Dec. 15, 1953 P. M. CHRISTENSEN 2,662,950

AUTOMATIC CIRCUIT BREAKER

Filed June 29, 1951

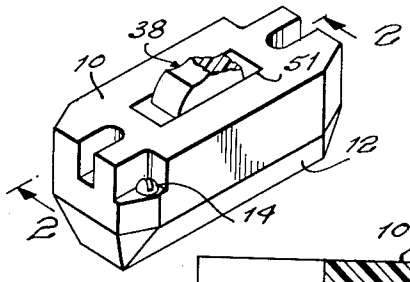
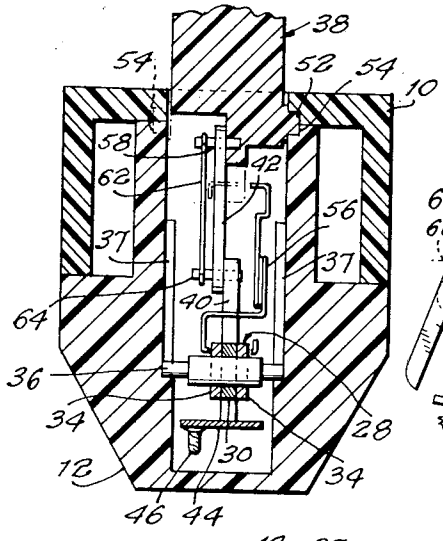


FIG. 1.

FIG. 2.

FIG. 4.



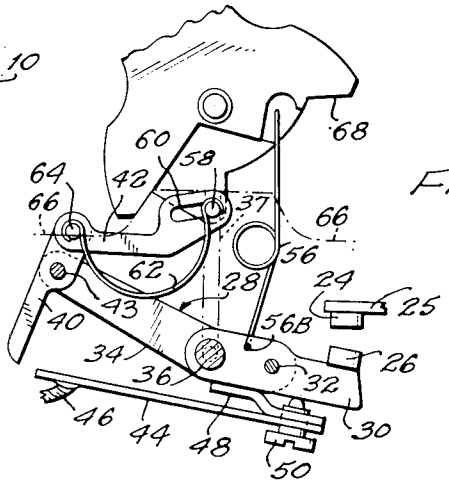


FIG. 3.

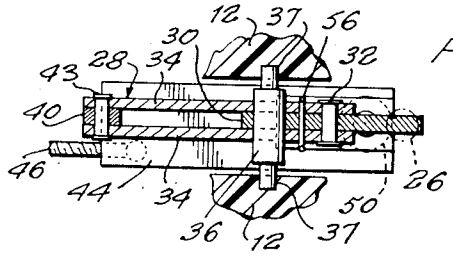


FIG. 5.

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UNITED STATES PATENT OFFICE

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AUTOMATIC CIRCUIT BREAKER

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Application June 29, 1951, Serial No. 234,297

22 Claims. (Cl. 200—116)

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The present invention relates in general to automatic circuit breakers, and in particular to circuit breakers of the type in which an actuator is pivotally carried by the movable contact member and is latched thereto under the control of the current responsive device for the manual operation of the circuit breaker to open and close the latter.

A circuit breaker of the general type to which the present invention relates is illustrated in Patent No. 2,209,352 issued to Joseph Sachs and myself, and is also shown in Patent No. Re. 23,188 to Harold A. Humpage.

As indicated in said Patent No. 2,209,352 to Joseph Sachs and myself, provision should be made for resiliently acting upon the movable contact member for assuring the required contact pressure or proper engagement between the companion contacts of the circuit breaker when the latter is closed, a resilient link indicated at 18 in said Patent No. 2,209,352, connected between the handle and the actuator, being provided for that purpose. Pursuant to this invention, it is unnecessary to provide a resilient link as the sole connection between the handle and the actuator for the movable contact member, and it is also unnecessary to resiliently mount the contacts as disclosed in the Sachs application Ser. No. 152,020 referred to in said latter patent. The elimination of the requirement for a resilient link as the sole connection between the handle and the releasably latched switch actuator is obviated pursuant to my present invention, and the connection between the handle and the actuator can include a rigid link and yet a resilient mounting of the contacts is not required.

