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(54) ISOLATING SWITCH

(57) An isolating switch, including a housing (1), which includes a first wall (10) and a second wall (20) which are oppositely arranged, and a third wall (30) and a fourth wall (40) which are oppositely arranged; a movable contact assembly which includes a movable contact bracket (50) being pivotally arranged in the housing and a first movable contact (51) arranged on the movable contact bracket and being able to pivot together with the movable contact bracket; a first stationary contact (61) fixedly arranged in the housing at a side close to the first wall and being able to contact and separate from the first movable contact; a first arc-extinguishing chamber (71) arranged in the housing at a side close to the third wall, and including a plurality of arc-extinguishing grids (80) sequentially arranged from a position close to the first stationary contact to a side of the second wall; the housing is provided with a first exhaust port (110), a second exhaust port (120) and a third exhaust port (130), the first and second exhaust ports are arranged on the first wall, the first exhaust port is closer to the first stationary contact than the second exhaust port, the second exhaust port is arranged between the first exhaust port and the third wall, the third exhaust port is arranged on the second wall and adjacent to an arc-extinguishing grid closest to the second wall in the first arc-extinguishing chamber.

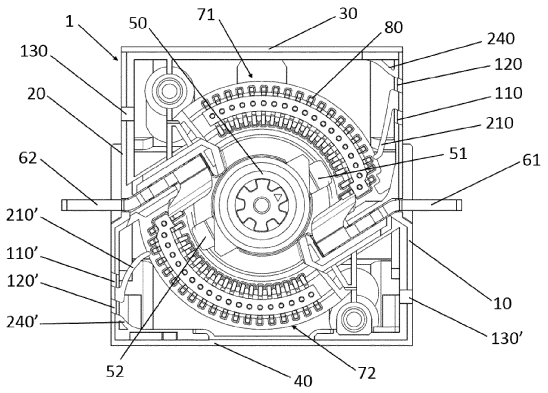

Fig. 1

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to the field of electrical switches, more specifically, relates to an isolating switch for large working voltage, in particular to a DC isolating switch.

BACKGROUND

[0002] In an electrical switch, when the movable contact and the stationary contact are separated, an electric arc will be generated. In order to extinguish the arc as soon as possible, it is needed to let the arc enter an arc-extinguishing chamber composed of a plurality of grids. After the arc enters the grids, the arc is divided into a plurality of short arcs by the grids, so that the arc voltage of the total arc rises sharply to help extinguish the arc.

[0003] In the existing art, the permanent magnet arc-extinguishing method is mainly adopted, and the arc moves towards the arc-extinguishing chamber under the action of the magnetic field of the arc-extinguishing chamber. However, for the DC isolating switch with large working voltage that has appeared in the market at present, the traditional arc-extinguishing chamber structure and arc-extinguishing method have been difficult to meet its performance requirements. In addition, because many parts of the switch are made of plastic, high-temperature gas will be generated under the action of arc, so it is needed to set up airways and exhaust ports reasonably so that the gas can be discharged from the housing of the switch as soon as possible to prevent the high-temperature gas from accumulating in the housing and damaging the parts in the switch.

SUMMARY

[0004] Therefore, the purpose of the present disclosure is to provide an improved isolating switch structure that can at least partially solve the above problems and is expected to enhance the arc extinguishing performance of the arc extinguishing chamber and prolong the electrical life of the isolating switch.

[0005] An isolating switch according to the present disclosure includes: a housing a first wall, a second wall, a third wall and a fourth wall, the first wall and the second wall being arranged opposite to each other, the third wall and the fourth wall being arranged opposite to each other and connecting the first wall to the second wall respectively; a movable contact assembly, including a movable contact bracket and a first movable contact arranged on the movable contact bracket, the movable contact bracket being pivotally arranged in the housing, and the first movable contact being able to pivot together with the movable contact bracket; a first stationary contact, fixedly arranged in the housing at a side close to the first wall and being able to contact and separate from the first movable contact; a first arc-extinguishing chamber, arranged in the housing at a side close to the third wall and including a plurality of arc-extinguishing grids, which are sequentially arranged from a position close to the first stationary contact toward a side of the second wall; the housing is provided with a first exhaust port, a second exhaust port and a third exhaust port, the first exhaust port and the second exhaust port are arranged on the first wall, the first exhaust port is closer to the first stationary contact than the second exhaust port, the second exhaust port is arranged between the first exhaust port and the third wall, and the third exhaust port is arranged on the second wall and adjacent to an arc-extinguishing grid closest to the second wall in the first arc-extinguishing chamber.

[0006] According to a preferable embodiment of the present disclosure, the isolating switch further includes a first airway wall, one end of the first airway wall is adjacent to and aligned with a third or fourth arc-extinguishing grid close to the first stationary contact in the first arc-extinguishing chamber, and the other end of the first airway wall is arranged between the first exhaust port and the second exhaust port.

[0007] According to a preferable embodiment of the present disclosure, the isolating switch further includes a second airway wall, one end of the second airway wall is arranged between the first exhaust port and the second exhaust port, and the other end of the second airway wall extends along a direction towards the third exhaust port and is connected to the third wall, wherein a depression or a through hole is arranged on the second airway wall at a position facing the second exhaust port, so that gas generated in the housing is able to be exhausted from the second exhaust port.

[0008] According to a preferable embodiment of the present disclosure, the isolating switch further includes a third airway wall, one end of the third airway wall is adjacent to an arc-extinguishing grid closest to the second wall in the first arc-extinguishing chamber, and the other end of the third airway wall is adjacent to the third exhaust port.

[0009] According to a preferable embodiment of the present disclosure, the isolating switch further includes a fourth airway wall, one end of the fourth airway wall is arranged on the third wall and adjacent to a position where the second airway wall and the third wall are connected, and the other end of the fourth airway wall is adjacent to the second exhaust port.

[0010] According to a preferable embodiment of the present disclosure, the first airway wall, the second airway wall, the third airway wall and the fourth airway wall form a smooth curve profile.

[0011] According to a preferable embodiment of the present disclosure, the first airway wall and the second airway wall are connected and form a smooth curve profile.

[0012] According to a preferable embodiment of the present disclosure, the plurality of arc-extinguishing grids in the first arc-extinguishing chamber are arranged along

an arc profile.

[0013] According to a preferable embodiment of the present disclosure, an arc-extinguishing grid closest to the first stationary contact among the plurality of arc-extinguishing grids in the first arc-extinguishing chamber is in contact with the first stationary contact.

