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(54) **CIRCUIT-BREAKER AND BAFFLE THEREOF**

(57) A circuit-breaker and a baffle (101) thereof are disclosed. Baffles are provided on both sides of a housing (103) of a circuit-breaker. A baffle on one side is located inside an arc angle (102) of a static contact, and the baffle cuts off a space inside the arc angle of the static contact. The baffles on both sides have a symmetrical structure. The baffle of the present invention can solve the problem that during a process of short-circuit breaking, high-temperature gas returns from a side of the arc angle of the static contact back to a place between a movable contact and the static contact, driving the arc to repeatedly move within an arc channel, resulting in a long breaking time and severe burning of the movable contact and the static contact. The baffle can effectively cut off an airflow and the arc, so that the arc can effectively enter an extinguishing arc chamber for extinguishing. The breaking time is significantly shortened, the breaking effect is better.

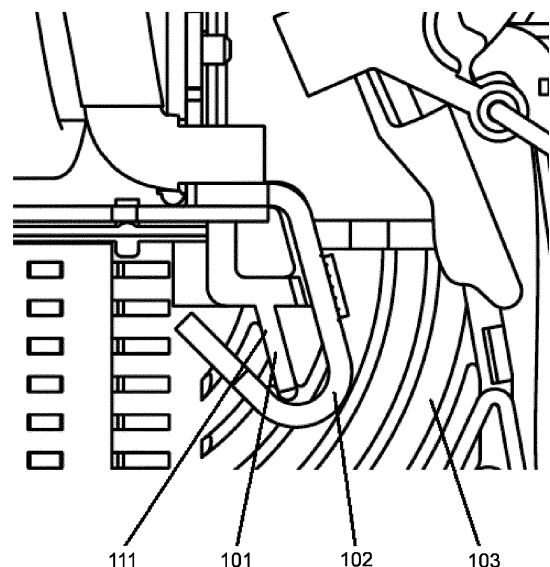


FIG 1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to the field of low voltage electrical apparatus, more particularly, to a baffle for cutting off arcs and airflow in a circuit breaker.

2. The Related Art

[0002] With the development of technology, the volume of circuit breaker products is getting smaller and smaller, but the technical performance indexes are getting higher and higher. As the size of the circuit breaker is reduced, the high-temperature expansion gas generated by an arc during a short circuit breaking process will interfere with the arc in a limited space. The high-temperature expansion gas will prevent the arc from effectively entering into an arc extinguishing chamber, resulting in a longer staying time of the arc outside the arc extinguishing chamber. The long time staying of the arc outside the arc extinguishing chamber, for example, staying in an arc channel will cause a longer breaking time and reduction in performance indexes. The long time staying arc will also cause severe burning of an arcing plate, a movable contact and a static contact.

[0003] Experimental results show that the high-temperature expansion gas will cause arc backflow, making the arc stay outside the arc extinguishing chamber and cannot enter into the arc extinguishing chamber. The arc backflow phenomenon mainly occurs in an arc angle area of the static contact, and the arc backflow phenomenon in this area is particularly serious. Most of the existing circuit breakers do not deal with the arc backflow phenomenon in the arc angle area of the static contact, and thus have the aforementioned problems.

[0004] Chinese patent application CN103123872A discloses a mounting switch with a pre-chamber and guide ribs. The mounting switch comprises a housing, a contact assembly in the pre-chamber, an arc extinguishing chamber, and first and second arc guides. The contact assembly comprises a static contact and a movable contact. The first and second arc guides lead the arc generated at the contact assembly at the time of switching on to the arc extinguishing chamber. The first arc guide is associated with the static contact, wherein the pre-chamber has a plurality of protruding guide ribs on at least one sub-surface inside the housing. The protruding guide ribs are arranged from an area of the contact assembly to an area of the arc extinguishing chamber approximately along the direction of travel of the arc. The pre-chamber has, on at least one sub-surface inside the housing, protruding tabs with an annular closed peripheral contour in the area of the static contact. The protruding tabs are arranged between the guide ribs adjacent to the static contact and the first arc guide, so that a cir-

ulation of gas flowing around the tab may be configured between the guide rib adjacent to the static contact and the first arc guide. The circuit breaker disclosed in CN103123872A considers the phenomenon of arc backflow in the arc angle area of the static contact, and designs a return circulation structure in the static contact and the arc angle area. The circuit breaker of CN103123872A guides the airflow inside the arc angle area, reduces the backflow of the airflow inside the arc angle area, and mitigates the obstruction of the arc entering into the arc extinguishing chamber caused by the airflow in the arc angle area. However, in the area outside the arc angle, the airflow close to the arc angle, especially the airflow just above the arc angle will also have a significant influence on the arc. CN103123872A does not perform any treatment on the airflow outside the arc angle area, so the arc will still stay for a long time as a result of the impact of the airflow in this area.

