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(54) **GRAPHITE SURGE PROTECTOR**

(57) The present disclosure provides a graphite surge protector, including a tripping apparatus, a graphite gap module, a first indicator plate, a second indicator plate, an indicator bracket, a power arm, and a bearing, where the first indicator plate is disposed on the indicator bracket, the indicator bracket is sleeved on the bearing, the bearing is fixedly connected to one end of the power arm, the other end of the power arm is fixedly connected to the tripping apparatus, and the tripping apparatus is

disposed on a lead terminal of the graphite gap module. When the tripping apparatus trips, the power arm is pushed to rotate around the bearing. When a surge occurs, the tripping apparatus trips, such that the power arm is pushed by the tripping apparatus to rotate around the bearing and drive the bearing to rotate. The bearing drives the indicator bracket to rotate, such that the first indicator plate makes a displacement and no longer overlaps with the second indicator plate.

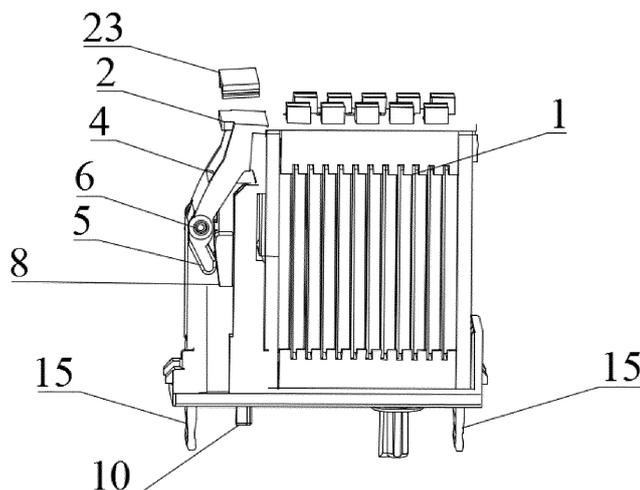


FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present disclosure claims priority to Chinese Patent Application No. 202120042013.0, filed with the China National Intellectual Property Administration (CNIPA) on January 8, 2021, and entitled "GRAPHITE SURGE PROTECTOR", which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to the technical field of surge protectors, and in particular, to a graphite surge protector.

BACKGROUND

[0003] A surge protector, also referred to as a lightning arrester, is an electronic apparatus that provides safety protection for various electronic devices, instruments, meters, and communication lines. When an electrical circuit or a communication line suddenly generates a peak current or voltage due to external interference, the surge protector can be conducted for shunting in a very short time, thereby avoiding damage to other equipment in the circuit caused by a surge. In prior applications, an overheating failure of the surge protector after withstanding the surge is not easily detected by operations and maintenance personnels in a timely manner. As a result, the surge protector cannot withstand a next surge, resulting in a short circuit, which causes a power supply accident and a loss.

SUMMARY

[0004] A technical problem to be resolved in the present disclosure is to provide a graphite surge protector, such that an overheating failure of the surge protector can be detected by operation and maintenance personnel in a timely manner, thereby avoiding a power supply accident and reducing a loss.

[0005] To resolve the above technical problem, the technical solutions adopted by the present disclosure are as follows:

A graphite surge protector is provided, including a tripping apparatus, a graphite gap module, a first indicator plate, a second indicator plate, an indicator bracket, a power arm, and a bearing, where the first indicator plate is disposed on the indicator bracket, the second indicator plate is overlapped under the first indicator plate, the indicator bracket is sleeved on the bearing, the bearing is fixedly connected to one end of the power arm, the other end of the power arm is fixedly connected to the tripping apparatus, and the tripping apparatus is disposed

on a lead terminal of the graphite gap module; and when the tripping apparatus trips, the power arm is pushed to rotate with the indicator bracket, and the first indicator plate no longer overlaps with the second indicator plate.

[0006] Further, the tripping apparatus includes: a metal dome, an alloy temperature sensing body, a sliding member, and a spring;

one end of the metal dome is welded and fixed to the lead terminal of the graphite gap module through the alloy temperature sensing body, and the other end of the metal dome is configured to connect an external live wire, protective wire, or grounding wire; the metal dome is connected to the sliding member in an abutting manner; the sliding member is fixedly connected to one end of the spring, and the other end of the power arm is fixedly connected to the sliding member; and the spring is in a force accumulation state, and the sliding member pushes the metal dome away from the graphite gap module when the spring is reset, and drives the power arm to rotate around the bearing.

[0007] Further, the graphite surge protector further includes a touch rod and a microswitch disposed on an alarm module, where the other end of the spring is fixedly connected to one end of the touch rod, and the other end of the touch rod is connected to a movable contact of the microswitch in the abutting manner.

[0008] Further, the alarm module includes a first printed circuit board and a second printed circuit board, where the microswitch is disposed on the first printed circuit board, the first printed circuit board is electrically connected to the second printed circuit board through a connecting wire, and the second printed circuit board is provided with an external jack.

[0009] Further, the graphite surge protector includes a pin and a socket, where all lead terminals of the graphite gap module are externally connected to the pin and the socket, the pin is connected to the socket in a plug/unplug manner, the socket is provided with an external interface, and different lead terminals of the graphite gap module are respectively connected to a live wire, a neutral wire, and a protective wire through the external interface.

[0010] Further, the socket includes a pin clip, a wire clip, a pin clip terminal, and a wire clip terminal; and the pin is connected to the pin clip in the plug/unplug manner, the wire clip terminal is disposed on the wire clip, the pin clip terminal is disposed on the pin clip, the wire clip terminal is in buckle connection with the pin clip terminal, and the external interface is disposed on the wire clip.

