Aug. 27, 1929. C. D. PLATT 1,726,503

THERMAL CUT-OUT

Filed Aug. 9, 1926

Fig. 1.

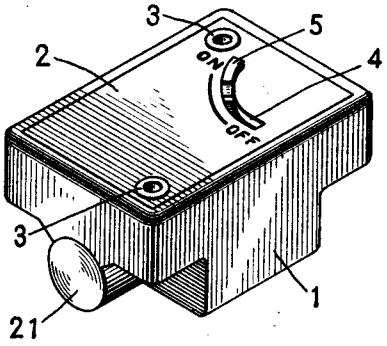


Fig. 2.

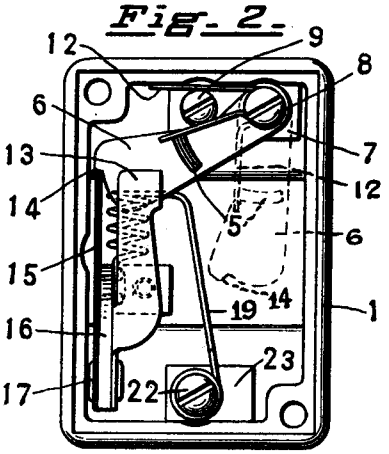


Fig. 3.

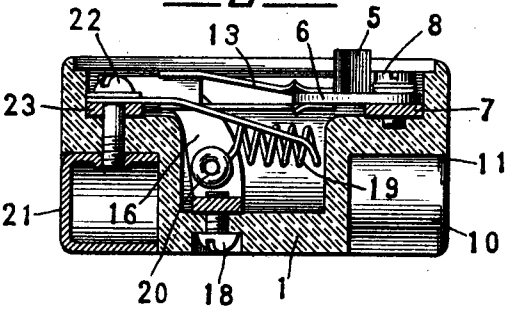


Fig. 4.

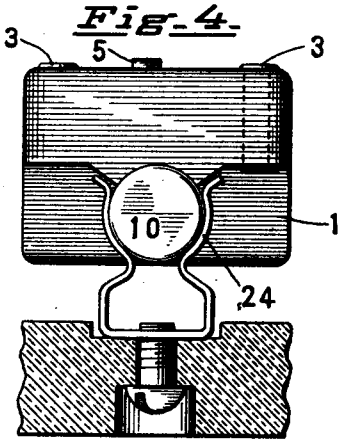
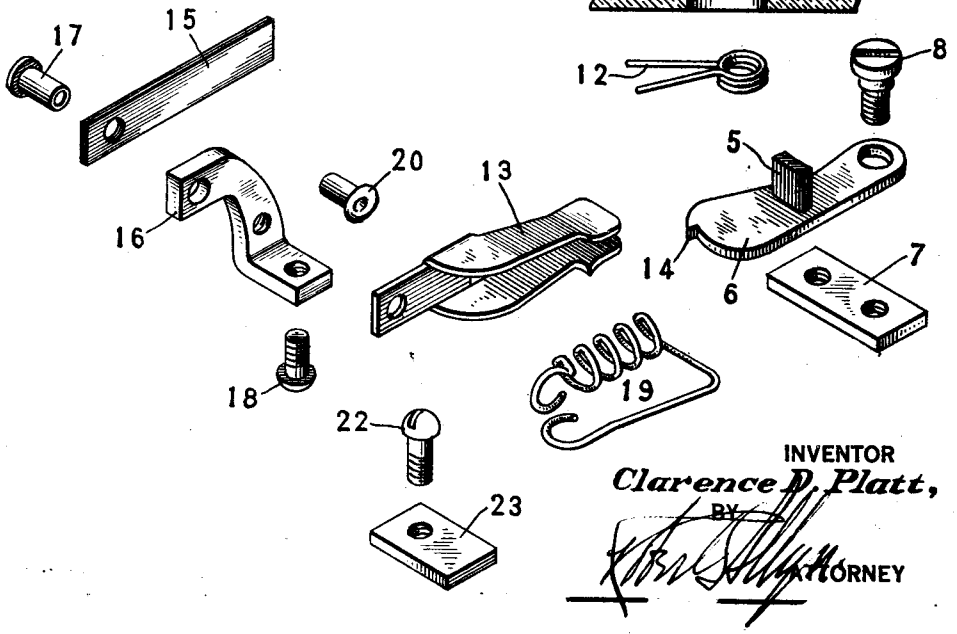


Fig. 5.



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UNITED STATES PATENT OFFICE.

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THERMAL CUT-OUT.

Application filed August 9, 1926. Serial No. 128,046.

