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(54) **BREAKER COUNTING DEVICE**

SCHUTZSCHALTERZÄHLVORRICHTUNG

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EP 3 200 129 B1

Description

TECHNICAL FIELD

[0001] The present invention relates to the field of low-voltage apparatuses, in particular to a circuit breaker with a counting device.

BACKGROUND ART

[0002] A counting device of a circuit breaker is mainly used for recording the number of on/off times of the circuit breaker in the use process, and facilitates a user to perform inspection, maintenance and replacement in real time according to the use situations of the circuit breaker. At present, in a counting device of an existing circuit breaker, a cam having a V-shaped groove rotating shaft is adopted to directly drive a counter lever to perform counting, but only the number of rotation revolutions of the V-shaped shaft can be recorded by such counting mode, and the number of operation times of the circuit breaker cannot be recorded directly, thereby resulting in inaccurate counting of the counter and reducing the reliability of the counting device of the circuit breaker. In addition, because a significant shake will be caused to the cam when the circuit breaker is switched on and switched off, and the cam is also in driving connection with the counter lever directly, the resulting shake will cause falling of a transmission structure and the counter lever, such that the counter loses efficacy and the stability of the counting device is reduced. Document JP-B-5321268 describes a circuit breaker. Document CN-U-203707052 describes a counting device for circuit breaker operating mechanism. Documents CN-A-101183620 and EP-A-1914773 describe an operation counter driving apparatus for air circuit breaker.

SUMMARY OF THE INVENTION

[0003] An objective of the present invention is to overcome the defects of the prior art and provide a counting device of the circuit breaker, which is accurate in counting, stable in device and simple in structure. The invention is defined by the accompanied claims.

[0004] In detail, the invention adopts the following technical solutions:

a circuit breaker with a counting device comprises a counter 2 and an executing lever 4, wherein the counter 2 is fixedly mounted on one side of an operation mechanism 6 of the circuit breaker, the executing lever 4 is mounted on one side of the operation mechanism 6 in a pivotal mode and is in driving connection with a counting lever 201 of the counter 2 and a linkage rotating shaft 600 extending out from the operation mechanism 6, the linkage rotating shaft (600) can rotate when the circuit breaker is switched off or switched on, and a reset spring 5 which can provide the rotation restoring force for the executing lever 4 is provided on the executing lever 4. One

end of the executing lever 4 is in driving connection with the counting lever 201 through a connecting rod 3, and the other end of the executing lever 4 is in sliding contact with a cantilever 610 extending out from the end portion of the linkage rotating shaft 600; one end of the connecting rod 3 is connected with the executing lever 4, and the other end of the connecting rod 3 is connected with the counting lever 201; the cantilever 610 can be driven to rotate through the operation mechanism 6 and drives the executing lever 4 to rotate to enable the connecting rod 3 to move so as to pull the counting lever 201 to complete counting.

[0005] Further, a lever 620 which corresponds to the cantilever 610 and is capable of oscillating up and down is mounted on a mechanism mounting plate 601 on one side of the operation mechanism 6; one end of the lever 620 is mounted on a side surface of a mechanism cover plate 602 in a pivotal mode, and the upper surface and the lower surface of the other end of the lever 620 are in contact connection with the upper surface of the cantilever 610 and the lower surface of one end of the executing lever 4 respectively; in addition, when the circuit breaker is switched on, the operation mechanism 6 drives the cantilever 610 to rotate downwards, such that the reset spring 5 releases energy while the lever 620 oscillates downwards to lose support to the executing lever 4, such that the executing lever 4 can rotate to drive the connecting rod 3 to pull the counting lever 201 to complete counting.

[0006] A roller 611 which is capable of rolling relative to the cantilever 610 and is in sliding contact with the bottom of the lever 620 is mounted on the end portion of the cantilever 610.

[0007] Further, one end of the connecting rod 3 is rotatably connected with a hole shaft of the executing lever 4, and the other end of the connecting rod 3 is in contact connection with the counting lever 201.

[0008] Further, a cover plate 602 is provided on one end of the operation mechanism 6, a platform 602a on which a fixing support 1 is mounted extends out from one side of the cover plate 602, and the fixing support 1 is of an L-shaped structure and comprises a vertical support portion 110 and a horizontal support portion 120 that are connected in a mutually vertical mode; the counter 2 is fixedly mounted on a side surface of the vertical support portion 110, the horizontal support portion 120 is fixedly connected with the edge of the platform 602a, and a mounting plate 1200 extends vertically out from one side of the horizontal support portion 120; a mounting shaft 121 that is connected with the executing lever 4 in a pivotal mode is provided on the mounting plate 1200.

[0009] Further, the reset spring 5 is provided on the mounting shaft 121 in a sleeving manner; a spring fixing end 501 and a spring buckling end 502 are provided on two ends of the reset spring 5 respectively; the mounting plate 1200 is provided with a spring mounting hole 122 which adjoins to the mounting shaft 121 and is used for fixing the spring fixing end 501; the spring buckling end

502 and the edge of the executing lever 4 are fixed in a buckling manner; and the reset spring 5 can drive the executing lever 4 to rotate while releasing energy, to drive the connecting rod 3 so as to pull the counting lever 201 to complete counting.

[0010] Further, a guiding hole 111 for guiding and limiting the connecting rod 3 extends out from one side of the vertical support portion 110; the connecting rod 3 is of a U-shaped structure, wherein a first right-angle bent portion 301 and a second right-angle bent portion 302 that are bent in the same direction are provided on two ends of the connecting rod 3 respectively; the first right-angle bent portion 301 may be rotatably connected with the hole shaft at the end portion of the executing lever 4, and the second right-angle bent portion 302 may be in contact connection with the counting lever 201 of the counter 2.

[0011] Further, the executing lever 4 is of an L-shaped structure, wherein a plane 421 at the bottom of a horizontal portion 420 of the L-shaped executing lever 4 may be in sliding fit with the cantilever 610, a lever mounting hole 412 for pivotal connection is formed in the conjunction between a vertical portion 410 and the horizontal portion 420 of the L-shaped executing lever 4, and a connecting rod mounting hole 411 for being rotatably connected with a hole shaft at one end of the connecting rod 3 is formed in the end portion of the vertical portion 410.

[0012] Further, guiding supports 621 are mounted on two sides of the lever 620 respectively.

[0013] Further, the operation mechanism 6 and the counter 2 mounted on one side thereof are mounted inside a base 7 of the circuit breaker, a panel 710 that is matched with a contour of the base 7 is mounted on the base 7, and an observation window 711 that corresponds to the numerical value window 202 of the counter 2 is embedded into the panel 710.

[0014] Further, a cover plate 602 is provided on one end of the operation mechanism 6; the fixing support 1 is fixedly mounted at an edge of the platform 602a that extends out from one side of the cover plate 602; the executing lever 4 is mounted outside the fixing support 1, one end of the executing lever 4 is provided above the platform 602a and is in transmission connection with the counting lever 201 through the connecting rod 3, and the other end of the executing lever 4 is provided below the platform 602a and is in contact connection with the lever 620; the counter 2 is mounted on the fixing support 1; a numerical value window 202 for observing a counting numerical value is provided on one side of the counter 2; the counting lever 201 is in driving connection with the counter 2 and can reset under a self-restoring force of the counter 2.

[0015] The counting device of the circuit breaker of the present invention drives the executing lever on the fixing support to rotate by the sliding of the cantilever, thereby realizing direct recording of the number of times of operation cycles of the circuit breaker and accurate counting of the counter, and improving the reliability of the counting

device. Moreover, the executing lever is in transmission connection with the counting lever through the connecting rod, such that the influence of the shake generated when the circuit breaker is switched on or switched off to the counter and the transmission structure can be reduced, the stability of the counting device is improved, and the service life of the counting device is prolonged.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Fig. 1 is a structural schematic drawing of the present invention;

Fig. 2 is a local structural schematic drawing of the present invention;

Fig. 3 is a structural side view of the present invention;

Fig. 4 is a structural schematic drawing of the fixing support of the present invention;

Fig. 5 is a structural schematic drawing of the connecting rod of the present invention;

Fig. 6 is a structural schematic drawing of the executing lever of the present invention;

Fig. 7 is a structural schematic drawing of the reset spring of the present invention;

Fig. 8 is a specific application embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] The specific embodiments of a counting device of a circuit breaker of the present invention will be further illustrated as below in conjunction with the embodiments illustrated in Figs. 1-8. The counting device of the circuit breaker of the present invention is not limited to the description in the following embodiments.

