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(54) THERMAL FUSE

(57) The present application relates to the field of protectors, particularly to a temperature fuse, which changes the traditional transmission manner of direct contact between a push rod and a temperature-sensing body. After improvements, a spring mechanism is added between the push rod and the temperature-sensing body to realize an indirect transmission between the push rod and the temperature-sensing body. Specifically, the spring mechanism includes springs and a spring column, the springs are sleeved at one end of the spring column, and when the temperature fuse is not triggered, the springs are in the state of compression. The temperature-sensing body abuts the other end of the spring column. One end of a push rod abuts a spring leaf, and the other end of the push rod abuts the end of the side wall of the spring column. The length of the temperature-sensing body in the expansion direction of the springs is greater than or equal to the length of the push rod abutting the spring column in the expansion direction of the springs. When the temperature-sensing body is triggered, a compression force of the springs is released, such that the other end of the push rod is separated from the spring column. Then the spring leaf is separated from the contact point under the action of its elastic force to cut off the circuit. The structure is used to overcome the problem of poor electrode contact caused by the aging of the temperature-sensing body.

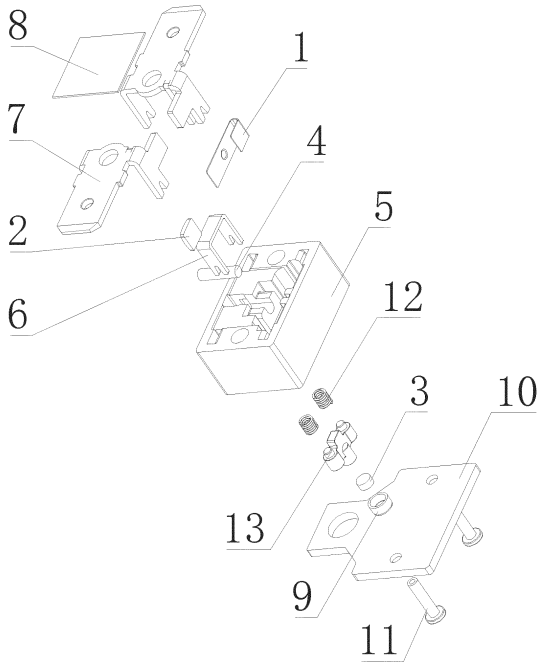

FIG. 6

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Description

CROSS-REFERENCE TO THE RELATED APPLICATIONS

[0001] This application (a temperature fuse) is based upon and claims priority to Chinese Patent Application No. 202122003888.2, filed on August 18, 2021, the entire contents of which are incorporated herein by reference

TECHNICAL FIELD

[0002] The present application relates to the field of protectors, particularly to a temperature fuse.

BACKGROUND

[0003] A temperature fuse is a kind of over-temperature protection component. When the protected electronic equipment has abnormal faults and heating, and the temperature reaches the fusing temperature of the temperature fuse, the fuse will be fused, thus cutting off the circuit. The temperature fuse is composed of a temperature-sensing body, an electrode, a ceramic housing, a push rod, a spring, etc. Usually, this type of product adopts the structure in which the fusible temperature-sensing body is placed at the bottom, and the push rod is placed above to push the spring leaf. The fusible temperature-sensing body melts when working, the push rod loses support, and the spring leaf separates from the electrode to cut off the circuit. The disadvantage of this structure is that the aging and shrinkage of the fusible temperature-sensing body will cause changes in the pressure between the spring leaf and the electrode contact point, resulting in poor contact.

SUMMARY

[0004] The technical problem to be solved by the present application is to provide a temperature fuse, which can effectively solve the problem of the pressure change resulting in poor contact of an electrode contact point caused by the aging of a temperature-sensing body.

[0005] To solve the above technical problems, the technical solutions adopted in the present application are as follows:

A temperature fuse includes a spring leaf and a contact point that is oppositely arranged to each other and further includes a spring mechanism, a temperature-sensing body, and a push rod. The spring mechanism includes springs and a spring column. The springs are sleeved at one end of the spring column, and when the temperature fuse is not triggered, the springs are in a state of compression. The temperature-sensing body abuts the other end of the spring column. One end of the push rod abuts the spring leaf, and the other end of the push rod abuts the end of a side wall of the spring column. The length of the temperature-sensing body in the expansion direction of the springs is greater than or equal to the length of the push rod abutting the spring column in the expansion direction of the springs.

[0006] Further, the spring column includes a seat body, two column bodies respectively arranged at both ends of the seat body on the same side, and a connecting part arranged on the seat body. The connecting part and the column bodies are arranged on the different sides of the seat body, and the springs are sleeved on the column bodies, respectively. The temperature-sensing body abuts the connecting part, and the other end of the push rod abuts a part of the seat body between the two column bodies.

[0007] Further, the temperature fuse includes a housing, two electrode sheets are interval and arranged at one end of the housing, and the two electrode sheets are accordingly electrically connected to the spring leaf and the contact point, respectively.

[0008] Further, a guide plate is arranged in the housing and is arranged at a position corresponding to the push rod.

[0009] Further, a copper cap is arranged in the housing, and the temperature-sensing body is arranged in the copper cap.

[0010] Further, the connecting part, the inner space of the copper cap, and the temperature-sensing body are cylindrical. The outer diameter of the connecting part is equal to the outer diameter of the temperature-sensing body, and the inner diameter of the copper cap is greater than the outer diameter of the connecting part.

[0011] Further, an installation plate is included. The other end of the housing is provided with an opening, the installation plate is fixed on the opening of the housing through the rivets to seal the opening, and the copper cap abuts the inner side wall of the installation plate.

[0012] Further, a cavity is arranged in the housing, and an insulating mica sheet and a resistance wire are arranged in the cavity. The resistance wire is electrically connected to a welding column arranged on the electrode sheet, and the insulating mica sheet is arranged between the resistance wire and the installation plate.

[0013] Further, the material of the housing is ceramic or plastic.

[0014] Further, the material of the push rod is ceramic or plastic.