SUMMARY

[0005] The invention proposes a baffle of a circuit breaker and a circuit breaker utilizing the baffle. The baffle can cut off an airflow inside and outside an arc angle zone of a static contact.

[0006] According to an embodiment of the present invention, a baffle of a circuit-breaker is provided. The baffles are provided on both sides of a housing of the circuit-breaker, wherein the baffle on one side is located inside an arc angle of a static contact, and the baffle cuts off a space inside the arc angle of the static contact.

[0007] According to an embodiment, a first baffle is provided on one side of the housing on which the static contact is located, the first baffle is located inside the arc angle of the static contact, and the first baffle cuts off an arc and/or an airflow. And a second baffle provided on the other side of the housing cuts off an arc and/or an airflow.

[0008] According to an embodiment, at least one of the first baffle and the second baffle is a straight edge baffle, and the straight edge baffle crosses the arc angle of the static contact so as to cut off the space inside the arc angle of the static contact.

[0009] According to an embodiment, at least one of the first baffle and the second baffle is an arc-shaped baffle, and the arc-shaped baffle occupies the arc angle of the static contact so as to cut off the space inside the arc angle of the static contact.

[0010] According to an embodiment of the present invention, a circuit breaker is provided. Baffles are provided on both sides of a housing of the circuit-breaker, wherein the baffle on one side is located inside an arc angle of a static contact, and the baffle cuts off a space inside the arc angle of the static contact. The baffles on both sides have a symmetrical structure.

[0011] According to an embodiment, a first baffle is provided on one side of the housing on which the static contact is located, the first baffle is located inside the arc

angle of the static contact, and the first baffle cuts off an arc and/or an airflow, a second baffle provided on the other side of the housing cuts off an arc and/or an airflow.

[0012] According to an embodiment, at least one of the first baffle and the second baffle is a straight edge baffle, and the straight edge baffle crosses the arc angle of the static contact so as to cut off the space inside the arc angle of the static contact.

[0013] According to an embodiment, at least one of the first baffle and the second baffle is an arc-shaped baffle, and the arc-shaped baffle occupies the arc angle of the static contact so as to cut off the space inside the arc angle of the static contact.

[0014] The baffle of the present invention can solve the problem that during a process of short-circuit breaking, high-temperature gas returns from a side of the arc angle of the static contact back to a place between a movable contact and the static contact, driving the arc to repeatedly move within an arc channel, resulting in a long breaking time and severe burning of the movable contact and the static contact. The baffle can effectively cut off an airflow and the arc, so that the arc can effectively enter an extinguishing arc chamber for extinguishing. The breaking time is significantly shortened, the breaking effect is better.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The above and other features, natures, and advantages of the invention will be apparent by the following description of the embodiments incorporating the drawings, wherein,

FIG. 1 illustrates a structural diagram of a baffle of a circuit breaker according to an embodiment of the present invention.

FIG. 2 illustrates a structural diagram of a baffle of a circuit breaker according to another embodiment of the present invention.

FIG. 3a and FIG. 3b illustrate a structural diagram of a circuit breaker according to an embodiment of the present invention.

FIG. 4a and FIG. 4b illustrate a structural diagram of a circuit breaker according to another embodiment of the present invention.

FIG. 5a and FIG. 5b illustrate a structural diagram of a circuit breaker according to a further embodiment of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

[0016] In order to effectively reduce the obstruction of the arc entering into the arc extinguishing chamber caused by the high-temperature expansion gas generat-

ed by the arc during the short-circuit breaking process, the structure at the arc angle position of the static contact needs to be optimized. Not only the influence of the airflow inside the arc angle area shall be considered, the influence of the airflow outside the arc angle area shall be considered as well. According to the present invention, a baffle is arranged in the arc angle area of the static contact, and the baffle cuts off the space inside the arc angle area. Further, another baffle with a symmetrical structure is arranged on the other side of the housing at a position corresponding to the arc angle area, so that both the airflow inside the arc angle area and outside the arc angle area can be cut off, and the arc backflow phenomenon in the arc angle area can be reduced. The arc can effectively enter into the arc extinguishing chamber for arc extinguishing.

