(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 318 540 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
07.02.2024 Bulletin 2024/06

(21) Application number: **22848498.6**

(22) Date of filing: **26.07.2022**

(51) International Patent Classification (IPC):
H01H 71/74 *(2006.01)* ***H01H 71/10*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
H01H 3/02; H01H 71/10; H01H 71/74

(86) International application number:
PCT/CN2022/107724

(87) International publication number:
WO 2023/005893 (02.02.2023 Gazette 2023/05)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **26.07.2021 CN 202110846733**

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(54) LOW-VOLTAGE SWITCHING DEVICE

(57) Disclosed is a low-voltage switching device. The low-voltage switching device includes an operating mechanism, a differential system and a compensating mechanism, wherein the compensating mechanism includes a support, as well as a lever and a cam rotationally assembled on the support; a sliding block which is connected to the lever and the cam respectively is assembled on the support; and a compensating tab which cooperates with the lever and the differential system respectively is disposed on the sliding block. The differential system rotates by pushing the compensating tab, such that the lever rotates to trigger the operating mechanism to trip. An adjusting screw is disposed between the cam and the sliding block. The sliding block drives the compensating tab to move by rotating the cam or the adjusting screw so as to adjust a distance between the compensating tab and the lever. According to the low-voltage switching device of the present invention, the sliding block, the cam and the lever of the compensating mechanism cooperate with one another, and the sliding block is adjusted by the adjusting screw or the cam to indirectly adjust the distance between the compensating tab and the lever, so that the whole compensating mechanism is more compact in structure, and is capable of completing compensation adjustment only in a small space.

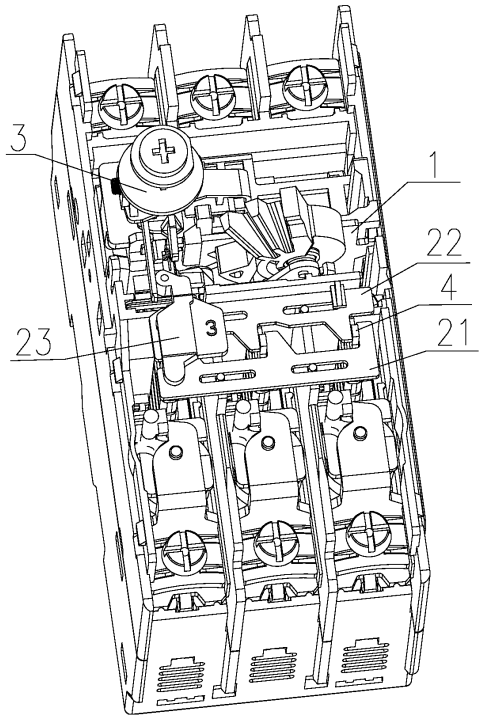

Fig. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to the field of low-voltage electrical appliances, and more particularly, to a low-voltage switching device.

BACKGROUND ART

[0002] A low-voltage switching device is a common switching element used in a power system to switch a circuit on and off, and can automatically cut off the circuit in the event of overcurrent or leakage fault in the circuit. The existing low-voltage switching devices, especially motor protection appliances with protection functions for overload, phase loss and the like, usually have a compensating mechanism for adjusting action characteristics of large and small gears of a product. However, in the event of the change in an initial position of a bimetal sheet, the difference in resistance value, the deviation in the manufacturing accuracy of various mating parts, or numerous current specifications encompassed in the same housing and different current spans under different current specifications, and the like in a thermomagnetic system, two-gear debugging is hardly carried out for the product, but one debugging will result in low qualification rate, so the angles of large and small gears may be extreme. In addition, due to the limited product space and the existing process levels, the adjustment range is hardly increased by additional adjusting screws.

SUMMARY OF THE INVENTION

[0003] The present invention aims to overcome the defects of the prior art and provide a low-voltage switching device with a simple structure, high reliability and high adjustment accuracy.

[0004] In order to achieve the above object, the present invention adopts the following technical solutions:

A low-voltage switching device, comprising an operating mechanism, a differential system and a compensating mechanism, wherein the compensating mechanism comprises a support, as well as a lever and a cam rotationally assembled on the support; a sliding block is slidably assembled on the support; a compensating tab which cooperates with the lever and the differential system respectively is disposed on the sliding block; the differential system drives the lever to rotate by pushing the compensating tab to rotate so as to trigger the operating mechanism to trip; an adjusting screw is disposed between the cam and the sliding block; and the sliding block drives the compensating tab to move by rotating the cam or the adjusting screw so as to adjust a distance between the compensating tab and the lever.

[0005] Further, the compensating tab and the adjusting screw are assembled on the same side of the sliding block; a first end of the compensating tab cooperates with a first end of the lever, a second end of the compensating tab cooperates with a differential plate of the differential system, and a second end of the lever cooperates with a lock buckle of the operating mechanism; and one end of the adjusting screw cooperates with a rotating shaft of the cam, and the other end of the adjusting screw is used for rotational operation of the adjusting screw.

[0006] Further, the cam is provided with a contact portion; the contact portion comprises an adjusting surface cooperating with the adjusting screw; a radial distance between the adjusting surface and the rotating shaft of the cam is not exactly equal; and in the rotation process of the cam, the sliding block drives the compensating tab to move in a direction close to or away from the lever through the cooperation of the adjusting surface and the adjusting screw.

[0007] Further, an elastic member is also assembled between the sliding block and the support, and provides an elastic driving force for the sliding block to move along the support.

[0008] Further, a guide structure that provides a guiding effect for the movement of the sliding block is also disposed between the sliding block and the support.

[0009] Further, a connecting portion is disposed on the support; the connecting portion, the lever and the sliding block are sequentially provided with a corresponding first connecting hole, second connecting hole and third connecting hole; the lever is disposed to sleeve the connecting portion through its second connecting hole; the sliding block is slidably assembled above the lever; and the rotating shaft of the cam sequentially passes through the third connecting hole and the second connecting hole and is then in rotating fit with the first connecting hole, such that the support, the lever, the cam and the sliding block are connected into a whole.

[0010] Further, a columnar boss as the connecting portion is disposed to protrude from the surface on one side of the support; the first connecting hole is formed in the middle of the connecting portion; one end surface of the support is provided with a connecting groove; one end of the elastic member disposed between the sliding block and the support is fixed inside the connecting groove, and the other end of the elastic member is connected to the sliding block; a guide protrusion is disposed to protrude from one end of the support; the guide protrusion and the connecting portion are located on the same side of the support; and a guide groove which cooperates with the sliding block is formed in the middle of the guide protrusion.

