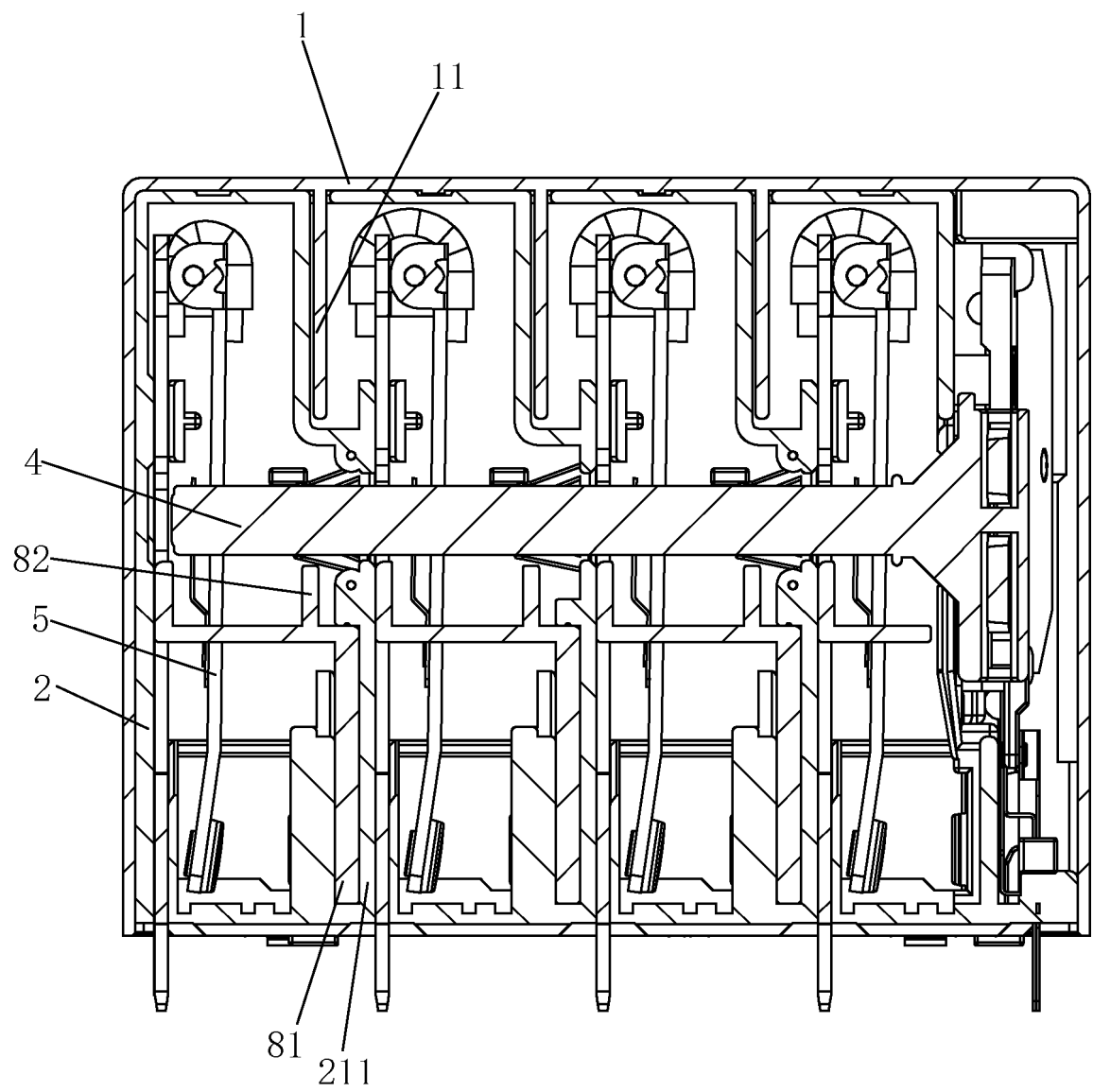


FIG.18

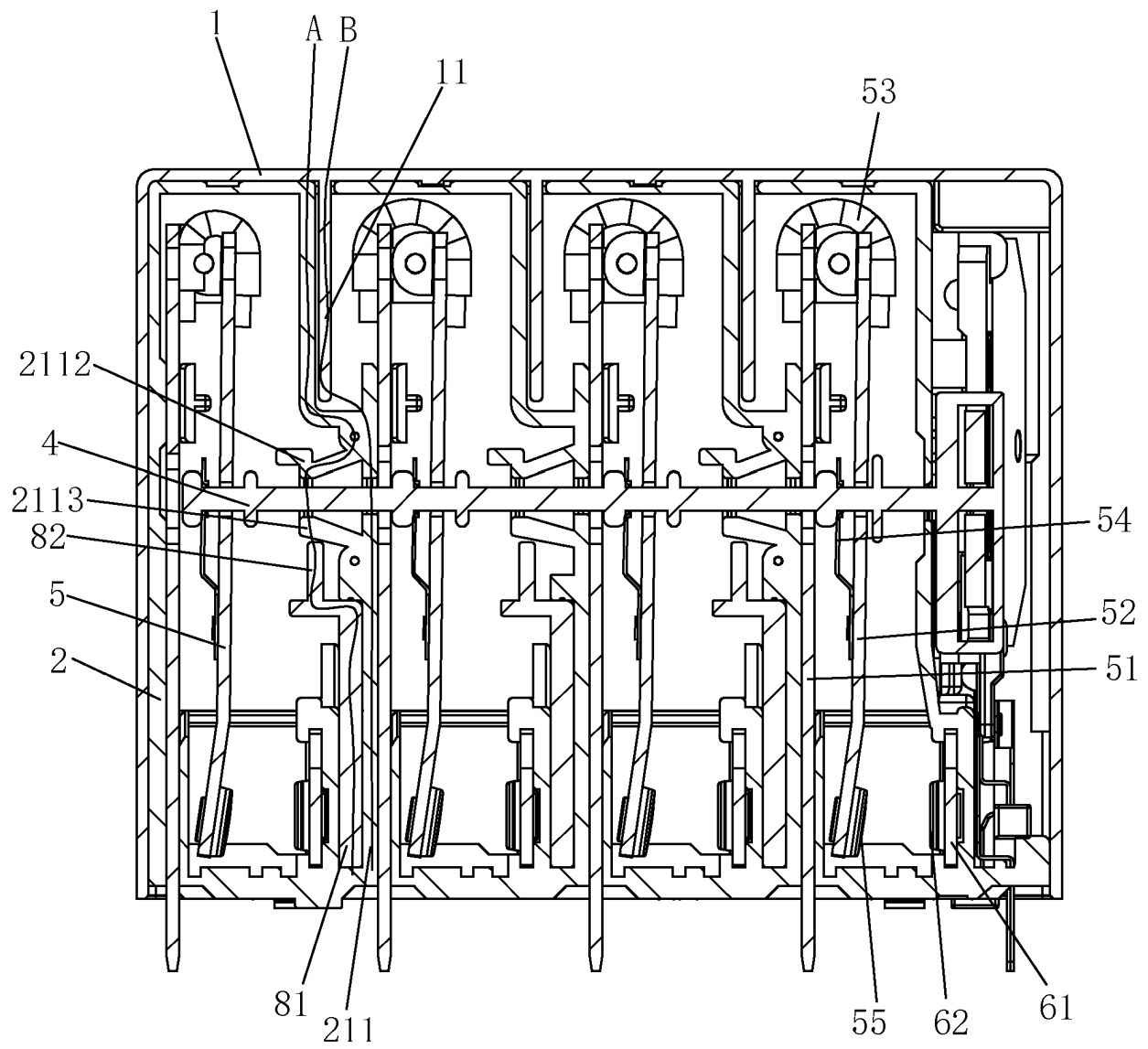