[0017] The circuit breaker is provided with baffles on both sides of a housing of the circuit-breaker, wherein the baffle on one side is located inside an arc angle of a static contact, and the baffle cuts off a space inside the arc angle of the static contact. The baffle may have various shapes that can realize the function of cutting off the space inside the arc angle. The baffle on the other side has a symmetrical structure. Here the term "symmetrical structure" means that the other baffle on the other side is arranged in a symmetrical position, that is, a corresponding position on the other side of the housing and has a corresponding size. Or it may be interpreted as follows: assuming that there is a symmetrical "virtual" static contact on the other side of the housing, the baffle on the other side is located exactly in the arc angle of the "virtual" static contact and cuts off the space inside the arc angle. It should be noticed that, the term "symmetrical" here refers to the corresponding mounting positions and sizes of the baffles, while the shapes of the baffle are not required to be exactly the same.

[0018] FIG. 1 illustrates a structural diagram of a baffle of a circuit breaker according to an embodiment of the present invention. According to the embodiment shown in FIG. 1, the baffle 101 provided on the housing 103 is a straight edge baffle 111. The straight edge baffle 111 crosses the arc angle 102 of the static contact so as to cut off the space inside the arc angle 102 of the static contact. According to the illustrated embodiment, the straight edge baffle 111 longitudinally crosses the arc angle 102 and separates the space within the arc angle 102 into two parts which are separated from each other.

[0019] FIG. 2 illustrates a structural diagram of a baffle of a circuit breaker according to another embodiment of the present invention. According to the embodiment shown in FIG. 2, the baffle 101 provided on the housing 103 is an arc-shaped baffle 112. The arc-shaped baffle 112 occupies the arc angle 102 of the static contact so as to cut off the space inside the arc angle 102 of the static contact. According to the illustrated embodiment, the arc-shaped baffle 112 has a shape that matches the arc angle 102, and the arc-shaped baffle 112 occupies the space inside the arc angle 102.

[0020] Except for the shape of the baffles shown in FIG. 1 and FIG. 2, other shapes may also be used for the baffles. It should be noticed that the baffles may be any shape which can realize the function of cutting off the space inside the arc angle.

[0021] Two baffles, a first baffle and a second baffle are respectively provided on different sides of the housing of the circuit-breaker. The first baffle is provided on the side of the housing on which the static contact is located, and the first baffle is located inside the arc angle of the static contact. The second baffle is provided on the other side of the housing. The first baffle and the second baffle have a symmetrical structure. That is, assuming that there is a symmetrical "virtual" static contact on the other side of the housing, the second baffle is located exactly in the arc angle of the "virtual" static contact and cuts off the space inside the arc angle. The first baffle and the second baffle both have the function of cutting off an arc and/or an airflow.

[0022] The present invention also provides a circuit breaker utilizing the baffle mentioned above. Baffles are provided on both sides of a housing of the circuit-breaker. The baffle on one side is located inside an arc angle of a static contact, and the baffle cuts off a space inside the arc angle of the static contact. The baffles on both sides have a symmetrical structure. The first baffle is provided on the side of the housing on which the static contact is located, and the first baffle is located inside the arc angle of the static contact. The second baffle is provided on the other side of the housing. The first baffle and the second baffle both have the function of cutting off an arc and/or an airflow. Each of the baffles may be a straight edge baffle as shown in FIG. 1, or an arc-shaped baffle as shown in FIG. 2. The baffles also may have other shapes that can realize the function of cutting off the space inside the arc angle.

[0023] FIG. 3a and FIG. 3b illustrate a structural diagram of a circuit breaker according to an embodiment of the present invention. According to the illustrated embodiment, the first baffle and the second baffle provided on different sides of the housing of the circuit breaker have a same shape, and are located at symmetrical positions. Both of the first baffle and the second baffle are straight edge baffles. As shown in FIG. 3a, the first baffle 301 provided on the side of the housing on which the static contact is located is a straight edge baffle, the first baffle 301 cuts off an arc and/or an airflow. Arrows in FIG. 3a show paths of the arc and/or the airflow. As shown in FIG. 3b, the second baffle 302 provided on the other side of the housing is also a straight edge baffle. The second baffle 302 is arranged in a symmetrical position with the first baffle 301. The second baffle 302 cuts off an arc and/or an airflow. Arrows in FIG. 3b show paths of the arc and/or the airflow.