[0011] Further, the graphite surge protector further in-

cludes a connection strip, where the connection strip is clamped and fixed on different wire clips by using screws.

[0012] Further, the graphite surge protector further a transparent window, where the transparent window is disposed in an overlapping direction of the first indicator plate and the second indicator plate.

[0013] Further, all graphite gap modules are graphite multi-gap structures.

[0014] In summary, the present disclosure has following beneficial effects: When a surge occurs, the graphite surge protector triggers the tripping apparatus on the graphite gap module, such that the power arm is pushed by the tripping apparatus to rotate around the bearing and drive the bearing to rotate. The bearing drives the indicator bracket to rotate, such that the first indicator plate makes a displacement and no longer overlaps with the second indicator plate, to form a physical indication. During inspection, operation and maintenance personnel can intuitively determine an overheating failure of the current surge protector based on relative displacement changes of the first and second indicator plates on the surge protector, and take a corresponding measure in a timely manner to avoid a power supply accident and reduce a loss.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] To describe the technical solutions in the embodiments of the present disclosure or in the prior art more clearly, the following briefly describes the drawings required for describing the embodiments or the prior art. Apparently, the drawings in the following description merely show some embodiments of the present disclosure, and those of ordinary skill in the art may still derive other drawings from these drawings without creative efforts.

FIG. 1 is a schematic structural diagram of a graphite surge protector when a related physical knowledge structure is in a normal state according to an embodiment of the present disclosure;

FIG. 2 is a schematic structural diagram of a graphite surge protector when a related physical knowledge structure is triggered according to an embodiment of the present disclosure;

FIG. 3 is a schematic structural diagram of a graphite gap module of a graphite surge protector according to an embodiment of the present disclosure;

FIG. 4 is an explosive view of a graphite gap module of a graphite surge protector according to an embodiment of the present disclosure;

FIG. 5 is a schematic structural diagram of a plug/unplug design of a graphite surge protector according to an embodiment of the present disclosure;

FIG. 6 is an explosive view of a base of a graphite surge protector according to an embodiment of the

present disclosure;

FIG. 7 is a specific schematic structural diagram of a wire clip and other components on a base of a graphite surge protector according to an embodiment of the present disclosure;

FIG. 8 is a specific schematic structural diagram of a microswitch, a first printed circuit board, and other components of a graphite surge protector according to an embodiment of the present disclosure; and

FIG. 9 is a schematic structural diagram of a connection strip of a graphite surge protector according to an embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0016] For detailed description on the technical contents, objectives and effects in the present disclosure, the present disclosure is described below with reference to implementations and accompanying drawings.

[0017] Referring to FIG. 1 to FIG. 9, a graphite surge protector includes a tripping apparatus, graphite gap module 1, first indicator plate 2, second indicator plate 3, indicator bracket 4, power arm 5, and bearing 6.

[0018] The first indicator plate 2 is disposed on the indicator bracket 4. The second indicator plate 3 is overlapped under the first indicator plate 2. The indicator bracket 4 is sleeved on the bearing 6. The bearing 6 is fixedly connected to one end of the power arm, and the other end of the power arm is fixedly connected to the tripping apparatus. The tripping apparatus is disposed on a lead terminal of the graphite gap module 1.

[0019] When the tripping apparatus trips, the power arm is pushed to rotate around the bearing 6, and the first indicator plate 2 no longer overlaps with the second indicator plate 3.

[0020] From the above description, it can be seen that the present disclosure has following beneficial effects: When a surge occurs, the graphite surge protector triggers the tripping apparatus on the graphite gap module 1, such that the power arm is pushed by the tripping apparatus to rotate around the bearing 6 and drive the bearing 6 to rotate. The bearing 6 drives the indicator bracket 4 to rotate, such that the first indicator plate 2 makes a displacement and no longer overlaps with the second indicator plate 3. During inspection, operation and maintenance personnel can intuitively determine an overheating failure of the current surge protector based on relative displacement changes of the first indicator plate 2 and the second indicator plate 3 on the surge protector, and take a corresponding measure in a timely manner to avoid a power supply accident and reduce a loss.

[0021] Further, the tripping apparatus includes: metal dome 7, an alloy temperature sensing body, sliding member 8, and spring 9.

[0022] One end of the metal dome 7 is welded and fixed to the lead terminal of the graphite gap module 1 through the alloy temperature sensing body, and the other end of the metal dome 7 is configured to connect an

external live wire, protective wire, or grounding wire. The metal dome 7 is connected to the sliding member 8 in an abutting manner. The sliding member 8 is fixedly connected to one end of the spring 9, and the other end of the power arm is fixedly connected to the sliding member 8.

[0023] The spring 9 is in a force accumulation state. The sliding member 8 pushes the metal dome 7 away from the graphite gap module 1 when the spring 9 is reset, and drives the power arm to rotate around the bearing 6.

[0024] From the above description, it can be seen that the external live wire, protective wire, or grounding wire is electrically connected to the lead terminal of the graphite gap module 1 through the metal dome 7. The one end of the metal dome 7 is welded onto the lead terminal of the graphite gap module 1 through the alloy temperature sensing body, to form an elastic buckle. The sliding member 8 and the spring 9 in the force accumulation state form an energy storage structure. When the overheating failure occurs, heat from the lead terminal of the graphite gap module 1 is transferred to the alloy temperature sensing body. The alloy temperature sensing body is melted due to an excessively high temperature, causing the metal dome 7 to detach from the lead terminal of the graphite gap module 1. Under elastic force of the metal dome 7 and abutting of the energy storage structure, the metal dome 7 disconnects from the graphite gap module 1, and the surge protector is disconnected from an external circuit to avoid some electrical accidents caused by a subsequent surge after the surge protector fails.

