Aug. 5, 1969 N. YORGIN ET AL 3,460,075

CIRCUIT BREAKER WITH IMPROVED LATCH AND TRIP STRUCTURES

Filed March 7, 1967 3 Sheets-Sheet 1

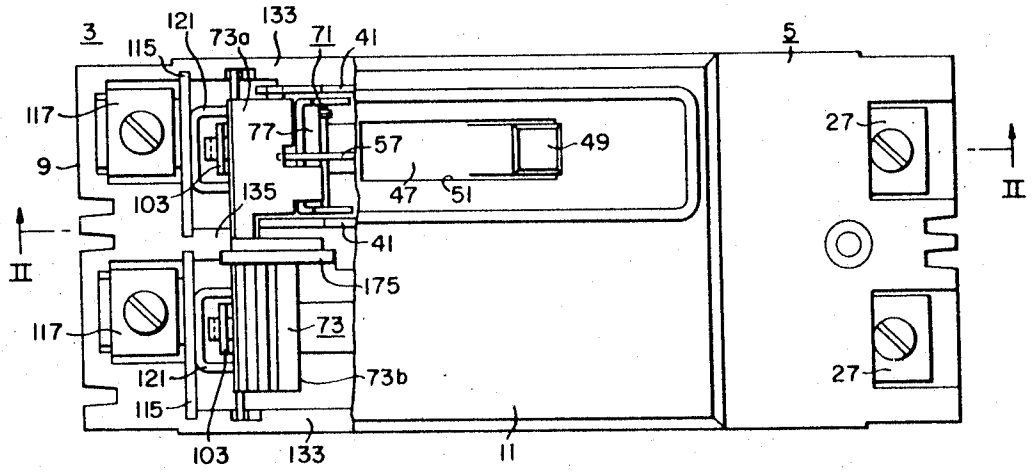


FIG.1.

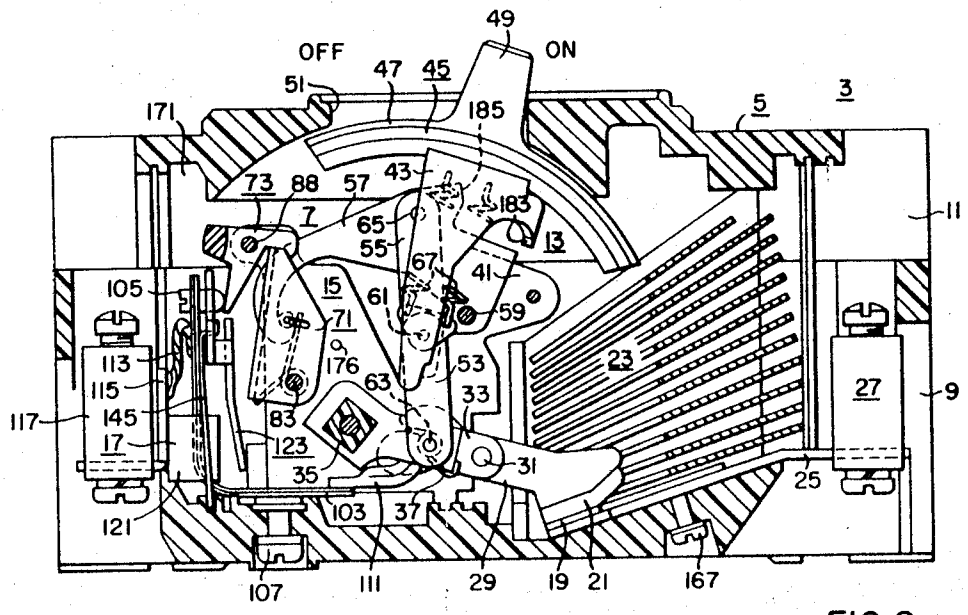


FIG.2.

WITNESSES

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CIRCUIT BREAKER WITH IMPROVED LATCH AND TRIP STRUCTURES

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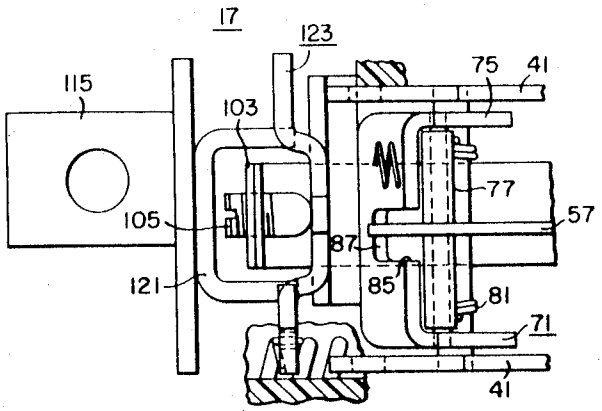


FIG.5.