[0024] FIG. 4a and FIG. 4b illustrate a structural diagram of a circuit breaker according to another embodiment of the present invention. According to the illustrated embodiment, the first baffle and the second baffle pro-

vided on different sides of the housing of the circuit breaker have a same shape, and are located at symmetrical positions. The first baffle and the second baffle are both arc-shaped baffles. As shown in FIG. 4a, the first baffle 401 provided on the side of the housing on which the static contact is located is an arc-shaped baffle, the first baffle 301 cuts off an arc and/or an airflow. Arrows in FIG. 4a show paths of the arc and/or the airflow. As shown in FIG. 4b, the second baffle 402 provided on the other side of the housing is also an arc-shaped baffle. The second baffle 402 is arranged in a symmetrical position with the first baffle 401. The second baffle 402 cuts off an arc and/or an airflow. Arrows in FIG. 4b show paths of the arc and/or the airflow.

[0025] The baffles provided on different sides of the housing may have different shapes. FIG. 5a and FIG. 5b illustrate a structural diagram of a circuit breaker according to a further embodiment of the present invention. According to the illustrated embodiment, the first baffle and the second baffle provided on different sides of the housing of the circuit breaker have different shapes, but are located at symmetrical positions and have corresponding sizes. As shown in FIG. 5a, the first baffle 501 provided on the side of the housing on which the static contact is located is a straight edge baffle, the straight edge first baffle 501 cuts off an arc and/or an airflow. Arrows in FIG. 5a show paths of the arc and/or the airflow. As shown in FIG. 5b, the second baffle 502 provided on the other side of the housing is an arc-shaped baffle. The arc-shaped second baffle 502 cuts off an arc and/or an airflow. Arrows in FIG. 5b show paths of the arc and/or the airflow. FIG. 5a and FIG. 5b better explain the meaning of the term "symmetrical structure" of the present invention. The symmetrical structure means that the second baffle on the other side is arranged in a symmetrical position with the first baffle. That is, the second baffle is arranged in a corresponding position on the other side of the housing and has a corresponding size. Or it may be interpreted as follows: assuming that there is a symmetrical "virtual" static contact on the other side of the housing, the second baffle is located exactly in the arc angle of the "virtual" static contact and cuts off the space inside the arc angle. The term "symmetrical" here refers to the corresponding mounting positions and sizes of the baffles, while the shapes of the baffle are not required to be exactly the same.

[0026] The baffle of the present invention can solve the problem that during a process of short-circuit breaking, high-temperature gas returns from a side of the arc angle of the static contact back to a place between a movable contact and the static contact, driving the arc to repeatedly move within an arc channel, resulting in a long breaking time and severe burning of the movable contact and the static contact. The baffle can effectively cut off an airflow and the arc, so that the arc can effectively enter an extinguishing arc chamber for extinguishing. The breaking time is significantly shortened, the breaking effect is better.

[0027] The above embodiments are provided to those skilled in the art to realize or use the invention, under the condition that various modifications or changes being made by those skilled in the art without departing the spirit and principle of the invention, the above embodiments may be modified and changed variously, therefore the protection scope of the invention is not limited by the above embodiments, rather, it should conform to the maximum scope of the innovative features mentioned in the Claims.

Claims

1. A baffle of a circuit-breaker, wherein the baffles are provided on both sides of a housing of the circuit-breaker, wherein the baffle on one side is located inside an arc angle of a static contact, and the baffle cuts off a space inside the arc angle of the static contact. 15
20
2. The baffle of a circuit-breaker according to claim 1, wherein a first baffle is provided on one side of the housing on which the static contact is located, the first baffle is located inside the arc angle of the static contact, and the first baffle cuts off an arc and/or an airflow, a second baffle provided on the other side of the housing cuts off an arc and/or an airflow. 25
3. The baffle of a circuit-breaker according to claim 2, wherein at least one of the first baffle and the second baffle is a straight edge baffle, and the straight edge baffle crosses the arc angle of the static contact so as to cut off the space inside the arc angle of the static contact. 30
35
4. The baffle of a circuit-breaker according to claim 2, wherein at least one of the first baffle and the second baffle is an arc-shaped baffle, and the arc-shaped baffle occupies the arc angle of the static contact so as to cut off the space inside the arc angle of the static contact. 40
5. A circuit breaker, wherein baffles are provided on both sides of a housing of the circuit-breaker, wherein the baffle on one side is located inside an arc angle of a static contact, and the baffle cuts off a space inside the arc angle of the static contact, the baffles on both sides have a symmetrical structure. 45
50
6. The circuit-breaker according to claim 5, wherein a first baffle is provided on one side of the housing on which the static contact is located, the first baffle is located inside the arc angle of the static contact, and the first baffle cuts off an arc and/or an airflow, a second baffle provided on the other side of the housing cuts off an arc and/or an airflow. 55

