Nov. 16, 1943. J. G. JACKSON 2,334,267

CIRCUIT BREAKER

Filed Sept. 25, 1941 3 Sheets-Sheet 1

Fig. 1.

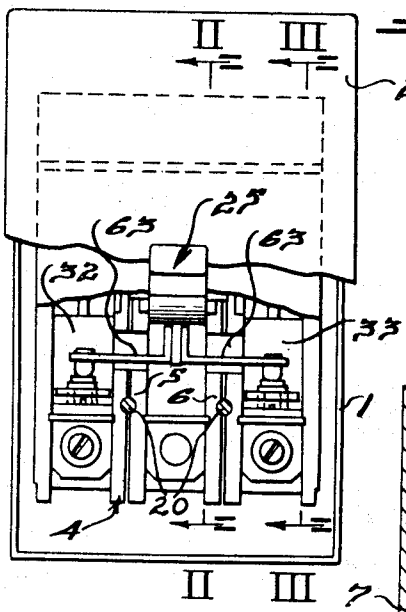
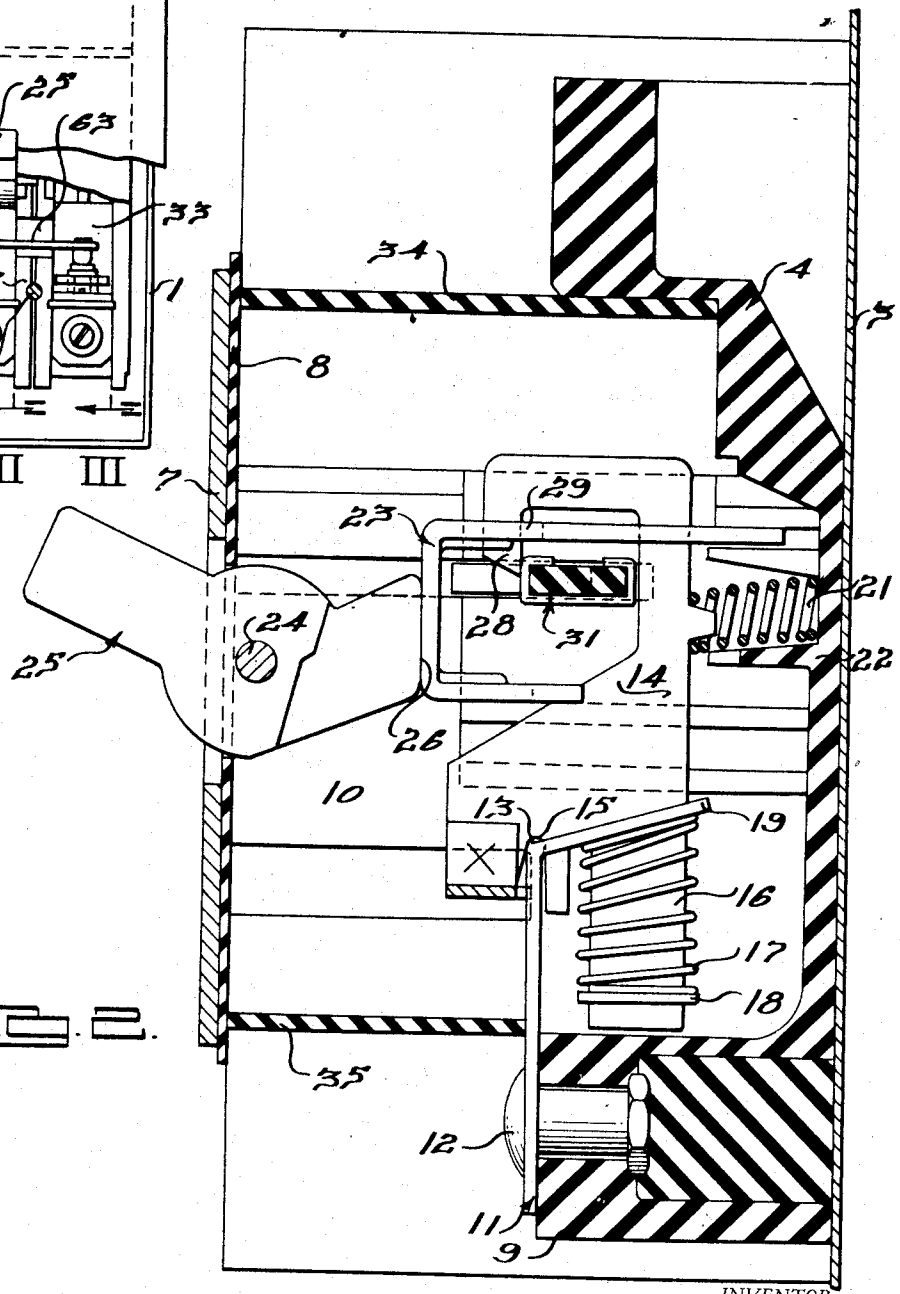