One object of the invention is to provide a cut out which will automatically open the circuit at a predetermined percentage of overload in the circuit.

Another object is to provide an automatic cut out having terminals which conform to the dimensions and spacings of the ferrules of standard cartridge fuses, and which may be substituted for such fuses in practically any switch or panel board construction or in any other construction in which such fuses may be used.

Another object is to provide an automatic cut out which is so compact that it occupies no more space than is required for a standard cartridge fuse plus the necessary clearance spacing as required by the underwriters.

Another object is to provide an automatic cut out from which magnets, solenoids, relays, auxiliary contacts and circuits are entirely eliminated and the cut out may be placed in operable position by merely inserting its terminals (ferrules) into a pair of standard fuse clips.

Another object is to provide an automatic cut out which is self-contained and may be reset but which does not require any fuse or renewable element in order to reset it.

Another object is to provide an automatic cut out in which the metallic operating parts are entirely enclosed and which may be reset without the use of tools of any description and without necessitating the touching of any metal or current carrying parts.

Another object is to provide an automatic cut out which will open the circuit at a predetermined point of overload but which will have a time lag element operating to prevent the immediate latching of the switch contacts after the switch has operated on overload.

Another object is to provide an automatic cut out constructed of standard parts and in which the different points of calibration may be pre-determined by using different sizes of one of its elements. Another object is to provide an automatic cut out having a standard form of switch blade and contact which operate as a current carrying quick-break switch.

Another object is to provide an automatic cut out with a thermostatic latching means which is operable without affecting the current carrying capacity of the parts at any stage of operation.

Another object is to provide an automatic cut out of such simple, compact and understandable form that any one may substitute it for an old type fuse in any standard electrical construction and thus thereafter save the cost of a fuse each time the cut out operates.

Another object is to provide an automatic cut out in which the calibration or operating point is determined at the factory and the operating parts are then covered and sealed against tampering with or changing by the careless user; such construction also acts as a safety warning or danger signal and will prevent the unintentional overloading of the circuit.

Referring to the accompanying drawings:

Fig. 1 shows a perspective view of one form of the device assembled.

Fig. 2 is a front view with the cover removed.

Fig. 3 is a longitudinal vertical section.

Fig. 4 is an end view showing the device inserted in the standard cartridge fuse holder clips.

Fig. 5 shows an "exploded" view of the working parts of the device.

Similar reference numerals are applied to identical parts in all figures.

The body of the device 1 may be manufactured of porcelain, molded material or other suitable insulation and is provided with a thin insulating cover 2 which is secured to the body by the tubular rivets 3. This cover is provided with a curved opening 4 through which projects the insulating handle or finger piece 5 by which the device may be reset.

The switch blade 6 is supported upon the metallic block 7 by the screw 8 about which it may swing. This block 7 is secured to the body of the device by the screw 9 which in turn holds the terminal cap 10 firmly into its cradle or seat 11 beneath the body. The spring 12 whose helical portion surrounds the screw 8 by bearing against the insulating handle 5 and the wall of the container 1 tends to force the switch blade 6 in counter-clockwise direction causing it to break contact with the switch jaws 13. This is normally prevented when the device is set, by the ear 14 engaging the end of the strip 15. This strip 15 is preferably made of bi-metallic thermostatic metal and is secured along with the switch jaws 13 to the

angular bracket 16 by the tubular rivet 17.

The bracket 16 and attached members are secured to the body by a screw 18. One end of the heating coil 19 is anchored to the bracket by the rivet 20. The other end is connected to the terminal cap 21 by the screw 22 which passes through the plate 23 and the insulating body. The terminal caps 10 and 21 correspond in size and spacing with the usual ferrules of a cartridge type fuse so that they are interchangeable in any standard type fuse clip such as 24.

It will be seen that this heating coil 19 and the switch contacts are in series between the terminal caps 21 and 10. This heating coil is so proportioned that when more than a certain predetermined amount of current flows through it, it will warp the thermostatic strip 15 sufficiently as to cause its disengagement from the ear 14 thereby releasing the switch blade which is immediately actuated by the spring 12 to swing rapidly in a counter-clockwise direction and thus breaking or opening the circuit.

The insulating handle 5 will then be in the "off" position (see Fig. 1) but as soon as the heating coil 19 has cooled sufficiently to allow the thermostatic strip 15 to assume its normal position the device may be reset.

It will also be seen that without changing the dimensions of any of the parts of this device, with the exception of the heating coil 19, it can be made to operate at any predetermined value of current within a wide range.

It will also be seen that the current value at which the device operates may be changed by substituting for the strip 15 another strip of thermostatic material of differing warping modulus, or again by varying the depth of the face of the ear 14.