Another object of this invention is to provide a resilient connection between the handle and the actuator for operating the latter manually, while the actuator is latched to the movable contact member by the current responsive device which trips the circuit breaker open upon overload, so that the movable contact is resiliently biased toward and pressed against the stationary contact to compensate for wear and inequalities, and to provide means which act positively on said actuator to reset the latter after the circuit breaker is tripped upon the occurrence of an overload.

Pursuant to the present invention and an object thereof, a spring means is operable, when the circuit breaker is closed, to bias the movable contact member to resiliently press the movable contact against the stationary contact for proper contact pressure to compensate for wear of the contacts or for other inequalities.

In conjunction with the above mentioned

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spring, the construction of the circuit breaker of the present invention is such that provision is made for a lost motion connection between the handle and a rigid link connected to the actuator of the circuit breaker to permit the spring to act in the closed condition of the circuit breaker to provide the required resilient pressure between the companion contacts of the circuit breaker to compensate for wear or other inequalities.

The above and other objects, features and advantages of the present invention will be more fully understood from the following description considered in connection with the accompanying illustrative drawings.

In the drawings:

Fig. 1 is a perspective view of a circuit breaker pursuant to the present invention;

Fig. 2 is a sectional view, on an enlarged scale, taken along the line 2—2 of Fig. 1, the circuit breaker mechanism being shown in the closed condition thereof;

Fig. 3 is a fragmentary view similar to Fig. 2, with parts broken away, the circuit breaker mechanism being shown in the open condition thereof;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2; and

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 2.

Referring now to the drawings in detail, the circuit breaker embodying the present invention, comprises a two-part insulation casing having the complementary preferably molded parts 10 and 12 in which the terminals 14 and 16 and the circuit breaker mechanism are mounted. It will be understood that the two casing parts 10 and 12 are held together by bolts 18 or other suitable means which pass through openings 20 provided in the casing part 10 and, as here shown, engage in upstanding collars 22 provided on the casing part 12. It will be understood, however, that the casing may be of any other suitable form, for example, of the form shown in my Patent No. 2,130,369 and in my pending application, Serial No. 137,402 filed January 7, 1950, where the casing is shown formed of complementary parts having their plane of separation parallel to the plane of movement of the movable contact member.

The stationary contact 24 is carried by the terminal member 25 in which the screw of terminal 16 is engaged, it being noted that the stationary contact is in a position within the casing to be engaged by the movable contact 26 carried by the movable contact member 28. More specifically, said movable contact member

comprises the current conducting portion 30 which is secured, as at 32, between the spaced insulating portions 34—34, it being noted that the movable contact 26 is carried at the free end of said conducting portion. A pivot member 36 is carried by the movable contact member 28, the opposite ends of said pivot having bearing engagement in the casing part 12, as illustrated in Figs. 4 and 5, whereby to mount the movable contact member for pivotal movement. Open end grooves 37 are provided to receive the ends of bearing pin 36 for the insertion of the latter into casing part 12.

In order to accomplish the manual movement of the movable contact member to and from both the circuit open and circuit closed positions thereof, provision is made for a handle 38 which is connected to the pivotally mounted actuator 40 by a rigid link 42 which is pivotally connected at one end thereof to said actuator and at the other end thereof to said handle, as will hereinafter be more specifically described. The actuator 40 is pivotally mounted between the insulated parts 34 of the movable contact member, as at 43, and is operatively connected to the movable contact member 28 for moving the latter, under the control of the current responsive latch 44, here shown as a bi-metallic strip by which said actuator is releasably latched to the movable contact member. To complete the circuit through the breaker, the latch 44 is connected to the terminal 14 through a flexible conductor 46. As here shown, the latch is rigidly secured to a downward extension 48 on the conducting element 30 of the movable contact member 28. In order to adjust the latch for purposes of calibration, an adjusting screw 50 extends through a threaded hole in the latch and in the extension 48. This screw abuts against the lower marginal edge of the conducting element 30. It will be apparent that by adjusting the screw 50 the extension 48 may be deflected and the latch 44 may be moved within certain narrow limits so as to change the degree of overlap of the actuator relative to the latch to adapt the latter to release the actuator upon the attainment of a definite predetermined overload condition. A casing opening 49 affords access to the screw.

