March 17, 1970 G. S. HARPER 3,501,606

AUXILIARY SPRING SWITCH

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Fig. 1.

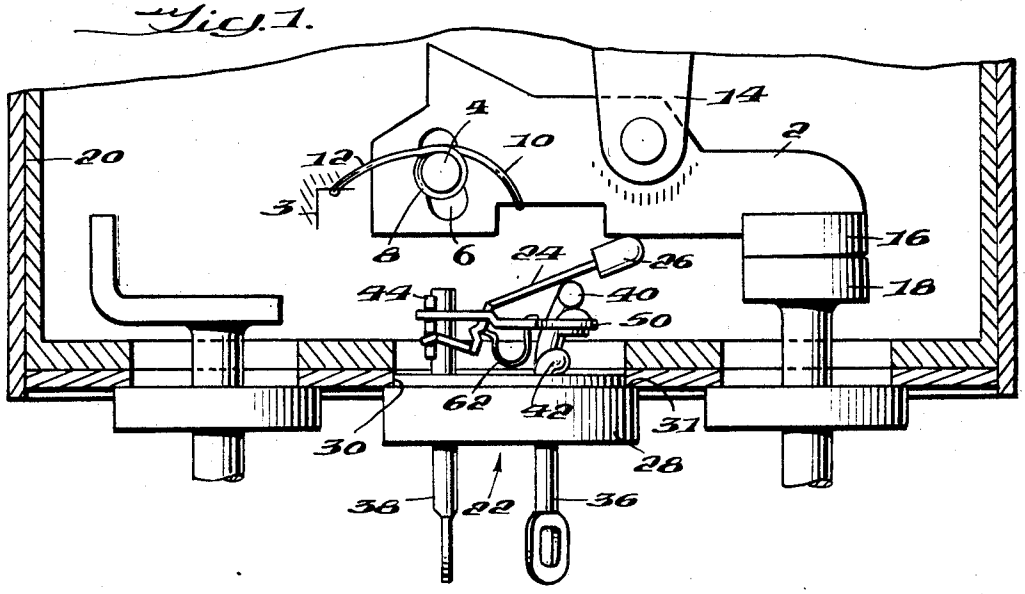
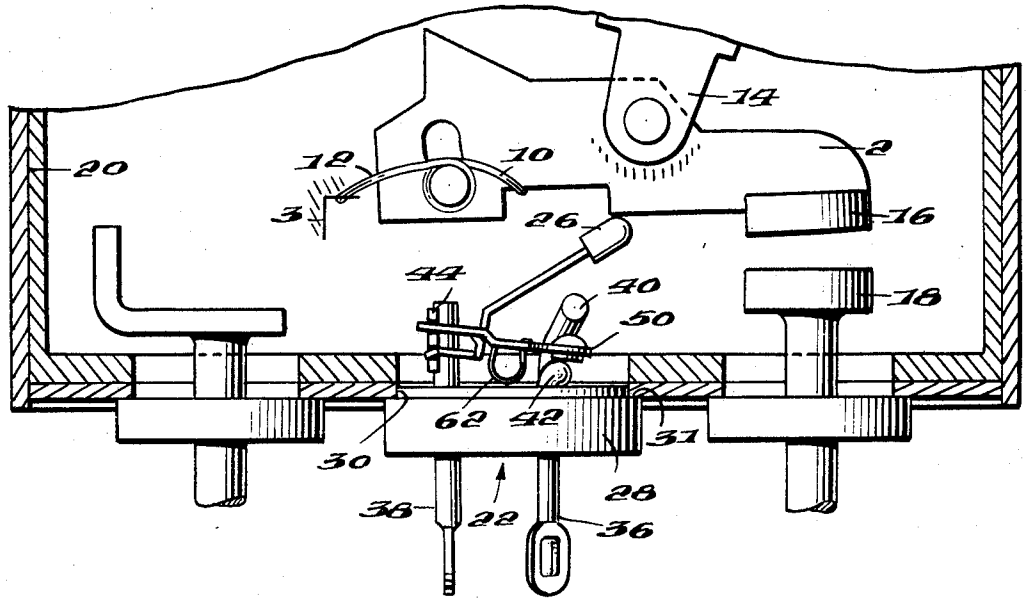



Fig. 2.




