Feb. 7, 1950 A. WARSHER 2,496,759

CIRCUIT BREAKER

Filed Jan. 11, 1945

Fig. 1.

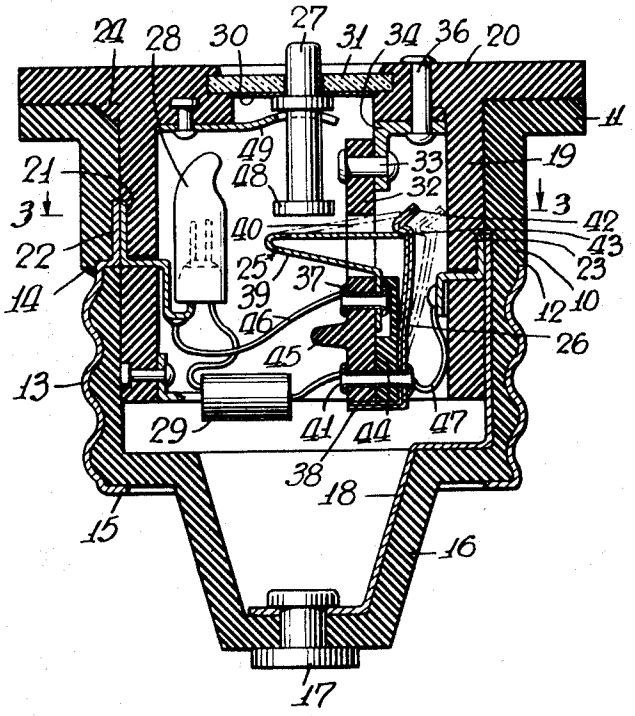


Fig. 2.

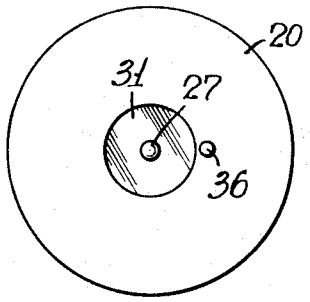


Fig. 3.

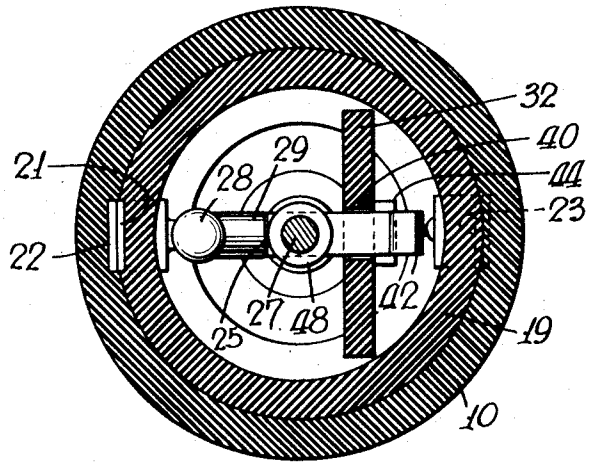
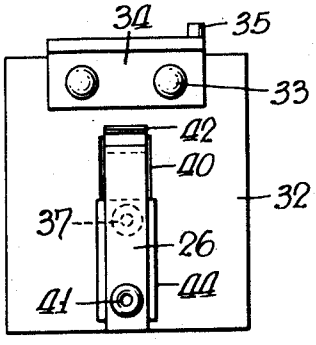


Fig. 4.



INVENTOR
Adolph Warsher
BY
Dean Fairbank & Hirsch
ATTORNEY

Patented Feb. 7, 1950 2,496,759

UNITED STATES PATENT OFFICE

2,496,759

CIRCUIT BREAKER

Adolph Warsher, Maywood, N. J.

Application January 11, 1945, Serial No. 572,296

6 Claims. (Cl. 200—121)

1

The present invention relates to circuit breakers, more especially of the resettable type, operating by thermal expansion under overload.

It is among the objects of the invention to provide a device of the above type, which may be substituted for the ordinary fuse, without any alteration in the conventional fuse terminal installation, which will operate reliably to interrupt a sustained overload, which is thoroughly proof against fire hazard, which effectively indicates even in the dark an interrupted circuit condition, which may be readily reset by a simple manual thrust, and which utilizes substantially the conventional fuse cartridge or fuse plug casing for housing the thermally responsive circuit interrupter, the resetting as well as the indicating instrumentalities.

In the accompanying drawings in which is shown one of various possible embodiments of the several features of the invention,

Fig. 1 is an enlarged view in longitudinal cross section through a fuse plug embodiment of the invention;

Fig. 2 is a plan view thereof;

Fig. 3 is a view in transverse cross section taken on line 3—3 of Fig. 1; and

Fig. 4 is a side elevation of the interrupter subassembly.