[0018] A circuit breaker with a counting device of the present invention comprises a counter 2 and an executing lever 4, wherein the counter 2 is fixedly mounted on a fixing support 1 on one side of an operation mechanism 6 of the circuit breaker, the executing lever 4 is mounted on the fixing support 1 in a pivotal mode and is in driving connection with a counting lever 201 of the counter 2 and a linkage rotating shaft 600 of the operation mechanism 6, and a reset spring 5 which can provide the rotation restoring force for the executing lever 4 is provided at the conjunction between the executing lever 4 and the fixing support 1. One end of the executing lever 4 is in driving connection with the counting lever 201 through a connecting rod 3, and the other end of the executing lever 4 is in sliding contact with a cantilever 610 extending out from the end portion of the linkage rotating shaft 600; one end of the connecting rod 3 is rotatably connected with a hole shaft of the executing lever 4, and the other end of the connecting rod 3 is connected with the counting lever 201; the cantilever 610 can be driven to rotate

through the operation mechanism 6 and drives the executing lever 4 to rotate to enable the connecting rod 3 to move so as to pull the counting lever 201 to complete counting. According to the counting device of the circuit breaker of the present invention, the structure of the counting device is simple by mounting the counter and the executing lever on the fixing support, and the assembly efficiency of the device is improved. The operation mechanism drives the linkage rotating shaft to rotate, such that the cantilever slides to drive the executing lever to rotate, thereby realizing direct recording of the number of times of operation cycles of the circuit breaker and accurate counting of the counter, and improving the reliability of the counting device. Moreover, the connecting rod is rotatably connected with the hole shaft of the executing lever and is in contact connection with the counting lever, such that the influence of the shake generated when the circuit breaker is switched on or switched off to the counter and the transmission structure can be reduced, the stability of the counting device is improved, and the service life of the counting device is prolonged.

[0019] According to the structural schematic drawing illustrated in Fig. 1 of the present invention, Fig. 1 illustrates a schematic drawing in which the counting device of the circuit breaker is in an initial state, i.e., at a non-counted state where the circuit breaker is switched off. Specifically, the executing lever 4 of the counting device of the circuit breaker can be driven to oscillate by the operation mechanism 6; the operation mechanism 6 is fixedly mounted by the mechanism mounting plates 601 on two sides thereof, and a linkage rotating shaft 600 which is in driving connection with the operation mechanism 6 extends out from two sides of the operation mechanism 6, and the linkage rotating shaft can rotate when the circuit breaker is switched off or switched on, so as to be in linkage with other circuit breaker or mechanism. A cover plate 602 is mounted on one end, corresponding to the linkage rotating shaft, of the operation mechanism 6; the cover plate 602 is jointly clamped and fixed by the mechanism mounting plates 601 on two sides; the fixing support 1 is mounted on one side of the cover plate 602; the counter 2 is mounted in front of the fixing support 1, and the executing lever 4 is mounted on a side surface of the fixing support 1 in a pivotal mode; a reset spring 5 for driving the executing lever 4 to rotate is also mounted at the conjunction between the executing lever 4 and the fixing support 1. The end portion of the executing lever 4 corresponds to the executing lever 201 of the counter 2, and is in driving connection with the executing lever 201 of the counter 2 through the connecting rod 3. The connecting rod 3 not only simplifies a driving connection structure, but also effectively reduces the influence of the shake generated when the operation mechanism 6 operates to the counter, prolongs the service life of the counter and improve the stability and the reliability of the counting device of the circuit breaker. One end of the executing lever 4 may be in driving connection with the counting lever 201, and the other end of

the executing lever 4 may be in driving connection with the cantilever 610 that extends out from the end portion of the linkage rotating shaft 600. The cantilever 610 extends out from one end of the linkage rotating shaft 600 and corresponds to a bottom surface 421 of the end portion of the executing lever 4. The cantilever 610 can rotate synchronously with the linkage rotating shaft 600 when the circuit breaker is switched off or switched on, such that the cantilever 610 is capable of oscillating up and down. In the oscillating process, the end portion of the cantilever 610 may be further in sliding fit with the bottom surface 421 of the executing lever 4, thereby driving the executing lever 4 to rotate along a pivot to finally drive the connecting rod 3 so as to pull the counting lever to complete counting.

[0020] In particular, the operation mechanism 6 is clamped and fixed by the mechanism mounting plates 601 on two sides, wherein a lever 620 that corresponds to the cantilever 610 and is capable of oscillating up and down is mounted on one of the mechanism mounting plates 601; one end of the lever 620 is mounted on a side surface of a mechanism cover plate 602 in a pivotal mode, and the upper surface and the lower surface of the other end of the lever 620 are in contact connection with the upper surface of the cantilever 610 and the lower surface of one end of the executing lever 4 respectively; in addition, when the circuit breaker is switched on, the operation mechanism 6 drives the cantilever 610 to rotate downwards, such that the reset spring 5 releases energy while the lever 620 oscillates downwards to lose support to the executing lever 4, such that the executing lever 4 can rotate clockwise to drive the connecting rod 3 to pull the counting lever 201 to complete counting. The cantilever mounted at the end portion of the linkage rotating shaft is in driving connection with the executing lever through the lever that is capable of oscillating up and down. On the one hand, because the cantilever is driven to rotate by the linkage rotating shaft to push the executing lever to rotate, the executing lever can be driven to rotate more stably by the force generated by rotating side due to the addition of the lever, such that the stability of the counting device is improved; on the other hand, the influence of the shake to the executing lever and the counter is reduced by indirect driving connection between the cantilever and the executing lever through the lever, and the service life of the counting device is improved. The counting device of the circuit breaker illustrated in Fig. 1 is in an initial state, i.e., a state where the circuit breaker is switched off, and at this moment, the cantilever 610 is driven to rotate by the linkage rotating shaft 600 and is in sliding friction with the lever 620 to drive the lever 620 to oscillate upwards so as to push the executing lever 4 to rotate anticlockwise; the executing lever 4 overcomes a restoring force of the reset spring 5 in a rotation process, and the connecting rod 3 that is rotatably connected with the hole shaft at the end portion of the executing lever 4 is in the initial state and does not pull the counting lever 201 to perform counting.

[0021] Fig. 2 illustrates a local structure enlarged drawing of a portion inside an imaginary line circle in Fig. 1; a platform 602 that corresponds to the cantilever 610 extends out from one side of the cover plate 602; the fixing support 1 is mounted at an edge of the platform 602a; one end of the executing lever 4 is provided above the platform 602a and is in transmission connection with the counting lever 201 through the connecting rod 3, the executing lever 4 is mounted outside the fixing support 1, and the other end of the executing lever 4 is provided below the platform 602a and is in contact connection with the lever 620; a numerical value window 202 for observing a counting numerical value is provided on the counter 2; the counting lever 201 is in driving connection with the counter 2 and can reset under a self-restoring force of the counter 2. According to a specific embodiment of the present invention, the mounting structure of the executing lever is simple, and the space is effectively saved; meanwhile, the platform that extends out from the cover plate not only plays a role of mounting the fixing support, but also realizing the purpose of mounting the counting device outside the mechanism mounting plates, such that the counting device is provided independent of the operation mechanism, thereby being convenient to maintain and mount. Moreover, the counting lever that can reset automatically is convenient to use, and connecting, fixing and driving steps are saved. In particular, a roller 611 which is capable of rolling relative to the cantilever 610 and is in sliding contact with the bottom of the lever 620 is mounted on the end portion of the cantilever 610. The linkage rotating shaft can rotate clockwise and anti-clockwise to drive the cantilever to move up and down so as to drive the executing lever to rotate correspondingly, and by means of the roller that may be in sliding contact with the executing lever, provided at the end portion of the cantilever, the driving process is more stable and gentle, and the reliability of the counting device is improved. Moreover, guiding supports 621 are mounted on two sides of the lever 620 respectively. The guiding supports 621 are mounted at the bottom of the platform 602a and are provided on two corresponding sides of the lever 620 respectively to jointly clamp and limit the lever 620. The guiding supports mounted on two sides of the lever can prevent the lever from oscillating in a left-right direction when the cantilever is in sliding friction to drive the lever to oscillate up and down, such that the stability of the counting device is improved.

