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(54) **AUXILIARY SWITCH**

(57) Disclosed in the present invention is an auxiliary switch, having a housing, in which are provided the following: an operating handle; a trip assembly; a connecting rod assembly; a first locking rod, having a first drive part and a second drive part, wherein the connecting rod assembly can drive the first locking rod, to enable the first drive part to engage with or disengage from the trip assembly; a resettable first rotating plate, connected to the second drive part and capable of being driven by the first locking rod, with a first moving contact being disposed on the first rotating plate; a resettable second ro-

tating plate, with a second moving contact being disposed thereon; and a second locking rod, resettably connected to the housing and capable of locking the second rotating plate, wherein the second locking rod can release the locking of the second rotating plate under the action of a driving force of the first locking rod. The auxiliary switch according to the present invention can not only be used to output an open/closed state of a circuit breaker, but at the same time can also be used to output a fault signal for a circuit in which the circuit breaker is located.

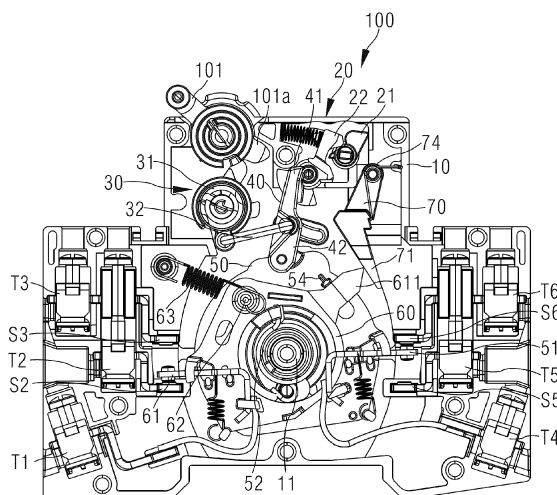


Fig. 1

Description

Technical field

[0001] The present invention relates to the field of low-voltage electricity, in particular to an auxiliary switch which can be used in cooperation with a circuit breaker.

Background art

[0002] In general, existing small circuit breakers have two types of switch in the auxiliary category. One is an auxiliary switch (AS) for outputting a circuit breaker open/closed state; the other is a fault signal contact (FC) for outputting a fault signal of a circuit in which the circuit breaker is located.

[0003] Specifically, according to an auxiliary switch in the prior art, in general, a handle thereof is connected to a handle of the small circuit breaker, and a shared trip arm thereof is connected to a trip arm of the small circuit breaker. An action of the handle or trip arm of the small circuit breaker drives an action of an internal mechanism of the auxiliary switch, realizing the AS function. The FC function is realized by having the handle of the auxiliary switch connected to the handle of the small circuit breaker, and the shared trip arm of the auxiliary switch connected to the trip arm of the small circuit breaker, wherein a handle can only drive mechanism closure, and the trip arm can drive mechanism tripping inside the switch. However, such a switch can only have one function, either AS or FC.

[0004] However, in many scenarios, these two types of switch must be used at the same time, to comprehensively provide feedback on the condition of the small circuit breaker so as to facilitate remote monitoring. If it is necessary for both functions to be possessed simultaneously, two auxiliary switches are needed in order to realize both functions mentioned above; this results in the product structure occupying a large amount of space, having a large number of components, and increased production costs.

Content of the invention

[0005] The object of the present invention is to provide an auxiliary switch with a more compact structure, which can not only be used to output an open/closed state of a circuit breaker, but at the same time can also be used to output a fault signal for a circuit in which the circuit breaker is located.

[0006] The present invention provides an auxiliary switch, for fitting and connecting to a circuit breaker, wherein the auxiliary switch has a housing, in which are provided the following: an operating handle, connected to a handle of the circuit breaker; a trip assembly, connected to a trip arm of the circuit breaker; a connecting rod assembly, which can be driven by the operating handle; a first locking rod, having a first drive part and a sec-

ond drive part, wherein the connecting rod assembly can drive the first locking rod, to enable the first drive part to engage with or disengage from the trip assembly; a resettable first rotating plate, connected to the second drive part and capable of being driven by the first locking rod, wherein a first moving contact located on one side of the housing is disposed on the first rotating plate, and rotation of the first rotating plate can bring the first moving contact into contact with either one of two static contacts located on one side of the housing, to accomplish switching between a first electrical circuit and a second electrical circuit; a resettable second rotating plate, disposed concentrically with the first rotating plate and capable of being driven by the first rotating plate, wherein a second moving contact located on another side of the housing is disposed on the second rotating plate, and rotation of the second rotating plate can bring the second moving contact into contact with either one of two static contacts located on the other side of the housing, to accomplish switching between a third electrical circuit and a fourth electrical circuit; and a second locking rod, resettably connected to the housing and capable of locking the second rotating plate, wherein the second locking rod can release the locking of the second rotating plate under the action of a driving force of the first locking rod. The design described above enables the connection and disconnection of four electrical circuits in the same housing, with the first rotating plate and the second rotating plate being controlled by the first locking rod and the second locking rod respectively, and being capable of realizing different connection/disconnection functions.

[0007] In another schematic embodiment of the auxiliary switch, one end of the second locking rod is rotatably connected to the housing by means of a reset element and can rotate between a first position and a second position; when the second locking rod is in the first position, another end of the second locking rod can engage with and lock the second rotating plate; when the second locking rod is in the second position, the other end of the second locking rod can release the locking of the second rotating plate.

[0008] In another schematic embodiment of the auxiliary switch, the connecting rod assembly comprises: a rotatable coupling element, capable of being fitted and connected to the operating handle; and a drive connecting rod, having one end connected to the coupling element and another end connected to the first locking rod.

[0009] In another schematic embodiment of the auxiliary switch, the first locking rod can rotate between a third position and a fourth position under a driving action of the drive connecting rod; when an engagement relationship between the first drive part and the trip assembly is removed, the first locking rod can move to a fifth position, and drive the second locking rod to the second position; at this time, the second locking rod can release the locking of the second rotating plate.