Fig. 2.



INVENTOR
John G. Jackson

BY
Myron J. Seibold
ATTORNEY

Nov. 16, 1943. J. G. JACKSON 2,334,267

CIRCUIT BREAKER

Filed Sept. 25, 1941 3 Sheets-Sheet 2

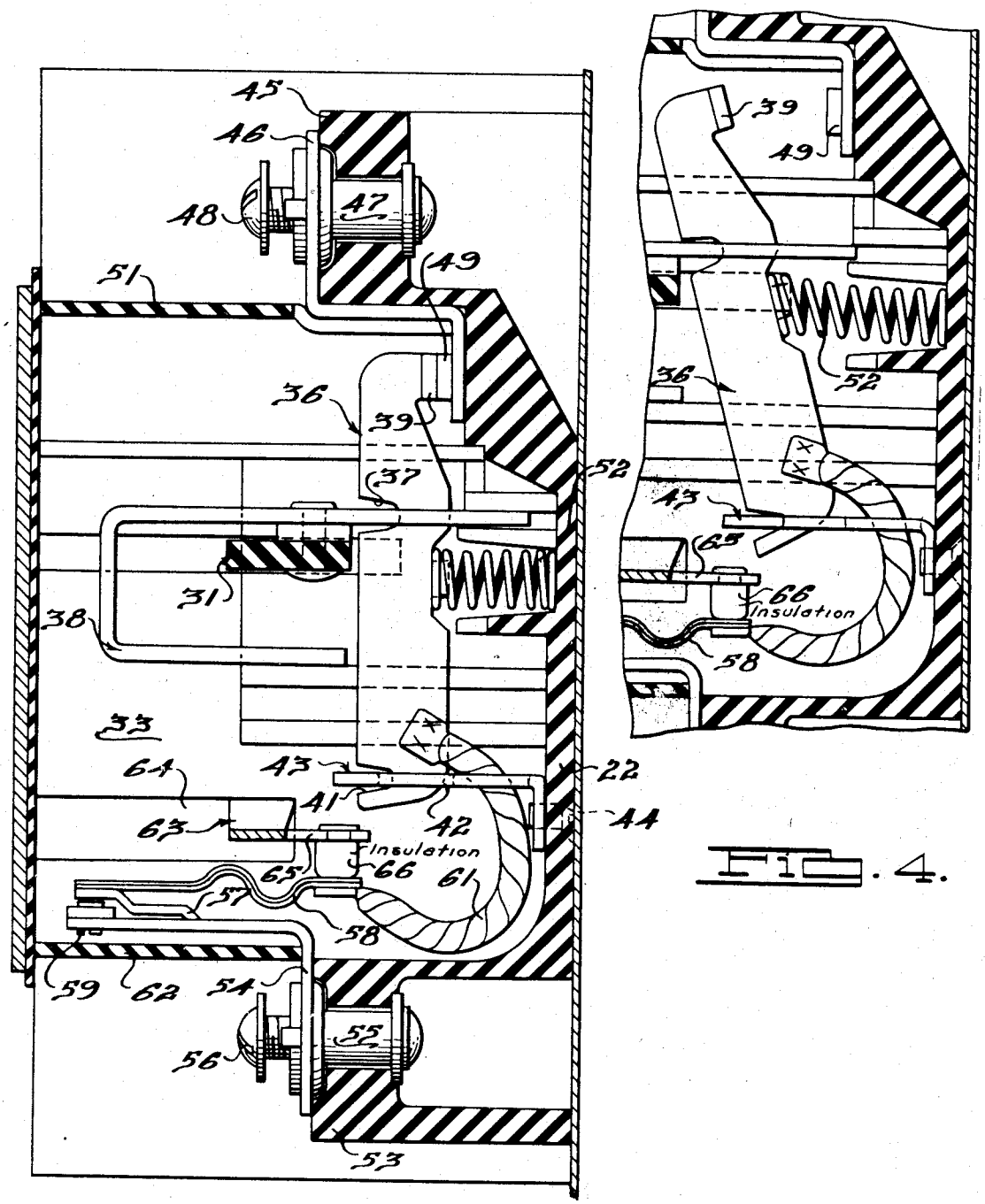


FIG. 4.