[0015] The advantages of the present application are as follows:

The temperature fuse provided by the present application changes the traditional transmission manner of direct contact between the push rod and the temperature-sensing body. After improvements, the spring mechanism is added between the push rod and the temperature-sensing body to realize an indirect transmission between the push rod and the temperature-sensing body. Specifically, the spring mechanism includes the springs and the spring column, the springs are sleeved at one end of the spring column, and when the temperature fuse is not triggered, the springs are in a state of compression. The tempera-

ture-sensing body abuts the other end of the spring column. One end of the push rod abuts the spring leaf, and the other end of the push rod abuts the end of the side wall of the spring column. The length of the temperature-sensing body in the expansion direction of the springs is greater than or equal to the length of the push rod abutting the spring column in the expansion direction of the springs. When the temperature-sensing body is triggered, a compression force of the springs is released, such that the other end of the push rod is separated from the spring column. Then the spring leaf is separated from the contact point under the action of its elastic force to cut off the circuit. The structure is used to overcome the problem of poor electrode contact caused by the aging of the temperature-sensing body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

FIG. 1 is a schematic diagram showing the structure of a temperature fuse disclosed by an embodiment of the present application;

FIG. 2 shows a setting manner of a push rod of the temperature fuse disclosed by the embodiment of the present application;

FIG. 3 shows a setting manner of a push rod of another temperature fuse disclosed by the embodiment of the present application;

FIG. 4 is a schematic diagram showing the structure of a temperature fuse disclosed by Embodiment I of the present application;

FIG. 5 is an exploded view of the temperature fuse disclosed by Embodiment I of the present application;

FIG. 6 is an exploded view of a temperature fuse according to Embodiment II of the present application;

FIG. 7 is a cross-section view of the assembled temperature fuse according to Embodiment II of the present application;

FIG. 8 is a schematic diagram showing the partial structure of the temperature fuse according to Embodiment II of the present application;

FIG. 9 is a front view showing a part of the temperature fuse according to Embodiment II of the present application;

FIG. 10 is an exploded view of a temperature fuse according to Embodiment III of the present application; and

FIG. 11 is a cross-section view of the assembled temperature fuse according to Embodiment III of the present application.

[0017] Reference numerals:

1. spring leaf; 2. contact point; 3. temperature-sensing body; 4. push rod; 5. housing; 6. guide plate; 7. electrode sheet;
8. mica sheet; 9. copper cap; 10. installation plate; 11. rivet;
12. spring; 13. spring column; 131. seat body; 132. column body; 133. connecting part;
14. resistance wire; 15. insulating mica sheet.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0018] To explain the technical content, purpose, and effect of the present application in detail, as follows, the embodiments combined with the drawings are used to illustrate the present invention.

[0019] As shown in FIG. 1, which is a schematic diagram showing the structure of a temperature fuse provided by the present application, including electrode sheets, a push rod spring, a push rod, and a spring mechanism. The spring of the push rod spring is sleeved on the push rod.

[0020] As shown in FIGS. 2 and 3, which show the design manners of the push rod in a temperature fuse provided by the present application, respectively. FIG. 2 shows that a guide post has a protrusion to fix an electric bridge to form the push rod, and FIG. 3 shows that a support is welded on the guide post, and a floating spring is placed in the support to fix the electric bridge to form the push rod.

[0021] Referring to FIGS. 4 and 5, Embodiment I of the present application is shown. In this embodiment, FIGS. 4 and 5 show the structural schematic diagram and the exploded view in Embodiment I of the present application, respectively. The temperature fuse of the utility model has two electrode sheets that are respectively riveted on a ceramic housing. Spring leaves and contact points are respectively spot-welded on the two electrode sheets. The guide post 17 is welded together with the support 16. In the support 16, the floating spring 18 presses on the electric bridge 19, such that a floating pressure appears when the electric bridge 19 contacts with the contact points 2. The guide post 17, the support 16, the floating spring 18, and the electric bridge 19 form a whole push rod, and the push rod spring 20 is placed at the front end of the push rod. When the temperature fuse is not triggered, the push rod spring 20 is in a state of compression. A resistance wire is welded on a welding column of the electrode sheet. When the product is used in a circuit with a large rated current, the resistance wire has an arc extinguishing function to prevent the spring leaves from producing an arc when the spring leaves separate from the contact points. The springs are placed in a cavity of the ceramic housing, a temperature-sensing body is placed in a copper cap, and the upper end of the temperature-sensing body supports the spring column. Specifically, the lower end of each of the column bodies of the spring column forms a large gap fit with the copper cap such that the large gap is conducive to the melt and discharge of the temperature-sensing body. The upper end of the spring column supports two springs. An instal-

lation plate is riveted with the ceramic housing to transfer the temperature and involved with the fixation. A cover plate is riveted together with the ceramic housing through rivets and has a dustproof and sealing function.

[0022] As shown in FIGS. 6-9. a temperature fuse provided by the present application includes a spring leaf and a contact point that is oppositely arranged to each other and further includes a spring mechanism, a temperature-sensing body, and a push rod. The spring mechanism includes springs and a spring column, the springs are sleeved at one end of the spring column, and when the temperature fuse is not triggered, the springs are in a state of compression. The temperature-sensing body abuts the other end of the spring column. One end of the push rod abuts the spring leaf, and the other end of the push rod abuts the end of a side wall of the spring column. The length of the temperature-sensing body in the expansion direction of the springs is greater than or equal to the length of the push rod abutting the spring column in the expansion direction of the springs.

[0023] According to the above description, the advantages of the present application are as follows:

The temperature fuse provided by the present application changes the traditional transmission manner of direct contact between the push rod and the temperature-sensing body. After improvements, the spring mechanism is added between the push rod and the temperature-sensing body to realize an indirect transmission between the push rod and the temperature-sensing body. Specifically, the spring mechanism includes the springs and the spring column, the springs are sleeved at one end of the spring column, and when the temperature fuse is not triggered, the springs are in a state of compression. The temperature-sensing body abuts the other end of the spring column. One end of the push rod abuts the spring leaf, and the other end of the push rod abuts the end of the side wall of the spring column. The length of the temperature-sensing body in the expansion direction of the springs is greater than or equal to the length of the push rod abutting the spring column in the expansion direction of the springs. When the temperature-sensing body is triggered, a compression force of the springs is released, such that the other end of the push rod is separated from the spring column. Then the spring leaf is separated from the contact point under the action of its elastic force to cut off the circuit. The structure is used to overcome the problem of poor electrode contact caused by the aging of the temperature-sensing body.

[0024] Further, the spring column includes a seat body, two column bodies arranged at both ends of the seat body on the same side, and a connecting part arranged on the seat body. The connecting part and the column bodies are arranged on the different sides of the seat body, and the springs are sleeved on the column bodies, respectively. The temperature-sensing body abuts the connecting part, and the other end of the push rod abuts a part of the seat body between the two column bodies.

[0025] According to the above description, through the above structure, the indirect transmission between the temperature-sensing body and the push rod is realized.

[0026] Further, the temperature fuse includes a housing, two electrode sheets are interval and arranged at one end of the housing, and the two electrode sheets are accordingly electrically connected to the spring leaf and the contact point, respectively.

[0027] Further, a guide plate is arranged in the housing and is arranged at a position corresponding to the push rod.