[0010] In another schematic embodiment of the auxiliary switch, the trip assembly comprises a shared trip

arm, for connecting to the trip arm of the circuit breaker; and a trip bolt, resettably connected to the housing, and capable of engaging with or disengaging from the shared trip arm.

[0011] In another schematic embodiment of the auxiliary switch, the first drive part has an engagement tip capable of engaging with the trip bolt, and a first boss for driving the second locking rod, to enable the first locking rod to better fit and move the second locking rod, and flexibly engage with and be tripped from the trip bolt.

[0012] In another schematic embodiment of the auxiliary switch, a projecting abutment part is disposed on the second rotating plate, and the other end of the second locking rod is provided with a second boss for engaging with the abutment part, in order to ingeniously realize locking and tripping of the second rotating plate by the second locking rod.

[0013] In another schematic embodiment of the auxiliary switch, a recess is also provided on the first boss, and a protruding part adapted to the recess is also disposed in a middle part of the second locking rod, to enable the first locking rod to effectively strike the second locking rod after tripping.

[0014] In another schematic embodiment of the auxiliary switch, a mounting part is disposed in a middle part of the first rotating plate, and a positioning protrusion is disposed on an inner wall of the housing; the mounting part can be disposed so as to surround the positioning protrusion in a rotatable manner, and a torsion spring is disposed on the mounting part, to better realize automatic resetting of the first rotating plate.

[0015] In another schematic embodiment of the auxiliary switch, a drive post is also disposed at an edge of the first rotating plate, to better drive an abutment part on the second rotating plate.

[0016] In another schematic embodiment of the auxiliary switch, a mounting hole is disposed in a middle part of the second rotating plate, and used to accommodate a mounting part on the first rotating plate; a mounting post is also disposed at an edge of the second rotating plate, and used for connecting a tension spring; two ends of the tension spring are connected to the mounting post and an inner wall of the housing respectively, to better realize automatic resetting of the second rotating plate.

[0017] Preferred embodiments are explained below in a clear and easily comprehensible way with reference to the accompanying drawings, to further explain the above-mentioned characteristics, technical features and advantages of the auxiliary switch and embodiments thereof.

Description of the accompanying drawings

[0018] The accompanying drawings below merely illustrate and explain the present invention schematically, without limiting the scope thereof.

Fig. 1 is a schematic structural diagram of a schematic embodiment of the auxiliary switch of the

present invention, with the handle thereof in an OFF position.

Fig. 2 is a schematic structural diagram of a schematic embodiment of the auxiliary switch of the present invention, with the handle thereof in an ON position.

Fig. 3 is a schematic structural diagram of a schematic embodiment of the auxiliary switch of the present invention, with the trip arm thereof in a tripped state.

Fig. 4 is a schematic structural diagram of a schematic embodiment of the first rotating plate of the present invention.

Fig. 5 is a schematic structural diagram of a schematic embodiment of the second rotating plate of the present invention.

Fig. 6 is a schematic structural diagram of a schematic embodiment of the first locking rod of the present invention.

Fig. 7 is a schematic structural diagram of a schematic embodiment of the second locking rod of the present invention.

Key to labels

auxiliary switch	100
housing	10
operating handle	101
drive end	101a
trip assembly	20
shared trip arm	21
trip bolt	22
connecting rod assembly	30
coupling element	31
drive connecting rod	32
first locking rod	40
first drive part	41
engagement tip	411
first boss	412
recess	413
second drive part	42
first rotating plate	50
connecting hole	501
mounting part	511
accommodating groove	511a
hitching post	511b
first moving contact	51
torsion spring	52
drive post	54

(continued)

second rotating plate	60
mounting hole	601
abutment part	611
second moving contact	61
mounting post	62
tension spring	63
second locking rod	70
second boss	71
protruding part	72
step part	73
reset element	74
wiring terminals	T1, T2, T3, T4, T5, T6
static contacts	S2, S3, S5, S6

Particular embodiments

[0019] To enable clearer understanding of the technical features, objectives and effects of the invention, particular embodiments of the present invention are now explained with reference to the accompanying drawings, in which identical labels indicate structurally identical components or components with similar structures but identical functions.

[0020] As used herein, "schematic" means "serving as an instance, example or illustration". No drawing or embodiment described herein as "schematic" should be interpreted as a more preferred or more advantageous technical solution.

[0021] The present invention relates to an auxiliary switch 100, for fitting and connecting to a circuit breaker, e.g. an MCB small circuit breaker.

[0022] Referring to fig. 1, this shows a schematic structural diagram of an auxiliary switch of the present invention when an operating handle is in an OFF position. Fig. 2 is a schematic structural diagram of an auxiliary switch of the present invention when an operating handle is in an ON position. Fig. 3 is a schematic structural diagram of an auxiliary switch of the present invention when a trip arm is in a tripped state. Referring to figs. 1 - 3, an auxiliary switch 100 of the present invention has a housing 10, with two mechanisms being arranged inside the housing 10, namely an AS mechanism and an FC mechanism; the AS mechanism and the FC mechanism can move in linkage, to realize different functions.

[0023] Referring to figs. 1 - 3, specifically, an operating handle 101, a trip assembly 20, a connecting rod assembly 30, a first locking rod 40, a first rotating plate 50, a second rotating plate 60 and a second locking rod 70 are disposed inside the housing 10. The AS mechanism comprises the operating handle 101, the trip assembly 20, the connecting rod assembly 30, the first locking rod 40 and the first rotating plate 50. The FC mechanism comprises the operating handle 101, the trip assembly 20, the connecting rod assembly 30, the second locking rod

70 and the second rotating plate 60. It is worth pointing out that the AS mechanism and the FC mechanism share the operating handle 101, the trip assembly 20 and the connecting rod assembly 30; since an arrangement whereby two mechanisms share some components is used, not only can space be saved, but the cost of components can also be reduced.