[0011] Further, one end surface of the sliding block is provided with a mounting groove; a pair of mating holes is formed in the mounting groove; a pair of connecting protrusions which are in rotating fit with the mating holes are formed in two sides of the compensating tab; two ends of the compensating tab extend out of the mounting groove and cooperate with the lever and the differential plate of the differential system, respectively; a mounting portion is disposed to protrude from the surface of the

sliding block; the mounting portion is provided with a screw hole for the adjusting screw to assemble; a rounded long hole as the third connecting hole is formed in the middle of the sliding block; and the third connecting hole allows the rotating shaft of the cam to pass through.

[0012] Further, the other end of the sliding block is bent to extend toward one side away from the mounting portion to form an extension; a guide portion is disposed to protrude from a sidewall of the sliding block between the extension and the third connecting hole; and a fixing portion is disposed to protrude from one side, facing the support, of the extension.

[0013] Further, the lever comprises a connecting plate provided with the second connecting hole in the middle; a first contact arm is disposed at a first end of the connecting plate; an abutting portion which is used for cooperating with the compensating tab is disposed at one end of the first contact arm away from the second connecting hole; a second contact arm is disposed at a second end of the connecting plate; and one end of the second contact arm away from the second connecting hole extends out of the support and cooperates with a lock buckle of the operating mechanism.

[0014] Further, the cam comprises an operating portion and a rotating shaft which are integrally formed; one end of the rotating shaft is connected to the operating portion, and the other end of the rotating shaft sequentially passes through the sliding block and the lever and is rotating fit with the support; a contact portion surrounding the outside of the rotating shaft is disposed to protrude from a junction between the operating portion and the rotating shaft; an arc surface of the contact portion is used as the adjusting surface to cooperate with the adjusting screw; and a radius of the arc surface gradually increases.

[0015] Further, the operating mechanism comprises a rotatable lock buckle; the lever rotates to push the lock buckle to rotate, so that a locking structure formed by the cooperation of the lock buckle and the operating mechanism disintegrates; the differential system comprises a first guide plate, a second guide plate and a differential plate connected between the first guide plate and the second guide plate; and when the first guide plate or the second guide plate is pushed, the differential plate actuates to push the compensating tab to rotate.

[0016] According to the low-voltage switching device of the present invention, the sliding block, the cam and the lever of the compensating mechanism cooperate with one another, and the sliding block is adjusted by the adjusting screw or the cam to indirectly adjust a distance between the compensating tab and the lever, so that the whole compensating mechanism is more compact in structure, and is capable of completing compensation adjustment only in a small space.

[0017] In addition, the contact portion which cooperates with the adjusting screw adopts a planar spiral body structure in which the radius of an arc surface gradually increases, which improves the adjustment accuracy of the compensating mechanism.

[0018] In addition, the elastic member is disposed between the sliding block and the support and provides an elastic driving force for the sliding block through an elastic deformation, which improves the cooperation degree between the sliding block and the support. By disposing the guide structure between the sliding block and the support, the adjustment accuracy is prevented from being affected by unnecessary shaking of the sliding block during movement.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

FIG. 1 is a schematic structural diagram of a low-voltage switching device of the present invention;

FIG. 2 is a schematic structural diagram (front view) of a compensating mechanism in the low-voltage switching device of the present invention;

FIG. 3 is a schematic structural diagram (side view) of the compensating mechanism in the low-voltage switching device of the present invention;

FIG. 4 is a schematic exploded view of the compensating mechanism in the low-voltage switching device of the present invention;

FIG. 5 is a schematic structural diagram of a support in the low-voltage switching device of the present invention;

FIG. 6 is a schematic structural diagram of a cam in the low-voltage switching device of the present invention;

FIG. 7 is a schematic structural diagram of a lever in the low-voltage switching device of the present invention;

FIG. 8 is a schematic structural diagram of a sliding block in the low-voltage switching device of the present invention; and

FIG. 9 is a schematic structural diagram of a compensating tab in the low-voltage switching device of the present invention.

DETAILED DESCRIPTIONS OF THE PREFERRED EMBODIMENTS

[0020] The specific implementation of a low-voltage switching device of the present invention will be further described below with reference to the embodiments given in FIGS. 1 to 9. The low-voltage switching device of the present invention is not limited to the description of the following embodiments.

[0021] The low-voltage switching device includes an operating mechanism 1, a differential system and a compensating mechanism 3, wherein the compensating mechanism 3 includes a support 31, as well as a lever 33 and a cam 32 rotationally assembled on the support 31; a sliding block 34 is slidably assembled on the support 31; a compensating tab 35 which cooperate with the lever

33 and the differential system respectively is disposed on the sliding block 34; the differential system drives the lever 33 to rotate by pushing the compensating tab 35 to rotate so as to trigger the operating mechanism 1 to trip; an adjusting screw 36 is disposed between the cam 32 and the sliding block 34; and the sliding block 34 drives the compensating tab 35 to move by rotating the cam 32 or the adjusting screw 36 so as to adjust a distance between the compensating tab 35 and the lever 33.

[0022] According to the low-voltage switching device of the present invention, the sliding block 34, the cam 32 and the lever 33 of the compensating mechanism 3 cooperate with one another, and the sliding block 32 is adjusted by the adjusting screw 36 or the cam 32 to indirectly adjust the distance between the compensating tab 35 and the lever 33, so that the whole compensating mechanism 3 is more compact in structure, and is capable of completing compensation adjustment only in a small space.

[0023] Combined with a detailed embodiment provided in FIGS. 1 to 9, the low-voltage switching device includes a housing. A contact mechanism, an operating mechanism 1, a thermomagnetic system and a differential system are disposed in the housing. The operating mechanism 1 controls a circuit to be switched on and off by driving a moving contact of the contact mechanism to be in contact with or disconnected from a static contact. The operating mechanism 1 includes a rotatable lock buckle (not shown), which forms a locking structure by cooperating with the operating mechanism 1. In the event of an abnormal state such as overload in the circuit, the thermomagnetic system triggers the differential system to unlock the operating mechanism 1. As shown in FIG. 1, in this embodiment, the differential system includes a first guide plate 21, a second guide plate 22 and a differential plate 23 cooperating with the first guide plate 21 and the second guide plate 22. The thermomagnetic system includes a bimetal sheet 4, wherein one end of the bimetal sheet 4 extends into a gap between the first guide plate 21 and the second guide plate 22. When the bimetal sheet 4 is bent by heating to push the first guide plate 21 or the second guide plate 22, the differential plate 23 actuates by pushing the lock buckle to rotate, so that the locking structure of the operating mechanism 1 disintegrates, thereby achieving tripping.

