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(54) BREAKER AND CONTACT DEVICE THEREOF HAVING FLIPPABLE STATIC CONTACT

(57) A contact device having a rotatable static contact and of a circuit breaker comprises a static contact that is embedded in a static contact support. The static contact support is internally provided with a static contact spring and a locating shaft used for mounting the static contact spring. The static contact support is further internally provided with a shaft body passing through the static contact. The shaft body comprises a central shaft passing through the axis of rotation of the static contact, and a bearing shaft passing through the static contact and limiting the static contact spring. A locating shaft (70) is sleeved with the static contact spring. Spring arms extending out from two ends are snapped to the bearing shaft passing through the static contact. The static contact of the device of the invention is rotatably mounted on the static contact support, a repulsive force is generated on the contact to allow a moving contact and the static contact to overturn at the same time, and then an electric arc is prolonged and arc blow-out is accelerated. A step surface passing through the shaft body of the static contact is used for limiting the two sides of the static contact to effectively prevent the static contact from moving in the axial direction of the shaft body, ensure a contact area of the moving contact and the static contact, effectively reduce assembling difficulty and improve assembling efficiency.

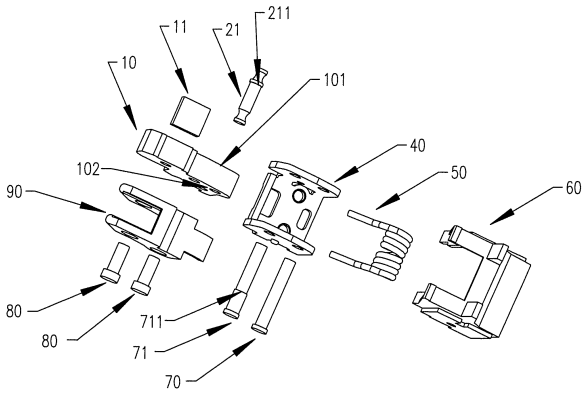

Fig. 8

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Description

TECHNICAL FIELD

[0001] The invention relates to the field of power distribution and industrial control, in particular to a circuit breaker and a contact device having a rotatable static contact and of the circuit breaker.

BACKGROUND ART

[0002] Generally, a static contact of a contact device of a traditional moulded case circuit breaker is fixedly mounted, and a moving contact can oscillate under the driving of an operating mechanism to be in contact with and separated from the static contact, thereby realizing closing and breaking of the circuit breaker. According to the contact device, only the moving contact can be rotatable, and the arcing speed is slower. Therefore, a contact device having a rotatable static contact and of a circuit breaker is provided. The rotatable function of the static contact mainly serves to generate a repulsive force on the contact to allow a moving contact and the static contact to overturn at the same time by using a short-circuited current flowing through the moving contact and the static contact, and then an electric arc is prolonged and arc blow-out is accelerated. Meanwhile, generally the static contact is pivotally mounted on a shaft in order to realize the rotatability of the static contact; as such, the static contact has two moving pairs, and can move axially in addition to being rotatable. If the static contact deviates axially, a contact area of the static contact and the moving contact is relatively small, and therefore there is also a need of a device for preventing the static contact from deviating axially. But under the constraint of a space, if it is necessary to additionally arrange independent elements to the device for preventing axial deviation, for example, two side surfaces of the static contact are additionally provided with shaft sleeves respectively, excessive elements need to be assembled, such that the assembling process is tedious, and the efficiency is low.

SUMMARY OF THE INVENTION

[0003] An objective of the invention is to overcome the defects of the prior art, and provide a contact device having a rotatable static contact and of a circuit breaker, and the circuit breaker, which has a simple structure.

[0004] To achieve the objective, the invention adopts the following technical solutions:

a contact device having a rotatable static contact and of a circuit breaker comprises a static contact 10 which is embedded in a static contact support 40; the static contact support 4 is internally provided with a static contact spring 50 and a locating shaft 70 used for mounting the static contact spring 50; the static contact support 40 is further internally provided with a shaft body passing through the static contact; the shaft body comprises a central shaft 71 passing through the axis of rotation of the static contact, and a bearing shaft 21 passing through the static contact and limiting the static contact spring; the locating shaft 70 is sleeved with the static contact spring 50; spring arms extending out from two ends are snapped to the bearing shaft 21 passing through the static contact 10.

[0005] Further, a second side surface 102, facing to the static contact 10, of the central shaft 71 is provide with a central limiting step surface 711; a first side surface 101, facing to the static contact 10, of the bearing shaft 21 is provided with a bearing limiting step surface 211; the central limiting step surface 711 and the bearing limiting step surface 211 jointly limit, from two sides, a movement of the static contact 10 along the shaft body.

[0006] Further, a first side surface 101, facing to the static contact, of the bearing shaft 21 is provided with a bearing limiting step surface 211; a first snap spring groove 212 for mounting a snap spring is arranged in a corresponding position of a second side surface 102, facing to the static contact, of the bearing shaft 21; the bearing limiting step surface 212 and the snap spring are matched to jointly limit a movement of the static contact along the shaft body.

[0007] Further, a second side surface 102, facing to the static contact, of the central shaft 71 is provided with a central limiting step surface 711; a second snap spring groove 712 for mounting a snap spring is arranged in a corresponding position of a first side surface 101, facing to the static contact, of the bearing shaft 71; the central limiting step surface 711 and the snap spring are matched to jointly limit a movement of the static contact along the shaft body.

[0008] Further, the static contact support 40 is of a U-shaped structure; mounting holes for the central shaft 71 and the locating shaft 70 are formed in two side walls of the U-shaped structure; and a spring arm mounting hole for mounting a spring arm that extends out from the middle of the static contact spring 50 is formed in the bottom of the U-shaped structure.

[0009] Further, the central shaft 71 comprises three sections of column bodies which are coaxial and of which the diameters are reduced progressively, wherein the diameters of the first column body 713, the second column body 714 and the third column body 715 are reduced in sequence; the central limiting step surface 711 is formed by connecting end surfaces of the second column body 714 and the third column body 715.

[0010] Further, the bearing shaft 21 comprises fixing portions 213 at two ends, and a connecting column body 214 located in the middle; column surfaces of the fixing portions 213 are recessed inwards to limit spring arms at two ends of the static contact spring 50; a convex ring 215 is arranged at the junction of the connecting column body 214 and one of the fixing portions 213, and the

bearing limiting step surface 211 is formed on a side wall, facing to the connecting column body 214, of the convex ring 215.

[0011] Further, the rotatable contact device comprises a contact point 11 welded to the static contact 10, and an emitting plate 90 which is riveted to the static contact 10 with a rivet 80 and is conductive to extinguishing electric arcs.

[0012] Further, the rotatable contact device further comprises a protective cover 60; the protection cover 60 is placed on the static contact support 40 and covers two ends of the shaft body.

[0013] The invention further provides a circuit breaker, comprising the contact device having a rotatable static contact, wherein the static contact support 40 of the contact device is fixedly mounted in the circuit breaker, and an operating mechanism drives the moving contact to oscillate to be in contact with and separated from the static contact so as to realize closing and breaking of the circuit breaker.

