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(71) Applicant: **Chint Low Voltage Electrical Technology Co., Ltd.**
Shanghai 201620 (CN)

(72) Inventors:
- **GU, Zhe**
  Shanghai 201620 (CN)
- **QIN, Zhikai**
  Shanghai 201620 (CN)
- **GE, Weijun**
  Shanghai 201620 (CN)
- **JIANG, Jiapeng**
  Shanghai 201620 (CN)

(74) Representative: **Petraz, Gilberto Luigi et al**
GLP S.r.l.
Viale Europa Unita, 171
33100 Udine (IT)

(54) CONTACT UNIT AND ISOLATION SWITCH

(57) Disclosed are a contact unit and an isolation switch. The contact unit includes a housing and a contact mechanism arranged in the housing. The contact mechanism includes a moving contact assembly and a pair of static contact assemblies. The moving contact assembly includes a contact support. The contact support is provided with a pair of moving contact portions. The moving contact portion is driven by the contact support to correspondingly match the static contact portion of the static contact assembly. The housing is provided with a swing limiting groove. A rotary supporting portion is arranged at a central position of the contact support in a protruding manner. The swing supporting portion rolls along a side wall of the swing limiting groove. A rolling surface contour line of the swing supporting portion is an equal-width curve. The swing supporting portion in the present invention rolls along the swing limiting groove respectively so that a movement trajectory is longer, so that the contact support obtains a larger linear velocity.

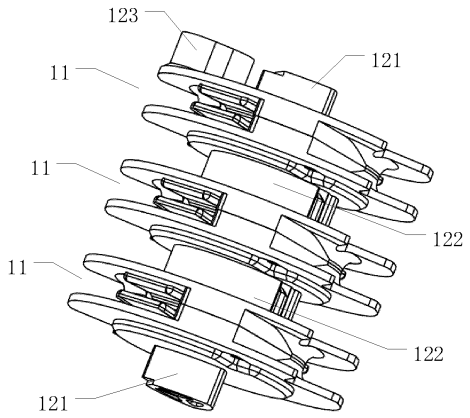

Fig.5

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Description

TECHNICAL FIELD

[0001] The present invention relates to the field of switching electrical appliances, in particular to a contact unit and an isolation switch.

BACKGROUND

[0002] With the rapid development of AC and DC electrical appliance industry, in particular, rotary isolation switches have been widely used in photovoltaic systems. The isolation switch is a switching device that has both an isolation function and a switching function, wherein a moving contact assembly in a contact unit is driven by an operating mechanism. However, in the traditional rotary isolation switch, due to a limited structure of the product, the moving contact assembly rotates coaxially with the operating mechanism when closing and opening processes are manually operated. By means of such structure, a rotating speed of the moving contact assembly reaches a bottleneck state under the same power reserve of the isolation switch, and a speed of the moving contact assembly cannot be improved, which is not conducive to optimizing the performance of the isolation switch.

SUMMARY

[0003] An object of the present invention is to overcome at least one defect of the prior art and provide a contact unit and an isolation switch, which have simple structure, fast moving speed of a moving contact assembly and high reliability.

[0004] In order to achieve the above object, the present invention adopts the following technical solutions:

The present invention provides a contact unit, comprising a housing and a contact mechanism arranged in the housing, wherein the contact mechanism comprises a moving contact assembly and a pair of static contact assemblies; the moving contact assembly comprises a contact support; the contact support is provided with a pair of moving contact portions; the moving contact portion is driven by the contact support to correspondingly match the static contact portion of the static contact assembly; the housing is provided with a swing limiting groove; a swing supporting portion is arranged at a central position of the contact support in a protruding manner; the swing supporting portion rolls along a side wall of the swing limiting groove; and a rolling surface contour line of the swing supporting portion is an equal-width curve.

[0005] Preferably, a cross-section of the swing limiting groove is in the shape of a rectangle; a short-side length of the rectangle is equal to a width of the equal-width curve; or, a cross-sectional shape of the swing limiting groove is in the shape of a square, wherein a side length of the square is equal to the width of the equal-width curve.

[0006] Preferably, a cross-sectional shape of the swing limiting groove is a Reuleaux triangle, and a cross-sectional shape of the swing limiting groove is a square.

[0007] Preferably, a protruding matching portion is arranged at a central position deviating from the contact support, and the matching portion swings along the trajectory groove formed in the housing to drive the contact support to rotate eccentrically.

[0008] Preferably, a moving contact bridge arranged in a radial direction is arranged in the contact support; both ends of the moving contact bridge are respectively used as moving contact portions; each moving contact portion is matched with the static contact portion of one static contact assembly respectively, and the matching portion is arranged on the contact support that deviates from an axis position of the moving contact bridge; and

during opening, a central axis of the moving contact bridge is perpendicular to a connecting line between a pair of static contact assemblies, and an included angle between both ends of the trajectory groove and the center of the swing limiting groove ranges from 80° to 100°.

[0009] Preferably, at least two sets of linkage structures are arranged between the contact supports of the adjacent two contact units, and all linkage structures form a rotationally symmetrical structure with respect to a connecting line of axes of the two contact supports.

[0010] Preferably, the contact support is also provided with a protruding rotary supporting portion; the rotary supporting portion and the swing supporting portion are respectively located at opposite two ends of the contact support; and the rotary supporting portion is in rotatable fit with a central groove arranged on the housing.

[0011] Preferably, the central groove is opposite to the swing limiting groove; the linkage structure can pass through the central groove; and each set of linkage structures comprises a plug-in portion and a slot that match each other.

[0012] The present invention further provides an isolation switch, comprising an operating module and a contact module which are laminated in sequence, wherein the contact module comprises at least one contact unit as above mentioned.

[0013] Further, further comprising a transmission module, wherein the transmission module comprises a transmission member; the transmission member is in transmission connection with the operating mechanism of the operating module; and a driving structure is arranged between the transmission member and the contact support close to the transmission member and deviates from axes of the transmission member and the contact support.

[0014] Further, the operating mechanism comprises an output shaft that rotates around an axis, the output shaft is in driving connection with a rotating member, at least two sets of transmission structures are arranged

between the rotating member and the transmission member, and the transmission structure deviates from the axes of the rotating member and the transmission member.

[0015] Further, the swing supporting portion is located at one end of the contact support close to the transmission member or at one end of the contact support away from the transmission member.

[0016] Further, a contact support immediately adjacent to the transmission member and/or one contact support away from the transmission member is provided with a swing supporting portion.

[0017] Further, the contact module comprises at least two contact units that are laminated; the contact support immediately adjacent to the transmission module is provided with a matching portion and a swing supporting portion; the contact support away from the transmission module is provided with another swing supporting portion; and the contact supports of the adjacent two contact units are connected in linkage.

[0018] Further, the driving structure comprises a driving portion and a matching portion that match each other; the driving portion is a boss structure arranged on the transmission member in a protruding manner; the matching portion is arranged on the contact support for matching the driving portion; and a transmission portion is arranged on one side of the transmission member facing the operating mechanism in a protruding manner.

[0019] According to the contact unit and the isolation switch of the present invention, a swing limiting groove is formed in a housing, a swing supporting portion on which a contact support is arranged rolls along a groove side wall of the swing limiting groove. When the contact support is driven by the same power output to rotate at the same angle, compared with a movement trajectory of a supporting portion of the existing contact support, a movement trajectory of a swing supporting portion is longer, so that the moving contact assembly can obtain a greater linear velocity, which is conducive to promoting a moving speed of the moving contact assembly.

[0020] In addition, a cross-sectional shape of a swing limiting groove is approximately a square, and a side length of the square is equal to a width of an equal-width curve. In particular, a cross-sectional shape of a swing supporting portion is a Reuleaux triangle, so that the swing supporting portion is in close fit with the swing limiting groove, and the cooperation degree between the swing limiting groove and the swing supporting portion is improved.

[0021] In addition, a driving portion is located at an axis position away from a module housing, and corresponds to a trajectory groove to provide an eccentric driving force for the contact support, which is conducive to the cooperation of the swing supporting portion and the swing limiting groove, and also has the advantage of convenient disassembly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

FIG. 1 is a schematic structural diagram of an isolation switch in the present invention;

FIG. 2 is a schematic diagram of the cooperation of an operating mechanism, a transmission member and a moving contact assembly in a top contact unit in the present invention;

FIG. 3 is a schematic structural diagram in which the operating mechanism is removed from the isolation switch in the present invention;

FIG. 4 is a schematic diagram of the cooperation of the operating mechanism, the transmission member and three contact units in the present invention;

FIG. 5 is a schematic diagram of the cooperation of moving contact assemblies in three contact units in the present invention;

FIG. 6 is a schematic structural diagram after the separation of moving contact assemblies in three contact units in the present invention;

FIG. 7 is a schematic structural diagram of a contact unit in the present invention;

FIG. 8 is a schematic structural diagram of a module housing in the present invention;

FIG. 9 is a schematic structural diagram of a top base and a moving contact assembly in the top base in the present invention;

FIG. 10 is a schematic structural diagram of the top base in the present invention;

FIGs. 11-12 are schematic structural diagrams of a moving contact assembly in a top contact unit in the present invention;

FIG. 13 is an exploded view of the moving contact assembly in the top contact unit in the present invention;

FIG. 14 is a schematic structural diagram of a first supporting member in the top contact unit in the present invention;

FIG. 15 is a schematic structural diagram of an intermediate base in the present invention;

FIG. 16 is a schematic structural diagram of a moving contact assembly of an intermediate contact unit in the present invention;

FIG. 17 is a schematic structural diagram of a rotary supporting portion of the intermediate contact unit in the present invention;

FIG. 18 is an exploded view of the moving contact assembly of the intermediate contact unit in the present invention;

FIG. 19 is a schematic structural diagram of a bottom base in the present invention;

FIG. 20 is a schematic structural diagram of a moving contact assembly of a bottom contact unit in the present invention;

FIG. 21 is a schematic structural diagram of a swing supporting portion of the moving contact assembly in

the bottom contact unit in the present invention; and FIG. 22 is an exploded view of the moving contact assembly in the bottom contact unit in the present invention.

[0023] Reference symbols represent the following components:
1a1-top base; 1b1-intermediate base; 1c1-bottom base; 101-swing limiting groove; 102-trajectory groove; 103-central groove; 11-moving contact assembly; 12-contact support; 120-step surface; 121-swing supporting portion; 122-rotary supporting portion; 123-matching portion; 124-plug-in portion; 125-slot; 126-mounting notch; 127-contact groove; 1281-buckle; 1282-clamping groove; 129-through hole; 12a-first supporting member; 12b-second supporting member; 13-moving contact bridge; 14-static contact assembly; 2-operating module; 20-operating mechanism; 21-rotating member; 31-transmission member; 311-transmission portion; and 312-driving portion.

DETAILED DESCRIPTION OF THE INVENTION

[0024] The specific implementations of a contact unit and an isolation switch of the present invention will be further described below in conjunction with the embodiments given in the accompanying drawings. The contact unit and the isolation switch of the present invention are not limited to the description of the following embodiments.

[0025] As shown in FIG. 1, the isolation switch includes an operating module 2, a transmission module and a contact module that are laminated. The contact module includes at least one contact unit. The transmission module is in transmission connection between the operating module 2 and one contact unit. The contact unit is driven by the operating mechanism 20 to be opened and closed. When the contact module includes more than one contact unit, the operating mechanism 20 preferably drives one contact unit closest to the operating module 2 through the transmission module to carry out opening and closing movements, and the rest of the contact units are in linkage connection with each other for synchronous operation. Of course, all contact units may also be connected to the transmission module.

[0026] As shown in FIGs. 2-6, the operating module 2 includes a first housing and an operating mechanism 20 arranged in the first housing. The transmission module includes a second housing and a transmission member 31 arranged in the second housing. The contact module includes a module housing. At least one contact unit is arranged in the module housing. The first housing, the second housing and the module housing are laminated and spliced in sequence to form a shell of the isolation switch. One end of an output shaft of the operating mechanism 20 extends out of the first housing as an operating end, and the other end of the output shaft extends into the second housing as an output end and is connected to the transmission member 31. The contact unit intermediately adjacent to the transmission module is driven by the transmission member 31 to carry out opening and closing movements.