[0028] According to the above description, through the above structure, the guide plate is fixed in the housing by means of riveting and is arranged at the position corresponding to the push rod to prevent the push rod from falling off.

[0029] Further, a copper cap is arranged in the housing, and the temperature-sensing body is arranged in the copper cap.

[0030] According to the above description, through the above structure, the temperature-sensing body is limited.

[0031] Further, the connecting part, the inner space of the copper cap, and the temperature-sensing body are cylindrical. The outer diameter of the connecting part is equal to the outer diameter of the temperature-sensing body, and the inner diameter of the copper cap is greater than the outer diameter of the connecting part.

[0032] According to the above description, through the above structure, a large gap fit is formed between the connecting part of the spring column and the copper cap such that the large gap is conducive to the melt and discharge of the temperature-sensing body.

[0033] Further, the housing includes an installation plate. The other end of the housing is provided with an opening, the installation plate is fixed on the opening of the housing through the rivets to seal the opening, and the copper cap abuts the inner side wall of the installation plate.

[0034] According to the above description, through the above structure, the installation plate is riveted on the housing through the rivets to play the role of sealing and limiting the copper cap. In addition, the traditional temperature fuse is configured with resin and other materials for sealing. When the temperature is too high, the sealing material could melt. Thereby, it cannot be used in high-temperature environments. The sealing method with the above structure has the characteristics of high-temperature resistance and can realize the temperature fuse with a high melting point.

[0035] Further, a cavity is arranged in the housing, and an insulating mica sheet and a resistance wire are arranged in the cavity. The resistance wire is electrically connected to a welding column arranged on the electrode sheet, and the insulating mica sheet is arranged between the resistance wire and the installation plate.

[0036] According to the above description, through the above structure, when the product is used in a circuit with a large rated current, the resistance wire has an arc extinguishing function to prevent the spring leaf from pro-

ducing an arc when the spring leaf separates from the contact point.

[0037] Further, the material of the housing is ceramic or plastic.

[0038] Further, the material of the push rod is ceramic or plastic.

[0039] According to the above description, through the above structure, the temperature resistance capacity reaches more than 500°C.

[0040] Referring to FIGS. 6-9, Embodiment II of the present application is shown as follows:

The temperature fuse provided by the present application includes the spring leaf 1, the contact point 2, the spring mechanism, the temperature-sensing body 3, the push rod 4, the housing 5, the guide plate 6, the electrode sheets 7, the mica sheet 8, the copper cap 9, the installation plate 10, and the rivets 11. In this embodiment, the material of the housing is ceramic or plastic. The material of the push rod is ceramic or plastic.

The two opposite ends of the housing 5 are openings, specifically the upper end opening and the lower end opening;

The spring leaf 1, the contact point 2, the spring mechanism, the temperature-sensing body 3, the push rod 4, the guide plate 6, and the copper cap 9 are all arranged in the housing 5. The two electrode sheets 7 are interval and arranged on both sides of the upper end opening, and the mica sheet 8 is arranged on the upper end opening and located between two electrode sheets. The two electrode sheets serve as the two electrical terminals of the product. In this embodiment, the mica sheet is configured to insert into the gap between the electrode sheet and the housing from the side and has a dustproof and sealing function.

[0041] The spring leaf 1 and the contact point 2 are oppositely arranged to each other, and the two electrode sheets are accordingly electrically connected to the spring leaf and the contact point, respectively.

[0042] The spring mechanism includes the springs 12 and the spring column 13. The spring column includes the seat body 131, two column bodies 132 respectively arranged at both ends of the seat body 131 on the same side, and the connecting part 133 arranged on the seat body. The connecting part 133 and the column bodies 132 are arranged on the different sides of the seat body, and the springs 12 are sleeved on the column bodies 132, respectively. The springs 12 are sleeved at one end of the spring column 13, and when the temperature fuse is not triggered, the springs are in a state of compression. The temperature-sensing body 3 abuts the other end of the spring column 13. One end of the push rod 4 abuts the spring leaf 1, and the other end of the push rod 4 abuts the end of the side wall of the spring column 13. The length of the temperature-sensing body 3 in the expansion direction of the springs matches the length of the push rod 4 in the expansion direction of the springs. The temperature-sensing body 3 abuts the connecting part 133, and the other end of the push rod 4 abuts the part of the seat body between the two column bodies.

[0043] The guide plate 6 is arranged in the housing 5 and is arranged at the position corresponding to the push rod. The guide plate is fixed in the housing by means of riveting and is arranged at the position corresponding to the push rod to prevent the push rod from falling off.

[0044] The copper cap 9 is arranged in the housing 5, and the temperature-sensing body 3 is arranged in the copper cap 9. The connecting part 133, the inner space of the copper cap 9, and the temperature-sensing body 3 are cylindrical. The outer diameter of the connecting part is equal to the outer diameter of the temperature-sensing body, and the inner diameter of the copper cap is greater than the outer diameter of the connecting part. The large gap fit is formed between the connecting part of the spring column and the copper cap, and the large gap is conducive to the melt and discharge of the temperature-sensing body.

[0045] The installation plate 10 is fixed on the lower end opening of the housing through the rivets 11 to seal the lower opening, and the copper cap 9 abuts the inner side wall of the installation plate 10.

[0046] Preferably, the housing is ceramic, and the temperature-sensing body adopts a material with a trigger mechanism higher than 300°C. The temperature fuse is further applied to temperatures above 300°C.

[0047] Referring to FIGS. 6-11. Embodiment III of the present application is shown as follows:

The difference from Embodiment II lies in the addition of a resistance wire in the housing. Specifically, a cavity is arranged in the housing, and the insulating mica sheet 15 and the resistance wire 14 are arranged in the cavity. The resistance wire 14 is electrically connected to a welding column arranged on the electrode sheet 7, and the insulating mica sheet 15 is arranged between the resistance wire 14 and the installation plate 10. Through the above structure, when the product is used in a circuit with a large rated current, the resistance wire has an arc extinguishing function to prevent the spring leaf from producing an arc when the spring leaf separates from the contact point.

[0048] In conclusion, the temperature fuse provided by the present application changes the traditional transmission manner of direct contact between the push rod and the temperature-sensing body. After improvements, the spring mechanism is added between the push rod and the temperature-sensing body to realize an indirect transmission between the push rod and the temperature-sensing body. Specifically, the spring mechanism includes the springs and the spring column, the springs are sleeved at one end of the spring column, and when the temperature fuse is not triggered, the springs are in a state of compression. The temperature-sensing body abuts the other end of the spring column. One end of the

push rod abuts the spring leaf, and the other end of the push rod abuts the end of the side wall of the spring column. The length of the temperature-sensing body in the expansion direction of the springs is greater than or equal to the length of the push rod abutting the spring column in the expansion direction of the springs. When the temperature-sensing body is triggered, the compression force of the springs is released, such that the other end of the push rod is separated from the spring column, and then the spring leaf is separated from the contact point under the action of its own elastic force to cut off the circuit. The structure is used to overcome the problem of poor electrode contact caused by aging of the temperature-sensing body and has the advantage of high-temperature resistance.