[0024] In order to facilitate operation and ensure the compactness of product structure, the auxiliary switch 100 can be connected in parallel with a side part of a circuit breaker; the operating handle 101 is correspondingly connected to a handle of the circuit breaker, while the trip assembly 20 is correspondingly connected to a trip arm of the circuit breaker. Furthermore, the trip assembly 20 further comprises a shared trip arm 21 and a trip bolt 22. The shared trip arm 21 is for connecting to the trip arm of the circuit breaker. The trip bolt 22 is resettably connected to the housing 10, and can engage with or disengage from the shared trip arm 21.

[0025] According to an embodiment of the present invention, referring to figs. 1 to 3, the connecting rod assembly 30 comprises: a coupling element 31 and a drive connecting rod 32. One end of the coupling element 31 can be connected to a drive end 101a of the operating handle 101 by a tooth meshing connection, another end of the coupling element 31 being connected to the drive connecting rod 32; by driving the operating handle 101, the coupling element 31 can be driven in synchronous rotation, at the same time transferring a driving force to the drive connecting rod 32.

[0026] At the same time, another end of the drive connecting rod 32 is connected to the first locking rod 40, in order to transfer the driving force of the operating handle 101 successively through the coupling element 31 and the drive connecting rod 32 to the first locking rod 40.

[0027] Preferably, referring to figs. 1 and 6, the first locking rod 40 has a first drive part 41 and a second drive part 42. The connecting rod assembly 30 can drive the first locking rod 40, to enable the first drive part 41 to engage with or disengage from the trip assembly 20.

[0028] The first rotating plate 50 and the second rotating plate 60 are each connected to an inner wall of the housing 10 by means of a reset element, and can rotate within a predetermined range under the action of a driving force and a restoring force. The second rotating plate 60 is disposed concentrically with the first rotating plate 50, and the second rotating plate 60 can be driven by the first rotating plate 50. A connecting hole 501 is also disposed on the first rotating plate 50, and used for connecting to the second drive part 42, to enable the first rotating plate 50 to be driven by the first locking rod 40.

[0029] It is worth pointing out that six wiring terminals in total, T1, T2, T3, T4, T5 and T6, are disposed on two sides of the housing 10, with three wiring terminals (T1/T2/T3 and T4/T5/T6) being disposed on each side of the housing 10, so that four different electrical circuits can be formed inside the housing 10.

[0030] As a schematic embodiment, the six wiring ter-

minals T1, T2, T3, T4, T5 and T6 are arranged in a symmetrical structure inside the housing 10 to form three pairs. A pair of wiring terminals T1 and T4 remote from the operating handle 101 are connected electrically to a first contact support on the first rotating plate 50 and a second contact support on the second rotating plate 60 respectively by means of soft conductive wires, and each maintain a normally closed state. Two pairs of static contacts S2, S3, S5 and S6 are disposed on the remaining two pairs of wiring terminals T2, T3, T5 and T6 respectively. A first moving contact 51 is disposed on the first rotating plate 50, the first moving contact 51 being located on the first contact support and being located on one side of the housing 10. Through the rotation of the first rotating plate 50, the first moving contact 51 can contact one of the two static contacts S5 and S6 located on the same side, and so can accomplish switching between a first electrical circuit and a second electrical circuit. A second moving contact 61 is disposed on the second rotating plate 60, the second moving contact 61 being located on the second contact support and being located on another side of the housing 10. Through the rotation of the second rotating plate 60, the second moving contact 61 can contact one of the two static contacts S2 and S3 located on the same side, and so can accomplish switching between a third electrical circuit and a fourth electrical circuit.

[0031] It is worth pointing out that the second locking rod 70 is resettably connected to the housing 10 and can lock the second rotating plate 60, and the second locking rod 70 can release the locking of the second rotating plate 60 under the action of a driving force of the first locking rod 40.

[0032] According to a schematic embodiment of the present invention, one end of the second locking rod 70 is rotatably connected to the housing 10 by means of a reset element 74 and can rotate between a first position and a second position. When the second locking rod 70 is in the first position, another end of the second locking rod 70 can engage with and lock the second rotating plate 60. When the second locking rod 70 is in the second position, the other end of the second locking rod 70 can release the locking of the second rotating plate 60.

[0033] The first locking rod 40 can rotate between a third position and a fourth position under a driving action of the drive connecting rod 32. When an engagement relationship between the first drive part 42 and the trip assembly 20 is removed, the first locking rod 40 can move to a fifth position, and drive the second locking rod 70 to the second position; at this time, the second locking rod 70 can release the locking of the second rotating plate 60.

[0034] Referring to figs. 6 and 7, according to an optional embodiment, the first drive part 41 has an engagement tip 411 capable of engaging with the trip bolt 22, and a first boss 412 for driving the second locking rod 70. A projecting abutment part 611 is disposed on the second rotating plate 60; the other end of the second locking rod 70 is provided with a second boss 71 for engaging with the abutment part 611. A recess 413 is also

provided on the first boss 412, and a protruding part 72 is also disposed in a middle part of the second locking rod 70; the shape of the protruding part 72 is adapted to the shape of the recess 413. The second locking rod 70 is also provided with a step part 73, and is enabled by this design to actively give way when struck by the first locking rod 40, so as not to obstruct the continued movement of the first locking rod 40.

[0035] Referring to fig. 4, a mounting part 511 is disposed in a middle part of the first rotating plate 50, the mounting part 511 projecting perpendicularly in the axial direction of the first rotating plate 50, and a positioning protrusion 11 is disposed on an inner wall of the housing 10; the mounting part 511 can be disposed so as to surround the positioning protrusion 11 in a rotatable manner. An accommodating groove 511a and a hitching post 511b are disposed on the mounting part 511, and used to mount a torsion spring 52; the torsion spring 52 enables automatic resetting of the first rotating plate 50.

