Aug. 7, 1951 R. S. DAVIS 2,563,103

CIRCUIT BREAKER

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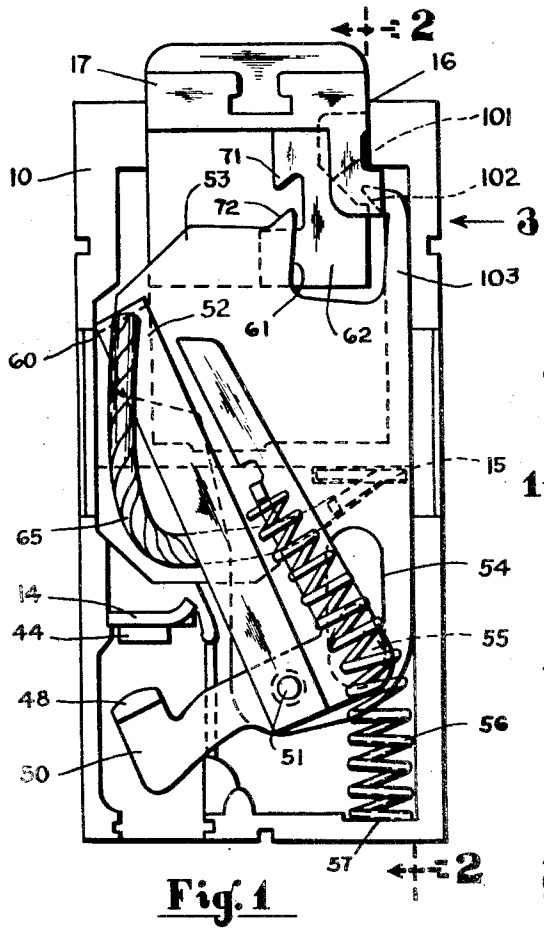