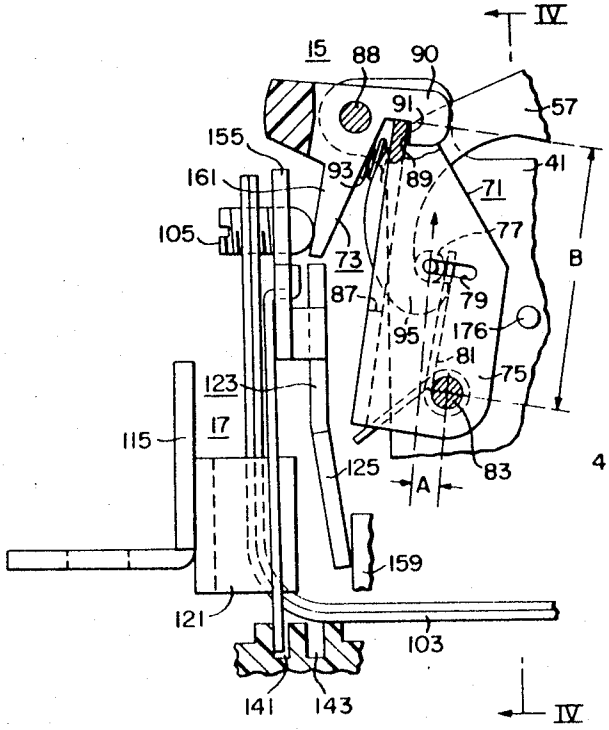


FIG.3.

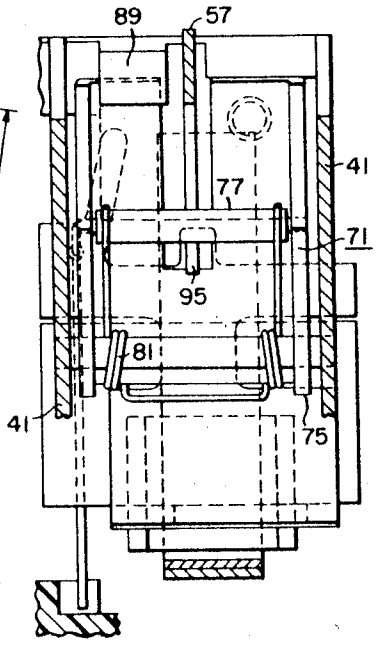


FIG.4.

CIRCUIT BREAKER WITH IMPROVED LATCH AND TRIP STRUCTURES

Filed March 7, 1967 3 Sheets-Sheet 3

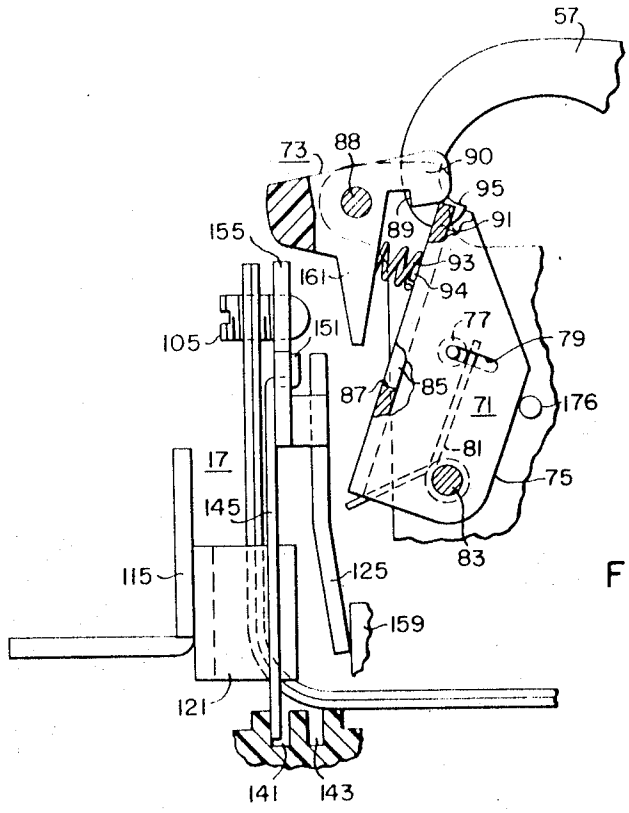
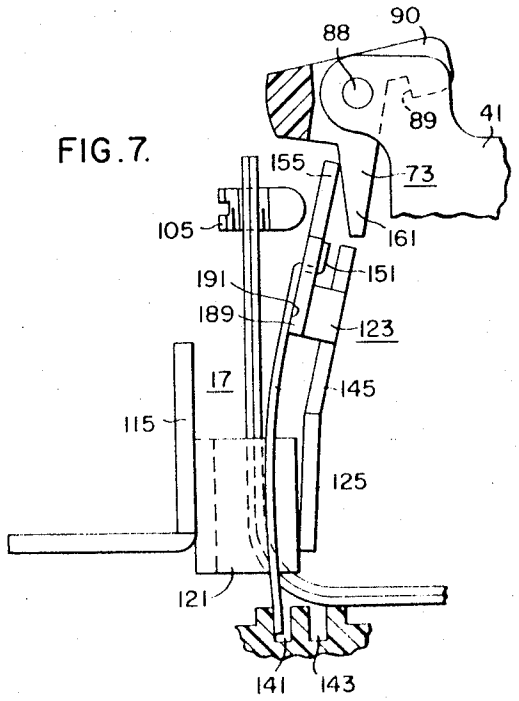
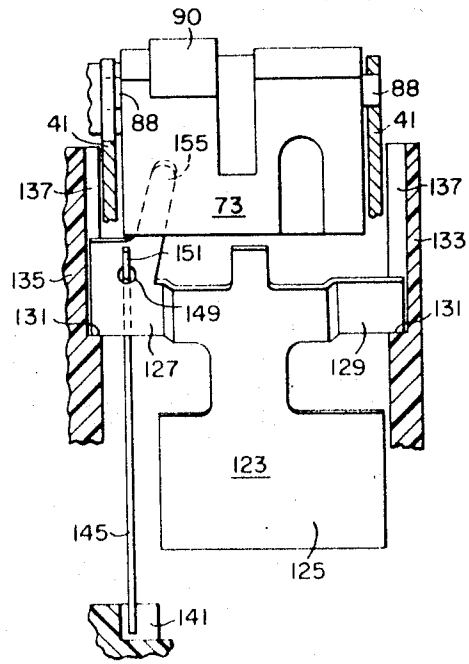