[0022] According to the structural side view of the present invention illustrated in Fig. 3, the operation mechanism 6 is clamped and fixed by the mechanism mounting plates 601 on two sides, wherein one mechanism mounting plate 601 extends out from the linkage rotating shaft 600 and is provided with the cantilever 610 at the end portion thereof, that can extend toward the lever 620 and can be in contact connection with the lever 620; the bottom of the lever 620 is in contact connection with the end portion of the cantilever 610, and the top of the lever 620 is in contact connection with the executing lever 4 to drive

the executing lever 4 to rotate. The reset spring 5 is mounted at a rotation pivot of the executing lever 4, and one end of the reset spring 5 is fixedly connected with the fixing support 1, and the other end of the reset spring 5 is in buckling connection with the edge of the executing lever 4; the reset spring 5 can drive the executing lever 4 to rotate to an initial position. The end portion of the executing lever 4 is in transmission connection with the counting lever 201 of the counter 2 through the connecting rod 3.

[0023] According to the structural schematic drawing of the fixing support 1 of the present invention illustrated in Fig. 4, a cover plate 602 is provided on one end of the operation mechanism 6; the fixing support 1 is fixedly mounted on the platform 602a that extends out from one side of the cover plate 602; the fixing support 1 is of an L-shaped structure and comprises a vertical support portion 110 and a horizontal support portion 120 that are connected in a mutually vertical mode; the counter 2 is fixedly mounted on a side surface of the vertical support portion 110, the horizontal support portion 120 is fixedly connected with the edge of the platform 602a, and a mounting plate 1200 extends vertically out from one side of the horizontal support portion 120; a mounting shaft 121 that is connected with the executing lever 4 in a pivotal mode is provided on the mounting plate 1200. The fixing support is mounted on the platform that extends out from one side of the cover plate, and therefore, the fixing support can be mounted conveniently, and the assembly efficiency of the counting device is improved. Moreover, the L-shaped fixing support is simple in structure, and because the mounting plate extends vertically out from the horizontal support portion, the executing lever is simple and convenient to mount, and the mounting efficiency is improved. Meanwhile, the mounting plate 1200 is provided with a spring mounting hole 122 for fixing one end of the reset spring 5; the reset spring 5 can be provided on the mounting shaft 121 in a sleeving manner, and is clamped and fixed by a side wall of the corresponding executing lever 4 and the mounting plate 1200. A guiding hole 111 for guiding and limiting the connecting rod 3 also extends out from one side of the vertical support portion 110.

[0024] In particular, according to the structural schematic drawing of the connecting rod 3 of the present invention illustrated in Fig. 5, the connecting rod 3 is of the U-shaped structure; a first right-angle bent portion 301 and a second right-angle bent portion 302 that are bent in the same direction are provided on two ends of the connecting rod 3 respectively, wherein the first right-angle bent portion 301 may be matched with a connecting rod mounting hole 411 formed in the end portion of the executing lever 4 to form a hole shaft rotating connection, and the second right-angle bent portion 302 may be in contact connection with the counting lever 201 of the counter 2, such that the executing lever 4 rotates and oscillates to drive the connecting rod 3 to pull the counting lever 201 to perform counting; one end of the connecting

rod is rotatably connected with the hole shaft of the executing lever, and the other end of the connecting rod is in contact connection with the counting lever; no fixed connection mode is adopted for two ends of the connecting rod, such that the connecting rod can be mounted conveniently, and meanwhile the efficacy loss of the counter caused by the shake of the executing lever can be effectively reduced, and the reliability of the counting device of the circuit breaker is improved. Moreover, the connecting rod 3 can be mounted inside a guiding hole 101 that extends out from one side of the vertical support portion 110 in a sleeving manner. The guiding hole can limit the connecting rod stably when the executing lever drives the connecting rod to move, and the connecting rod provided inside the guiding hole is unlikely to fall off from the executing lever or the counting lever due to the shake, and therefore the stability and the accuracy of the counting device are improved.

[0025] According to the structural schematic drawing of the executing lever 4 of the present invention illustrated in Fig. 6, the executing lever 4 is of an L-shaped structure, wherein a plane 421 at the bottom of a horizontal portion 420 of the L-shaped executing lever 4 may be in sliding fit with the cantilever 610, a lever mounting hole 412 for pivotal connection is formed in the conjunction between a vertical portion 410 and the horizontal portion 420 of the L-shaped executing lever 4 and is connected with the mounting shaft 121 provided on the mounting plate 1200 in a pivotal mode, and the connecting rod mounting hole 411 for being rotatably connected with a hole shaft of the first right-angle bent portion 301 at one end of the connecting rod 3 is formed in the end portion of the vertical portion 410. By means of the L-shaped executing lever, a space where the lever oscillates can be saved, and the practicability of the counting device is improved. Moreover, the plane at the bottom of the horizontal portion of the executing lever is in sliding fit with the end portion of the cantilever and can be stressed sufficiently, such that the driving process of the cantilever is stable and reliable.

[0026] According to the structural schematic drawing of the reset spring 5 of the present invention illustrated in Fig. 7, the reset spring 5 is provided on the mounting shaft 121 in a sleeving manner; a spring fixing end 501 and a spring buckling end 502 are provided on two ends of the reset spring 5 respectively; the mounting plate 1200 is provided with a spring mounting hole 122 which adjoins to the mounting shaft 121 and is used for fixing the spring fixing end 501; the spring buckling end 502 and the edge of the executing lever 4 are fixed in a buckling manner; and the reset spring 5 can drive the executing lever 4 to rotate while releasing energy, to drive the connecting rod 3 so as to pull the counting lever 201 to perform counting. One end of the reset spring is fixedly connected with the spring mounting hole of the fixing support, and the other end of the reset spring is in buckling connection with the executing lever to realize simple and stable connection of the reset spring, such that the reset spring is stable and reliable in an energy storage process and an energy

releasing process and is unlikely to fall off to make the executing lever lose efficacy, and therefore, the reliability of the counting device of the circuit breaker is improved.

[0027] According to the specific application embodiment of the present invention illustrated in Fig. 8, the operation mechanism 6 and the counter 2 mounted on one side thereof are mounted inside a base 7 of the circuit breaker, a panel 710 that is matched with a contour of the base 7 is mounted on the base 7, and an observation window 711 that corresponds to the numerical value window 202 of the counter 2 is embedded into the panel 710. The observation window embedded into the panel is convenient for the user to observe and record in real time, such that the time of detaching the panel is omitted, and the use efficiency of the counting device is improved. Moreover, the counting device and the operation mechanism are jointly mounted inside one base; the reliability of the counting device that is provided inside is improved, and the counting device is convenient to mount.

[0028] The counting process of the counting device of the circuit breaker of the present invention is as follows: when the operation mechanism 6 of the circuit breaker is switched on, the linkage rotating shaft 600 drives the cantilever 610 provided at the end portion to rotate, such that the roller 611 at the end portion of the cantilever 610 moves downwards to make the lever 620 lose a support power; meanwhile, the lever 620 oscillates downward to make the executing lever 4 lose a support power and drives the executing lever 4 to rotate clockwise under the action of the restoring force when the reset spring 5 releases energy; the executing lever 4 rotates to drive the connecting rod 3 connected with the end portion to slide backwards inside the guiding hole 111, such that the second right-angle bent portion 302 of the connecting rod 3 pulls the counting lever 201 to drive the counter 2 to perform once counting.