Fig. 1

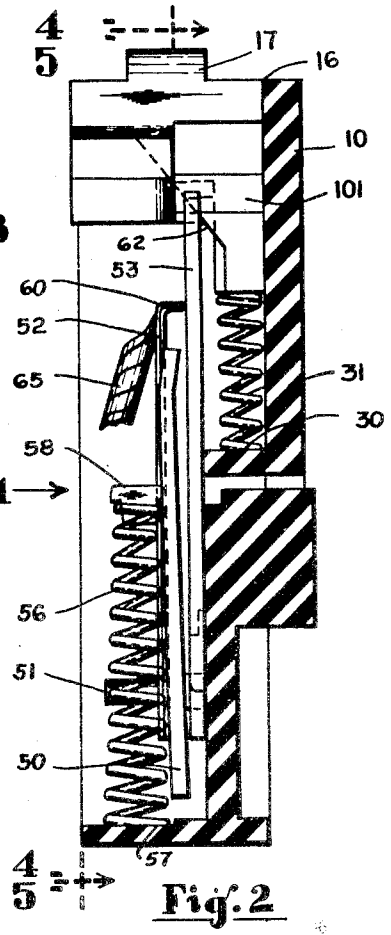


Fig. 2

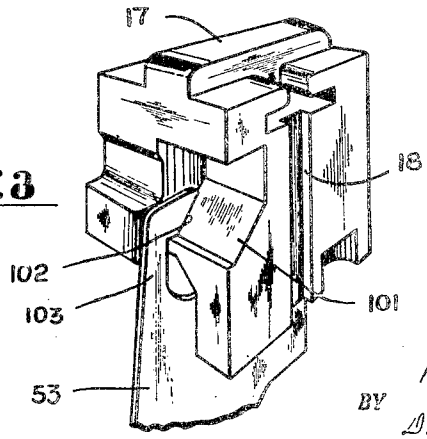


Fig. 3

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Fig. 5

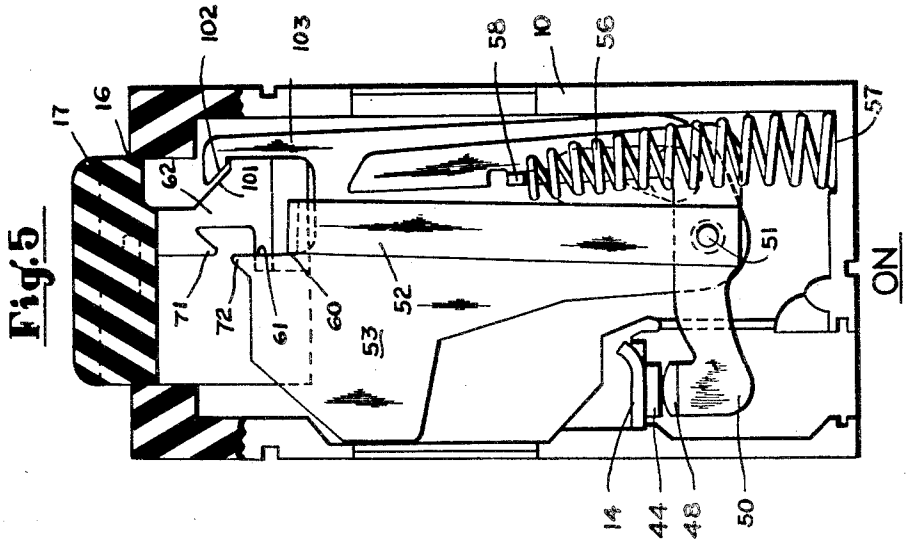
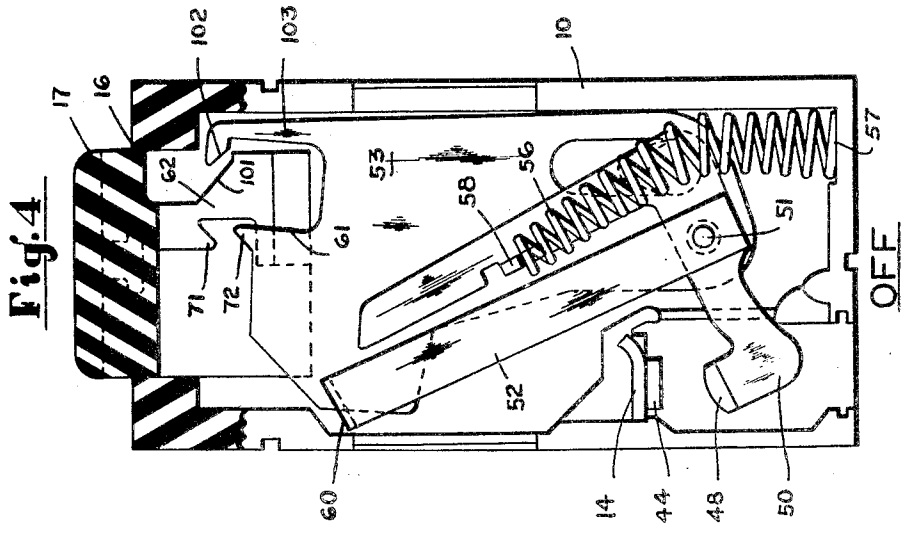


Fig. 4



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CIRCUIT BREAKER

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Application August 6, 1948, Serial No. 42,982

4 Claims. (Cl. 200—70)

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This application relates to circuit breakers and discloses an improvement over the breaker disclosed in a prior patent to Platz 2,374,778 of May 1, 1945.

That patent and this application disclose a switch or breaker including a plate 53, a contactor 50, an operating spring 56, a handle 17, and a handle return spring 31. The operating spring 56 which moves the contactor 50 to open circuit position likewise urges plate 53 in a direction opposite to that of the contactor on circuit opening movement.

At the same time, the handle return spring 31 moves the handle 17 to complete the movement of the parts, namely the handle, the contactor, and the plate, to the circuit open position.