7. The circuit-breaker according to claim 6, wherein at least one of the first baffle and the second baffle is a straight edge baffle, and the straight edge baffle crosses the arc angle of the static contact so as to cut off the space inside the arc angle of the static contact. 5
8. The circuit-breaker according to claim 6, wherein at least one of the first baffle and the second baffle is an arc-shaped baffle, and the arc-shaped baffle occupies the arc angle of the static contact so as to cut off the space inside the arc angle of the static contact. 10

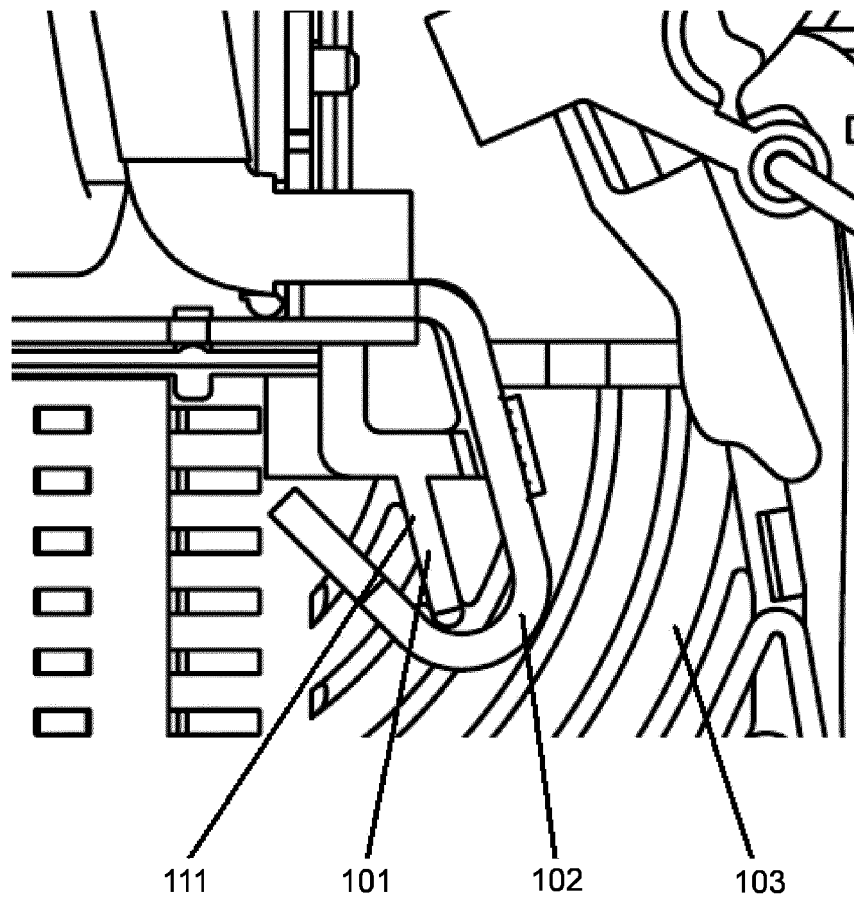


FIG 1

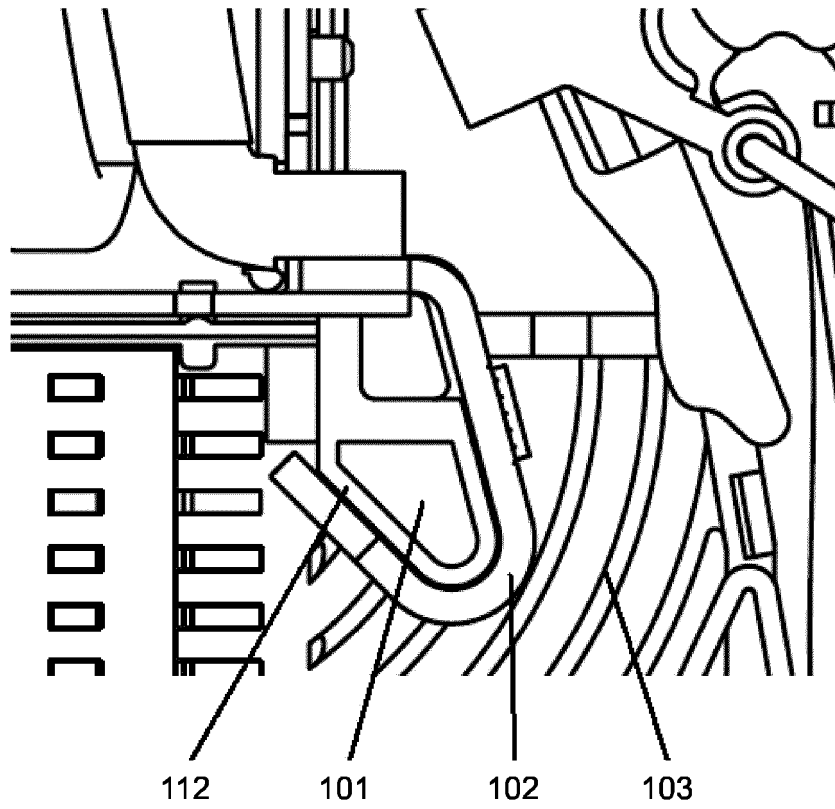


FIG 2

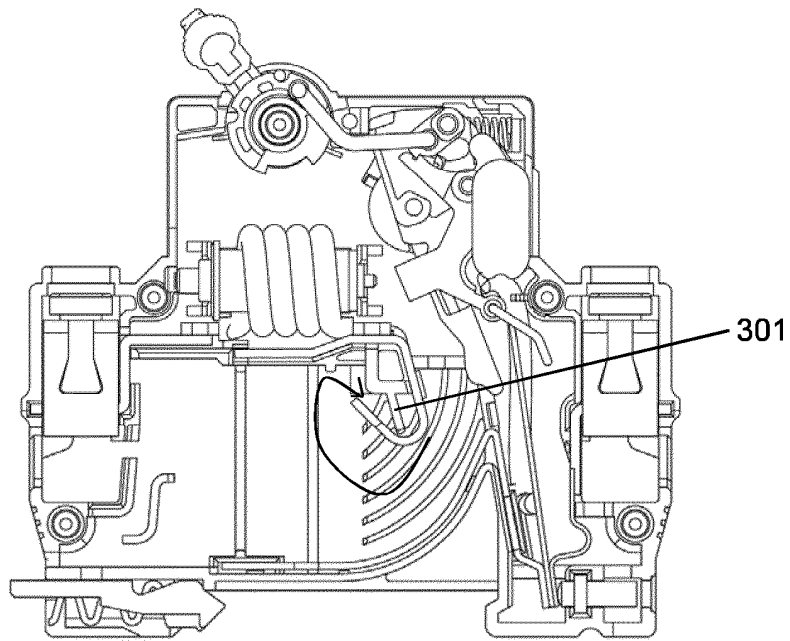


FIG 3a

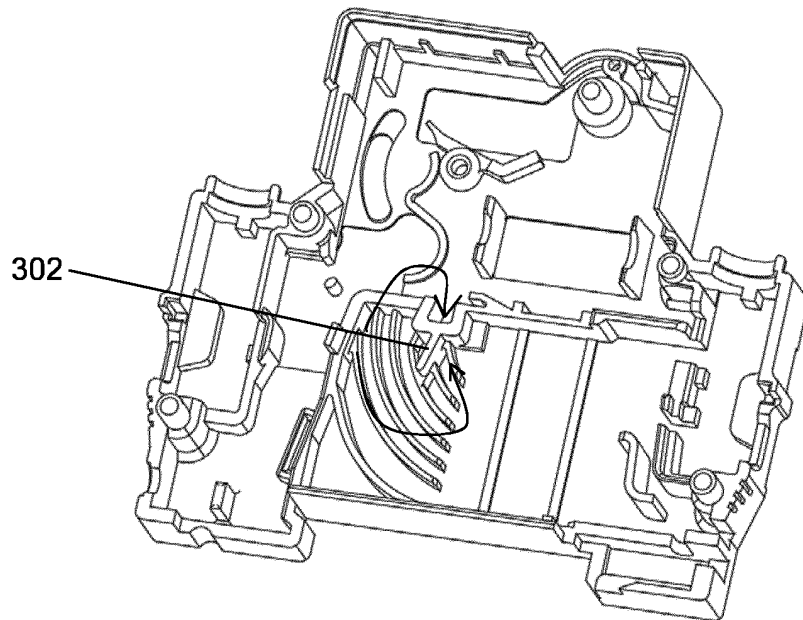


FIG 3b

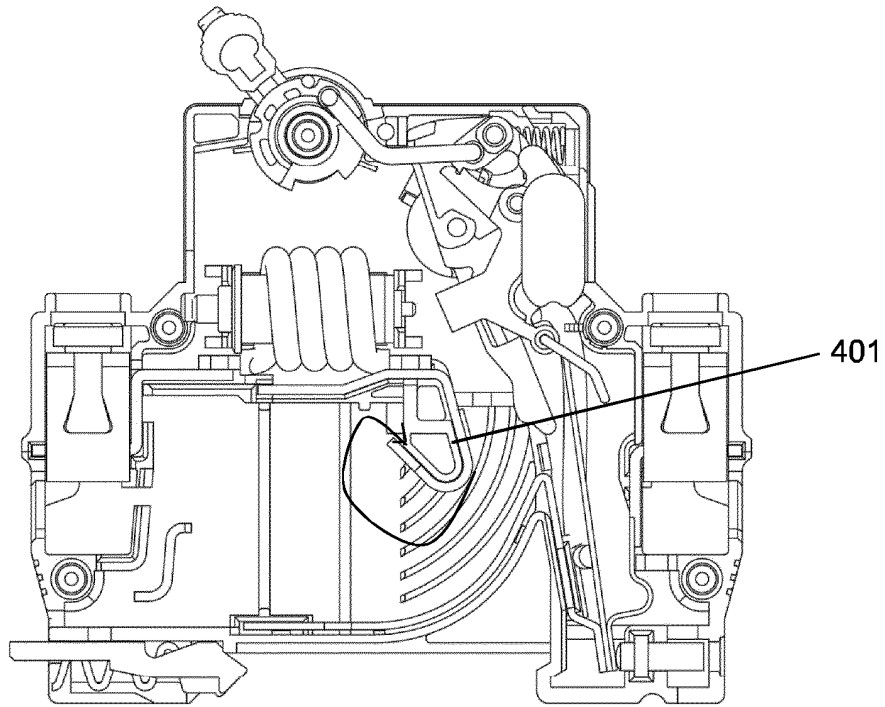


FIG 4a

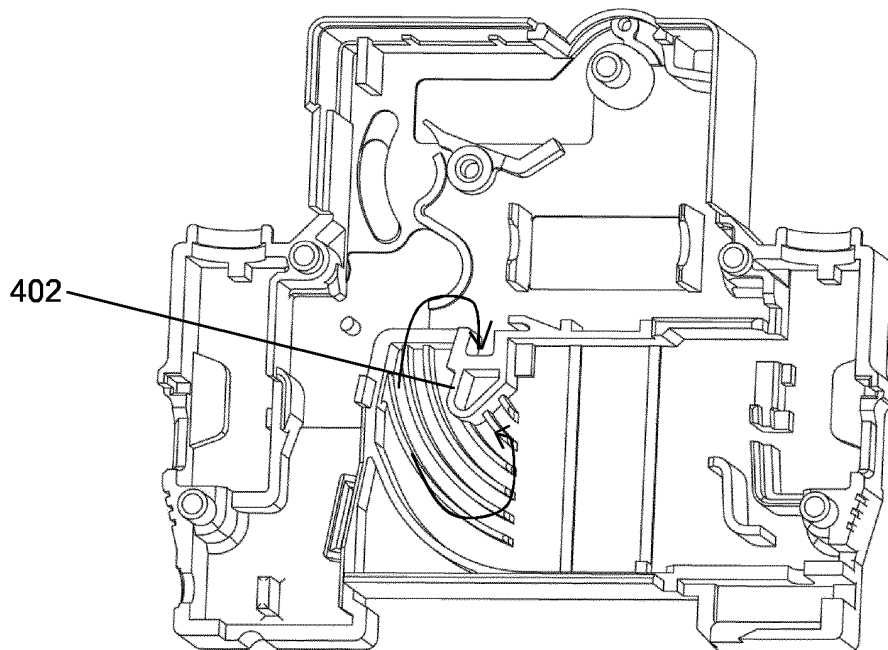


