

Feb. 6, 1940.

J. G. JACKSON

2,188,949

CIRCUIT BREAKER

Filed May 6, 1936

2 Sheets-Sheet 1

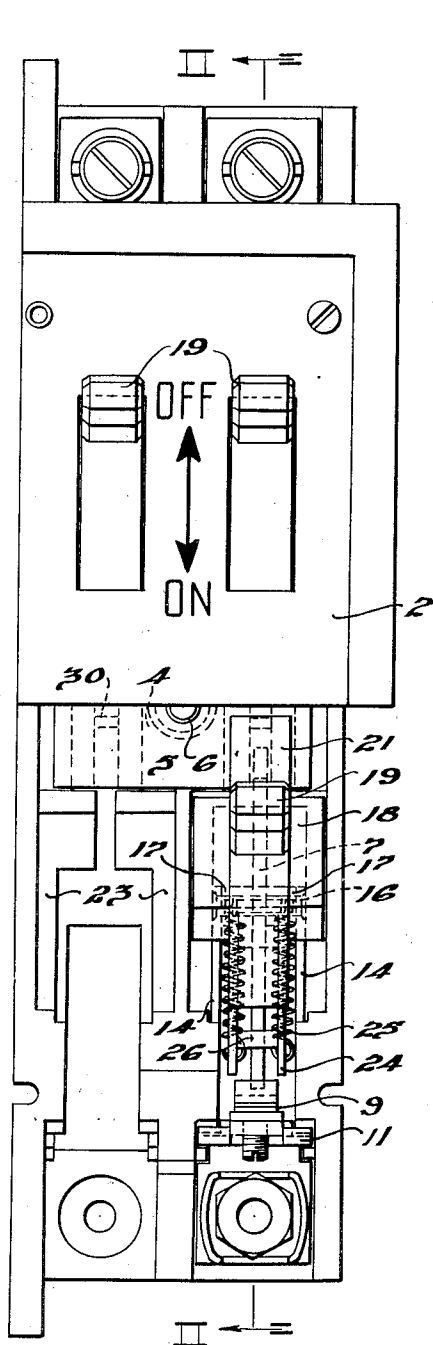


FIG. 1.

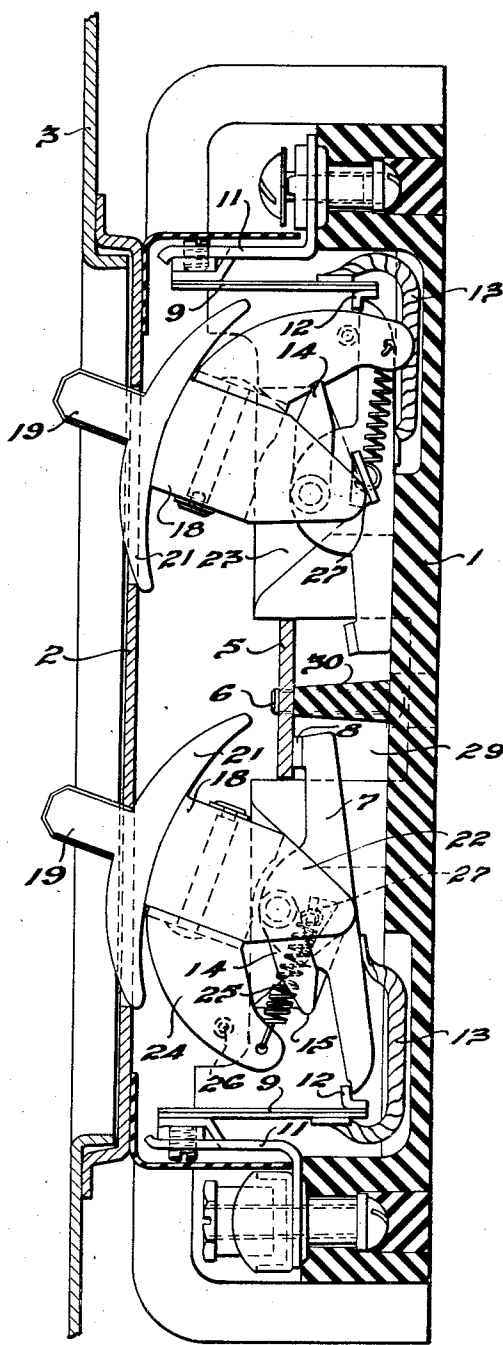


FIG. 2.

