Sept. 29, 1936. R. H. BENTLEY 2,056,119

WIRE TERMINAL AND HEATER MOUNTING FOR OVERLOAD ELECTRIC SWITCHES

Filed Sept. 5, 1935

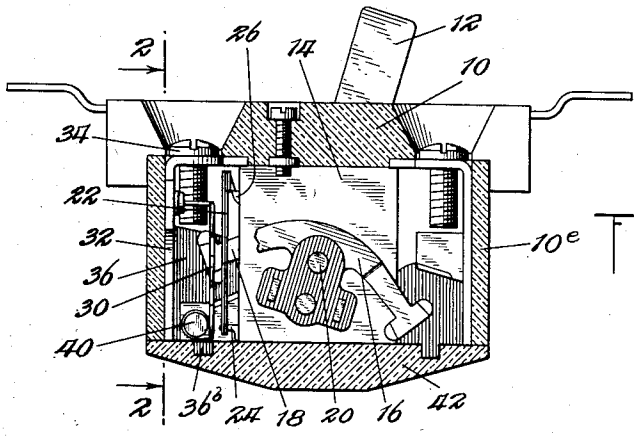


Fig. 1.

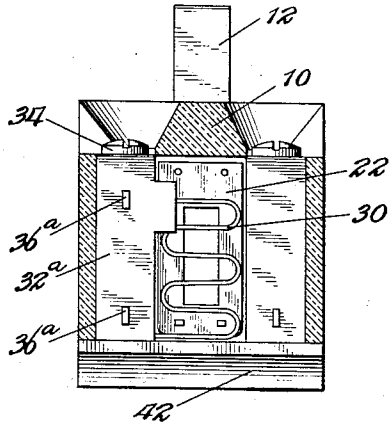


Fig. 2.

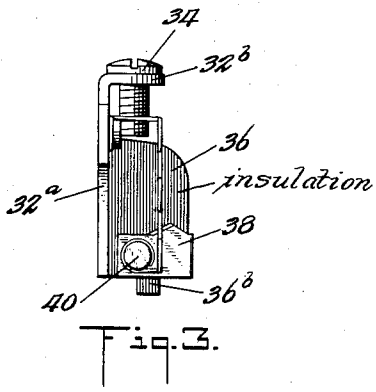


Fig. 3.

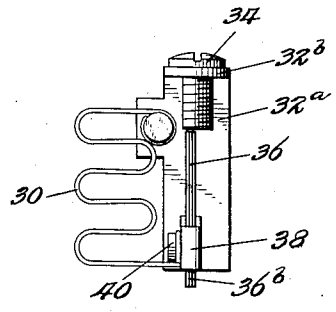


Fig. 4.

INVENTOR
ROBERT H. BENTLEY
BY HIS ATTORNEYS

Howson and Howson

Patented Sept. 29, 1936

2,056,119

UNITED STATES PATENT OFFICE

2,056,119

WIRE TERMINAL AND HEATER MOUNTING FOR OVERLOAD ELECTRIC SWITCHES

Robert H. Bentley, Hartford, Conn., assignor to The Arrow-Hart & Hegeman Electric Company, Hartford, Conn., a corporation of Connecticut

Application September 5, 1935, Serial No. 39,335

5 Claims. (Cl. 200—122)

This invention relates to electric switches. More particularly it relates to wire terminals and heater mountings for electric switches of the type in which the switch contacts are released automatically upon the occurrence of overload by the flexing of a bimetallic strip or other device responsive to the thermal effects of a current.

In overload switches which are adapted to be operated upon the occurrence of a predetermined overload current by the flexing of a bimetallic or like thermal responsive element it is often necessary to supply heating devices such as coiled resistance wires which have various capacities in order that the overload mechanism will be caused to operate at different overload current values. In many cases the overload means comprises primarily a bimetallic strip which is heated by the heat emanating from a coiled resistance wire which becomes hot when a current over a predetermined value passes through it. In this type of overload mechanism, in which the current does not pass through the bimetallic strip, it is desirable that the heater be adapted to be slipped into position, and removed and replaced by other heaters when necessary, with the utmost economy of time and labor.

It is an object of my invention to provide a combined wire terminal, contact and heater for an overload switch of the above type which may be inserted into assembled position and removed therefrom while the remaining parts of the switch are all in assembled position and without disturbing the positions of the other parts of the switch mechanism.