[0027] Specifically, as shown in FIGs. 3, 6 and 7, each contact unit includes a contact mechanism and a pair of wiring assemblies. The contact mechanism includes a moving contact assembly 11 and a pair of static contact assemblies 14 (only one static contact assembly 14 in the pair of static contact assemblies 14 is shown in FIG. 7). Each static contact assembly 14 is connected to one wiring assembly. The moving contact assembly 11 rotates between the pair of static contact assemblies 14 for turning on or off a main line in each contact unit. The moving contact assembly 11 includes a contact support 12 and a pair of moving contact portions arranged in the contact support 12. The contact support 12 is rotatably arranged between the pair of static contact assemblies 14. As the contact support 12 is driven to rotate, each moving contact portion is respectively in contact with or separated from one static contact assembly 14. The two adjacent contact units are in linkage connection through the contact support 12, so that the contact mechanisms in all contact units can be synchronously opened and closed.

[0028] An improvement point of the present application lies in that at least one swing limiting groove 101 and a trajectory groove 102 are formed in the module housing, wherein the trajectory groove 102 is located on a connecting wall of the module housing close to the operating module 2. The swing limiting groove 101 is formed in a connecting wall of the module housing. The contact support 12 is provided with a matching portion 123 swinging along the trajectory groove 102. A protruding swing supporting portion 121 is arranged at one end of the contact support 12 facing the swing limiting groove 101 respectively. Each swing supporting portion 121 rolls along a groove side wall of one swing limiting groove 101 respectively, and a rolling surface contour line of the swing supporting portion 121 is an equal-width curve.

[0029] In this way, when the contact support 12 is driven to rotate, the matching portion 123 swings along the trajectory groove 102 to drive the contact support 12 to rotate. The swing supporting portion 121 rolls along the swing limiting groove 101 respectively. Compared with a movement trajectory of a supporting portion of the existing contact support 12, a movement trajectory of the swing supporting portion 121 is longer under the condition that a driving force and a rotation angle are the same, so that the contact support 12 obtains a greater linear velocity, and a moving speed of the moving contact assembly 11 is further improved.

[0030] Preferably, the number of swing limiting grooves 101 is two. The two swing limiting grooves 101 are oppositely spaced, and at least one contact unit is arranged between the two swing limiting grooves 101, which is conducive to ensuring the stability when applied to a plurality of contact units. Further, one of the swing

limiting grooves 101 and the trajectory groove 102 are located on the same connecting wall of the module housing, and the other swing limiting groove 101 is located on the connecting wall of the module housing away from the operating module 2. In this way, each swing limiting groove 101 corresponds to one swing supporting portion 121, and the two swing supporting portions are correspondingly matched with the two swing limiting grooves respectively, thereby improving a cooperation degree between the contact support and the module housing. Of course, one of the swing limiting grooves 101 and the trajectory groove 102 may be located on the two connecting walls adjacent to the module housing, and the other swing limiting groove 101 is located on the connecting wall of the module housing away from the operating module 2, achieving the same effect.

[0031] Preferably, as shown in FIGs. 7-10, the swing limiting groove 101 is coaxial with the module housing. The trajectory groove 102 is located at an axis position that deviates from the module housing, and the trajectory groove 102 is arranged around one side of the swing limiting groove 101. Correspondingly, the matching portion 123 moving along the trajectory groove 102 may be directly or indirectly driven by the operating module 2. Preferably, the matching portion 123 is connected to the operating mechanism through the transmission module. Under the driving of the operating mechanism 20, the operating module may provide an eccentric driving force for the contact support 12. Such a structure does not interfere with the cooperation of the two swing supporting portions 121 and the swing limiting grooves 101, and is also convenient to disassemble.

[0032] Preferably, a cross-sectional shape of the swing limiting groove 101 is approximately a square, and a side length of the square is equal to a width of an equal-width curve. The swing supporting portion 121 is used for rotatably supporting the moving contact assembly 11, so that the swing supporting portion 121 is in close fit with the swing limiting groove 101, and the cooperation degree between the swing limiting groove 101 and the swing supporting portion 121 is improved. Of course, a cross-section of the swing limiting groove 101 may also be a square, but a short-side length of the square is equal to a width of the equal-width curve, and a long-side length is only slightly greater than the short-side length. The cooperation tightness of the swing supporting portion 121 and the swing limiting groove 101 is slightly worse at this moment. It should be noted that the cross-section of the swing limiting groove 101 in the present application refers to a cross-section perpendicular to the swing limiting groove 101, a cross-sectional shape is basically a square or rectangle, and a corner is an arc angle, but a side length relationship satisfies a side length relationship of the square or the rectangle, which will not be repeated .

[0033] Further, a cross-sectional shape of the swing supporting portion 121 is enclosed by the odd number of equal-width curves in the same plane. Preferably, a cross-sectional shape of the swing supporting portion 121 is a Reuleaux triangle formed by three equal-width curves, and has the advantages of simple processing and high cooperation degree. Of course, the cross-sectional shape of the swing supporting portion 121 may also be enclosed by five, seven or more equal-width curves, but with the increase of the number of equal-width curves, its processing difficulty and outer diameter will increase accordingly.

[0034] It should be noted that if a graph is placed between two parallel lines and tangent to these two parallel lines. No matter how the graph moves, as long as it is still in these two parallel lines, it will always be tangent to these two parallel lines. Such a curve is an equal-width curve. A distance between these two parallel lines is called the width of the equal-width curve. The Reuleaux triangle refers to a curved triangle composed of three sections of arcs by making an arc by taking vertexes of a regular triangle as centers and a side edge of the regular triangle as a radius. Three curved edges of the Reuleaux triangle are three equal-width curves respectively. Correspondingly, an arc is made by taking vertexes of a regular pentagon as centers and a diagonal line of the regular pentagon as a radius to obtain a curved pentagon composed of five segments of arcs. At this time, five curved edges of the curved pentagon are five equal-width curves, and others are not repeated.

[0035] In conjunction with FIGs. 1-22, a first embodiment of an isolation switch is provided. In the present embodiment, the isolation switch includes an operating module 2, a transmission module and a contact module which are laminated in sequence.

[0036] As shown in FIGs. 1, 2 and 4, the operating module 2 includes a first housing. An operating mechanism 20 is assembled in the first housing. One end of an output shaft of the operating mechanism 20 is used as an operating end. The operating end may be provided with a handle portion. The handle portion can be operated manually to drive the output shaft to rotate around an axis, thereby being located at the operating mechanism 20 for energy storage. The other end of the output shaft of the operating mechanism 20 is used as an output end. A rotating member 21 is connected to the output end. The rotating member 21 rotates with the output shaft and is in transmission connection with the transmission module.

[0037] As shown in FIGs. 2-4, the transmission module includes a second housing and a transmission member 31. The transmission member 31 is coaxial with the rotating member 21. Two sets of transmission structures which are matched with each other are arranged between the transmission member 31 and the rotating member 21. Each set of transmission structures is located at an axis position of the rotating member 21 deviating from the transmission member 31. The transmission structures deviate from an axis of the rotating member 21 and an axis of the transmission member 31, which is conducive to promoting the linkage stability between the transmission member 31 and the rotating

member 21. Preferably, all transmission structures form a rotationally symmetrical structure with respect to the axis of the transmission member 31 and the axis of the rotating member 21.

[0038] In the present embodiment, each transmission structure includes transmission portions 311 and transmission grooves that are in plug-in fit with each other. The two transmission grooves are formed in one end of the rotating member 21 facing the transmission module. The two transmission grooves form a rotationally symmetrical structure with respect to the axis of the rotating member 21. Two transmission portions 311 are arranged on the transmission member 31 in a protruding manner. The two transmission portions 311 form a rotationally symmetrical structure with respect to the axis of the transmission member 31. Each transmission portion 311 is correspondingly plugged with one transmission groove, achieving the advantages of convenient disassembly and assembly, and stable connection.

[0039] As shown in FIGs. 2 and 4, the transmission member 31 is in linkage connection with the contact module. That is, driving structures that matches each other are arranged between the transmission member 31 and the moving contact assembly 11 of the contact module. In the present embodiment, a driving structure is arranged between the contact support 12 and the transmission member 31 in the contact unit immediately adjacent to the transmission member 31. The driving structure deviates from the axis of the transmission member 31 and the axis of the contact support 12. The driving structure provides an eccentric driving force for the contact module. In the present embodiment, the driving structure includes a driving portion 312 and a matching portion 123 that are matched with each other. The driving portion 312 is a boss structure arranged on the transmission member 31 in a protruding manner. The matching portion 123 is arranged on the contact support 12 and is used for matching the driving portion 312.

[0040] As shown in FIGs. 1 and 3-7, the contact module includes a module housing, and three contact units are arranged in the module housing. As shown in FIG. 7, each contact unit includes a housing, a pair of wiring assemblies and a contact mechanism. The housing includes a connecting wall and two pairs of side walls. Each pair of side walls are oppositely spaced and each side wall is vertically connected to the connecting wall. After the housings are laminated, the side walls of all housings are correspondingly connected to form the side wall of the module housing. The connecting wall of each housing is the connecting wall of the module housing. The connecting walls of the adjacent two module housings are oppositely spaced, and are perpendicular to a central axis of the module housing. A pair of wiring assemblies are respectively arranged on opposite two sides of each housing. The side wall of the housing is provided with a wiring hole corresponding to the wiring assembly. The contact mechanism is arranged between the pair of wiring assemblies. The contact mechanism includes a moving contact assembly 11 and a pair of static contact assemblies 14. The moving contact assemblies 11 are rotatably assembled in the middle of the housing. A pair of static contact assemblies 14 are respectively arranged on opposite two sides of the moving contact assembly 11, and a pair of static contact assemblies 14 form a rotationally symmetrical structure respectively with respect to the center of the moving contact assembly 11. Each static contact assembly 14 is correspondingly connected to one wiring assembly. The static contact assemblies 14 and the wiring assemblies may adopt the prior art.

[0041] As shown in FIGs. 5-7, 11 and 13, the moving contact assembly 11 includes a contact support 12. The contact support 12 is provided with a contact groove 127. Preferably, the contact groove 127 is formed along a circumferential side wall of the contact support 12. The static contact portion of each static contact assembly 14 may correspondingly extend into the contact groove 127. A pair of moving contact portions are assembled in the contact groove 127. A pair of moving contact portions form a rotationally symmetrical structure with respect to an axis of the contact support 12. Preferably, during opening, a connecting line between the pair of moving contact portions is perpendicular to a connecting line between a pair of static contact assemblies 14. After the contact support 12 is driven to rotate for 80°-100°, each moving contact portion is correspondingly matched with one static contact portion respectively, thereby realizing the closing of the contact mechanism. The moving contact assemblies 11 of the adjacent two contact units are in linkage connection through the contact support 12. That is, linkage structures that are matched with each other are arranged between the adjacent two contact supports 12. Preferably, at least two sets of linkage structures are provided. Each set of linkage structures are located at an axis position that deviates from the contact support 12, which is conducive to improving the linkage stability of the adjacent two contact supports 12. Further, all linkage structures form a rotationally symmetrical structure with respect to the axis of the contact support 12. Each set of linkage structures are coaxial with each set of transmission structures, thereby improving the cooperation stability and synchronization among the operating module 2, the transmission module and the contact module. Preferably, the linkage structure includes a plug-in portion124 and a slot 125 which are in plug-in fit with each other.

[0042] As shown in FIGs. 1-3, 7-10, 15 and 19, in the present embodiment, the housing of each contact unit is a groove-shaped structure which is open on one side. The adjacent groove-shaped structures are covered with each other to achieve closure. Correspondingly, a module housing is formed by splicing a plurality of groove-shaped structures together. In order to facilitate description, the module housing includes a top base 1a1, two intermediate bases 1b1 and a bottom base 1c1 which are laminated in sequence. Bottom walls of the top base 1a1, the intermediate bases 1b1 and the bottom base 1c1 are

respectively used as connecting walls of the two module housings. The top base 1a1 covers one intermediate base 1b1, and the other intermediate base 1b1 covers the bottom base 1c1. The contact mechanism and the wiring assembly of each contact unit are correspondingly assembled on one intermediate base 1b1 or the bottom base 1c1. In addition, the top base 1a1 may be used as a second housing. The transmission member 31 is rotatably assembled between the top base 1a1 and the first housing. That is, the transmission member 31 is assembled on one side of the top base 1a1 away from the intermediate base 1b1.

[0043] Combined with FIGs. 3, 5 and 6-15, the contact unit closest to the operating module 2 is described in detail. For the convenience of description, the contact unit closest to the operating module 2 is referred to as a top contact unit.