FIG. 3.

INVENTOR
John G. Jackson

BY

Myron V. Seibold
ATTORNEY

Nov. 16, 1943. J. G. JACKSON 2,334,267

CIRCUIT BREAKER

Filed Sept. 25, 1941 3 Sheets-Sheet 3

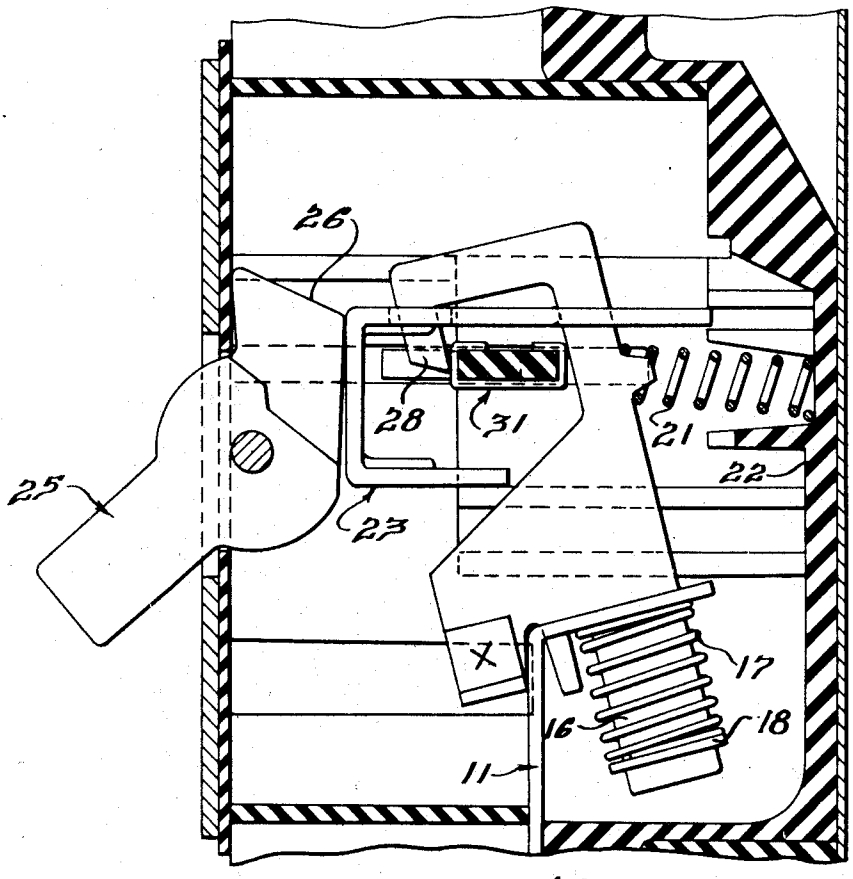


Fig. 5.