[0014] The static contact of the invention is rotatably mounted on the static contact support, and is capable of being fixed by the static contact spring and overturning around the central shaft. A repulsive force can be generated on the contact to allow a moving contact and the static contact to overturn at the same time by using a short-circuited current flowing through the moving contact and the static contact, and then an electric arc is prolonged and arc blow-out is accelerated. Two sides of the static contact are limited by a limiting component formed on the static contact support or step surfaces passing through the shaft body of the static contact, such that the static contact can be effectively prevented from moving axially along the shaft body, so as to ensure a contact area of the moving contact and the static contact, the assembling difficulty can be effectively reduced, and the assembling efficiency can be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

Fig. 1 is a structural schematic drawing of a rotatable contact device of a circuit breaker of embodiment 1 of the invention;

Fig. 2 is a structural exploded schematic drawing of the rotatable contact device of the circuit breaker of embodiment 1 of the invention;

Fig. 3 is a structural schematic drawing of a static contact support of embodiment 1 of the invention;

Fig. 4 is an assembling stereogram of the rotatable contact device of the circuit breaker of embodiment 1 of the invention;

Fig. 5 is an assembling top view of the rotatable contact device of the circuit breaker of embodiment 1 of the invention;

Fig. 6 is a structural exploded schematic drawing of another rotatable contact device of the circuit breaker of embodiment 1 of the invention;

Fig. 7 is a structural schematic drawing of another static contact support of embodiment 1 of the invention;

Fig. 8 is a structural exploded schematic drawing of a rotatable contact device of a circuit breaker of embodiment 2 of the invention;

Fig. 9 is a structural schematic drawing of a bearing shaft of embodiment 2 of the invention;

Fig. 10 is a structural schematic drawing of a central shaft of embodiment 2 of the invention;

Fig. 11 is an assembling stereogram of the rotatable contact device of the circuit breaker of embodiment 2 of the invention;

Fig. 12 is an assembling top view of the rotatable contact device of the circuit breaker of embodiment 2 of the invention;

Fig. 13 is a structural schematic drawing of another bearing shaft of embodiment 2 of the invention;

Fig. 14 is a structural schematic drawing of another central shaft of embodiment 2 of the invention.

[0016] As illustrated in drawings, the static contact 10, the first side surface 101, the second side surface 102, the contact point 11, the bearing shaft 21, the bearing limiting step surface 211, the first snap spring groove 212, the fixing portion 213, the connecting column body 214, the convex ring 215, the static contact support 40, the upper limiting surface 401, the limiting groove 411, the first limiting surface 412, the second limiting surface 413, the first limiting arm 422, the second limiting arm 423, the static contact spring 50, the protective cover 60, the locating shaft 70, the central shaft 71, the central limiting step surface 711, the second snap spring groove 712, the first column body 713, the second column body 714, the third column body 715, the rivet 80 and the emitting plate 90 are referred.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] The specific embodiments of a rotatable contact device of a circuit breaker of the invention will be further illustrated as below in conjunction with the embodiments illustrated in Figs. 1-14. The rotatable contact device of the circuit breaker of the invention is not limited to the description in the following embodiments.

Embodiment 1:

[0018] As illustrated in Figs. 1-5, a contact device having a rotatable static contact and of a circuit breaker comprises a static contact 10 and a moving contact (not shown in drawings), wherein the static contact 10 is embedded in a static contact support 40; the static contact support 4 is internally provided with a static contact spring 50 and a locating shaft 70 used for mounting the static contact spring 50; the static contact support 40 is further

internally provided with a shaft body passing through the static contact; the shaft body comprises a central shaft 71 passing through the axis of rotation of the static contact, and a bearing shaft 21 passing through the static contact and limiting the static contact spring; the locating shaft 70 is sleeved with the static contact spring 50; spring arms extending out from two ends are snapped to the bearing shaft 21 passing through the static contact 10; a spring arm extending out from the middle is snapped into a spring arm mounting hole in the contact support 40; a limiting component for limiting a movement of the static contact along an axial position of the shaft body is further formed on the static contact support 40. The contact device further comprises a contact point 11 welded to the static contact, an emitting plate 90 riveted to the static contact with a rivet 80, and a protective cover 60; the protective cover 60 is placed on the static contact support and covers two ends of the central shaft 71 and two ends of the locating shaft 70; the emitting plate 90 is an insulator covering the surrounding of the contacts of the circuit breaker. When strong electric arcs are generated between the moving contact and the static contact, a gas capable of cooling the electric arcs can be generated upon scorching of the electric arcs, air pressure around the contacts is increased, and therefore, extinguishing of electric arcs is facilitated. The static contact 10 of the contact device of the invention is pivotally mounted to the static contact support 40 via the central shaft 71, the static contact 10 is rotatable around the central shaft 71 under the action of a force of the static contact spring, and meanwhile, a balance is kept under the limiting of the limiting component on the static contact support 40. Meanwhile, an initial pressure is kept on the contacts. The protective cover 60 is placed on the support to prevent the central shaft 71 and the locating shaft 70 from moving axially.

[0019] As illustrated in Fig. 3, the limiting component comprises a limiting groove 411 correspondingly formed on the static contact support, and the static contact is embedded into the limiting groove 411; an upper limiting surface 401 which is in contact location with an end surface of the static contact is arranged at the bottom of the limiting groove; a first limiting surface 412 and a second limiting surface 413 which are in contact location with a side surface of the static contact are arranged at two sides of the upper limiting surface 401 respectively. The limiting groove 411 can prevent the contact from moving axially, thereby realizing axial location of the static contact, and ensuring a contact area of the moving contact and the static contact. To be specific, the static contact support 40 is of a U-shaped structure; mounting holes for mounting the central shaft 71 and the locating shaft 70 are formed in two side walls of the U-shaped structure; and a spring arm mounting hole for mounting a spring arm that extends out from the middle of the static contact spring 50 is formed in the bottom of the U-shaped structure; a fixing hole which is fixedly connected with a base of the circuit breaker is also formed in the bottom of the U-shaped structure; the limiting groove 411 is formed in a corresponding position at one end of the bottom of the static contact support 40. This is a specific mounting way of fixing the static contact 10 via the static contact spring 50, and of course, other ways may also be adopted to fix the static contact 10 by adopting a spring.

[0020] Figs. 6 and 7 illustrate another form of the limiting component. The limiting component comprises a first limiting arm 422 and a second limiting arm 423 which are in contact location with the side surface of the static contact and are arranged on two inner side walls of the static contact support respectively. The first limiting arm 422 and the second limiting arm 433 prevent the static contact from moving axially, thereby realizing axial location of the static contact.

[0021] The static contact of the invention is rotatably mounted on the static contact support, and is capable of being fixed by the static contact spring and overturning around the central shaft 71. A repulsive force can be generated on the contact to allow the moving contact and the static contact to overturn at the same time by using a short-circuited current flowing through the moving contact and the static contact, and then an electric arc is prolonged and arc blow-out is accelerated. Meanwhile, the limiting component can limit the static contact from deviating in an axial direction. Because the limiting component can be machined and formed inside the static contact support directly, machining is convenient, and the limiting component can be manufactured in advance, without occupying assembling time. A limiting function can be realized without the need of fitting to shaft body mounting in an assembling process like shaft sleeves, such that the assembling difficulty can be effectively reduced, and the assembling efficiency can be improved. Further, the protective cover 60 is placed on the support to prevent the central shaft 71 and the locating shaft 70 from axially moving, assembly is convenient and efficiency is high.

Embodiment 2:

[0022] As illustrated in Figs. 8-12, a contact device having a rotatable static contact and of a circuit breaker comprises a static contact 10 and a moving contact (not shown in drawings), wherein the static contact 10 is embedded into a static contact support 40; the static contact support 4 is internally provided with a static contact spring 50 and a locating shaft 70 used for mounting the static contact spring 50; the static contact support 40 is further internally provided with a shaft body passing through the static contact; the shaft body comprises a central shaft 71 passing through the axis of rotation of the static contact, and a bearing shaft 21 passing through the static contact and limiting the static contact spring; the locating shaft 70 is sleeved with the static contact spring 50; spring arms extending out from two ends are snapped to the bearing shaft 21 passing through the static contact 10; a spring arm extending out from the middle is snapped to

a spring arm mounting hole in the contact support 40; a step surface for limiting a movement of the static contact 10 along the shaft body is further formed on a side surface, facing to the static contact 10, of the shaft body. The contact device further comprises a contact point 11 welded to the static contact, an emitting plate 90 riveted to the static contact with a rivet 80, and a protective cover 60; the protective cover 60 is placed on the static contact support and covers two ends of the central shaft 71 and two ends of the locating shaft 70. The static contact 10 of the contact device of the invention is pivotally mounted on the static contact support 40 via the central shaft 71, the static contact 10 is rotatable around the central shaft 71 under the action of a force of the static contact spring, and meanwhile, a balance is kept under the limiting of the shaft body on the static contact support 40. Meanwhile, an initial pressure is kept on the contacts. The protective cover 60 is placed on the support to prevent the central shaft 71 and the locating shaft 70 from moving axially. The static contact support 40 is of a U-shaped structure; mounting holes for mounting the central shaft 71 and the locating shaft 70 are formed in two side walls of the U-shaped structure; a spring arm mounting hole for mounting the spring arm that extends out from the middle of the static contact spring 50 is formed in the bottom of the U-shaped structure, and a fixing hole which is fixedly connected with the base of the circuit breaker is also formed in the bottom of the U-shaped structure.

