

July 19, 1949.

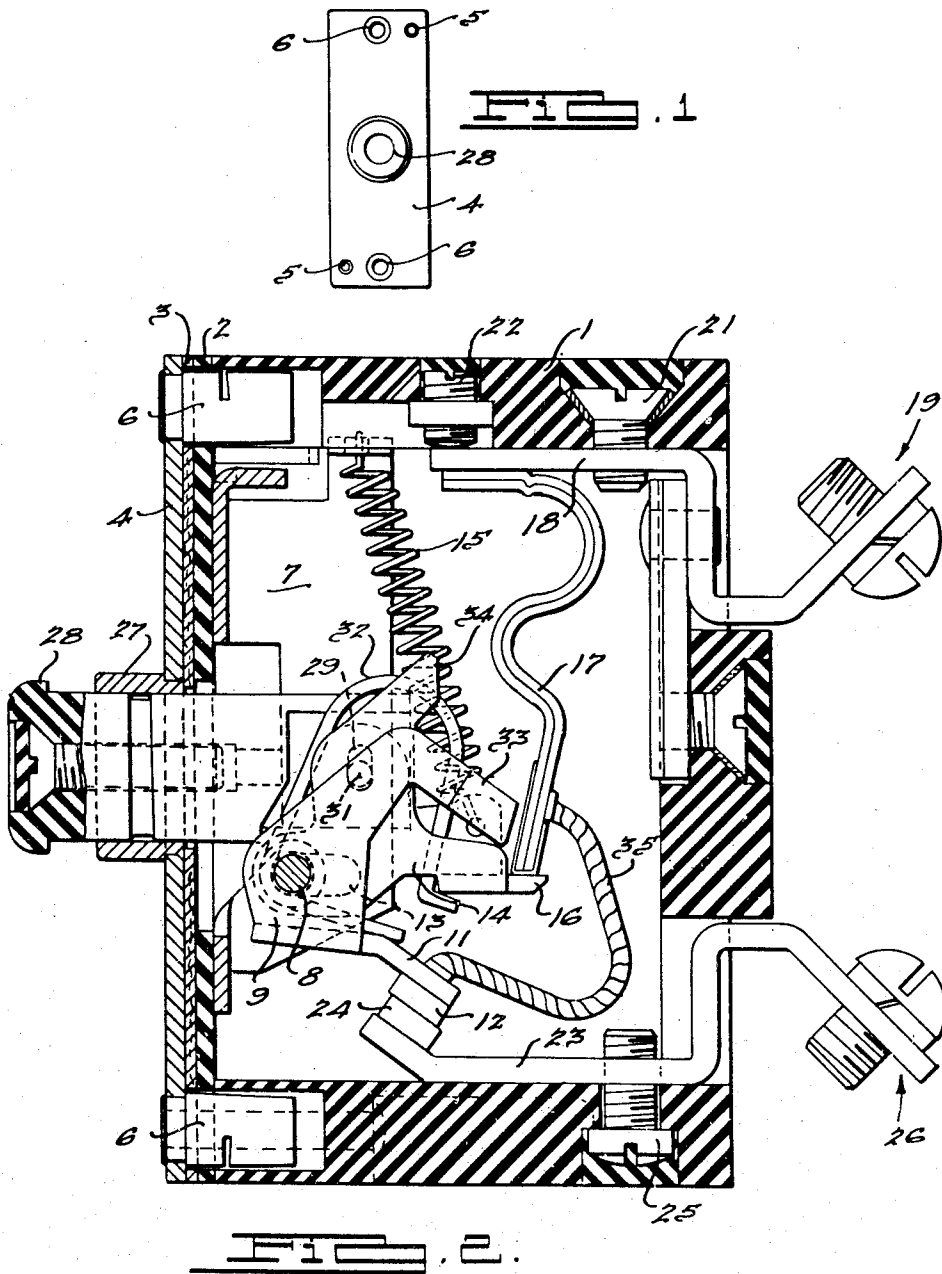
J. J. ZELLER

2,476,648

CIRCUIT BREAKER

Filed June 4, 1945

2 Sheets-Sheet 1



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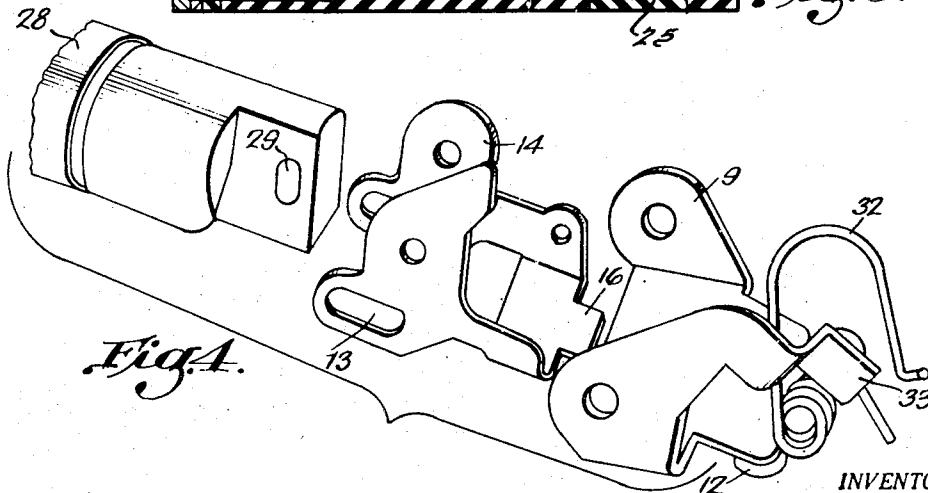
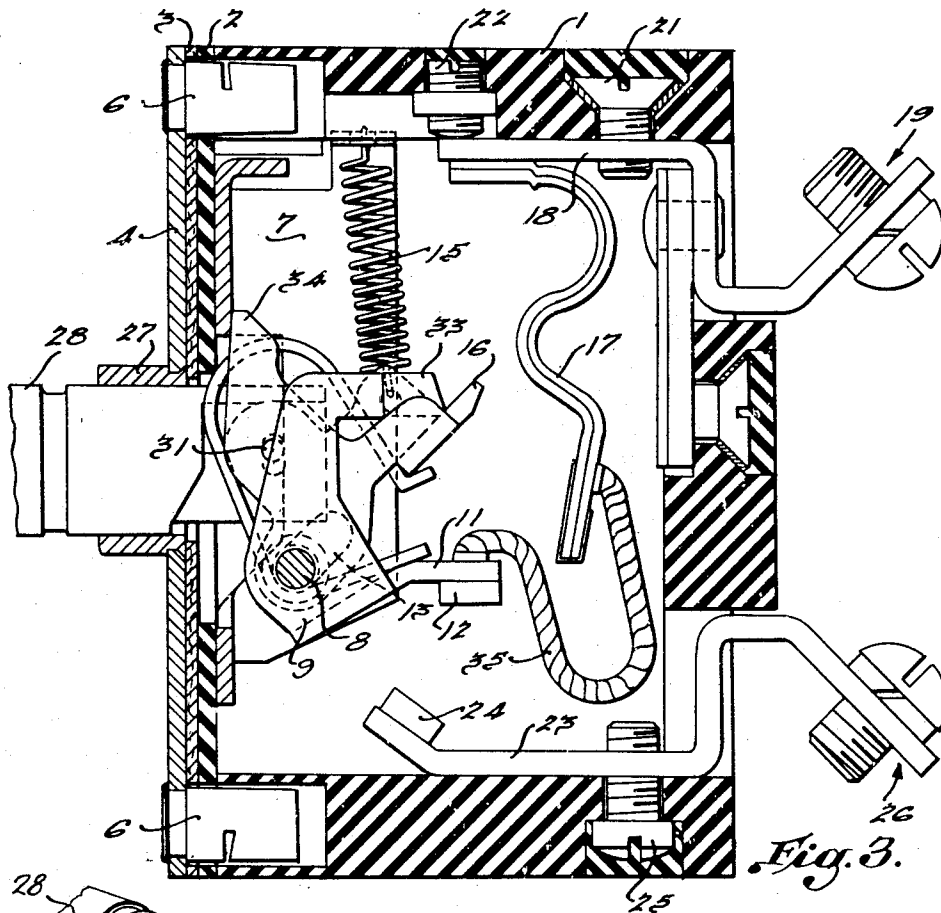
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CIRCUIT BREAKER

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Application June 4, 1945, Serial No. 597,498

6 Claims. (Cl. 200—116)

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This invention relates to electric circuit breakers having manual and automatic means for effecting contact separation.

One object of the invention is the provision of an automatic electric circuit breaker in which the manual switching action and reset are effected through the reciprocation of a push button operator.

Another object of the invention is the provision of an automatic electric circuit breaker in which the manual opening of the contacts is effected by the movement bodily of an element, normally latched by a current responsive element, into an unlatching position permitting operation of the circuit breaker mechanism to separate the contacts.