Another object of my invention is to provide a combined wire terminal and heater mounting which may be inserted and removed from the switch casing with facility while the other parts of the switch mechanism are in position.

Another object of my invention is to provide a variety of similar wire terminals, contacts and heater devices, any one of which may be inserted in a switch of the above type whereby the overload rating of the switch may be varied to suit the requirements of need in particular cases, without changing the construction of the switch.

Another object of my invention is to provide a combined wire terminal contact and heater mounting which is economical to construct and easy to assemble in the switch whereby the expense of the construction of an overload switch is reduced to an economical minimum.

Other objects and advantages of my invention will become apparent as it is described in connection with the accompanying drawing.

In the drawing:—

Figure 1 is a longitudinal section view in elevation of a switch embodying the principles of my invention.

Figure 2 is a transverse section view of a section taken along line 2—2 of Figure 1 of my invention.

Figure 3 is a detailed side elevation view of my new combined wire terminal, contact and heater mounting for electric overload switches.

Figure 4 is a detailed end elevation view of the combined wire terminal, contact and heater mounting shown in Figure 3.

Referring to the drawing, the switch mechanism is mounted in a hollow insulating base 10 which may be of porcelain or any other suitable insulating material. The base may have an opening or slot in its top face for the accommodation of a reciprocating operating lever 12 of insulating material by which switches of the type to which this invention relates are customarily operated. The details of the switch mechanism need not be described herein since the invention is applicable to various types of overload operated switches and is not limited to the use with switch mechanism of any particular design. The switch mechanism may be mounted in a stamped U-shaped sheet metal frame 14 which is secured to the inner surface of the top wall of the insulating base 10 by screws. A pair of movable contacts 16 and 18 are provided on opposite sides of the frame 14 and are mounted for pivotal movement about an axis 20 as the operating lever 12 is moved from right to left and vice versa.

To cause the switch to operate upon overload, there may be provided a bimetallic strip 22 which is mounted adjacent the left edge of the frame as shown in Figure 1 by having its bottom edge secured to a member 24 assembled upon the bottom part of the switch frame 14. The bimetallic strip may flex to the left (see Figure 1) about its mounting at the bottom, when heated, to disengage a finger 26 of the overload mechanism and permit the contacts 16 and 18 to move from closed to open position under the action of the overload mechanism. The construction as thus far described is conventional and may be of any convenient design or manufacture.

It will be noted that the bimetallic strip 22 lies in a plane transverse to the length of the switch base 10. In order that heat may be transferred to the bimetallic strip upon the occurrence of an overload there is provided a heater in the form of a resistance wire 30 which is coiled several times around back upon itself as

seen best in Figures 2 and 4. One end of this coil is riveted to the upper portion of a wire terminal member 32 which may conveniently be stamped from a strip of sheet brass or other good conductive material into inverted L-shape. The longer portion or leg 32*a* of this wire terminal may lie against the inner surface of the end wall 10*e* of the switch casing 10 while the shorter portion or arm 32*b* will lie beneath the top wall of the switch casing 10, this top wall being apertured above the arm 32*b* for the accommodation of a binding screw 34 which is threaded into a threaded aperture provided in the arm 32*b* so that a feed wire may be secured to the wire terminal.

Preferably the upper end of the heater element 30 is bent outwardly away from the wire terminal so as to cause the main portion of the heater element to be spaced away from the terminal. There is secured to the center of the lower part of leg 32*a* of the wire terminal a piece of sheet insulation 36 which lies in a plane perpendicular to the plane of the leg portion 32*a* and is secured thereto by lugs 36*a* formed on the sheet insulation and passing through apertures in the leg portion 32*a* and having their ends peened over or deformed to hold the piece of sheet insulation in position upon the wire terminal. Secured to the bottom corner of the insulating sheet 36 is a fixed contact 38 of the switch. This contact may be formed by stamping a strip of sheet metal into U-shape with the two parallel portions of the U spaced apart a distance equal to the thickness of the insulating sheet so that the sheet will just fit between said parallel portions. The contact may be secured upon the insulating sheet by a rivet 40 passing through the parallel portions thereof and through the insulating sheet. This rivet may also serve to secure the lower end of the resistance wire or heater to the contact 38 thereby completing the electric connection from the wire terminal 32 through the heater element 30 to the stationary contact 38.