[0029] When the operation mechanism 6 of the circuit breaker is switched off, the linkage rotating shaft 600 drives the cantilever 610 provided at the end portion to rotate to drive the roller 611 at the end portion of the cantilever 610 to move upwards; the roller 611 drives the lever 620 to push the executing lever 4 to overcome the restoring force of the reset spring 5 to rotate anticlockwise, and meanwhile, the reset spring 5 is at an energy storage state; the executing lever 4 rotates to drive the connecting rod 3 connected with the end portion to slide forwards inside the guiding hole 111, such that the second right-angle bent portion 302 of the connecting rod 3 moves the counting lever 201 of the counter 2 away; the counting lever 201 returns to the initial state under the action of the self-restoring force of the counter 2, and prepares for next counting.

[0030] The present invention is further elaborated according to the above content in conjunction with the specific preferred embodiments, and it may not be considered that the specific embodiments of the present utility model are only limited to these description. For those common skilled in the art, several simple deductions or replace-

ments made without departing from the concept of the present invention will fall into the protection scope of the present claims.

Claims

1. A circuit breaker with a counting device, comprising a counter (2) and an executing lever (4), **characterized in that** the counter (2) is fixedly mounted on one side of an operation mechanism (6) of the circuit breaker, the executing lever (4) is mounted on one side of the operation mechanism (6) in a pivotal mode and is in driving connection with a counting lever (201) of the counter (2) and a linkage rotating shaft (600) extending out from the operation mechanism (6), the linkage rotating shaft (600) can rotate when the circuit breaker is switched off or switched on, and a reset spring (5) which can provide the rotation restoring force for the executing lever is provided on the executing lever (4);
one end of the executing lever (4) is in driving connection with the counting lever (201) through a connecting rod (3), and the other end of the executing lever (4) is in sliding contact with a cantilever (610) extending out from the end portion of the linkage rotating shaft (600); one end of the connecting rod (3) is connected with the executing lever (4), and the other end of the connecting rod (3) is connected with the counting lever (201); the cantilever (610) can be driven to rotate through the operation mechanism (6) and drives the executing lever (4) to rotate to enable the connecting rod (3) to move so as to pull the counting lever (201) to complete counting.
2. The circuit breaker with the counting device according to claim 1, wherein the a lever (620) which corresponds to the cantilever (610) and is capable of oscillating up and down is mounted on a mechanical mounting plate (601) on one side of the operation mechanism (6); one end of the lever (620) is mounted on a side surface of a mechanical cover plate (602) in a pivotal mode, and the upper surface and the lower surface of the other end of the lever (620) are in contact connection with the upper surface of the cantilever (610) and the lower surface of one end of the executing lever (4) respectively; in addition, when the circuit breaker is switched on, the operation mechanism (6) drives the cantilever (610) to rotate downwards, such that the reset spring (5) releases energy while the lever (620) oscillates downwards to lose support to the executing lever (4), such that the executing lever (4) rotates to drive the connecting rod (3) to pull the counting lever (201) to complete counting.
3. The circuit breaker with the counting device according to claim 2, wherein a roller (611) which is capable

of rolling relative to the cantilever (610) and is in sliding contact with the bottom of the lever (620) is mounted on the end portion of the cantilever (610).

4. The circuit breaker with the counting device according to claim 1, wherein one end of the connecting (3) is rotatably connected with a hole shaft of the executing lever (4), and the other end of the connecting rod (3) is in contact connection with the counting lever (201).
5. The circuit breaker with the counting device according to claim 1, wherein a cover plate (602) is provided on one end of the operation mechanism (6), a platform (602a) on which a fixing support (1) is mounted extends out from one side of the cover plate (602), and the fixing support (1) is of an L-shaped structure and comprises a vertical support portion (110) and a horizontal support portion (120) that are connected in a mutually vertical mode; the counter (2) is fixedly mounted on a side surface of the vertical support portion (110), the horizontal support portion (120) is fixedly connected with the edge of the platform (602), and a mounting plate (1200) extends vertically out from one side of the horizontal support portion (120); a mounting shaft (121) that is connected with the executing lever (4) in a pivotal mode is provided on the mounting plate (1200).
6. The circuit breaker with the counting device according to claim 5, wherein the reset spring (5) is provided on the mounting shaft (121) in a sleeving manner; a spring fixing end (501) and a spring buckling end (502) are provided on two ends of the reset spring (5) respectively; the mounting plate (1200) is provided with a spring mounting hole (122) which adjoins to the mounting shaft (121) and is used for fixing the spring fixing end (501); the spring buckling end (502) and the edge of the executing lever (4) are fixed in a buckling manner; the reset spring (5) can drive the executing lever (4) to rotate while releasing energy, to drive the connecting rod (3) so as to pull the counting lever (201) to complete counting.
7. The circuit breaker with the counting device according to claim 5, wherein a guiding hole (111) for guiding a limiting connecting rod (3) extends out from one side of the vertical support portion (110); the connecting rod (3) is of a U-shaped structure, wherein a first right-angle bent portion (301) and a second right-angle bent portion (302) that are bent in the same direction are provided on two ends of the connecting rod (3) respectively; the first right-angle bent portion (301) may be rotatably connected with the hole shaft at the end portion of the executing lever (4), and the second right-angle bent portion (302) may be in contact connection with the counting lever (201) of the counter (2).

8. The circuit breaker with the counting device according to claim 1, wherein the executing lever (4) is of an L-shaped structure, and wherein a plane at the bottom of a horizontal portion (420) of the L-shaped executing lever (4) may be in sliding fit with the cantilever (610), a lever mounting hole (412) for pivotal connection is formed in the conjunction between a vertical portion (410) and the horizontal portion (420) of the L-shaped executing lever (4), and a connecting rod mounting hole (411) for being in rotatable connection with a hole shaft at one end of the connecting rod (3) is formed in the end portion of the vertical portion (410).
9. The circuit breaker with the counting device according to claim 2, wherein guiding supports (621) are mounted on two sides of the lever (620) respectively.
10. The circuit breaker with the counting device according to claim 1, wherein a cover plate (602) is provided on one end of the operation mechanism (6); the fixing support (1) is fixedly mounted at an edge of the platform (602a) that extends out from one side of the cover plate (602); the executing lever (4) is mounted outside the fixing support (1), one end of the executing lever (4) is provided above the platform (602a) and is in transmission connection with the counting lever (201) through the connecting rod (3), and the other end of the executing lever (4) is provided below the platform (602a) and is in contact connection with the lever (620); the counter (2) is mounted on the fixing support (1); a numerical value window (202) for observing a counting numerical value is provided on one side of the counter (2); the counting lever (201) is in driving connection with the counter (2) and can reset under a self-restoring force of the counter (2).

Patentansprüche

1. Stromkreisunterbrecher mit einer Zählvorrichtung, aufweisend einen Zähler (2) und einen Ausführhebel (4), **dadurch gekennzeichnet, dass** der Zähler (2) an einer Seite eines Betriebsmechanismus (6) des Stromkreisunterbrechers fest montiert ist, wobei der Ausführhebel (4) an einer Seite des Betriebsmechanismus (6) in einer schwenkbaren Weise montiert ist und in Antriebsverbindung ist mit einem Zählhebel (201) des Zählers (2) und einer Verbindungsdrehwelle (600), die sich von dem Betriebsmechanismus (6) aus erstreckt, wobei die Verbindungsdrehwelle (600) rotieren kann, wenn der Stromkreisunterbrecher ausgeschaltet oder eingeschaltet wird, und wobei eine Rückstellfeder (5), welche eine Drehrückstellkraft für den Ausführhebel bereitstellt, an dem Ausführhebel (4) bereitgestellt ist, wobei ein Ende des Ausführhebels (4) über eine Ver-

bindungsstange (3) in Antriebsverbindung mit dem Zählhebel (201) ist und das andere Ende des Ausführhebels (4) in einem Verschiebekontakt mit einem Kragarm (610) ist, der sich von dem Endabschnitt der Verbindungsdrehwelle (600) aus erstreckt, wobei ein Ende der Verbindungsstange (3) mit dem Ausführhebel (4) verbunden ist, und wobei das andere Ende der Verbindungsstange (3) mit dem Zählhebel (201) verbunden ist, wobei der Kragarm (610) durch den Betriebsmechanismus (6) angetrieben werden kann, um zu rotieren, und den Ausführhebel (4) antreibt, um zu rotieren, um die Verbindungsstange (3) zu veranlassen, sich zu bewegen, um so den Zählhebel (201) zu ziehen, um das Zählen zu komplettieren.