As here shown, the casing part 10 is provided with an opening 51 through which the handle 38 extends for the manual operation thereof. Said handle is provided with a pivot member 52 which has bearing engagement in the casing parts 10 and 12, as illustrated at 54 in Fig. 4. A coil spring 56 interengages the handle and the movable contact member 28 for biasing the latter to the open circuit position thereof. The handle is also provided with a laterally extending pin 58 which extends into an elongated slot 60 formed at one end of the rigid link 42 whereby the handle is connected to said link.

Pursuant to the present invention, provision is made for a spring 62 which has one end thereof secured to the aforementioned handle pin 58, the other end thereof being secured to the pivot pin 64, which pivotally interconnects the link 42 and the actuator 40, as illustrated in Fig. 4.

It will be understood that, as illustrated in Fig. 2, when the handle 38 is in the "on" or circuit closed position thereof and the actuator 40 is latched to the movable contact member 28 by engagement of the outer end 40A thereof with the bi-metal strip 44, as shown, relative pivotal movement between the actuator and the movable contact member is prevented and contact 26 is in engagement with contact 24. In this position, the spring 62 and the actuator 40 are in overset toggle condition, the pivotal axis at 64 being above or in front of a line extending between the pivotal axes at 43 and 58, viewing Fig. 2. It will be noted, that in said condition, the pin 58 carried by the handle 38, which pin forms a pivotal axis of the toggle, is disposed inwardly of the end 60A of the slot 60. Therefore, it will be apparent that due to the lost motion connection of the pin and the link, the spring 62 can act, in said condition of the circuit breaker mechanism, to bias the movable contact member 28, through the actuator 40, in a direction to resiliently press the movable contact 26 against the stationary contact 24 to compensate for wear of the contacts or for other inequalities.

In addition to the above described toggle, it will be understood that an additional toggle is formed by the spring 62 and the handle 38. With the parts in the normally closed circuit position, as illustrated in Fig. 2, the pivotal axis at the pin 58 is above or in front of a straight line connecting the pivotal axes at 52 and 64, the spring 62 thus cooperating with the handle 38 to form a normally locked or overset toggle. It will be noted that the casing part 12 is provided with a shoulder 66 which is engaged by the portion 68 of the handle 38 to limit the movement thereof in the circuit closed condition. Said latter overset toggle tends to retain the handle in the closed condition of the circuit breaker against the bias of the spring 56 which tends to move the handle to the open circuit condition thereof, illustrated in Fig. 3. However, it will also be noted that the lever distance between the end 56A of spring 56 and the handle pivot 52 is less than the lever distance between the end 56B of said spring and the movable contact member pivot 36. Therefore, the moment of force or torque applied by the spring 56 to the movable contact member, which torque is applied to the handle through the actuator 40 and the spring 62, in combination with the aforesaid toggles, in a direction to retain the handle in the closed position thereof, is greater than the torque which tends to move the handle to the open circuit position thereof.

With the circuit breaker mechanism in the closed condition thereof, as illustrated in Fig. 2, it will be apparent that in order for the circuit breaker to open automatically, that is pursuant to the flexing of the bi-metallic strip 44 upon heating thereof, the toggle constituted by the actuator 40 and the spring 62 must be broken and this can take place by release of the end 40A of the actuator by the bi-metallic strip 44 when the circuit breaker trips upon overload or other predetermined load conditions. The opening of the circuit breaker, when the latch 44 releases the actuator, is effected by the spring 56. Upon the disengagement of the latch 44 from the actuator 40 and the consequent breaking of the toggle, the actuator 40 will initially pivot in a counterclockwise direction viewing Fig. 2. As the handle is moved to the "off" position thereof by the spring 56, the pin 58 carried thereby will ride in the slot 60 of link 42 to the slot end 60A. The link will be carried by the pin 58 to the position thereof illustrated in Fig. 3. Said movement of the link causes the actuator to pivot in a clockwise direction to the position thereof illustrated in Fig. 3. This prevents the actuator from being "hung up" upon the cooling of the bimetal. Therefore, it will be

apparent that the link 42 acts positively on the actuator 40 to reset the latter after the circuit breaker is tripped upon the occurrence of an overload. Further, it will be observed that even though the handle 38 is held in the "on" position, the spring 56 is effective to open the circuit breaker when the latter is tripped, that is when the latch 44 disengages the actuator 40.