FIG.19

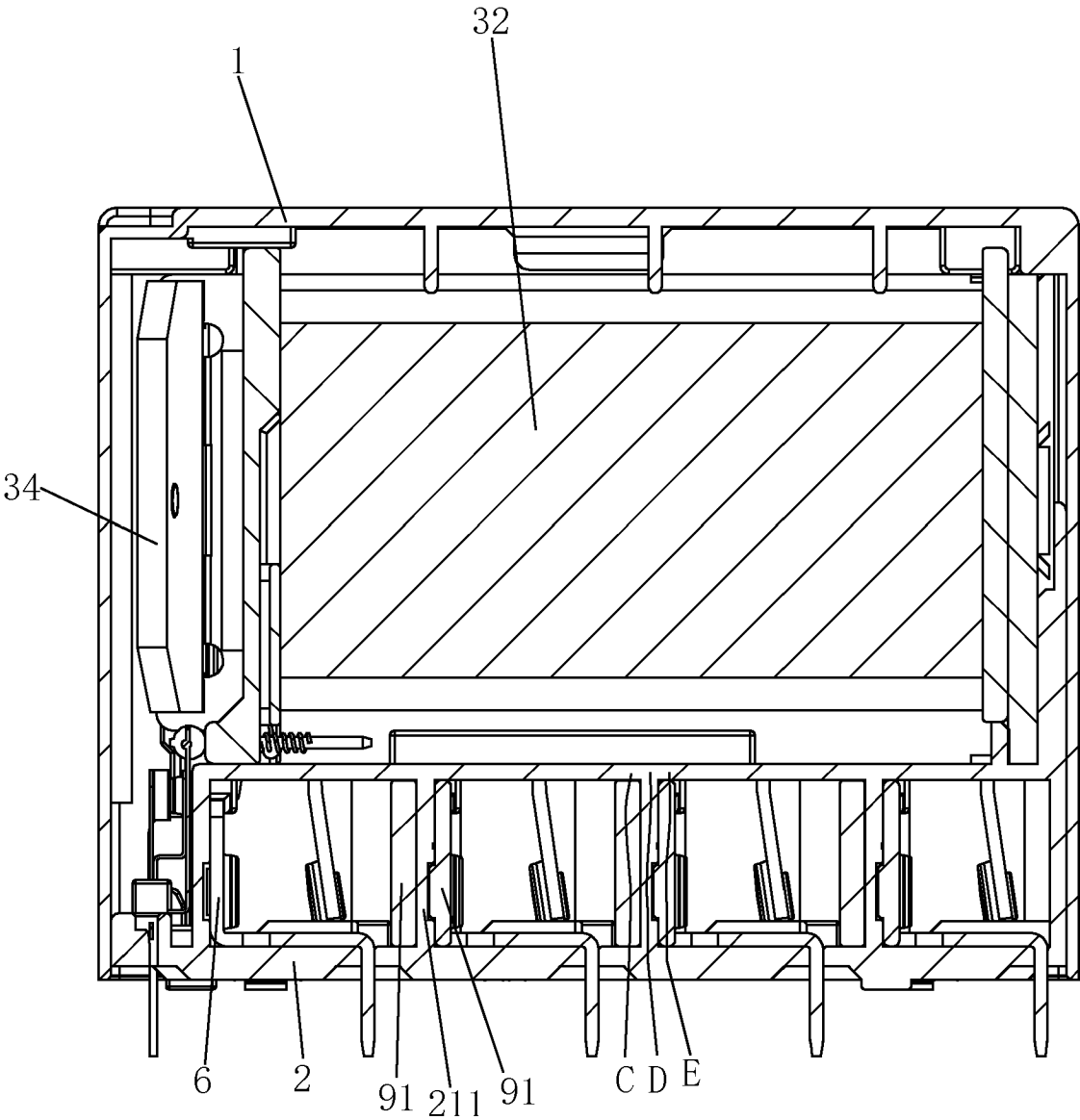


FIG.20

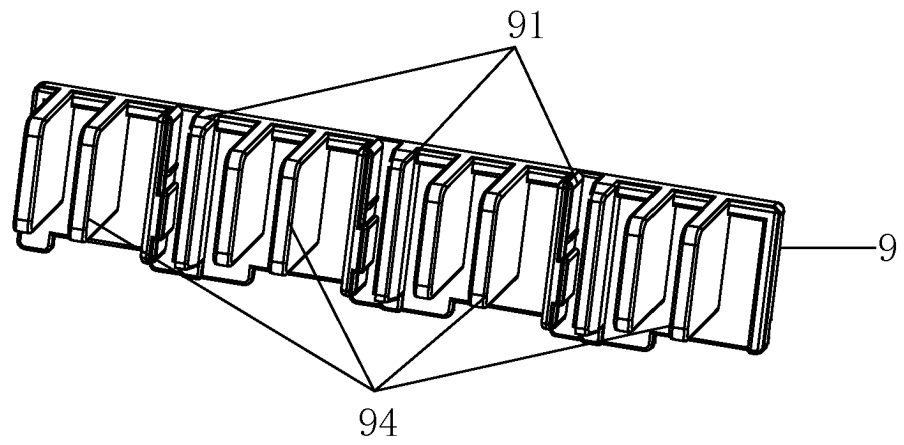