[0014] According to a preferable embodiment of the present disclosure, an angle between arc-extinguishing grid closest to the first stationary contact among the plurality of arc-extinguishing grids in the first arc-extinguishing chamber and a contact surface of the first stationary contact is in a range of 0-5 degrees.

[0015] According to a preferable embodiment of the present disclosure, the plurality of arc-extinguishing grids in the first arc-extinguishing chamber are divided into a first part close to the first wall and a second part close to the second wall, arc-extinguishing grids of one of the first part and the second part are arranged in a straight line, and arc-extinguishing grids of the other one of the first part and the second part are arranged in an arc profile.

[0016] According to a preferable embodiment of the present disclosure, the isolating switch further includes at least one connection plate extending along an arrangement direction of the plurality of arc-extinguishing grids in the first arc-extinguishing chamber, and the plurality of arc-extinguishing grids in the first arc-extinguishing chamber are vertically fixed to the at least one connection plate.

[0017] According to a preferable embodiment of the present disclosure, the isolating switch further includes: a second movable contact, arranged on the movable contact bracket, the second movable contact being able to pivot together with the movable contact bracket; a second stationary contact, fixedly arranged in the housing at a side close to the second wall and being able to contact and separate from the first movable contact; and a second arc-extinguishing chamber, arranged in the housing at a side close to the fourth wall and including a plurality of arc-extinguishing grids, sequentially arranged from a position close to the second stationary contact toward a side of the first wall, the housing is also provided with a fourth exhaust port, a fifth exhaust port and a sixth exhaust port, the fourth exhaust port and the fifth exhaust port are arranged on the second wall; the fourth exhaust port is closer to the second stationary contact than the fifth exhaust port; the fifth exhaust port is arranged between the fourth exhaust port and the fourth wall; and the sixth exhaust port is arranged on the first wall and adjacent to an arc-extinguishing grid closest to the first wall in the second arc-extinguishing chamber.

[0018] According to a preferable embodiment of the present disclosure, the first stationary contact and the second stationary contact are centrally symmetrical with respect to a rotation axis of the movable contact bracket, the first arc-extinguishing chamber and the second arc-extinguishing chamber are centrally symmetrical with respect to the rotation axis of the movable contact bracket, and a position of the first exhaust port and a position of the fourth exhaust port are centrally symmetrical with respect to the rotation axis of the movable contact bracket, a position of the second exhaust port and a position of the fifth exhaust port are centrally symmetrical with respect to the rotation axis of the movable contact bracket, and a position of the third exhaust port and a position of the sixth exhaust port are centrally symmetrical with respect to the rotation axis of the movable contact bracket.

BRIEF DESCRIPTION OF DRAWINGS

[0019]

Fig. 1 shows a schematic diagram of a first embodiment of an isolating switch according to the present disclosure;

Fig. 2 shows a schematic diagram of a second embodiment of an isolating switch according to the present disclosure;

Fig. 3 shows an example of a structure of an arc-extinguishing chamber according to the present disclosure;

Fig. 4 shows a schematic diagram of a third embodiment of an isolating switch according to the present disclosure;

Fig. 5 shows another example of a structure of an arc-extinguishing chamber according to the present disclosure;

Fig. 6 shows a structure of a transition piece in the arc-extinguishing chamber of Fig. 5.

DETAILED DESCRIPTION

[0020] In order to make the purpose, technical scheme and advantages of the technical scheme of the present disclosure more clear, the technical solution of the embodiment of the present disclosure will be described clearly and completely with the accompanying drawings of the specific embodiment of the present disclosure. Like reference numerals in the drawings represent like parts.

[0021] Unless otherwise defined, technical terms or scientific terms used here shall have their ordinary meanings as understood by people with ordinary skills in the field to which this disclosure belongs. The "first", "second" and similar words used in the description and claims of the present disclosure do not indicate any order, quantity or importance, but are only used to distinguish different components. Similarly, similar words such as "a" or "an" do not necessarily mean quantitative restrictions. Similar words such as "including" or "containing" mean that the elements or objects appearing before the word cover the elements or objects listed after the word and their equivalents, without excluding other elements or objects. Similar words such as "connect" or "connected" are not limited to physical or mechanical connection, but can include electrical connection, whether direct or indirect. "Up", "Down", "Left" and "Right" are only used to indicate the relative positional relationship. When the absolute posi-

tion of the described object changes, the relative positional relationship may also change accordingly.

[0022] Hereinafter, the present disclosure will be described in detail by describing exemplary embodiments.

[0023] Fig. 1 shows a schematic diagram of a first embodiment of an isolating switch according to the present disclosure. As illustrated by the figure, a housing 1 of an isolating switch is roughly square, including a first wall 10, a second wall 20, a third wall 30 and a fourth wall 40, the first wall 10 and the second wall 20 are arranged opposite to each other, the third wall 30 and the fourth wall 40 are arranged opposite to each other and respectively connect the first wall 10 to the second wall 20. A movable contact assembly is arranged at a center position of the housing 1, and includes a movable contact bracket 50, a first movable contact 51 and a second movable contact 52 arranged on the movable contact bracket 50, the movable contact bracket 50 is able to pivot around its center, and the first movable contact 51 and the second movable contact 52 are able to pivot together with the movable contact bracket 50. The isolating switch includes a first stationary contact 61 and a second stationary contact 62, the first stationary contact 61 is arranged at a side of the first wall 10 and the second stationary contact 62 is arranged at a side of the second wall 20. With the pivoting of the movable contact bracket 50, the first movable contact 51 can contact and separate from the first stationary contact 61, the second movable contact 52 can contact and separate from the second stationary contact 62. The isolating switch also includes a first arc-extinguishing chamber 71 and a second arc-extinguishing chamber 72. As can be seen from the figure, the first arc-extinguishing chamber 71 is arranged in the housing 1 at a side close to the third wall 30, a plurality of arc-extinguishing grids 80 included in the first arc-extinguishing chamber 71 are sequentially arranged from a position close to the first stationary contact 61 towards the second wall 20 and arranged substantially in an arc profile. The second arc-extinguishing chamber 72 is arranged in the housing 1 at a side close to the fourth wall 40, the second arc-extinguishing chamber 72 includes a plurality of arc-extinguishing grids 80 sequentially arranged from a position close to the second stationary contact 62 toward the first wall 10, and arranged substantially in an arc profile.