2. Stromkreisunterbrecher mit der Zählvorrichtung gemäß Anspruch 1, wobei ein Hebel (620), welcher zu dem Kragarm (610) korrespondiert und imstande ist, aufwärts und abwärts zu oszillieren, an einer mechanischen Montageplatte (601) an einer Seite des Betriebsmechanismus (6) montiert ist, wobei ein Ende des Hebels (620) an einer Seitenfläche einer mechanischen Abdeckplatte (602) in einer schwenkbaren Weise montiert ist, und wobei die obere Fläche und die untere Fläche des anderen Endes des Hebels (620) zugeordnet in Kontaktverbindung mit der oberen Fläche des Kragarms (610) und der unteren Fläche eines Endes des Ausführhebels (4) sind, wobei ferner, wenn der Stromkreisunterbrecher angeschaltet wird, der Betriebsmechanismus (6) den Kragarm (610) antreibt, um abwärts zu rotieren, sodass die Rückstellung der Feder (5) Energie freigibt, während der Hebel (620) abwärts oszilliert, um Abstützung zu dem Ausführhebel (4) zu verlieren, sodass der Ausführhebel (4) rotiert, um die Verbindungsstange (3) anzutreiben, um den Zählhebel (201) zu ziehen, um das Zählen zu komplettieren.

3. Stromkreisunterbrecher mit der Zählvorrichtung gemäß Anspruch 2, wobei eine Rolle (611), welche imstande ist, relativ zu dem Kragarm (610) zu rollen und in Verschiebekontakt mit der Unterseite des Hebels (620) ist, an dem Endabschnitt des Kragarms (610) montiert ist.

4. Stromkreisunterbrecher mit der Zählvorrichtung gemäß Anspruch 1, wobei ein Ende der Verbindungsstange (3) drehbar mit einem Lochschaft des Ausführhebels (4) verbunden ist, und wobei das andere Ende der Verbindungsstange (3) im Berührungskontakt mit dem Zählhebel (201) ist.

5. Stromkreisunterbrecher mit der Zählvorrichtung gemäß Anspruch 1, wobei eine Abdeckplatte (602) an einem Ende des Betriebsmechanismus (6) bereitgestellt ist, wobei eine Plattform (602a), an welcher ein Befestigungshalter (1) montiert ist, sich von einer

Seite der Abdeckplatte (602) aus erstreckt, und wobei der Befestigungshalter (1) von einer L-förmigen Struktur ist und einen vertikalen Halteabschnitt (110) und einen horizontalen Halteabschnitt (120) aufweist, die in einer gegenseitig vertikalen Weise verbunden sind, wobei der Zähler (2) an einer Seitenfläche des vertikalen Halteabschnitts (110) fest montiert ist, wobei der horizontale Halteabschnitt (120) mit dem Rand der Plattform (602) fest verbunden ist, und wobei sich eine Montageplatte (1200) von einer Seite des horizontalen Halteabschnitts (120) aus vertikal erstreckt, wobei ein Montageschaft (121), der mit dem Ausführhebel (4) in einer schwenkbaren Weise verbunden ist, an der Montageplatte (1200) bereitgestellt ist.

6. Stromkreisunterbrecher mit der Zählvorrichtung gemäß Anspruch 5, wobei die Rückstellfeder (5) an dem Montageschaft (121) in einer Hülsenweise bereitgestellt ist, wobei ein Federbefestigungsende (501) und ein Federabknickende (502) zugeordnet an zwei Enden der Rückstellfeder (5) bereitgestellt sind, wobei die Montageplatte (1200) mit einem Federmontageloch (122) bereitgestellt ist, das an den Montageschaft (121) angrenzt und verwendet ist zum Befestigen des Federbefestigungsendes (501), wobei das Federabknickende (502) und der Rand des Ausführhebels (4) in einer abgeknickten Weise befestigt sind, wobei die Rückstellfeder (5) den Ausführhebel (4) antreiben kann, um zu rotieren während Freigebens von Energie, um die Verbindungsstange (3) anzutreiben, um so den Zählhebel (201) zu ziehen, um das Zählen zu komplettieren.
7. Stromkreisunterbrecher mit der Zählvorrichtung gemäß Anspruch 5, wobei ein Führungsloch (111) zum Führen einer beschränkenden Verbindungsstange (3) sich von einer Seite des vertikalen Halteabschnitts (110) aus erstreckt, wobei die Verbindungsstange (3) von einer U-förmigen Struktur ist, wobei ein erster rechter-Winkel-Biegeabschnitt (301) und einer zweiter rechter-Winkel-Biegeabschnitt (302), die in der gleichen Richtung gebogen sind, zugeordnet an zwei Enden der Verbindungsstange (3) bereitgestellt sind, wobei der erste rechter-Winkel-Biegeabschnitt (301) mit dem Lochschaft des Endabschnitts des Ausführhebels (4) drehbar verbunden sein kann und der zweite rechter-Winkel-Biegeabschnitt (302) in Kontaktverbindung mit dem Zählhebel (201) des Zählers (2) sein kann.
8. Stromkreisunterbrecher mit der Zählvorrichtung gemäß Anspruch 1, wobei der Ausführhebel (4) von einer L-förmigen Struktur ist, und wobei eine Ebene an der Unterseite eines horizontalen Abschnitts (420) des L-förmigen Ausführhebels (4) in einem Verschiebesitz mit dem Kragarm (610) sein kann, wobei ein Hebelmontageloch (412) zur Schwenkver-

bindung in der Kreuzungsstelle zwischen einem vertikalen Abschnitt (410) und dem horizontalen Abschnitt (420) des L-förmigen Ausführhebels (4) ausgebildet ist, und wobei ein Verbindungsstangenmontageloch (411), um in drehbarer Verbindung mit einem Lochschaft an einem Ende der Verbindungsstange (3) zu sein, im Endabschnitt des vertikalen Abschnitts (410) ausgebildet ist.

9. Stromkreisunterbrecher mit der Zählvorrichtung gemäß Anspruch 2, wobei Führungshalter (621) zugeordnet an beiden Seiten des Hebels (620) montiert sind.
10. Stromkreisunterbrecher mit der Zählvorrichtung gemäß Anspruch 1, wobei eine Abdeckplatte (602) an einem Ende des Betriebsmechanismus (6) bereitgestellt ist, wobei der Befestigungsabschnitt (1) an einem Rand der Plattform (602a) fest montiert ist, der sich von einer Seite der Abdeckplatte (602) aus erstreckt, wobei der Ausführhebel (4) außerhalb des Befestigungshalters (1) montiert ist, wobei ein Ende des Ausführhebels (4) oberhalb der Plattform (602a) bereitgestellt ist und durch die Verbindungsstange (3) in Übertragungsverbindung mit dem Zählhebel (201) ist, und wobei das andere Ende des Ausführhebels (4) unterhalb der Plattform (602a) bereitgestellt ist und in Kontaktverbindung mit dem Hebel (620) ist, wobei der Zähler (2) an dem Befestigungshalter (1) montiert ist, wobei ein Zahlenwertfenster (202) zum Beobachten eines Zählzahlenwerts an einer Seite des Zählers (2) bereitgestellt ist, wobei der Zählhebel (201) in Antriebsverbindung mit dem Zähler (2) ist und unter einer Selbstrückstellkraft des Zählers (2) rückstellen kann.

