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2,774,844

RESETTABLE CIRCUIT BREAKER

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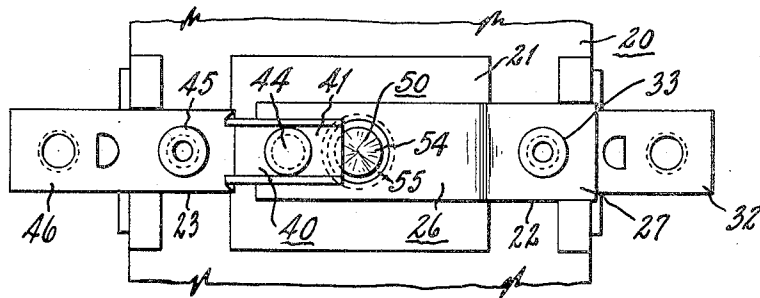


Fig. 1.

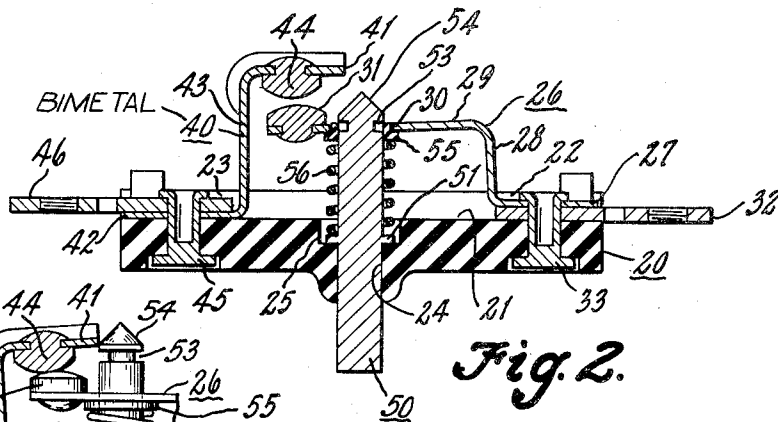


Fig. 2.

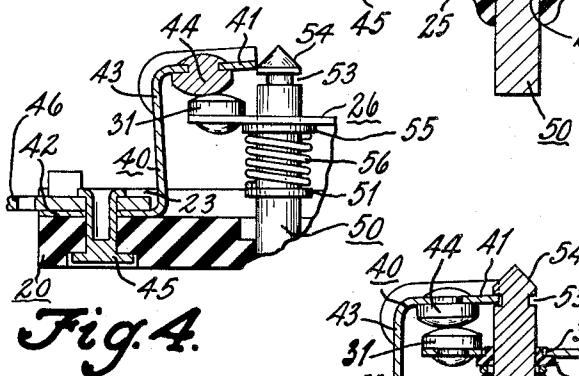


Fig. 4.

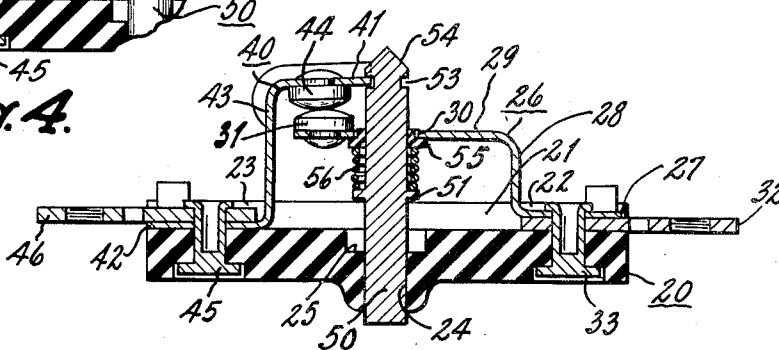


Fig. 3.

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RESETTABLE CIRCUIT BREAKER

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4 Claims. (Cl. 200-116)

This invention relates to electric circuit breakers of the type that are automatically operable to break the circuit controlled thereby in event that a current greater than that which can be safely carried by said circuit is passed therethrough.