FIG.6.

FIG.8.

FIG.7.





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CIRCUIT BREAKER WITH IMPROVED LATCH AND TRIP STRUCTURES

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Filed Mar. 7, 1967, Ser. No. 621,321

Int. Cl. H01h 75/10, 77/06

U.S. Cl. 335—9 10 Claims

ABSTRACT OF THE DISCLOSURE

A circuit breaker having separable contacts and a latched releasable member releasable to effect automatic opening of the contacts, with a latch member latching the releasable member, a trip member latching the latch member and trip means operating automatically upon the occurrence of overloads to move the trip member to release the latch member to thereby release the releasable member.

Certain features disclosed in this case are disclosed and claimed in the copending case of N. Yorgin et al., Ser. No. 621,329, filed Mar. 7, 1967, and assigned to the assignee of the instant case.

An object of this invention is to provide a circuit breaker with an improved light-load latch structure.

Another object of this invention is to provide a circuit breaker with an improved double-latching structure operable to an unlatching position to effect automatic opening of the breaker contacts.

Another object of this invention is to provide an improved multi-pole circuit breaker comprising a releasable member releasable to effect opening of the breaker contacts, a roller latch member latching the releasable member, a common trip member latching the roller latch member and, in each pole unit, a trip device operable upon the occurrence of overload current conditions to operate the common trip member to release the roller latch member to thereby release the releasable member.

A general object of this invention is to provide an improved compactly constructed circuit breaker that is dependable in operation and relatively easy to assemble.

These and other objects of the invention will be apparent from the following description when taken in conjunction with the accompanying drawings.

In said drawings:

FIGURE 1 is a top view, with parts broken away, of a circuit breaker constructed in accordance with the principles of this invention;

FIG. 2 is a sectional view taken generally along the lines II—II of FIG. 1;

FIG. 3 is an enlarged view of certain parts seen in FIG. 2;

FIG. 4 is a sectional view, with parts broken away and with both supporting plates shown in section, taken generally along the line IV—IV of FIG. 3;

FIG. 5 is a top view of the parts shown in FIG. 3 with parts of both supporting plates shown and with certain parts broken away for purpose of clarity;

FIG. 6 is a view similar to FIG. 3 with parts broken away for the purpose of clarity and with certain parts being shown in the tripped position;

FIG. 7 is a view of certain of the parts shown in FIG. 3 with parts shown in a position reached during a magnetic tripping operation; and

FIG. 8 is a view similar to FIG. 4 with certain parts broken away and with the armature support means being shown.

Referring to the drawings, there is shown in FIGS. 1 and 2, a two-pole circuit breaker 3 comprising an insulating housing 5 and a circuit-breaker mechanism 7 supported in the housing 5. The housing 5 comprises an insulating base 9 and an insulating cover 11 cooperating with the base 9 to enclose the circuit-breaker mechanism 7 that is mounted on the base 9.

The circuit-breaker mechanism 7 comprises an operating mechanism 13, a latch mechanism 15 and a thermal-and-magnetic trip device 17.

A stationary contact 19, a movable contact 21 and an arc-extinguishing unit 23 are provided for each pole unit of the breaker. The stationary contact 19 for each pole is rigidly mounted on the inner end of a conducting strip 25 that is secured to the base 9 and that extends outward to an external cavity where a well-blown type of solderless terminal connector 27 is secured to the outer end of the member 25. The movable contact 21 for each of the pole units is mounted on a contact arm 29 that is pivotally mounted by means of a pin 31 on a switch arm 33 that is fixedly secured to an insulating tie bar 35. The switch arms 33 for both pole units are secured to the tie bar 35 for common movement with the tie bar that is pivotally mounted by means of suitable pins in the side walls of the breaker housing. A torsion spring 37 in each pole unit biases the associated contact arm 29 in a clockwise (FIG. 2) direction about the switch arm 33 to provide contact pressure in the closed position of the contacts.

The operating mechanism 13 is a single operating mechanism disposed in the upper (FIG. 1) pole unit. The operating mechanism 13 is supported on two metallic rigid supporting plates 41 that are fixedly secured to the base 9 in the one pole unit of the circuit breaker. Only one of the plates 41 is seen in FIG. 2. An inverted U-shaped operating lever 43 is pivotally supported on the supporting plates 41 with the inner ends of the legs of the lever 43 positioned in U-shaped notches in the plates 41. An insulating operating member 45 is fixedly supported to the front portion of the operating lever 43. The operating member 45 comprises an insulating shield 47 and a handle 49. The handle 49 protrudes out through an opening 51 in the cover 11, and the shield 47 closes the opening 51 in all positions of the handle.