Revendications

1. Disjoncteur avec un dispositif de comptage, comprenant un compteur (2) et un levier d'exécution (4), **caractérisé en ce que** le compteur (2) est monté de manière fixe sur un côté d'un mécanisme d'actionnement (6) du disjoncteur, le levier d'exécution (4) est monté sur un côté du mécanisme d'actionnement (6) dans un mode pivotant et est en liaison d'entraînement avec un levier de comptage (201) du compteur (2) et un arbre de rotation de tringlerie (600) s'étendant hors du mécanisme d'actionnement (6), l'arbre de rotation de tringlerie (600) peut tourner lorsque le disjoncteur est arrêté ou mis en marche, et un ressort de réinitialisation (5) qui peut fournir la force de rappel de rotation pour le levier d'exécution est prévu sur le levier d'exécution (4) ; une première extrémité du levier d'exécution (4) est en liaison d'entraînement avec le levier de comptage (201) par l'intermédiaire d'une tige de liaison (3), et l'autre extrémité du levier d'exécution (4) est en con-

tact coulissant avec un porte-à-faux (610) s'étendant hors de la partie d'extrémité de l'arbre de rotation de tringlerie (600) ; une première extrémité de la tige de liaison (3) est reliée au levier d'exécution (4), et l'autre extrémité de la tige de liaison (3) est reliée au levier de comptage (201) ; le porte-à-faux (610) peut être entraîné en rotation par l'intermédiaire du mécanisme d'actionnement (6) et entraîne le levier d'exécution (4) en rotation afin de permettre à la tige de liaison (3) de se déplacer de manière à tirer le levier de comptage (201) pour terminer le comptage.

2. Disjoncteur avec le dispositif de comptage selon la revendication 1, dans lequel le levier (620) qui correspond au porte-à-faux (610) et est capable d'osciller vers le haut et vers le bas est monté sur une plaque de montage mécanique (601) sur un premier côté du mécanisme d'actionnement (6) ; une première extrémité du levier (620) est montée sur une surface latérale d'une plaque de recouvrement mécanique (602) dans un mode pivotant, et la surface supérieure et la surface inférieure de l'autre extrémité du levier (620) sont respectivement en connexion de contact avec la surface supérieure du porte-à-faux (610) et la surface inférieure d'une extrémité du levier d'exécution (4) ; en outre, lorsque le disjoncteur est mis en marche, le mécanisme d'actionnement (6) entraîne le porte-à-faux (610) à tourner vers le bas, de telle sorte que le ressort de réinitialisation (5) libère de l'énergie tandis que le levier (620) oscille vers le bas pour perdre le support du levier d'exécution (4), de telle sorte que le levier d'exécution (4) tourne pour entraîner la tige de liaison (3) à tirer le levier de comptage (201) pour terminer le comptage.
3. Disjoncteur avec le dispositif de comptage selon la revendication 2, dans lequel un rouleau (611) qui est capable de rouler par rapport au porte-à-faux (610) et qui est en contact coulissant avec la partie inférieure du levier (620) est monté sur la partie d'extrémité du porte-à-faux (610).
4. Disjoncteur avec le dispositif de comptage selon la revendication 1, dans lequel une première extrémité de la liaison (3) est reliée de manière rotative à un arbre de trou du levier d'exécution (4), et l'autre extrémité de la tige de liaison (3) est en connexion de contact avec le levier de comptage (201).
5. Disjoncteur avec le dispositif de comptage selon la revendication 1, dans lequel une plaque de recouvrement (602) est prévue sur une première extrémité du mécanisme d'actionnement (6), une plate-forme (602a) sur laquelle un support de fixation (1) est monté s'étend à partir d'un premier côté de la plaque de recouvrement (602), et le support de fixation (1) est d'une structure en forme de L et comprend une partie

de support verticale (110) et une partie de support horizontale (120) qui sont connectées dans un mode mutuellement vertical ; le compteur (2) est monté fixement sur une surface latérale de la partie de support verticale (110), la partie de support horizontale (120) est connectée fixement au bord de la plate-forme (602), et une plaque de montage (1200) s'étend verticalement à partir d'un côté de la partie de support horizontale (120) ; un arbre de montage (121) qui est connecté au levier d'exécution (4) dans un mode pivotant est prévu sur la plaque de montage (1200).

6. Disjoncteur avec le dispositif de comptage selon la revendication 5, dans lequel le ressort de réinitialisation (5) est prévu sur l'arbre de montage (121) de manière à former un manchon ; une extrémité de fixation de ressort (501) et une extrémité de flambage de ressort (502) sont prévues respectivement sur deux extrémités du ressort de réinitialisation (5) ; la plaque de montage (1200) est pourvue d'un trou de montage de ressort (122) qui est adjacent à l'arbre de montage (121) et qui est utilisé pour fixer l'extrémité de fixation de ressort (501) ; l'extrémité de flambage de ressort (502) et le bord du levier d'exécution (4) sont fixés de manière à former un flambage ; le ressort de réinitialisation (5) peut entraîner le levier d'exécution (4) en rotation tout en libérant de l'énergie, pour entraîner la tige de liaison (3) de manière à tirer le levier de comptage (201) pour terminer le comptage.
7. Disjoncteur avec le dispositif de comptage selon la revendication 5, dans lequel un trou de guidage (111) destiné à guider une tige de liaison de limitation (3) s'étend hors d'un premier côté de la partie de support verticale (110) ; la tige de liaison (3) est d'une structure en forme de U, dans lequel une première partie coudée à angle droit (301) et une seconde partie coudée à angle droit (302) qui sont coudées dans la même direction sont prévues sur deux extrémités de la tige de liaison (3) respectivement ; la première partie coudée à angle droit (301) peut être reliée de manière rotative à l'arbre de trou au niveau de la partie d'extrémité du levier d'exécution (4), et la seconde partie coudée à angle droit (302) peut être en connexion de contact avec le levier de comptage (201) du compteur (2).
8. Disjoncteur avec le dispositif de comptage selon la revendication 1, dans lequel le levier d'exécution (4) est d'une structure en forme de L, et dans lequel un plan au niveau de la partie inférieur d'une partie horizontale (420) du levier d'exécution en forme de L (4) peut être en ajustement coulissant avec le porte-à-faux (610), un trou de montage de levier (412) destiné à une liaison pivotante est formé conjointement entre une partie verticale (410) et la partie horizon-

tale (420) du levier d'exécution en forme de L (4), et un trou de montage de tige (411) destiné à être en liaison rotative avec un arbre de trou à une première extrémité de la tige de liaison (3) est formé dans la partie d'extrémité de la partie verticale (410).

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9. Disjoncteur comportant le dispositif de comptage selon la revendication 2, dans lequel des supports de guidage (621) sont montés respectivement sur deux côtés du levier (620).

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10. Disjoncteur comportant le dispositif de comptage selon la revendication 1, dans lequel une plaque de recouvrement (602) est prévue à une première extrémité du mécanisme d'actionnement (6) ; le support de fixation (1) est monté de manière fixe sur un bord de la plate-forme (602a) qui s'étend à partir d'un côté de la plaque de recouvrement (602) ; le levier d'exécution (4) est monté à l'extérieur du support de fixation (1), une première extrémité du levier d'exécution (4) est prévue au-dessus de la plate-forme (602a) et est en connexion de transmission avec le levier de comptage (201) à travers la tige de liaison (3), et l'autre extrémité du levier d'exécution (4) est prévue au-dessous de la plate-forme (602a) et est en connexion de contact avec le levier (620) ; le compteur (2) est monté sur le support de fixation (1) ; une fenêtre de valeur numérique (202) pour observer une valeur numérique de comptage est prévue sur un côté du compteur (2) ; le levier de comptage (201) est en connexion d'entraînement avec le compteur (2) et peut être réinitialisé sous l'action d'une force d'auto-rappel du compteur (2).