[0036] Referring to fig. 5, as an optional embodiment, a drive post 54 is also disposed at an edge of the first rotating plate 50, and used to drive the abutment part 611 on the second rotating plate 60. A mounting hole 601 is disposed in a middle part of the second rotating plate 60, and used to accommodate the mounting part 511 on the first rotating plate 50. A mounting post 62 is also disposed at an edge of the second rotating plate 60, and used for connecting a tension spring 63. As shown in the figures, one end of the tension spring 63 is connected to the mounting post 62, the other end of the tension spring 63 being connected to an inner wall of the housing 10; the tension spring 63 enables automatic resetting of the second rotating plate 60.

[0037] To enable those skilled in the art to better understand the present case, the operating process of the auxiliary switch 100 of the present invention is described in detail below with reference to figs. 1 to 3.

[0038] Reference is made to figs. 1 - 2, which show schematic diagrams of the internal structure of the auxiliary switch when the operating handle 101 is moved from the OFF position to the ON position. In the process of closing the operating handle 101, the drive end 101a of the operating handle 101 can drive the coupling element 31 to rotate in an anticlockwise direction; the driving force of the operating handle 101 is transferred successively through the coupling element 31 and the drive connecting rod 32 to the first locking rod 40, which is in the third position. Under the action of the driving force, the first locking rod 40 moves from the third position to the fourth position, and the engagement tip 411 on the first locking rod 40 can at this time engage with the trip bolt 22; at this time, the second drive part 42 of the first locking rod 40 will drive the first rotating plate 50 to rotate in a clockwise direction, and as the position of the moving contact 51 on the first rotating plate 50 changes, the circuit state thereof also changes, e.g. may switch from the first electrical circuit to the second electrical circuit. At the same time, the drive post 54 on the first rotating plate

50 will drive the second rotating plate 60 in synchronous rotation in a clockwise direction, until the abutment part 611 on the second rotating plate 60 engages with the second boss 71 on the second locking rod 70, so the second rotating plate 60 is finally locked; as the position of the moving contact 61 on the second rotating plate 60 changes, the circuit state thereof also changes, e.g. may switch from the third electrical circuit to the fourth electrical circuit, at which time the second locking rod 70 is in the first position.

[0039] If the operating handle is then opened at this time, moving the operating handle 101 from the ON position to the OFF position, the drive end 101a of the operating handle 101 can drive the coupling element 31 to rotate in a clockwise direction; this will cause the engagement tip 411 on the first locking rod 40 to disengage from the trip bolt 22, and the second drive part 42 of the first locking rod 40 drives the first rotating plate 50 to rotate in an anticlockwise direction. At this time, the first locking rod 40 can move from the fourth position to the third position, and as the position of the moving contact 51 on the first rotating plate 50 changes, the circuit state also changes, e.g. may switch from the second electrical circuit to the first electrical circuit. At this time, since the second rotating plate 60 is locked by the second locking rod 70, which is in the first position, the first rotating plate 50 cannot drive the second rotating plate 60 to rotate together therewith, so the circuit state thereof remains unchanged.

[0040] Referring to fig. 3, if the shared trip arm 21 acts and thereby causes the trip bolt 22 to trip, this will cause the engagement tip 411 on the first locking rod 40 to disengage from the trip bolt 22. Due to the tripping of the first locking rod 40, as an accumulated spring force is released, the first locking rod 40 moves from the fourth position to the fifth position, and the first rotating plate 50 rotates in an anticlockwise direction. As the position of the first moving contact 51 changes, the circuit state thereof also changes, e.g. switches from the first electrical circuit to the second electrical circuit. It is worth pointing out that when the first locking rod 40 moves from the fourth position to the fifth position, the first locking rod 40 can effectively strike, by means of the first boss 412 thereon, the protruding part 72 on the second locking rod 70, causing tripping between the second boss 71 on the second locking rod 70 and the abutment part 611 on the second rotating plate 60, and driving the second locking rod 70 from the first position to the second position, thereby releasing the locking of the second rotating plate 60 by the second locking rod 70. The second locking rod 70 then returns to the first position under the action of a restoring force. Since the locking of the second rotating plate 60 has already been released by the second locking rod 70, the second rotating plate 60 can rotate in an anticlockwise direction under the action of an elastic force of the tension spring 63. As the position of the second moving contact 61 changes, the circuit state also changes, e.g. may switch from the fourth electrical circuit to the

third electrical circuit. Thus, through the above design of the present invention, even when the operating handle 101 is stuck in the ON position, the first locking rod 40 and second locking rod 70 can still trip normally.

[0041] By using the auxiliary switch of the present invention, both AS and FC functions can be realized in one auxiliary switch. If a fault occurs in a circuit in which the small circuit breaker is located, the shared trip arm thereof must act; therefore, through the shared trip arm serving as a fault signal input, the FC mechanism inside the auxiliary switch is connected. In addition, the opening/closing of the handle of the small circuit breaker can also cause the contacts thereof to open/close, hence the handle and the shared trip arm serve as a signal input for the circuit breaker open/closed state, and the AS mechanism inside the auxiliary switch is connected. In summary, the present invention can not only be used to output the open/closed state of the circuit breaker, but at the same time can also be used to output a fault signal for the circuit in which the circuit breaker is located. In relation to the prior art, both AS and FC functions can be realized at the same time, multiple components are shared by two mechanisms, costs are reduced, and the product structure is made more compact, while increasing the product's competitiveness.

[0042] It should be understood that although the description herein is based on various embodiments, it is by no means the case that each embodiment contains just one independent technical solution. Such a method of presentation is adopted herein purely for the sake of clarity. Those skilled in the art should consider the description in its entirety. The technical solutions in the various embodiments could also be suitably combined to form other embodiments capable of being understood by those skilled in the art.