[0025] Further, the graphite surge protector further includes touch rod 10 and microswitch 11 disposed on an alarm module.

[0026] The other end of the spring 9 is fixedly connected to one end of the touch rod 10, and the other end of the touch rod 10 is connected to a movable contact of the microswitch 11 in the abutting manner.

[0027] From the above description, it can be seen that the other end of spring 9 is also connected to the touch rod 10 for pressing against the microswitch 11. When the overheating failure occurs on the surge protector, the spring 9 is reset, and the touch rod 10 is not sufficient to abut the microswitch 11 after losing the force of the spring 9. As a result, the microswitch 11 changes from a normally closed state to a normally open state, thereby triggering the alarm module. A failure alarm is reported.

[0028] Further, the alarm module includes first printed circuit board 12 and second printed circuit board 13.

[0029] The microswitch 11 is disposed on the first printed circuit board 12, the first printed circuit board 12 is electrically connected to the second printed circuit board 13 through a connecting wire, and the second printed circuit board 13 is provided with external jack 14.

[0030] From the above description, it can be seen that when the microswitch 11 changes from the normally closed state to the normally open state, a circuit structure composed of the first printed circuit board 12 and the

second printed circuit board 13 is correspondingly changed, and this change information can be externally transmitted through the external jack 14.

[0031] Further, the graphite surge protector includes pin 15 and socket 16.

[0032] All lead terminals of the graphite gap module 1 are externally connected to the pin 15 and the socket 16, the pin 15 is connected to the socket 16 in a plug/unplug manner, the socket 16 is provided with external interface 17, and different lead terminals of the graphite gap module 1 each are connected to the live wire, a neutral wire, and the protective wire through the external interface 17 separately.

[0033] From the above description, it can be seen that the graphite gap module 1 on the surge protector achieves flexible combination through a plug/unplug design of the pin 15 and the socket 16 to meet different design requirements.

[0034] Further, the socket 16 includes pin clip 18, wire clip 19, pin clip terminal 20, and a terminal of the wire clip 19.

[0035] The pin 15 is connected to the pin clip 18 in the plug/unplug manner, the wire clip terminal 21 is disposed on the wire clip 19, the pin clip terminal 20 is disposed on the pin clip 18, the wire clip terminal 21 is in buckle connection with the pin clip terminal 20, and the external interface 17 is disposed on the wire clip 19.

[0036] From the above description, it can be seen that the pin 15 is connected to the pin clip 18 on the socket 16 in the plug/unplug manner. The external neutral wire, protective wire, and live wire are all fixed to the socket 16 through the wire clip 19.

[0037] Further, the graphite surge protector further includes connection strip 22.

[0038] The connection strip 22 is clamped and fixed on different wire clips 19 by using screws.

[0039] From the above description, it can be seen that the connection strip 22 is configured to connect wire clips 19 on different sockets 16. The connection strip 22 can connect sockets 16 corresponding to different graphite gap modules 1 together, which not only reduces wiring on the surge protector, but also establishes a physical connection between different graphite gap modules 1, increasing overall structural stability of the surge protector.

[0040] Further, the graphite surge protector further includes transparent window 23.

[0041] The transparent window 23 is disposed in an overlapping direction of the first indicator plate 2 and the second indicator plate 3.

[0042] From the above description, it can be seen that the transparent window 23 is convenient for operation and maintenance personnel to observe a change in a relative displacement between the first indicator plate 2 and the second indicator plate 3, to determine whether the surge protector fails.

[0043] Further, all graphite gap modules 1 are graphite multi-gap structures.

[0044] From the above description, it can be seen that the graphite multi-gap structure is designed to perform continuous multi-layer gap discharge, and each layer is insulated from each other, improving discharge capacity and thermal stability of the surge protector.

[0045] Referring to FIG. 1 to FIG. 3, Embodiment 1 of the present disclosure is as follows:

A graphite surge protector includes a tripping apparatus, graphite gap module 1, first indicator plate 2, second indicator plate 3, indicator bracket 4, power arm 5, and bearing 6, as shown in FIG. 1 and FIG. 2. The indicator plate 2 is disposed on the indicator bracket 4. The second indicator plate 3 is overlapped under the first indicator plate 2. The indicator bracket 4 is sleeved on the bearing 6. The bearing 6 is fixedly connected to one end of the power arm, and the other end of the power arm is fixedly connected to the tripping apparatus. The tripping apparatus is disposed on a lead terminal of the graphite gap module 1. When the tripping apparatus trips, the power arm is pushed to rotate around the bearing 6, and the first indicator plate 2 no longer overlaps with second indicator plate 3. In this embodiment, when a surge occurs, the tripping apparatus on the graphite gap module 1 is triggered, such that the power arm is pushed by the tripping apparatus to rotate around the bearing 6 and drive the bearing 6 to rotate. The bearing 6 drives the indicator bracket 4 to rotate, such that the first indicator plate 2 makes a displacement and no longer overlaps with the second indicator plate 3. During inspection, operation and maintenance personnel can intuitively determine an overheating failure of the current surge protector based on relative displacement changes of the first indicator plate 2 and the second indicator plate 3 on the surge protector, and take a corresponding measure in a timely manner to avoid a power supply accident and reduce a loss.