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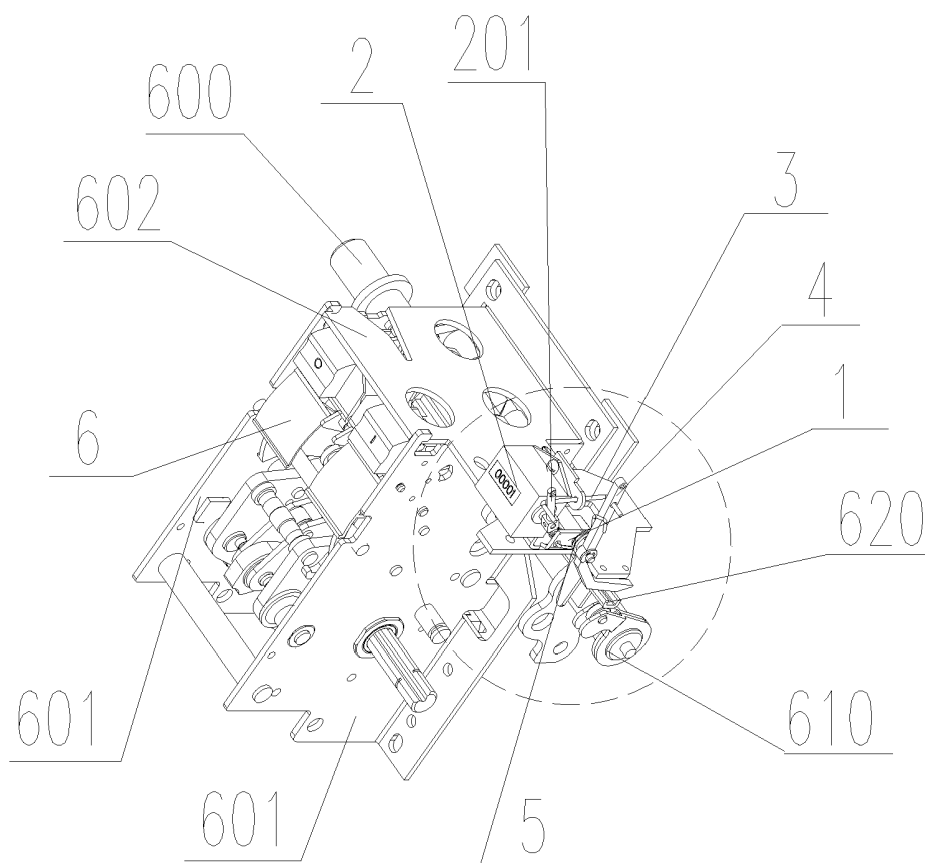