[0023] As illustrated in Figs. 9-10, the step surfaces of the shaft body include a central limiting step surface 711 and a bearing limiting step surface 211; the central limiting step surface 711 is arranged on a second side surface 102, facing to the static contact, of the central shaft 71; the bearing limiting step surface 211 is arranged on a first side surface 101, facing to the static contact, of the bearing shaft 21; the central limiting step surface 711 and the bearing limiting step surface 211 jointly limit, from two sides, a movement of the static contact 10 along the shaft body, thereby ensuring a contact area of the moving contact and the static contact; in addition, machining is simple, no element needs to be increased, assembling difficulty is reduced, and therefore it is an optimal limiting scheme. The central shaft 71 comprises three sections of column bodies which are coaxial and of which the diameters are reduced progressively, wherein the diameters of the first column body 713, the second column body 714 and the third column body 715 are reduced in sequence; the central limiting step surface 711 is formed by connecting end surfaces of the second column body 714 and the third column body 715. The bearing shaft 21 comprises fixing portions 213 at two ends, and a connecting column body 214 located in the middle; column surfaces of the fixing portions 213 are recessed inwards to limit spring arms at two ends of the static contact spring 50; a convex ring 215 is arranged at the junction of the connecting column body 214 and one of the fixing portions 213, and the bearing limiting step surface 211 is formed on a side wall, facing to the connecting column body 214, of the convex ring 215.

[0024] As illustrated in Fig. 13, as another form of the step surfaces of the shaft body, a bearing limiting step surface 211 is arranged on a first side surface 101, facing to the static contact, of the bearing shaft 21, a first snap spring groove 212 for mounting a snap spring is arranged in a corresponding position of a second side surface 102, facing to the static contact, of the bearing shaft 21, and then the snap spring (not shown in Fig. 13) is snapped into the snap spring groove. The step surfaces of the shaft body include the bearing limiting step surface 211, and the bearing limiting step surface 211 and the snap spring are matched to jointly limit a movement of the static contact along the shaft body.

[0025] As illustrated in Fig. 14, as another form of the step surfaces of the shaft body, a central limiting step surface 711 is arranged on a second side surface 102, facing to the static contact, of the central shaft 71, a second snap spring groove 712 for mounting a snap spring is arranged in a corresponding position of a first side surface 101, facing to the static contact, of the central shaft 71, and then the snap spring (not shown in Fig. 13) is snapped into the snap spring groove. The step surfaces of the shaft body include the central limiting step surface 711, and the central limiting step surface 711 and the snap spring are matched to jointly limit a movement of the static contact along the shaft body.

[0026] In order to enhance a limiting effect, the above three step surface forms of the shaft body can also be combined, namely two groups or three groups of the central limiting step surface 711 and the bearing limiting step surface 211, the central limiting step surface 711 and the snap spring fixed by the second snap spring groove 712, and the bearing limiting step surface 211 and the snap spring fixed by the first snap spring groove 212 are combined to jointly limit a movement of the static contact along the shaft body, and of course the cost is increased. Preferably, the way in which the central limiting step surface 711 and the bearing limiting step surface 211 are matched is adopted merely, and two elements are matched to jointly form a limiting structure for the static contact, such that no element needs to be increased, self assembly of the central shaft 71 and the bearing shaft 21 is not affected, and assembling efficiency is high.

[0027] Furthermore, the invention may also adopt a form of integrating embodiment 1 and embodiment 2, i.e., axial movement of the static contact is limited by the limiting component and the step surfaces of the shaft body at the same time. The referred technical features may refer to the drawings and description to the above two embodiments, and will not be repeated here again.

Embodiment 3:

[0028] The invention further provides a circuit breaker, comprising the contact device having a rotatable static contact, wherein the operating mechanism of the circuit breaker is connected with the movable contact of the

contact device, the static contact support of the contact device is fixedly mounted in the circuit breaker, and the operating mechanism drives the moving contact to rotate to be in contact with and separated from the static contact so as to realize closing and breaking of the circuit breaker. Both the moving contact and the static contact of the circuit breaker of the invention are rotatable. A repulsive force can be generated on the contact to allow the moving contact and the static contact to overturn at the same time by using a short-circuited current flowing through the moving contact and the static contact, and then an electric arc is prolonged and arc blow-out is accelerated. Of course, the circuit breaker further comprises an arc extinguishing device, an overcurrent protection mechanism and other mechanisms.

[0029] The contact device having the rotatable static contact and of the circuit breaker of the invention further comprises the rotatable static contact, except for the rotatable moving contact. A repulsive force can be generated on the contact to allow the moving contact and the static contact to overturn at the same time by using a short-circuited current flowing through the moving contact and the static contact, and then an electric arc is prolonged and arc blow-out is accelerated. The static contact of the invention can be rotatably mounted in the static contact support via the central shaft and the static contact spring, such that the structure is simple. Furthermore, two sides of the static contact are limited by the limiting component formed on the static contact support and/or the step surfaces passing through the shaft body of the static contact, such that the static contact can be effectively prevented from moving axially the shaft body.

[0030] The invention is further elaborated according to the above content in conjunction with the specific preferred embodiments, and it may not considered that the specific embodiments of the invention are only limited to these description. For those common skilled in the art, several simple deductions or replacements made without departing from the concept of the invention will fall into the protection scope of the invention.

Claims

1. A contact device having a rotatable static contact and of a circuit breaker, **characterized in that** the contact device comprising a static contact (10) that is embedded in a static contact support (40); the static contact support (4) is internally provided with a static contact spring (50) and a locating shaft (70) used for mounting the static contact spring (50); the static contact support (40) is further internally provided with a shaft body passing through the static contact; the shaft body comprises a central shaft (71) passing through the axis of rotation of the static contact, and a bearing shaft (21) passing through the static contact and limiting the static contact spring; a locating shaft (70) is sleeved with the static contact spring (50); spring arms extending out from two ends are snapped to the bearing shaft (21) passing through the static contact (10).

2. The contact device having a rotatable static contact according to claim 1, **characterized in that** a second side surface (102), facing to the static contact (10), of the central shaft (71) is provided with a central limiting step surface (711); a first side surface (101), facing to the static contact (10), of the bearing shaft (21) is provided with a bearing limiting step surface (211); the central limiting step surface (711) and the bearing limiting step surface (211) jointly limit, from two sides, a movement of the static contact (10) along the shaft body.

3. The contact device having a rotatable static contact according to claim 1, **characterized in that** a first side surface (101), facing to the static contact, of the bearing shaft (21) is provided with a bearing limiting step surface (211); a first snap spring groove (212) for mounting a snap spring is arranged in a corresponding position of a second side surface (102), facing to the static contact, of the bearing shaft (21); the bearing limiting step surface (212) and the snap spring are matched to jointly limit a movement of the static contact along the shaft body.

4. The contact device having a rotatable static contact according to claim 1, **characterized in that** a second side surface (102), facing to the static contact, of the central shaft (71) is provided with a central limiting step surface (711); a second snap spring groove (712) for mounting a snap spring is arranged in a corresponding position of a first side surface (101), facing to the static contact , of the central shaft (71); the central limiting step surface (711) and the snap spring are matched to jointly limit a movement of the static contact along the shaft body.

