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(54) **BREAKER COUNTING DEVICE**

(57) A counting device of a circuit breaker comprises a counter and an executing lever. The counter is fixedly mounted on one side of an operation mechanism of the circuit breaker, the executing lever is mounted on one side of the operation mechanism in a pivotal mode and is in driving connection with a counting lever of the counter and a linkage rotating shaft extending out from the operation mechanism, and a reset spring which can provide the rotation restoring force for the executing lever is provided on the executing lever. One end of the executing lever is in driving connection with the counting lever through a connecting rod, and the other end of the executing lever is in sliding contact with a cantilever extending out from the end portion of the linkage rotating shaft. One end of the connecting rod is connected with the executing lever, and the other end of the connecting rod is connected with the counting lever. The cantilever can be driven to rotate through the operation mechanism and drives the executing lever to rotate to enable the connecting rod to move so as to pull the counting lever to complete counting. The counting device of the circuit breaker is accurate in counting, stable in device and simple in structure.

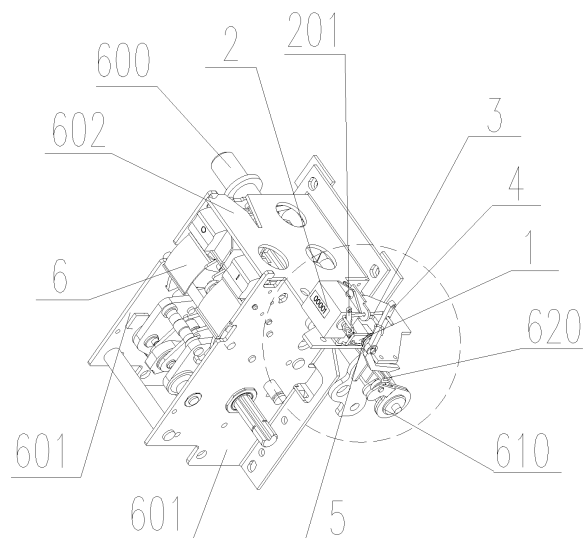


Fig. 1

Description

TECHNICAL FIELD

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

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.

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.

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

a counting device of a circuit breaker 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, 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.

5 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 counting device of a circuit breaker 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 connect-

ing 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 embodi-

ment 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 descriptions. For those common skilled in the art, several simple deductions or replacements made without departing from the concept of the

present invention will fall into the protection scope of the present invention.

Claims

1. A counting device of a circuit breaker, 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), 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 counting device of the circuit breaker 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 counting device of the circuit breaker 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 counting device of the circuit breaker 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 counting device of the circuit breaker 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 counting device of a circuit breaker 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 counting device of the circuit breaker 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 counting device of the circuit breaker 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 ex-

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 counting device of the circuit breaker according to claim 2, wherein guiding supports (621) are mounted on two sides of the lever (620) respectively.
10. The counting device of the circuit breaker 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).