Other objects and features of the invention will be readily apparent to those skilled in the art from the specification and appended drawings illustrating certain preferred embodiments in which:

Figure 1 is a front elevational view of an automatic electric circuit breaker according to the present invention.

Figure 2 is an enlarged longitudinal sectional view through the breaker of Figure 1.

Figure 3 is a view similar to Figure 2 but showing the parts in open circuit position.

Figure 4 is an exploded perspective view of certain of the operating parts of the circuit breaker.

The circuit breaker, according to the present invention, as specifically illustrated in the drawings, comprises a cup-shaped base member 1, having a closing cover formed by insulating plates 2 and 3, and an outer metallic plate 4 maintained in sealed relation on the base 1 by rivets 5. The plate 4 is provided with a pair of threaded hollow rivets 6 for mounting the breaker in position.

Within the base 1 is mounted a supporting bracket 7 carrying on opposite side walls a stationary pivot pin 8 upon which is pivotally mounted a generally U-shaped conducting element 9 having its bight extended to form a contact arm 11 carrying movable contact 12. Also mounted on the pin 8 through a slot 13 is a trigger element 14 mounted to pivot about the pin 8 and through slot 13 to be moved bodily relative thereto. The trigger element 14 is biased by tension spring 15 for movement in a counterclockwise direction as viewed in Figure 2. The trigger element 14 is provided with a latch tip 16 adapted to be engaged by the end of a bimetallic member 17 mounted upon a conducting connector 18 extending through the base 1 and terminating at the back thereof in the terminal connector 19.

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The connector 18 is mounted in position by a stud 21 and the position of the bimetallic element 17, and, hence, the calibration of the overload current at which the breaker will trip is determined by an adjusting screw 22. A second conducting connector 23 carries stationary contact 24 and is mounted within the base 1 by stud 25. The connector 23 extending through the rear wall of the base 1 terminates in the terminal connector 26.

The metallic cover plate 4 is provided with a hub 27 within which is disposed a push button operator 28 for rectilinear movement into and out of the breaker interior. The interior end of push button operator 28 is provided with a slot 29 receiving a pin 31 carried within the opposite arms of the trigger element 14. A spring 32 disposed between the trigger element 14 and the conducting element 9 biases them for rotation in opposite directions relative to each other and, hence, serves to maintain the contact pressure between contacts 12 and 24. The conducting element 9 is provided with a leg extension 33 positioned to engage the face of latch tip 16 and also to restrict the follow-up movement of the bimetal 17 on manual operation. The trigger element 14 is provided with arm extension 34 limiting its movement in a counterclockwise direction. A flexible lead 35 interconnects the switching arm 11 and the end of the bimetallic element 17 to establish a current path from terminal 19, connector 18, bimetallic element 17, flexible lead 35, switching arm 11, contact 12, contact 24, and connector 23 to terminal 26.

As shown in Figure 2, the circuit breaker parts are in the contacts engaged position. Upon the occurrence of a current overload, the bimetal 17 will become heated and flex to the right out of engagement with the latch tip 16 on trigger element 14. Under the influence of the tension spring 15, trigger element 14 will then rotate in a counterclockwise direction and by engagement with arm 33 will carry with it the conducting element 9 to place the parts in the contacts separated position of Figure 3.

To reset the breaker into engaged position, the operator 28 is pushed inwardly to rotate the element 14 in a clockwise direction about pin 8 into the position of Figure 2 where it will again be latched by the bimetal element 17, and this movement of the element 14 will, through spring 32, also rotate the conducting element 9 in a counterclockwise direction into the contacts engaged position. In this resetting movement the contacts 12 and 24 engage before the latch tip 16 is

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in latching position, so that the spring 32 is stressed to supply the contact pressure.

For manual opening of the contacts, the push button operator 28 is pulled outwardly. As the operator 28 moves outwardly, the trigger element 14 will be moved bodily to the left as viewed in Figure 2, such movement being permitted by the slot 13 which moves relative to the pin 8. The element 14 moves to the left until the latching tip 16 is disengaged from the bimetallic member 17 whereupon the elements 14 and 9 will be rotated in a counterclockwise direction under the bias of spring 15 into the open circuit position of Figure 3. In this manual unlatching by movement of the trigger element 14, the arm 33 prevents bimetal 17 from following up movement of the latching tip 16. As the manual and automatic open circuit positions are the same, the resetting of the breaker after a manual operation is identical with that previously described after an automatic opening.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto, as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What is claimed is:

1. In an automatic electric circuit breaker, a stationary contact, a movable contact, a switching member carrying said movable contact, an operating member, current responsive means normally latching said operating member in inoperative position, means biasing said operating member to move said switching member to contacts disengaged position upon release of said operating member by said current responsive means upon the occurrence of a current overload through the circuit breaker, and manual means for bodily moving said operating member out of engagement with said current responsive latching means for movement of said operating member and switching member under said biasing means to contacts disengaged position at will, said manual means also effecting relatching of said operating member and reengagement of said contacts after either manual or automatic release of the operating member.