Devices of this type are provided to prevent damage and are generally in the form of removable fuses which are burned out by an excess current. The burned out fuse is useless and must be replaced before the circuit can be again closed. This might be dangerous in case an important circuit is opened in this manner and said circuit cannot be used again until a new fuse is substituted for that destroyed.

An object of the present invention is to provide an improved automatic circuit breaker which will automatically open a circuit, if such circuit carries an excess current, but will not be damaged by the excess current, and which will be rendered effective to release the circuit whenever the circuit is opened thereby.

Another object of the present invention is to provide a circuit breaker having a member automatically movable to a circuit opening position if an excess current is passed through said circuit and manually operable means for moving and holding the member in a circuit closed position after the circuit has been broken.

Another object of the present invention is to provide a thermostatic circuit breaker which will have constant contact pressures up to the time of separation of the contacts and when the contacts separate they will separate with a snap action, thus eliminating arcs and consequently burning of the contact surfaces.

Another object of the present invention is to provide a latching connection for an automatic circuit breaker which does not carry current, thus the breaker calibration is not subject to change in case there is arcing and burning at the contacts.

Further objects and advantages of the present invention will be apparent from the following disclosure, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a plan view of the switch embodying the features of the present invention.

Figure 2 is a central vertical section of Figure 1.

Fig. 3 is a view similar to Fig. 2 but showing the switch in its closed position.

Fig. 4 is a detail sectional view showing the switch parts in position before the parts of the switch are latched in the switch closed position.

The device disclosed herein, although applicable to control any electric circuit, was designed primarily to control various electrical circuits of an automotive vehicle, such as headlights, parking lights, etc.

Referring to the drawings, a fragment of a base or supporting block 20 fabricated from a suitable dielectric material is shown. This base has holes, not shown, through which attaching members are insertable for se-

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curing the base in any suitable position. In the present instance the base is shown as supporting only one switch, but it is to be understood however, that as many as these devices as desired may be supported in spaced relation by the base 20 to control as many separate circuits as necessary.

The base 20 is formed with a recess 21, grooves or channels 22 and 23, each communicating with the recess 21 and a counterbored opening 24 to provide a shoulder 25. Each switch adapted to be supported on the base 20 is composed of relatively wide resilient metallic strip material to provide a conductor 26 which is bent to form a base portion 27 which fits in the groove 22. The conductor 26 is bent upwardly from the base portion 27 to provide a portion 28 and then inwardly to provide a resilient or flexible arm 29 which overlies the base and the opening 24. The arm 29 is provided with an opening 30 aligned with the opening 24 and carries a contact 31. The arm 29 in its normal state is inclined toward the base 20, as shown in Fig. 2 and normally occupies such a position that the contacts are separated. Before the base portion 27 is placed in the groove 22, a conducting plate 32 is placed therein to which a lead, not shown, of a circuit to be controlled by the automatic breaking means is adapted to be connected. The base portion 27 and the plate 32 are secured to the base by a rivet 33. The sides of the grooves 22 cooperate with the side edges of the plate 32 and the base 27 of the conductor 26 to prevent them from turning relative to the base 20.

The base 20 also supports a bimetal element or thermostatic strip 40 bent into the shape as shown to provide arms 41 and 42 and an upstanding portion 43. The arm 42 of element 40 extends into the groove 23 to prevent the element from turning relative to the base 20. The element 40 is more sensitive to heat when overloaded by excessive electric current flow in the circuit controlled by the circuit breaker. The element 40 undergoes distortion when so heated by an overload of electric current passing through it. The element 40 has an arm 42 secured to the base 20 by a rivet 45 which also secures a conducting plate 46 in contact with the element 40 to the base as clearly shown in Fig. 2. The plate 46 provides a terminal for the switch for connection to a lead, not shown, of the circuit to be controlled by the switch.