[0024] As illustrated by the figure, the first stationary contact 61 and the second stationary contact 62 are centrally symmetrical with respect to a rotation axis of the movable contact bracket 50, the first arc-extinguishing chamber 71 and the second arc-extinguishing chamber 72 are centrally symmetrical with respect to the rotation axis of the movable contact bracket 50, and the first movable contact 51 and the second movable contact 52 are radially in a straight line with respect to the rotation axis of the movable contact bracket 50. Because the first stationary contact 61 and the second stationary contact 62 are identical in structure and working principle, and the first arc-extinguishing chamber 71 and the second arc-extinguishing chamber 72 are identical in structure and working principle, only the positions in the housing are different, therefore, only the first movable contact 51, the first stationary contact 61 and the first arc-extinguishing chamber 71 and their related structures in the housing 1 will be described in detail below.

[0025] When the movable contact bracket 50 pivots so that the first movable contact 51 and the second movable contact 52 are separated from the first stationary contact 61 and the second stationary contact 62, respectively, an arc will be generated between the movable contacts and the stationary contacts. Fig. 1 shows the moving direction of the arc, which moves towards the arc-extinguishing chamber and is divided into a plurality of short arcs by the arc-extinguishing grids of the arc-extinguishing chamber so as to extinguish the arc.

[0026] Because many parts of the switch are made of plastic and high-temperature gas will be generated under the action of electric arc, the isolating switch according to the present disclosure is provided with a plurality of exhaust ports on the housing 1, so as to facilitate the generated gas to be discharged from the housing 1 and prevent the high-temperature gas from accumulating in the housing and damaging the parts in the switch.

[0027] As illustrated by the first embodiment of the isolating switch according to the present disclosure in Fig. 1, the housing 1 of the isolating switch includes a first exhaust port 110, a second exhaust port 120 and a third exhaust port 130 at a side of the first arc-extinguishing chamber 71. Specifically, the first exhaust port 110 and the second exhaust port 120 are arranged on the first wall 10, the first exhaust port 110 is closer to a position of the first stationary contact 61, the second exhaust port 120 is arranged between the first exhaust port 110 and the third wall 30, and the third exhaust port 130 is arranged on the second wall 20 and adjacent to an arc-extinguishing grid closest to the second wall 20 in the first arc-extinguishing chamber 71, that is, adjacent to an arc-extinguishing grid at the extreme end of the first arc-extinguishing chamber 71.

[0028] In order to guide the generated high-temperature gas from the vicinity of the first arc-extinguishing chamber 71 to three exhaust ports to be discharged from the housing 1, a plurality of airway walls are also arranged in the housing 1 of the isolating switch according to the present disclosure. As illustrated by Fig. 1, one end of a first airway wall 210 is adjacent to and aligned with a third arc-extinguishing grid of the first arc-extinguishing chamber 71 close to the first stationary contact 61, and the other end of the first airway wall 210 is connected to a position between the first exhaust port 110 and the second exhaust port 120 on the first wall 10 of the housing 1. Although not shown in the figure, it is conceivable that one end of the first airway wall 210 may be adjacent to and aligned with a fourth arc-extinguishing grid of the first arc-extinguishing chamber 71, which is close to the first stationary contact 61, according to the number and arrangement of arc-extinguishing grids in different situa-

tions. As a result, the high-temperature gas generated at the first few arc-extinguishing grids in the first arc-extinguishing chamber 71 is discharged from the first exhaust port 110 under the guidance of the first airway wall 210, and the high-temperature gas generated at the arc-extinguishing grids in the middle part of the first arc-extinguishing chamber 71 is discharged from the second exhaust port 120. Because the arc-extinguishing grids 80 of the first arc-extinguishing chamber 71 is arranged along an arc, the arc generated by the separation of the first movable contact 51 and the second movable contact 61 moves along the arc profile of the arc-extinguishing grids 80 towards the second wall 20, and the high-temperature gas generated at the arc-extinguishing grid at the end of the first arc-extinguishing chamber 71 is discharged from the housing 1 through the third exhaust port 130 adjacent to the last arc-extinguishing grid.

[0029] According to the second embodiment of the isolating switch of the present disclosure, as illustrated by Fig. 2, a second airway wall 220 can also be arranged in the housing 1 of the isolating switch. One end of the second airway wall 220 is arranged on the first wall 10 of the housing 1, between the first exhaust port 110 and the second exhaust port 120, and the other end of the second airway wall 220 extends towards the third exhaust port 130 and is connected to the third wall 30. In addition, a depression 221 or a through hole is arranged on the second airway wall 220 at a position facing the second exhaust port 120, so that the gas generated in the housing 1 can be exhausted from the second exhaust port 120. As illustrated by Fig. 2, one end of the third airway wall 230 is adjacent to the arc-extinguishing grid closest to the second wall 20 in the first arc-extinguishing chamber 71, and the other end of the third airway wall 230 is connected to the second wall 20 adjacent to the third exhaust port 130. Under the guidance of the second airway wall 220 and the third airway wall 230, the high-temperature gas generated at the arc-extinguishing grids at the middle part and the end part of the first arc-extinguishing chamber 71 can be discharged from the housing 1 more effectively, thus preventing the parts in the housing 1 from being damaged by high temperature. Preferably, the first airway wall 210 and the second airway wall 220 are integrally connected between the first exhaust port 110 and the second exhaust port 120, so that the first airway wall 210 and the second airway wall 220 cooperate to guide gas. In addition, it can be seen that the third exhaust port 130 in this embodiment is closer to the third wall 30, for example, at the included angle between the second wall 20 and the third wall 30, compared with the embodiment in which the third airway wall 230 is not provided in Fig. 1.

[0030] Optionally, as illustrated by Figs. 1 and 2, a fourth airway wall 240 can be further arranged in the housing 1 of the isolating switch, one end of the fourth airway wall 240 is arranged on the third wall 30, adjacent to a position where the second airway wall 220 and the third wall 30 are connected, and the other end of the fourth airway wall 240 is connected with the first wall 10 and adjacent to the second exhaust port 120. The fourth airway wall 240 can guide the gas passing through the depression 221 of the second airway wall 220 to the second exhaust port 120, and prevent the high-temperature gas from gathering at the corner between the first wall 10 and the third wall 30.

[0031] Preferably, the first airway wall 210, the second airway wall 220, the third airway wall 230 and the fourth airway wall 240, and the joint of the first airway wall 210 and the second airway wall 220 all form a smooth curved contour, so as to avoid the edges and corners on the airway wall from obstructing gas discharge.