[0049] The above descriptions are only embodiments of the present application and do not limit the scope of the patent of the present application. All equivalent transformations made by means of the specification and the drawings of the present application, or the direct or indirect usage of the present application in the relevant technical fields shall fall within the scope of patent protection of the present application.

[0050] The terms "an embodiment," "embodiments," or "one or more embodiments" referred to herein mean that particular features, structures, or characteristics described in conjunction with the embodiments are included in at least one embodiment of the present application. In addition, please note that the examples of the term "in an embodiment" here do not necessarily refer to the same embodiment.

[0051] A large number of details are explained in the specification provided here. Whereas, it is understandable that the embodiments of the present application can be practiced without these specific details. In some embodiments, known methods, structures, and techniques are not shown in detail to avoid obscuring the understanding of this specification.

[0052] Finally, it should be noted that the above embodiments are only used to illustrate the technical solutions of the present application, not to restrict the present application. Although the present application is explained in detail with reference to the embodiments mentioned above, those having ordinary skill in the art should understand that they can still modify the technical solutions recorded in the above-mentioned embodiments or make equivalent replacements on partial technical features in the present application. These modifications or replacements do not deviate the nature of the corresponding technical solutions from the ideas and scope of the technical solutions of the embodiments of the present application.

Claims

1. A temperature fuse, comprising a push rod, a push rod spring, a spring mechanism, and a temperature-sensing body; the spring mechanism comprises springs and a spring column, the springs are sleeved at one end of the spring column, and when the temperature fuse is not triggered, the springs are in a state of compression; the temperature-sensing body abuts the other end of the spring column; one end of the push rod abuts the push rod spring, and when the temperature fuse is not triggered, the push rod spring is in the state of compression; the other end of the push rod abuts an end of a side wall of the spring column; and a length of the temperature-sensing body in an expansion direction of the springs is greater than or equal to a length of the push rod abutting the spring column in the expansion direction of the springs.

2. The temperature fuse according to claim 1, wherein the spring column comprises a seat body, two column bodies respectively arranged at both ends of the seat body on a same side, and a connecting part arranged on the seat body; the connecting part and the column bodies are arranged on the different sides of the seat body; the springs are sleeved on the column bodies; the temperature-sensing body abuts the connecting part; and the other end of the push rod abuts a part of the seat body between the two column bodies.

3. The temperature fuse according to claim 2, wherein the temperature fuse further comprises a housing, two electrode sheets are interval and arranged at one end of the housing, and the two electrode sheets are accordingly electrically connected to a spring leaf and a contact point, respectively.

4. The temperature fuse according to claim 3, wherein a guide plate is arranged in the housing and is arranged at a position corresponding to the push rod.

5. The temperature fuse according to claim 3, wherein a copper cap is arranged in the housing, and the temperature-sensing body is arranged in the copper cap.

6. The temperature fuse according to claim 5, wherein the connecting part, an inner space of the copper cap, and the temperature-sensing body are cylindrical; and an outer diameter of the connecting part is equal to an outer diameter of the temperature-sensing body, and an inner diameter of the copper cap is greater than the outer diameter of the connecting part.

7. The temperature fuse according to claim 5, wherein the housing further comprises an installation plate; the other end of the housing is provided with an opening; the installation plate is fixed on the opening of the housing through rivets to seal the opening; and

the copper cap abuts an inner side wall of the installation plate.

8. The temperature fuse according to claim 7, wherein a cavity is arranged in the housing; an insulating mica sheet and a resistance wire are arranged in the cavity; the resistance wire is electrically connected to a welding column arranged on the electrode sheet; and the insulating mica sheet is arranged between the resistance wire and the installation plate.

9. The temperature fuse according to claim 3, wherein a material of the housing is ceramic or plastic.

10. The temperature fuse according to claim 1, wherein a material of the push rod is ceramic or plastic.

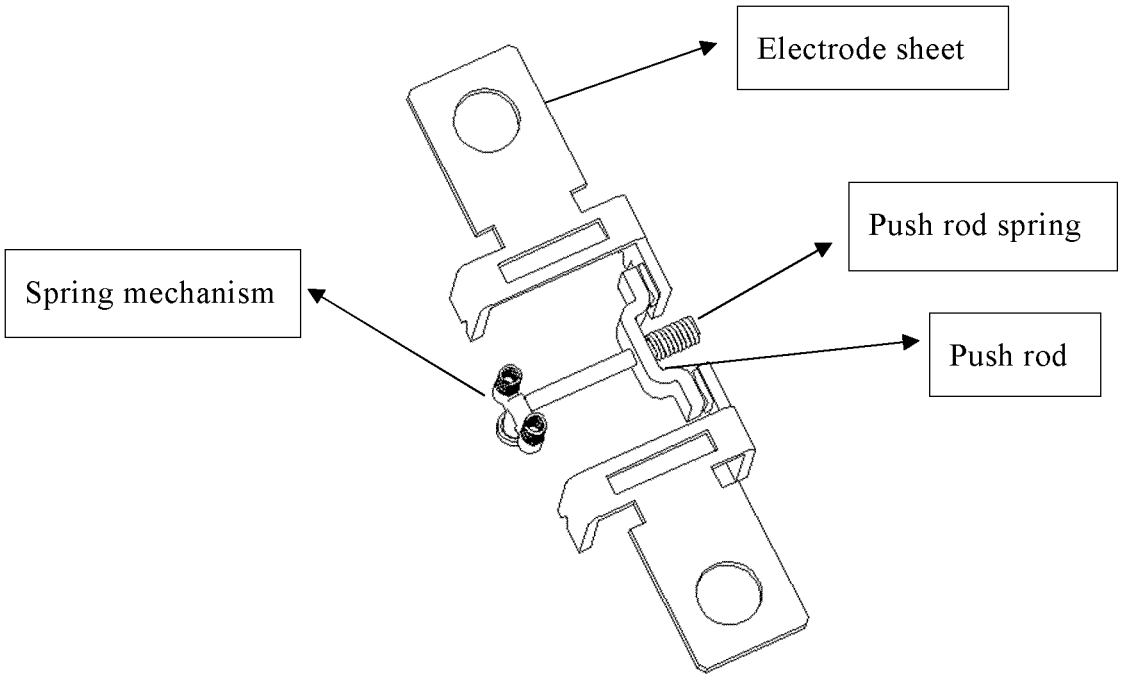
Electrode sheet
Push rod spring
Spring mechanism
Push rod