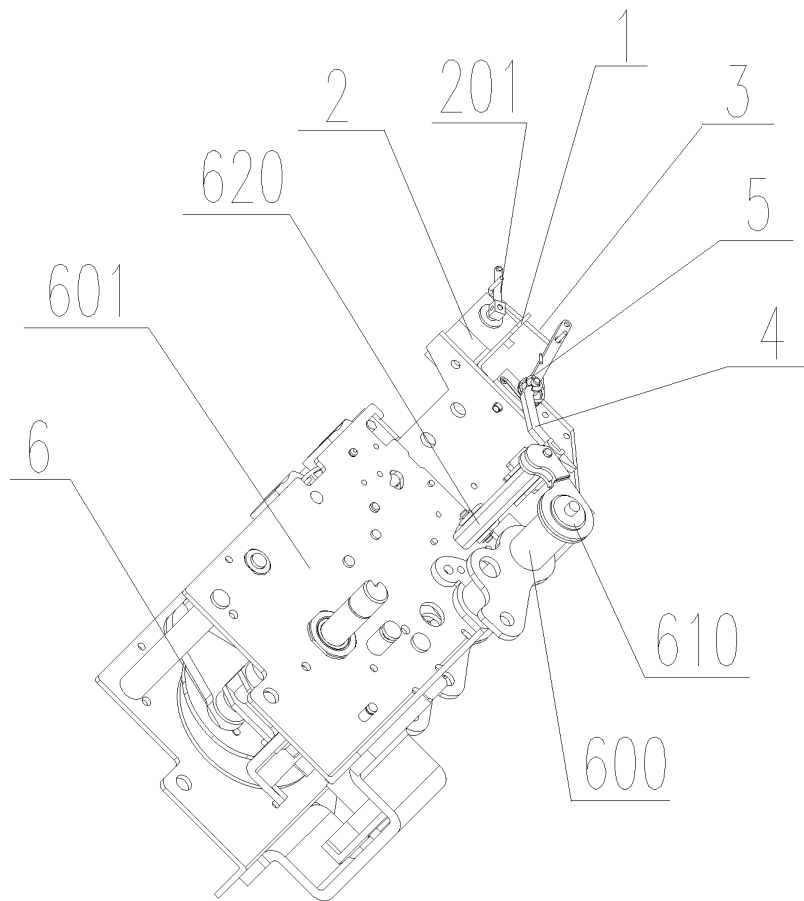


Fig. 3

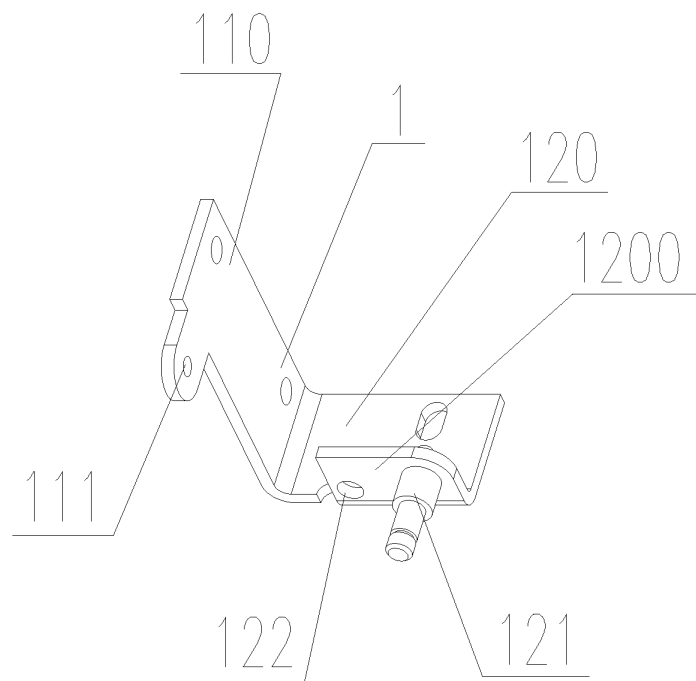


Fig. 4

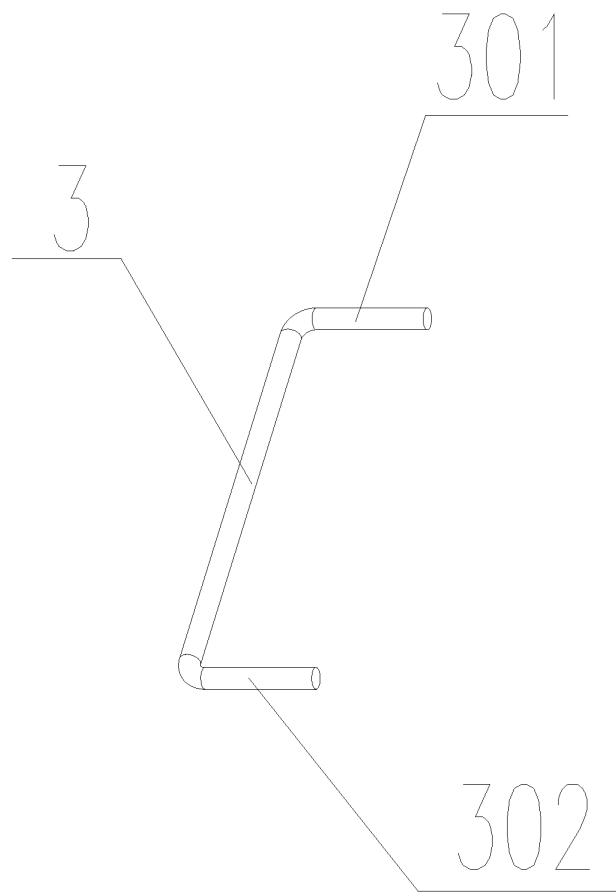


Fig. 5

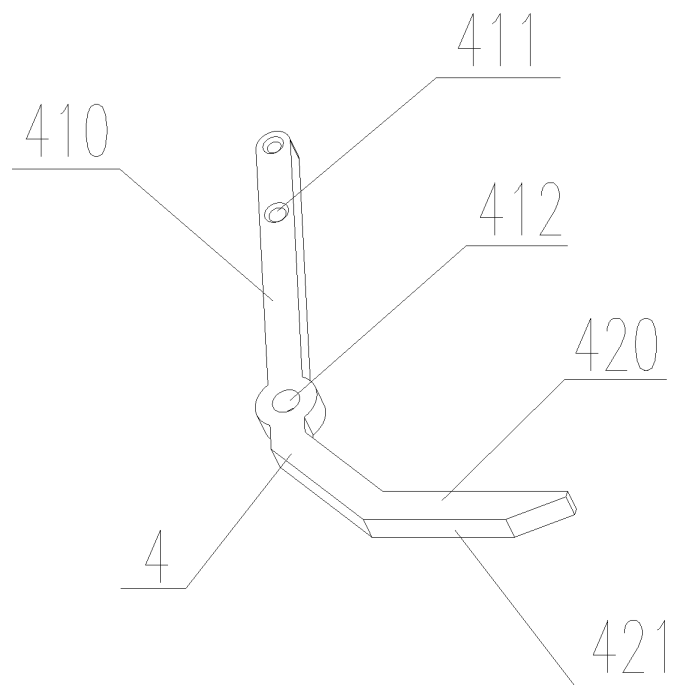


Fig. 6

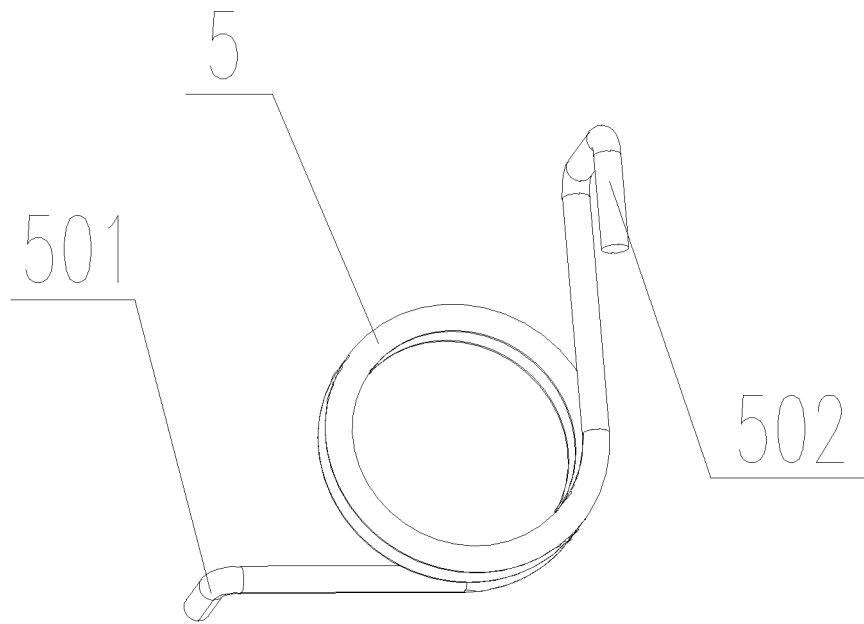


Fig. 7

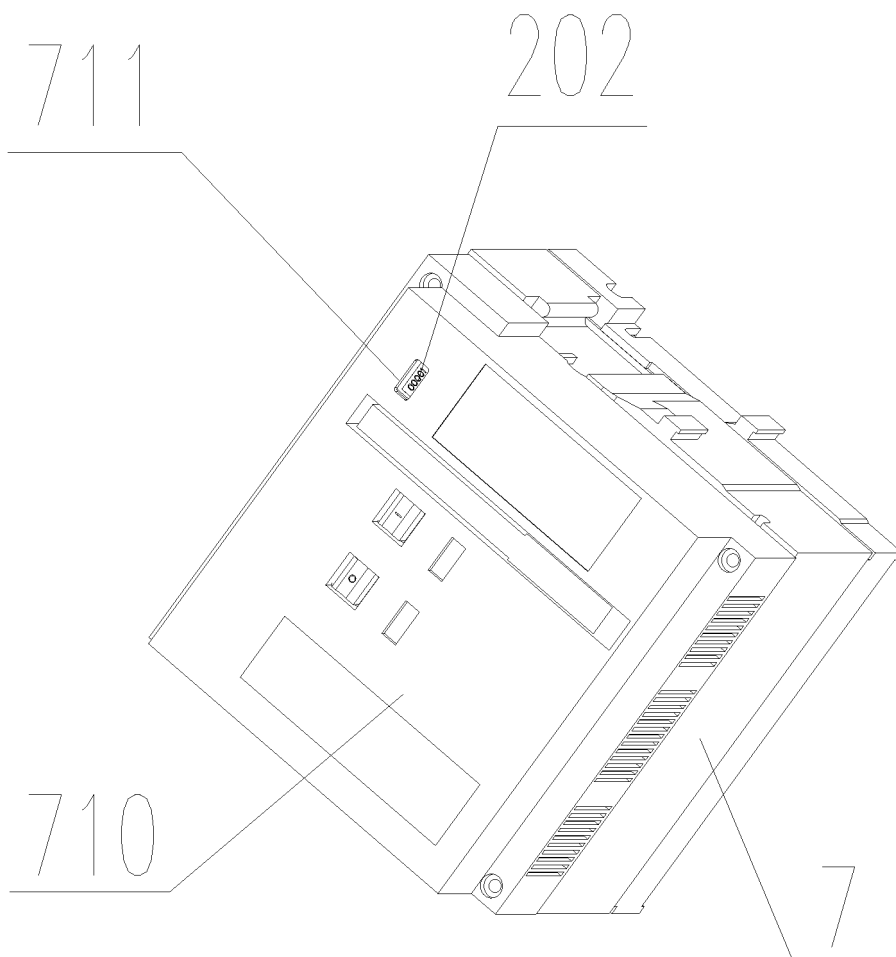


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2015/090756

A. CLASSIFICATION OF SUBJECT MATTER

G06M 1/08 (2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06M

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

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

WPI, EPODOC, CNPAT, CNKI: breaker?, rotat+, count+, shaft+, rod+, lever+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 104299029 A (ZHEJIANG CHINA ELEC APPLIANCE) 21 January 2015 (21.01.2015) claims 1 to 10	1-10
PX	CN 204189191 U (ZHEJIANG CHINA ELEC APPLIANCE) 04 March 2015 (04.03.2015) claims 1 to 9, description, paragraph [0015]	1-10