[0044] As shown in FIGs. 3, 5, 6, 8-10 and 15, the top contact unit includes a housing, a contact mechanism and a pair of wiring assemblies. This housing includes an intermediate base 1b1 and a top base 1a1 covering the intermediate base 1b1. The intermediate base 1b1 is in the shape of a rectangular groove as a whole. A mounting groove is respectively formed in opposite two sides of the intermediate base 1b1, respectively. A static contact assembly 14 and a wiring assembly are respectively assembled in each mounting groove, respectively. A wiring hole is formed in a side wall of the intermediate base 1b1. A side wall of each mounting groove is provided with a wiring hole. The two wiring holes form a rotationally symmetrical structure with respect to the center of the intermediate base 1b1. Each wiring hole is correspondingly located at a position of the intermediate base 1b1 close to a corner. A central groove 103 is formed in the center of a bottom wall of the intermediate base 1b1. The central groove 103 penetrates through the bottom wall of the intermediate base 1b1. The central groove 103 may be used for being in rotatable fit with the moving contact assembly 11 assembled on the intermediate base, and may also provide a penetrating position for the linkage structure between the adjacent two contact supports 12.

[0045] As shown in FIG. 10, a structure of the top base 1a1 is similar to that of the intermediate base 1b1. The top base 1a1 is provided with a mounting groove and a wiring assembly which are the same as the intermediate base 1b1, but differ from the intermediate base 1b1 in that, a swing limiting groove 101 is formed in a central position of the top base 1a1, the swing limiting groove 101 is used for cooperating with a swing supporting portion 121 of the contact support 12, and the swing limiting groove 101 may penetrate through the bottom wall of the top base 1a1, or may also be only a groove structure having an opening facing the intermediate base 1b1. In drawings, the swing limiting groove 101 penetrates through the bottom wall of the top base 1a1 (that is, a connecting wall close to the module housing of the operating module 2), and a cross-section of the swing limiting groove 101 is a square. A trajectory groove 102 is formed in one side of the swing limiting groove 101. The trajectory groove 102 is arc-shaped as a whole and surrounds one side of the swing limiting groove 101. A central angle between both ends of the trajectory groove 102 and the contact support 12 ranges from 80° to 100°. The trajectory groove 102 corresponds to the matching portion 123 of the contact support 12. A driving portion 312 of the transmission member 31 penetrates through the trajectory groove 102 and is in linkage with the matching portion 123.

[0046] As shown in FIGs. 11-14, the moving contact assembly 11 of the top contact unit includes a contact support 12 and a moving contact bridge 13. A contact groove 127 is formed along a circumferential side wall of the contact support 12. The moving contact bridge 13 is arranged in a radial direction of the contact support 12. Both ends of the moving contact bridge 13 extend into the contact groove 127 of the contact support 12 as a moving contact portion respectively. Slots 125 and/or plug-in portions of a linkage structure are arranged at one end of the contact support 12 away from the operating module 2, and are used for being in linkage connection of the contact supports 12 of the adjacent contact units. The number of the slots 125 and/or the plug-in portions 124 is two or more than two. Preferably, all slots 125 and/or the plug-in portions 124 that are preferably located in the same contact support 12 form a rotationally symmetrical structure with respect to the axis of the contact support 12, which is conducive to improving the linkage stability. Further, a rotary supporting portion 122 is arranged at a central position of the contact support 12 facing the intermediate base 1b1 in a protruding manner. The rotary supporting portion 122 may be in rotatable fit with a central groove 103, which is conducive to maintaining the rotational stability of the contact support 12. Preferably, the rotary supporting portion 122 is provided with the slots 125, so that the linkage structures of the adjacent two contact supports 12 pass through the central groove 103, which is also conducive to simplifying the structure.

[0047] A swing supporting portion 121 is arranged at a central position of the contact support 12 facing the top base 1a1 in a protruding manner. At this time, the swing supporting portion 121 and the rotary supporting portion 122 are respectively located on opposite two sides of the contact support 12. A rolling surface contour line of the swing supporting portion 121 is an equal-width curve. Preferably, an outer diameter of the swing supporting portion 121 is smaller than an outer diameter of the rotary supporting portion 122, which is conducive to realizing the rotational stability of the contact support 12. A matching portion 123 is arranged on one side of the swing supporting portion 121 in a protruding manner. The matching portion 123 is located at an eccentric position and corresponds to a trajectory groove 102. A driving portion 312 of the transmission module is in linkage connection with the matching portion 123, such that the operating module 2 outputs an eccentric driving force to the contact support 12 through the transmission mod-

ule. At this time, the matching portion 123 moves in the trajectory groove 102 to drive the contact support 12 to rotate eccentrically. In the present embodiment, a central angle of a rotation trajectory of the matching portion 123 ranges from 80° to 100°. In this way, a corner angle of the moving contact bridge 13 along the contact support 12 ranges from 80° to 100°, and thus the moving contact bridge 13 is matched with the static contact assembly 14. The swing supporting portion 121 rotates along with the contact support 12, and a rolling surface of the swing supporting portion 121 rolls along a groove side wall of the swing limiting groove 101. In the present embodiment, a cross-sectional shape of the swing supporting portion 121 is a Reuleaux triangle, a cross-sectional shape of the swing limiting groove 101 is a square, and a side length of the square is equal to a width of the equal-width curve, while ensuring that the contact support 12 obtains a larger linear velocity. The swing supporting portion 121 is also in close fit with the swing limiting groove 101, such that the cooperation degree between the swing limiting groove 101 and the swing supporting portion 121 is improved.

[0048] Its principle is briefly described, the cross-sectional shape of the swing supporting portion 121 is the Reuleaux triangle, and the cross-sectional shape of the swing limiting groove 101 is a square.

[0049] When the cross-sectional shape of the swing limiting groove 101 is a square, and the side length of the square is equal to the width of the equal-width curve, three ends of the Reuleaux triangle are in contact with three groove side walls of the swing limiting groove 101 respectively. When the contact support 12 is driven to rotate for one cycle, an end of the Reuleaux triangle rotates for one cycle along the groove side wall of the swing limiting groove 101, its swing trajectory is a square that is approximately the cross-sectional shape of the swing limiting groove 101. The swing supporting portion 121 with a circular cross-section rotates for one cycle in the swing limiting groove 101, and its movement trajectory is a circle inscribed to the swing limiting groove 101. It can thus be seen that when a driving force and the rotation angle are both specified, a linear velocity of a long movement trajectory is larger. Therefore, the swing supporting portion 121 a cross-sectional shape of which is a Reuleaux triangle can obtain a larger linear velocity, thereby improving a moving speed of the moving contact assembly 11. It should be noted that when the cross-section of the swing limiting groove 101 is a rectangle, a short-side length of the rectangle is the same as the width of the equal-width curve. At this time, a movement trajectory of the swing supporting portion 121 is longer, and the contact support 12 obtains a larger linear velocity, but may affect the cooperation stability of the moving contact mechanism.

[0050] In addition, the contact support 12 in the present embodiment may be of an integral structure or a split structure, preferably a split contact support 12 in the present embodiment.

[0051] As shown in FIGs. 11-14, the contact support 12 includes a first supporting member 12a and a second supporting member 12b which are oppositely spaced. The first supporting member 12a and the second supporting member 12b are both disc shapes with the same diameter. Two plug-in portions 124 are arranged at one end of the first supporting member 12a facing the second supporting member 12b, and the two plug-in portions 124 form a rotationally symmetrical structure with respect to an axis of the first supporting member 12a. A rotary supporting portion 122 is formed in the center of one end of the first supporting member 12a away from the second supporting member 12b in a protruding manner. The rotary supporting portion 122 is in rotatable fit with the central groove 103 of the intermediate base 1b1, and an end surface of the rotary supporting portion 122 can pass through the central groove 103 and correspond to the contact support 12 of the adjacent contact unit (that is, corresponds to the contact support 12 in the contact unit located in the middle position). Two slots 125 are formed in the end surfaces of the rotary supporting portion 122, and the two slots 125 form a rotationally symmetrical structure with respect to an axis of the first supporting member 12a, achieving the advantages of stable connection and convenient disassembly and assembly.

[0052] A rotary supporting portion 121 is arranged at a central position of the second supporting member 12b away from the first supporting member 12a in a protruding manner. A cross-sectional shape of the swing supporting portion 121 is a Reuleaux triangle. A boss structure is arranged on one side of the swing supporting portion 121. This boss structure is provided with a groove as a matching portion 123. This groove is used for being plugged with a driving portion 312 of the transmission module, which is convenient for disassembly and assembly, and also ensures the matching stability. Preferably, the matching portion 123 is arranged at an axis position that deviates from the moving contact bridge 13. That is, a connecting line from the matching portion 123 to the axis of the contact support 12 is at an included angle with the axis of the moving contact bridge 13. The matching portion 123 and the moving contact bridge 13 are staggered, so that the moving contact assembly 11 can be disassembled and assembled conveniently, thereby improving the cooperation degree of the moving contact assembly 11 and other parts. The second supporting member 12b is further provided with through holes 129 correspondingly plugged with the two plug-in portions 124, and the through holes 129 are respectively located on both sides of the swing supporting portion 121. The first supporting member 12a and the second supporting member 12b which are in plug-in fit have the advantage of convenient disassembly and assembly. In the present embodiment, the plug-in portion 124 is plugged into the slot 125 but does not protrude from the second supporting member 12b, which prevents the plug-in portion 124 from protruding from the second supporting member 12b and rubbing against the top base 1a1, thereby interfering

with the smoothness of the cooperation of the swing supporting portion 121 and the swing limiting groove 101, as well as the matching portion 123 and the trajectory groove 102.

[0053] When the first supporting member 12a is in plug-in fit with the second supporting member 12b, a gap formed between an edge of the first supporting member 12a and an edge of the second supporting member 12b is used as a contact groove 127. The moving contact bridge 13 is radially limited between the two plug-in portions 124, such that both ends of the moving contact bridge 13 respectively extend into the contact groove 127 as the moving contact portions. Further, the first supporting member 12a and the second supporting member 12b are respectively provided with a radial groove. The two radial grooves are docked to form an assembling groove. This assembling groove is correspondingly located between the two plug-in portions 124 and is used for limited assembly of the moving contact bridge 13. Preferably, a foolproof structure is arranged between the assembling groove and the moving contact bridge 13. The foolproof structure includes a foolproof protrusion and a foolproof groove that are matched with each other.

[0054] Preferably, as shown in FIG. 13, a clamping structure is further arranged between the first supporting member 12a and the second supporting member 12b. The clamping structure includes a buckle 1281 and a clamping groove 1282 that are matched with each other. In the present embodiment, the buckle 1281 is arranged on one side of the second supporting member 12b facing the first supporting member 12a in a protruding manner. The clamping groove 1282 is formed in the first supporting member 12a, which further enhances the assembly stability of the first supporting member 12a and the second supporting member 12b and has the advantage of convenient disassembly.

[0055] Of course, when the contact support 12 is of an integral structure, a contact groove 127 is formed in a circumferential side wall of the contact support 12. A swing supporting portion 121 is arranged at a central position of one end of the contact support 12 in a protruding manner. A matching portion 123 is arranged at an eccentric position at the same end of the contact support 12 in a protruding manner, a connecting line between the matching portion 123 and the axis of the contact support 12 is at an included angle with the axis of the moving contact bridge 13. A rotary supporting portion 122 is arranged at the other end of the contact support 12 away from the swing supporting portion 121. At least two slots 125 are formed in an end surface of the rotary supporting portion 122. Both ends of the moving contact bridge 13 arranged in the contact support 12 respectively extend into the contact groove 127 as moving contact portions.

[0056] In addition, an edge of the contact support 12 is further provided with a pair of mounting notches 126. Each mounting notch 126 is communicated with the contact groove 127 respectively. Each static contact assembly 14 is correspondingly transferred from the mounting notch 126 into the contact groove 127, such that the moving contact assembly 11 can be integrally assembled in the intermediate base 1b1 conveniently. A connecting line between a pair of mounting notches 126 is perpendicular to a central axis of the moving contact bridge 13. The distances between the matching portion 123 and the two mounting notches 126 are inconsistent, and the matching portion 123 is closer to one of the mounting notches 126. Combined with FIGs. 1, 3-7 and 15-18, the contact unit located in the middle is described in detail. For the convenience of description, the contact unit located in the middle is referred to as an intermediate contact unit.