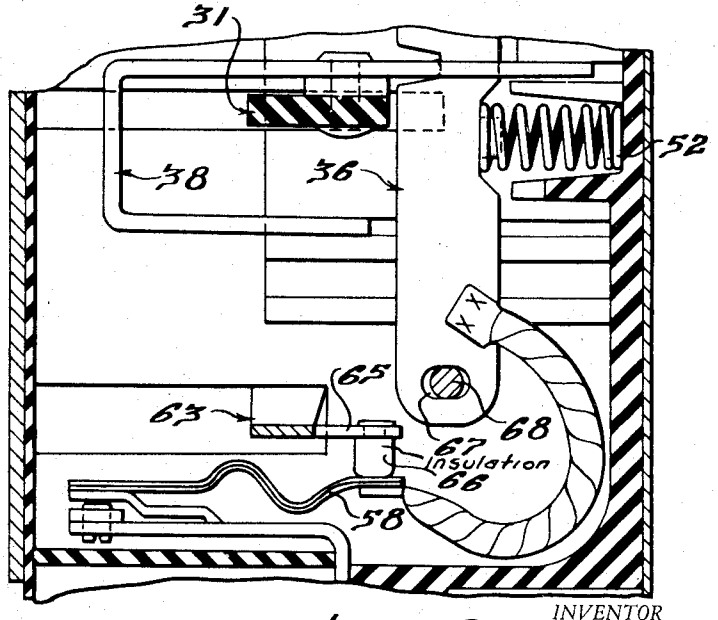


Fig. 6.

INVENTOR
John G. Jackson

BY
Myron J. Tribold
ATTORNEY

Patented Nov. 16, 1943 2,334,267

UNITED STATES PATENT OFFICE

2,334,267

CIRCUIT BREAKER

John G. Jackson, Detroit, Mich., assignor to Square D Company, Detroit, Mich., a corporation of Michigan

Application September 25, 1941, Serial No. 412,230

18 Claims. (Cl. 200—116)

This invention relates to devices for making and breaking electrical circuits and more particularly to circuit breakers automatically operable in response to a current overload.

One object of the present invention is to provide a circuit breaker having improved operating means therefor.

Another object of the present invention is to provide in an automatic electric circuit breaker an improved form of latching means for the releasable contact carrier.

Another object of the present invention is to provide in an automatic circuit breaker an improved current responsive latch.

Another object of the present invention is to provide an improved construction of multiple circuit breaker.

Another object of the present invention is to provide an improved multipole circuit breaker having releasable contact carriers and a current responsive latch therefor with means for insuring simultaneous movement of all the carriers upon the passage of an overload through any one.

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

Figure 1 is a front elevational view of the circuit breaker according to the present invention with the front cover partially broken away to show internal parts.

Figure 2 is a vertical sectional view taken on the line II—II of Figure 1.

Figure 3 is a vertical sectional view taken on the line III—III of Figure 1.

Figure 4 is a view similar to Figure 3, but with the contacts shown in separated position.

Figure 5 is a view similar to Figure 2 but with the operating parts shown in manual "off" position.

Figure 6 is a fragmentary sectional view similar to Figure 4 but showing a modified construction.

The circuit breaker, as illustrated in the drawings, comprises an outer enclosing box 1 having a cover 2 mounted thereon. Within the box and upon the back wall 3 thereof is mounted a generally cup-shaped insulating base 4 having a pair of dividing walls 5 and 6 to provide three compartments therein. A metallic cover 7 is preferably sealably attached to the base 4 by means of spun over portions of rivets 20 or in any other manner, and an insulating sheet 8 of fibre or other material is disposed in back of the metallic cover 7.

Upon an end ledge 9 at the bottom of the circuit breaker is mounted a generally L-shaped member 11 as by means of a rivet insert 12 and extending within the central compartment 10 of the base 4. Engaging the member 11 and adapted to pivot about an edge 13 thereof is a movable member or latch 14. The member 14 is slotted as at 15 to receive a portion of the L-shaped member, and is provided with an extended portion 16. The L-shaped member 11 is slotted to receive the extended portion 16 in such manner that the member 14 may freely pivot about the edge 13 or may be moved rectilinearly relative thereto as will hereinafter be described. A spring 17 carried upon the extended portion 16 and interposed between a ledge 18 and a leg 19 of the L-shaped member exerts its bias to normally maintain the latch 14 in engagement with edge 13. A second spring 21 interposed between the back wall 22 of the base 4 and the back edge of the latch 14 continually biases the latch for movement in a counterclockwise direction about the edge 13 as viewed in the drawings.

The latch 14 is provided with a latch tip 28 adapted to extend through a central opening 29 provided in the longer leg of a rectilinearly movable U-shaped member 23 and releasably engage a rectilinearly movable member 31 preferably formed of insulating material and guided for movement by slots formed within the opposed dividing walls 5 and 6; the member 31 extends through these slots and into the compartments 32 and 33 provided on either side of the central compartment 10. The latch tip 28 is engaged by the member 23 to be retained in its contacts engaged position as in Figure 2.