FIG. 1

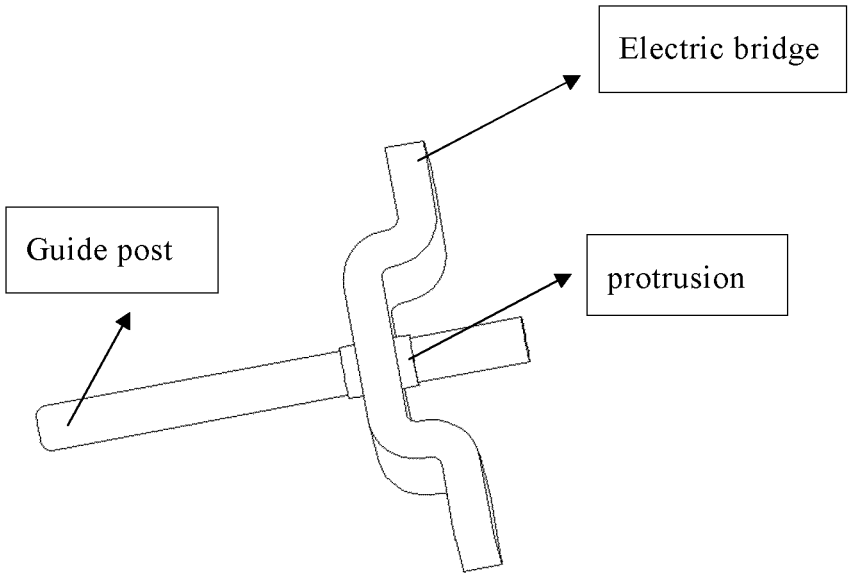
Electric bridge
Guide post
protrusion

FIG. 2

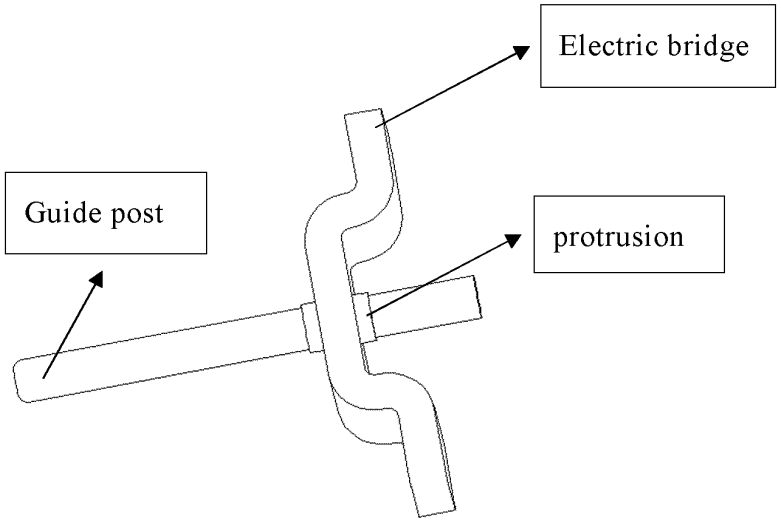
Electric bridge
Guide post
protrusion

FIG. 3

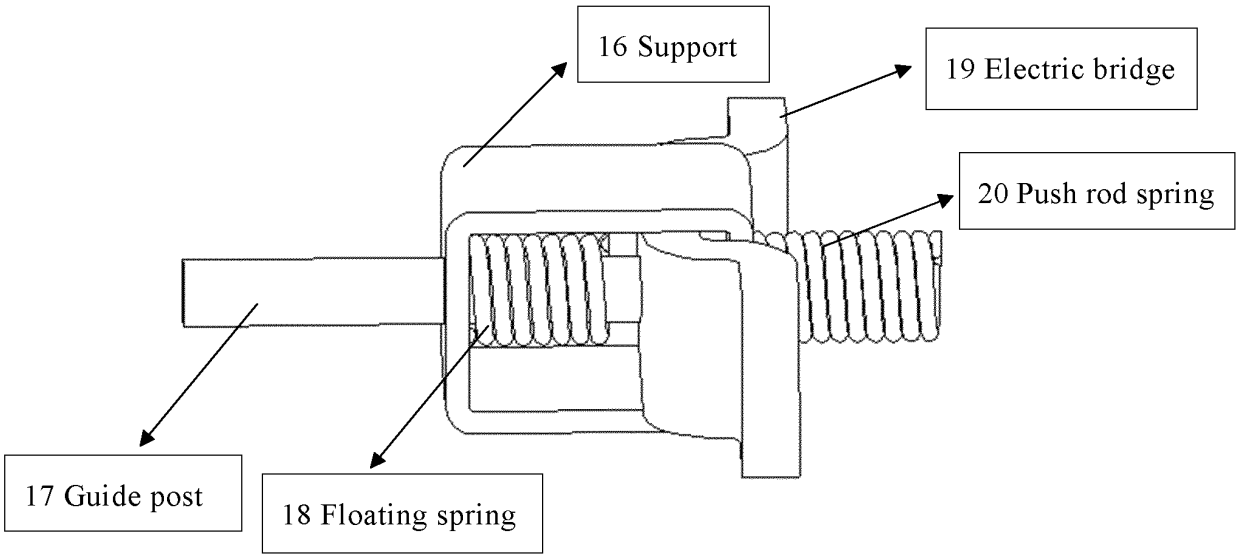
16 Support
19 Electric bridge
20 Push rod spring
17 Guide post
18 Floating spring

