

Feb. 7, 1933.

G. O. WILMS

1,896,736

PROTECTIVE OVERLOAD DEVICE OR CIRCUIT BREAKER

Filed Nov. 23, 1928

Fig. 1.

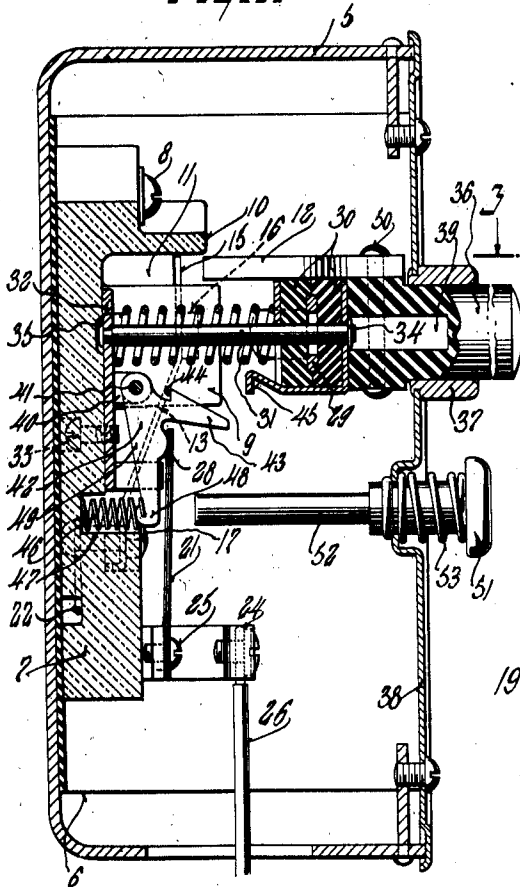


Fig. 2.

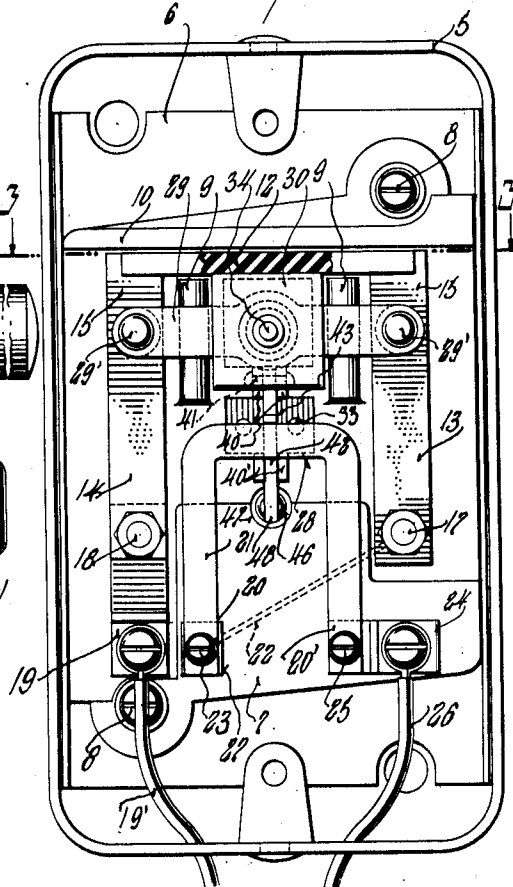


Fig. 3.

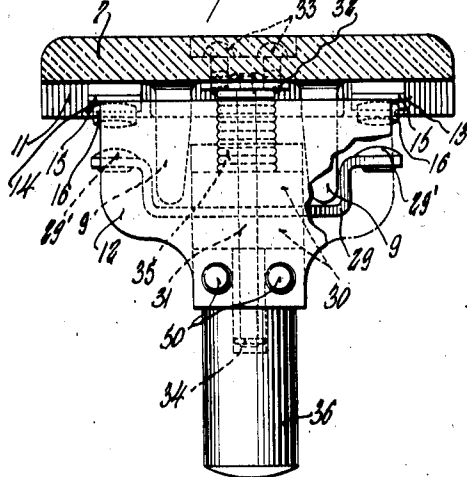
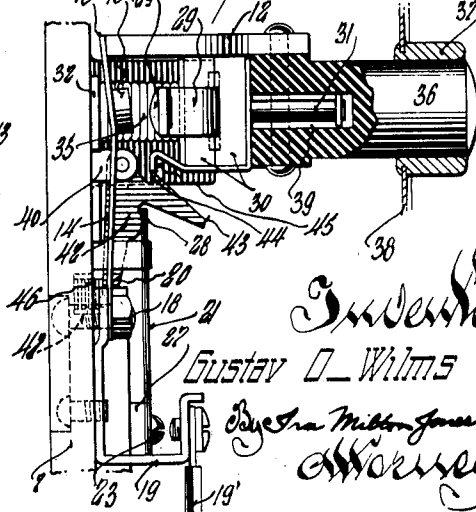


Fig. 4.