[0057] As shown in FIG. 2, the intermediate contact unit includes a housing, a contact mechanism and a pair of wiring assemblies. The housing of the intermediate contact unit is another intermediate base 1b1. The structure of the intermediate base 1b1 is the same as the structure of the intermediate base 1b1 of the top contact unit. A pair of static contact assemblies 14 of the contact mechanism and a pair of wiring assemblies are the same as those of the top contact unit. The structure of the moving contact assembly 11 of the contact mechanism is similar to that of the moving contact assembly 11 of the top contact unit.

[0058] As shown in FIGs. 3-6 and 16-18, the moving contact assembly 11 of the intermediate contact unit includes a contact support 12 and a moving contact bridge 13. A contact groove 127 is formed in a circumferential side wall of the contact support 12. The moving contact bridge 13 is arranged in a radial direction of the contact support 12. Both ends of the moving contact bridge 13 extend into the contact groove 127 of the contact support 12 respectively as a moving contact portion. Different from the contact support 12 of the top contact unit, the contact support 12 of the intermediate contact unit is no longer provided with a swing supporting portion 121 and a driving portion 312, but a linkage structure is respectively arranged at opposite two ends of the contact support 12 and is used for linkage connection with the contact supports 12 of the adjacent two contact units. A protruding plug-in portion 124 is arranged at one end of the contact support 12 facing the top contact unit. The plug-in portion 124 is correspondingly plugged with the slot 125 of the contact support 12 in the top contact unit. A rotary supporting portion 122 is arranged in the center of one end of the contact support 12 away from the top contact unit in a protruding manner. The rotary supporting portion 122 is the same as the rotary supporting portion 122 of the top contact unit, which is used for being in rotatable fit with the intermediate base 1b1 of the intermediate contact unit and is provided with a slot 125.

[0059] In conjunction with FIGs. 16-18, a split contact support 12 is provided, which is suitable for an intermediate contact unit.

[0060] The contact support 12 includes a first support-

ing member 12a and a second supporting member 12b which are spaced oppositely. The first supporting member 12a and the second supporting member 12b are both disc shapes with the same diameter. Two plug-in portions 124 are arranged at one end of the first supporting member 12a facing the second supporting member 12b. The two plug-in portions 124 form a rotationally symmetrical structure with respect to an axis of the first supporting member 12a. The second supporting member 12b is provided with through holes 129 which are correspondingly plugged with the two plug-in portions 124. The plug-in portion 124 still protrudes from the surface of the second supporting member 12b after passing through the through hole 129 for plugging with the contact support 12 of the top contact unit. A rotary supporting portion 122 is formed in the center of one end of the first supporting member 12a away from the second supporting member 12b. The rotary supporting portion 122 is in rotatable fit with a central groove 103 of the intermediate base 1b1. Two slots 125 are formed in an end surface of the rotary supporting portion 122. The two slots are in plug-in fit with the contact support 12 of the other contact unit. In addition, the two slots 125 form a rotationally symmetrical structure with respect to an axis of the first supporting member 12a, achieving the advantages of stable connection and convenient disassembly and assembly.

[0061] When the first supporting member 12a is in plug-in fit with the second supporting member 12b, clamping structures which are limited each other are arranged on the first supporting member 12a and the second supporting member 12b. The contact groove 127 which is formed cooperatively, the assembling groove for limiting the moving contact bridge 13, the foolproof structure and the mounting notch 126 that is convenient for the assembly of the contact support 12 are all the same as the contact support 12 of the top contact unit. In the same way, the contact support 12 of the intermediate contact unit may also be of an integrated structure.

[0062] Combined with FIGs. 1, 3-7 and 19-22, the contact unit furthest away from the operating module 2 is described in detail. For the convenience of description, the contact unit furthest away from the operating module 2 is referred to as a bottom contact unit.

[0063] As shown in FIGs. 3-7 and 19, the bottom contact unit includes a bottom base 1c1, a contact mechanism and a pair of wiring assemblies. The bottom base 1c1 is similar in structure to the intermediate base 1b1. The bottom base is in a rectangular groove shape as a whole and is provided with the same mounting groove and the contact hole as the intermediate base 1b1. The static contact assembly 14 and the wiring assembly of the contact mechanism are the same as those of the other two contact units, but are different from the intermediate base 1b1 in that a circular groove is formed in the center of a bottom wall of the bottom base 1c1. The bottom of the circular groove is in contact with the moving contact assembly 11. The rotational stability of the moving contact assembly 11 is improved by increasing a contact surface between the moving contact assembly 11 and the bottom base 1c1. A swing limiting groove 101 is formed in a central position of a bottom wall of the bottom base 1c1, that is, a central position of the circular groove, and is located in a central axis between the bottom base 1c1 and the swing limiting groove 101 of the top base 1a1. In addition, the two swing limiting grooves 101 have the same shape and also have a square cross-sectional shape.

[0064] The moving contact assembly 11 of the bottom contact unit includes a contact support 12 and a moving contact bridge 13. A contact groove 127 is formed in a circumferential side wall of the contact support 12. The moving contact bridge 13 is arranged in a radial direction of the contact support 12. Both ends of the moving contact bridge 13 extend into the contact groove 127 of the contact support 12 respectively as a moving contact portion. Linkage structures which are matched with each other are arranged between the contact support 12 and the adjacent contact support 12. In FIG. 6, the contact supports 12 arranged on the bottom contact unit and the intermediate contact unit are each provided with the same plug-in portion 124. The plug-in portion 124 of the bottom contact unit is used for being correspondingly plugged with the slot 125 of the intermediate contact unit, thereby achieving linkage connection. A swing supporting portion 121 is arranged at a central position of the contact support 12 facing the bottom base 1c1 in a protruding manner. Preferably, the swing supporting portion 121 of the bottom contact unit has the same structure as the swing supporting portion 121 of the top contact unit. That is, the cross-sectional shapes of the two swing supporting portions 121 are both Reuleaux triangles, and their rolling surface contour lines are equal-width curves. When the contact support 12 is driven to rotate, a rolling surface of the swing supporting portion 121 rolls along the groove side wall of the swing limiting groove 101. A matching principle of the swing supporting portion 121 and the swing limiting groove 101 is the same as that of the top contact unit.

[0065] Combining FIGs. 3-6 and 20-22, a split moving contact assembly 11 is provided, which is suitable for the bottom contact unit.

[0066] As shown in FIGs. 20-22, the contact support 12 includes a first supporting member 12a and a second supporting member 12b which are spaced oppositely. The first supporting member 12a and the second supporting member 12b are both disc shapes with the same diameter. Two plug-in portions 124 are arranged at one end of the first supporting member 12a facing the second supporting member 12b. The two plug-in portions 124 form a rotationally symmetrical structure with respect to an axis of the first supporting member 12a. A step surface 120 is formed in the center of one end of the first supporting member 12a away from the second supporting member 12b in a protruding manner. The step surface 120 is limited in a circular groove and is used for increasing a

contact surface between the bottom base 1c1 and the first supporting member 12a. A swing supporting portion 121 is arranged in a central position (i.e., a central position of the step surface 120) of the first supporting member 12a away from the second supporting member 12b in a protruding manner. A cross-sectional shape of the swing supporting portion 121 is a Reuleaux triangle. The second supporting member 12b is provided with through holes 129 which are correspondingly plugged with the two plug-in portions 124. The first supporting member 12a and the second supporting member 12b which are in plug-in fit have the advantage of convenient disassembly and assembly. In addition, the plug-in portions 124 correspondingly penetrate out of the through holes 129 and then protrude from the second supporting member 12b and are used for being plugged with the slot 125 of the intermediate contact unit.

[0067] When the first supporting member 12a is in plug-in fit with the second supporting member 12b, clamping structures which are limited each other are arranged on the first supporting member 12a and the second supporting member 12b. The contact groove 127 which is formed cooperatively, the assembling groove for limiting the moving contact bridge 13, the foolproof structure and the mounting notch 126 that is convenient for the assembly of the contact support 12 are all the same as the contact support 12 of the top contact unit. In the same way, the contact support 12 of the bottom contact unit may also be of an integrated structure.

[0068] It should be noted that, in the present embodiment, an outer diameter of the rotary supporting portion 122 is greater than an outer diameter of the swing supporting portion 121, and all plug-in portions 124 are correspondingly located on the outer side of the swing supporting portion 121, so as to ensure the stability of the linkage connection.

[0069] A second embodiment of an isolation switch is provided. The isolation switch includes an operating module 2, a transmission module and a contact module that are laminated in sequence. The structures of the operating module 2 and the transmission module are the same as those of the first embodiment. The contact module includes a module housing and three contact units. The module housing is formed by splicing a top base 1a1, two intermediate bases 1b1 and a bottom base 1c1.

[0070] The top contact unit includes an intermediate base 1b1 and a top base 1a1 covering the intermediate base 1b1. A central groove 103 and a trajectory groove 102 are formed in a central position of the top base 1a1. A swing limiting groove 101 is formed in the central position of the intermediate base 1b1. At this moment, the swing limiting groove 101 and the trajectory groove 102 are located on two adjacent connecting walls of the housing, that is, on the adjacent two connecting walls of the module housing. The remaining wiring holes, the mounting grooves and other structures are the same as those in the first embodiment. Correspondingly, the static contact assembly 14 and the wiring assembly assembled in the housing are also the same as the first embodiment.

[0071] The moving contact assembly includes a contact support 12 and a moving contact bridge 13 arranged on the contact support 12. The contact support 12 is provided with a swing supporting portion 121, a rotary supporting portion 122 and a matching portion 123 which are matched with the swing limiting groove 101, the trajectory groove 102 and the central groove 103 respectively. The swing limiting portion 121 and the matching portion 123 are located on opposite two sides of the contact support 12. The rotary supporting portion 122 and the matching portion 123 are located on the same side of the contact support 12. The rest of the structures are the same as the contact support 12 in the first embodiment.

[0072] The contact support 12 in the present embodiment may also adopt a split structure, wherein the swing supporting portion 121 is correspondingly arranged at a central position of the first supporting member 12a, and the swing supporting portion 121 faces away from the second supporting member 12b. At the same time, the swing supporting portion 121 needs to be provided with a slot 125 with the same function as the first embodiment, and is used for being plugged with the plug-in portion 124 of the adjacent contact support 12. The rotary supporting portion 122 and the matching portion 123 are arranged on one side of the second supporting member 12 away from the first supporting member 12a. The rest of the structures may adopt the structure in the first embodiment.

[0073] It should be noted that the sizes of the central groove 103 of the top contact unit and the rotary supporting portion 122 can be reduced accordingly to prevent interference with the cooperation of the matching portion and the trajectory groove 102. In addition, the linkage structure in the present embodiment needs to adopt a structure with a smaller size than the first embodiment. That is, the single sizes of the plug-in portion 124 and the slot 125 are reduced. Spacings between the adjacent two plug-in portions 124 or the slot 125 are reduced, and the remaining two contact units are the same as those in the first embodiment.

[0074] A third embodiment of an isolation switch is provided. In the present embodiment, the isolation switch includes an operating module 2, a transmission module and a contact module which are laminated in sequence. The structures of the operating module 2 and the transmission module are the same as those of the first embodiment. The contact module includes a module housing and three contact units. The module housing is formed by splicing a top base 1a1, two intermediate bases 1b1 and a bottom base 1c1. The top contact unit is the same as that of the first embodiment and the second embodiment.

[0075] The bottom contact unit is similar to that of the first embodiment. A central position of the bottom base 1c1 is no longer provided with a swing limiting groove 101, but only with a central groove 102 of a groove structure. A swing limiting groove 101 is formed in a

central position of the intermediate base 1b1 covering the bottom base 1c1. Correspondingly, the contact support 12 is provided with a swing supporting portion 121 matched with the swing limiting groove 101. At this time, the swing supporting portion 121 faces away from the bottom base 1c1. A rotary supporting portion 122 may be arranged on one side of the contact support 12 facing the bottom base 1c1.

[0076] When the contact support 12 is of a split structure, that is, a rotary supporting portion 122 is arranged on one side of the first supporting member 12a facing the bottom base 1c1, and a swing supporting portion 121 is arranged on one side of the second supporting member 12b away from the bottom base 1c1. At the same time, the plug-in portion 124 is arranged on the swing supporting portion 121. Correspondingly, the single sizes of the plug-in portion 124 and the slot 125 are reduced, and the spacings between the adjacent two plug-in portions 124 or the slot 125 are reduced, so that the plug-in portions 124 can pass through the swing limiting groove 101 and are plugged with the slots of the adjacent contact supports 12, thereby achieving linkage.