[0046] As shown in FIG. 3, the tripping apparatus includes: metal dome 7, an alloy temperature sensing body, sliding member 8, and spring 9. One end of the metal dome 7 is welded and fixed to the lead terminal of the graphite gap module 1 through the alloy temperature sensing body, and the other end of the metal dome 7 is configured to connect an external live wire, protective wire, or grounding wire. The metal dome 7 is connected to the sliding member 8 in an abutting manner. The sliding member 8 is fixedly connected to one end of the spring 9, and the other end of the power arm is fixedly connected to the sliding member 8. The spring 9 is in a force accumulation state. The sliding member 8 pushes the metal dome 7 away from the graphite gap module 1 when the spring 9 is reset, and drives the power arm to rotate around the bearing 6. The above is a specific structural design of the tripping apparatus, and an actual operating principle of the tripping apparatus is as follows:

One end of the metal dome 7 is welded onto the lead terminal of the graphite gap module 1 through the alloy temperature sensing body, to form an elastic buckle. The sliding member 8 and the spring 9 in the force accumu-

lation state form an energy storage structure. When the overheating failure occurs, heat from the lead terminal of the graphite gap module 1 is transferred to the alloy temperature sensing body. The alloy temperature sensing body is melted due to an excessively high temperature, causing the metal dome 7 to detach from the lead terminal of the graphite gap module 1. Under elastic force of the metal dome 7 and abutting of the energy storage structure, the metal dome 7 disconnects from the graphite gap module 1, and the surge protector is disconnected from an external circuit to realize tripping.

[0047] In this embodiment, the graphite surge protector includes transparent window 23. The transparent window 23 is disposed in an overlapping direction of the first indicator plate 2 and second indicator plate 3. The transparent window 23 is convenient for operation and maintenance personnel to observe a change in a relative displacement between the first indicator plate 2 and the second indicator plate 3, to determine whether the surge protector fails.

[0048] In addition, in this embodiment, the first indicator plate 2 and the second indicator plate may be set to different colors, such as red and green, to indicate normal and failure states of the surge protector.

[0049] Referring to FIG. 4, FIG. 6, and FIG. 8, Embodiment 2 of the present disclosure is as follows:

A graphite surge protector further includes touch rod 10 and microswitch 11 disposed on an alarm module, as shown in FIG. 4 and FIG. 1. The other end of the spring 9 is fixedly connected to one end of the touch rod 10, and the other end of the touch rod 10 is connected to a movable contact of the microswitch 11 in the abutting manner. In this embodiment, the other end of the spring 9 is further connected to the touch rod 10 for pressing against the microswitch 11. When an overheating failure occurs on the surge protector, the spring 9 is reset, and the touch rod 10 is not sufficient to abut the microswitch 11 after losing the force of the spring 9. As a result, the microswitch 11 changes from a normally closed state to a normally open state, thereby triggering the alarm module. A failure alarm is reported.

[0050] In this embodiment, the alarm module includes first printed circuit board 12 and second printed circuit board 13. The microswitch 11 is disposed on the first printed circuit board 12, the first printed circuit board 12 is electrically connected to the second printed circuit board 13 through a connecting wire, and the second printed circuit board 13 is provided with external jack 14.

[0051] Referring to FIG. 5, FIG. 6, FIG. 7, and FIG. 9, Embodiment 3 of the present disclosure is as follows:

A graphite surge protector includes pin 15 and socket 16 based on Embodiment 1 or Embodiment 2, as shown in FIG. 1. The socket 16 includes pin clip 18, wire clip 19, pin clip terminal 20, and wire clip terminal 21.

[0052] As shown in FIG. 5 to FIG. 7, all lead terminals of the graphite gap module 1 are externally connected to the pin 15 and the socket 16, and different lead terminals of the graphite gap module 1 are respectively con-

nected to a live wire, a neutral wire, and a protective wire through the external interface 17. The pin 15 is connected to the pin clip 18 in the plug/unplug manner, the wire clip terminal 21 is disposed on the wire clip 19, the pin clip terminal 20 is disposed on the pin clip 18, the wire clip terminal 21 is in buckle connection with the pin clip terminal 20, and the external interface 17 is disposed on the wire clip 19.

[0053] As shown in FIG. 9, the graphite surge protector further includes connection strip 22. The connection strip 22 is clamped and fixed on different wire clips 19 by using screws.

[0054] In summary, the present disclosure provides the graphite surge protector. When a surge occurs, the graphite surge protector triggers the tripping apparatus on the graphite gap module, such that the power arm is pushed by the tripping apparatus to rotate around the bearing and drive the bearing to rotate. The bearing drives the indicator bracket to rotate, such that the first indicator plate makes a displacement and no longer overlaps with the second indicator plate. During inspection, operation and maintenance personnel can intuitively determine an overheating failure of the current surge protector based on relative displacement changes of the first and second indicator plates on the surge protector, and take a corresponding measure in a timely manner to avoid a power supply accident and reduce a loss. A plug/unplug design between the graphite gap module and the socket makes it flexible and convenient to use the surge protector. In addition, the surge protector is equipped with a failure alarm apparatus to trigger an alarm after the surge protector fails. Based on the transparent window and alarm information, operation and maintenance personnel can determine whether the surge protector fails, and take a corresponding maintenance measure in a timely manner.

[0055] The foregoing are merely embodiments of the present disclosure and do not constitute a limitation on the scope of the patent of the present disclosure. Any equivalent change made by using the description and the accompanying drawings of the present disclosure, or direct or indirect application thereof in related technical fields, shall still fall in the protection scope of the patent of the present disclosure.