X	CN 203707052 U (JIANGSU NEW LUOKAI MECHANICAL AND ELECTRICAL MFG GROUP CO., LTD) 09 July 2014 (09.07.2014) description, paragraphs [0012] to [0014] and figures 1 and 2	1, 4, 8
Y	CN 203707052 U (JIANGSU NEW LUOKAI MECHANICAL AND ELECTRICAL MFG GROUP CO., LTD) 09 July 2014 (09.07.2014) description, paragraphs [0012] to [0014] and figures 1 and 2	5, 6
Y	CN 101183620 A (LS IND SYSTEMS CO., LTD) 21 May 2008 (21.05.2008) description, page 5, the first paragraph to page 7, the fourth paragraph and figures 1 to 3	5, 6

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

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search 01 December 2015	Date of mailing of the international search report 18 December 2015
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer JIANG, Na Telephone No. (86-10) 62413225

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2015/090756

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 202600758 U (SHANGHAI SIEMENS SWITCH CO., LTD) 12 December 2012 (12.12.2012) the whole document	1-10
A	CN 202695346 U (SHANGHAI LIANGXIN ELECTRICAL) 23 January 2013 (23.01.2013) the whole document	1-10

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

INTERNATIONAL SEARCH REPORT
 Information on patent family members

 International application No.
 PCT/CN2015/090756

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
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CN 204189191 U	04 March 2015	None	
CN 203707052 U	09 July 2014	None	
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		CN 101183620 B	16 February 2011
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		ES 2339170 T3	17 May 2010
		KR 100771921 B1	01 November 2007
		MY 153202 A	29 January 2015
CN 202600758 U	12 December 2012	None	
CN 202695346 U	23 January 2013	None	