2. In an automatic electric circuit breaker, a stationary contact, a movable contact, a switching member carrying said movable contact, an operating member, current responsive means normally latching said operating member in inoperative position, means biasing said operating member to move said switching member to contacts disengaged position upon release of said operating member by said current responsive means upon the occurrence of a current overload through the circuit breaker, manual means for bodily moving said operating member out of engagement with said current responsive latching means for movement of said operating member and switching member under said biasing means to contacts disengaged position at will, said manual means including a push button operator rectilinearly movable in one direction to effect the unlatching movement of said operating member, and means for effecting reengagement of said contacts and relatching of said operating member by rectilinear movement of said push button operator in the opposite direction.

3. In an automatic electric circuit breaker, a stationary contact, a movable contact, a piv-

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otally mounted switching member carrying said movable contact and adapted to effect engagement and disengagement thereof with said stationary contact, an operating member, a pivotal mounting for said operating member permitting movement thereof bodily relative to its pivotal axis, means biasing said operating member for rotation about its pivotal mounting to effect rotation of said switching member to contacts disengaged position, current responsive means normally latching said operating member in inoperative position and releasing the same for rotation under its biasing means upon the occurrence of a current overload through the circuit breaker, manual means for bodily moving said operating member into an unlatched position to effect its rotation under the action of said biasing means at will, said manual means effecting return of said switching member to contacts engaged position and of said operating member to relatched position after either manual or automatic release of said operating member.

4. In an automatic electric circuit breaker, a stationary contact, a movable contact, a pivotally mounted switching member carrying said movable contact and adapted to effect engagement and disengagement thereof with said stationary contact, an operating member, a pivotal mounting for said operating member permitting movement thereof bodily relative to its pivotal axis, means biasing said operating member for rotation about its pivotal mounting to effect rotation of said switching member to contacts disengaged position, current responsive means normally latching said operating member in inoperative position and releasing the same for rotation under its biasing means upon the occurrence of a current overload through the circuit breaker, manual means for bodily moving said operating member into an unlatched position to effect its rotation under the action of said biasing means at will, said manual means including a reciprocal push button operator which is pulled to effect the movement bodily of the operating member to its unlatched position, and means for effecting reset of said switching member and operating member upon a pushing movement of said push button operator.

5. In an automatic electric circuit breaker, a stationary contact, a movable contact, a pivotally mounted switching member carrying said movable contact into and out of engagement with said stationary contact, an operating member having a pin and slot pivotal mounting, means biasing said operating member for rotation about its pivotal mounting, current responsive means normally latching said operating member in inoperative position, means interconnecting said operating member and switching member to effect movement of said switching member upon rotation of said operating member, a reciprocal push button operator, means providing a pin and slot connection between said push button operator and said operating member whereby movement of said push button operator in one direction effects movements bodily of said operating member out of engagement with said current responsive latching means by relative movement of said first mentioned pin and slot mounting to effect rotation of the operating member about its pivotal mounting and movement of said switching member to contacts disengaged position.

6. In an automatic electric circuit breaker, a stationary contact, a movable contact, a pivotally

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mounted switching member carrying said movable contact into and out of engagement with said stationary contact, an operating member having a pin and slot pivotal mounting, means biasing said operating member for rotation about its pivotal mounting, current responsive means normally latching said operating member in inoperative position, means interconnecting said operating member and switching member to effect movement of said switching member upon rotation of said operating member, a reciprocable push button operator, means interconnecting said push button operator and said operating member whereby movement of said push button operator in one direction effects movement bodily of said operating member out of engagement with said current responsive latching means by relative movement of said pin and slot mounting to effect rotation of the operating member about its pivotal mounting and movement of said switching member to contacts disengaged position, movement of said push button operator

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in the reverse direction effecting reset of said switching member and operating member, said interconnecting means between said switching member and said operating member including a spring stressed in the reset position to effect contact pressure between the engaged contacts.

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