[0032] Instead of the embodiment that all arc-extinguishing grids in the same arc-extinguishing chamber are arranged along an arc, the arc-extinguishing grids in the same arc-extinguishing chamber can be divided into two parts, one of the two parts is arranged along an arc profile and the other one of the two parts is arranged along a straight line. For example, as illustrated by the embodiment in Fig. 2, the plurality of arc-extinguishing grids 80 of the first arc-extinguishing chamber 71 are divided into a first part close to the first wall 10 and a second part close to the second wall 20, the arc-extinguishing grids of the first part are arranged in an arc shape, and the arc-extinguishing grids of the second part are arranged along a straight line substantially perpendicular to the second wall 20. Of course, the opposite example can also be envisaged, in which the arc-extinguishing grids of the first part close to the first wall 10 are arranged in a straight line, while the arc-extinguishing grids of the second part close to the second wall 20 are arranged in an arc profile.

[0033] Preferably, as illustrated by Fig. 1 and Fig. 2, the arc-extinguishing grid closest to the first stationary contact 61 among the arc-extinguishing grids 80 in the first arc-extinguishing chamber 71 is in contact with the first stationary contact 61, so as to enhance the guiding effect on the arc generated on the stationary contact. An included angle between the arc-extinguishing grid closest to the first stationary contact 61 and a contact surface of the first stationary contact 61 is preferably in the range of 0 to 5 degrees. In this way, the first arc-extinguishing grid closest to the first stationary contact 61 not only works as an arc-extinguishing grid, but also acts as an arc guide grid, and the material and structure of the first arc-extinguishing grid are consistent with those of other arc-extinguishing grids, so that it is not needed to manufacture the arc guide grid separately, and the production cost of the isolating switch is reduced.

[0034] Preferably, a connection plate can also be provided for the plurality of arc-extinguishing grids of the arc-extinguishing chamber. For example, as illustrated by the close-up of the arc-extinguishing chamber in Fig. 3, a plurality of arc-extinguishing grids 80 are connected between upper and lower connection plates 81 and vertically fixed to the two connection plates 81. The connection plate 81 preferably extends along an arrangement direction of the arc-extinguishing grids 80. The configu-

ration of the connection plate enables the plurality of arc-extinguishing grids 80 to form a module, thereby reducing the manufacturing cost and simplifying the assembly process. Two connection plates 81 are not necessary, and a configuration in which only the upper connection plate or only the lower connection plate exists is conceivable.

[0035] Fig. 4 shows a third embodiment of an isolating switch according to the present disclosure. As can be seen from the figure, a transition piece 83 is also inserted into the plurality of arc-extinguishing grids 80 in the first arc-extinguishing chamber 71, and the transition piece 83 divides the plurality of arc-extinguishing grids 80 into a first group of arc-extinguishing grids close to the first wall 10 and a second group of arc-extinguishing grids close to the second wall 20. The perspective view of the arc-extinguishing chamber in this embodiment is shown in Fig. 5, and the structure of the transition piece 83 is shown in Fig. 6. As can be seen from the figure, the transition piece 83 is generally in the shape of a triangular prism, including a flat first sidewall 831 and a flat second sidewall 832, and an acute angle is formed between the first sidewall 831 and the second sidewall 832. Each arc-extinguishing grid in the first group of arc-extinguishing grids at a side of the first side wall 831 is parallel to the first side wall 831, and each arc-extinguishing grid in the second group of arc-extinguishing grids at a side of the second side wall 832 is parallel to the second side wall 832. In other words, the first group of arc-extinguishing grids and the second group of arc-extinguishing grids are all arranged along a straight line. Particularly, as illustrated by Fig. 4, a gap formed between the arc-extinguishing grids in the first group and the arc-extinguishing grids in the second group faces the rotation center of the movable contact bracket 50. The transition piece 83 actually provides steering between two groups of arc-extinguishing grids arranged in a straight line, and steers the arc moving in a straight line along the arrangement direction of the first group of arc-extinguishing grids to the arrangement direction of the second group of arc-extinguishing grids, so that the arc is more effectively guided in the direction towards the third exhaust port 130.

[0036] Preferably, for the embodiment of the transition piece 83 with a roughly triangular cross section, a first partition wall 310 and a second partition wall 320 are also arranged in the housing 1 of the isolating switch. One end of the first partition wall 310 is adjacent to and approximately flush with a first side wall 831 of the transition piece 83, and the other end of the first partition wall 310 is connected to the third wall 30, and the first partition wall 310 forms a smooth curve profile toward the second exhaust port 120. One end of the second partition wall 320 is adjacent to and approximately flush with a second sidewall 832 of the transition piece 83, and the other end of the second partition wall 320 is connected to the third wall 30, and the second partition wall 320 forms a smooth curve profile in the direction of the third exhaust port 130. In this way, the high-temperature gas generated close to the first group of arc-extinguishing grids is discharged to the second exhaust port 120 under the guidance of the first airway wall 210 and the first partition wall 310, and the high-temperature gas generated close to the second group of arc-extinguishing grids is discharged to the third exhaust port 130 under the guidance of the second partition wall 320 and the third airway wall 230. It should be noted that when the first partition wall 310 and the second partition wall 320 are provided, the gas generated close to the first group of arc-extinguishing grids does not need to be guided to the third exhaust port 130, so there is no need to provide a second airway wall to prevent the high-temperature gas moving to the second exhaust port 120 from being blocked.

[0037] Preferably, in addition to the first group and the second group of arc-extinguishing grids, two arc-extinguishing grids 80a, 80b can be arranged close to the first stationary contact 61. As illustrated by Fig. 4, the first arc-extinguishing grid 80a of the first arc-extinguishing chamber 71 is in contact with the stationary contact 61, and forms an angle between 0 and 5 degrees with the contact surface of the stationary contact 61. The second arc-extinguishing grid 80b is parallel to the first arc-extinguishing grid 80a, but slightly offsets towards the first wall 10. The third arc-extinguishing grid 80c is the first arc-extinguishing grid of the first group of arc-extinguishing grids, is parallel to the second arc-extinguishing grid 80b, but slightly offsets with respect to the second arc-extinguishing grid 80b towards the first wall 10. The arc-extinguishing grids which are offset provide an enhanced arc guiding effect for the arc generated on the stationary contact, so that the arc is guided into the arc-extinguishing chamber and moves along the arrangement direction of the arc-extinguishing grids.