FIG. 4

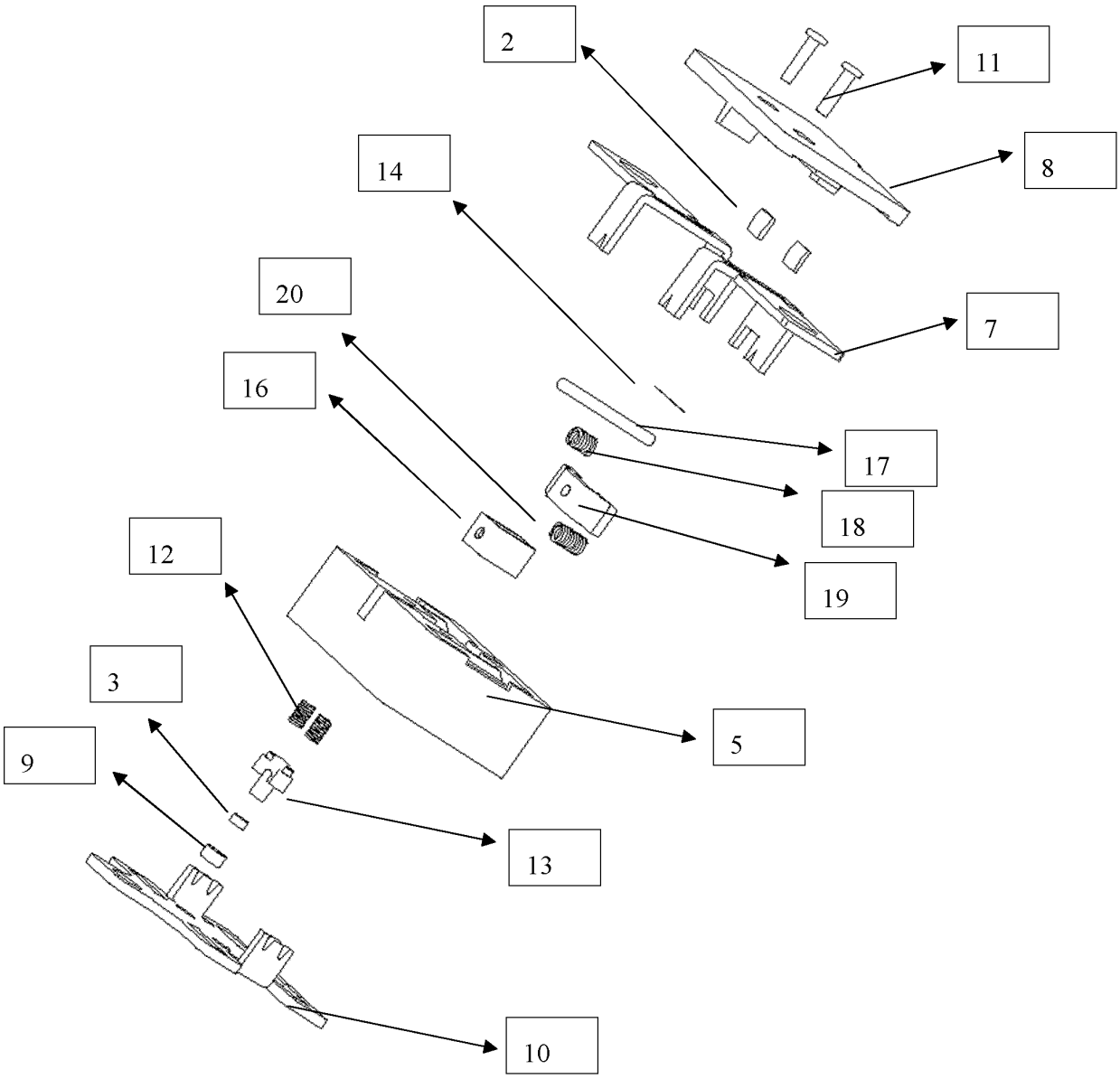

FIG. 5

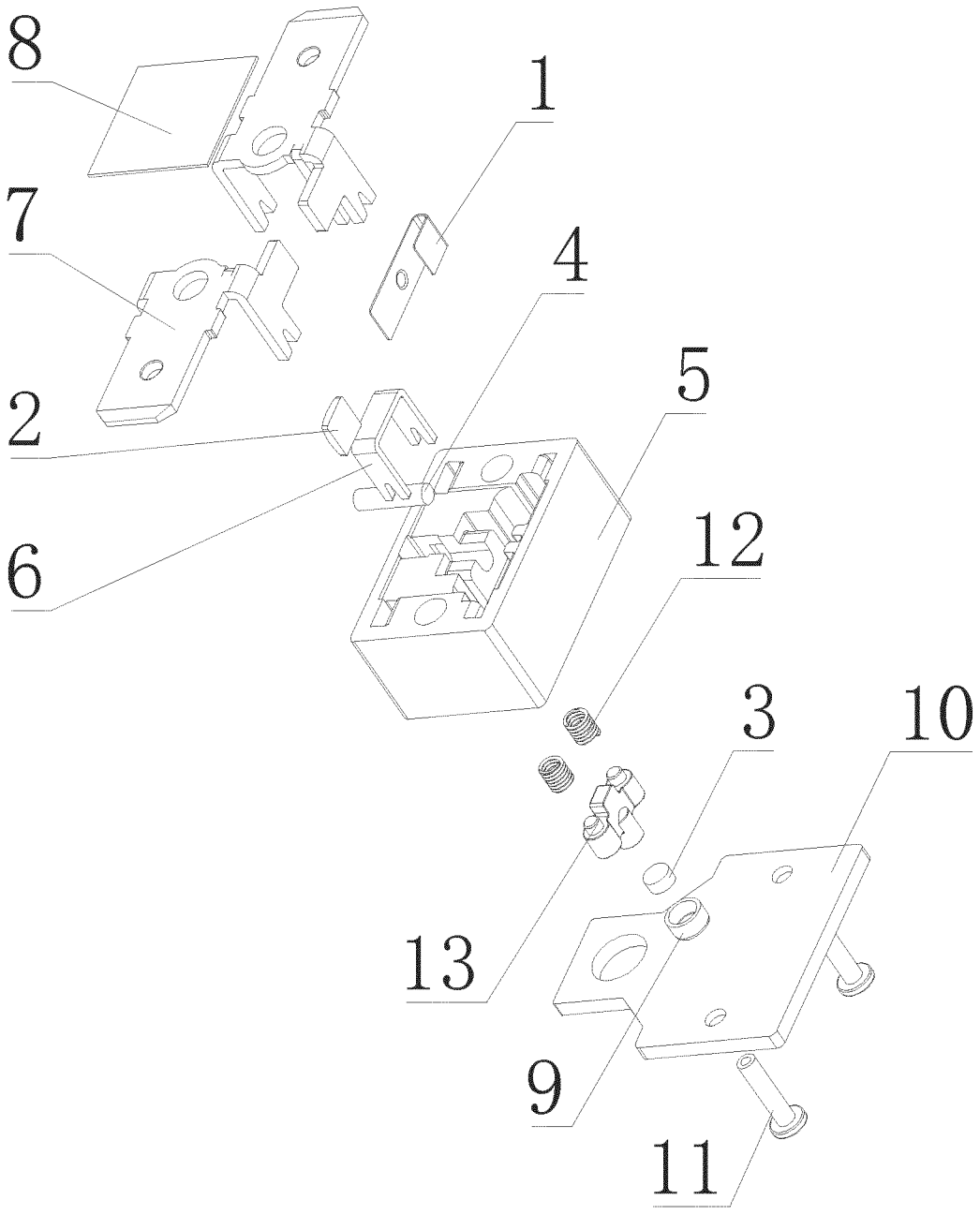

FIG. 6

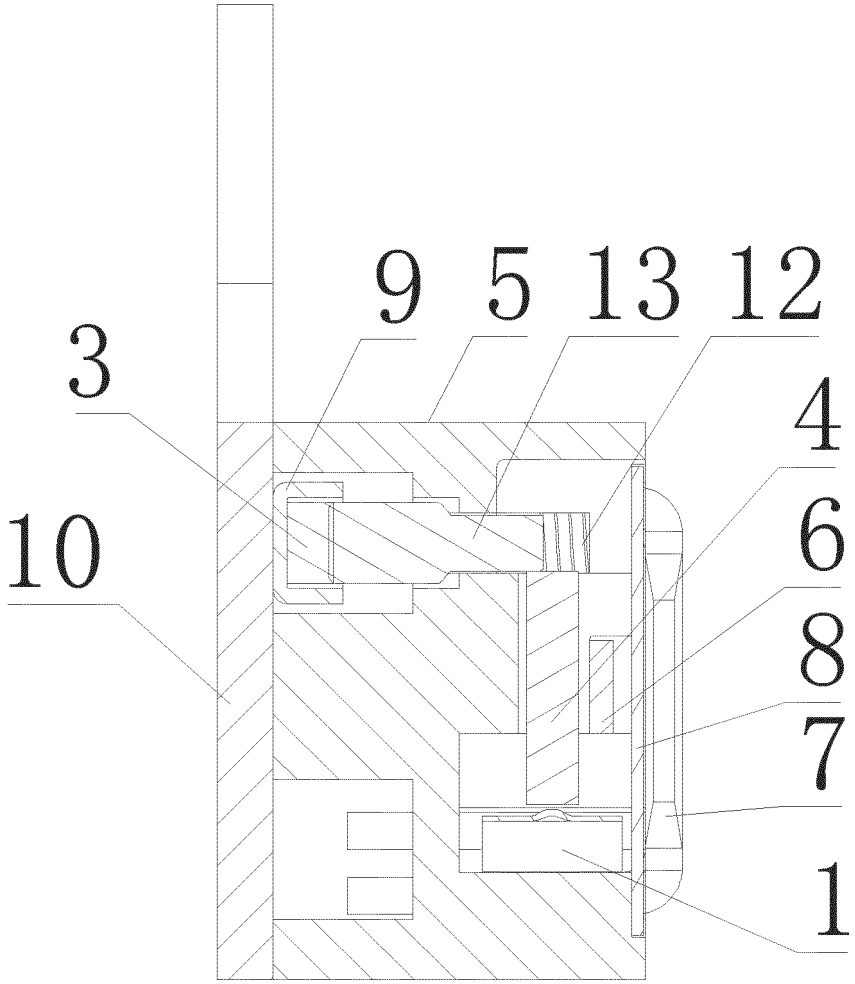

FIG. 7

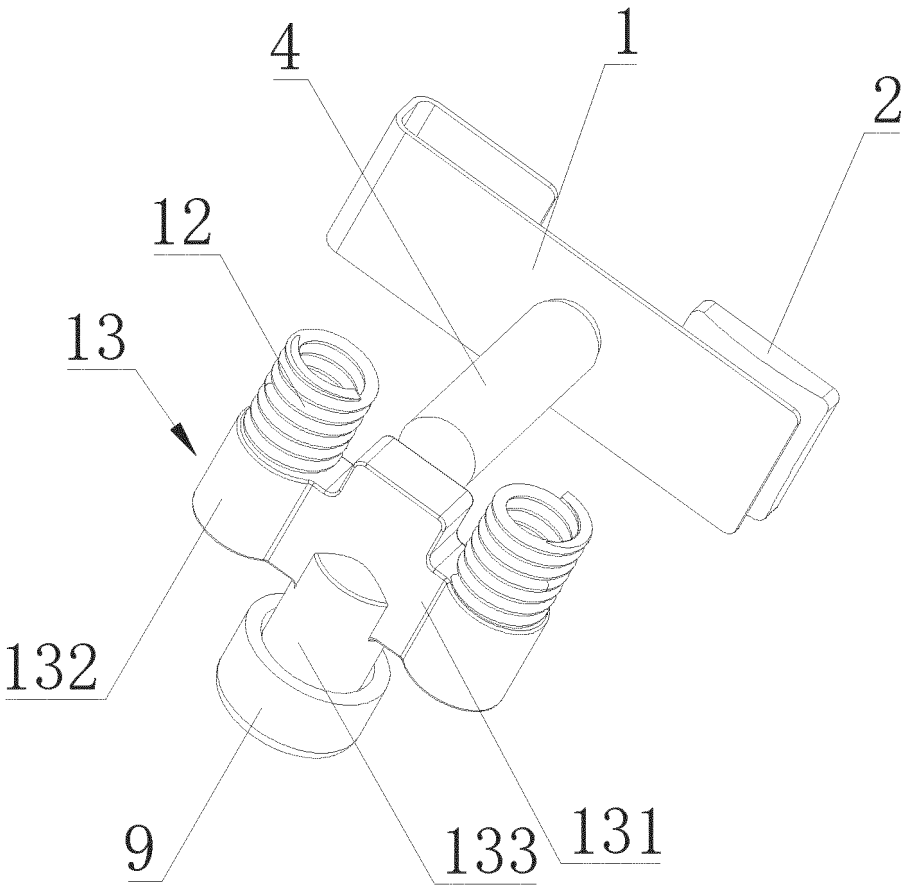

FIG. 8

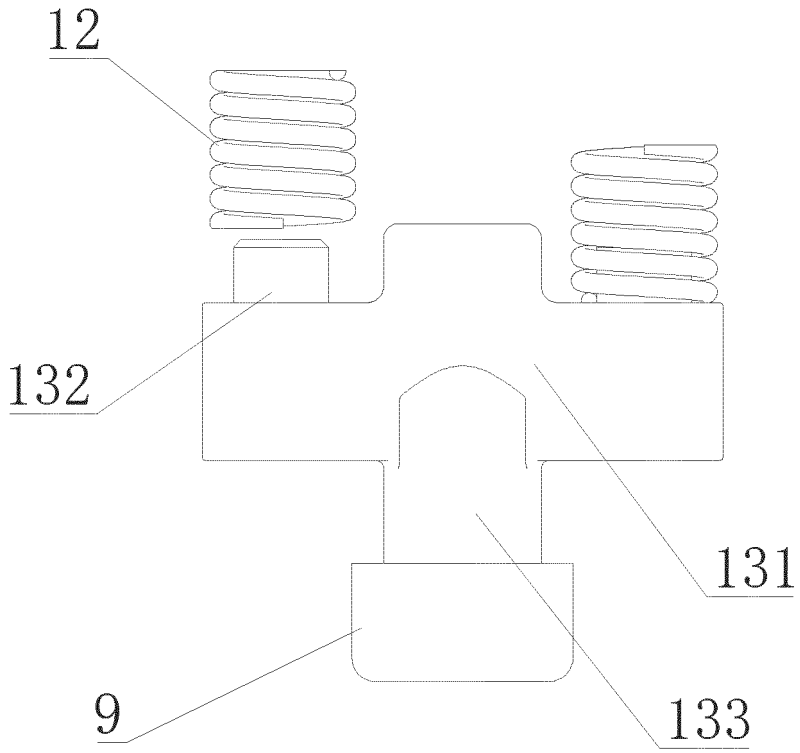

FIG. 9

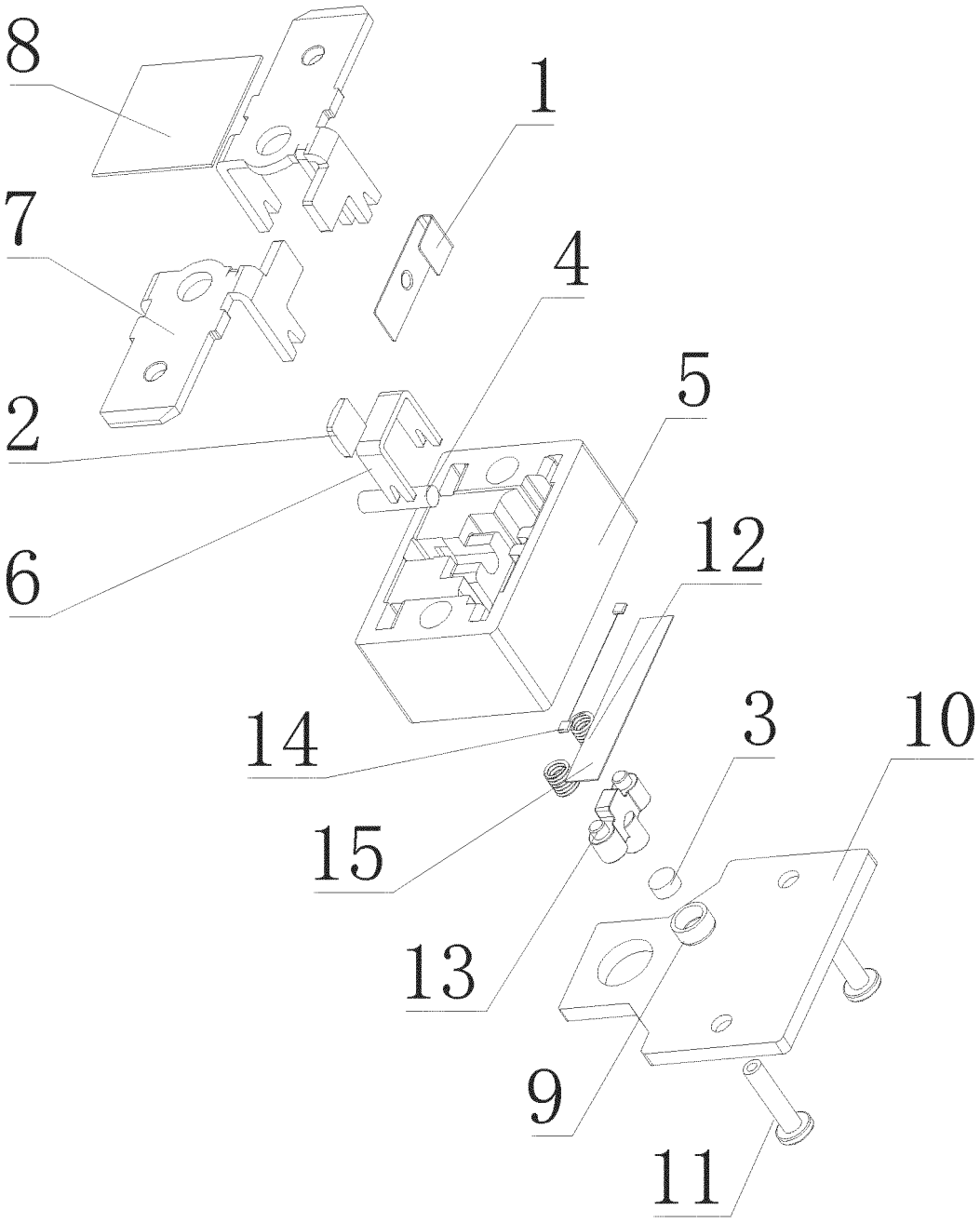

FIG. 10

FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/113371

A. CLASSIFICATION OF SUBJECT MATTER

H01H 37/76(2006.01)i; H01H 85/02(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01H37/-;H01H85/-

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

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