It will be apparent that wire terminals with contacts connected thereto, of somewhat similar construction to that just described but without the heater mounted thereon, may be provided at the opposite end and on the other side of the switch for engagement with the conventional bridging contacts 16 and 18 in a conventional fashion to complete the circuit through the switch.

The movable contacts in engaging and disengaging with the fixed contacts will wipe over the surfaces of the insulating plates, for example 36. Thus any arc which may be drawn on contact separation will, upon coming in contact with the cool surfaces of the plates such as 36, be cooled and quenched quickly and effectively, whereby the current rupturing capabilities of the switch are increased.

After all the switch parts have been placed in position except the combined wire terminal, contact and heater device, this device may be slipped in position through the open rear of the switch base 10 and then a back plate 42 of insulating material may be placed over the rear face of the switch to enclose the switch mechanism. Preferably this back plate is provided with a recess for a lug 36*b* extending from the bottom edge of the insulating plate, by means of which the bottom of the wire terminal device is held in position. In order to hold the top portion of the wire terminal in position, a recess having shape substantially like that of the arm 32*b* may conveniently be provided in the top wall of the switch casing 10 including the aperture of the terminal screw 34. Thus the engagement of the base 10 and the back plate 42 with the top and bottom of the wire terminal hold it against vertical and backward and forward movement in and out of the casing 10 and the leg 36*a* and the engagement of the arm 32*b* in the recess and the top wall of the casing 10 hold the wire terminal against lateral and longitudinal movement within the casing 10.

It will be apparent that the construction of my combined wire terminal and heater mounting is extremely simple and that the terminal and mounting may be slipped into position in the switch very easily while all the switch parts are in place. Thus by providing terminals with heaters of various capacities, the capacity of the switch may be determined after all of the other switch parts have been placed in position and the switch is ready for final assembly.

Many modifications within the scope of my invention will occur to those skilled in the art, therefore I do not limit my invention to the exact form of the invention as illustrated and described.

I claim:—

1. In an electric switch operable by the thermal effect of an overload current, a device comprising a wire terminal member having a screw thereon for attaching a lead wire thereto, an insulating member attached to said terminal member, a switch contact mounted on said insulating member and insulated from said terminal member, and a resistance wire forming a heater connected at one end to said terminal member and at the other end to said contact, said device being removable as a unit from said switch.

2. In an electric switch operable by the thermal effect of an overload current, a device comprising wire terminal means, insulating means mounted on said terminal means, a switch contact mounted on said insulating means and insulated from said terminal means, conducting means adapted to be heated by the passage therethrough of an electric current, said conducting means being connected to said terminal means, and to said contact, said device being removable as a unit from said switch.

3. In an electric switch operable by the thermal effect of an overload current, fixed and movable contacts, a device comprising wire terminal means, insulating means mounted on said terminal means and lying approximately in the plane of movement of said movable contact, a fixed contact mounted on said insulating means and insulated from said terminal means, and conducting means adapted to be heated by the passage of an overload current therethrough and connected to said fixed contact and said terminal means, said device being removable as a unit from said switch.

4. In an electric switch operable by the thermal effect of an overload current, fixed and movable contacts, a device comprising wire terminal means, insulating means upon which a fixed contact is mounted and which in turn is mounted upon said terminal means, said insulating means lying approximately in the plane of movement of said movable contact and serving to quench an arc upon separation of said fixed and movable contacts and to insulate said fixed contact and said terminal means, and means adapted to be heated by the passage of an electric cur-

rent therethrough and connected to said terminal means and to said fixed contact, said device being removable from said switch as a unit.

5. In an electric switch operable by the thermal effect of an overload current, a hollow insulating casing, a movable contact, switch mechanism therein, in combination with a device comprising a wire terminal member having a portion lying adjacent one end of the casing, an insulating member mounted on said terminal member and extending toward the other end of said casing, a switch contact mounted on said insulating member and out of contact with said terminal member, a conducting member adapted to be heated by the passage therethrough of an overload current and connecting said terminal member and said contact, said device being removable from said casing as a unit.

ROBERT H. BENTLEY.