[0038] Similar to the first embodiment and the second embodiment, in the third embodiment of the isolating switch according to the present disclosure, at least one connection plate can be provided for the first group of arc-extinguishing grids and the second group of arc-extinguishing grids respectively, so that the plurality of arc-extinguishing grids 80 form a module. Because the arc-extinguishing grids in each group of the present embodiment are arranged in a straight line, the manufacturing cost is further reduced and the assembly process is simplified.

[0039] As mentioned above, in different configurations, the second arc-extinguishing chamber 72 always keeps central symmetry with the first arc-extinguishing chamber 71 about the rotation axis of the movable contact bracket 50, so the description about the structure of the first arc-extinguishing chamber 71 can also be applied to the second arc-extinguishing chamber 72. In addition, for the second movable contact 52, the second stationary contact 62 and the second arc-extinguishing chamber 72, a fourth exhaust port 110', a fifth exhaust port 120' and a sixth exhaust port 130' are correspondingly provided. The fourth exhaust port 110' and the fifth exhaust port 120' are arranged on the second wall 20, the fourth ex-

haust port 110' is closer to the second stationary contact 62 than the fifth exhaust port 120', and the fifth exhaust port 120' is arranged between the fourth exhaust port 110' and the fourth wall 40. The sixth exhaust port 130' is arranged on the first wall 10 and adjacent to the arc-extinguishing grid closest to the first wall 10 in the second arc-extinguishing chamber 72. The position of the first exhaust port 110 and the position of the fourth exhaust port 110' are centrally symmetrical with respect to the rotation axis of the movable contact bracket 50, the position of the second exhaust port 120 and the position of the fifth exhaust port 120' are centrally symmetrical with respect to the rotation axis of the movable contact bracket 50, and the position of the third exhaust port 130 and the position of the sixth exhaust port 130' are centrally symmetrical with respect to the rotation axis of the movable contact bracket 50.

[0040] Correspondingly, a fifth airway wall 210', a sixth airway wall 220', a seventh airway wall 230' and an eighth airway wall 240' are also arranged in the housing 1 of the isolating switch. The fifth airway wall 210' and the first airway wall 210 are centrally symmetrical with respect to the rotation axis of the movable contact bracket 50, the sixth airway wall 220' and the second airway wall 220 are centrally symmetrical with respect to the rotation axis of the movable contact bracket 50, the seventh airway wall 230' and the third airway wall 230 are centrally symmetrical with respect to the rotation axis of the movable contact bracket 50, and the eighth airway wall 240' and the fourth airway wall 240 are centrally symmetrical with respect to the movable contact bracket 50. In addition, for the embodiment provided with the transition piece 83, a third partition wall 310' and a fourth partition wall 320' are also provided in the housing 1, and the third partition wall 310' and the first partition wall 310 are centrally symmetrical with respect to the rotation axis of the movable contact bracket 50, and the fourth partition wall 320' and the second partition wall 320 are centrally symmetrical with respect to the rotation axis of the movable contact bracket 50.

[0041] These exhaust ports, airway walls and partition walls for the second movable contact 52, the second stationary contact 62 and the second arc-extinguishing chamber 72 are identical in structure and working principle to those for the first movable contact 51, the first stationary contact 61 and the first arc-extinguishing chamber 71, and only differ in relative positions in the housing 1, so they will not be described in detail here.

[0042] In this paper, several exemplary embodiments of the improved isolating switch according to the present disclosure are described in detail with reference to the preferred embodiments. However, those skilled in the art can understand that various variations and modifications can be made to the above specific embodiments without departing from the concept of the present disclosure, and various technical features and structures proposed by the present disclosure can be combined without exceeding the protection scope of the present disclosure, which is determined by the appended claims.

Claims

1. An isolating switch, **characterized in that** the isolating switch comprises:

   a housing comprising a first wall, a second wall, a third wall and a fourth wall, the first wall and the second wall being arranged opposite to each other, the third wall and the fourth wall being arranged opposite to each other and connecting the first wall to the second wall respectively;
   a movable contact assembly comprising a movable contact bracket and a first movable contact arranged on the movable contact bracket, the movable contact bracket being pivotally arranged in the housing, the first movable contact being able to pivot together with the movable contact bracket;
   a first stationary contact fixedly arranged in the housing at a side close to the first wall and being able to contact and separate from the first movable contact;
   a first arc-extinguishing chamber arranged in the housing at a side close to the third wall and comprising a plurality of arc-extinguishing grids, which are sequentially arranged from a position close to the first stationary contact toward a side of the second wall;
   wherein the housing is provided with a first exhaust port, a second exhaust port and a third exhaust port, the first exhaust port and the second exhaust port are arranged on the first wall, the first exhaust port is closer to the first stationary contact than the second exhaust port, the second exhaust port is arranged between the first exhaust port and the third wall, and the third exhaust port is arranged on the second wall and adjacent to an arc-extinguishing grid closest to the second wall in the first arc-extinguishing chamber.

2. The isolating switch according to claim 1, **characterized in that** the isolating switch further comprises a first airway wall, one end of the first airway wall is adjacent to and aligned with a third or fourth arc-extinguishing grid close to the first stationary contact in the first arc-extinguishing chamber, the other end of the first airway wall is arranged between the first exhaust port and the second exhaust port.

3. The isolating switch according to claim 1, **characterized in that** the isolating switch further comprises a second airway wall, one end of the second airway wall is arranged between the first exhaust port and the second exhaust port, the other end of the second

airway wall extends along a direction towards the third exhaust port and is connected to the third wall, wherein a depression or a through hole is arranged on the second airway wall at a position facing the second exhaust port, so that gas generated in the housing is able to be exhausted from the second exhaust port.

4. The isolating switch according to claim 1, **characterized in that** the isolating switch further comprises a third airway wall, one end of the third airway wall is adjacent to an arc-extinguishing grid closest to the second wall in the first arc-extinguishing chamber, and the other end of the third airway wall is adjacent to the third exhaust port.

5. The isolating switch according to claim 3, **characterized in that** the isolating switch further comprises a fourth airway wall, one end of the fourth airway wall is arranged on the third wall and adjacent to a position where the second airway wall and the third wall are connected, the other end of the fourth airway wall is adjacent to the second exhaust port.

6. The isolating switch according to any one of claims 1-5, **characterized in that** the first airway wall, the second airway wall, the third airway wall and the fourth airway wall form a smooth curve profile.

7. The isolating switch according to claim 6, **characterized in that** the first airway wall and the second airway wall are connected and form a smooth curve profile.