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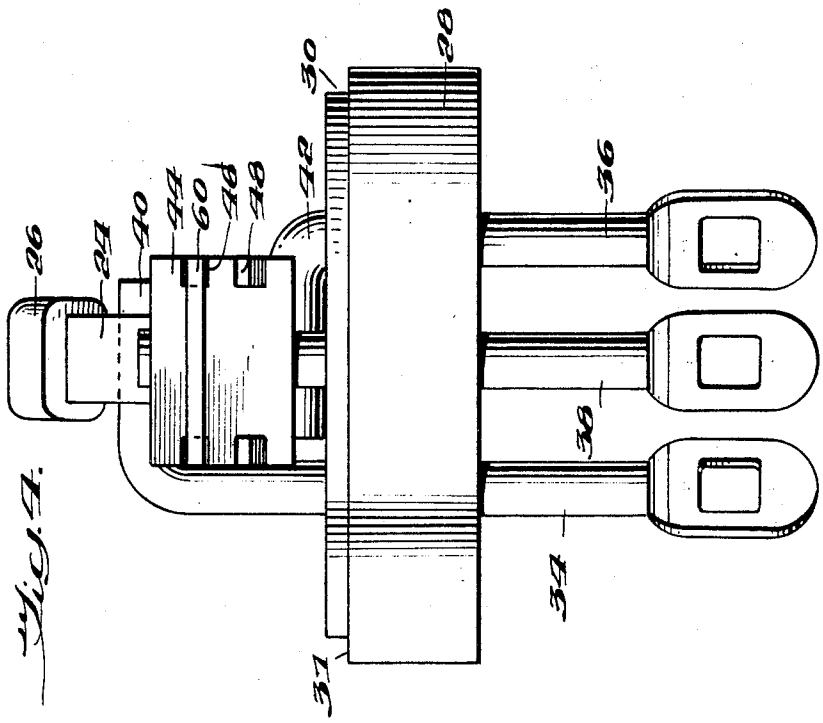



Fig. 4.

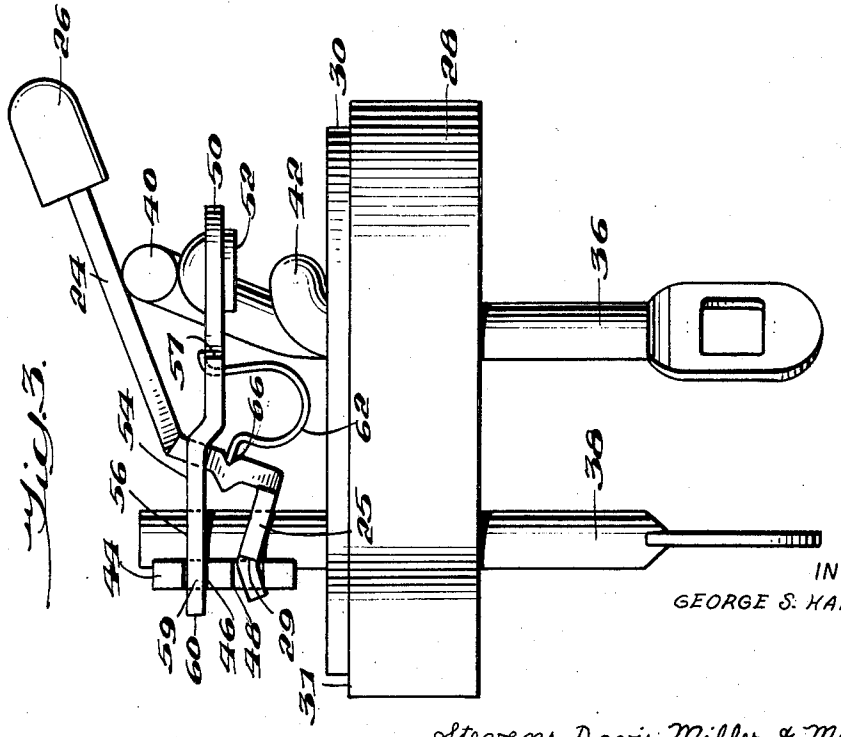



Fig. 3.

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Fig. 5.