Referring now to the drawings, there is a fuse plug housing or casing of generally conventional construction including a main or outer insulating fuse body 10 with an upper rim 11, presenting a peripheral shoulder 12 against which abuts the upper end of the screw shell terminal contact 13 soldered in place as at 14 and rolled under the base of the body as at 15, the body having the usual frusto-conical inner end 16 mounting the central contact 17 to which is connected the conductor strip 18 extending along the inner wall of the body. Telescoped into this generally conventional outer fuse body is the insulating inner fuse body 19 which includes the cover 20 and the cylindrical body that is snugly telescoped into the outer shell. The inner shell has a contact 21 frictionally coacting with the screw shell conductor strip 22 and a second contact 23 similarly coacting with the conductor strip 18 for the central conductor. To assure registry of the contacts of the inner and outer plugs, they are keyed as at 24.

According to the invention, the circuit breaker and associated elements are mounted within the fuse plug in lieu of the usual fuse strip between the terminals. In general the invention

2

involves the use of a switch comprising a movable preloaded spring contact element 25 and a coacting thermally responsive catch element 26 electrically connected in series between the terminals 21 and 23. The device also includes the reset button 27 accessible through the cover 20 for relatching the device after it is sprung on overload. Preferably the device also includes a miniature vapor electric lamp 28 with the associated series connected ballast coil 29, the said two series connected elements also being connected between the terminals 21 and 23 and affixed within the inner casing. The operatively connected circuit breaker normally short circuits the miniature vapor electric lamp, but upon rupture of the circuit that lamp lights and renders luminous a phosphorescent paint area 30 on the under surface of and exposed to view through a translucent or transparent plate 31 in the cover 30.

In the practical specific embodiment disclosed, the coacting spring and thermally responsive elements are mounted on an insulating carrying plate 32 in turn affixed as by eyelets, rivets or screws 33 to an angle bracket 34, desirably with a locating nub 35 to depend from the cover 20 to which said bracket is affixed by eyelets, screws or rivets 36. The insulating plate 32 depends from the cover to one side of the axis of the fuse plug and is spaced at both faces and preferably also at its edges from the wall of the casing.

Preferably the releasable spring contact element 25 is an elongated phosphor bronze or beryllium copper strip rivets in place as by eyelet 37. The spring contact is bent in a U-shaped loop 39 through a window slot 40 to protrude from the other face of the mounting plate. The lower edge of the window slot extends but little below the lower arm of the U in the spring contact and extends well thereabove to permit the snapping release of said spring contact as indicated in dotted lines in Fig. 1.

Coacting with the spring contact element is the thermally responsive element 26 preferably in the form of a bimetallic catch mounted at its lower end by eyelet 41, upon the same face as the spring contact and keyed against rotation about said eyelet by bending its lower end at 38 about the lower edge of the plate 32. Catch 26 is formed with a latching end 42 normally locking the horizontal extremity 43 of the spring contact in lower or stressed position, as shown in the drawings. Preferably an insulating

plate 44 is interposed between the carrying plate 32 and the bimetallic catch 26 and is held in place by eyelet 41 and extends over eyelet 37 to prevent arcing over. Preferably also plate 32 has an upstanding rib 45 to prevent arcing over between eyelets 37 and 41. Connector wires 46 and 47 are affixed to the respective eyelets 37 and 41 and extend to the respective contacts 21 and 23 to which they are desirably soldered as shown.

The U-looped portion 39 of the spring contact preferably extends, as shown, to the axial line of the plug into the path of movement of the enlarged lower end 48 of a reset rod having the button 27 protruding upwardly through the center of the window 31 in the cover of the fuse. Preferably a leaf spring 49 on the under face of the cover resiliently retains the button in elevated position.

In use of the circuit breaker as thus far described, the current will pass from terminal 17 through strip 18, contact 23, lead 47, eyelet 41, bimetallic catch 26, spring contact 25, eyelet 37, lead 46, and contact 21 to the screw terminal 13. A transient overload, that is, one of the type not injurious to the circuit, will not heat the bimetallic strip sufficiently to change the relation shown in Fig. 1. Upon a sufficiently sustained overload, however, said catch 26 will move outwardly and release the preloaded spring contact 25 which then snaps upwardly as shown. By reason of the preloading set forth, the snapping, when it occurs, is so vigorous that no arc will be maintained and the circuit is sharply interrupted.

The device affords an inherent safety lag and will not snap open on every short and harmless surge of abnormal current, but only on sustained overloads of predetermined time-current product which will produce sufficient heat in the bimetallic element to release the spring catch member and allow the circuit contacts to separate. The bimetallic catch will remain in deflected position after it trips until it cools sufficiently to return. Accordingly it would be impossible to reset the circuit breaker prematurely. Thus adequate time is afforded for the wires of the previously overloaded circuit to cool down before the circuit can be reclosed. This is to be distinguished from the conventional melting type of fusible link which is apt to blow if replaced too promptly.