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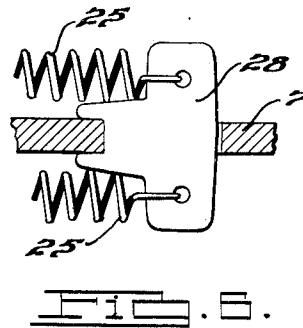
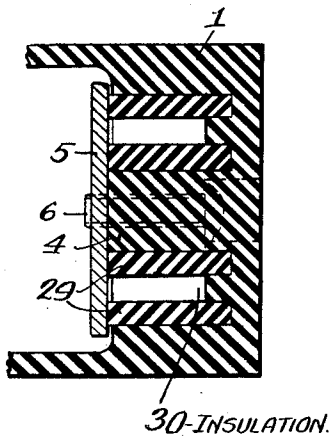
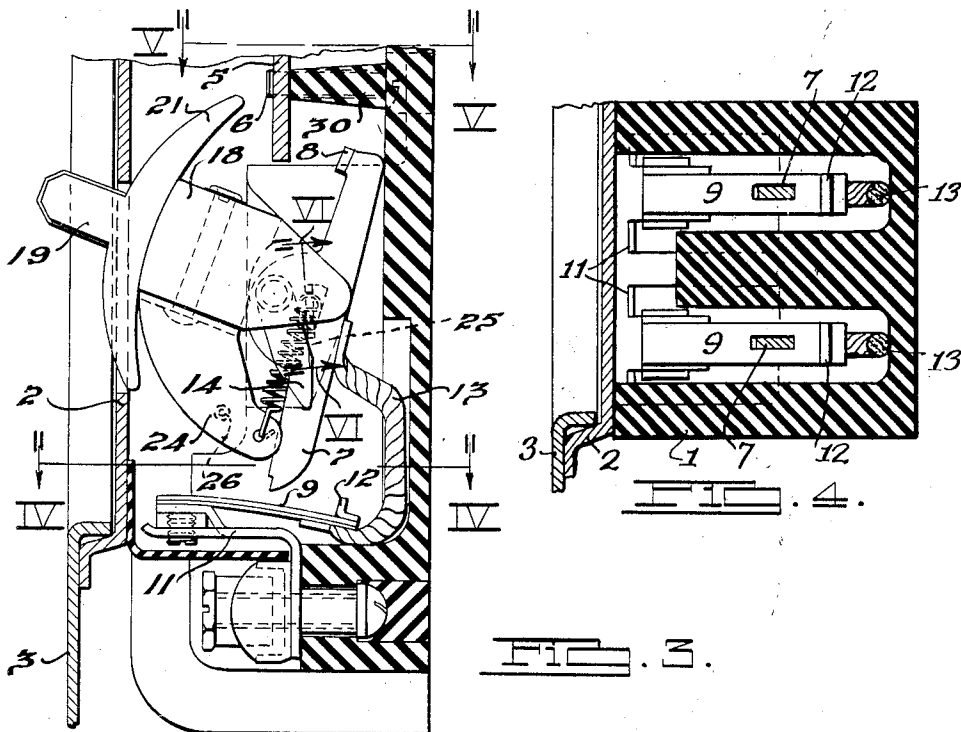


FIG. 5.

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2,188,949

CIRCUIT BREAKER

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tion of Michigan

Application May 6, 1936, Serial No. 78,098

16 Claims. (Cl. 200—116)

This invention relates to apparatus for making and breaking electrical circuits and more particularly to electric circuit breakers automatically operable in response to a current overload and manually operable with a snap action.

The object of the present invention is to provide an improved form of quick make and break automatic electric circuit breaker of simple and economical construction.