[0056] The term "one embodiment", "embodiment" or "one or more embodiments" mentioned herein means that a specific feature, structure, or characteristic described in combination with the embodiment is included in at least one embodiment of the present disclosure. In addition, it should be noted that the phrase example "in an embodiment" herein does not necessarily refer to the same embodiment.

[0057] In the specification provided herein, a large quantity of specific details are described. However, it can be understood that the embodiments of the present disclosure can be practiced without these specific details. In some embodiments, well-known methods, structures and techniques are not shown in detail to avoid obscuring

the understanding of this specification.

Claims

1. A graphite surge protector, comprising a tripping apparatus, a graphite gap module, a first indicator plate, a second indicator plate, an indicator bracket, a power arm, and a bearing, wherein

the first indicator plate is disposed on the indicator bracket, the second indicator plate is overlapped under the first indicator plate, the indicator bracket is sleeved on the bearing, the bearing is fixedly connected to one end of the power arm, the other end of the power arm is fixedly connected to the tripping apparatus, and the tripping apparatus is disposed on a lead terminal of the graphite gap module; and

when the tripping apparatus trips, the power arm is pushed to rotate with the indicator bracket, and the first indicator plate no longer overlaps with the second indicator plate.

2. The graphite surge protector according to claim 1, wherein the tripping apparatus comprises a metal dome, an alloy temperature sensing body, a sliding member, and a spring;

one end of the metal dome is welded and fixed to the lead terminal of the graphite gap module through the alloy temperature sensing body, and the other end of the metal dome is configured to connect an external live wire, protective wire, or grounding wire; the metal dome is connected to the sliding member in an abutting manner; the sliding member is fixedly connected to one end of the spring, and the other end of the power arm is fixedly connected to the sliding member; and

the spring is in a force accumulation state, and the sliding member pushes the metal dome away from the graphite gap module when the spring is reset, and drives the power arm to rotate around the bearing.

3. The graphite surge protector according to claim 2, further comprising a touch rod and a microswitch disposed on an alarm module, wherein the other end of the spring is fixedly connected to one end of the touch rod, and the other end of the touch rod is connected to a movable contact of the microswitch in the abutting manner.

4. The graphite surge protector according to claim 3, wherein the alarm module comprises a first printed circuit board and a second printed circuit board, wherein

the microswitch is disposed on the first printed circuit board, the first printed circuit board is electrically connected to the second printed circuit board through a connecting wire, and the second printed circuit board is provided with an external jack. 5

5. The graphite surge protector according to claim 1, comprising a pin and a socket, wherein all lead terminals of the graphite gap module are externally connected to the pin and the socket, the pin is connected to the socket in a plug/unplug manner, the socket is provided with an external interface, and different lead terminals of the graphite gap module are respectively connected to a live wire, a neutral wire, and a protective wire through the external interface. 10 15

6. The graphite surge protector according to claim 5, wherein the socket comprises a pin clip, a wire clip, a pin clip terminal, and a wire clip terminal; and the pin is connected to the pin clip in the plug/unplug manner, the wire clip terminal is disposed on the wire clip, the pin clip terminal is disposed on the pin clip, the wire clip terminal is in buckle connection with the pin clip terminal, and the external interface is disposed on the wire clip. 20 25

7. The graphite surge protector according to claim 6, further comprising a connection strip, wherein the connection strip is clamped and fixed on different wire clips by using screws. 30

8. The graphite surge protector according to claim 1, further comprising a transparent window, wherein the transparent window is disposed in an overlapping direction of the first indicator plate and the second indicator plate. 35

9. The graphite surge protector according to claim 1, wherein all graphite gap modules are graphite multi-gap structures. 40

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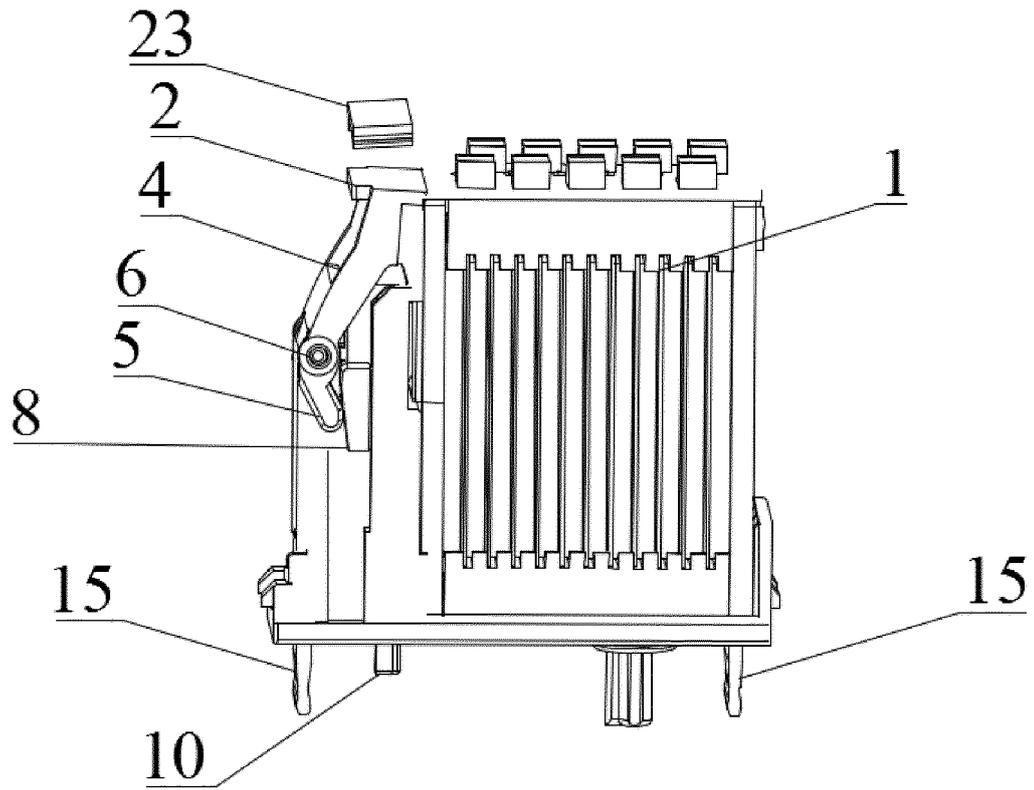