5. The contact device having a rotatable static contact according to claim 1, **characterized in that** the static contact support (40) is of a U-shaped structure; mounting holes for the central shaft (71) and the locating shaft (70) are formed in two side walls of the U-shaped structure; a spring arm mounting hole for mounting a spring arm that extends out from the middle of the static contact spring (50) is formed in the bottom of the U-shaped structure.

6. The contact device having a rotatable static contact according to claim 2 or 4, **characterized in that** the central shaft (71) comprises three sections of column bodies which are coaxial and of which the diameters are reduced progressively, wherein the diameters of the first column body (713), the second column body (714) and the third column body (715) are reduced in sequence; the central limiting step surface (711)

is formed by connecting end surfaces of the second column body (714) and the third column body (715).

7. The contact device having a rotatable static contact according to claim 3 or 4, **characterized in that** the bearing shaft (21) comprises fixing portions (213) at two ends, and a connecting column body (214) located in the middle; column surfaces of the fixing portions (213) are recessed inwards to limit spring arms at two ends of the static contact spring (50); a convex ring (215) is arranged at the junction of the connecting column body (214) and one of the fixing portions (213), and the bearing limiting step surface (211) is formed on a side wall, facing to the connecting column body (214), of the convex ring (215).

8. The contact device having a rotatable static contact according to claim 1, **characterized in that** the rotatable contact device comprises a contact point (11) welded to the static contact (10), and an emitting plate (90) which is riveted to the static contact (10) with a rivet (80) and is conductive to extinguishing electric arcs.

9. The contact device having a rotatable static contact according to claim 1, **characterized in that** the rotatable contact device further comprises a protective cover (60); the protective cover (60) is placed on the static contact support (40) and covers two ends of the shaft body.

10. A circuit breaker, comprising the contact device having a rotatable static contact according to claims 1 to 9, **characterized in that** the static contact support (40) of the contact device is fixedly mounted in the circuit breaker, and an operating mechanism drives the moving contact to oscillate to be in contact with and separated from the static contact so as to realize closing and breaking of the circuit breaker.