Further objects and features of the invention will be readily apparent to those skilled in the art from the following specifications and the appended drawings illustrating certain embodiments of the invention in which:

Figure 1 is a front elevational view in multi-circuit form of the circuit breaker according to the present invention with a portion of the cover removed to show internal parts.

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

Figure 3 is a partial view similar to Figure 2 showing the parts in a different position.

Figure 4 is a sectional view taken on the line IV—IV of Figure 3.

Figure 5 is a partial sectional view taken on the line V—V of Figure 3.

Figure 6 is a detail sectional view taken on the line VI—VI of Figure 3.

The circuit breaker shown comprises a generally cup-shaped insulating base 1 having a cover 2 formed to cooperate with the cover of the enclosing box partially shown at 3. Within the base is generally centrally provided a supporting post 4 carrying a contact plate 5 secured thereagainst as by a stud 6 threaded into the plate. Mounted on the base and cooperating with the contact plate 5 are four individual automatic electric circuit breaker mechanisms according to the present invention. Each of these mechanisms includes a switching member 7 having a contact surface 8 at one end cooperating with stationary contact 5 and latching at its opposite end to the free end of a bimetallic element 9 adjustably supported upon a connector 11 leading to the exterior of the breaker as is more fully explained in applicant's copending application, Serial No. 36,247, filed August 15, 1935 now Patent #2,132,625, granted October 11, 1938. The latching end of the switching member 7 may be directly latched to the bimetal or may, as shown, engage a latching portion 12 rigid with the bimetal. A flexible lead 13 connects the free end of the bimetal 9 to a mid point on the member 7.

A pair of arms 14 are pivoted in notches 15 in

the base. The switching member 7 is pivoted to the arms 14 and these arms connected together in spaced relation by means of a rivet 16 and spacers 17 located between the arms and the switching member. A manual operator generally denoted at 18 includes an exterior handle portion 19 integral with a shield 21 for the handle opening. A pair of spaced legs 22 supporting the handle and shield are pivotally mounted in substantially V-shaped notches 23 in the base. 10 A U-shaped bracket 24 is mounted rigid with the operator and to the ends of its legs over center springs 25 are connected. A pin 26 connects the legs adjacent to their free ends for a purpose to be hereinafter described.

The switching member 7 is provided at its body portion with a generally triangular opening 27 in which is disposed a flipper element 28 as shown in detail in Figure 6. The ends of the operating springs 25 are connected to this flipper element as shown. This element is freely movable and the sides of the opening are so related to the center of operation that the flipper will serve to quickly move the operating springs through their dead center position independent of the speed of operation of the operating handle. This flipper has substantially the same operating characteristics as that described and claimed in the copending application of John G. Jackson and Wallace T. Allen, Serial No. 12,798, 20 filed March 25, 1935.

That portion of the base opposite the path of movement of the movable contacts 8 may be provided with liners of fibre or other arc insulating material 29 more particularly shown in 35 Figure 5. A post 30 may be provided between the opposed movable contacts to prevent deposit of metal upon one contact from an arc drawn by the other.

The operation of the device according to the present invention should be readily apparent with relation to Figures 2 and 3. The circuit breaker mechanism shown in the lower portion of Figure 2 is in the contacts engaged position. To move the contacts to a manually disengaged 45 position the handle 19 will be moved in a downward direction whereupon the parts will assume the position shown in reverse in the mechanism at the top of Figure 2. In this movement, just before the springs 25 approach their effective 50 dead center position with respect to the movable links or supporting arms 14 the flipper 28 will be moved to the opposite side of the opening in the member 7 and will thus quickly move the operating springs through the effective dead cen-

ter position regardless of the speed of movement of handle 19. As the spring 25 moves below the pivot of the supporting arms 14 the switching member 7 will be quickly moved to the position shown in the upper portion of Figure 2 about the pivotal engagement of the supports 14 with the base.