The switch arm 33 for the center pole unit is operatively connected, by means of a toggle comprising toggle links 53 and 55, to a releasable member or cradle 57 that is pivotally supported on the supporting plates 41 by means of a pin member 59. The toggle links 53, 55 are pivotally connected together by means of a knee pivot pin 61. The toggle link 53 is pivotally connected to the switch arm 33 by means of a pin 63, and the toggle link 55 is pivotally connected to the releasable member 57 by means of a pin 65. Overcenter springs 67 are connected under tension between the knee pivot 61 and the bight portion of the operating lever 43.

The contacts are manually opened by movement of the handle 41 in a counterclockwise (FIG. 2) direction from the "ON" to the "OFF" position. This movement carries the line of action of the overcenter springs 67 to the left causing collapse of the toggle 53, 55 to thereby rotate the tie bar 35 in a counterclockwise direction to simultaneously move the two switch arms 33 to the open position opening the contacts of the two pole units. The contacts are manually closed by reverse movement of the handle 49 from the "OFF" to the "ON" position, which movement moves the line of action of the overcenter springs 67 to the right to straighten the toggle 53, 55 to thereby rotate the tie bar 35 in a clockwise direction to move the switch arm 33 of the two pole units to the closed position seen in FIG. 2.

The releasable member 57 is latched in the position

seen in FIG. 2 by means of the latch mechanism **15**. As is better seen in FIG. 3, the latch mechanism **15** comprises a roller latch member **71** and a trip member **73**. The roller latch member **71** comprises a generally U-shaped main body part **75** and a roller member **77** movably supported for limited travel on the main body part **75**. As can be seen in FIGS. 3–6, the roller member **77** is provided with pin portions at the opposite ends thereof that fit within elongated slots **79** on the side plates of the main body part **75**. A torsion spring member **81** biases the roller member **77** to one end of the slots **79**. The roller-latch member **71** is pivotally supported on the supporting plates **41** by means of a pin member **83**. A slot **85**, having a lower end **87**, is provided in the bight portion of the U-shaped main body part **75** to permit movement of the releasable trip member **57** between the latched and tripped positions in a manner to be hereinafter described.

The member **73** is an insulating trip bar that extends across both of the pole units. It is noted that the trip member **73** is left out of FIG. 5 for the purpose of clarity. As can be understood with reference to FIGS. 1 and 6–8, the trip member **73** is a molded insulating member formed to provide a pair of insulating pin portions **88** that are disposed in suitable openings in the supporting plates **41** to pivotally support the trip member **73** on the supporting plates **41**. The trip member **73**, which extends through both pole units (FIG. 1) is formed to be supported on only the two supporting plates **41** that are positioned in the one pole unit. As is seen in FIG. 1, although the trip member **73** is provided with different shapes **73***a* and **73***b* in the two pole units, it is noted that this is a unitary member molded as an integral unit to extend across both pole units. The trip member **73** is provided with a latch surface **89**, on a hook portion **90** thereof, for engaging a surface **91** on the main body part **75** of the roller latch member **71**. A compression spring **93** is positioned between the latch member **71** and the trip member **73** to bias the trip bar **73** in the latching direction. The roller latch member **71** is provided with a stamped-out projection **94** (FIG. 6), and one end of the spring member fits over the projection **94**. The trip member **73** is provided with an indentation into which the other end of the spring member **93** fits in order to retain the spring member **93** in position. As can be seen in FIG. 3, the releasable member **57** is provided with a lower hook-shaped end **95** that engages under the roller **77** to latch the releasable member **57**.

There is a separate thermal-and-magnetic trip means **17** in each pole unit. Each of the trip means **17** comprises a generally L-shaped bimetal member **103** having an adjusting screw **105** supported at the upper free end thereof, each of the bimetals **103** is secured to the base **9** by means of a screw member **107**, and electrically connected to the associated switch arm **33** by means of a flexible conductor **111**. Another flexible conductor **113** (FIG. 2) is connected at one end to the upper end of the associated bimetal **103** and at the other end to the vertical leg of a generally L-shaped conductor **115** that extends through an opening at the one end of the housing. A separate solderless terminal connector **117** is secured to the horizontal leg of each of the conductors **115**. Each trip means **117** also comprises a generally U-shaped magnetic member **121** that is welded or otherwise fixedly secured, at the bight portion thereof, to the vertical leg of the associated L-shaped conductor **115**. As can be seen in FIGS. 1 and 5, the opposite legs of each U-shaped magnetic member **121** extend on opposite sides of the vertical leg of the associated bimetal **103** to terminate opposite a magnetic armature **123**. As can be seen in FIG. 8, each of the armatures **123** comprises a lower attracting part **125** that is positioned opposite the legs of the associated magnetic member **121** (FIG. 2), and a pair of arm portions **127** and **129** (FIG. 8) that rest on ledge parts **131** of the insulating base **9**. As can be seen in FIG. 1, the housing base **9** comprises a pair of side walls **133** and a center barrier **135** that extend the length of the base **9** to provide two adjacent compartments for the two pole units of the circuit breaker. The insulating parts **133** and **135** are provided with slots **137** therein (FIG. 8) forming lower shoulder supporting surfaces **131** upon which the arms **127**, **129** of the armature **123** rest to provide a pivotal support for the armature **123**. Each pole unit is formed with a pair of slots **141** and **143** (FIG. 7) in the base **9**. In each pole unit, a spring member **145**, that comprises an elongated spring wire member, is mounted in position with the lower end thereof in the slot **141**. Each spring member **145** extends upward on the side of the armature **123** that faces the associated magnetic member **121** and is bent over at the upper end thereof (FIG. 7) and passed through an opening **149** (FIG. 8) in the arm **127** of the armature to provide an upper end **151** that engages the armature **123** on the upper side of the pivot **131** and on the side of the armature that is opposite the side that faces the U-shaped magnetic member **121**. One leg **127** of each of the armatures **123** is provided with an upper actuating part **155**. In each pole unit, the associated spring **145** biases the associated armature **123** in a counterclockwise (FIG. 3) direction about the pivots **131** (FIG. 8) which movement is limited by the engagement of the actuating part **125** of the armature **123** with a stop **159** (FIG. 3) that is molded integral with the housing base **9**. As can be seen in FIG. 3, the insulating trip member **73** is formed with a depending projecting part **161** in each pole unit that is positioned adjacent the associated actuating screw **105** and adjacent the associated actuating part **155** of the associated armature.