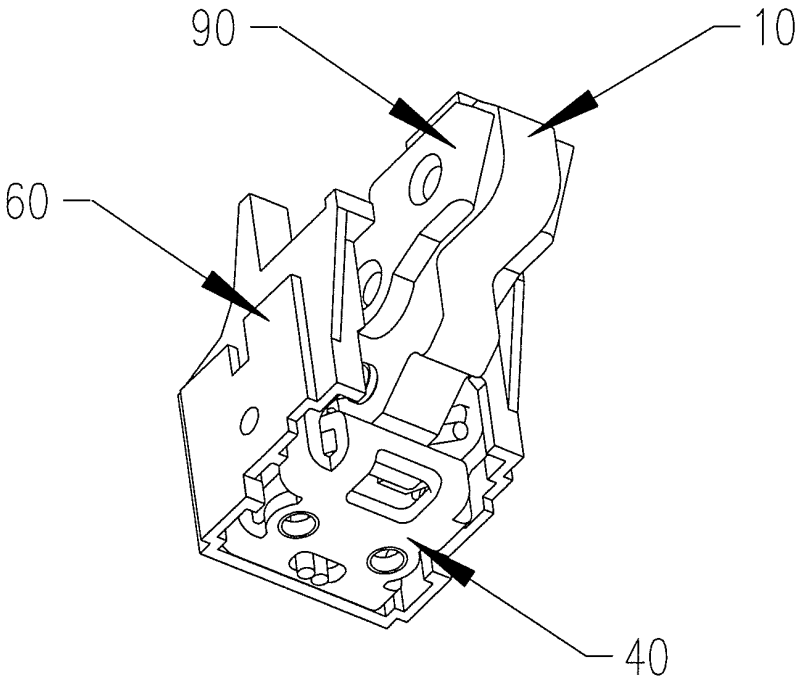

Fig. 1

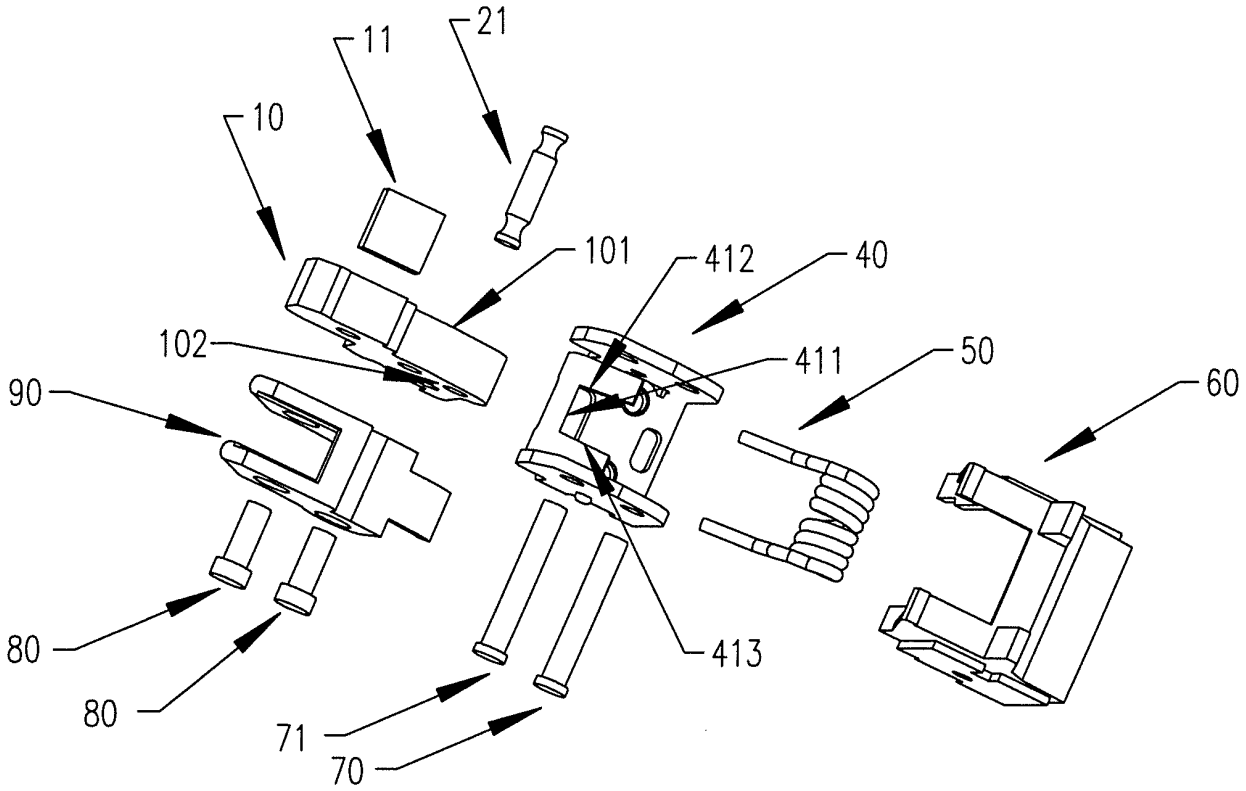

Fig. 2

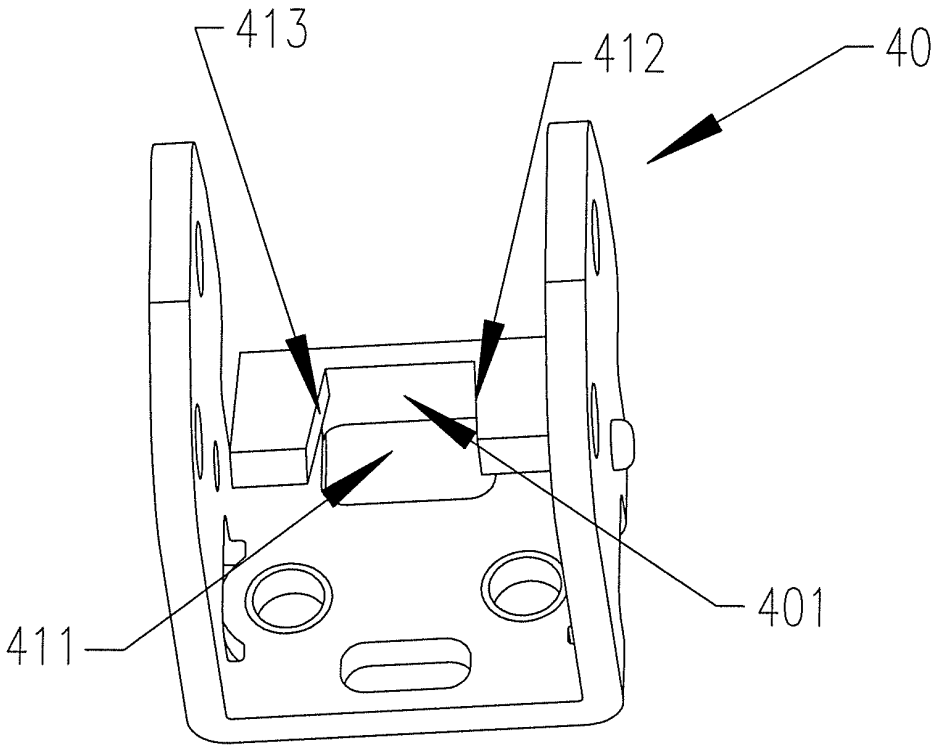

Fig. 3

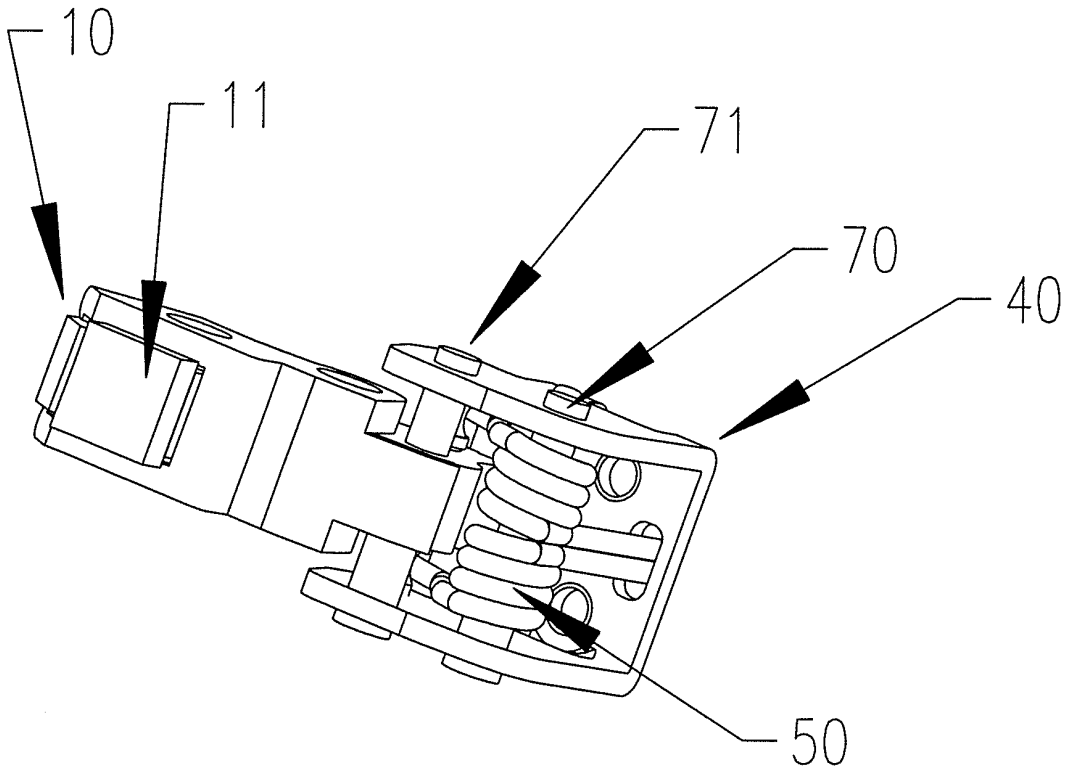