[0024] The compensating mechanism 3 is also disposed inside the housing. The compensating mechanism 3 is connected between the differential system and the operating mechanism 1. The compensating mechanism 3 can adjust a tripping stroke of the product. After a working environment temperature of the product changes, the action characteristics still meet requirements. That is, the differential plate 23 triggers the lock buckle to rotate through the compensating mechanism 3, such that the operating mechanism 1 trips.

[0025] The compensating mechanism 3 includes a support 31. The support 31 is used to fix the compensating mechanism 3 in the housing. Preferably, the support 31 is used to dispose the compensating mechanism 3 on one side of the operating mechanism 1. The lever 33 and the cam 32 are rotatably assembled on the support 31. The sliding block 34 which is connected to the lever 33 and the cam 32 respectively is disposed on the support 31, and the lever 33, the cam 32, the sliding block 34 and the support 31 are formed into a whole. Specifically, the support 31 is provided with a connecting portion 312. A second connecting hole 332 is formed in the middle of the lever 33. The lever 33 is disposed to sleeve the connecting portion 312 through the second connecting hole 332, such that the lever 33 is in rotating fit with the support 31. A first connecting hole 311 is formed in the middle of the connecting portion 312. A third connecting hole 343 which corresponds to the first connecting hole 311 is formed in one side of the sliding block 34. The sliding block 34 is slidably assembled on the support 31 and located above the lever 33. A rotating shaft 322 of the cam 32 sequentially passes through the third connecting hole 343 and the second connecting hole 332 and is then in rotating fit with the first connecting hole 311, such that the support 31, the lever 33, the cam 32 and the sliding block 34 are connected into a whole. Therefore, the compensating mechanism 3 is compact in whole structure and high in cooperation degree, and occupies a small space inside the housing.

[0026] The lever 33 cooperates with the lock buckle of the operating mechanism 1. A compensating tab 35 and an adjusting screw 36 are disposed on the sliding block 34. The compensating tab 35 is rotatably disposed on the sliding block 34. Two ends of the compensating tab 35 cooperate with the lever 33 and the differential plate 23 of the differential system, respectively. The differential plate 23 pushes the compensating tab 35 to rotate, such that the lever 33 rotates to trigger the operating mechanism 1 to trip. The adjusting screw 36 is located between the cam 32 and the sliding block 34. The sliding block 34 moves away from or close to the lever 33 by rotating the cam 32 or the adjusting screw 36, such that the compensating plate 35 is indirectly driven by the sliding block 34, thereby realizing the compensation between the operating mechanism 1 and the differential system.

[0027] Preferably, the cam 32 is provided with a contact portion 323. The contact portion 323 includes an adjusting surface cooperating with the adjusting screw 36. A radial distance between the adjusting surface and the rotating shaft 322 of the cam 32 is not exactly equal, that is, the contact portion 323 has a diameter-variable contact surface. In the rotation process of the cam 32, the sliding block 34 drives the compensating tab 35 to move in a direction close to or away from the lever 33 through the cooperation of the adjusting surface and the adjusting screw 36. In this embodiment, the contact portion 323 may be a planar spiral body disposed around the rotating shaft 322. A radius of an arc surface of the planar spiral body gradually increases from inside to outside, and the arc surface of the planar spiral body is used as an adjusting surface to cooperate with the adjusting screw 36.

Of course, the contact portion 323 may also be a disc body surrounding the rotating shaft 322. A plurality of groove structures of different depths or an annular groove having a gradually increasing depth is formed in the circumferential side of the disc body. The groove structure or the groove bottom surface of the annular groove is used as the adjusting surface. By rotating the cam 32, the adjusting screw 36 corresponds to different groove structures or the groove bottom surfaces of different lengths of the annular groove, so that a radial distance between the adjusting surface and the rotating shaft 322 is not exactly equal, which is conducive to improving the adjustment accuracy of the compensating mechanism 3.

[0028] The sliding block 34 is slidably installed on the support 31. Preferably, an elastic member 37 is also assembled between the sliding block 34 and the support 31 and produces an elastic deformation in the movement process of the sliding block 34. The elastic deformation provides an elastic driving force for the sliding block 34 to move on one side of the support 31, which improves the cooperation degree between the sliding block 34 and the support 31. Further, a guide structure is also provided between the sliding block 34 and the support 31. The guide structure is used to provide a guiding effect for the movement of the sliding block 34, which prevents the adjustment accuracy from being affected by unnecessary shaking of the sliding block 34.

[0029] Combined with FIGS. 2 to 5, a specific structure of the support 31 is provided. The support 31 is a blocky structure as a whole. A columnar boss which serves as the connecting portion 312 is disposed to protrude from the surface on one side of the support 31. In FIG. 4, the connecting portion 312 is located in the middle of the upper surface of the support 31, and a first connecting hole 311 is formed in the middle of the connecting portion 312. A connecting groove 313 is formed in one end surface of the support 31. In FIG. 4, the connecting groove 313 is located in the front end surface of the support 31, and the elastic member 37 is assembled in the connecting groove 313. In this embodiment, the elastic member 37 is a spring, wherein two ends of the spring are connected to the connecting groove 313 and the sliding block 34, respectively. In this way, when the sliding block 34 moves along one side of the support 31, the deformation of the spring provides an elastic driving force for the sliding block 34. A guide protrusion 314 is disposed at one end of the support 31. In FIG. 4, the guide protrusion 314 is formed by the upward protruding extension of the edge on the front end surface of the support 31. At this time, the guide protrusion 314 and the connecting portion 312 jointly protrude from the upper surface of the support 31, and a guide groove 315 is formed in the middle of the guide protrusion 314. In FIG. 5, the guide groove 315 penetrates through the front and rear sides of the guide protrusion 314. Preferably, an avoidance opening is formed in a central area on the upper part of the guide groove 315, such that other portions of the sliding block 34 pass through in conjunction with the avoidance opening. Of course, when the guide protrusion 314 is sufficient to accommodate the sliding block 34, it is also possible not to provide an avoidance opening, but the support 31 will be too large in volume.