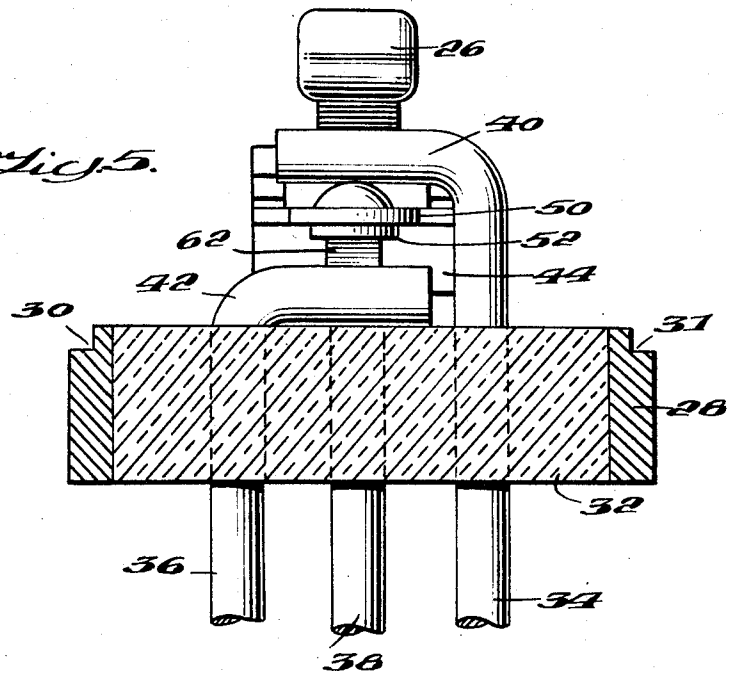
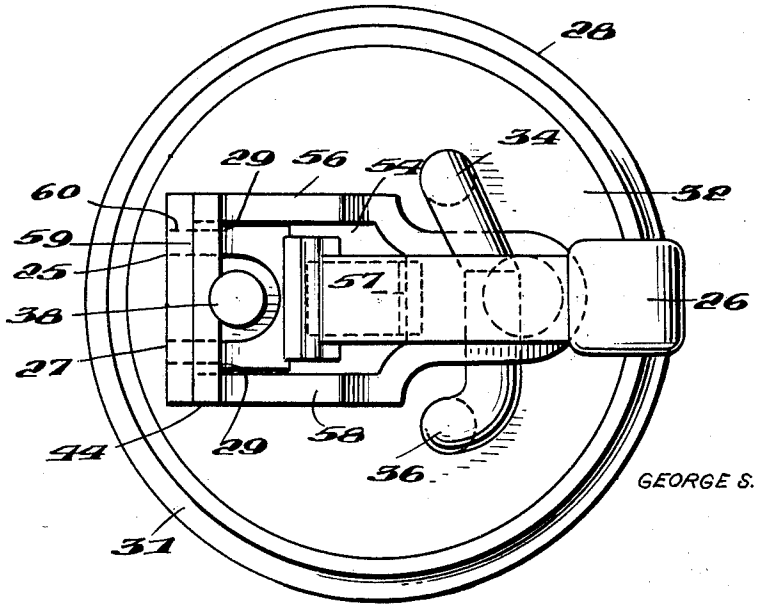



Fig. 6.




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AUXILIARY SPRING SWITCH

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Fig. 7.