FIG 4b

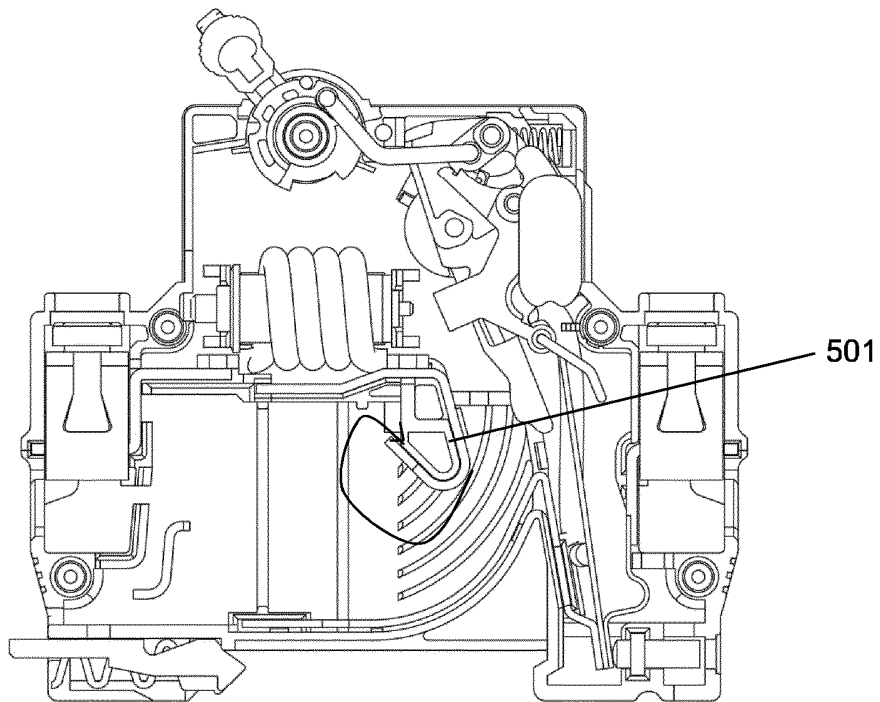


FIG 5a

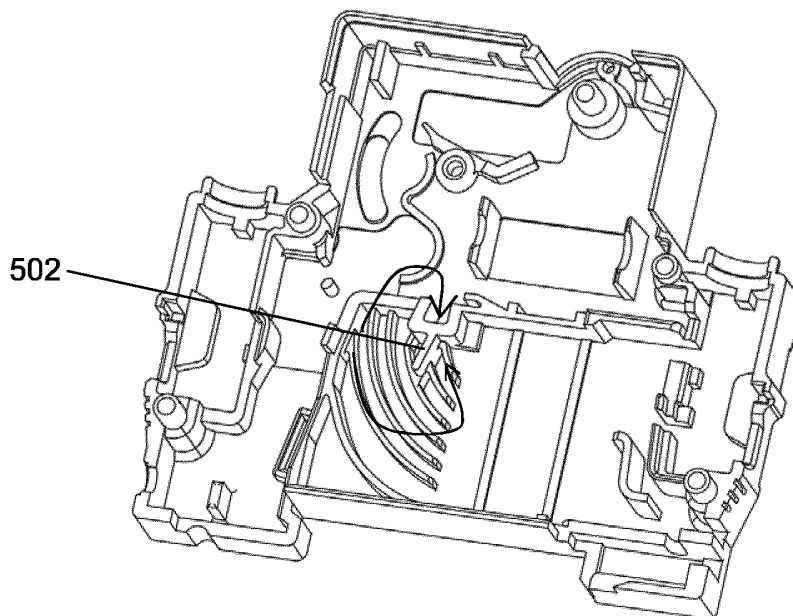


FIG 5b

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/100722

A. CLASSIFICATION OF SUBJECT MATTER

H01H 73/18 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI; EPODOC; CNPAT; CNKI: breaker, static, fixing, contact, arc, angle, U, shape, cut, block, gas, airflow, baffle, plate

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 105185671 A (SHANGHAI SEARI ELECTRICAL APPARATUS TECHNOLOGY CO., LTD. et al.) 23 December 2015 (23.12.2015) description, paragraphs [0021]-[0031], and figure	1-8
PX	CN 205231002 U (SHANGHAI SEARI ELECTRICAL APPARATUS TECHNOLOGY CO., LTD. et al.) 11 May 2016 (11.05.2016) description, paragraphs [0021]-[0031], and figure 1-5b	1-8