8. The isolating switch according to any one of claims 1-5, **characterized in that** the plurality of arc-extinguishing grids in the first arc-extinguishing chamber are arranged along an arc profile.

9. The isolating switch according to any one of claims 1-5, **characterized in that** an arc-extinguishing grid closest to the first stationary contact among the plurality of arc-extinguishing grids in the first arc-extinguishing chamber is in contact with the first stationary contact.

10. The isolating switch according to claim 9, **characterized in that** an angle between arc-extinguishing grid closest to the first stationary contact among the plurality of arc-extinguishing grids in the first arc-extinguishing chamber and a contact surface of the first stationary contact is in a range of 0-5 degrees.

11. The isolating switch according to any one of claims 1-5, **characterized in that** the plurality of arc-extinguishing grids in the first arc-extinguishing chamber are divided into a first part close to the first wall and a second part close to the second wall, arc-extinguishing grids of one of the first part and the second part are arranged in a straight line, and arc-extinguishing grids of the other one of the first part and the second part are arranged in an arc profile.

12. The isolating switch according to claim 1, **characterized in that** the isolating switch further comprises at least one connection plate extending along an arrangement direction of the plurality of arc-extinguishing grids in the first arc-extinguishing chamber, the plurality of arc-extinguishing grids in the first arc-extinguishing chamber are vertically fixed to the at least one connection plate.

13. The isolating switch according to claim 1, **characterized in that** the isolating switch further comprises:

a second movable contact, arranged on the movable contact bracket, the second movable contact being able to pivot together with the movable contact bracket;
a second stationary contact, fixedly arranged in the housing at a side close to the second wall and being able to contact and separate from the first movable contact; and
a second arc-extinguishing chamber, arranged in the housing at a side close to the fourth wall and comprising a plurality of arc-extinguishing grids, sequentially arranged from a position close to the second stationary contact toward a side of the first wall,
wherein the housing is also provided with a fourth exhaust port, a fifth exhaust port and a sixth exhaust port, the fourth exhaust port and the fifth exhaust port are arranged on the second wall; the fourth exhaust port is closer to the second stationary contact than the fifth exhaust port; the fifth exhaust port is arranged between the fourth exhaust port and the fourth wall; and the sixth exhaust port is arranged on the first wall and adjacent to an arc-extinguishing grid closest to the first wall in the second arc-extinguishing chamber.

14. The isolating switch according to claim 13, **characterized in that** the first stationary contact and the second stationary contact are centrally symmetrical with respect to a rotation axis of the movable contact bracket, the first arc-extinguishing chamber and the second arc-extinguishing chamber are centrally symmetrical with respect to the rotation axis of the movable contact bracket, and a position of the first exhaust port and a position of the fourth exhaust port are centrally symmetrical with respect to the rotation axis of the movable contact bracket, a position of the second exhaust port and a position of the fifth exhaust port are centrally symmetrical with respect to the rotation axis of the movable contact bracket, and

a position of the third exhaust port and a position of the sixth exhaust port are centrally symmetrical with respect to the rotation axis of the movable contact bracket.

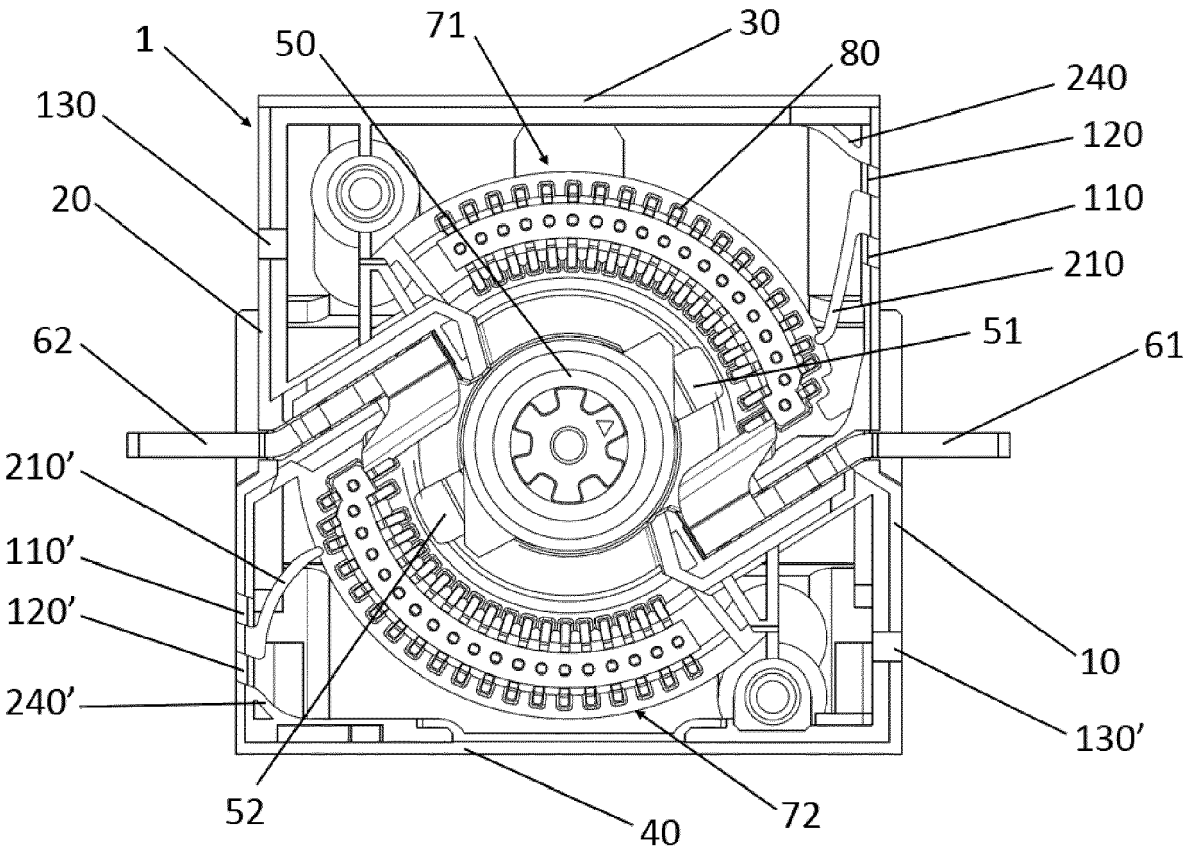
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Fig. 1