While as here illustrated the spring 62 extends to the right of the link 42, viewing Fig. 2, it will be understood that, if desired, the spring may extend to the left of said link.

Certain of the features described and claimed herein are disclosed in my copending application Serial No. 181,223, filed August 24, 1950.

The subject matter of the present application is related to the subject matter of the copending application of Thomas M. Cole, Serial No. 234,304, filed simultaneously herewith, and assigned to the assignee hereof.

While I have shown and described the preferred embodiment of my invention, it will be understood that various changes may be made in the present invention without departing from the underlying idea or principles of the invention within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, and an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, that improvement which comprises means cooperating with said actuator to form a toggle which when in overset relationship holds said contact member in its closed circuit position, a pivotal axis of said toggle being constituted by a lost motion connection, and said means being operable upon said lost motion connection when said actuator is latched to said movable contact member for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker.

2. In an automatic circuit breaker having a stationary contact, a pivotally movable contact member having a contact engageable with and disenageable from said stationary contact, a current responsive latch carried by said movable contact member, and an actuator pivotally mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, that improvement which comprises means cooperating with said actuator to form a toggle which when in overset relationship holds said contact member in its closed circuit position, a pivotal axis of said toggle being constituted by a lost motion connection, and said means being operable upon said lost motion connection when said actuator is latched to said movable contact member for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker, a manually operable handle movable to different positions for operating the movable contact member to open and close the circuit breaker in the manual operation thereof, and means including said lost motion connection connected between said handle and said actuator for preventing relative pivotal movement between said actuator and the movable contact member when the handle is in circuit-

closing position and the actuator is latched to said movable contact member.

3. In an automatic circuit breaker having a stationary contact, a pivotally movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch carried by said movable contact member, and an actuator pivotally mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, that improvement which comprises means cooperating with said actuator to form a toggle which when in overset relationship holds said contact member in its closed circuit position, a pivotal axis of said toggle being constituted by a lost motion connection, and said means being operable upon said lost motion connection when said actuator is latched to said movable contact member for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker, a manually operable handle movable to different positions for operating the movable contact member to open and close the circuit breaker in the manual operation thereof, and means including said lost motion connection connected between said handle and said actuator for preventing relative pivotal movement between said actuator and the movable contact member when the handle is in circuit-closing position and the actuator is latched to said movable contact member, said first mentioned means being a resilient member and said connecting means being a rigid link.

4. In an automatic circuit breaker having a stationary contact, a pivotally movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch carried by said movable contact member, and an actuator pivotally mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, that improvement which comprises means cooperating with said actuator to form a toggle which when in overset relationship holds said contact member in its closed circuit position, a pivotal axis of said toggle being constituted by a lost motion connection, and said means being operable upon said lost motion connection when said actuator is latched to said movable contact member for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker, a manually operable handle movable to different positions for operating the movable contact member to open and close the circuit breaker in the manual operation thereof, and means including said lost motion connection connected between said handle and said actuator for preventing relative pivotal movement between said actuator and the movable contact member when the handle is in circuit-closing position and the actuator is latched to said movable contact member, said connecting means being a rigid link having a slot defined therein, said handle having a part disposed for movement within said slot, and said first mentioned means being a resilient member interconnected between said part and said actuator.

5. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, an actuator mounted on said contact member and operatively connected thereto,

under the control of said latch, for closing the circuit breaker, a movable operating member and a link interconnected between said actuator and said operating member, that improvement which comprises a lost motion connection between said link and said operating member and means operable upon said lost motion connection when said actuator is latched to said movable contact member for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker.

6. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a movable operating member and a link interconnected between said actuator and said operating member, that improvement which comprises a lost motion connection between said link and said operating member and means operable upon said lost motion connection when said actuator is latched to said movable contact member for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker, said actuator and said means cooperating with each other to form a toggle which when in overset relationship holds said contact member in its closed-circuit position, said lost motion connection constituting a pivotal axis of said toggle.

7. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a movable operating member and a link interconnected between said actuator and said operating member, that improvement which comprises a lost motion connection between said link and said operating member and means operable upon said lost motion connection when said actuator is latched to said movable contact member for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker, said operating member and said means cooperating with each other to form a toggle which when in overset relationship holds said operating member in its closed circuit position, said lost motion connection constituting a pivotal axis of said toggle.

8. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a movable operating member and a link interconnected between said actuator and said operating member, that improvement which comprises a lost motion connection between said link and said operating member and means operable upon said lost motion connection when said actuator is latched to said movable contact member for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker, said actuator and said means cooperating with each other to form a toggle which when in overset relationship holds said contact member in its closed circuit position, said operating member and said means cooperating with each other to form a toggle which when in overset relationship holds said operating member in its closed circuit position, said lost motion connection constituting a pivotal axis in each of said toggles.

9. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a movable operating member and a link interconnected between said actuator and said operating member, that improvement which comprises a lost motion connection between said link and said operating member and means operable upon said lost motion connection when said actuator is latched to said movable contact member for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker, said link being a rigid member and said means being a resilient member.

10. In a automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a movable operating member and a link interconnected between said actuator and said operating member, that improvement which comprises a lost motion connection between said link and said operating member and means operable upon said lost motion connection when said actuator is latched to said movable contact member for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker, said lost motion connection being constituted by a slot defined in said link and said operating member being provided with a part mounted for movement in said slot.

11. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a movable operating member and a link interconnected between said actuator and said operating member, that improvement which comprises a lost motion connection between said link and said operating member and means operable upon said lost motion connection when said actuator is latched to said movable contact member for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker, said lost motion connection being constituted by a slot defined in said link and said operating member being provided with a part mounted for movement in said slot, and said means being a resilient member interconnected between said part and said actuator.

12. In an automatic circuit breaker having a stationary contact, a pivotally movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch carried by said movable

contact member, and an actuator pivotally mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, that improvement which comprises means cooperating with said actuator to form a toggle which when in overset relationship holds said contact member in its closed circuit position, a pivotal axis of said toggle being constituted by a lost motion connection, said means being operable upon said lost motion connection when said actuator is latched to said movable contact member for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker, a manually operable handle movable to different positions for operating the movable contact member to open and close the circuit breaker in the manual operation thereof, means including said lost motion connection connected between said handle and said actuator for preventing relative pivotal movement between said actuator and the movable contact member when the handle is in circuit closing position and the actuator is latched to said movable contact member, and means interconnected between said handle and said movable contact member for biasing the latter to the circuit open position thereof, the lever arm distance between said latter means and said movable contact member being greater than the lever arm distance between said latter means and said handle whereby said handle is retained in the circuit-closed position thereof in the circuit closed condition of said circuit breaker.

13. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch carried by said movable contact member, an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a pivotally movable operating member, that improvement which comprises a connection between said actuator and said operating member which includes a lost motion engagement between said operating member and said connection, and resilient means operable through said lost motion engagement when said actuator is latched to said movable contact for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker.

14. In an automatic circuit breaker having a stationary contact, a pivotally movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch carried by said movable contact member, an actuator pivotally mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a pivotally movable operating member, that improvement which comprises a connection between said actuator and said operating member which includes a lost motion engagement between said operating member and said connection, and resilient means operable through said lost motion engagement when said actuator is latched to said movable contact for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker, said resilient means cooperating with said actuator to form a first toggle which when in overset relationship holds said contact member in its circuit closed position, said resilient means cooperating with said operating member to form a second toggle which when in overset relationship holds said operating member in its circuit closed position.