FIG. 1

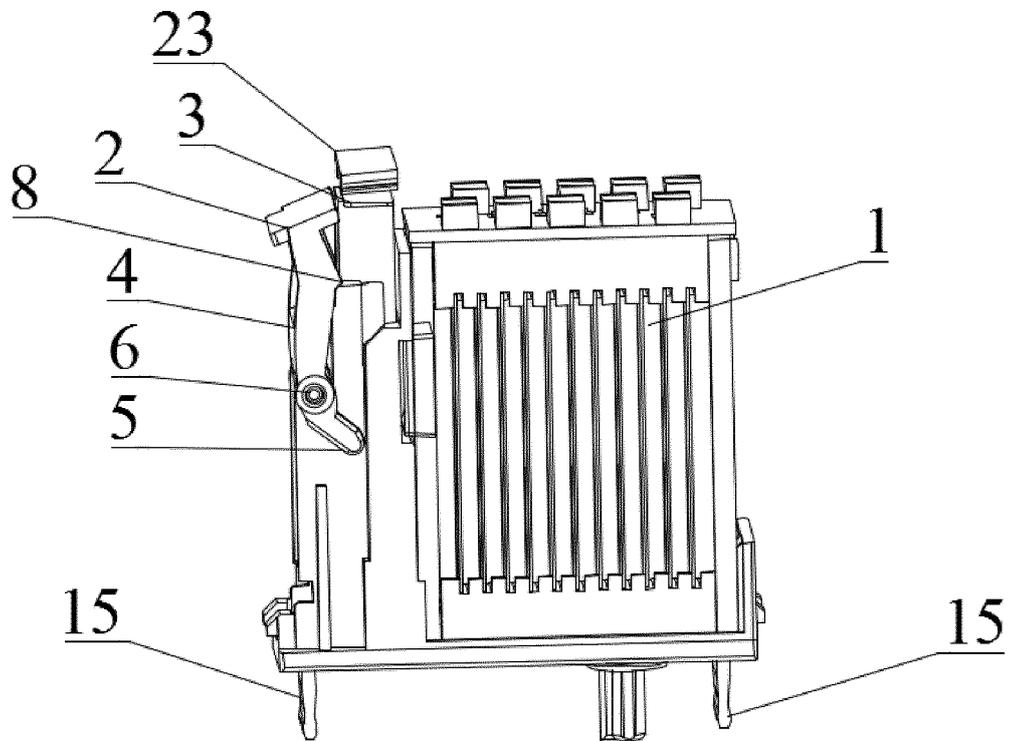


FIG. 2

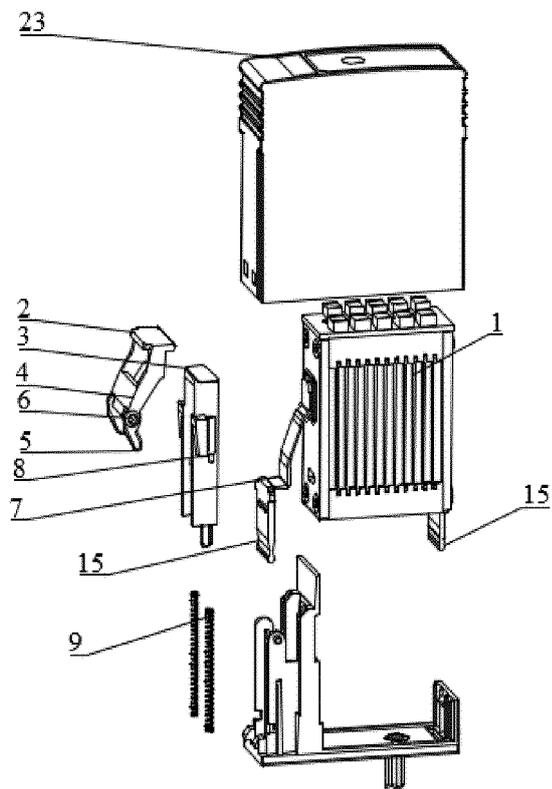


FIG. 3

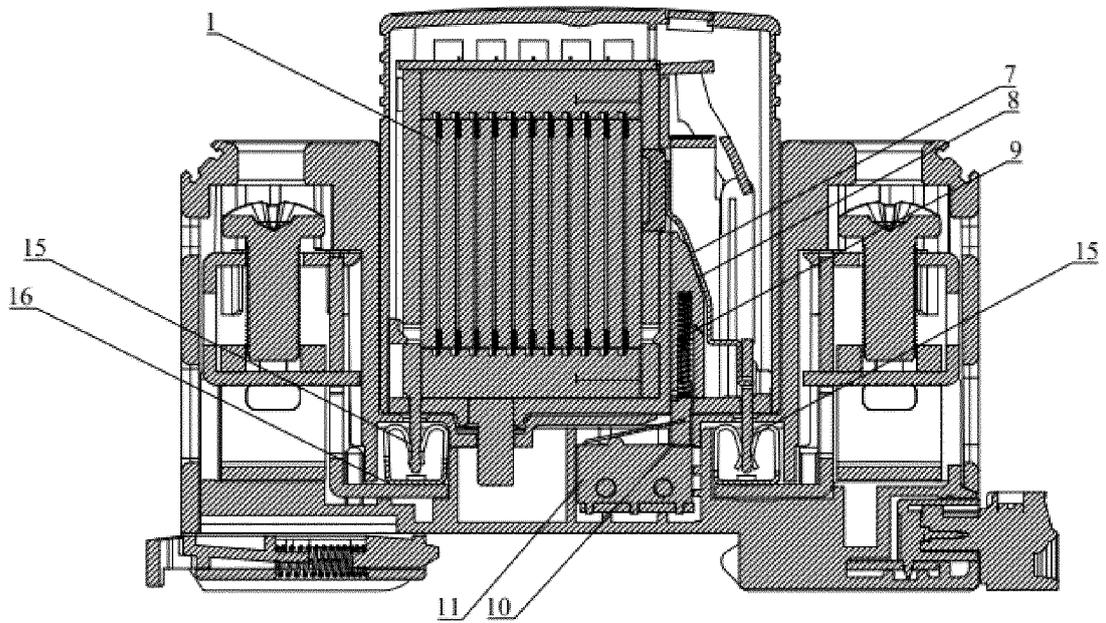


FIG. 4

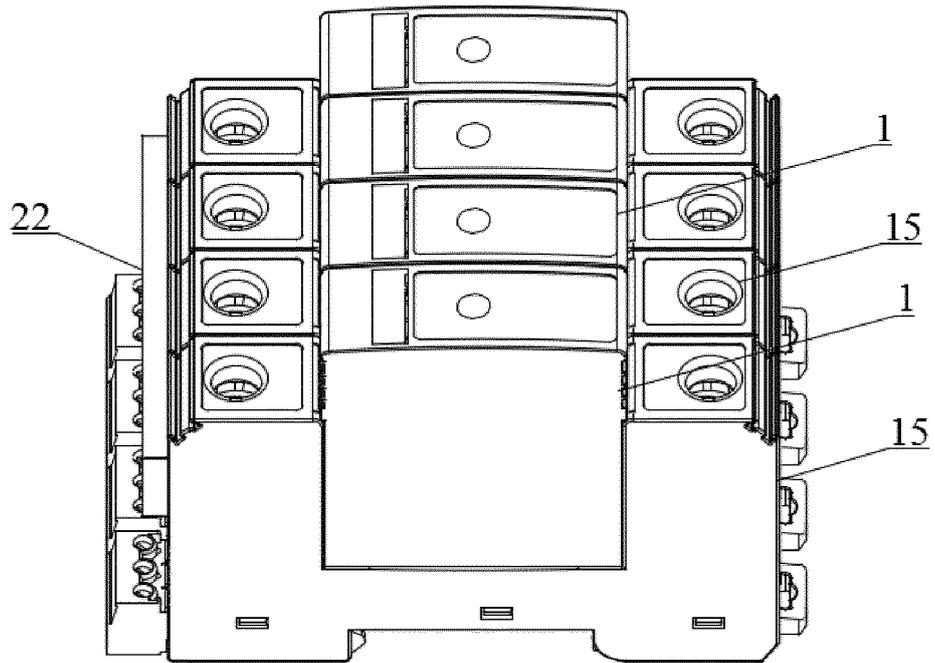


FIG. 5

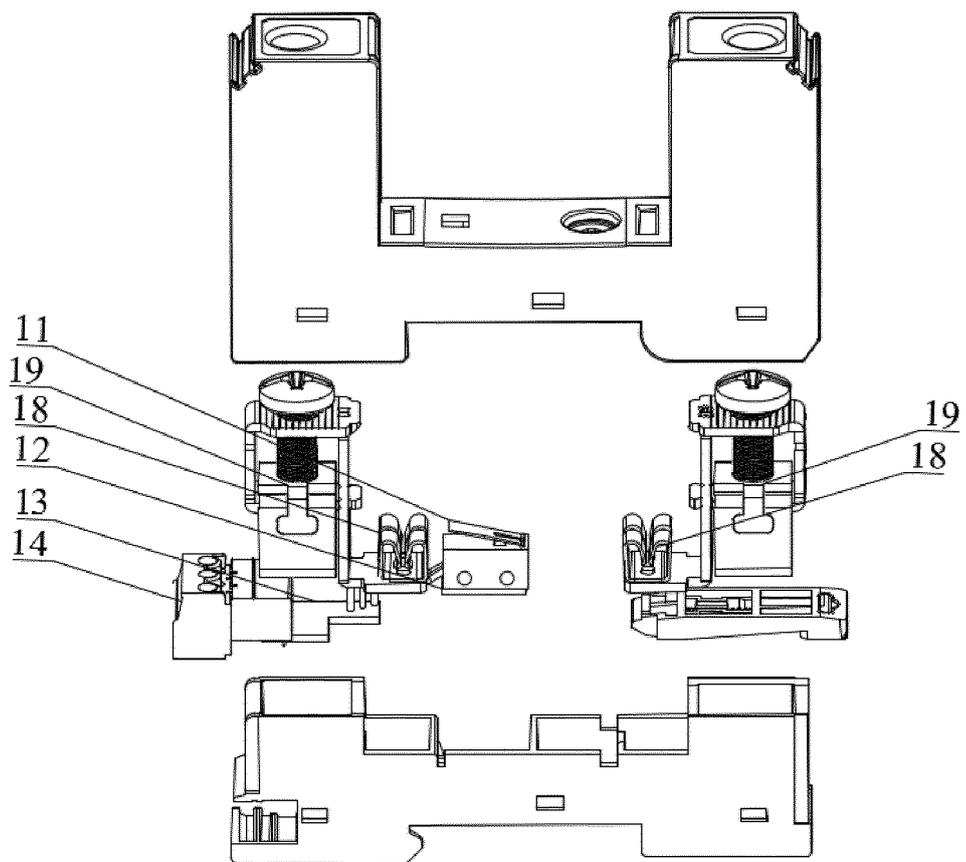


FIG. 6

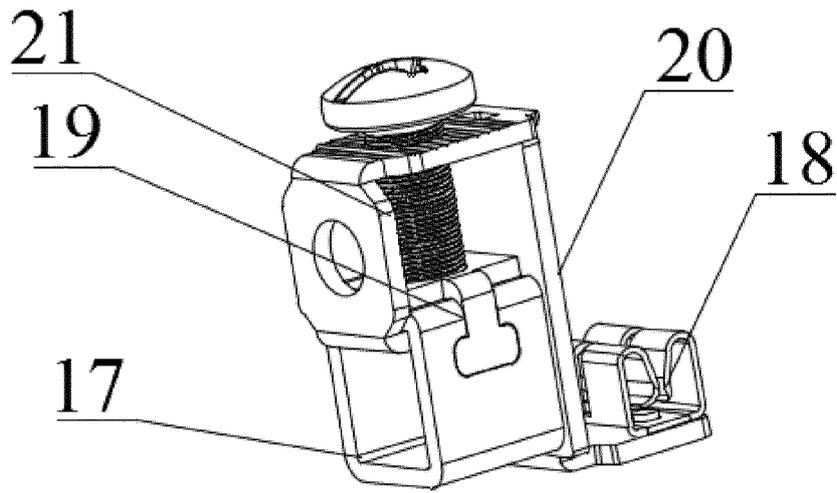


FIG. 7

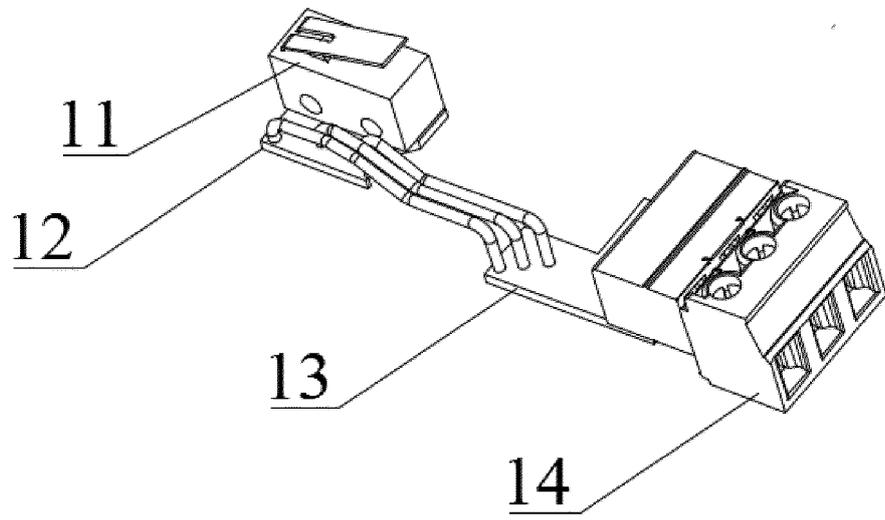


FIG. 8

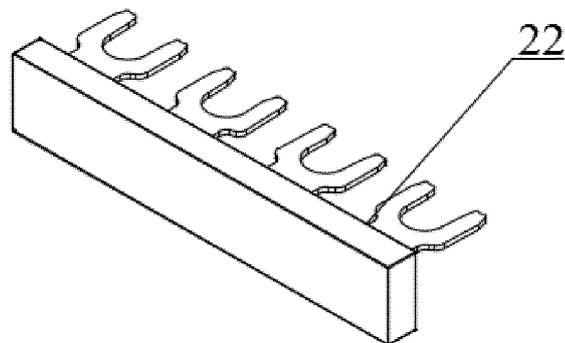


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2021/113580

5	A. CLASSIFICATION OF SUBJECT MATTER H02H 9/04(2006.01)i According to International Patent Classification (IPC) or to both national classification and IPC		
10	B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) H02H Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
15	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) CNABS, CNTXT, CNKI, DWPI, SIPOABS, IEEE: 浪涌, 电涌, 电涌, 保护器, 石墨, 指示, 显示, 视窗, 告警, 报警, surge, protector, plumbago, graphite, indicat+, denote, show, display, alarm		
20	C. DOCUMENTS CONSIDERED TO BE RELEVANT		
25	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
30	Y	CN 206481053 U (XIAMEN HONGFA ELECTRICAL SAFETY & CONTROLS CO., LTD.) 08 September 2017 (2017-09-08) description, paragraphs 35-48 and figures 1-8	1-9
35	Y	CN 212304737 U (ZHONGGUANG LIGHTNING PROTECTION TECHNOLOGIES CO., LTD.) 05 January 2021 (2021-01-05) description, paragraphs 53-78 and figures 1-20	1-9
40	Y	CN 209516625 U (ZHEJIANG X&Z ELECTRIC CO., LTD.; ZHEJIANG TENGEN ELECTRIC CO., LTD.) 18 October 2019 (2019-10-18) description, paragraphs 17-18 and figure 1	3-4
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55	<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
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