[0077] A fourth embodiment of an isolation switch is provided. The isolation switch includes an operating module 2, a transmission module and a contact module that are laminated in sequence. The structures of the operating module 2 and the transmission module are the same as those of the first embodiment. The contact module includes a module housing and three contact units. The module housing is formed by splicing a top base 1a1, an intermediate base 1b1 and a bottom base 1c1. The structures of the top base 1a1, the intermediate base 1b1 and the bottom base 1c1 are the same as those in the first embodiment. The contact mechanisms and the wiring assemblies of the three contact units are the same as those in the first embodiment. The contact mechanisms and the wiring assemblies of the two contact units are arranged between the top base 1a1 and the intermediate base 1b1, or the contact mechanisms and the wiring assemblies of the two contact units are arranged between the intermediate base 1b1 and the bottom base 1c1.

[0078] A fifth embodiment of an isolation switch is provided. The isolation switch includes an operating module 2, a transmission module and a contact module which are laminated in sequence. The structures of the operating module 2 and the transmission module are the same as those in the first embodiment. The contact module includes a module housing. The module housing includes a cover body and a base which are covered each other. The cover body and the base are respectively similar to the top base 1a1 and the bottom base 1c1 in the first embodiment. The cover body and the base each include side walls and a connecting wall connected between the side walls. Side walls of the cover body and the base are docked to form a side wall of the module housing. The connecting wall of the cover body and the connecting wall of the base are spaced oppositely and respectively serve as two connecting walls of the module housing. The cover body is provided with a swing limiting groove 101 and a trajectory groove 102. The base is provided with another swing limiting groove 101. The three contact units share one module housing. The contact mechanisms and the wiring assemblies of the three contact units may be the same as those in the first embodiment. The moving contact assemblies 11 of the three contact units are laminated and connected in linkage. The contact support 12 of the top contact unit is provided with a matching portion 123 and a swing supporting portion 121 to match the trajectory groove 102 and the swing limiting groove 101 of the cover body respectively. The contact support 12 of the bottom contact unit is provided with a swing supporting portion 121 and is matched with the swing limiting groove 101 of the base. The static contact assembly 14 and the wiring assembly of each contact unit may be fixed on the side wall of the module housing.

[0079] In addition, the contact module in the present embodiment may include a contact unit, two contact units or more contact units.

[0080] When the contact module includes a contact unit, this contact unit includes a contact mechanism and a pair of wiring assemblies. The static contact assembly 14 and the wiring assembly of the contact mechanism are the same as those in the first embodiment. The moving contact assembly 11 includes a contact support 12 and a moving contact bridge 13. The assembly of the moving contact bridge 13 and the contact support 12 is the same as that in the first embodiment. A matching portion 123 and a swing supporting portion 121 are arranged at one end of the contact support 12 facing the cover body. A swing supporting portion 121 is arranged at one end of the contact support 12 facing the base. The matching portion 123 and the swing supporting portion 121 are the same as those in the first embodiment.

[0081] In addition, the contact support 12 may be of a split structure. The contact support 12 includes a first supporting member 12a and a second supporting member 12b that are matched with each other. The first supporting member 12a adopts the first supporting member 12a in the bottom contact unit in the first embodiment, and the second supporting member 12b adopts the second supporting member 12b in the top contact unit in the first embodiment.

[0082] When the contact module includes two contact units, the moving contact assembly 11 in the contact unit close to the operating module 2 adopts the moving contact assembly 11 of the top contact unit in the first embodiment, the moving contact assembly 11 in the contact unit away from the operating module 2 adopts the moving contact assembly 11 of the bottom contact unit, and the moving contact assemblies 11 of the adjacent two contact units are in linkage connection through the slots 125 and the plug-in portions 124 that match each other.

[0083] When the contact module includes more than three contact units. The moving contact assembly 11 in

the contact unit close to the operating module 2 adopts the moving contact assembly 11 of the top contact unit in the first embodiment, the moving contact assembly 11 in the contact unit away from the operating module 2 adopts the moving contact assembly 11 of the bottom contact unit, the remaining contact units adopt the moving contact assembly 11 of the intermediate contact unit in the first embodiment, and the adjacent two moving contact assemblies 11 are connected in linkage.

[0084] A sixth embodiment of an isolation switch is provided. The isolation switch includes the same operating module 2 and transmission module as the above embodiment, wherein the contact module includes at least one contact unit, and only one contact unit is provided with a swing supporting portion 121.

[0085] In the case of only one contact unit, the contact unit may adopt a top contact unit in the first embodiment or the second embodiment.

[0086] In the case of two or more contact units, the top contact unit may be the top contact unit in the first embodiment or the second embodiment, and the remaining contact units adopt the intermediate contact unit in the first embodiment or the second embodiment; or, the bottom contact unit adopts the bottom contact unit in the first embodiment or the third embodiment, and the top contact unit adopts the top contact unit in the first embodiment, but is no longer provided with the swing supporting portion 121 and the swing limiting groove 101. The remaining contact units in the present embodiment adopt the intermediate contact unit in the first embodiment or the second embodiment.

[0087] It should be explained that, in the description of the present invention, the terms such as "up", "down", "left", "right", "inner" and "outer" indicating the directional or positional relations on the basis of the directional or positional relations shown in the drawings are only used for conveniently describing the present invention and simplifying the description, not indicate or imply that the referred devices or elements must have a specific orientation and be configured and operated in a specific direction; therefore, they cannot be construed as a limitation on the present invention.

[0088] We have made further detailed description of the present invention mentioned above in combination with specific preferred embodiments, but it is not deemed that the specific embodiments of the present invention is only limited to these descriptions. A person skilled in the art can also, without departing from the concept of the present invention, make several simple deductions or substitutions, which all be deemed to fall within the protection scope of the present invention.

Claims

1. A contact unit, comprising a housing and a contact mechanism arranged in the housing, wherein the contact mechanism comprises a moving contact assembly (11) and a pair of static contact assemblies (14); the moving contact assembly (11) comprises a contact support (12); the contact support (12) is provided with a pair of moving contact portions; the moving contact portion is driven by the contact support (12) to correspondingly match the static contact portion of the static contact assembly (14); the housing is provided with a swing limiting groove (101); a swing supporting portion (121) is arranged at a central position of the contact support (12) in a protruding manner; the swing supporting portion (121) rolls along a side wall of the swing limiting groove (101); and a rolling surface contour line of the swing supporting portion (121) is an equal-width curve.

2. The contact unit according to claim 1, wherein a cross-section of the swing limiting groove (101) is in the shape of a rectangle; a short-side length of the rectangle is equal to a width of the equal-width curve; or, a cross-sectional shape of the swing limiting groove (101) is in the shape of a square, wherein a side length of the square is equal to the width of the equal-width curve.

3. The contact unit according to claim 2, wherein a cross-sectional shape of the swing limiting groove (101) is a Reuleaux triangle, and a cross-sectional shape of the swing limiting groove (101) is a square.

4. The contact unit according to claim 1, wherein a protruding matching portion (123) is arranged at a central position deviating from the contact support (12), and the matching portion (123) swings along the trajectory groove (102) formed in the housing to drive the contact support (12) to rotate eccentrically.

5. The contact unit according to claim 4, wherein a moving contact bridge (13) arranged in a radial direction is arranged in the contact support (12); both ends of the moving contact bridge (13) are respectively used as moving contact portions; each moving contact portion is matched with the static contact portion of one static contact assembly (14) respectively, and the matching portion (123) is arranged on the contact support (12) that deviates from an axis position of the moving contact bridge (13); and
during opening, a central axis of the moving contact bridge (13) is perpendicular to a connecting line between a pair of static contact assemblies (14), and an included angle between both ends of the trajectory groove (102) and the center of the swing limiting groove (101) ranges from 80° to 100°.

6. The contact unit according to claim 1, wherein at least two sets of linkage structures are arranged between the contact supports (12) of the adjacent two contact units, and all linkage structures form a

rotationally symmetrical structure with respect to a connecting line of axes of the two contact supports (12).

7. The contact unit according to claim 6, wherein the contact support (12) is also provided with a protruding rotary supporting portion (122); the rotary supporting portion (122) and the swing supporting portion (121) are respectively located at opposite two ends of the contact support (12); and the rotary supporting portion (122) is in rotatable fit with a central groove (103) arranged on the housing.

8. The contact unit according to claim 7, wherein the central groove (103) is opposite to the swing limiting groove (101); the linkage structure can pass through the central groove (103); and each set of linkage structures comprises a plug-in portion (124) and a slot (125) that match each other.

9. An isolation switch, comprising an operating module (2) and a contact module which are laminated in sequence, wherein the contact module comprises at least one contact unit according to any one of claims 1 to 8.

10. The isolation switch according to claim 9, further comprising a transmission module, wherein the transmission module comprises a transmission member (31); the transmission member (31) is in transmission connection with the operating mechanism (20) of the operating module (2); and a driving structure is arranged between the transmission member (31) and the contact support (12) close to the transmission member (31) and deviates from axes of the transmission member (31) and the contact support (12).

11. The isolation switch according to claim 10, wherein the operating mechanism (20) comprises an output shaft that rotates around an axis, the output shaft is in driving connection with a rotating member (21), at least two sets of transmission structures are arranged between the rotating member (21) and the transmission member (31), and the transmission structure deviates from the axes of the rotating member (21) and the transmission member (31).

12. The isolation switch according to claim 10, wherein the swing supporting portion (121) is located at one end of the contact support (12) close to the transmission member (31) or at one end of the contact support (12) away from the transmission member (31).

13. The isolation switch according to claim 10, wherein a contact support (12) immediately adjacent to the transmission member (31) and/or one contact support (12) away from the transmission member (31) is provided with a swing supporting portion (121).

14. The isolation switch according to claim 13, wherein the contact module comprises at least two contact units that are laminated; the contact support (12) immediately adjacent to the transmission module is provided with a matching portion (123) and a swing supporting portion (121); the contact support (12) away from the transmission module is provided with another swing supporting portion (121); and the contact supports (12) of the adjacent two contact units are connected in linkage.

15. The isolation switch according to claim 10, wherein the driving structure comprises a driving portion (312) and a matching portion (123) that match each other; the driving portion (312) is a boss structure arranged on the transmission member (31) in a protruding manner; the matching portion (123) is arranged on the contact support (12) for matching the driving portion (312); and a transmission portion (311) is arranged on one side of the transmission member (20) facing the operating mechanism (20) in a protruding manner.