15. In an automatic circuit breaker having a stationary contact, a pivotally movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch carried by said movable contact member, an actuator pivotally mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a pivotally movable operating member, that improvement which comprises a connection between said actuator and said operating member which includes a lost motion engagement between said operating member and said connection, and resilient means operable through said lost motion engagement when said actuator is latched to said movable contact for biasing the latter whereby to provide for proper contact pressure between said contacts in the closed condition of the circuit breaker, said resilient means cooperating with said actuator to form a first toggle which when in overset relationship holds said contact member in its circuit closed position, said resilient means cooperating with said operating member to form a second toggle which when in overset relationship holds said operating member in its circuit closed position, and means interconnected between said operating member and said movable contact member for biasing the latter to the circuit open position thereof, the moment of force applied by said latter means to said movable contact member being greater than the movement of force applied thereby to said operating member whereby said operating member is retained in the circuit closed position thereof in the circuit closed condition of said circuit breaker.

16. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, and an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a manually operable handle having an operative connection with said actuator for actuating the latter, said connection comprising resilient means between said handle and said actuator for operating the latter to close the circuit breaker, and means more rigid than said resilient means also connected between said actuator and said handle and effective to move said actuator to a predetermined position in relation to said current responsive latch to reset said actuator following the automatic opening of the circuit breaker.

17. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, and an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a manually operable handle having an operative connection with said actuator for actuating the latter, said connection comprising resilient means between said handle and said actuator for operating the latter to close the circuit breaker, and means between said handle and said actuator for moving said actuator positively in one direction to a re-set posi-

tion following the automatic opening of the circuit breaker.

18. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, and an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a manually operable handle having an operative connection with said actuator for actuating the latter, said connection comprising resilient means between said handle and said actuator for operating the latter to close the circuit breaker, and means for moving said actuator positively in one direction to a re-set position following the automatic opening of the circuit breaker, said last mentioned means comprising a rigid link pivotally connected to said actuator and to said handle and having a limited movement on said handle at said pivotal connection of the link to the handle.

19. In an automatic circuit breaker having a stationary contact, a pivotally movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch carried by said movable contact member, and an actuator pivotally mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a manually operable handle having an operative connection with said actuator for actuating the latter, said connection comprising resilient means between said handle and said actuator for operating the latter to close the circuit breaker, and means more rigid than said resilient means also connected between said actuator and said handle and effective to move said actuator to a predetermined position in relation to said current responsive latch to reset said actuator following the automatic opening of the circuit breaker.

20. In an automatic circuit breaker having a stationary contact, a pivotally movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch carried by said movable contact member, and an actuator pivotally mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, a manually operable handle having an operative connection with said actuator for actuating the latter, said connection comprising resilient means between said handle and said actuator for operating the latter to close the circuit breaker, and means more rigid than said resilient means also connected between said actuator and said handle and effective to move said actuator to a predetermined position in relation to said current responsive latch to reset said actuator following the automatic opening of the circuit breaker, and means for moving said actuator positively in one direction to a reset position following the automatic opening of the circuit breaker, said last mentioned means comprising a rigid link pivotally connected to said actuator and to said handle and having a limited movement on said handle at said pivotal connection of the link to the handle.

21. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, and a manually operable handle, a connection between said handle and said actuator comprising a resilient member and a comparatively non-resilient member operatively connected to each other and to said handle and actuator, respectively, for operating said actuator to close the circuit breaker and to provide a resilient pressure between said contacts in the closed condition of the circuit breaker.

22. In an automatic circuit breaker having a stationary contact, a movable contact member having a contact engageable with and disengageable from said stationary contact, a current responsive latch, an actuator mounted on said contact member and operatively connected thereto, under the control of said latch, for closing the circuit breaker, and a manually operable handle, a connection between said handle and said actuator comprising a resilient member and a comparatively non-resilient member operatively connected to each other and to said handle and actuator, respectively, for operating said actuator to close the circuit breaker and to provide a resilient pressure between said contacts in the closed condition of the circuit breaker, said resilient and comparatively non-resilient members each having opposite ends connected to said handle and to said actuator.

PAUL MARTIN CHRISTENSEN.

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