It will be noted that when the circuit is closed the current passes through this device from terminal cap to terminal cap, through relatively stationary parts and, although some of the current may in the form shown flow through the bi-metallic latch when the circuit is closed, the main circuit is not at all affected by the slow moving latch or by the snapping away movement of the switch blade from the latch, because the actual circuit breaking moment does not come until the switch blade is leaving the contact jaws, thus the circuit is broken entirely by the blade 6 snapping quickly away from the stationary contact 13 in contradistinction to the separation of slow moving thermostatic elements.

To cause the operation of the thermostatic latch by means of an adjacent heater coil provides for a valuable time lag feature in that, after the opening of the circuit, the coil remains in a heated condition long enough to prevent the relatching of the switch in closed position for an appreciable time, whereas, a bi-metallic thermostatic member cools and returns to its normal condition comparatively very quickly.

A feature of particular value in this construction is that the nature of the parts and the arrangement of the same is such that the device can actually be so reduced in size that it may be commercially produced and substituted, in use, for the common 30 amp. 250 v. enclosed fuses without any change in the fuse clips or their standard spacings.

The heater element, the thermostatic latch and the functions they perform are of such a nature that it is possible to commercially produce accurately calibrated cut-outs which may be depended upon to automatically operate at the predetermined point and which point may easily be varied from one to thirty amperes to conform to standard practice, or, of course the relays may be of either larger or smaller relative size or capacity.

I claim:—

1. An electric cut out comprising an insulating body having a recess in the front, a pivoted switch blade, a thermostatic latching means coacting directly therewith and a separate heater element for said means all mounted in said recess, an insulating cover for said recess and terminal caps at the rear of opposite ends of said body electrically connected respectively to the switch blade and to one terminal of the latching means, said terminal caps being adapted to be inserted in standard fuse clips positioned at standard spacings.

2. An electric-cut-out comprising an insulating body having a recess, a movable snap switch blade, a bi-metallic thermostatic latch having direct operable engagement with said switch blade, a separate heating element for said latch mounted in said recess and terminal caps at opposite ends of said body electrically connected respectively to the movable switch blade and to the heater element for said latch, said cut-out being adapted to be inserted in standard cartridge type fuse clips.

3. An electric cut-out comprising an insulating body having a recess in the front, a pivoted snap switch blade mounted in said recess, a terminal cap exterior to said body and connected to said switch blade, a stationary switch contact in said recess adapted to be engaged by said pivoted switch blade, a thermostatic element having a direct latching engagement with the switch blade, a heater element adjacent said thermostatic element in said recess and having one end electrically connected to the stationary switch contact and an exterior terminal cap connected to the other end of said heater element.

4. An electric cut-out comprising a body having a recess, a cover for said recess, a bracket mounted in said recess, a stationary

switch contact and a thermostatic latch secured to said bracket, a heater element adjacent to and with one end connected to said bracket, a movable switch member in said recess co-acting with the stationary switch contact and exterior circuit terminals secured to said body and electrically connected respectively to said movable switch member and to the other end of said heater element.

5. An electric cut-out comprising a body having a recess, a cover for said recess, an electric switch blade, a thermostatic latch strip and a heater coil mounted in said recess adjacent to said strip, the tip of said strip serving to directly engage the switch blade in the closed circuit position under normal conditions and said coil being arranged to heat and bend the thermostatic element to release the switch under predetermined conditions and circuit terminals on the outside of said body electrically connected respectively to the switch blade and the heater coil.

6. In an electric cut-out an insulating housing comprising a body and a cover, terminal caps secured to the back of said housing and adapted to engage in standard fuse clips set apart at standard spacing, a pivoted snap switch blade, a bi-metallic thermostatic latch strip having direct engagement with said switch blade, and a heater element for said latch strip mounted in said housing back of said thermostatic latch and connected to one of said exterior terminals, said heater element being positioned adjacent to but back of said latch strip.

7. An electric cut-out comprising a body having a recess, a pivoted snap switch blade, a pair of switch jaws, a thermostatic switch latch and a heating element for said latch, all mounted in said recess, said latch having direct engagement with said switch blade and being influenced by said heating element to release said blade prior to the opening of the circuit, and two terminal caps mounted on the back of said body, one being electrically connected to said heating element and the other being electrically connected to said switch blade.

8. An electric cut-out comprising an insulating body having a recess, a bracket mounted in said recess, stationary switch jaws and a bi-metallic thermostatic switch latch secured to said bracket, said latch having a movable end, a heater element connected to said bracket and positioned adjacent said latch, a pivoted switch blade in said recess to engage said switch jaws and coacting directly with the movable end of said latch, a spring tending to disengage said blade from said jaws and latch, and exterior circuit terminals secured to said body and electrically connected respectively to said movable switch blade and to said heater element.