Fig. 1

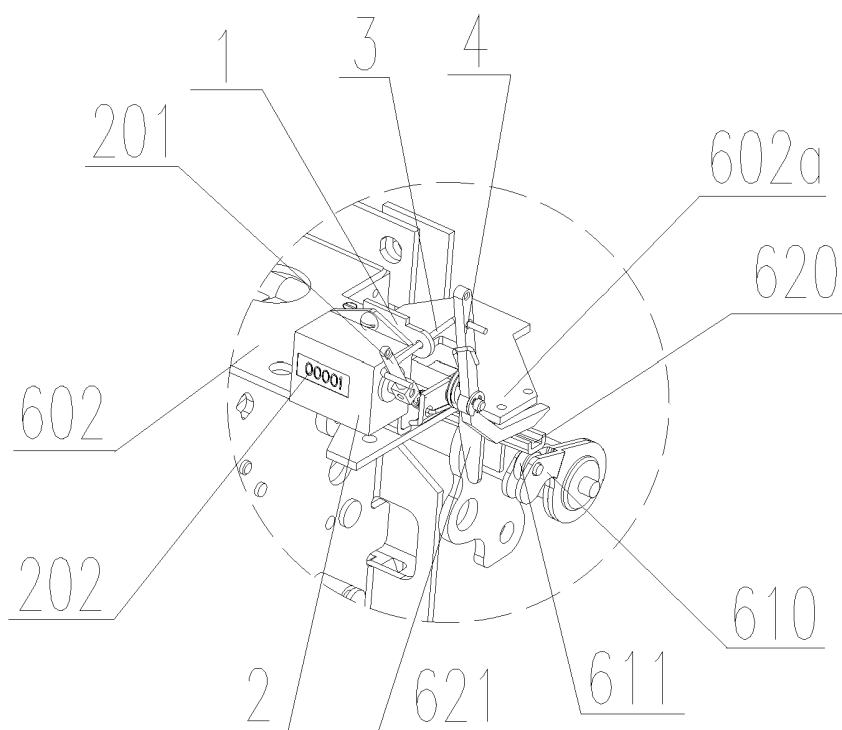


Fig. 2

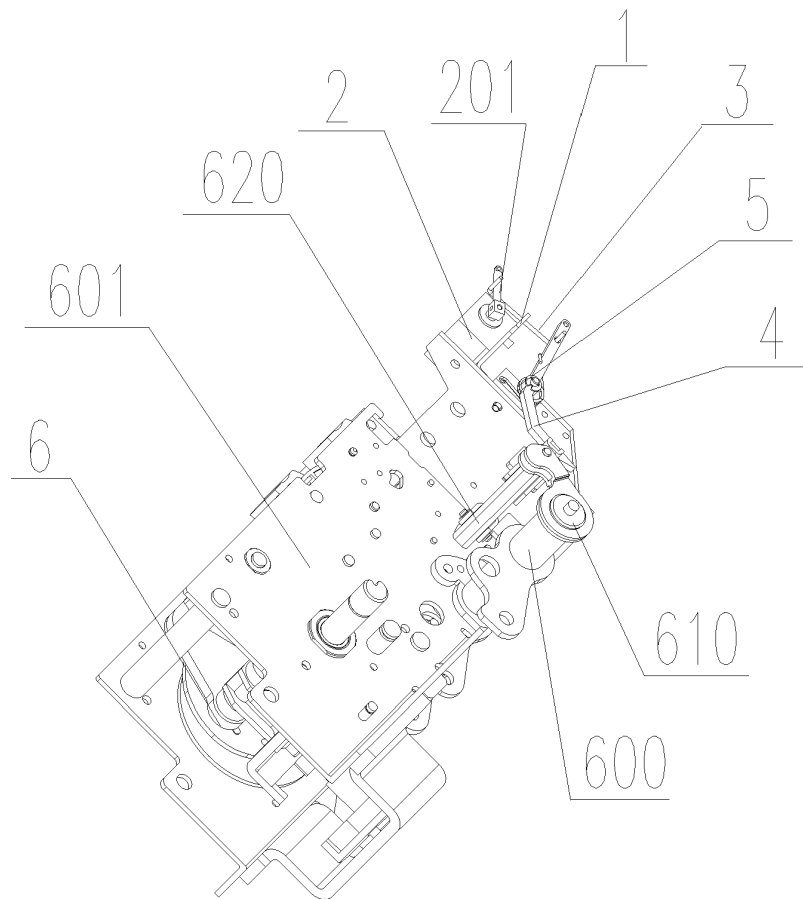


Fig. 3

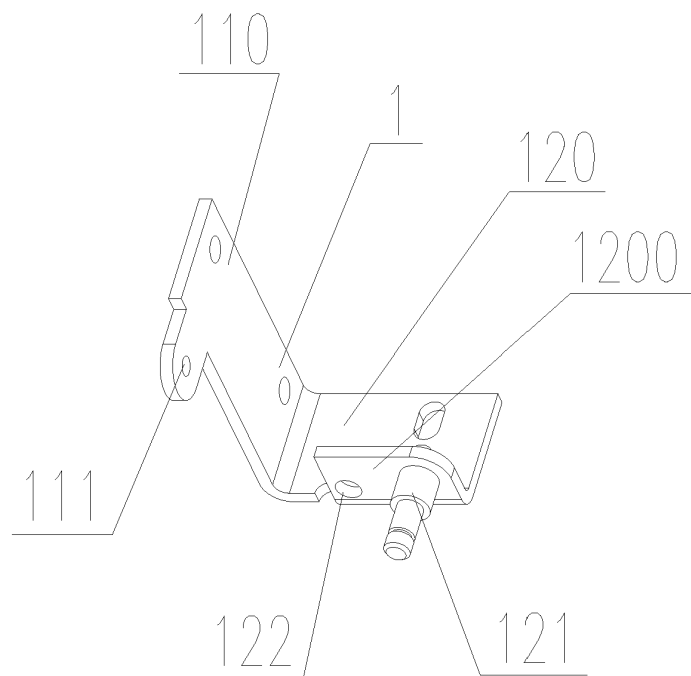


Fig. 4

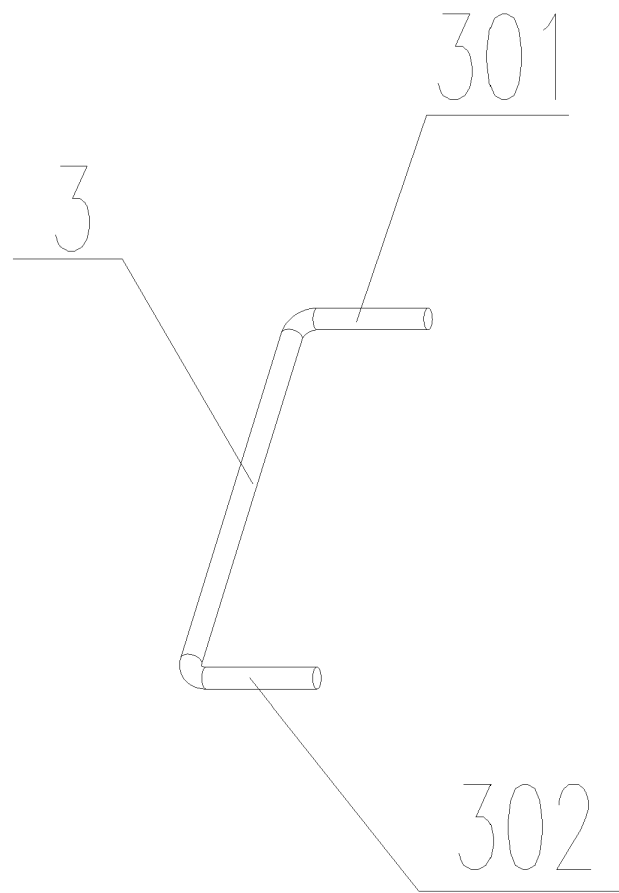


Fig. 5

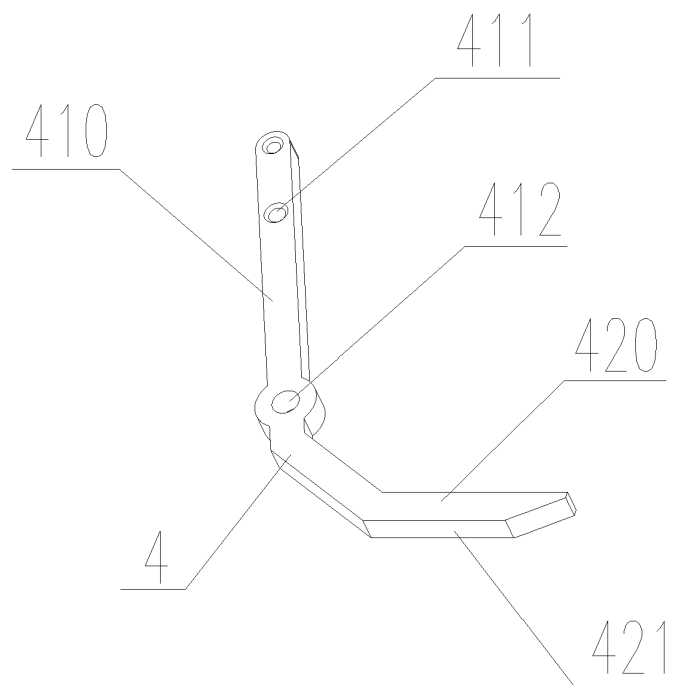


Fig. 6

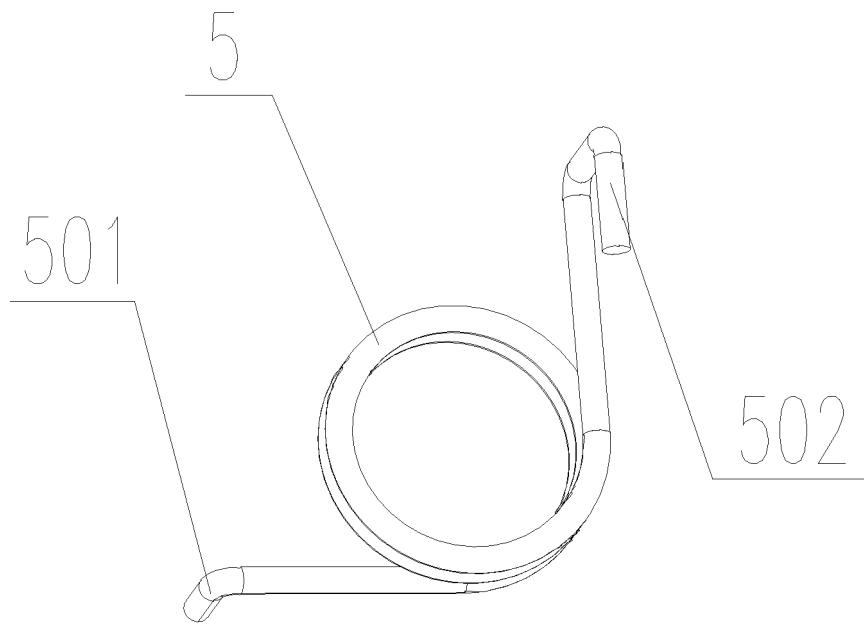


Fig. 7

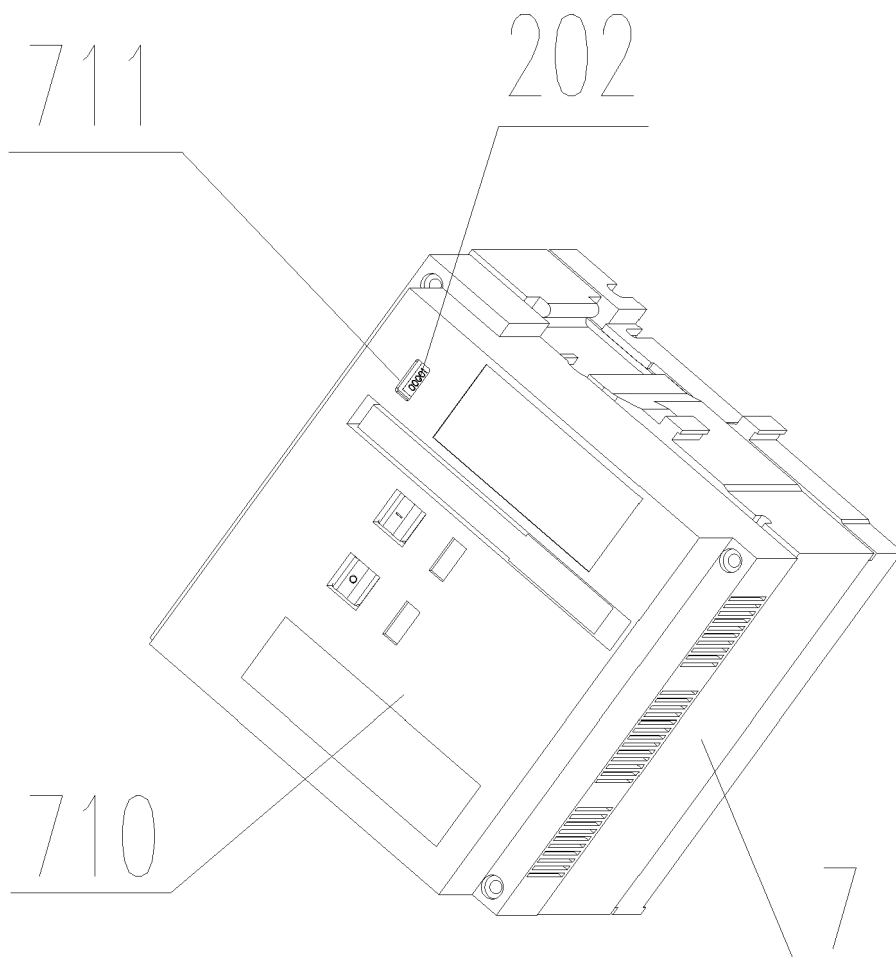


Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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