Upon a shaft 24 received within notches in the dividing walls 5 and 6 is mounted a rotary handle 25 having an interior camming surface adapted to cooperate with the flat front surface of the member 23 to move it rectilinearly, and includes a stable flat surface 26 for the contacts engaged position.

Fibre plates 34 and 35 are disposed at either end of the central compartment 10 to sealably enclose it against access.

Within the compartments 32 and 33 are disposed similar circuit breaker mechanisms, each embodying a floating contact bar or switch member 36 having a notch 37 in its forward edge receiving the top edge of a cooperating slot provided in the longer leg of a generally U-shaped member 38 secured to the end of the rectilinearly

movable member 31 and guided for rectilinear movement at right angles to the base by formations within the base. The contact bar 36 is provided at the end near the top of the base with a contact surface 39 and at its opposite end is notched as at 41 to interengage with a cooperating slot 42 provided within the longer leg of a generally L-shaped bracket 43 rigidly secured to the back wall 22 of the base by stud 44. Upon an end ledge 45 at the top of the circuit breaker is mounted a connector 46 as by means of a spun over portion of a metallic insert 47 having a terminal stud 48 threaded therein. The connector 46 extends into the interior of the breaker and there carries a stationary contact 49 adapted to cooperate with the movable contact surface 39. The top portion of the base is sealed off by means of an insulating wall 51 of fibre or other material preventing access to the interior. In the contacts engaged position of the bar 36 it is seen, as in Figure 3, that the notched end of the bar will be loosely disposed within the slot 42 so that the force of a compression spring 52 interposed between the back wall of the base and the rear edge of contact bar 36 may be exerted upon the contact bar 36 to bias it for rotation about its pivotal engagement with the U-shaped member 38 and thereby provide for a substantial contact pressure between contacts 39 and 49. As shown in Figure 3, the spring 52 is compressed and upon release of latch 14 from member 31 it is adapted to effect movement of the member 38 toward the front of the base and to effect an engagement of the notch 41 with the forward end of the slot 42 and pivot the contact bar 36 about this engagement into the "off" position of Figure 4.

At the bottom end of the circuit breaker, upon a ledge 53, is mounted a connector 54 as by means of a spun over portion of a metallic insert 55 having a terminal stud 56 threaded therein. The connector 54 extends within the interior of the breaker and has the center of its interior end pressed out as at 57 and to this is rigidly secured, as by welding, a current responsive bimetallic strip 58. A stud 59 carried by the connector 54 bears against the pressed out portion 57 and serves to adjust the position of the bimetal and hence the current rating to which the breaker is responsive. A flexible lead 61 connects the free end of the bimetallic member 58 to the contact bar 36. An insulating wall 62 serves to seal off the bottom of the breaker from the exterior.

Rigidly secured to the latch 14, as by welding, are two oppositely directed L-shaped members 63 adapted to extend through slots 64 provided in the walls 5 and 6 and into the compartments 32 and 33. Each member 63 is provided with a leg 65 directed toward the back wall 22 of the base 4. At the end of each leg 65 is mounted an insulating button 66 adapted to be engaged by the bimetallic member 58 whereby movement of the bimetallic member 58, when heated, will effect movement of the latch 14.

The operation of the circuit breaker will now be described:

As specifically shown herein, the circuit breaker is of the multipole form and the circuit breaker mechanisms will perform simultaneously. As illustrated in Figures 2 and 3, the circuit breaker is in the closed circuit position. To place the parts in manual "off" position, the handle 25 is rotated in a counterclockwise direction until the surface 26 is disengaged from the front surface of the movable member 23, which is thus no longer restrained and is free to move rectilinearly forward. This permits the rectilinearly movable member 31 to move forward, the latch 14 rotating in a counterclockwise direction and these parts assuming the position of Figure 5. The removal of the restraint on rectilinearly movable member 31 removes the restraint on the contact bars 36 which now rotate under the influence of springs 52 about their engagement with the brackets 43 in a counterclockwise direction, moving the generally U-shaped elements 38 supported on the member 31 rectilinearly in a forward direction. The operating parts then assume the "off" position of Figure 4. To again place the parts in closed circuit position, the handle is rotated in a clockwise direction whereby latch 41 will be moved to positively move member 31 and the contact bars 36 into contacts engaged position.