FIG. 21

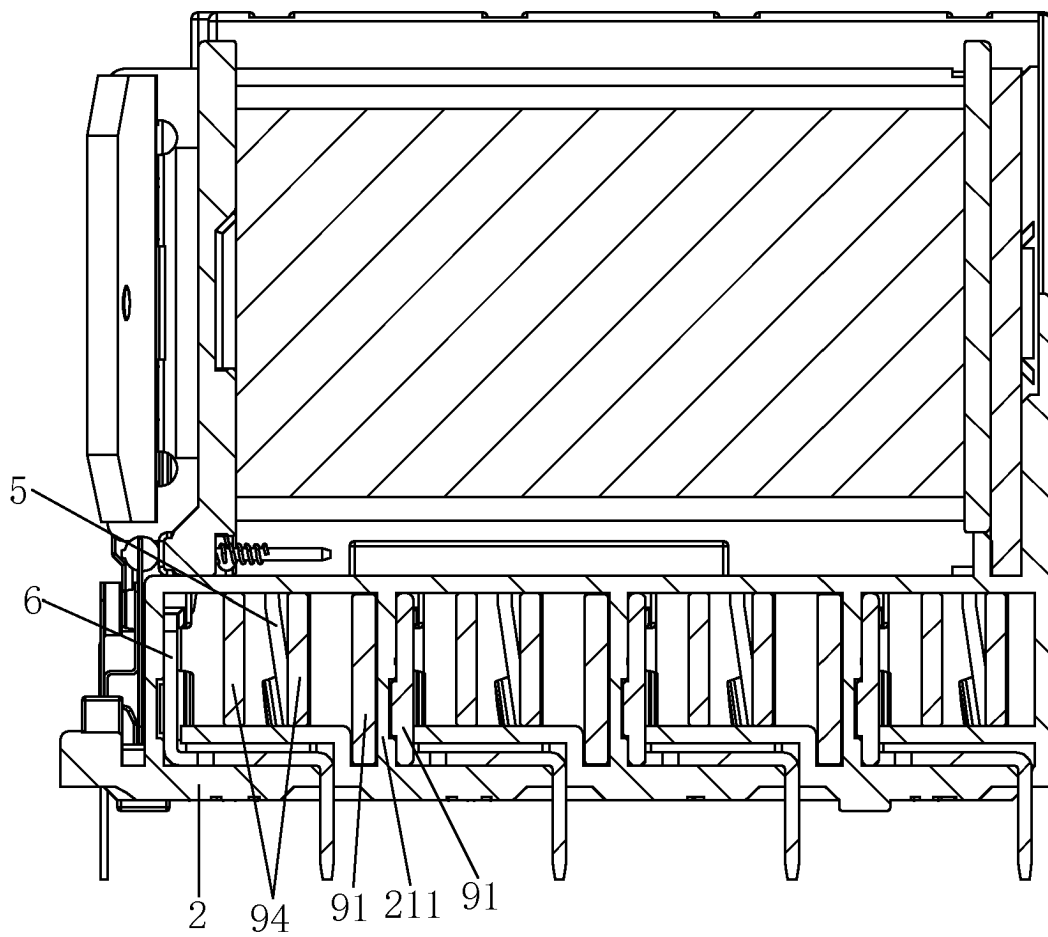


FIG. 22

REFERENCES CITED IN THE DESCRIPTION

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