June 2, 1925. 1,539,870

M. J. SANDIN

ELECTRIC CUT-OUT

Filed June 17, 1920

Fig. 1.

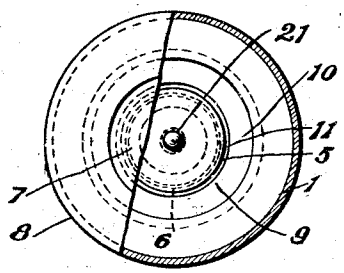


Fig. 3.

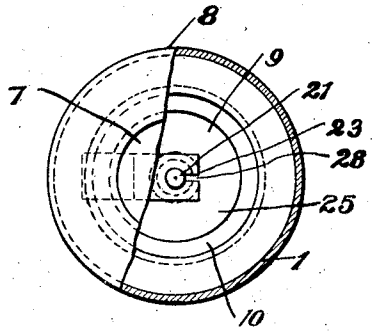


Fig. 5.

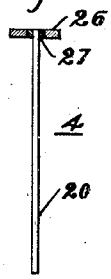


Fig. 2.

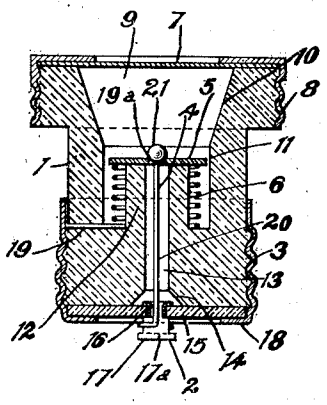


Fig. 4.

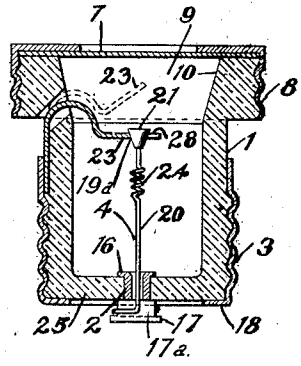


Fig. 6.

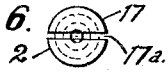
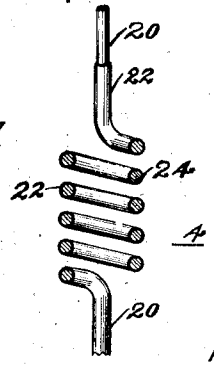


Fig. 7.



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Patented June 2, 1925. 1,539,870

UNITED STATES PATENT OFFICE.

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ELECTRIC CUT-OUT.

Application filed June 17, 1920. Serial No. 389,567.

To all whom it may concern:

Be it known that I, MAURITS JEROME SANDIN, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electric Cut-Outs, of which the following is a specification.

My invention relates to electrical protective devices and particularly to cut-outs having time-limit characteristics for interrupting circuits in response to predetermined overloads.

One object of my invention is to provide a device of the above indicated character that shall be simple and durable in construction and effective in operation.

Another object of my invention is to provide an economical, renewable, thermal-responsive element for an electric cut-out that shall embody fusible means for interrupting a circuit and heating means for the fusible means, thereby eliminating the necessity of having, as a permanent member of the device, a heating coil that is subject to damage.

In electric circuits where motors or other devices may be subjected to slight overloads for a certain length of time, it is desirable to provide a protective device having a time-limit characteristic. This may be accomplished by providing a thermal-responsive circuit-interrupting member that, on an overload of short duration, does not heat sufficiently to interrupt the circuit but which will interrupt the circuit when an overload continues for a considerable period of time.

In cut-out of relatively small capacity, a heating coil of relatively small cross-sectional area and, therefore, likely to damage, is usually employed.

In practicing my invention, I provide a container or casing having suitable terminals and a resiliently biased member, connected to one of the terminals, disposed therein. A renewable thermal-responsive element comprises a relatively short heating conductor of relatively high resistance provided, at one end, with a head or enlarged portion, secured in position by fusible means, that is separated from the conductor in response to a certain temperature. The renewable element is attached, at one end, to one of the casing terminals and is placed under tension by the co-operation of its headed end with the resiliently biased member.