With the parts in the position shown in the lower portion of Figure 2, upon occurrence of an overload the bimetal will be bent downwardly in the position as shown in Figure 3, whereupon the corresponding end of switching member 7 is released and it will rotate about its engagement with the supporting arms 14 into the position shown in Figure 3. In this position rotation of the supporting arms 14 in a counter clockwise direction about their pivotal engagement with the base under the bias of springs 25, which rotation would tend to move the switching member 7 forwardly, is prevented by the positive mechanical blocking of the portion of the member 7 adjacent its pivotal mounting by the under surface of the manual operator 18. This interference or blocking of the parts is shown by their engagement in dotted lines of Figure 3.

To reset the parts after an automatic operation the handle is moved to "off" position whereupon the pin 26 positively engages the end of switch member 7 and moves it to relatched engagement in the normal "off" position as shown in the upper portion of Figure 2. In this movement the switching member 7 pivots substantially about its engagement with the bottom of the base and has a slight sliding movement with respect thereto.

Although the circuit breaker has been shown in multi-circuit form, it is obvious that the operating mechanism is susceptible to use in simple single pole form and in multi-pole form with but slight variations and that 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 switching member carrying a contact surface at one end cooperating with said stationary contact, current responsive latching means for the opposite end of said member, a link pivotally mounted on a fixed part and having a pivotal connection with said member, a manual operator, and spring means interconnecting said operator and member for moving said member in response to movement of said operator.

2. In an automatic electric circuit breaker, a stationary contact, a switching member carrying a contact surface at one end cooperating with said stationary contact, current responsive latching means for the opposite end of said member, a link pivotally mounted on a fixed part and having a pivotal connection with said member, a manual operator, and spring means interconnecting said operator and member, said spring moving said link about its pivotal mounting in response to movement of said operator to move said member.

3. In an automatic electric circuit breaker, a stationary contact, a switching member carrying a contact surface at one end cooperating with said stationary contact, current responsive latching means for the opposite end of said member, a link pivotally mounted on a fixed part and having a

pivotal connection with said member, a manual operator, and spring means interconnecting said operator and member, said member pivoting about its engagement with said link under the bias of said spring when released by said current responsive latching means.

4. In an automatic electric circuit breaker, a stationary contact, a switching member carrying a contact surface at one end cooperating with said stationary contact, current responsive latching means for the opposite end of said member, a link pivotally mounted on a fixed part and having a pivotal connection with said member, a manual operator, and spring means interconnecting said operator and member, said spring moving said link about its pivotal mounting in response to movement of said operator to move said member, said member pivoting about its engagement with said link under the bias of said spring when released by said current responsive latching means.

5. In an automatic electric circuit breaker, a stationary contact, a switching member carrying a contact surface at one end cooperating with said stationary contact, current responsive latching means for the opposite end of said member, a link pivotally mounted on a fixed part and having a pivotal connection with said member, a manual operator, and spring means interconnecting said operator and member, said member pivoting about its engagement with said link under the bias of said spring when released by said current responsive latching means, and means on said operator for positively moving said member into relatched engagement after such release.

6. In an automatic electric circuit breaker, a stationary contact, a switching member carrying a contact surface at one end cooperating with said stationary contact, current responsive latching means for the opposite end of said member, a link pivotally mounted on a fixed part and having a pivotal connection with said member, a manual operator, spring means biasing said member and having one end connected to said operator, the opposite end of said spring having a limited movement with respect to said member to effect quick movement of said spring through its effective dead center position irrespective of the speed of the manual operator.

7. In an automatic electric circuit breaker, a stationary contact, a switching member carrying a contact surface at one end cooperating with said stationary contact, current responsive latching means for the opposite end of said member, a link pivotally mounted on a fixed part and having a pivotal connection with said member, a manual operator, a spring having one end connected to said operator and its other end connected to an element connected to and having a limited movement with respect to said member, said element serving to quickly move the spring through its effective dead center position irrespective of the speed of the manual operator.

8. In an automatic electric circuit breaker, a stationary contact, a switching member carrying a contact surface at one end cooperating with said stationary contact, current responsive latching means for the opposite end of said member, a link pivotally mounted on a fixed part and having a pivotal connection with said member, a manual operator, a freely swinging element pivoted on said member, and a spring interconnecting said element and operator, said element func-

tioning to quickly move the spring past the pivotal mounting of said link.