Upon the occurrence of an overload in any one of the bimetals 58, it will become heated and bend counterclockwise as viewed in Figure 3. In this movement it will push upon the insulating button 66 to rectilinearly move latch 14 against the bias of spring 17 to move latch tip 28 out of engagement with the rectilinearly movable member 31. Upon release of the member 31 the contact bars 36 are free to simultaneously rotate about their engagements with the members 43 under the bias of compression springs 52, the members 31 and 38 moving rectilinearly forward.

To reset the breaker after an automatic opening, the operating handle 25 is rotated counterclockwise to "off" position whereby spring 21 will effect a counterclockwise rotation of the latch 14 to a position where the compressed spring 17 will effect movement of the latch tip 28 into re-engagement with the rectilinearly movable member 31 in the normal "off" position of Figure 5. It is to be noted that the generally U-shaped members 38 are made sufficiently long so that when they engage the front of the base the rectilinearly movable member 31 will be stopped in a position in which the latch 14 may be moved to effect re-engagement therewith under the action of springs 17 and 21.

A modification of the circuit breaker is illustrated in Figure 6 wherein the contact bar 36 is provided with a generally oval slot 67 which loosely receives a pin 68 secured to a wall of the base. The bar 36 is adapted to rotate about the pin 68 similarly and for the same purpose as in the preferred construction, the slot providing for the application of contact pressure as previously described.

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 switching element having a contact surface adjacent to one end adapted to cooperate with said stationary contact, means providing a relatively stationary pivot for the opposite end thereof, an actuating member engaging said switching element for movement thereof, a pivotal member releasably engaging said actuating member, a manual member, a rectilinearly movable member operatively

interconnecting said manual member and said pivotal member to effect manual operation of said switching element to contacts engaged position, and current responsive means adapted to release said actuating member from said pivotal member to effect movement of said switching element to contacts disengaged position under the bias of said spring means.

2. In an automatic electric circuit breaker, a stationary contact, a switch member having a contact surface adjacent to one end and adapted to cooperate with said contact, a relatively stationary pivot for the opposite end thereof, means biasing said switch member to contacts disengaged position, an actuating member operatively engaging said switch member for actuation thereof to contacts engaged position, a movable latch normally engageable with said actuating member and mounted for independent movement thereof, manual means operative to move said movable latch to positively move said actuating member, a current responsive means for moving said latch to release said actuating member therefrom whereby said switch member may be moved to contacts disengaged position by said biasing means.

3. In an automatic electric circuit breaker, a stationary contact, a movable switch member having a contact surface adjacent to one end thereof, a relatively stationary pivot for the opposite end thereof, biasing means for said switch member interjacent the ends thereof, a rectilinearly movable actuating member operatively engaging said switch member for movement thereof, a latch engageable with said actuating member, and current responsive means for moving said latch rectilinearly to release said actuating member therefrom to effect movement of said switch member under the force of said biasing means.

4. In an automatic electric circuit breaker, a stationary contact, a movable switch member having a contact surface adjacent to one end adapted to cooperate with said contact, biasing means for said switch member, a relatively stationary pivot for the opposite end thereof, a pivotal member, a rectilinearly movable member engaged by said pivotal member and in turn being in operative engagement with said switch member, manual means for actuating said pivotal member to move said switch member to contacts engaged position, and current responsive means adapted to disengage said pivotal member from said rectilinearly movable member to effect movement of said switch member to contacts disengaged position by said biasing means.

5. In an automatic electric circuit breaker, a stationary contact, a movable switch member having a contact surface adjacent to one end adapted to cooperate with said contact, biasing means for said switch member, a relatively stationary pivot for the opposite end of said switch member, a movable member engaging said switch member interjacent the ends thereof, a movable latch engageable with said movable member and mounted for movement independently thereof, manual means operative on said latch to move the same to positively actuate said movable member, and said switch member, to contacts engaged position, and current responsive means for moving said latch independently of said manual means to release said movable member to effect movement of said switch member to contacts disengaged position under the force of said biasing means.