During the assembly of the circuit breaker, the circuit breaker mechanism **7** is mounted on the base **9** when the cover **11** is removed. The conductor **25**, with the terminals **27** and contact **19** thereon are moved into the position seen in FIG. 2. The arc-extinguishing unit **23** is then dropped in place. A screw member **167** is then connected to connect the conductor **25** and the arc-extinguishing unit **23** to the base **9**. Thereafter, an assembly, comprising the bimetal **103**, magnetic member **121**, conductor **113**, conductor **115**, terminal connector **117**, tie bar **35**, switch arms **33** and contact arms **29** for the two pole units, and the links **53**, **55** connected to the switch arm **33**, are dropped down into the base with the ends of the tie bar **35** moving down into bearings in slots in the side walls of the housing base to pivotally support the tie bar **35**. The links **53** and **55** are connected to the switch arm **33** of the one pole unit when moved into the mounted position with the tie bar and switch arms. Thereafter, the armatures **123** of the two pole units are dropped down into position in the slots **137** (FIG. 8). A spring **145** is moved into the mounted position with each armature, with the lower end of the spring being positioned in one of the slots **141**, **143**. After the armatures **123** are in the mounted position, the supporting plates **41** with the trip member **73**, roller latch member **71** and releasable member **57** connected thereto are moved down into position. Each of the supporting plates **41** comprises two lower supporting foot members that protrude through openings in the base **9** and that are spun over at the external bottom of the base **9** to fixedly secure the supporting plates in position in a well-known manner. Thereafter, the upper toggle link **55** is connected to the releasable member **57** by means of the pin **65**. Thereafter, the operating lever **43** with the springs **67** connected thereto are moved into position and the springs **67** are connected to the knee pivot **61**. The operating lever **43** pivots in the U-shaped slots of the two supporting plates **41**. Thereafter, the insulating member **45** is attached to the front portion of the operating lever **43** and the cover **11** is then moved into the mounted position and secured to the base **9**. The cover **11** is provided with side walls that cooperate with the side walls **133** of the base and an insulating barrier portion **171** (FIG. 2) that cooperates with the

insulating barrier 135 of the base 9 to divide the housing into two adjacent compartments for the two pole units. As can be seen in FIG. 1, the insulating trip member 73 is molded to form a disc-shaped part 175 that fits in suitable slots in the barriers 135, 171 to close off the opening in the barriers through which the common trip member 73 passes.

The circuit through each pole unit extends from the terminal connector 117 (FIG. 2) through the conductor 115, the flexible conductor 113, the bimetal 103, the flexible conductor 111, the switch arm 33, the contact arm 29, the contact 21, the contact 19, the conductor 25 to the other terminal connector 27.

When the circuit breaker is in the latched position seen in FIG. 2, the tension springs 67 operate through the toggle link 55 and pivot 65 to force the trip member 57 in a clockwise direction (FIG. 2) about the pivot 59. Clockwise movement of the releasable member 57 is restrained by the engagement of the free end 95 (FIG. 3) of the releasable member 57 under the roller member 77 of the roller latch member 71 with the releasable member 57 pulling the roller latch member 71 in a clockwise direction about the pivot 83. Clockwise movement of the roller latch member 71 about the pivot 83 is restrained by the engagement of the surface 91 (FIG. 3) of the roller latch member 71 with the latch surface 89 of the trip member 73. The latch surface 89 of the trip member 73 is a surface of the insulating material of the molded insulating trip bar. The force of the roller latch member 71 against the latch surface 89 of the trip member 73 operates through the axis of the pivot 88 of the trip member 73 so that the clockwise movement of the roller latch member 71 is restrained by the trip member 73 without tending to move the trip member 73 about the axis of the pivotal support 88 of the trip member 73. Thus, the trip member 73 is in a neutral position latching the roller latch member 71 and releasable member 57 in the latched position seen in FIGS. 2 and 3.