[0030] Combined with FIGS. 2 to 4, and 8, a specific structure of the sliding block 34 is provided. A mounting groove 341 is formed in one end surface of the sliding block 34. In FIG. 8, the mounting groove 341 is located in the left end surface of the sliding block 34, and a pair of opposing mating holes 3411 is formed in the mounting groove 341. In FIG. 8, the mating holes 3411 are located in the upper and lower sidewalls of the mounting groove 341, respectively; and a mounting portion 342 is disposed to protrude from the surface on one end of the sliding block 34. In FIG. 8, the mounting portion 342 is located on the upper sidewall edge of the mounting groove 31. A screw hole 3421 for the adjusting screw 36 to be assembled is formed in the middle of the mounting portion 342. The screw hole 3421 is a threaded hole with two ends being penetrated. One end of the adjusting screw 36 serves as an adjusting end to face the cam 32, and the other end of the adjusting screw 36 serves as an operating end. The extension amount of the adjusting end of the adjusting screw 36 is adjusted by rotating the operating end, so as to adjust a spacing between the sliding block 34 and the cam 32. A third connecting hole 343 is formed in the middle of the sliding block 34. Preferably, the third connecting hole 343 adopts a long groove-shaped perforated structure, so the movement of the sliding block 34 on the support 31 is not interfered while the rotating shaft 322 of the cam 32 pass through the third connecting hole. The other end of the sliding block 34 is bent to the side away from the mounting portion 342 to form an extension 344. In this embodiment, the extension 344 is located at the right end of the sliding block 34 and is bend downward to face the support 1. The extension 344 is bent to face the right end surface of the support 31. A fixing portion 3411 is disposed to protrude from one side, facing the support 31, of the extension 344. The fixing portion 3441 is connected to one end of the elastic member 37. A guide portion 345 is disposed on the sliding block 34 between the extension 344 and the third connecting hole 343. Preferably, the guide portion 345 is located on the sidewall of the sliding block 34, avoiding increasing the height of the sliding block 34 and interfering with the cooperation between the sliding block 34 and the cam 32 as well as the lever 33. In this embodiment, the guide portion 345 is formed by the protrusion of the lower edge of the sliding block 34 between the extension 344 and the third connecting hole 343 to both sides. The guide portion 345 cooperates with the guide groove 315 of the guide protrusion 314. Preferably, the upper and lower parts and sidewalls of the guide groove 315 are fitted to the upper and lower parts and sidewalls of the guide portion 345, respectively, to prevent unnecessary shaking of the sliding block 34 during movement.

[0031] As shown in FIGS. 2 to 4, and FIG. 9, a con-

necting protrusion 353 is disposed on each of two sides in the middle of the compensating tab 35. The compensating tab 35 is rotatably assembled in the mounting groove 341 through the connecting protrusions 352 and the mating holes 3411. In this embodiment, the compensating tab 35 and the adjusting screw 36 are located on the same side of the sliding block 34. Preferably, each connecting protrusion 353 is located to deviate from a central position of the compensating tab 35, so that the compensating tab 35 has a short arm 351 and a long arm 352 of varying lengths, wherein the short arm 351 serves as a first end to extend out of the mounting groove 341 and to cooperate with the lever 33, and the long arm 352 serves as a second end to extend out of the mounting groove 341 and to cooperate with the differential plate 23 of the differential system.

[0032] As shown in FIGS. 2 to 4, and FIG. 7, the lever 33 includes an integrated connecting plate 331, as well as a first contact arm 333 and a second contact arm 334 which are located at both ends of the connecting plate 331. A through hole which serves as the second connecting hole 332 is formed in the middle of the connecting plate 331. The second connecting hole 332 is in rotating fit with the connecting portion 312 of the support 31. The first contact arm 333 is located at a first end of the connecting plate 331, and an abutting portion 3331 which is used to cooperate with the compensating tab 35 is disposed at one end of the first contact arm 333 away from the second connecting hole 332. The second contact arm 334 is located at a second end of the connecting plate 331, and one end of the second contact arm 334 away from the second connecting hole 332 extends out of the support 31 and cooperates with the lock buckle of the operating mechanism 1. In this embodiment, the first contact arm 333 and the second contact arm 334 are disposed along a central axis of the connecting plate 331. Preferably, the first contact arm 333 and the second contact arm 334 are each of a strip-shaped plate structure. The abutting portion 3331 is located on a board surface (a left board surface of the first contact arm 333 in FIG. 7) on one side, facing the lever 33, of the first contact arm 333, wherein the length of the first contact arm 333 is less than that of the second contact arm 334. As shown in FIGS. 1, 2 and 4, when the bimetal sheet 4 of the thermomagnetic system moves the differential plate 23 to the left, the differential plate 23 rotates clockwise by pushing a second contact piece of the compensating tab 35. The second contact arm 334 of the compensating tab 35 rotates clockwise in response to the abutting portion 3331 pushing the lever 33, so that the second end of the lever 33 pushes the lock buckle to rotate for unlocking.

[0033] As shown in FIGS. 2 to 4, and 6, the cam 32 includes an operating portion 321 and a rotating shaft 322 which are integrally formed, wherein a groove for the cam 32 to rotate is formed in an outward end (the end extending out of the housing) of the operating portion 321. In FIG. 1 and FIG. 4, the groove for operating the cam 32 to rotate is a cross groove, and a baffle 3211 is disposed at the other end of the operating portion 321. The baffle 3211 cooperates with the mounting portion 342, such that the adjusting screw 36 is disposed on the mounting portion 342 to face the rotating shaft 322. One end of the rotating shaft 322 is connected to the operating portion 321, and the other end of the rotating shaft 322 sequentially passes through the sliding block 34 and the lever 33 and is in rotating fit with the support 31, that is, sequentially passes through the third connecting hole 343 and the second connecting hole 332 and is in rotating fit with the first connecting hole 311. A contact portion 323 surrounding the outside of the rotating shaft 322 is disposed to protrude from the junction between the operating portion 321 and the rotating shaft 322. In this embodiment, preferably, the central axis of the adjusting screw 36 is perpendicular to the central axis of the rotating shaft 322. The contact portion 323 is a planar spiral body having an arc surface with a gradually increasing radius, and the arc surface of the contact portion 323 is used as an adjusting surface to cooperate with the adjusting screw 36. The arc surface of varying radius cooperates with the adjusting screw 36 by rotating the cam 32, such that the sliding block 34 moves to drive the compensating tab 35 to move. In this embodiment, as shown in FIGS. 1 and 2, the cam 32 is rotated clockwise, the adjusting screw 36 gradually contacts the arc surface with a large radius, the sliding block 34 shifts to the left, and the compensating tab 35 also shifts to the left. At this time, a distance between the compensating tab 35 and the lever 33 increases, and conversely, a distance between the lever 33 and the compensating tab 35 decreases. Alternatively, by rotating the adjusting screw 36 and by changing an extension length of the adjusting screw 36, the adjusting screw 36 moves the sliding block 34 in conjunction with the arc surface of the same radius and drives the compensating tab 35 to move, thereby changing the distance between the compensating tab 35 and the differential plate 23. Therefore, the low-voltage switching device achieves fine adjustment of early trip or no trip in a specified current gear.