X	CN 1758396 A (CHANGSHU SWITCH MFG CO., LTD.) 12 April 2006 (12.04.2006) description, and figures 1-4	1-3, 5-7
Y	CN 1758396 A (CHANGSHU SWITCH MFG CO., LTD.) 12 April 2006 (12.04.2006) description, and figures 1-4	4, 8
Y	CN 103123872 A (ABB 股份公司) 29 May 2013 (29.05.2013) description, paragraphs [0025] and [0036], and figures 1-3	4, 8

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

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	
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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	"&" document member of the same patent family

Date of the actual completion of the international search
20 December 2016Date of mailing of the international search report
04 January 2017Name and mailing address of the ISA
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Haidian District, Beijing 100088, China
Facsimile No. (86-10) 62019451

Authorized officer

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Telephone No. (86-10) 62411773

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/100722

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 200990306 Y (TCL LOW VOLTAGE WUXI ELECTRIC APPLIANCE CO., LTD.) 12 December 2007 (12.12.2007) the whole document	1-8
A	JP 2006286569 A (MITSUBISHI ELECTRIC CORP.) 19 October 2006 (19.10.2006) the whole document	1-8

Form PCT/ISA /210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
 Information on patent family members

 International application No.
 PCT/CN2016/100722

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		IN201201304 12	28 June 2013
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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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