Referring to FIG. 3, it will be understood that the releasable member 57 acts on the roller 77 in the direction indicated by the arrow X, which direction is normal to the latch surface of the releasable member 57. The force of the trip member 73 is reduced by the ratio of the lever arm A to the lever arm B. The lever arm A can be made small because the roller 77 reduces the friction between the main body part 75 and the releasable member 57.

The angle of the latch surface 89 is such that when the trip member 73 rotates, the main body part 75 does not move. Thus, the only load that must be overcome during a tripping operation is the bias force on the trip member 73 and the low friction load between the molded insulating latch surface 89 of the releasable member 73 and the metallic latch surface 91 of the main body part 75 of the roller latch member 71.

The circuit breaker is shown in the closed position in FIG. 2. Upon the occurrence of an overload current above a first predetermined value and below a second predetermined value in any of the pole units, the bimetal 103 in the overloaded pole unit becomes heated and flexes to the right (FIG. 2) with a time delay whereupon the screw 105 engages the associated part 161 (FIG. 3) of the trip member 73 to rotate the trip member 73 in a counterclockwise unlatching direction. During this movement, the latch surface 89 of the trip member 73 clears the latch surface 91 of the roller latch member 71 whereupon the roller latch member 71 is free to move in a clockwise direction (FIGS. 2 and 3). Upon release of the roller latch member 71, the springs 67 (FIG. 2) operate to rotate the releasable member 57 in a clockwise direction moving the roller latch member 71 and releasable member 57 to the tripped position seen in FIG. 6. The releasable member 57 is stopped in the tripped position when it engages a stop pin 176 (FIG. 2) that is supported on the supporting plates 41. Upon movement of the releasable member 57 to the tripped position seen in FIG. 6 the line of action of the springs 67 is moved to the left of a line between the pins 61, 65 and the springs 67 collapse the toggle 55, 53 rotating the switch arm 33 that is attached to the toggle link 53 to move the tie bar 35 and both of the switch arms for the two pole units in a counterclockwise direction opening the contacts of both pole units.

As can be seen in FIG. 6, in the tripped position the spring 93 tends to move the trip member 73 clockwise which movement is restrained by the engagement of the part 90 of the trip member 73 on the top of the roller latch member 71. The roller latch member 71 is stopped in the position shown in FIG. 6 by a stop projection 176 on one supporting plate 41. When the circuit is interrupted the bimetal 103 cools and straightens to the initial position seen in FIGS. 2 and 6.

Upon the occurrence of a tripping operation the springs 77 maintain the operating lever 43 and handle 49 in a position intermediate the "OFF" and "ON" positions in a well-known manner to provide a visual indication that the circuit breaker has been tripped.

Before the circuit breaker can be manually operated after an automatic tripping operation, the circuit breaker mechanism must be reset and relatched. Resetting is effected by movement of the handle 49 from the intermediate position to a position slightly past the full "OFF" position. During this movement, a part 183 (FIG. 2) on the operating lever 43 engages a shoulder portion 185 on the releasable member 57 to rotate the releasable member 57 in a counterclockwise direction about the pivot 59. During this movement, the releasable member 57 moves down in the slot 85 (FIG. 6) in the roller latch member 71 and the end part 95 of the releasable member 57 engages the roller 77 moving the roller 77 in the slot 79 against the bias of the spring 81 to a position which permits movement of the end part 95 of the releasable member 57 past the roller 77, and when the end part 95 of the releasable member 57 passes the roller 77 the torsion spring 81 biases the roller 77 back to the position seen in FIGS. 3 and 6. During this resetting movement of the releasable member 57, the end part 95 of the releasable member 57 engages the surface 87 (FIG. 6) on the part 75 of the roller latch member 71 moving the roller latch member 71 in a counterclockwise direction from the position seen in FIG. 6 to the position seen in FIG. 3. As the roller latch member 71 moves to the position seen in FIG. 3, wherein the bight portion of the roller latch clears the hook end 90 of the trip member 73, the spring 93, which has been additionally charged by counterclockwise movement of the roller latch member 71 biases the trip member 73 in a clockwise (FIG. 3) direction moving the trip member 73 clockwise to the latching position seen in FIG. 3 wherein the surface 89 on the trip member 73 engages the surface 91 on the roller latch member 71 to again latch the parts in the position seen in FIGS. 1 and 3. Clockwise movement of the trip member 73 is limited by the engagement of the upper end of the roller latch member 71 with the surface under the hook-shaped part 90 of the trip member 73 as seen in FIGS. 2 and 3. Thereafter, upon release of the handle 49 by the operator, the springs 67 again bias the toggle link 55 to bias the releasable member 57 in a clockwise (FIG. 2) direction to move the releasable member up to engage the roller 77 (FIG. 3) in the latched position seen in FIGS. 2 and 3. Thereafter, the handle 49 can be manually moved between the "OFF" and "ON" positions to operate the contacts in the manner hereinbefore described.