6. In an automatic electric circuit breaker, a stationary contact, a movable switch member having a contact surface adjacent to one end adapted to cooperate with said contact, biasing means for said switch member, a relatively stationary pivot for the opposite end of said switch member, a movable actuating member operatively engaging said switch member, a movable latch mounted for movement independently of said actuating member and normally engageable therewith, a pivot for said latch, means to rotate said latch about said pivot to positively move said actuating member and said switch member against said biasing means to contacts engaged position, and current responsive means to move said latch rectilinearly to release said actuating member, said switch member moving to contacts disengaged position under the force of said biasing means.

7. In an automatic electric circuit breaker, a stationary contact, a movable switch member having a contact surface adjacent to one end adapted to cooperate with said contact, biasing means for said switch member, a movable member engaging said switch member for movement thereof, a latch engaging said movable member, a pivot for said latch, spring means continually biasing said latch toward its pivot, manual means, means operatively interconnecting said manual means and said latch whereby movement of said manual means rotates said latch to positively move said movable member and said switch member to contacts engaged position against said biasing means, and current responsive means for moving said latch rectilinearly and away from its pivot and against the bias of its spring means to release the movable member, said switch member then moving to contacts disengaged position under the force of said biasing means.

8. In an automatic electric circuit breaker, a stationary contact, a movable contact, a switch member movable to move said movable contact for cooperation with said stationary contact, means for actuating said switch member and comprising a rectilinearly movable member, a latch engageable by said rectilinearly movable member, means continually biasing said latch toward engaged position, and current responsive means for moving said latch rectilinearly and in a direction substantially perpendicular to the path of movement of said rectilinearly movable member, and against said biasing means to release said rectilinearly movable member.

9. In an automatic electric circuit breaker, a stationary contact, a movable contact, a switch member movable to move said movable contact into and out of engagement with said stationary contact, means biasing said switch member toward contacts disengaged position, a rectilinearly movable member operatively engaging said switch member for movement thereof to contacts engaged position, a latch engageable with said rectilinearly movable member, means continually biasing said latch toward engaged position, and current responsive means for moving said latch rectilinearly and in a direction substantially perpendicular to the direction of movement of the rectilinearly movable member, and against its biasing means to release said rectilinearly movable member, said switch member moving to contacts disengaged position under the force of said first biasing means upon release of said rectilinearly movable member.

10. In an automatic electric circuit breaker, a stationary contact, a movable contact, a switch

member movable to move said movable contact into and out of engagement with said stationary contact, biasing means for said switch member, a rectilinearly movable member operatively connected to said switch member to effect movement thereof, a movable latch engageable with said rectilinearly movable member, means providing a pivot for said latch, means to rotate said latch about said pivot to positively actuate said rectilinearly movable member and said switch member to contacts engaged position, and current responsive means to move said latch rectilinearly and away from said pivot to release said rectilinear movable member to effect movement of said switch member to contacts disengaged position under the force of said biasing means.

11. In a circuit breaker, a stationary contact, a movable contact, a switch member movable to move said movable contact to engaged and disengaged positions, biasing means for said switch member, a movable member operatively connected to said switch member for movement thereof, a pivot for said movable member, manual means for rotating said movable member about said pivot to actuate said switch member to contacts engaged position, and means separate from said manual means to move said movable member rectilinearly to effect movement of said switch member to contacts disengaged position.

12. In a circuit breaker, a stationary contact, a movable contact, a pivoted switch member movable to move said movable contact into and out of engagement with said stationary contact, means for biasing said switch member, a rectilinearly movable member operatively connected to said switch member to effect movement thereof, a latch engaging said rectilinearly movable member, a pivot for said latch, manual means operable to rotate said latch to positively move said rectilinearly movable member and rotate said switch member into contacts engaged position against said biasing means, and current responsive means for moving said latch rectilinearly to release said rectilinear movable member, said switch member rotating under the force of said biasing means to contacts disengaged position upon the release of said rectilinearly movable member.