[0043] The series of detailed explanations set out above are merely particular explanations of feasible embodiments of the present invention, which are not intended to limit the scope of protection thereof. All equivalent embodiments or changes made without departing from the artistic spirit of the present invention, such as combinations, divisions or repetitions of features, shall be included in the scope of protection of the present invention.

Claims

1. An auxiliary switch (100), for fitting and connecting to a circuit breaker, wherein the auxiliary switch (100) has a housing (10), in which are provided the following:

an operating handle (101), connected to a handle of the circuit breaker;
a trip assembly (20), connected to a trip arm of the circuit breaker;
a connecting rod assembly (30), which can be driven by the operating handle (101);

- a first locking rod (40), having a first drive part (41) and a second drive part (42), wherein the connecting rod assembly (30) can drive the first locking rod (40), to enable the first drive part (41) to engage with or disengage from the trip assembly (20) ;
- a resettable first rotating plate (50), connected to the second drive part (42) and capable of being driven by the first locking rod (40), wherein a first moving contact (51) located on one side of the housing (10) is disposed on the first rotating plate (50), and rotation of the first rotating plate (50) can bring the first moving contact (51) into contact with either one of two static contacts located on one side of the housing (10), to accomplish switching between a first electrical circuit and a second electrical circuit;
- a resettable second rotating plate (60), disposed concentrically with the first rotating plate (50) and capable of being driven by the first rotating plate (50), wherein a second moving contact (61) located on another side of the housing (10) is disposed on the second rotating plate (60), and rotation of the second rotating plate (60) can bring the second moving contact (61) into contact with either one of two static contacts located on the other side of the housing (10), to accomplish switching between a third electrical circuit and a fourth electrical circuit; and
- a second locking rod (70), resettably connected to the housing (10) and capable of locking the second rotating plate (60), wherein the second locking rod (70) can release the locking of the second rotating plate (60) under the action of a driving force of the first locking rod (40).
2. The auxiliary switch (100) as claimed in claim 1, wherein one end of the second locking rod (70) is rotatably connected to the housing (10) by means of a reset element and can rotate between a first position and a second position; when the second locking rod (70) is in the first position, another end of the second locking rod (70) can engage with and lock the second rotating plate (60); when the second locking rod (70) is in the second position, the other end of the second locking rod (70) can release the locking of the second rotating plate (60).
 3. The auxiliary switch (100) as claimed in claim 1, wherein the connecting rod assembly (30) comprises:
 - a rotatable coupling element (31), capable of being fitted and connected to the operating handle (101); and
 - a drive connecting rod (32), having one end connected to the coupling element (31) and another end connected to the first locking rod (40).
 4. The auxiliary switch (100) as claimed in claim 3, wherein the first locking rod (40) can rotate between a third position and a fourth position under a driving action of the drive connecting rod (32); when an engagement relationship between the first drive part (42) and the trip assembly (20) is removed, the first locking rod (40) can move to a fifth position, and drive the second locking rod (70) to the second position; at this time, the second locking rod (70) can release the locking of the second rotating plate (60).
 5. The auxiliary switch (100) as claimed in claim 1, wherein the trip assembly (20) comprises a shared trip arm (21), for connecting to the trip arm of the circuit breaker; and a trip bolt (22), resettably connected to the housing (10), and capable of engaging with or disengaging from the shared trip arm (21) .
 6. The auxiliary switch (100) as claimed in claim 5, wherein the first drive part (41) has an engagement tip (411) capable of engaging with the trip bolt (22), and a first boss (412) for driving the second locking rod (40).
 7. The auxiliary switch (100) as claimed in claim 1, wherein a projecting abutment part (611) is disposed on the second rotating plate (60), and the other end of the second locking rod (70) is provided with a second boss (71) for engaging with the abutment part (611).
 8. The auxiliary switch (100) as claimed in claim 1, wherein a recess (413) is also provided on the first boss (412), and a protruding part (72) adapted to the recess (413) is also disposed in a middle part of the second locking rod (70).
 9. The auxiliary switch (100) as claimed in claim 1, wherein a mounting part (511) is disposed in a middle part of the first rotating plate (50), and a positioning protrusion (11) is disposed on an inner wall of the housing (10); the mounting part (511) can be disposed so as to surround the positioning protrusion (11) in a rotatable manner, and a torsion spring (52) is disposed on the mounting part (511), and used to realize automatic resetting of the first rotating plate (50).
 10. The auxiliary switch (100) as claimed in claim 1, wherein a drive post (54) is also disposed at an edge of the first rotating plate (50), and used to drive an abutment part (611) on the second rotating plate (60).
 11. The auxiliary switch (100) as claimed in claim 1, wherein a mounting hole (601) is disposed in a middle part of the second rotating plate (60), and used

to accommodate a mounting part (511) on the first rotating plate (50); a mounting post (62) is also disposed at an edge of the second rotating plate (60), and used for connecting a tension spring (63); two ends of the tension spring (63) are connected to the mounting post (62) and an inner wall of the housing (10) respectively, so as to realize automatic resetting of the second rotating plate (60).