Upon the occurrence of an overload above the second predetermined value in any of the pole units, the current flowing through the bimetal 103 energizes the associated magnetic members 121, 123 sufficiently to attract the armature 123 from the position seen in FIGS. 2 and 3

to the position seen in FIG. 7. During this movement, the armature 123 moves in a clockwise (FIG. 7) direction on the surfaces 131 (FIG. 8) against the bias of the associated spring member 145 and the upper part 155 of the armature 123 engages the part 161 of the trip member 73 to rotate the trip member in a counterclockwise direction from the position seen in FIGS. 2 and 3 to the position seen in FIGS. 6 and 7, whereupon the trip member 73 releases the roller latch member 71 to effect a magnetic tripping operation in the same manner hereinbefore described with regard to the thermal tripping operation. The magnetic tripping operation is instantaneous as opposed to the time-delay thermal tripping operation. During the tripping movement of the armature 123, the spring 145 is flexed or bowed to the position seen in FIG. 7. As can be seen in FIG. 7, the lower end of the spring 145 is positioned in the slot 141 to prevent lateral movement of the lower end of the spring 145. With the upper end 151 of the spring 145 being moved to the position seen in FIG. 7, and with the part 189 of the armature 123 moving about a fixed pivot 131 (FIG. 8) such that the part 189 engages the spring 145 at 191, the spring 145 is bowed in the manner seen in FIG. 7 such that upon interruption of the circuit and deenergization of the magnetic members 121, 123, the spring 145 discharges from the bowed position seen in FIG. 7 to the position seen in FIG. 6 moving the armature 123 counterclockwise from the tripping position of FIG. 7 to the initial position seen in FIG. 6. The circuit breaker is relatched following a magnetic tripping operation in the same manner as was hereinbefore described.

The spring biasing force acting on the armature can be increased by mounting the lower end of the spring 145 in the slot 143 (FIGS. 6 and 7). It is to be understood that a plurality of slots similar to the slots 141 and 143 could be provided in the base 9 to provide a plurality of adjustments of the biasing force of the spring 145.

The latching structure provides a light-load latch with reduced friction between the latch engaging surfaces of the trip bar and roller latch.

An advantage of using the roller latch that is free to travel on the main body part of the roller latch member is that as the releasable member starts to move during a tripping operation, the hook end of the releasable member cams the roller member in the slot as the hook end of the releasable member passes the roller member thereby permitting the releasable member to move to the tripped position faster than the releasable member would move if the roller member were on a fixed pivot on the main body part of the roller latch member. The use of the roller latch member also permits a relatching operation with less travel of the releasable member. The construction of the trip structure also permits the breaker to be relatched if a shock causes the roller member to travel in the slots to a position where the roller member releases the releasable member while the main body part of the roller latch member remains latched. If this occurs, the breaker can be relatched with the releasable member camming the roller back in the slot as the hook end of the releasable member passes the roller member and with the torsion spring biasing the roller member back to the latching position when the hook end of the releasable member passes the roller member. The releasable member can be reset in the same manner in case the roller latch member and trip member are shocked from the position seen in FIG. 6 to the latched position seen in FIG. 3 while the releasable member remains in the tripped position of FIG. 6. Another advantage is that the use of a roller member to latch the releasable member eliminates the need of grinding the engaging latching surfaces between the main body part of the roller latch member and the releasable member. An advantage of using the coil compression spring between the roller latch member and the trip member is that when a short circuit occurs and the armature is instantaneously and forcibly attracted to the tripping position, the armature hits the trip member hard and the coil spring between the trip member and roller latch member goes solid whereby there is a direct transfer of force from the armature, through the trip member, through the solid coil spring to the roller latch member to forcibly move the roller latch member to the unlatching position.

A two-pole circuit breaker was herein specifically described. It is to be understood that a three-pole circuit breaker could be constructed in accordance with the principles of this invention with a third pole positioned on the opposite side of the pole that houses the single operating mechanism. In this case, the trip member would be extended into the other pole compartment and the tie bar for the contact arms would be extended into the other compartment so that operation of the single operating mechanism would operate all three pole units and tripping movement of the common trip member could be effected by operation of the separate trip means in any of the three pole units. A single pole circuit breaker could be constructed in accordance with the disclosure of FIG. 2 wherein the pole unit that houses the single operating mechanism is disclosed.

While the invention has been disclosed in accordance with the provisions of the patent statutes, it is to be understood that various changes in the structural details and arrangement of parts may be made without departing from the spirit and scope of the invention.

We claim as our invention:

1. A multi-pole circuit breaker comprising a pair of contacts in each pole, a latched releasable member, a first spring beans biasing said releasable member toward a tripped position, manually operatable means operable when said releasable member is latched to operate said contacts between opened and closed positions, a roller latch member comprising a main body part and a roller member supported on said main body part for movement with said main body part for limited travel on said main body part relative to said main body part, said roller latch member being in a latching position with said roller member engaging said releasable member to latch said releasable member in the latched position, a common trip member common to all of said poles, said trip member being in a latching position engaging said main body part of said roller latch member to latch said roller latch member in the latching position, separate trip means in each pole operable automatically upon the occurrence of overload current conditions above a predetermined value in the associated pole to move said trip member to a tripped position to release said roller latch member to thereby release said releasable member, and upon release of said releasable member said first spring means moving said releasable member to a tripped position to effect opening of all of said pair of contacts.