A push button or actuator or plunger 50, is mounted for vertical movement in the opening 24 of the base 20. In this instance the actuator is made of metal. The push button is formed with an annular flange 51 intermediate its ends which cooperates with the shoulder 25 to limit the downward movement thereof as viewed in Fig. 2. The upper end of the plunger is formed with a latching groove 53, adapted to receive the free end of arm 41, and a cone-shaped end 54. The plunger passes through and has a loose fit in an insulating flanged bushing 55 which has its shank extending through the opening 30 of the arm 29. A compression spring 56 surrounding the plunger is disposed between the bushing 55 and the collar 51 and held under compression by the resilient arm 29 to bias the plunger 50 downwardly until the flange 51 bears against the shoulder 25.

When a circuit to be controlled is in its open position the switch parts assume approximately the positions shown in Fig. 2 wherein the free end of the arm 41 of thermal element 40 is above the cone-shaped end 54 of the plunger and the contacts 31 and 44 are separated. When it is desired to close the circuit breaker the operator pushes the plunger 50 upwardly, as viewed in Fig. 2. As the plunger is moved upwardly the coiled spring 56 is further compressed because of the resisting force in the flexible arm 29. When the spring 56 is com-

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pressed a certain amount it will overcome the resisting force of the arm 29 so that the arm will be moved by the spring 56 until contact 31 engages contacts 44. When that happens both arms 26 and 40 are moved together upwardly causing the cone-shaped end to engage the free end of arms 41 and move portion 43 in a counterclockwise direction, see Fig. 4, until the free end of the arm 41 is opposite the groove 53. When this happens the element 40 tends to return to the normal state with the free end of arm 41 entering the groove 53 to lock the switch in circuit making position, as shown in Fig. 3. The spring arm 29 always tends to separate contact 31 from contact 44 and the spring 56 tends to move the plunger 50 downwardly but these actions are prevented by the latching action of the element 40. If a current is passing through the circuit controlled by contacts 44, 31, and the circuit temperature does not exceed a predetermined degree, the parts of the switch remain in the position shown in Fig. 3, and the circuit remains closed. If there is a short circuit or for other reasons an excess current is passed through the circuit which is sufficient to heat the element above a predetermined degree, the element 40 moves to the left sufficiently to free the arm 41 from the groove 53. The instant the arm is out of the groove 53 the arm 29 and the plunger will be forced downwardly by the spring action of arm 29 so that the circuit breaker will stand in open position. As soon as the circuit is opened the bimetal strip 40 begins to cool and returns to its normal state without engaging the plunger.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. An automatic circuit breaker, comprising in combination; a bimetallic strip member having a freely moveable end and a fixed end mounted to a support, a flexible strip member having one end fixed to said support and having the other end free to move and normally spaced from said bimetallic member, a moveable plunger movable relative to and adapted to move the free end of said flexible member into contacting engagement with said bimetallic member, and a means on said plunger engageable with the free end of said bimetal member

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for maintaining said members in said contacting engagement until the bimetallic member thermally responds to a predetermined current passing therethrough and causes said means to be released.

2. An automatic circuit breaker, comprising in combination; a bimetallic strip member having a freely moveable end and a fixed end mounted on a support, a second strip member having one end fixed in spaced relation to said bimetallic member on said support and the other end normally spaced from said bimetallic member, a moveable plunger spaced between the fixed ends of said members adapted to move said second member into engagement with said bimetallic member and means on said plunger engageable by the free end of said bimetallic member for holding said members in said engagement.

3. The construction of the character described in claim 2 wherein the means for maintaining the members in engagement includes a notch extension on the plunger that is adapted to pass through an aperture in the second member and is adapted to form a latching engagement with the bimetallic member, when the members are in engagement.

4. The construction of the character described in claim 1 wherein a spring surrounds said plunger and is engageable with the member moved thereby so as to be compressed when said plunger is moved for forming the contacting relation between said members.

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