CNTXT; CNABS; ENTXT; VCN; VEN: 弹簧, 触点, 触头, 杆, 轴, 柱, 销, 感温, 可熔, 抵, 顶, 压缩, 复位, 解除, 释放, 脱扣, rod, release, pole, spring, bar, trip+, pin, free, support+, resist+, contact+, shaft

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 215869131 U (XIAMEN SET ELECTRONICS CO., LTD.) 18 February 2022 (2022-02-18) claims 1-10	1-10
A	JP 2011204516 A (NEC SCHOTT COMPONENTS CORP.) 13 October 2011 (2011-10-13) entire document	1-10
A	JP 2013077411 A (NEC SCHOTT COMPONENTS CORP.) 25 April 2013 (2013-04-25) entire document	1-10
A	JP 2010272387 A (UCHIHASHI ESTEC CO., LTD.) 02 December 2010 (2010-12-02) entire document	1-10
A	CN 210223894 U (BAOYING ANDEA ELECTRONIC TECHNOLOGY CO., LTD.) 31 March 2020 (2020-03-31) entire document	1-10

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

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"P" document published prior to the international filing date but later than the priority date claimed
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
03 November 2022	**17 November 2022**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/113371

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 215869131 U	18 February 2022	None	
JP 2011204516 A	13 October 2011	None	
JP 2013077411 A	25 April 2013	None	
JP 2010272387 A	02 December 2010	JP 4757931 B2	24 August 2011
CN 210223894 U	31 March 2020	None	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 202122003888 **[0001]**