In response to a predetermined temperature in the heating conductor, the head of the element is moved quickly away from the heating conductor to interrupt the circuit.

Figure 1 of the accompanying drawings is a plan view, partially in section and partially in elevation, of a cut-out embodying my invention.

Fig. 2 is a sectional side view of the device shown in Fig. 1.

Figs. 3 and 4 are views, similar to Figs. 1 and 2, of a modified form of my invention.

Fig. 5 is a detail view of a modified form of renewable thermal-responsive element embodied in my invention.

Fig. 6 is a bottom plan view of a terminal member shown in Fig. 4, and

Fig. 7 is an enlarged detail view, partially in elevation and partially in section, showing a manner of insulating any of the renewable elements shown.

A cut-out of the plug type embodying my invention may comprise, in general, an insulating container or casing 1, a bottom terminal member 2, a side screw-sleeve terminal member 3, a renewable termal-responsive element 4, a movable conducting member 5, a spring 6, a transparent window or disk 7 and a screw cap member 8. The casing 1, as shown in Figs. 1 and 2, is provided with a main chamber 9 having a frusto-conical upper portion 10 and a cylindrical lower portion 11 into which a sleeve portion 12 projects from the lower portion of the casing 1. An opening 13, of relatively small diameter, extends through the sleeve portion 12 to the lower end of the casing 1 where it is provided with an outwardly-flaring or countersunk portion 14.

The bottom terminal member 2, of substantially hollow-sleeve formation and fitted into an apertured disk or washer 15, is provided, at its inner end, with an annular flange 16 disposed in the opening 14 for holding it in position in the disk 15 and, at its outer end, with a headed portion 17 having a transverse slot 17^a. The disk 15 is held against the bottom of the casing 1 by a flange 18 on the terminal member 3.

The spring 6, connected at one end 19 to the sleeve terminal member 3, is wound

helically about the sleeve portion 12 and is in compression between the bottom of the chamber 9 and the movable conducting member 5. The member 5 constitutes substantially a washer having an opening 19ª disposed over the opening 13 on the sleeve portion 12.

The renewable thermal-responsive element 4 comprises a portion 20 of relatively thin conducting wire or other conductor, preferably of relatively high resistance, to which a bead or ball 21 of solder or suitable alloy is secured at one end. The wire 20 is embedded in the bead 21 and, therewith, constitutes a renewable element comprising the source of heat by which it is actuated.

The mass of the bead 21 is such as to absorb a considerable amount of the heat from the wire 20, thereby furthering the time-limit characteristic caused by the construction of the element and by the fact that the actuating heat is generated mainly in the wire.

The portion 20 of the element 4 is placed through the openings 19ª and 13 and the washer 5 is depressed to compress the spring 6, after which one end of the portion 20 is bent back into the slot 17ª of the terminal 2 and wrapped around the outer surface of the latter under the head 17. The bead 21, being larger in diameter than the opening 19ª, will hold the washer 5 in depressed position.

Upon the occurrence of an overload of sufficient duration to heat the element 4 and the bead 21 to a predetermined degree, the bead 21 will be separated from the conductor 20 to interrupt the circuit.

As shown in Fig. 7, any of the renewable elements 4 may be provided with an insulating coating 22 to prevent deterioration and to conserve the heat in the element.

In Figs. 3 and 4, the chamber 9 is of substantially cup-shape and, instead of the helical spring 6 and the washer 5, a composite member 23 serves to hold the bead 21 and to separate it from the element 4. The heating conductor 20 may be provided with a few helical turns 24 or be otherwise arranged to increase its heating capacity without altering the length or function of the element. The member 23 may be provided with a slot 28 extending from the opening 19ª to one edge thereof to receive the element and thus permit the coil 24 to be larger, if desired, than the opening 19ª. Also, in this form, the bottom terminal member 2 may be secured to a bottom wall 25 of the casing 1.

In Fig. 5, a washer 26 takes the place of the beads 21 in Figs. 1 to 4 and is secured to the end of the heating conductor 20 by a body of solder or alloy 27.

While I have shown and described particular forms of my invention, changes may be effected therein without departing from the spirit and scope thereof, as set forth in the appended claims.