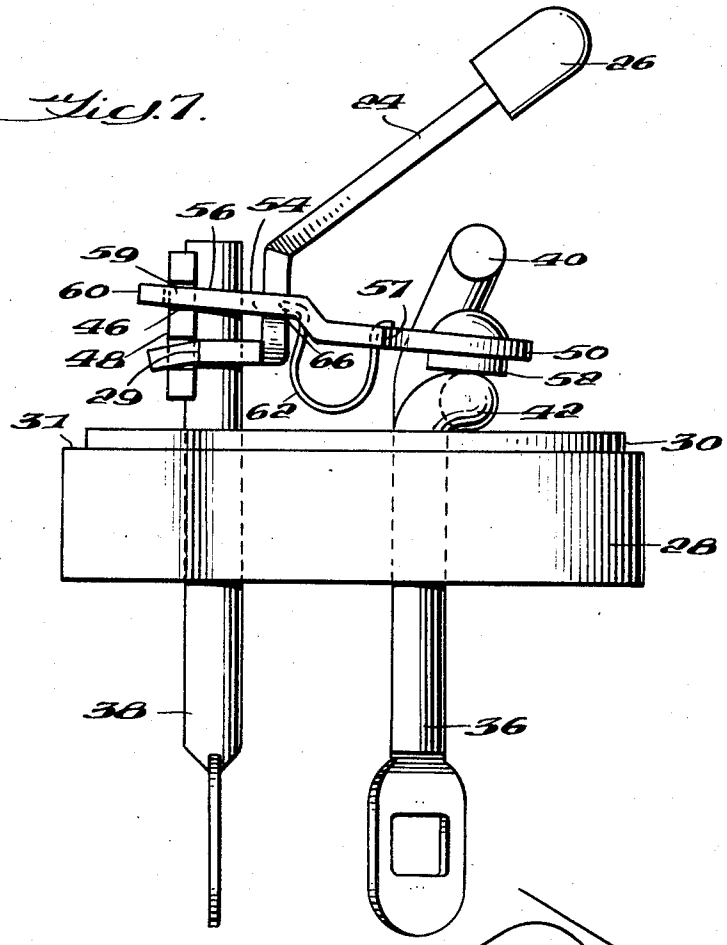
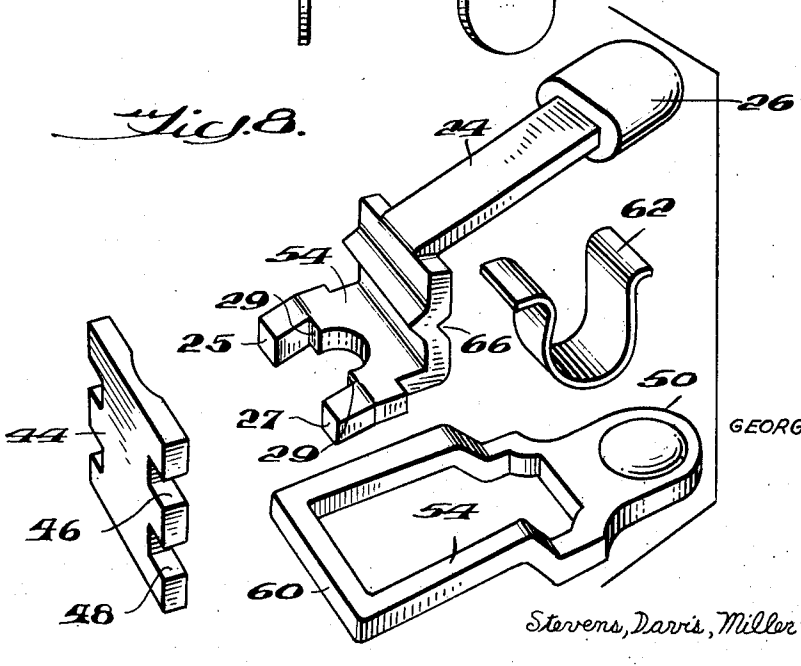



Fig. 8.




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United States Patent Office 3,501,606
Patented Mar. 17, 1970



3,501,606

# AUXILIARY SPRING SWITCH

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Int. Cl. H01h 9/38, 33/12
U.S. Cl. 200—146 3 Claims

## ABSTRACT OF THE DISCLOSURE

Disclosed is a snap action spring switch for use as an auxiliary switch in a circuit breaker. The switch comprises a lever and crossing link both pivoted to a plate secured to one switch terminal. The switch lever is actuated from the contact lever of the circuit breaker and the link carries a contact movable between two stationary contacts. A U-shaped spring acts between the lever and link to cause snap action of the movable contact.

This invention relates to a switch and more particularly to a switch for use in conjunction with a circuit breaker.

There are occasions when it is desired to control circuits in conjunction with the condition of a different circuit.

It is an object of this invention to provide a switching arrangement which is operated in response to an overload condition in one circuit to control operation of other circuits.

It is a further object of this invention to provide a switching arrangement which is operated by the mechanism for opening and closing the contacts of a circuit breaker.

It is a further object of this invention to provide an auxiliary switch for use with a circuit breaker as aforesaid which is fast acting, small, and reliable.

These and further objects of the invention will become manifest upon reading the following description in conjunction with the accompanying drawing wherein:

FIG. 1 shows the general arrangement of the main and auxiliary switches;

FIG. 2 shows the arrangement of the switch contacts after the occurrence of an overload;

FIG. 3 shows an enlarged view partly in section of the auxiliary switch;

FIG. 4 is a view taken on the line 4—4 of FIG. 3;

FIG. 5 is a view partly in section taken on the line 5—5 of FIG. 3;

FIG. 6 is a top plan view of the auxiliary switch; and

FIG. 7 is a view of the auxiliary switch in normal position.

FIG. 8 is an exploded view of the mechanism.

In FIGS. 1 and 2 is shown a circuit breaker mechanism comprising a lever 2 pivotally and slidably mounted in a frame 3 by a pin 4 secured to the frame and a slotted opening 6 in the lever. A spring 8 is wound around the pin and has a biasing arm 10 acting on the lever and a reaction arm 12 acting against the frame to urge the lever toward the position illustrated in FIG. 2. A link 14 is connected to a current responsive mechanism operated by a preselected current flow through movable contact 16 mounted on the lever and contact 18 fixed in housing 20 to open the contacts as shown in FIG. 2. This mechanism is described in greater detail in my copending application Ser. No. 377,993 and is referred to here merely as illustrative of the invention since the invention is capable of use with other circuit breakers.