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UNITED STATES PATENT OFFICE

GUSTAV O. WILMS, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
ALLEN-BRADLEY COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WIS-
CONSIN

PROTECTIVE OVERLOAD DEVICE OR CIRCUIT BREAKER

Application filed November 23, 1928. Serial No. 321,317.

This invention relates to certain new and useful improvements in protective overload devices or circuit breakers.

In the use of devices of this character, when conditions arise which cause the protective overload device to cut out, the operator at times disables the same to render the protective feature inoperative. This produces a fire hazard and, consequently, the underwriters do not look favorably on devices of this character which permit the disabling of the overload protective feature and this invention has as an object the provision of means whereby it is impossible to hold the circuit closed as long as a condition exists which will actuate the protective overload feature.

A further object of this invention resides in the provision of an improved device of the character described in which the member for closing the circuit carries a member which prevents holding the contacts closed against the overload protective feature.

It is a still further object of this invention to provide an improved device of the character described which is of extremely simple but durable construction to insure its positive and efficient operation at all times.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawing, I have illustrated one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a view, partly in section and partly in side elevation, taken transversely through a protective overload device or circuit breaker embodying my invention;

Figure 2 is a front plan view thereof with the cover removed;

Figure 3 is an enlarged, detail view of the movable contactor and the arc deflector and guard carried thereby, said view being taken through Figure 2 on the plane of the line 3-3; and

Figure 4 is a fragmentary, detail view in side elevation with parts broken away and in section illustrating the manner in which the arc deflector and guard prevents disabling of the protective overload feature.

Referring now more particularly to the accompanying drawing, in which like numerals designate like parts throughout the several views, 5 represents a casing preferably of metal and lined with an insulator 6 and having an insulator base or panel 7 secured therein to mount the switch instrumentalities, to be later described.

Panel 7 is secured in the box by screws or bolts 8 and is provided with a pair of longitudinally disposed, sidewise spaced deflectors 9 and a transverse deflector 10, the deflector 10 being disposed above the deflectors 9 to provide a space 11 therebetween into which an arc deflector and guard 12, to be later described, is movable.

Spring contact fingers 13 and 14 are fixed to the base 7 outwardly of the deflectors 9 with their free ends 15 extended into the space 11, contact buttons 16 being carried by the fingers at a point approximately centrally of the deflectors 9. The spring fingers 13 and 14 have their lower ends fixed to the panel 7 by bolts or other means 17 and 18, respectively, the finger 14 being directly connected with a terminal 19 with which one line or conductor 19' of the circuit in which the device is included is connected. The other spring finger 13 has its lower end connected with one end 20 of an approximately U shaped, thermal-responsive member 21 by a conductor 22 passed along the back of the panel and having one end connected with the mounting screw 17 and its other end connected with a mounting screw 23 securing the end 20 of the thermal-responsive member to the panel. The other end 20' of the member 21 is connected with a terminal 24 by a screw 25 to which a second line conductor 26 of the circuit in which the device is incorporated is connect-

ed, so that the circuit is normally broken between the members 13 and 14.

The thermal responsive member 21 is preferably constructed of two metals having different coefficients of expansion and is positioned between the member 13 and 14, being spaced from the panel 7 by a spacer 27 at its end 20 and by the terminal 24 at its end 20'. That side of the member 21 formed of the metal having the highest coefficient of expansion is disposed outwardly so that its closed end portion 28 moves toward the panel when subjected to the thermal influence of current passing therethrough.

The members 13 and 14 are adapted to be bridged by a movable contactor 29 having contacts 29' on its outer ends which register with the contacts 16 of members 13 and 14, the contactor being secured between two blocks of insulating material 30 slidably mounted on a rod or pin 31 extended from a plate 32 fixed to the panel 7 between the deflectors 9 by screws 33. A stop 34 formed on the outer end of the rod 31 limits the outward movement of the blocks 30 and the movable contactor carried thereby under the influence of an expansile spring 35 coiled about the rod between the blocks 30 and the plate 32, so that the contactor is at all times yieldably urged from the fingers 13 and 14 to break the circuit therebetween.

The movable contactor, however, is adapted to be actuated against spring 35 by a button or other member 36 guided in a bushing 37 carried by the cover 38 of the housing 5 and having a recess 39 in which the outer end of the rod 31 is received when the button is depressed, there being means to maintain the movable contactor in engagement with the contacts 16, as now about to be described.