I claim as my invention:

1. An electric cut-out device comprising a heating conductor, a body of fusible material adhering directly thereto, and conducting means biased against said body to complete a circuit and to interrupt the circuit in response to a predetermined temperature.

2. A thermal-responsive device comprising a terminal member, a relatively short heating conductor of relatively high resistance detachably connected to the terminal, a body of fusible material adhering thereto, and a separate conducting member movable with respect to the heating conductor and normally yieldingly held against movement by said body and adapted to be released to interrupt a circuit in response to a predetermined temperature.

3. A thermal-responsive device comprising a terminal member, a heating conductor, a body of fusible material adhering to one end thereof, and a conducting member movable with respect to the heating conductor and normally yieldingly held against movement by engagement with said body and adapted to be released to interrupt a circuit in response to a predetermined temperature.

4. In an electric cut-out device, the combination with a casing, contact terminals therefor, and a movable conducting member connected to one of said terminals, of a separate thermal-responsive element comprising a relatively short length of heating conductor detachably connected to the other of said terminal members, and fusible means adhering to the conductor for releasably engaging the movable member and for holding the said element in circuit relation to the terminals and for releasing the same to open the circuit in response to a predetermined temperature.

5. In an electric cut-out device, the combination with a casing and contact terminals therefor, of an apertured movable conducting member connected to one of said terminals, a thermal-responsive element comprising a heating conductor connected to the other of said terminal members, and a body of fusible material adhering to the heating conductor and disposed in said aperture for holding the movable member in circuit relation to the terminals and for releasing the movable member to open the circuit in response to a predetermined temperature.

6. A thermal-responsive device comprising a body of fusible material, a heating conductor having a portion embedded therein, a movable conducting member having an aperture by which it embraces the heating conductor and resilient means for biasing the movable member against said body.

7. In an electric cut-out device of the

plug-type, the combination with side and bottom contact terminals therefor, of a resiliently biased conducting member operatively connected to the side terminal, a renewable thermal-responsive element comprising a heating conductor connected to the bottom terminal, and a body of fusible material adhering to the heating conductor normally disposed to hold the conducting member in circuit relation to the terminals and to release the conducting member to open the circuit in response to predetermined circuit conditions.

8. In an electric cut-out, the combination with a casing and terminal members therefor, of a renewable thermal-responsive device comprising a heating conductor detachably secured at one end to a terminal and having an enlarged head of fusible material adhering thereto by means of which the conductor is releasably attached to the other terminal.

9. In an electric cut-out, the combination with a casing having relatively movable terminals therefor and a thermal-responsive link for connecting the terminals comprising a heating conductor detachably secured to one terminal and having a fusible portion adhering thereto for engaging the other terminal and for retaining it in operative relation with the conductor.

10. In an electric cut-out, a support, a pair of relatively movable terminals, one of which is movable with respect to the support, and a renewable thermal-responsive link for connecting the terminals comprising a heating conductor detachably secured at one end to the one conductor and having a straight portion provided with an adherent fusible portion for engaging the flexible terminal and holding it in flexed position and which is moved longitudinally of the conductor and separated therefrom when the temperature of the conductor has reached a predetermined degree.

11. In an electric cut-out, a casing having a relatively small perforation therethrough and having a chamber communicating therewith, a terminal secured to the casing and having an opening therein registered with the said perforation, a second terminal within the chamber movable toward and away from the first terminal and provided with an opening, and a thermal-responsive device comprising a heating conductor adapted to be inserted through the openings in the terminals and attached at one end to the first terminal and provided at the other end with an adherent fusible head for engaging the movable terminal and for retaining it in operative relation with the said conductor.

12. In an electric cut-out, a casing having a chamber therein and a relatively long and narrow perforation extending therethrough, a flexible terminal in the chamber, a terminal adjacent one end of the perforation and a heating conductor in the perforation in the casing having a fusible head for releasably attaching the conductor to the movable terminal.

In testimony whereof, I have hereunto subscribed my name this 14th day of June 1920.

MAURITS JEROME SANDIN.