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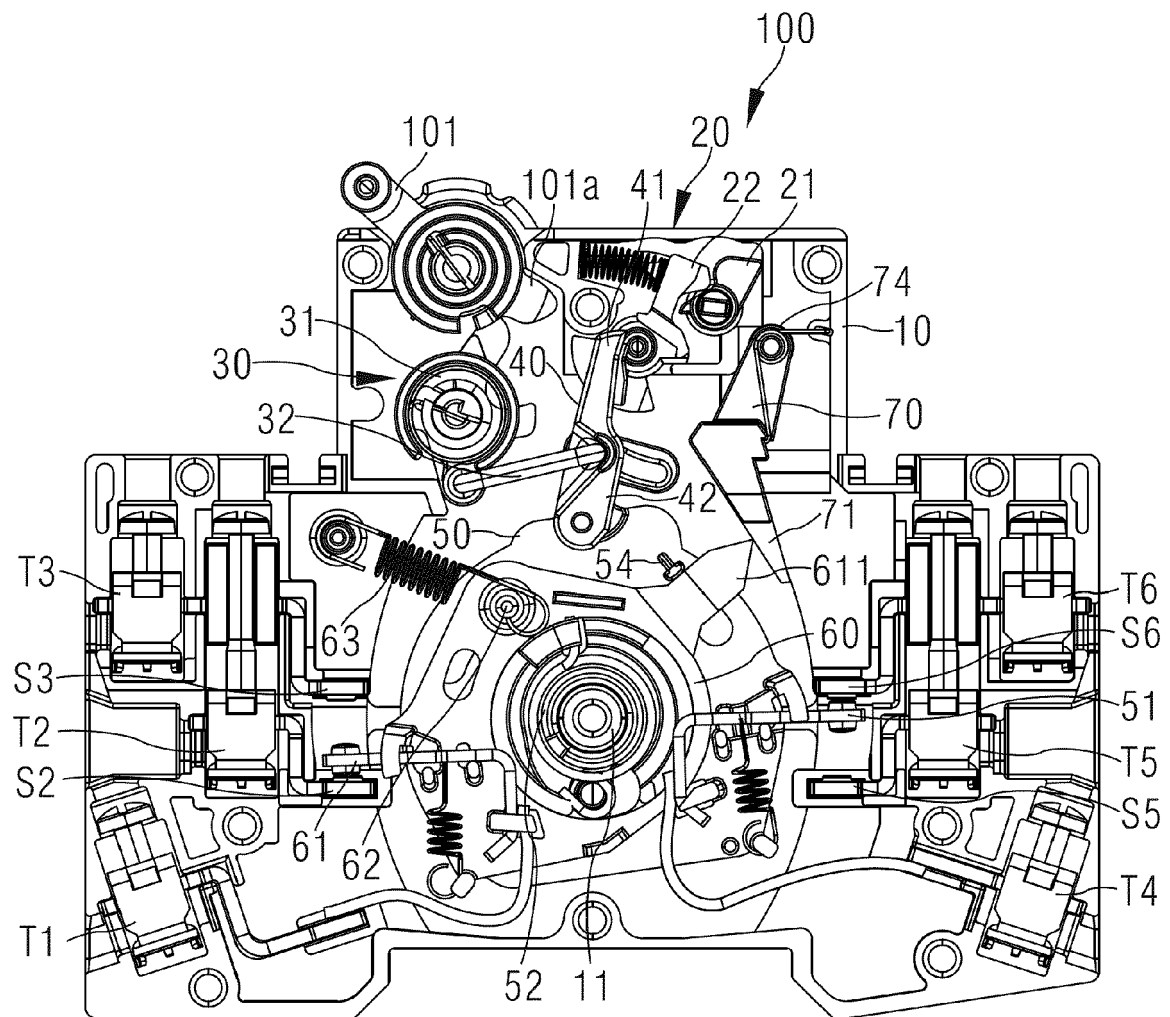