The circuit breaker having contacts 16 and 18 operates as the main switch of this invention in conjunction with an auxiliary switch indicated generally by the numeral 22. The auxiliary switch is mounted in the housing 20 adjacent the lever 2 of the main switch and is provided with an actuator lever 24 in contact with lever 2 in the closed position of contacts 16 and 18 but may or may not be in contact with the lever 2 in the open position of the contacts. The actuator lever is provided with an electrical insulating sleeve 26 to insulate it from lever 2.



The auxiliary switch comprises a metal ring 28 provided with a reduced portion 30 to define a shoulder 31 to provide a mounting in the housing 20 and for the proper positioning of the actuating lever relative to lever 2. An insulating body of glass 32 is fixedly mounted in the ring and has terminals 34, 36 and 38 embedded therein.

The terminal 34 is bent at one end to provide a contact 40 and terminal 36 is bent at one end to provide a contact 42 underlying contact 40. The terminal 38 has secured thereto as by welding a support plate 44 having paired notches 46, 48 in the edges thereof. A link 50 having a contact 52 secured thereto at one end is pivotally mounted in the upper pair of notches 46. The lever 24 is pivotally mounted in the lower pair of notches 48 and is bent to extend through an opening 54 in link 50. The lateral edges of the opening are defined by a pair of spaced legs 56, 58 and the longitudinal edges 57 and 59 of the opening are defined by the body portion of the link and a bar portion 60. The lever 24 is formed with a pair of spaced legs 25, 27 which extend through the lower pair of notches to provide the pivotal mounting. Each leg has formed therewith a shoulder 29.

A plate spring 62 shaped as a U is located between edge 57 and lever 24 to urge the link toward the right as shown in FIG. 3 to slide the bar portion 60 into contact with the plate to limit the movement of the link. The spring reacts against lever 24 to slide the shoulders into contact with the plate to limit the movement of the lever to the left.

In operation the contacts 16 and 18 are closed as illustrated in FIG. 1 and the lever 24 is urged into contact with lever 2 by spring 62. Contacts 40 and 52 of the auxiliary switch are closed and contacts 42 and 52 are open as shown in FIG. 3. On a predetermined overload current through contacts 16, 18 these contacts are opened and assume the position illustrated in FIG. 2. Lever 24 of the auxiliary switch is urged by spring 62 into the position shown in FIGS. 2 and 7 to separate contacts 40, 52 and close contacts 42, 52. The contacts remain in the latter position until the contacts 16 and 18 are again closed.

Movement of the lever 24 to shift contact 52 produces a toggle action to move the contact quickly. As can be seen in FIG. 3, the spacing of the pivot portions of lever 24 and link 50 and the shape of lever and link are such that the contact of the right leg of spring 62 with the link is above the contact of the left leg of the spring with lever 24. This arrangement urges the levers counterclockwise to close contacts 40, 52 and urge lever 24 into contact with lever 2. When lever 24 is released by lever 2 it is moved counterclockwise by spring 62 until the contact point 66 is moved above the contact of the right leg of the lever with link 50 at which time spring 62 pivots the link 50 clockwise to close the contacts 42, 52 and open contacts 40, 52 as shown in FIG. 7.

It is to be understood that certain changes, alterations, modifications and substitutions may be made in the structure of this invention within the spirit and scope of the appended claims.

I claim:

1. A switch comprising a support of insulating material, a pair of spaced terminals extending through the support and bent at adjacent ends to define a pair of vertically spaced contacts, a third terminal spaced from said pair of terminals, a plate secured to said third ter-

minal and provided with an upper and a lower pair of notches in opposite lateral edges, a link provided with an opening in one end and a contact on the other end, the terminal and plate extending through the opening with the opposed lateral edges of the opening loosely mounted in the upper pair of notches for pivotal movement therein, a lever extending through the opening between the plate and a longitudinal edge of said opening, said lever having a pair of spaced legs and a shoulder on each leg, said legs being loosely received in the lower of said pair of notches for pivotal movement therein, and a spring pivotally mounted on the lever and on said longitudinal edge urging the shoulder on said legs into contact with the plate and the other longitudinal edge of the opening against the plate.

**2.** Apparatus according to claim **1** in combination with a main switch having a fixed contact and a movable contact, said lever being coupled to said movable contact of said main switch for movement therewith.

**3.** Apparatus according to claim **1** wherein said support comprises a ring, an electrical insulator mounted in said ring, said terminals passing through said electrical insulator.




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ROBERT S. MACON, Primary Examiner

U.S. Cl. X.R.

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