In the patented construction spring 56 is relied upon to maintain latching pressure as well as to move the contactor and the plate to open circuit position. Since spring 56 must be strong enough to move the plate, as well as the contactor, it is made quite powerful, with the result that there may be in some cases excessive latch pressure.

In order to permit a reduction of latch pressure and of the strength of the operating spring, where desired, without removing the force for moving the plate, and thus to improve the operating characteristics of the circuit breaker, there has been added to the circuit breaker shown in the patent, a mechanical connection between the handle return spring 31 and the plate 53 whereby the influence of that spring is available to be added to the influence of the operating spring to assist in causing circuit opening movement of the plate. The mechanical connection is established through the use of a cam on the handle which is moved outwardly by the handle return spring acting automatically, such handle cam co-operating with a bevelled follower portion of the plate to bias that plate in the same direction in which the plate was intended to be biased by the operating spring, with the additional bias being provided by the handle return spring operating through the handle.

In this way, the bias of two springs, the operating spring and the handle return spring, is here relied upon to move the plate as necessary to open circuit position, and in this way an improvement in the operating characteristics of the breaker may thus be obtained. Latch pressure and the strength of spring 56 may be reduced, but the plate 53 will nevertheless be moved on circuit opening.

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An embodiment of the circuit breaker, including the plate biasing cam of the handle and the bevelled follower portion of the plate, is disclosed in the appended drawings.

In these drawings,

Fig. 1 is a view as if in the direction of arrow 1 of Fig. 2, showing the switch with a cover plate removed for purposes of clarity, and with the parts shown in open circuit or "off" position.

Fig. 2 is a section view as if on line 2—2 of Fig. 1 with the cover plate omitted for purposes of clarity.

Fig. 3 is a perspective view of the novel details of the switch, generally as if in the direction of the arrow 3 of Fig. 1.

Figs. 4 and 5 are views like Fig. 1, but with parts shown in section, and with the parts shown respectively in open circuit or "off" position and in closed circuit or "on" position.

The drawings show the switch as comprising a cup shaped casing 10 having an open front closed by a plate or cover, omitted for purposes of clarity. In the back of the case are line and load terminals 14 and 15. In an opening 16 at the top of the case reciprocates a handle or actuator 17 formed as a push button to be engaged by the finger of the operator for push only manipulation, for downward pressure only. A groove 18 of the handle receives a tongue, not shown, of the casing to guide the handle in its up and down motion in the casing. The handle is actuated by push push action and there is no push pull action.

The casing provides at 30 a seat for a coiled compression spring 31, which biases or returns the handle outwardly. Lugs of the handle cooperate with lugs of the casing to limit or stop outward motion of the handle.

A stationary contact 44 integral with line terminal 14 is adapted to be engaged with butt contact by the contact tip 48 of an L shaped contactor 50 riveted and welded at 51 to a bimetal strip 52, with rivet 51 being formed as a pin to provide a loose pivotal connection between the contactor 50, with its strip 52, and a plate or member 53 of insulation, the latter having an elongated slot 54 receiving a stop 55 formed on the back of the casing.

An operating spring 56 has its lower end in a seat 57 of the casing and its upper end surrounding a spring lug 58 of the contactor 50. Spring 56 functions to rotate arm 50 counterclockwise for circuit opening on the axis of pivot pin 51 when the latching hook 60 forming the free end

of the bimetal strip 52 is released from engagement with the holding abutment, namely, the latching edge 61 of the plate 53. Such release of latch 60 from abutment 61 is effected either automatically, by the warping of the bimetal 52 on overload, or manually by the camming action provided by a sloping unlatching cam 62 of the handle. When the handle is pushed down, the cam 62 unlatches hook 60 off the abutment 61 to permit the contactor 50 to be rocked counterclockwise relative to the plate 53 by the spring 56 for circuit opening.

In a circuit opening action, spring 56, acting through contactor 50 and rivet 51, will slide the plate 53 upwardly with movement limited by stop 55, and will rock plate 53 clockwise about stop 55 as a pivot.