9. An electric cut-out comprising a body having a recess, a pivoted switch blade, a stationary contact to be engaged thereby, a bi-metallic thermostatic latch and a separate heater element mounted in said recess behind said latch, said latch serving to directly engage the switch blade and hold it in the closed circuit position under normal conditions, a spring tending to disengage said switch blade and said heater element being arranged to heat the thermostatic latch, thus causing it to warp and release the switch blade at a predetermined circuit condition, and two terminal caps on the outside of said body electrically connected respectively to the switch blade and to the heater element.

10. A device to replace fuses of the standard 30 amp., 250 volt cartridge type and consisting of an insulating body with exterior conducting terminals secured thereto, the dimensions and relative positions of said terminals being substantially those of standard 30 amp., 250 volt fuses, a spring opened switch blade adapted to be latched in the closed circuit position, a thermostatic strip directly engaging said blade, a heating element positioned so as to heat said strip and cause it to warp and unlatch said switch blade at a predetermined circuit condition, said switch blade and said heating element being connected in series between said terminals.

11. An electric cut-out comprising a rectangular body having a recess in the front, a pivoted snap switch blade, a bi-metallic thermostatic latch having direct latching engagement with said switch blade and a separate heater element for said latch mounted in said recess and two terminal members mounted on the back of said body and electrically connected respectively to said heater element and to the pivoted switch blade.

12. An electric cut-out comprising an insulating body having a recess in the front and a cradle opening in the back at each end, a terminal cap secured in each cradle behind said body, a stationary snap switch contact and a thermostatic latch mounted in said recess, a heater element in said recess having one end connected to said contact and a screw connecting the other end of said heater element to one of said terminal caps, a pivoted snap switch member in said recess adapted to co-act with the stationary contact and with the said latch and a screw connecting said snap switch member to the other terminal cap.

13. An electric cut-out comprising an insulating block having a recess in the front and cradles in the back at opposite ends, a standard fuse cap secured in each cradle, stationary switch jaws, a heater element and a separate thermostatic latch mounted in said recess and connected to one of said caps, a pivoted snap switch blade mounted in said

recess and adapted to co-act with the stationary jaws and with said thermostatic latch and connected to the other fuse cap, said latch having direct operable engagement with said blade and being operable to release said blade prior to the opening of the circuit.

14. An electric cut-out including a spring pressed switch member, a stationary contact member and appurtenant terminals for said members, a bi-metallic thermostatic latch having direct operable engagement with the spring pressed switch member and a heating element for the latch, the latch affecting portion of said heating element being positioned along side of one edge of said latch but free of direct contact with said latch.

15. An electric cut-out including a spring pressed switch member, a stationary contact member and appurtenant terminals for said members, a bi-metallic thermostatic latch for the spring pressed switch member and a heating element for the latch, the latch affecting portion of said heating element being positioned adjacent to said latch but entirely out of the path of movement of said latch, whereby the normal operating movement of said latch is effected mainly by the heat radiated from said heating element.

16. An electric cut-out including a spring pressed switch member, a stationary contact member for the spring pressed member and appurtenant terminals for said members, a bi-metallic thermostatic latch having a movable end directly engaging the spring pressed member and a heating element for the latch, the latch affecting portion of said heating element being mounted adjacent to said latch but mechanically free from said latch, whereby the normal bending movement of said latch is not limited mechanically by the proximity of the said heating element.

17. An electric cut-out including a switch having a spring pressed contact, a co-operating stationary contact and appurtenant terminals, a bi-metallic latch having direct abutting engagement with the spring pressed contact and a heater element in series with the latch, said spring pressed contact and said stationary contact co-operating to maintain a closed circuit for an appreciable time after said latch has been released by said heater element.

18. In a switch a rectangular body having a recess open at the front, a switch member pivoted in one end of the recess, a switch contact and a bi-metallic thermostatic latch secured in the opposite end, a heater element mounted entirely behind the thermostatic member and positioned away from the operating path of said latch, a cover for the recess, securing means for said cover, and terminal caps on the back of the body at opposite ends and connected respectively to said switch member and to said heater element.

19. An electric cut-out comprising an insulating housing having external terminals at the back and on opposite ends, a pivoted spring pressed switch blade mounted in said housing and electrically connected with one terminal, a stationary bracket detachably mounted in said housing, a contact and a thermostatic latch carried by said bracket and removable therewith and a heater element having one end secured to said bracket and the other end secured electrically to the other terminal.

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