Fig. 4

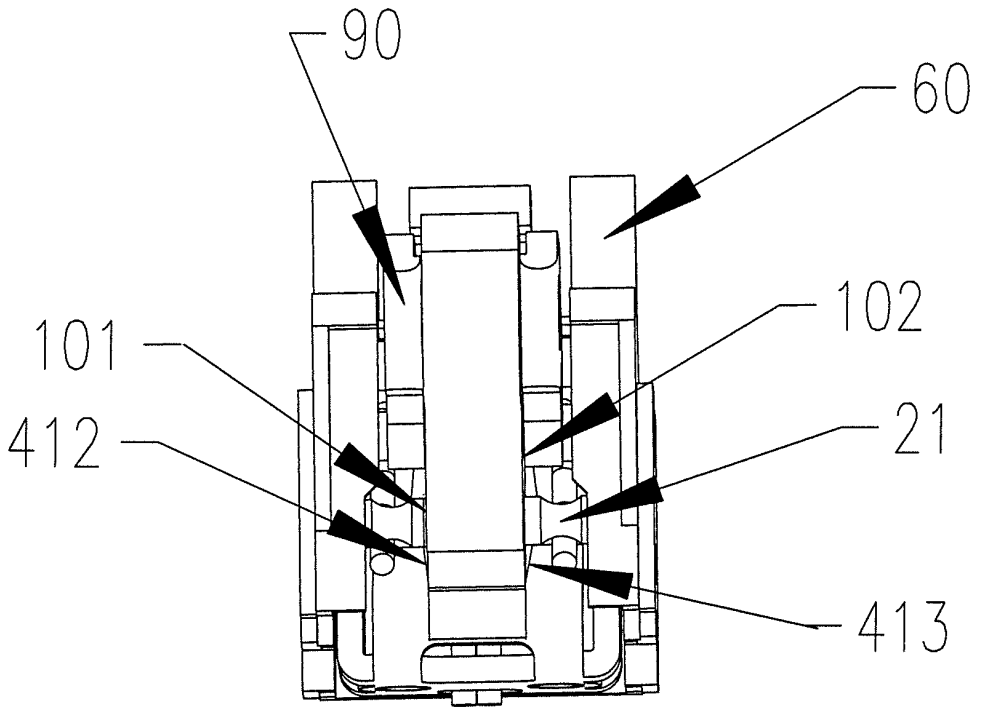
90
60
102
101
21
412
413

Fig. 5

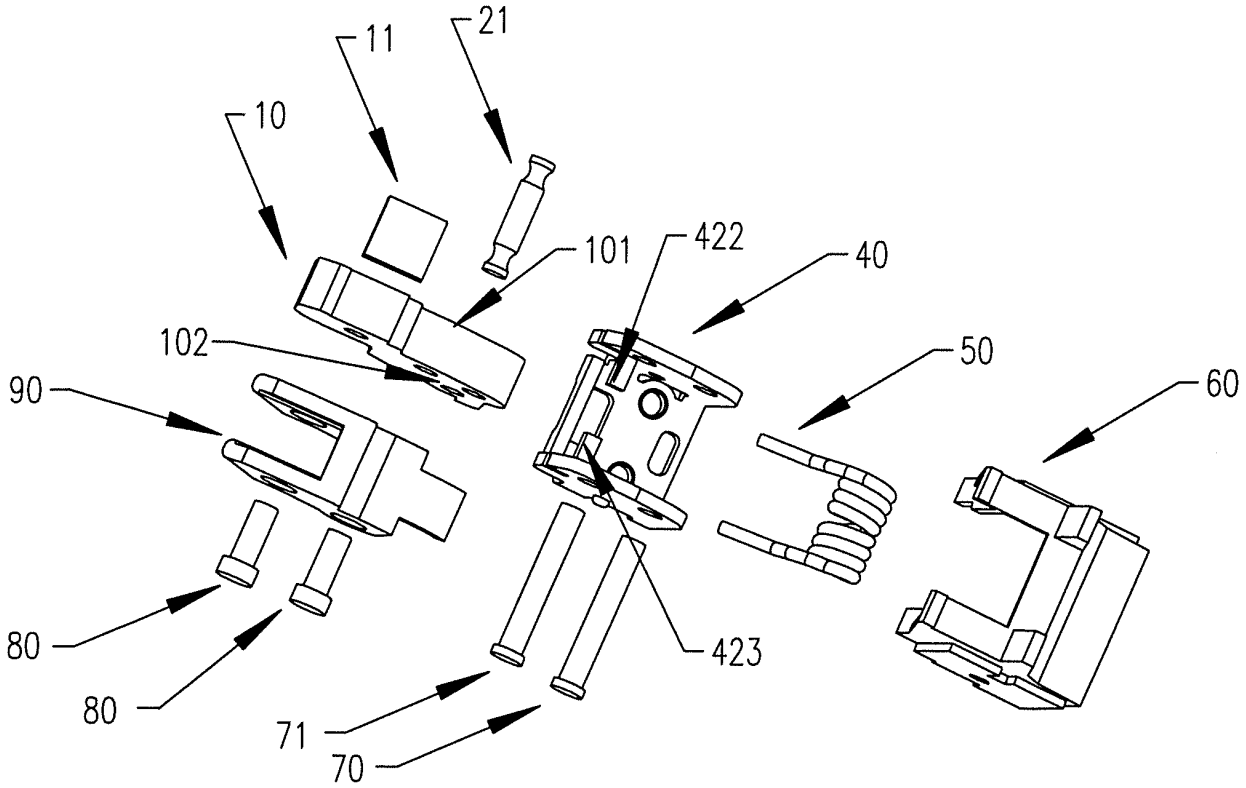
11
21
10
101
422
40
102
50
60
90
80
80
423
71
70