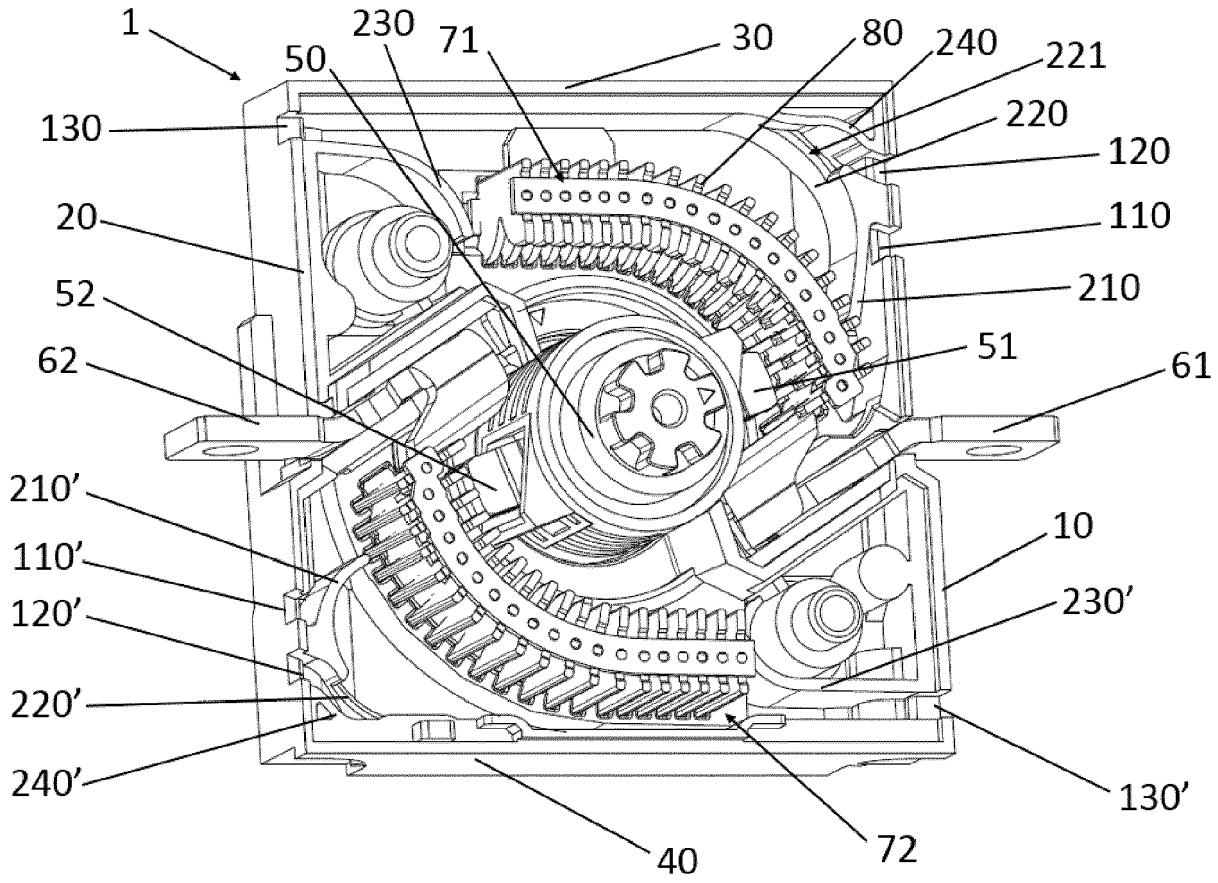
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Fig. 2