[0034] The above content is a further detailed description of the present invention in conjunction with specific preferred embodiments, but it cannot be regarded that the specific embodiments of the present invention are limited to these descriptions. For a person of ordinary skill in the art to which the present invention belongs, without departing from the idea of the present invention, a number of simple deductions or replacements may be made, which should be regarded as falling within the protection scope of the present invention.

Claims

1. A low-voltage switching device, comprising an operating mechanism (1), a differential system and a compensating mechanism (3), wherein the compen-

sating mechanism (3) comprises a support (31), as well as a lever (33) and a cam (32) rotationally assembled on the support (31); a sliding block (34) is slidably assembled on the support (31); a compensating tab (35) which cooperates with the lever (33) and the differential system respectively is disposed on the sliding block (34); the differential system drives the lever (33) to rotate by pushing the compensating tab (35) to rotate so as to trigger the operating mechanism (1) to trip; an adjusting screw (36) is disposed between the cam (32) and the sliding block (34); and the sliding block (34) drives the compensating tab (35) to move by rotating the cam (32) or the adjusting screw (36) so as to adjust a distance between the compensating tab (35) and the lever (33).

2. The low-voltage switching device according to claim 1, wherein the compensating tab (35) and the adjusting screw (36) are assembled on the same side of the sliding block (34); a first end of the compensating tab (35) cooperates with a first end of the lever (33), a second end of the compensating tab (35) cooperates with a differential plate (23) of the differential system, and a second end of the lever (33) cooperates with a lock buckle of the operating mechanism (1); and one end of the adjusting screw (36) cooperates with a rotating shaft (322) of the cam (32), and the other end of the adjusting screw (36) is used for rotational operation of the adjusting screw (36).

3. The low-voltage switching device according to claim 1, wherein the cam (32) is provided with a contact portion (323); the contact portion (323) comprises an adjusting surface cooperating with the adjusting screw (36); a radial distance between the adjusting surface and a rotating shaft (322) of the cam (32) is not exactly equal; and in the rotation process of the cam (32), the sliding block (34) drives the compensating tab (35) to move in a direction close to or away from the lever (33) through the cooperation of the adjusting surface and the adjusting screw (36).

4. The low-voltage switching device according to claim 1, wherein an elastic member (37) is also assembled between the sliding block (34) and the support (31), and provides an elastic driving force for the sliding block (34) to move along the support (31).

5. The low-voltage switching device according to claim 1, wherein a guide structure that provides a guiding effect for the movement of the sliding block (34) is also disposed between the sliding block (34) and the support (31).

6. The low-voltage switching device according to claim 1, wherein a connecting portion (312) is disposed on the support (31); the connecting portion (312), the lever (33) and the sliding block (34) are sequentially provided with a corresponding first connecting hole (311), a second connecting hole (332) and a third connecting hole (343); the lever (33) is disposed to sleeve the connecting portion (312) through its second connecting hole (332); the sliding block (34) is slidably assembled above the lever (33); and a rotating shaft (322) of the cam (32) sequentially passes through the third connecting hole (343) and the second connecting hole (332) and is then in rotating fit with the first connecting hole (311), such that the support (31), the lever (33), the cam (32) and the sliding block (34) are connected into a whole.

7. The low-voltage switching device according to claim 1, wherein a columnar boss as a connecting portion (312) is disposed to protrude from the surface on one side of the support (31); a first connecting hole (311) is formed in the middle of the connecting portion (312); one end surface of the support (31) is provided with a connecting groove (313); one end of a elastic member (37) disposed between the sliding block (34) and the support (31) is fixed inside the connecting groove (313), and the other end of the elastic member (37) is connected to the sliding block (34); a guide protrusion (314) is disposed to protrude from one end of the support (31); the guide protrusion (314) and the connecting portion (312) are located on the same side of the support (31); and a guide groove (315) which cooperates with the sliding block (34) is formed in the middle of the guide protrusion (314).

8. The low-voltage switching device according to claim 1, wherein one end surface of the sliding block (34) is provided with a mounting groove (341); a pair of mating holes (3411) is formed in the mounting groove (341); a pair of connecting protrusions (353) which are in rotating fit with the mating holes (3411) are formed in two sides of the compensating tab (35); two ends of the compensating tab (35) extend out of the mounting groove (341) and cooperate with the lever (33) and a differential plate (23) of the differential system, respectively; a mounting portion (342) is disposed to protrude from the surface of the sliding block (34); the mounting portion (342) is provided with a screw hole (3421) for the adjusting screw (36) to assemble; a rounded long hole as the third connecting hole (343) is formed in the middle of the sliding block (34); and the third connecting hole (343) allows a rotating shaft (322) of the cam (32) to pass through.

9. The low-voltage switching device according to claim 8, wherein the other end of the sliding block (34) is bent to extend toward one side away from the mounting portion (342) to form an extension (344); a guide

portion (345) is disposed to protrude from a sidewall of the sliding block (34) between the extension (344) and the third connecting hole (343); and a fixing portion (3441) is disposed to protrude from one side, facing the support (31), of the extension (344).

10. The low-voltage switching device according to claim 1, wherein the lever (33) comprises a connecting plate (331) provided with a second connecting hole (332) in the middle; a first contact arm (333) is disposed at a first end of the connecting plate (331); an abutting portion (3331) which is used for cooperating with the compensating tab (35) is disposed at one end of the first contact arm (333) away from the second connecting hole (332); a second contact arm (334) is disposed at a second end of the connecting plate (331); and one end of the second contact arm (334) away from the second connecting hole (332) extends out of the support (31) and cooperates with a lock buckle of the operating mechanism (1).

11. The low-voltage switching device according to claim 1, wherein the cam (32) comprises an operating portion (321) and a rotating shaft (322) which are integrally formed; one end of the rotating shaft (322) is connected to the operating portion (321), and the other end of the rotating shaft (322) sequentially passes through the sliding block (34) and the lever (33) and is rotating fit with the support (31); a contact portion (323) surrounding the outside of the rotating shaft (322) is disposed to protrude from a junction between the operating portion (321) and the rotating shaft (322); an arc surface of the contact portion (323) is used as the adjusting surface to cooperate with a adjusting screw (36); and a radius of the arc surface gradually increases.