A pair of spaced lugs or ears 40 are struck from the medial portion of the plate 32 to pivotally mount, as at 41, an approximately L shaped locking member 42, one arm 43 of which is notched to provide a latch 44 adapted for engagement with a projection 45 extended from the members 30 to maintain the movable contactor in its circuit closing position, as best shown in Figures 1 and 4. The latch is normally urged to its operative position by an expansile spring 46 confined in a well 47 in the panel 7 and normally engaging the outer free end 48 of the other arm 49 of the locking member 42 to cause the latch to hold the contactor "in" after it reaches this position, a second pair of spaced lugs 40' being struck from the lower portion of the plate to guide the movement of the member 42.

The transverse portion 28 of the thermal-responsive member 21 normally rests on the arm 49 of the member 42 without exerting force thereon and in the event of an overload, the temperature of the member 21 rises causing it to flex inwardly and depress the arm 49 of the locking member, disengaging

its latch 44 from the projection 45 and freeing the movable contactor for instant movement to circuit breaking position by its spring 35.

Heretofore, it has been found that to defeat the purpose of the overload protective feature and to maintain the circuit closed some operators have jammed the movable contactor in its circuit making position thus creating a fire hazard. Therefore, switches of this nature have not met with the approval of the underwriters and in the accompanying drawing is illustrated a very simple and efficient arrangement whereby an operator is prevented from holding the contact "in" to disable the overload protective feature.

The means for accomplishing this includes the arc deflector or guard 12 which is fixed to the button or member 36, as at 50, and is of sufficient width at its inner end to bridge the ends 15 of the spring members 13 and 14. The depth of the guard is greater than the distance from the innermost faces of the contacts 29' to the outermost face of the members 30 so that as the members 30 are moved inwardly to close the switch, the spring members 13 and 14 are first depressed and held out of engagement with the bridging contactor 29 until the catch 44 engages the projection 45 to hold the movable contactor against outward movement, and the pressure is removed from the member 36 permitting the resiliency of the members 13 and 14 to move the same outwardly to engage their contacts 16 with the contacts 29' and close the circuit. During the time the contacts are engaged the guard 12 cooperates with the deflectors 9 and 10 to enclose the contacts.

Assuming that an overload existing in the circuit has opened the switch and the operator in an attempt to close the same holds the member 36 "in" as shown in Figure 4, it will be impossible to close the circuit in this manner as the latch 44 will be held out of the path of the projection 45 by the thermal responsive member 21, and the spring fingers 13 and 14 and their contacts 16 will be held out of engagement with the contacts 29' of the contactor 29 by the guard 12, as illustrated.

When it is desired to break the circuit independently of the overload protective device, a button 51 is depressed to engage the inner end of its stem 52 with the end 48 of the locking member arm 49 depressing it against its spring to release the catch 44 from the projection 45. The stem 52 is mounted in the cover 38 and is normally urged to its inoperative position by a spring 53.

From the foregoing description, taken in connection with the accompanying drawing, it will be readily apparent to those skilled in the art to which an invention of the character described appertains, that I provide a simplified and improved circuit breaker and

overload protective device which is so designed as to prevent a person from defeating the protective feature.

I claim:

5 1. An electrical appliance of the character described, comprising a pair of yieldable members each mounted at one end with their outer end portions free, contacts carried by the free end portions of said members, a con-
10 tactor mounted for linear movement to and from engagement with said contacts to electrically bridge the same, means normally urging the contactor out of engagement with said contacts, means movable independently
15 of the contactor and along its axis of linear movement and operable to move the contactor against its urging means and towards the contacts, means for holding the contactor in its contact engaging position, and means
20 movable with the contactor operating means to retain the contacts out of engagement with the contactor until said holding means has become operative and said operating means is retracted.

25 2. An electrical appliance of the character described, comprising a pair of yieldable members each mounted at one end with their other end portions free, contacts carried by the free end portions of said members,
30 a contactor mounted for linear movement to and from engagement with said contacts to electrically bridge the same, means normally urging the contactor out of engagement with said contacts, means movable independently
35 of the contactor and along its axis of linear movement and operable to move the same against its urging means and towards the contacts, means for holding the contactor in its contact engaging position, means movable
40 with the contactor operating means to retain the contacts out of engagement with the contactor until said holding means has become operative and said operating means is retracted, and means influenced by the occurrence by an overload in a circuit including said yieldable members and contacts for rendering said holding means inoperative.