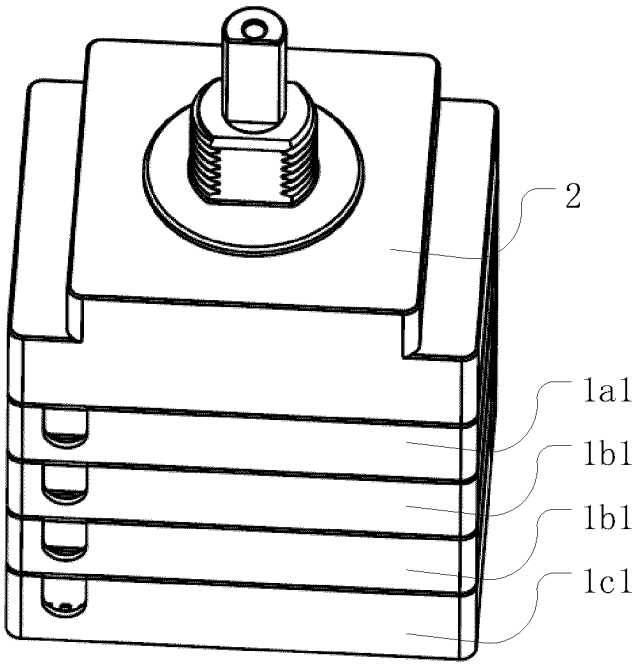

Fig.1

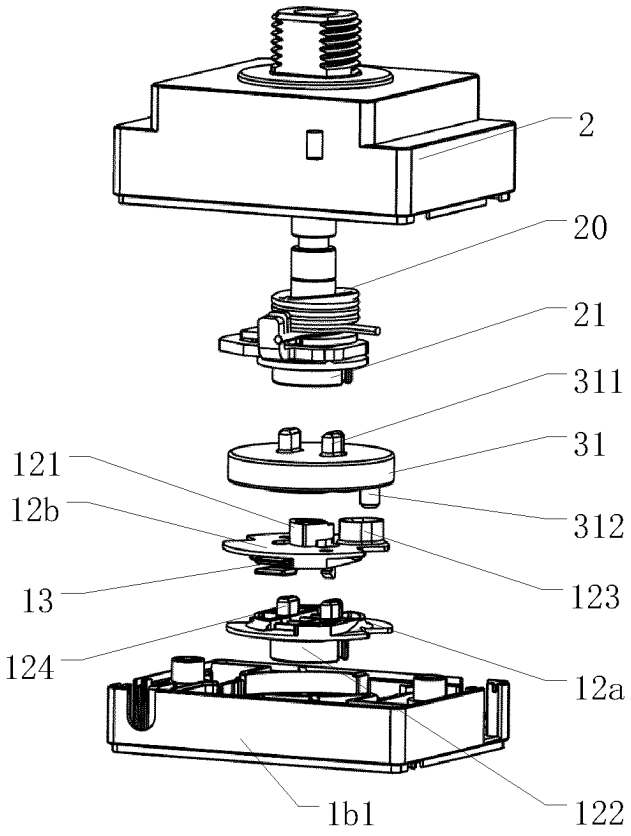

Fig.2

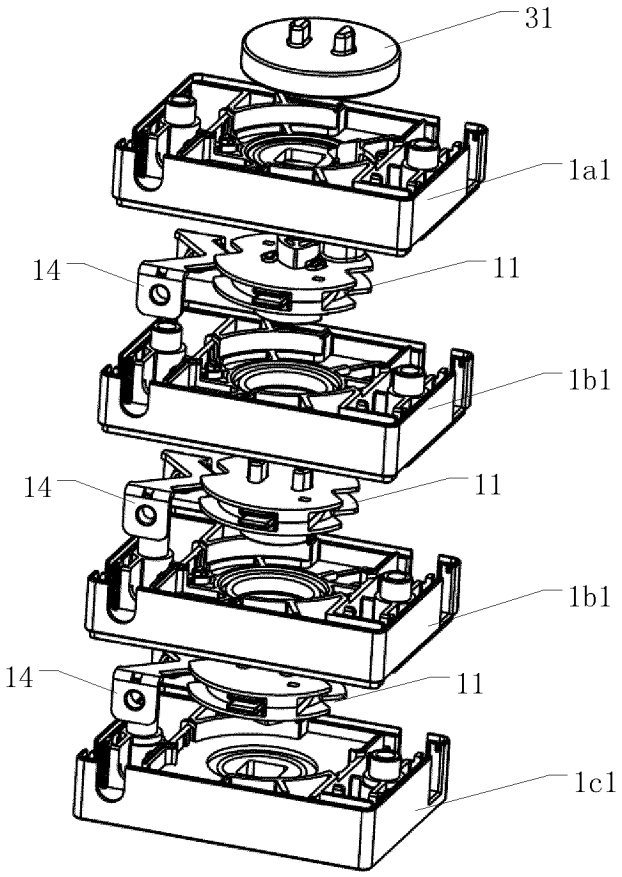

Fig.3

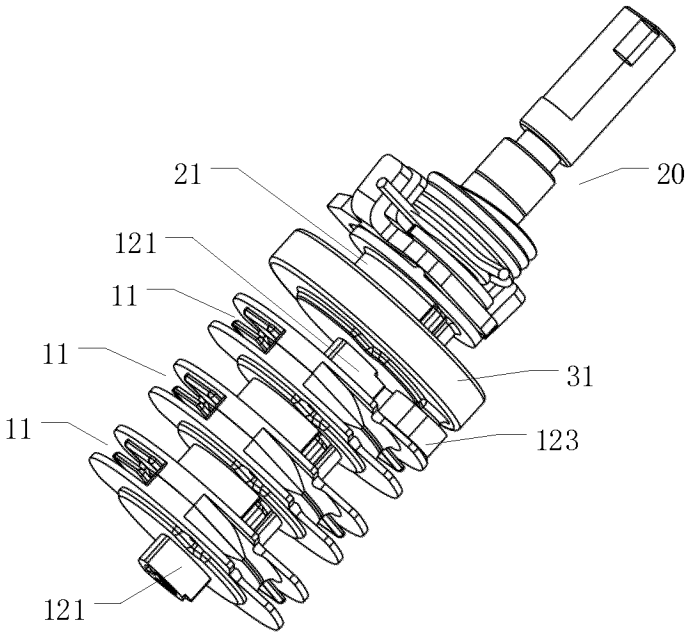

Fig.4

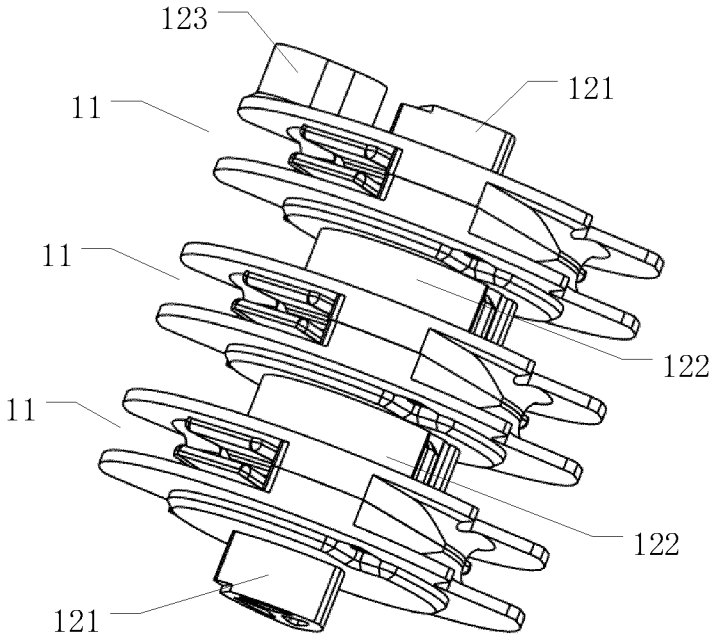
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Fig.5

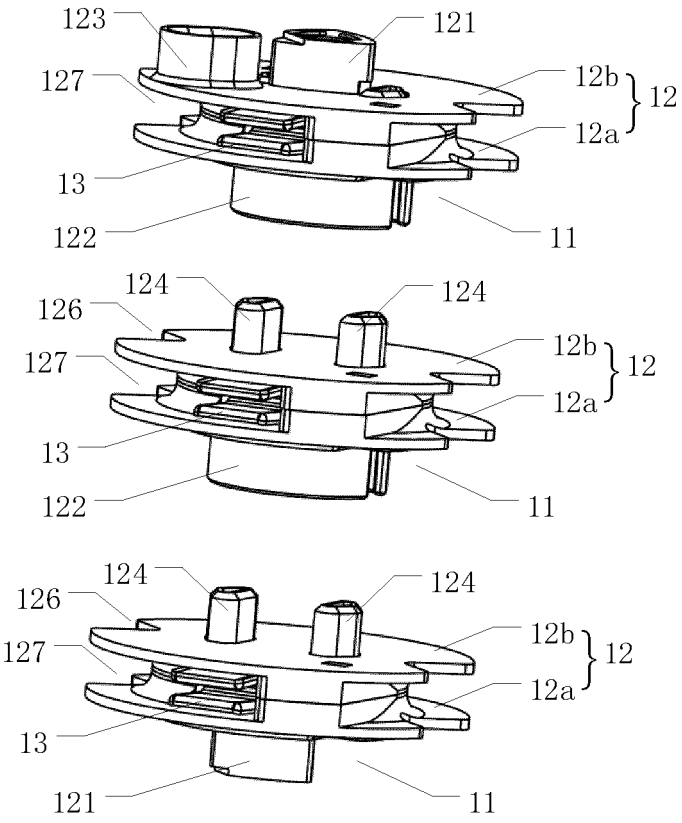
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Fig.6