Fig. 1

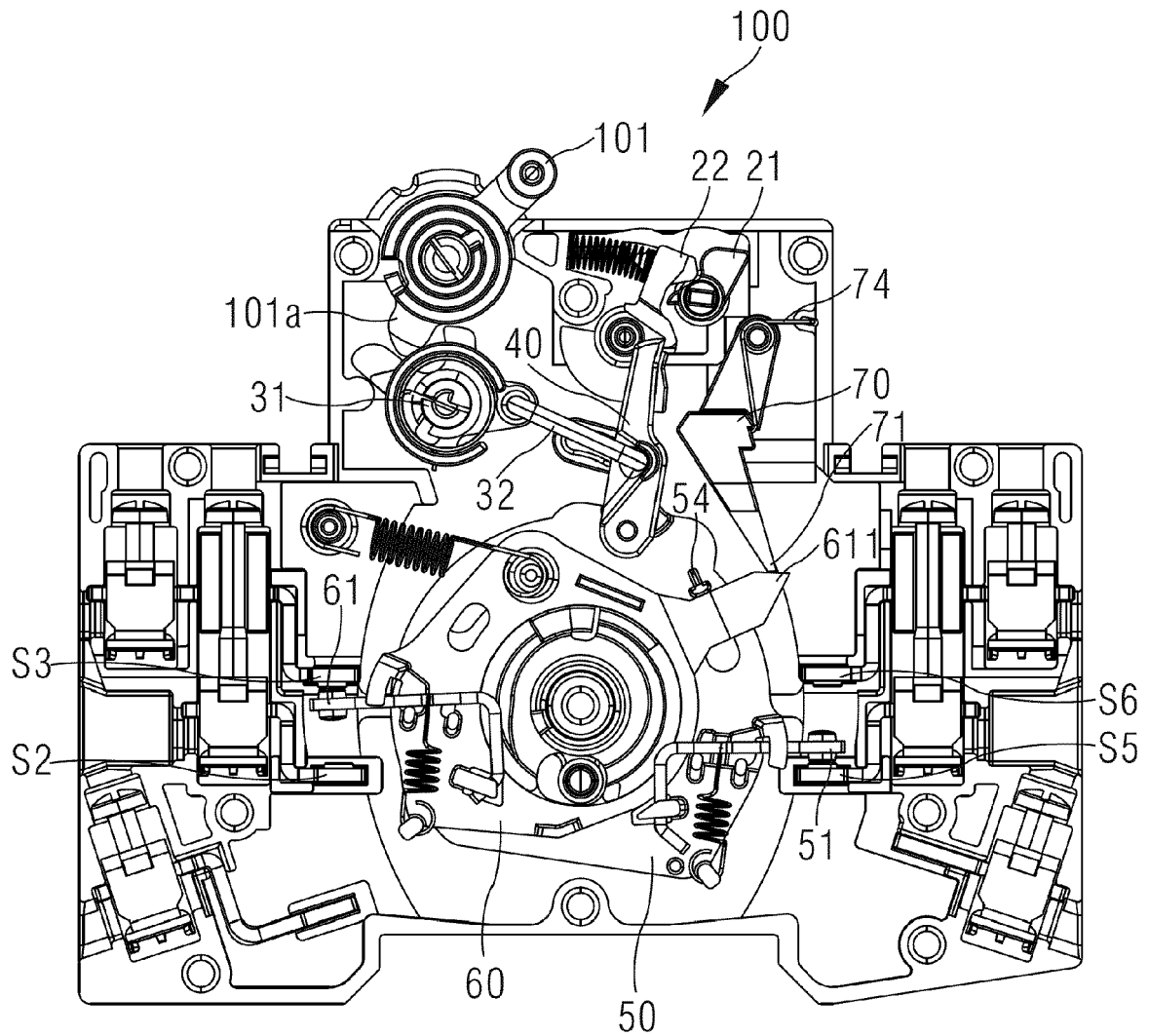


Fig. 2

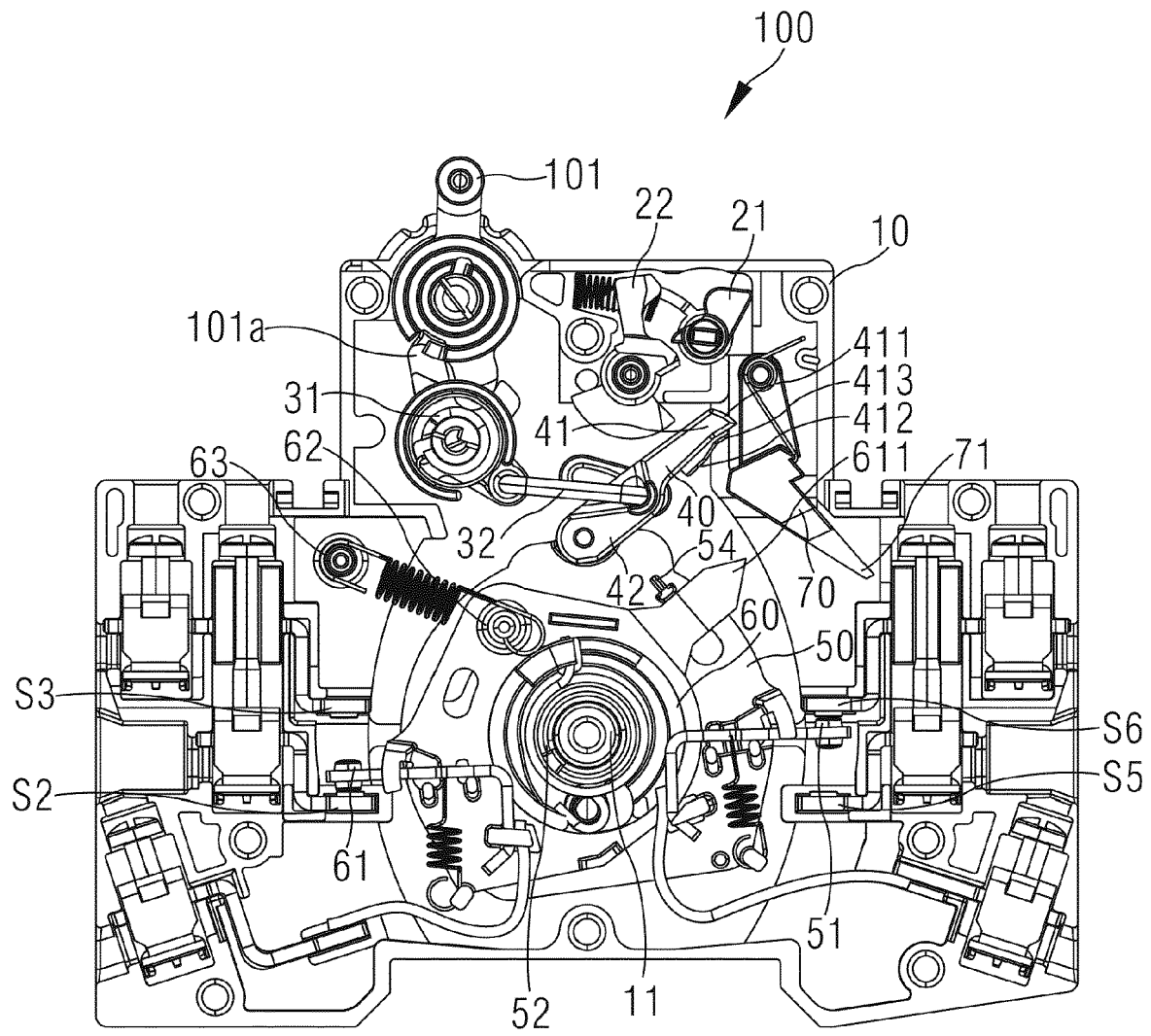


Fig. 3

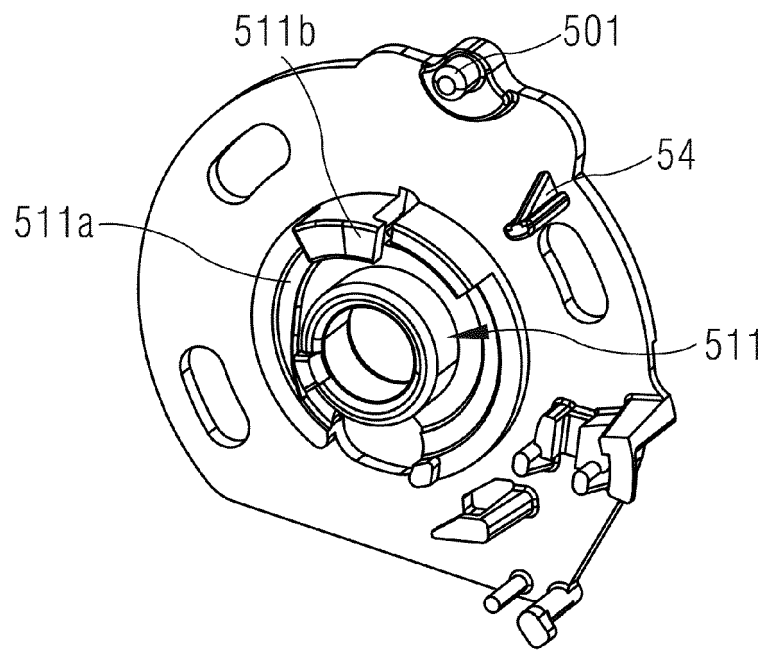


Fig. 4

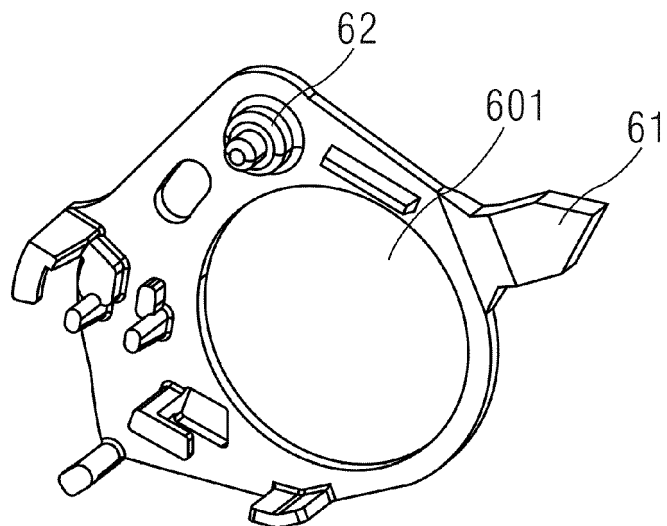


Fig. 5

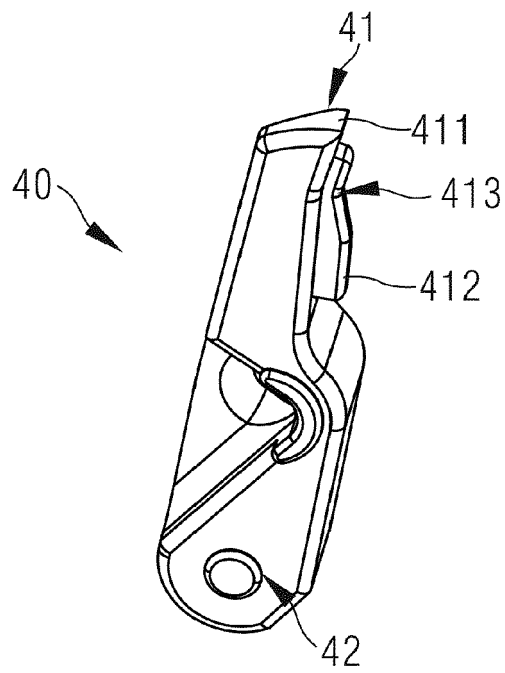


Fig. 6

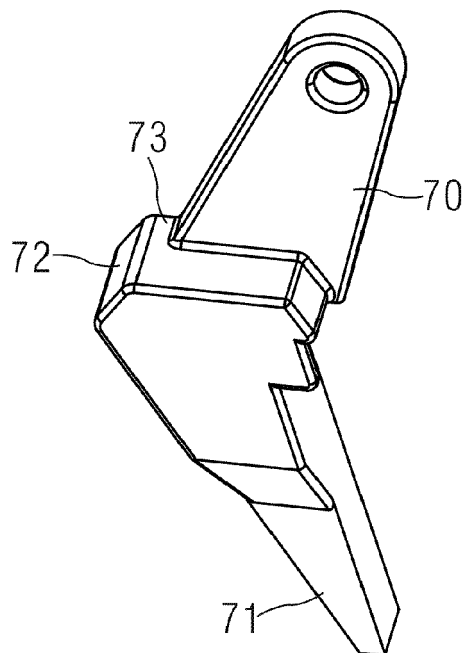


Fig. 7



EUROPEAN SEARCH REPORT

Application Number
EP 17 20 8583

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 147 605 A2 (LICENTIA GMBH [DE]) 10 July 1985 (1985-07-10) * page 2, paragraph 5 - page 7, paragraph 1; figures 1-3 *	1-11	INV. H01H71/46 H01H1/22
A	EP 0 951 044 A1 (SCHNEIDER ELECTRIC IND SA [FR]) 20 October 1999 (1999-10-20) * page 3, paragraph 0011 - page 5, paragraph 0032; figures 1-3 *	1-11	
A	WO 2010/052077 A1 (SIEMENS AG [DE]; CHEN XIANG [CN]; BAO ZHANG YAO [CN]; CAO REN JUN [CN]) 14 May 2010 (2010-05-14) * page 7, paragraph 1 - page 9, paragraph 1; figures 1-4 *	1-11	
A	US 2 885 500 A (WALL DAVID A) 5 May 1959 (1959-05-05) * column 2, line 24 - column 3, line 25; figures 1,2 *	1-11	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 3 May 2018	Examiner Pavlov, Valeri
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 20 8583

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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03-05-2018

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0147605 A2	10-07-1985	DE 8334014 U1 EP 0147605 A2	31-10-1984 10-07-1985
EP 0951044 A1	20-10-1999	CN 1233070 A DE 69920793 D1 DE 69920793 T2 EP 0951044 A1 ES 2229648 T3 FR 2777694 A1	27-10-1999 11-11-2004 17-11-2005 20-10-1999 16-04-2005 22-10-1999
WO 2010052077 A1	14-05-2010	CN 101740273 A DE 112009002296 T5 WO 2010052077 A1	16-06-2010 10-10-2013 14-05-2010
US 2885500 A	05-05-1959	NONE	

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