12. The low-voltage switching device according to claim 1, wherein the operating mechanism (1) comprises a rotatable lock buckle; the lever (33) rotates to push the lock buckle to rotate, so that a locking structure formed by the cooperation of the lock buckle and the operating mechanism (1) disintegrates; the differential system comprises a first guide plate (21), a second guide plate (22) and a differential plate (23) connected between the first guide plate (21) and the second guide plate (22); and when the first guide plate (21) or the second guide plate (22) is pushed, the differential plate (23) actuates to push the compensating tab (35) to rotate.

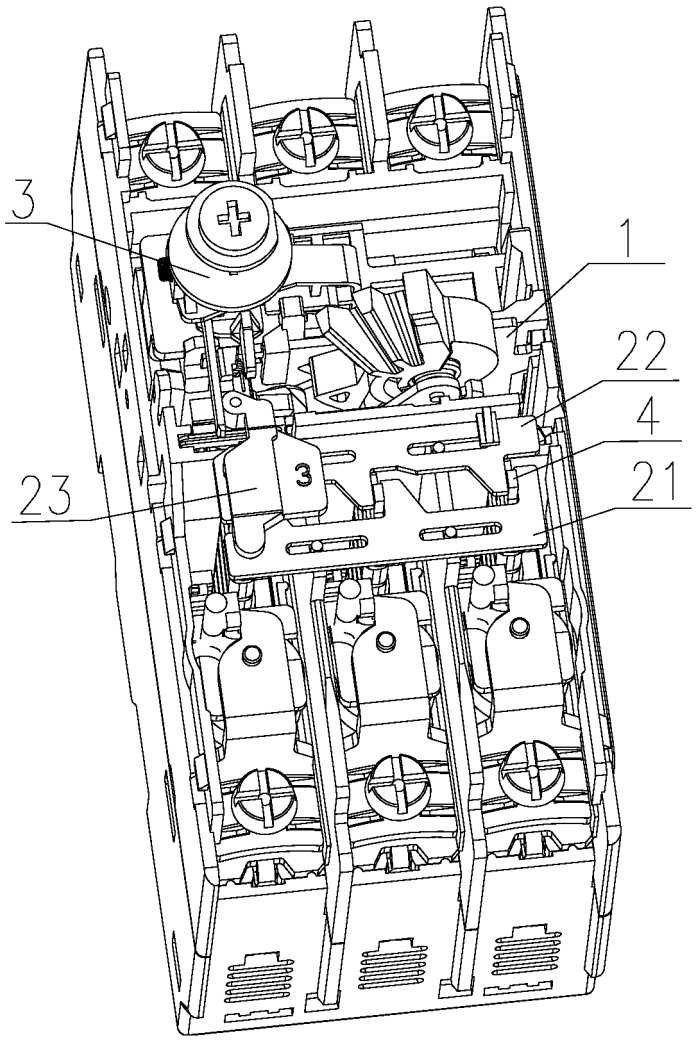

Fig. 1

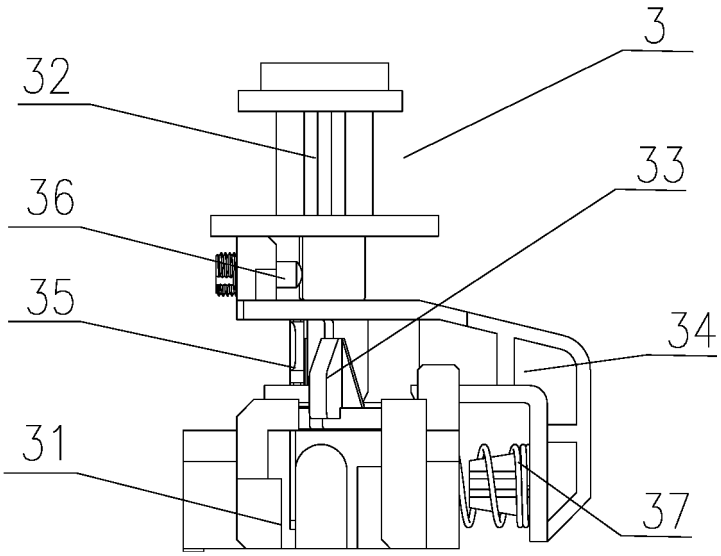

Fig. 2

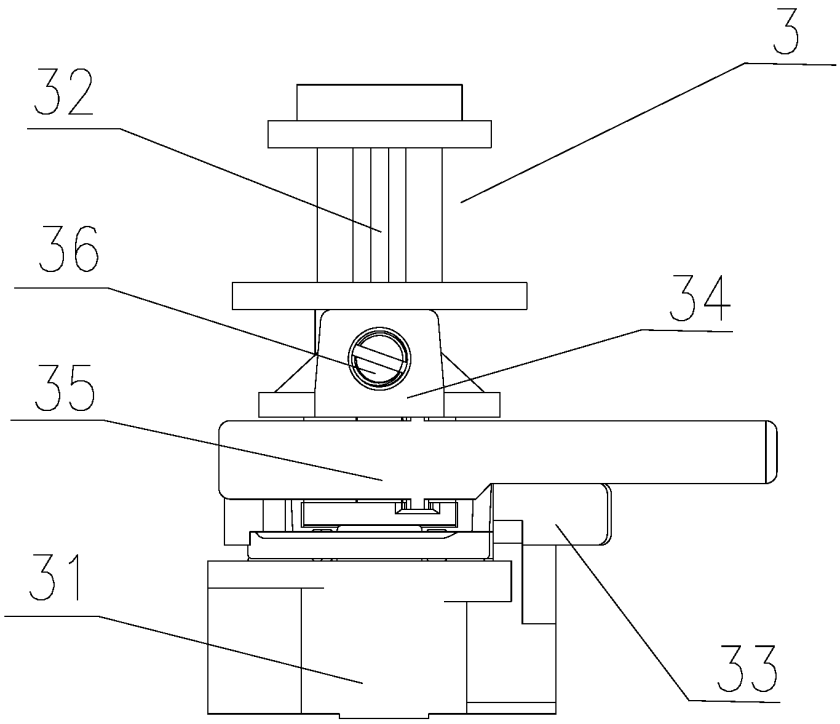

Fig. 3

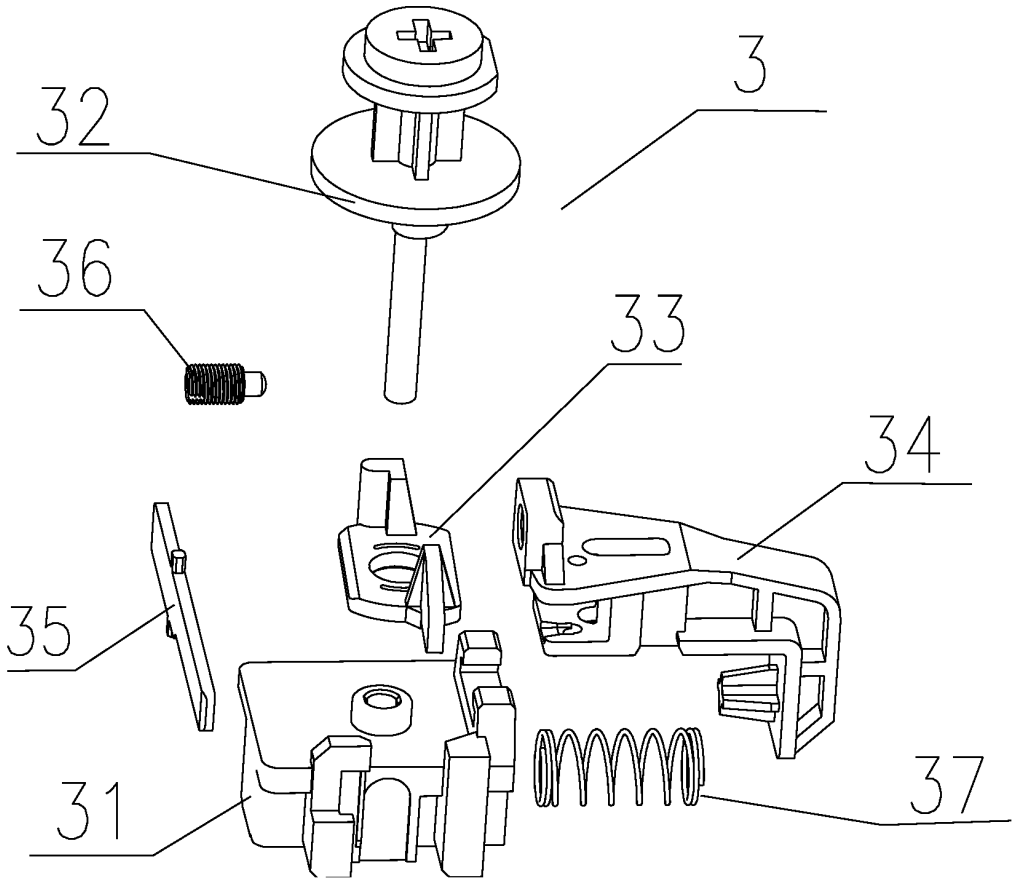

Fig. 4

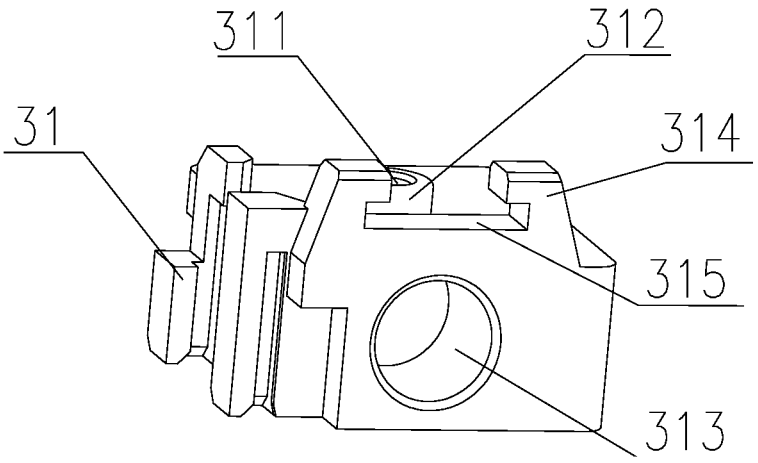

Fig. 5