3. An electrical switch appliance for closing and opening an electric circuit, comprising a mounting panel, yieldable members
50 mounted at one end from the panel and having their other ends normally free, a contactor mounted for linear movement along an axis substantially perpendicular to the mounting
55 panel to engage the yieldable members and electrically bridge the same to complete the circuit, means for holding the contactor in its circuit making position, an actuator movable along said substantially perpendicular
60 axis operable to move the contactor to its circuit making position, and means operable as the contactor is moved to circuit making position to engage the yieldable members and retain the same out of engagement with the
65 contactor until the contactor has been secured

in its contact making position and the actuator has been retracted.

4. An electrical device of the character described including contacts between which an electric circuit is adapted to be made and broken, a contactor operable to electrically
70 bridge the contacts and complete the circuit, means for releasably holding the contactor in engagement with said contacts, an actuator for moving the contactor to engagement with the holding means, common means for movably mounting the contactor and the actuator,
75 means carried by the actuator for holding the contacts out of engagement with the contactor until the contactor is engaged by its holding means and the actuator has been retracted.

5. An electrical device of the character described, comprising a mounting panel, contacts mounted on the panel, arc shields disposed between the contacts, a contactor operable to bridge the contacts and complete an electric circuit therethrough, holding
85 means for securing the contactor in circuit making position, means operable to release said holding means upon the occurrence of an overload in the circuit to break the circuit between the contactor and contacts, a member operable to move the contactor to its circuit making position for engagement with
90 said holding means, and an arc guard movable with the contactor toward circuit making position and cooperating with the arc shields to provide arc chambers in which the circuit is made and broken.

6. An electrical device of the character described, comprising a mounting panel, contacts mounted on the panel, arc shields disposed between the contacts, a contactor operable to bridge the contacts and complete
105 an electric circuit therethrough, holding means for securing the contactor in circuit making position, means operable to release the holding means upon the occurrence of an overload in the circuit to break the circuit between the contactor and contacts, a member operable to move the contactor to its circuit making position for engagement with
110 said holding means, and an arc guard movable with the contactor toward circuit making position to cooperate with said arc shields to provide arc chambers in which the circuit is made and broken, said arc guard preventing the holding of the contactor in circuit making position while the holding means
115 has been rendered inoperative by a circuit overload.

7. An electrical appliance of the character described, comprising a mounting panel, yieldable members mounted at their lower
125 ends to the panel with their upper ends free, a contactor guided for movement to and from engagement with the free yieldable ends of said members to bridge the same and complete a circuit therethrough, spring means
130

normally urging the contactor to a position separated from the contacts, latch means operable to hold the contactor in circuit making position, means operable upon the occurrence of an overload in the circuit including said contacts to hold said latch means in inoperative position as long as the overload exists, a member independent of the contactor and adapted to be depressed to move the contactor toward the contacts and to a position to be engaged by said holding means, said member being retractable free of the contactor after the same is held by said holding means, and a member carried by said independent member and engageable with the free ends of the yieldable members as the same is moved inwardly with the contactor prior to the engagement of the contactor therewith whereby the circuit is maintained open after the contactor is engaged with its holding means until the independent member is retracted.

8. In an electrical device of the character described, contacts, arc shields disposed between the contacts, a contactor operable to bridge the contacts, and complete an electric circuit therethrough, releasable means for securing the contactor in circuit making position, said means releasing upon the occurrence of an overload in the circuit, a member operable to move the contactor to its circuit making position for engagement with said releasable securing means, and an arc guard movable with the contactor toward circuit making position and cooperating with the arc shields to provide arc chambers in which the circuit is adapted to be made and broken.

9. In a switch device for closing and opening an electric circuit, a relatively stationary contact, a movable contactor engageable therewith to close the circuit, an actuator for moving said contactor, means mounting the contactor and actuator for movement along a common axis, trip means subject to overload conditions in the circuit for releasably holding the contactor in circuit making position, and means carried by the actuator and moving in advance of the contactor for engaging the relatively stationary contact and holding the same out of engagement with the contactor until the contactor is engaged by its trip means and the actuator retracted.

10. In an electric switch device for closing and opening an electric circuit, a relatively stationary contact, a movable contactor engageable therewith to close the circuit, a mounting stem for said movable contactor and along which said movable contactor is movable, mounting means for the stem, spring means between the movable contactor and the mounting means for yieldably urging the movable contactor to open position, an actuator movable along the axis of said mounting stem and operable to move the movable contactor toward the relatively sta-

tionary contact, latch means carried by the mounting means for the stem and engageable with the movable contactor to hold the same in circuit closing position, means carried by the actuator and operable to hold the relatively stationary contact out of engagement with the movable contactor until the movable contactor is engaged by the latch means and the actuator retracted, and thermally responsive means for tripping the latch member upon the occurrence of a predetermined condition to release the movable contactor for disengagement from the relatively stationary contact.

In testimony whereof I have hereunto affixed my signature.

GUSTAV O. WILMS.