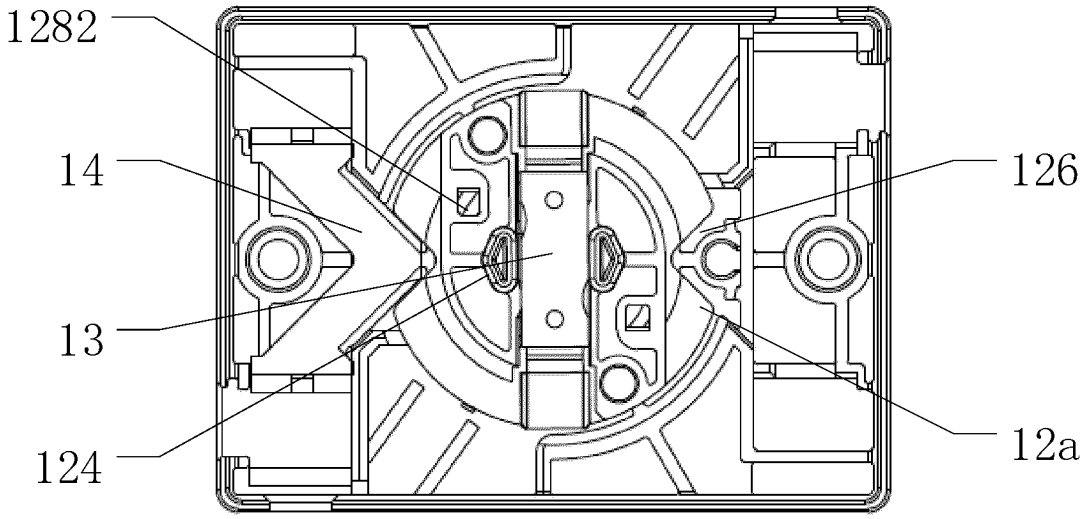

Fig.7

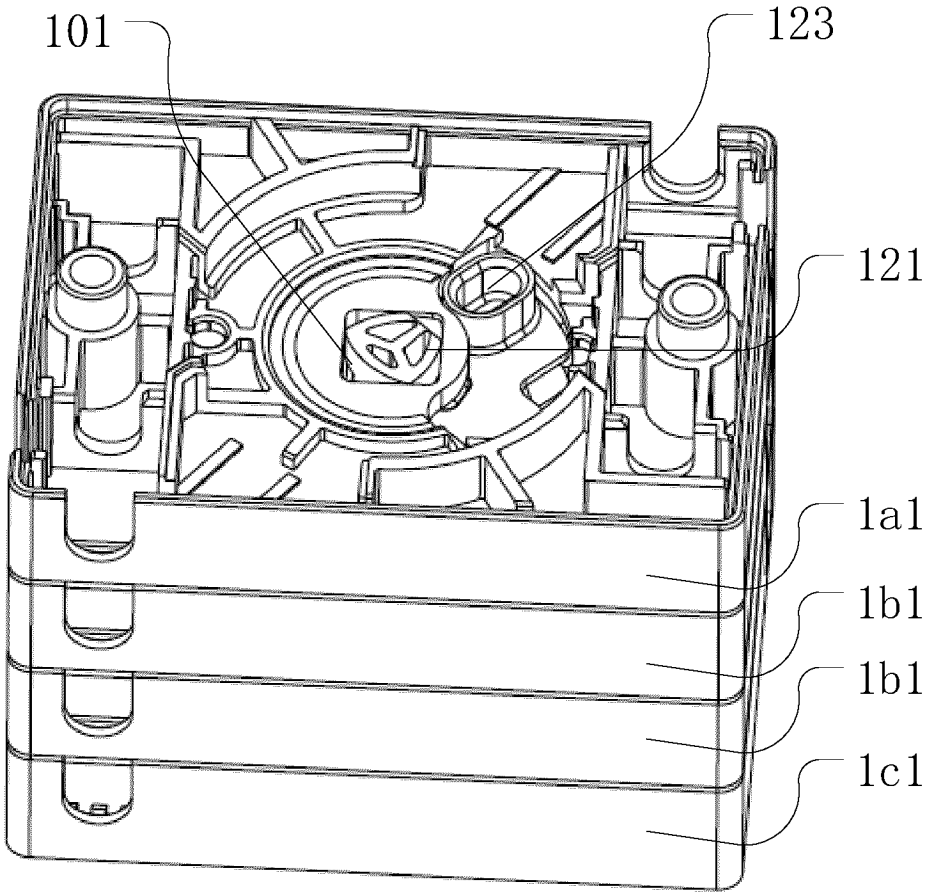

Fig.8

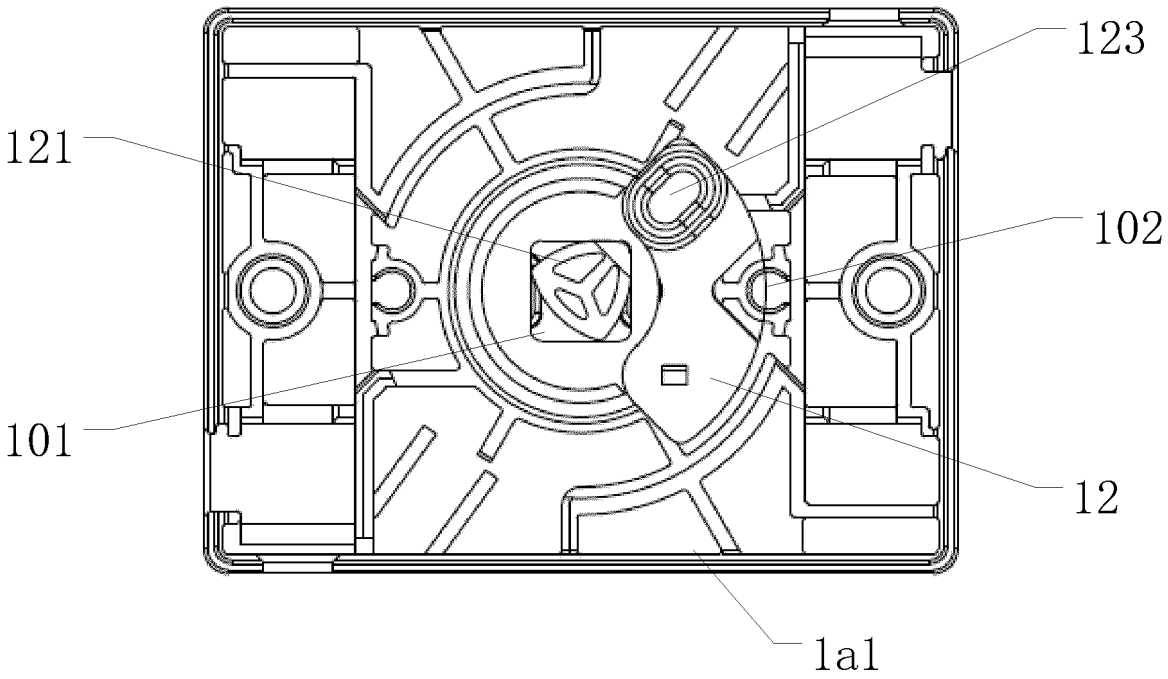

Fig.9

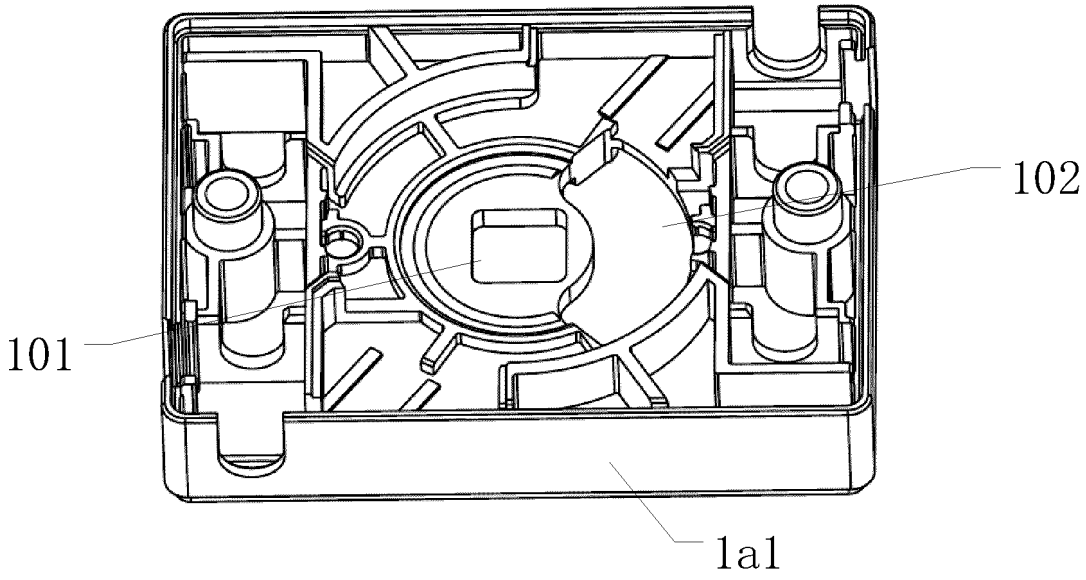

Fig.10

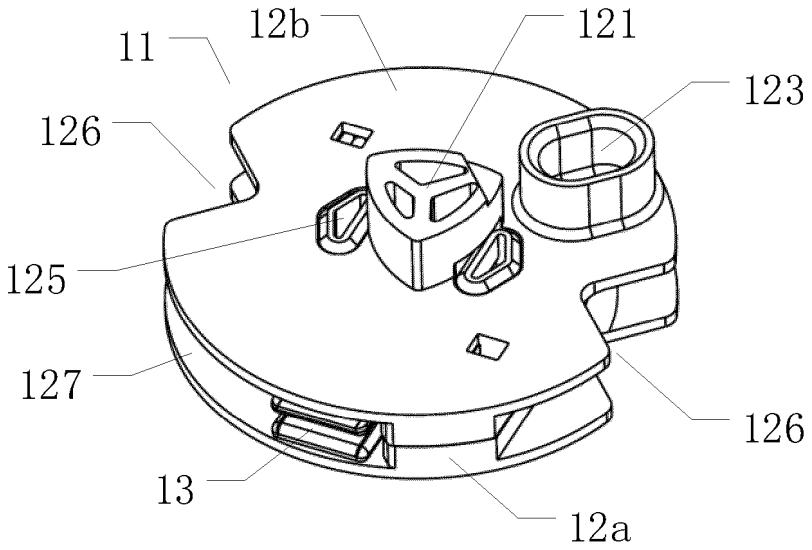
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Fig.11

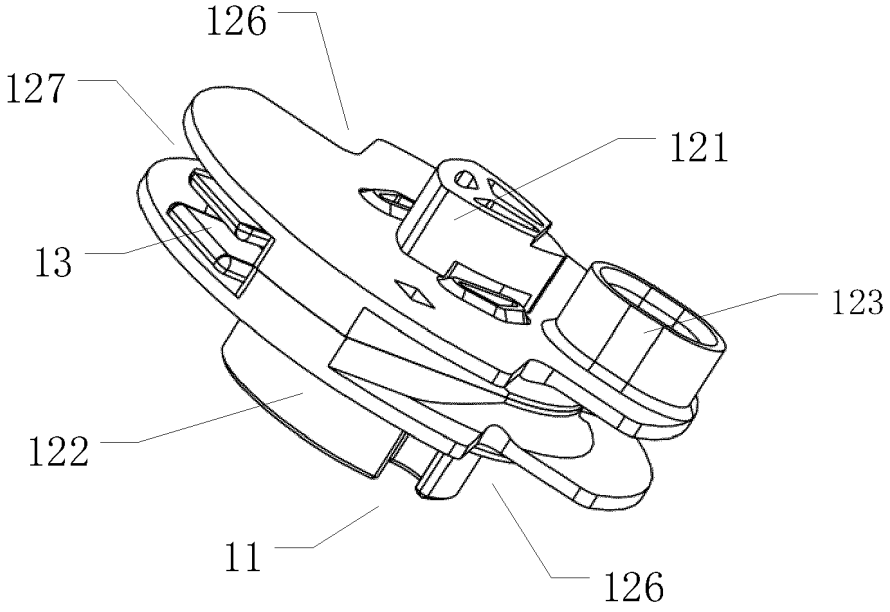
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Fig.12

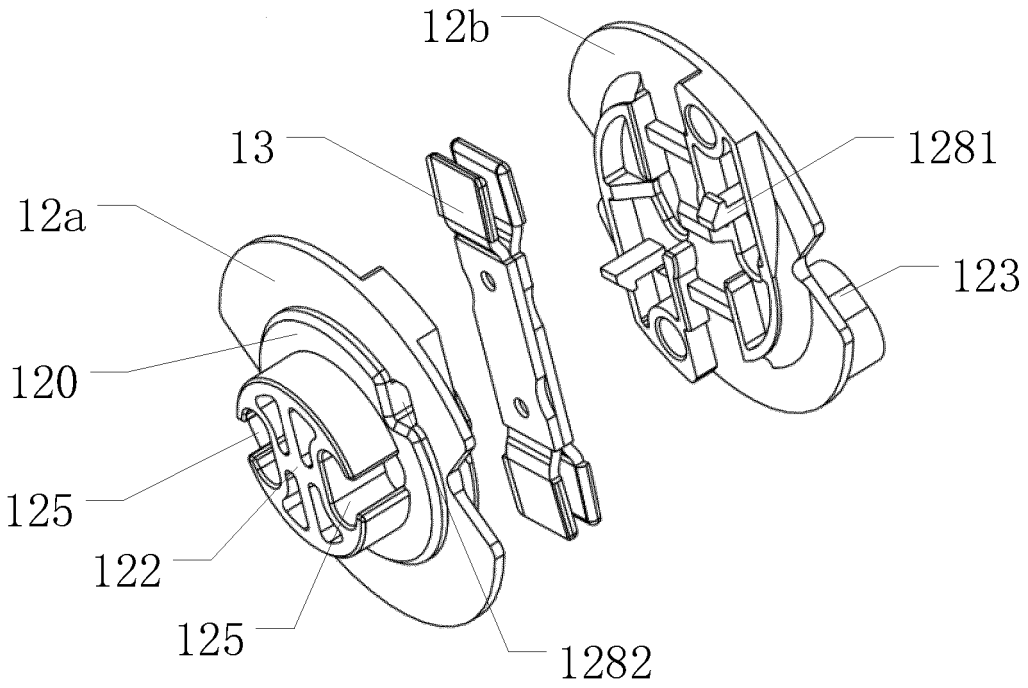
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Fig.13

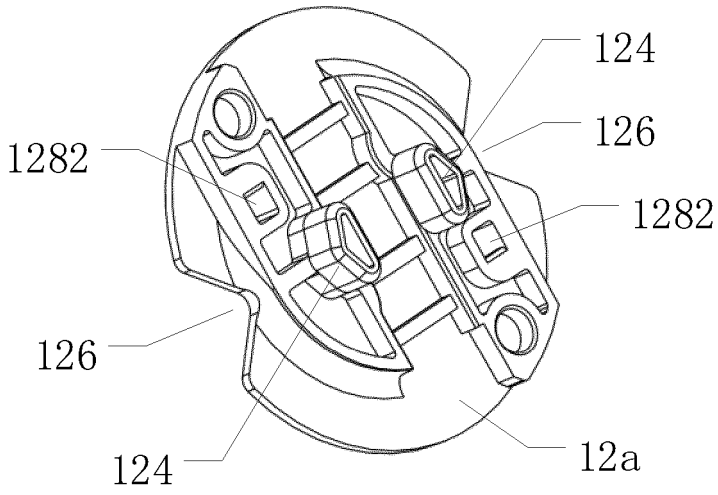
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Fig.14