To effect unlatching, the handle is pushed down to move latch 60 off the abutment 61. Thereafter handle 17, when released, is moved to its full out position by the handle return spring 31.

In such movement of the handle, the lower edge of cam 101 on the side of the handle will engage the bevelled tip or follower 102 of the portion 103 of plate 53, positively moving plate 53 clockwise during the circuit opening movement of the parts. Actually, motion of the plate 53 is imparted thereto by the engagement of the surface 102 with the lower edge of the cam 101. The angular surface of cam 101 has no operative function and merely provides a clearance into which the surface 102 may enter. The operative contact is between the surface 102 and the lower edge of cam 101. As shown in Fig. 3, as the handle 17 is raised by its spring 31, the member 53 will be moved to the left away from the lower left edge of the cam surface 101.

When the plate is so moved on unlatching, the relatching cam 72 of such plate is automatically positioned under the relatching cam 71 of the handle. The next inward stroke of the handle will cause the plate 53 to move down and at the same time will cause the contactor to rock clockwise from the position of Fig. 1 but with its contact 48 separated from contact 44 by the fact that both plate 53 and the contactor 50 are in their lowermost position. Release of the handle thereafter permits upward movement of the contactor, by spring 56, to engage contact 44 and close the circuit and this likewise causes the plate 53 to return to the position of Fig. 5 where its relatching cam 72 is no longer in the path of travel of the relatching cam 71 of the handle and likewise to position latch hook 60 in the path of travel of unlatching cam 62 of the handle, thus terminating movement of the parts.

It will be observed that during the unlatching or circuit opening movement, plate 53 is influenced not only by spring 56 but also by handle return spring 31 to move clockwise to the position of Figs. 1 and 4, spring 56 acting on plate 53 through the contactor 50 and spring 31 acting on the plate 53 through the handle. This contrasts the construction hereof from that shown in the prior patent to Platz 2,374,778 of May 1, 1945, where the construction is such that spring 56 and that alone is available for influencing plate 53 to move clockwise on unlatching. In the construction of the patent there is no equivalent

or duplicate of the cam 101 of the handle and the bevelled follower 102 of plate 53 for enabling the influence of spring 31 or the movement of handle 17 to be imparted to plate 53 for rocking it clockwise on unlatching.

Now having described the circuit breaker herein disclosed, reference should be had to the claims which follow for a determination of the inventions hereof.

I claim:

1. In a circuit breaker having a contactor, a member, a handle, an operating spring for moving said contactor and said member simultaneously to open circuit position, and a handle return spring for moving the handle to open circuit position; the combination comprising cam means interconnecting said handle return spring and said member whereby the handle return spring and the operating spring co-act to move said member to circuit open position.

2. In a circuit breaker having a contactor, a member, a handle, an operating spring for moving said contactor and said member simultaneously to open circuit position, and a handle return spring for moving the handle to open circuit position; the combination comprising cam means interconnecting said handle return spring and said member whereby the handle return spring will add its influence to that of the operating spring to move said member to circuit open position, said contactor and said member being interconnected to move in opposite directions on circuit opening.

3. In a circuit breaker having a contactor, a member, a handle, an operating spring for moving said contactor and said member simultaneously to open circuit position, and a handle return spring for moving the handle to open circuit position; the combination comprising means mechanically interconnecting the handle return spring and the member, including a cam edge on said handle adapted to engage a follower on said member whereby handle movement during circuit opening will move said member towards circuit open position.

4. In a circuit breaker having a contactor, a support member, a handle member, an operating spring for moving said contactor and said support member simultaneously to open circuit position, and a handle return spring for moving the handle member to open circuit position; the combination comprising means mechanically interconnecting the handle return spring, the handle member and the support member, including a cam edge on one of said members adapted to engage a follower on the other member whereby movement of the handle member during circuit opening will move said support member towards circuit open position.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,948,198	Blake	Feb. 20, 1934
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