Fig. 6

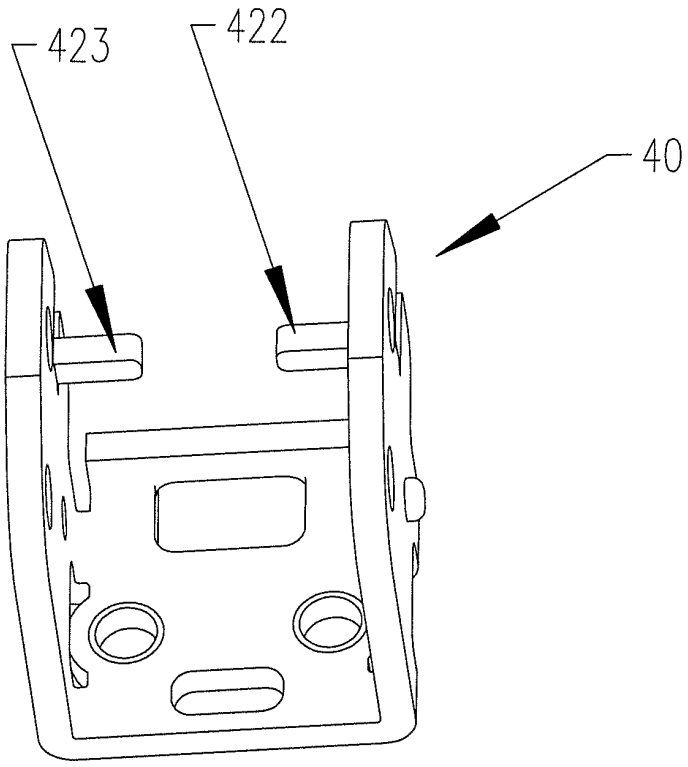

Fig. 7

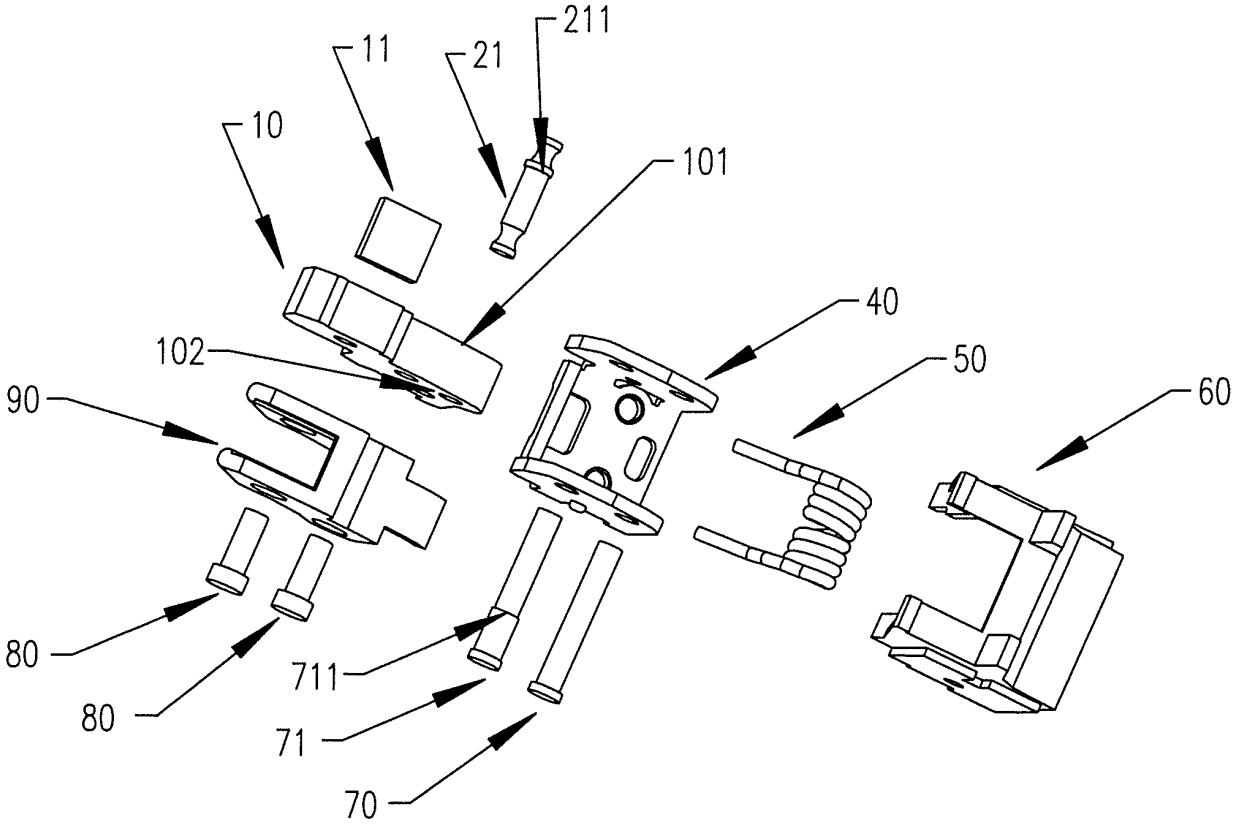

Fig. 8

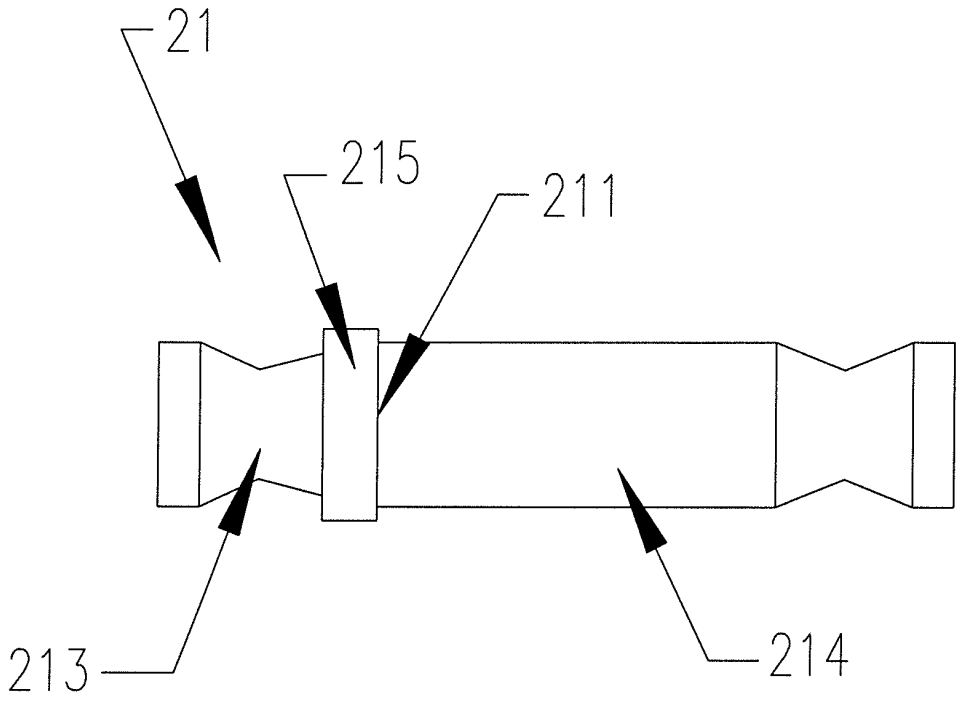

Fig. 9

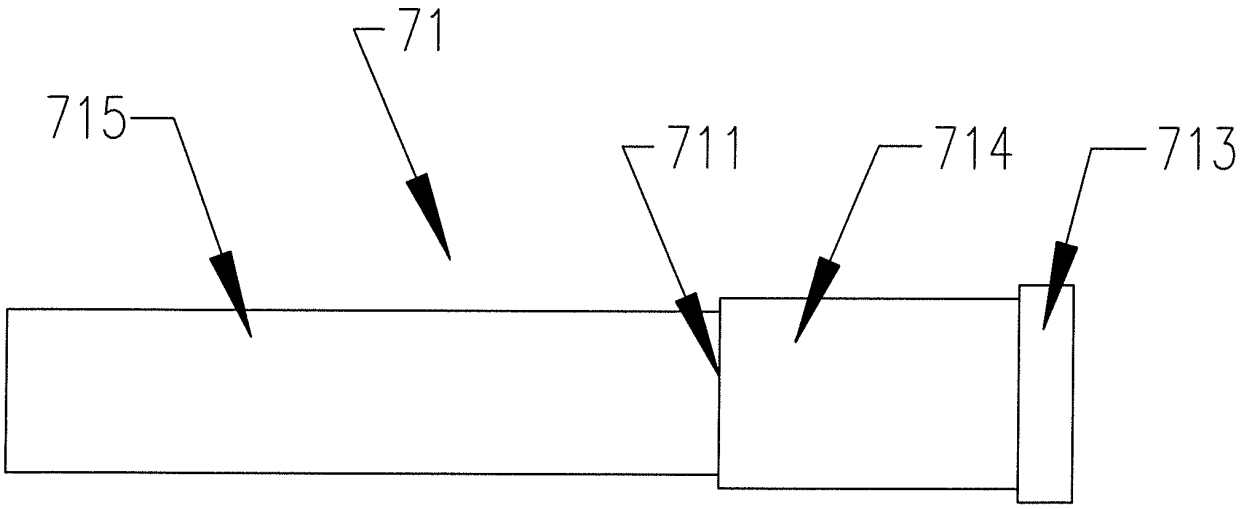

Fig. 10

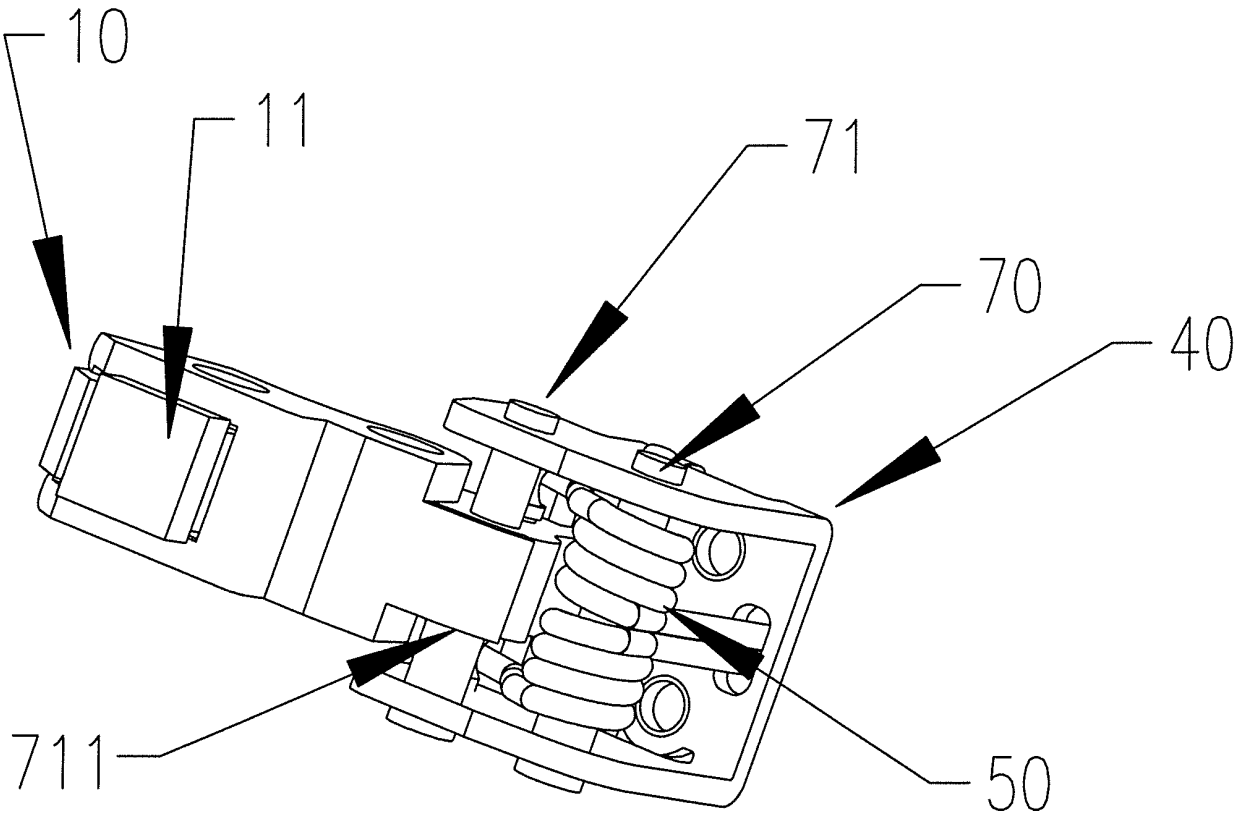

Fig. 11

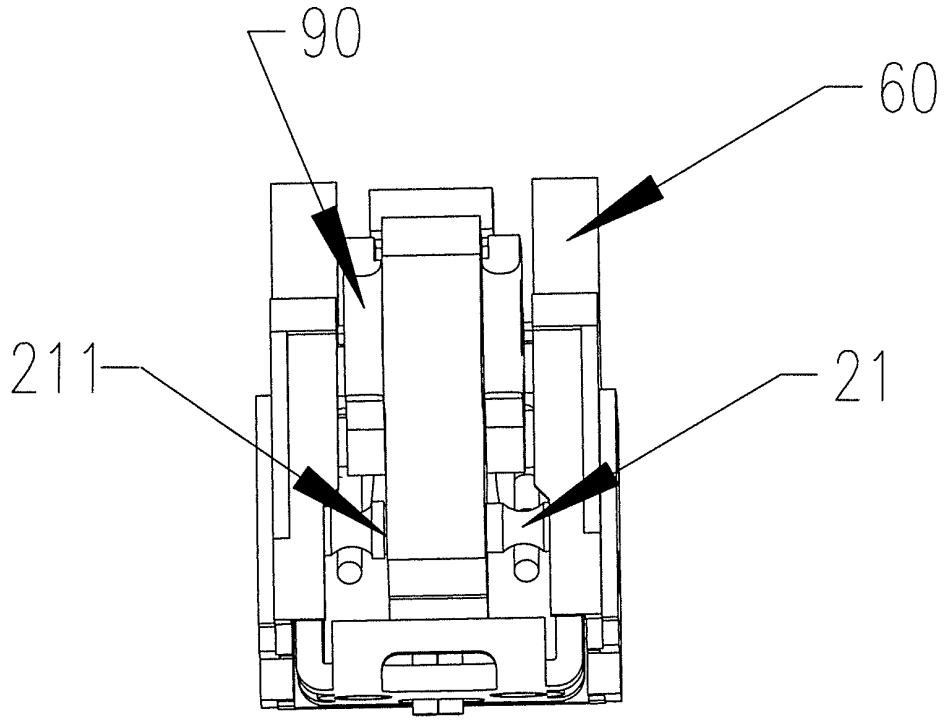

Fig. 12

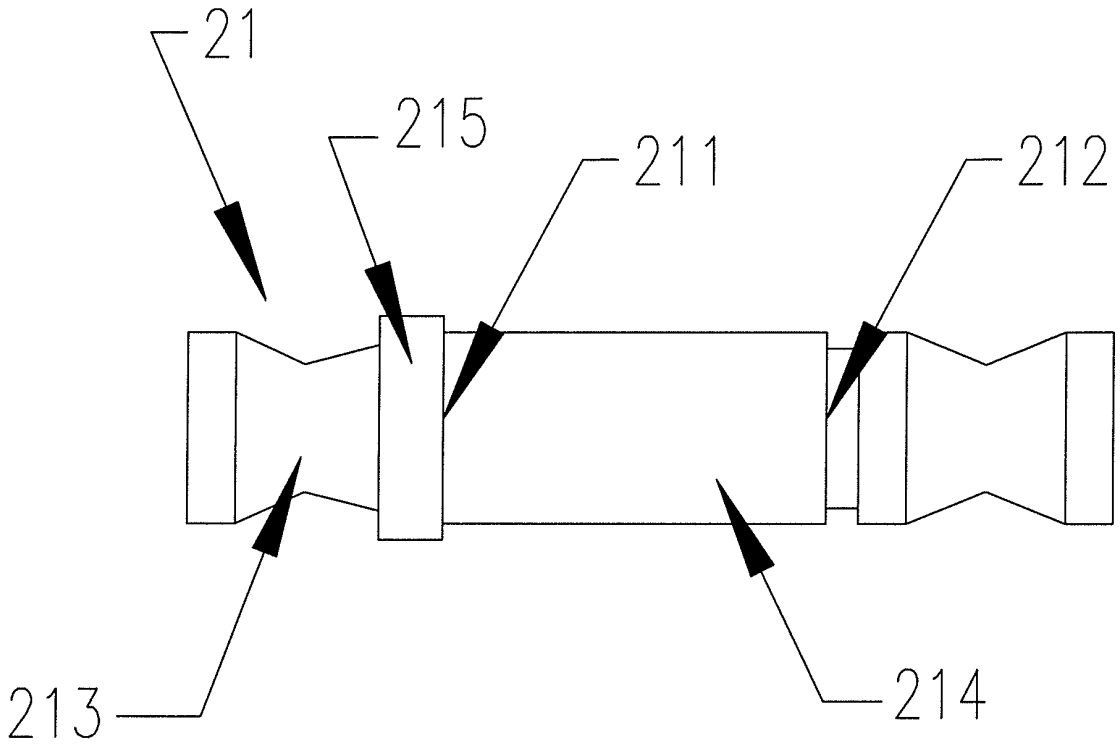

Fig. 13

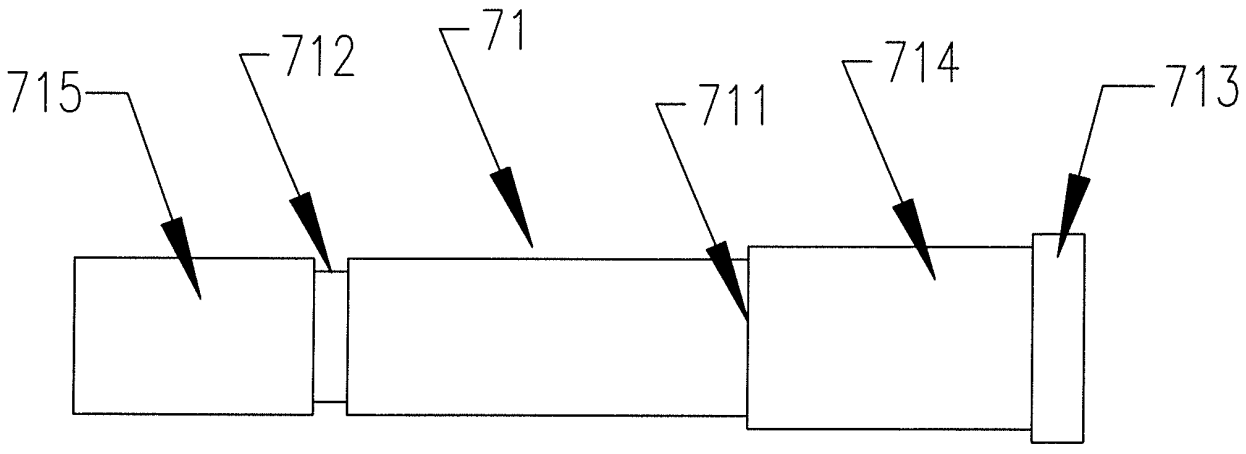

Fig. 14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2015/071816

A. CLASSIFICATION OF SUBJECT MATTER

H01H 73/04 (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: axis, support, fixed contact, movable fixed contact, circuit, breaker, contact, stationary, movable, fixed, spring

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 102568964 A (JIANGSU PHONO ELECTRIC CO., LTD.), 11 July 2012 (11.07.2012), description, paragraphs 0009-0010, and figures 1-6	1-10
A	CN 101315852 A (ZHEJIANG CHINT ELECTRICS CO., LTD.), 03 December 2008 (03.12.2008), the whole document	1-10
A	CN 101783269 A (JIANGSU PHONO ELECTRIC CO., LTD.), 21 July 2010 (21.07.2010), the whole document	1-10
A	CN 201689851 U (JIANGSU PHONO ELECTRIC CO., LTD.), 29 December 2010 (29.12.2010), the whole document	1-10
A	CN 101763998 A (JIANGSU PHONO ELECTRIC CO., LTD.), 30 June 2010 (30.06.2010), the whole document	1-10
A	US 5146194 A (WESTINGHOUSE ELECTRIC CORP.), 08 September 1992 (08.09.1992), the whole document	1-10

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
04 May 2015 (04.05.2015)	**27 May 2015 (27.05.2015)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **XIAO, Jia** Telephone No.: (86-10) **62413367**

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

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2015/071816

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 102568964 A	11 July 2012	CN 102568964 B	19 March 2014
CN 101315852 A	03 December 2008	CN 100593833 C	10 March 2010
CN 101783269 A	21 July 2010	CN 101783269 B	18 July 2012
CN 201689851 U	29 December 2010	None	
CN 101763998 A	30 June 2010	CN 101763998 B	02 May 2012
US 5146194 A	08 September 1992	AU 4254589 A	26 April 1990
		AU 628085 B2	10 September 1992
		ZA 8908524 A	31 July 1991

Form PCT/ISA/210 (patent family annex) (July 2009)