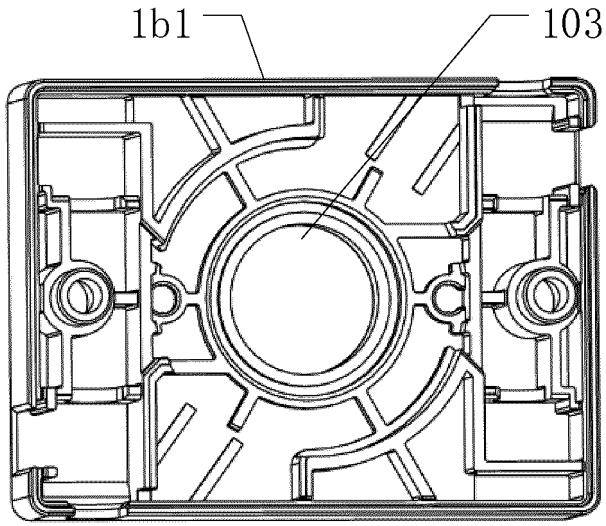

Fig.15

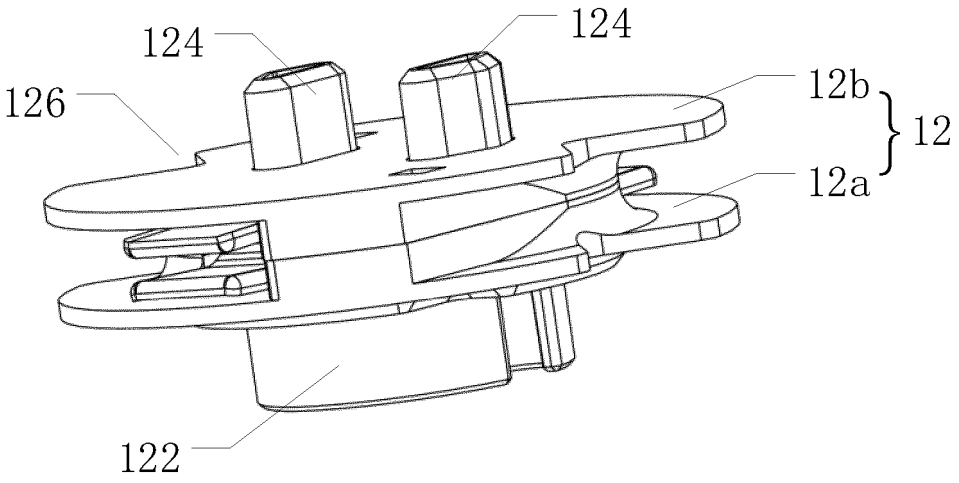

Fig.16

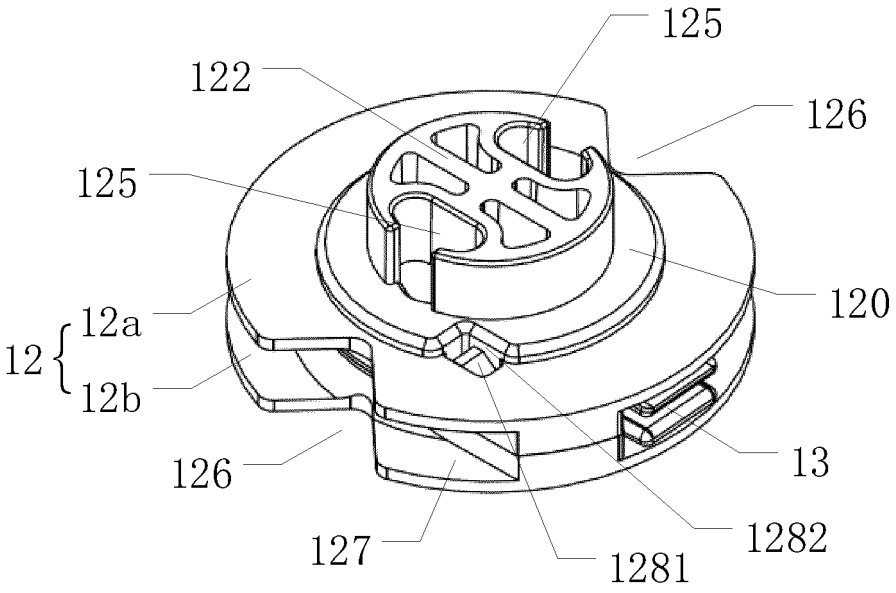
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Fig.17

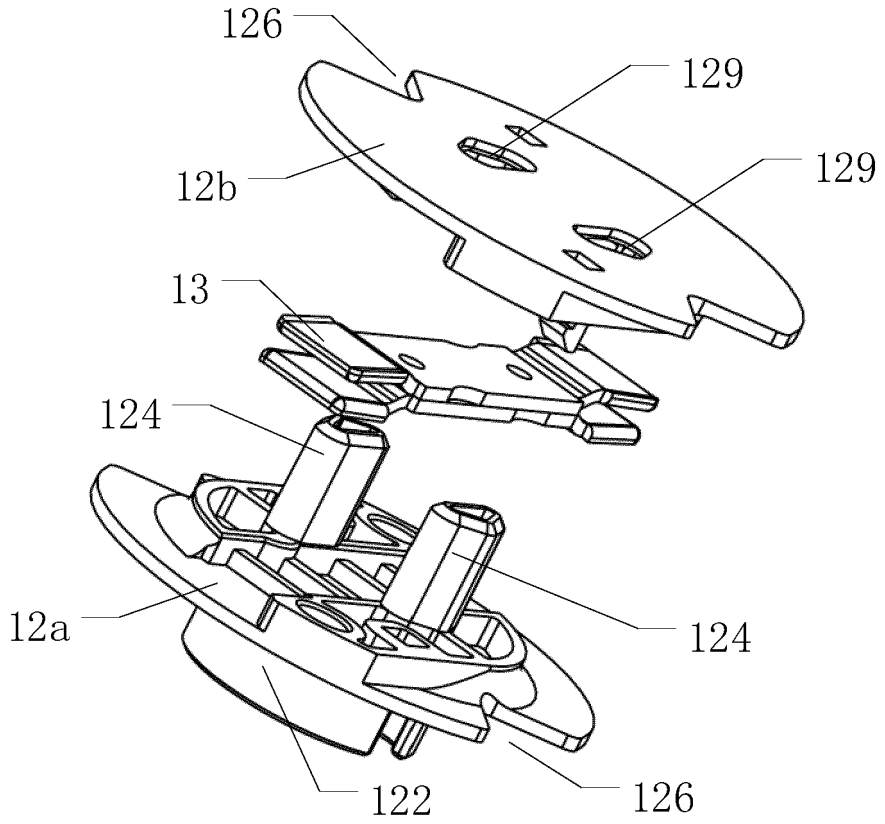
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Fig.18

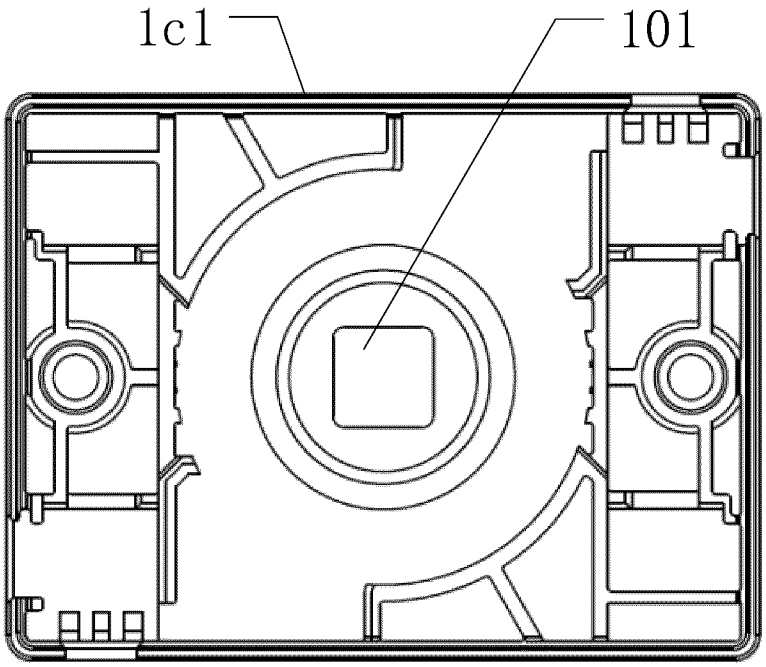

Fig.19

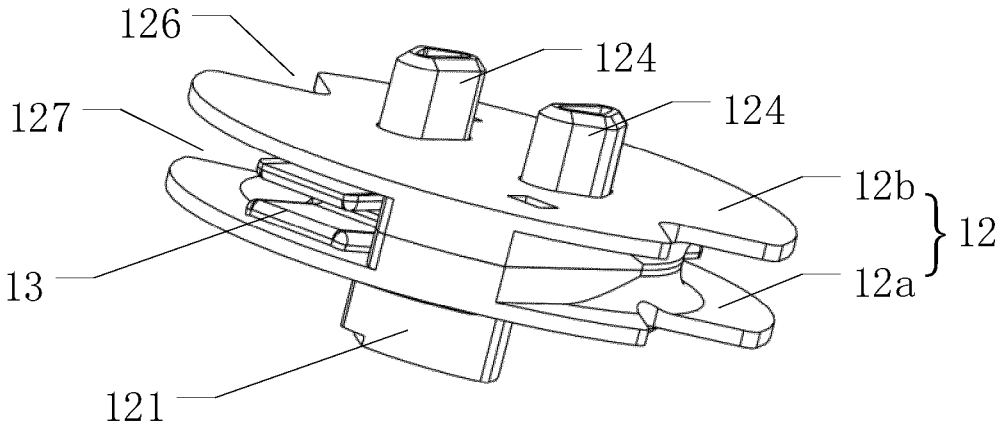

Fig.20

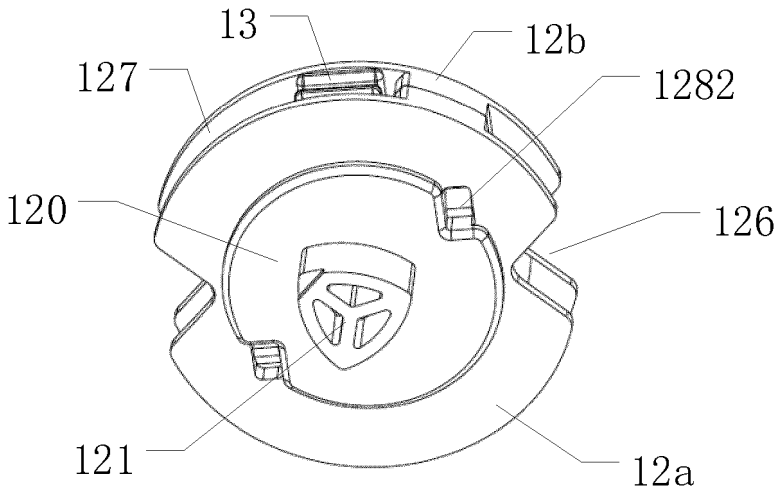
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Fig.21

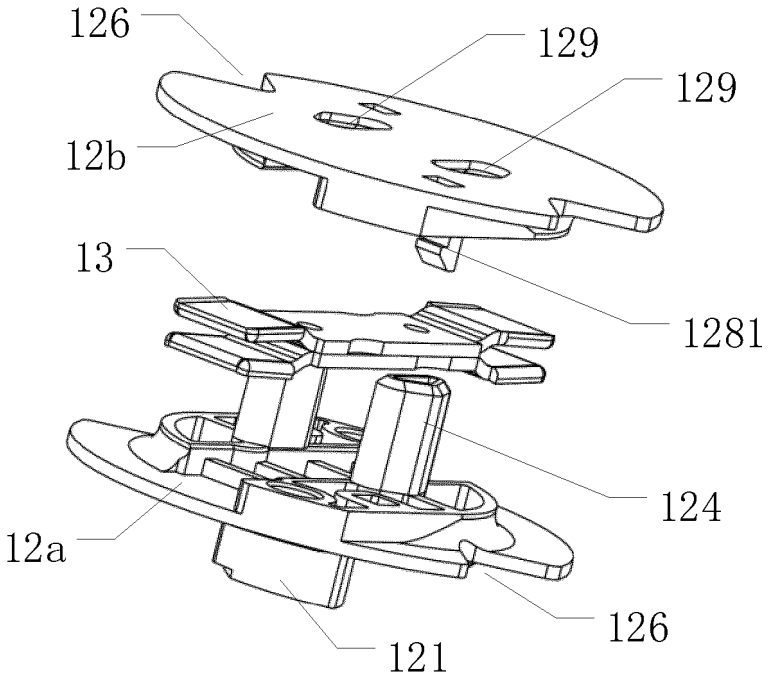
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Fig.22

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2024/073328

A. CLASSIFICATION OF SUBJECT MATTER

H01H31/02(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)

IPC: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)

CNTXT, ENTXT, ENTXTC, DWPI, CNKI: 开关, 接触, 触头, 等宽曲线, 偏心, 速度, switch, contactor, contact, isometric, aequilatus, equivalent, width, eccentric, speed

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 205810648 U (CHANGSHU SWITCHGEAR MANUFACTURING CO., LTD. (FORMERLY CHANGSHU SWITCHGEAR PLANT)) 14 December 2016 (2016-12-14) description, paragraphs 0039-0054, and figures 1-20	1, 9
A	CN 111370242 A (YUEQING DONGHAI ELECTRIC APPLIANCE CO., LTD.) 03 July 2020 (2020-07-03) entire document	1-15
A	US 2023033155 A1 (BREMAS ERSCE S.P.A.) 02 February 2023 (2023-02-02) entire document	1-15

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

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"E" earlier application or patent but published on or after the international filing date
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"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
12 April 2024	**17 April 2024**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2024/073328

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 205810648 U	14 December 2016	None	
CN 111370242 A	03 July 2020	None	
US 2023033155 A1	02 February 2023	US 11756750 B2	12 September 2023

Form PCT/ISA/210 (patent family annex) (July 2022)