13. In a circuit breaker, a stationary contact, a movable contact, a switch member movable to move said movable contact for cooperation with said stationary contact, biasing means for said switch member, a rectilinearly movable member operatively connected with said switch member, a latch engageable with said rectilinearly movable member, a pivot for said latch, manual means, rectilinearly movable means interconnecting said manual means and said latch whereby said manual means may rotate said latch about said pivot to positively move said rectilinearly movable member and actuate said switch member to contacts engaged position, means separate from said manual means to move said latch rectilinearly to release said rectilinearly movable member to effect movement of said switch member to contacts disengaged position under the force of said biasing means.

14. In a circuit breaker, a stationary contact, a movable contact, a switch member movable to move said movable contact into and out of engagement with said stationary contact, a rectilinearly movable member operatively connected to said switch member, a latch engageable with said rectilinearly movable member, a pivot for said latch, a manual member operable to "on" position to rotate said latch to positively actuate said rectilinearly movable member and said switch member to contacts engaged position, spring means adapted to move said rectilinearly movable member and said switch member to contacts disengaged position upon movement of said manual member to "off" position, and current responsive means for moving said latch rectilinearly to release said rectilinearly movable member, said spring means then operating to move said switch member from contacts engaged position to contacts disengaged position.

15. In a circuit breaker, a stationary contact, a movable contact, a switch member movable to move said movable contact for cooperation with said stationary contact, a rectilinearly movable member operatively connected to said switch member, a latch engageable with said rectilinearly movable member, a pivot therefor, means continually biasing said latch toward engaged position, a manual member, a movable element operatively interconnecting said latch and said manual member, said manual member being operable to actuate said movable element from a first position to rotate said latch to positively actuate said first rectilinearly movable member and said switch member to contacts engaged position, and a plurality of spring means adapted to move said rectilinearly movable member and said switch member to contacts disengaged position and to rotate said latch to return said movable element to said first position upon movement of said manual member to "off" position.

16. In a circuit breaker, a stationary contact, a movable contact, a switch member movable to move said movable contact for cooperation with said stationary contact, a rectilinearly movable member operatively connected to said switch member, a latch engageable with said rectilinearly movable member, a pivot therefor, means continually biasing said latch toward engaged position, a manual member, a movable element operatively interconnecting said latch and said manual member, said manual member being operable to actuate said movable element from a first position to rotate said latch to positively actuate said first rectilinearly movable member and said switch member to contacts engaged position, spring means adapted to move said rectilinearly movable member and said switch member to contacts disengaged position upon movement of said manual member to "off" position, and current responsive means for moving said latch independently of said manual means and rectilinearly to release said rectilinearly movable member to effect movement of said switch member from contacts engaged position to contacts disengaged position.

17. In an automatic electric circuit breaker, a stationary contact, a movable contact, a switch member movable to move said movable contact into and out of engagement with said stationary contact, a rectilinearly movable member, means operatively interconnecting said rectilinearly movable member and said switch member, biasing means for said switch member, a latch engageable with said rectilinearly movable member, manual means operable to "on" position to move said latch to positively move said rectilinearly movable member to actuate said switch member to contacts engaged position, and current responsive means for moving said latch rectilinearly to release said rectilinearly movable member, said switch member moving to contacts disengaged position under the force of said bias-

ing means, spring means operative to move said rectilinearly movable member when released by said latch, stop means to limit said movement, and means to move said latch into re-engagement with said rectilinearly movable member upon movement of said manual means to "off" position.

18. In an automatic electric circuit breaker, a stationary contact, a movable contact, a switch member movable to move said movable contact to engaged and disengaged position, a rectilinearly movable member, means operatively interconnecting said rectilinearly movable member and said switch member, a latch, a pivot therefor, said latch being engageable with said rectilinearly movable member, a manual member, a movable member operatively interconnecting said manual member and said latch, said manual member being operable to "on" position to rotate said latch to positively actuate said rectilinearly movable member and said switch member to contacts engaged position, a current responsive means for moving said latch rectilinearly to release said rectilinearly movable member, said switch member moving to contacts disengaged position upon release of said rectilinearly movable member, and spring means adapted to pivotally move said latch, upon movement of said manual operator to "off" position, into reengagement with said rectilinearly movable member.

JOHN G. JACKSON.