The miniature vapor electric lamp may be filled with any suitable noble gas, such as argon, and its electrodes are spaced so that it will glow under a predetermined voltage materially below that of the line. The miniature lamp and the series connected ballast resistance are disposed in the inner fuse plug in the space to one side of the plate 32 and reset button 27.

Even though little or no arcing occurs when the circuit breaker snaps open, the flow through the ballast resistance 28 and miniature lamp 28 will cause the latter to light at least for an instant and in general remain lighted for a substantial period of time to activate the phosphorescent paint spot 30 on window 31, and preferably also on button 27. The phosphorescent paint will remain visible in the dark for a long period of time, even though the miniature lamp shall have become extinguished, thereby to facilitate resetting.

While the invention has been shown incorporated in a fuse plug, it will be understood that the construction could be readily incorporated within a cartridge fuse or any other type of conventional fuse, and that it could likewise be incorporated in any desired size or shape of casing.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A circuit breaker comprising a fuse plug casing having a central and a screw shell contact, a cover, a bracket affixed to the inner wall of said cover, an insulating plate affixed to said bracket and depending into said casing at a distance from the lateral wall thereof and having a window opening therein, a movable spring contact strip and a bimetallic catch element both affixed at the lower ends thereof to the same side of the insulating plate, the spring contact strip presenting a loop extending through said window to the face opposite the side on which the contact strip and catch element are affixed, the free end of said spring contact strip being maintained in depressed position by said catch, and a central reset button in said cover, spring urged upward through the cover, registering at its lower end with the looped portion of said spring contact strip and adapted to reset the same.

2. A circuit breaker comprising a fuse plug casing having a central and a screw contact, a cover, an insulating plate depending from said cover, a pair of metallic mounting elements through said plate, a spring contact element affixed to said plate at one end thereof by one metal mounting element, and a coacting bimetallic catch affixed to said plate by the other metal mounting member, a miniature glow discharge lamp and an associated ballast within said casing connected in series between said metallic mounting members, a phosphorescent paint spot exposed to said lamp and means connecting the respective metallic mounting members to the terminals of the plug.

3. A circuit breaker comprising a fuse plug casing, having a central and a screw contact, a cover, an insulating plate depending from said cover, a pair of metallic mounting elements through said plate, a spring contact element affixed to said plate at one end thereof by one metal mounting element, and a coacting bimetallic catch affixed to said plate by the other metal mounting member, a reset button, a miniature glow discharge lamp and an associated ballast within said casing connected in series between said metal mounting members, and means connecting the respective metal mounting members to the terminals of the plug, said plug having a translucent window in its cover through which the reset button extends, said window having an area covered with phosphorescent paint and exposed to the radiation from said miniature lamp.

4. A circuit breaker comprising a fuse plug casing, including an outer body having a central and a screw shell contact a cover having an inner body telescoped into said outer body, an insulating mount carried by said cover, a releasable spring contact element, and a bimetallic catch, both affixed to said mount at one face thereof, said catch being adapted to latch said spring contact, said spring contact element having a loop extending from the other face of said mount, a reset button extending through the cover to coact

with said loop for relatching the same, conducting leads from the spring contact and the catch respectively, contact members carried by the inner body to which said leads are respectively affixed, said contact members coacting respectively in the assembled body with the central and the screw shell contacts of the outer body.

5. The combination recited in claim 4 in which a miniature glow discharge lamp with an associated ballast resistance in series therewith are disposed within the inner body between the insulating mount and one of said contacts, the terminals of said series connected elements being electrically connected respectively to the contact members of the coacting catch and spring contact elements and a phosphorescent paint spot exposed to said lamp.

6. A circuit breaker comprising a fuse plug casing including a cover, an insulating plate mounted on said cover and depending therefrom, a releasable spring contact strip eyeleted to said plate at one end thereof and extending in a reverse U-bend through a window in said plate with the loop of the U protruding from the other face thereof and the free end of said strip protruding from the face on which said strip is mounted, an insulating sheet overlapping the mounted end of said strip, a bimetallic catch superposed over said insulated sheet, an eyelet

connecting said sheet and said catch to said plate, said catch having a conformation at its upper end to maintain the spring contact strip depressed, said plate having an insulating rib intervening between the two eyelets, and a reset button through the cover of the plug to coact with said loop for resetting the same.

ADOLPH WARSHER.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,313,622	Dodds	Aug. 19, 1919
1,431,220	Donle	Oct. 10, 1922
1,666,339	Miller	Apr. 17, 1928
1,800,710	Weigand	Apr. 14, 1931
1,939,194	Angell	Dec. 12, 1933
1,957,345	Kriegstedt	May 1, 1934
2,059,985	Frank et al.	Nov. 3, 1936
2,074,400	Kauffman	Mar. 23, 1937
2,147,754	Rivers	Feb. 21, 1939
2,172,203	Johnson et al.	Sept. 5, 1939
2,179,198	Reed	Nov. 7, 1939
2,351,984	Leonard	June 20, 1944
2,391,680	Cook	Dec. 25, 1945