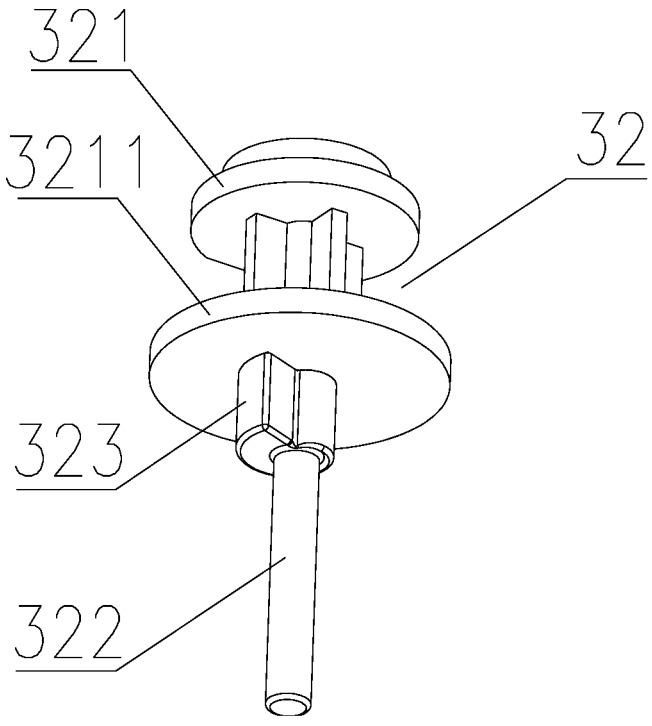

Fig. 6

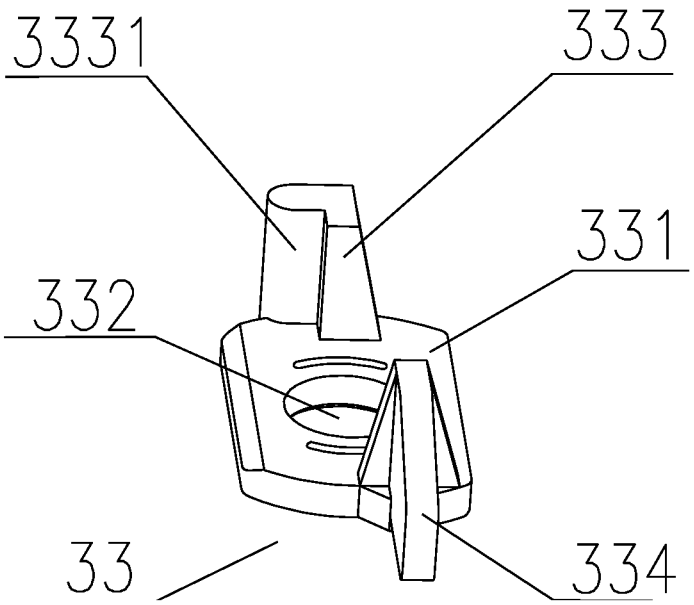

Fig. 7

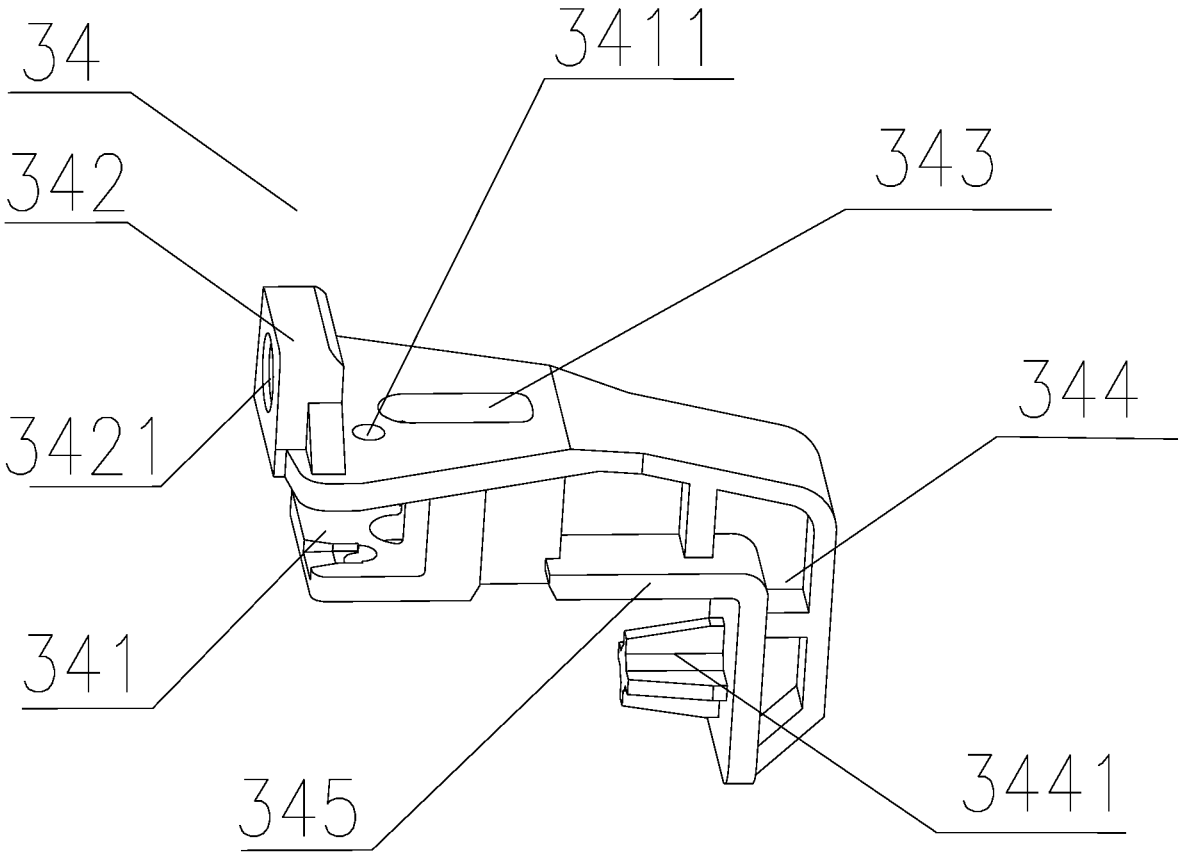

Fig. 8

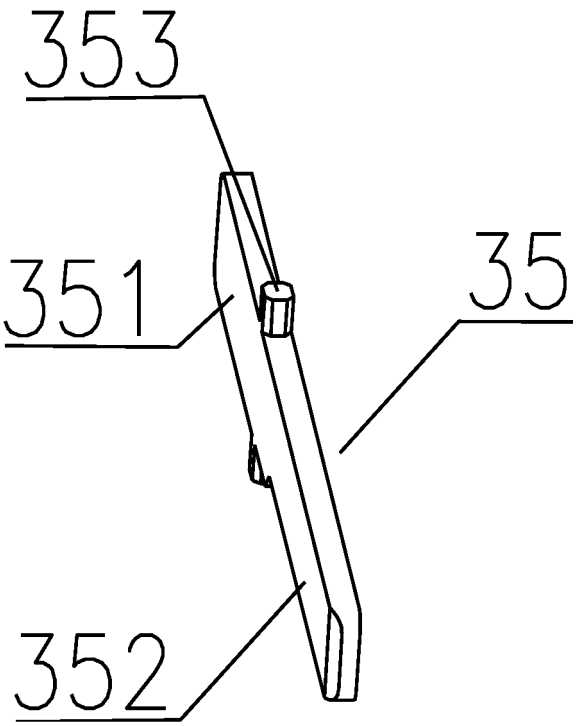

Fig. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/107724

A. CLASSIFICATION OF SUBJECT MATTER

H01H 71/74(2006.01)i; H01H 71/10(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)

H01H71/-

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; VCN; VEN; ENTXT: H01H71, H01H73, H01H3, 差动, 过载, 补偿, 调节, 调试, 脱扣, 杠杆, 断路器, 凸轮, differential, overload, compensat+, adjust+, trip+, breaker, cam, rod, lever

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 216054342 U (SHANGHAI CHINT INTELLIGENT TECHNOLOGY CO., LTD.) 15 March 2022 (2022-03-15) claims 1-12	1-12
A	CN 101436494 A (FUJI ELECTRIC FA COMPONENTS & SYSTEMS CO., LTD.) 20 May 2009 (2009-05-20) entire document	1-12
A	JP 2001345038 A (FUJI ELECTRIC CO., LTD.) 14 December 2001 (2001-12-14) entire document	1-12
A	CN 207587663 U (ZHEJIANG CHINT ELECTRIC APPLIANCE CO., LTD.) 06 July 2018 (2018-07-06) entire document	1-12

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

* Special categories of cited documents:
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"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
08 October 2022	**24 October 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/CN2022/107724

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
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CN	101436494	A	20 May 2009	US	2009128077	A1	21 May 2009
				JP	2009123515	A	04 June 2009
				CN	101436494	B	27 February 2013
				US	8063600	B2	22 November 2011
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CN	207587663	U	06 July 2018	CN	109509689	A	22 March 2019

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