2. A multi-pole circuit breaker according to claim 1, said releasable member being mounted on a first pivot in proximity to oen end thereof and comprising a latch part at the other end thereof, in the latched position of said releasable member said roller member engaging said latch part to latch said releasable member, a second spring means biasing said roller member on said main body part to the latching position, said manually operable means being manually operable to move said releasable member from the tripped position to a resetting position against the bias of said first spring means, said roller member being in the path of movement of said latch part of said releasable member as said releasable member is moved to said resetting position, during said movement of said releasable member to said resetting position said latch part camming said roller member causing said roller member to travel on said main body part to permit said latch part to be moved past said roller member and when said latch part passes said roller member said second spring

means biasing said roller member on said main body part into the latching position of said roller member on said main body part, during said movement of said releasable member to said resetting position said releasable member engaging said main body part to move said main body part to the latching position thereof and when said main body part reaches the latching position said trip member being automatically moved to the latching position thereof to latch said roller latch member, and upon release of said manually operable means when said releasable member has reached the resetting position and said roller latch member and trip member have reached the latching positions said first spring means biasing said releasable member into engagement with said roller member to the latched position of said releasable member.

3. A multi-pole circuit breaker according to claim 1, said releasable member being mounted on a first pivot in proximity to one end thereof and comprising a latch part at the other end thereof, said roller latch member being mounted on a second pivot separate from said first pivot, a second spring means biasing said roller member on said main body part to a latching position, said trip member being mounted on a third pivot separate from said first and second pivots, a third spring means biasing said trip member toward the latching position, said trip member to the latching position, said manually operable means being manually operable to move said releasable member from the tripped position to a resetting position against the bias of said first spring means, said roller member being in the path of movement of said latch part of said releasable member as said releasable member is moved to the resetting position, during movement of said releasable member to the resetting position said latch part engaging said roller member and moving said roller member on said main body part out of the path of movement of said latch part and when said latch part bypasses said roller member said second spring means biasing said roller member back to the latching position on said main body part, during movement of said releasable member to the resetting position said releasable member engaging said main body part and moving said main body part to the latching position and when said main body part reaches the latching position said third spring means biasing said trip member to the latching position wherein said trip member engages said roller latch member to latch said roller latch member in the latching position, and when said releasable member has reached said resetting position with said roller latch member and trip member in the latching positions upon release of said manually operable means said first spring means biasing said releasable member to move said latch part into latching engagement with said roller member.

4. A multi-pole circuit breaker according to claim 3, said third spring means comprising a compression spring between said roller latch member and said trip member biasing said roller latch member in unlatching direction and biasing said trip member in latching direction.

5. A multi-pole circuit breaker according to claim 3, said releasable member being movable from said latched position to said tripped position on said first pivot in a first direction, said roller latch member being movable from the latching position to the unlatching position on said second pivot and in said first direction, and said trip member being movable from the latching position to the unlatching position on said third pivot in a second direction opposite said first direction.

6. A multi-pole circuit breaker according to claim 3, said trip member comprising a molded insulating member, said trip member comprising a latch surface engaging the main body part of said roller latch member to latch said roller latch member in the latching position, and said latch surface comprising a surface of the insulating material of said molded insulating trip member.

7. A circuit breaker comprising a pair of contacts and a latched releasable member mounted on a first pivot, a first spring means biasing said releasable member in a first direction on said first pivot toward a tripped position, a latch member mounted on a second pivot separate from said first pivot, said latch member being in a latching position latching said releasable member in the latched position, said latch member when released being movable on said second pivot in said first direction to an unlatching position to release said releasable member, upon release of said releasable member said first spring means moving said releasable member to said tripped position to effect opening of said contacts, a trip member mounted on a third pivot separate from said first and second pivots, said trip member being in a latching position latching said latch member in the latching position, said trip member being movable on said third pivot toward an unlatching position in a second direction opposite said first direction to release said latch member, a second spring means between said latch member and said trip member biasing said trip member toward the latching position, and trip means operating automatically upon the occurrence of overload current conditions above a predetermined value to move said trip member to the unlatching position to release said latch member.

8. A circuit breaker according to claim 7, and said second spring means comprising a compression spring positioned between said latch member and said trip member which compression spring biases said latch member in the unlatching direction and which compression spring biases said trip member in the latching direction.

9. A circuit breaker according to claim 7, manually operable means operable when said releasable member is in the latched position to open and close said contacts, said manually operable means being operable to move said trip member from the tripped position to a resetting position against the bias of said first spring means, upon operation of said manually operable means to move said releasable member to the resetting position said releasable member moving on said first pivot in the second direction opposite said first direction and said trip member engaging said latch member to move said latch member on said second pivot in the second direction opposite said first direction to the latching position, when said latch member reaches the latching position said second spring means operating to bias said trip member in the first direction opposite said second direction to the latching position to relatch said latch member in the latching position, and when said releasable member has reached said resetting position and said latch member and trip member have reached the latching position upon release of said manually operable means said first spring means biasing said releasable member on said first pivot in said first direction into latching engagement with said latch member whereupon said releasable member is maintained in the latched position.

10. A circuit breaker according to claim 9, and said latch member comprising a main body part mounted on said second pivot and a roller member mounted for limited travel on said main body part which roller member engages said releasable member to latch said releasable member in the latched position.

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