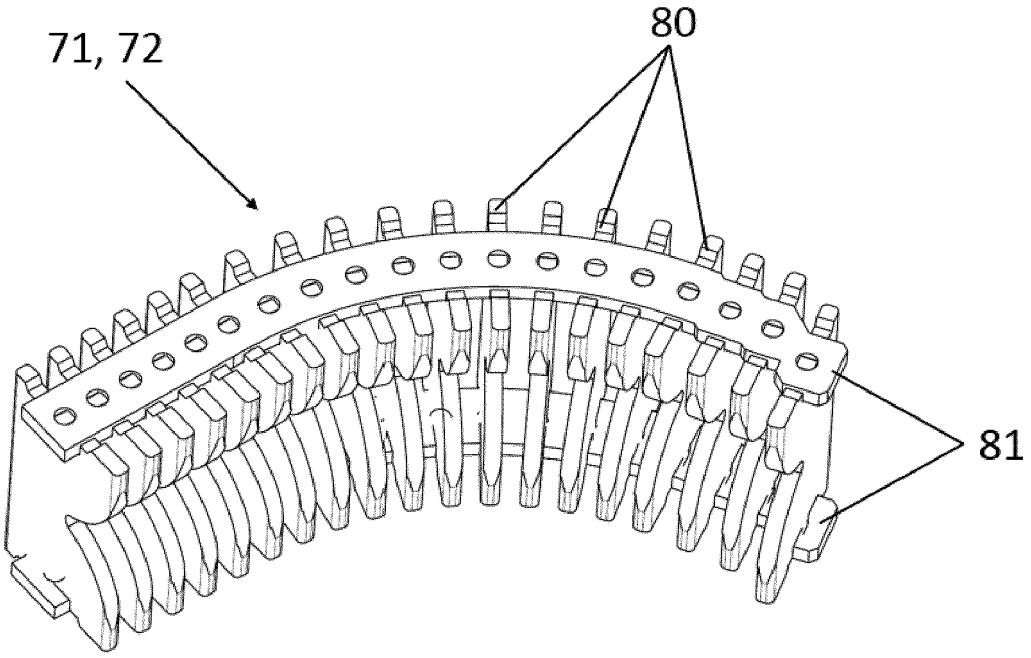

Fig. 3

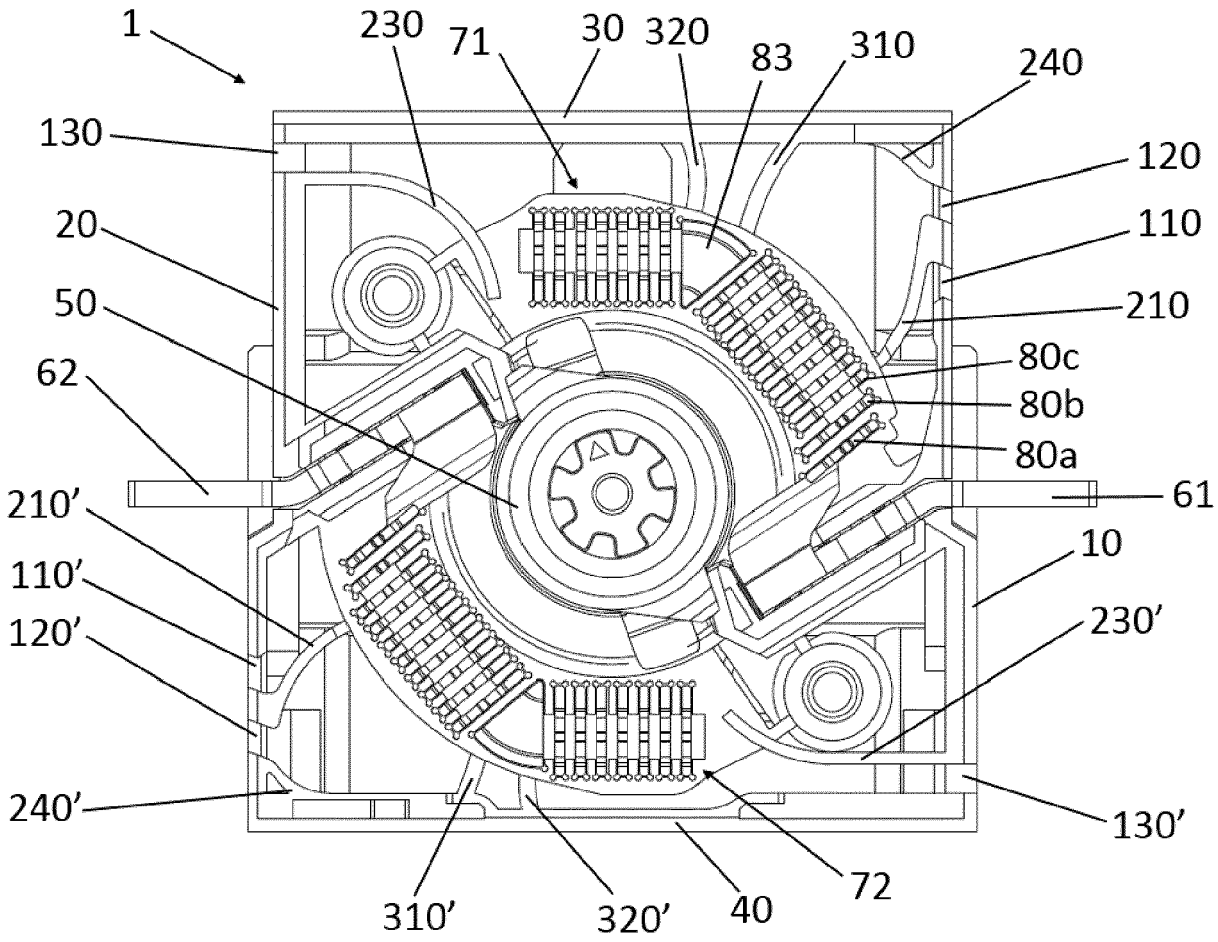
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Fig. 4

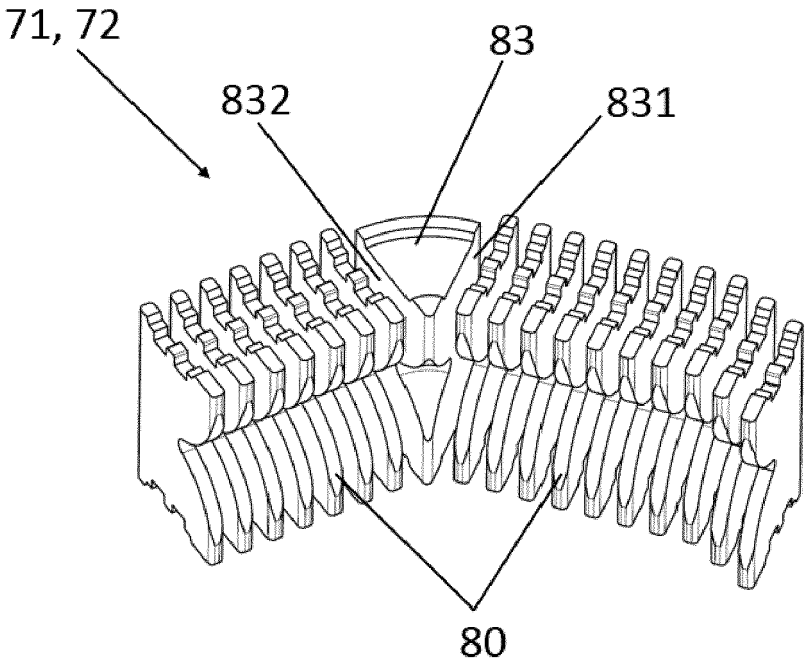

Fig. 5

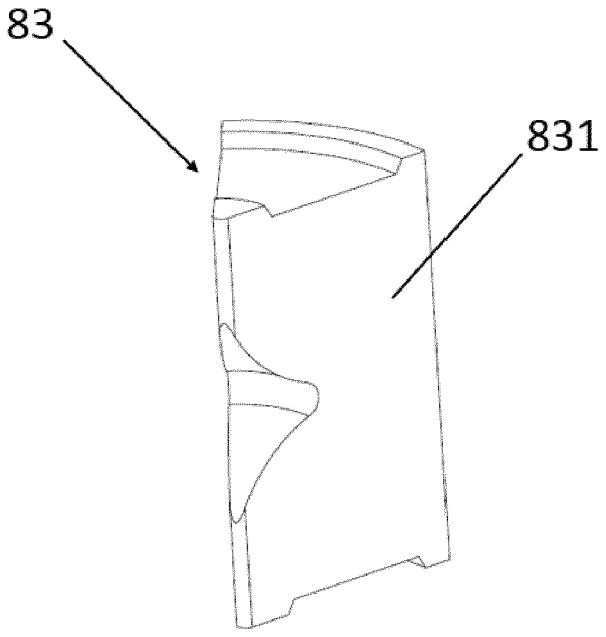

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 24 30 5412

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 11 107 642 B2 (ABB SCHWEIZ AG [CH]) 31 August 2021 (2021-08-31) * column 2, line 40 - column 19, line 25; figures 1-10 *	1-14	INV. H01H9/34 H01H73/18
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A	JP S56 143634 A (MATSUSHITA ELECTRIC WORKS LTD) 9 November 1981 (1981-11-09) * page 177 - page 178; figures 1-5 *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 July 2024	Drabko, Jacek

CATEGORY OF CITED DOCUMENTS

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16-07-2024

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82