9. In an automatic electric circuit breaker, a stationary contact, a pivoted support, a switching member pivoted to said support and carrying a contact surface at one end adapted to cooperate with said stationary contact, current responsive latching means for the opposite end of said member, a manual operator, spring means interconnecting said member and operator, said spring means moving said support about its pivot to move said member to contacts engaged and disengaged position in response to movement of said operator and said spring means maintaining pressure between said contact surface and said contact when they are engaged.

10. In an automatic electric circuit breaker, a stationary contact, a pivoted support, a switching member pivoted to said support and carrying a contact surface at one end adapted to cooperate with said stationary contact, current responsive latching means for the opposite end of said member, a manual operator, spring means interconnecting said member and operator, said spring means moving said support about its pivot to move said member to contacts engaged and disengaged position in response to movement of said operator, said member pivoting about its engagement with said support under the bias of said spring means when released by said latching means to move said contact surface to disengaged position.

11. In an automatic electric circuit breaker, a stationary contact, a pivoted support, a switching member pivoted to said support and carrying a contact surface at one end adapted to cooperate with said stationary contact, current responsive latching means for the opposite end of said member, a manual operator, spring means interconnecting said member and operator, said spring means moving said support about its pivot to move said member to contacts engaged and disengaged position in response to movement of said operator, said member pivoting about its engagement with said support under the bias of said spring means when released by said latching means to move said contact surface to disengaged position, and means on said operator for positively engaging and moving said member into relatched position after such release.

12. In an automatic electric circuit breaker, a switching member carrying a contact surface at one point and a latching surface at another point, a stationary contact in position to be engaged by said contact surface, current responsive latching means engaging said latching surface, a supporting element pivoted on a fixed part and having a pivotal engagement with said member, a manual operator, and over center spring means for moving said element about its pivot in response to movement of said operator to move said member to circuit closed and circuit open positions, said member being biased for rotation about its pivotal engagement with said element when in the

circuit closed position and being restrained from such rotation by said latching means.

13. In an automatic electric circuit breaker, a pivotally mounted support, a switching member pivoted on said support and carrying a contact surface on one side of its pivot and a latching surface at the opposite side, a stationary contact in position to be engaged by said contact surface, current responsive latching means cooperating with said latching surface, a manual operator, and spring means for quickly moving said support about its pivotal mounting in response to movement of said operator to move the switching member to circuit closed and circuit open positions, said member being biased by said spring means for rotation about its pivot when in current closed position and being restrained from such rotation by said latching means.

14. In an automatic electric circuit breaker, a stationary contact, a switching member having a pivot interjacent its ends and carrying a contact surface at one end cooperating with said stationary contact, current responsive latching means for the opposite end of said member, a manual operator, and overcenter spring means for moving said pivot in response to movement of said operator, said spring means maintaining pressure between said contact surface and said contact when they are engaged, said member rotating about said pivot when released by said latching means, said pivot remaining stationary when said member is released.

15. In an electric circuit breaker, a stationary contact, a switching member having a pivot interjacent its ends and carrying a contact surface at one end cooperating with said stationary contact, current responsive latching means for the opposite end of said member, a manual operator, and over-center spring means for moving said pivot in response to movement of said operator, said spring means biasing said member for rotation about said pivot, said member rotating about said pivot when released by said latching means and said pivot remaining substantially stationary when said member is released.

16. In an electric circuit breaker, a stationary contact, a switching member having a pivot interjacent its ends and carrying a contact surface at one end cooperating with said stationary contact, current responsive latching means for the opposite end of said member, a manual operator, and over-center spring means for moving said pivot in response to movement of said operator, said spring means maintaining pressure between said contact surface and contact when they are engaged and at the same time biasing said member about said pivot to disengage the contact surface from the contact, said member rotating about said pivot when released by said latching means, and said pivot remaining substantially stationary when said member is so released.

JOHN G. JACKSON.