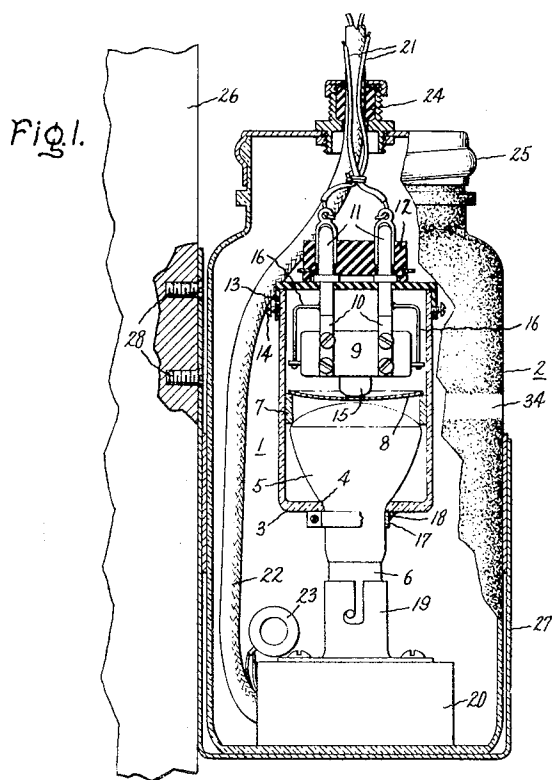
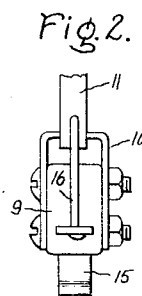
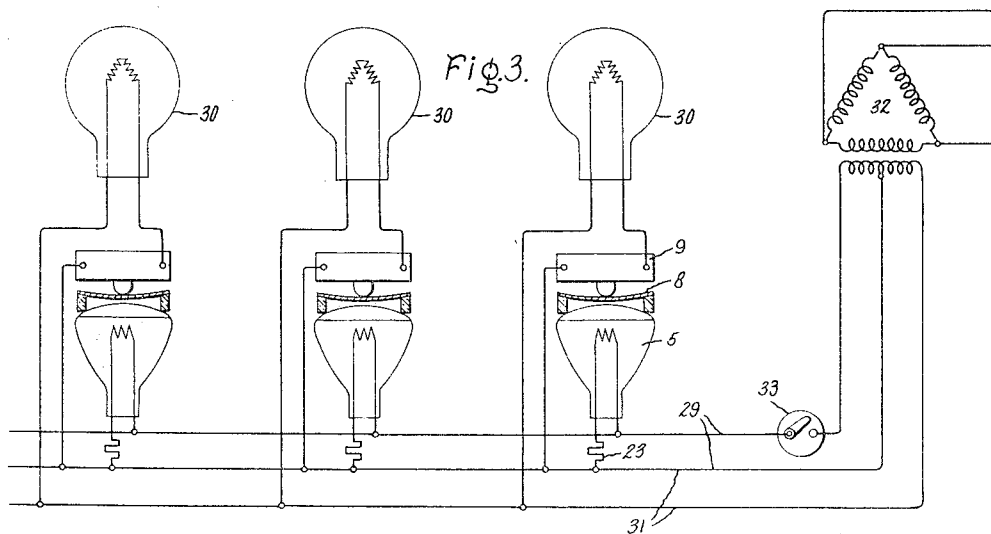


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THERMOSTATIC RELAY
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THERMOSTATIC RELAY

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3 Claims. (Cl. 200-122)

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This invention relates to electrical relays and more particularly to an improved thermostatic relay for control of multiple street lighting circuits.

Conventional relays presently available for control of multiple street lighting units are of the armature type and have a manufacturing cost approximately equal to the cost of the multiple street lighting units which they control. This cost is deemed by operators of multiple street lighting circuits to be excessive and efforts have been made by manufacturers and others to produce a simple, light weight, reliable relay for this service. However, in spite of extensive research and development in this field, manufacturers, to date, have not been able appreciably to produce such a relay.

For the control of series street lighting circuits, I have provided thermosdisc relays, as disclosed in my U. S. Letters Patents 1,982,368, granted November 27, 1934 and 2,125,765, granted August 2, 1938 and assigned to the same assignee as this application. In the relay disclosed in my above patents, a thermosdisc is supported on wire supports and operates an electrical switch connected in series with a street light to be controlled by the relay. The thermosdisc is operated by heat supplied from a lamp filament positioned below the thermosdisc. The switch, thermosdisc and filament are housed in one glass envelope with terminal means for the filament and switch at one end thereof.

In relays of this type, the lamp filament must be sufficiently rugged to withstand the vibrations produced by the operation of the thermosdisc and switch. This is no obstacle in a series street lighting circuit because the current is relatively large and the voltage drop across the lamp heater filament is quite small so that a rugged filament may, therefore, be used. However, this limitation is an obstacle in a multiple street lighting circuit because in such a circuit the available voltage is approximately 120 volts and, therefore, a more delicate lamp heater filament must be used to produce sufficient heat energy to operate the thermosdisc. Therefore, although each of the relays disclosed in the mentioned patents operate satisfactorily in a series street lighting circuit, other characteristics are required for relays to be used in a multiple street lighting circuit.

It is an object of this invention to provide an improved relay of the thermostatic type which is suitable for application to multiple street lighting circuits.

It is a further object to provide a light weight,

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simple relay that will reduce the cost of multiple street lighting service to a small fraction of its present cost.

Another object is to provide a relay which may be accommodated in a light weight, simple housing.

A further object is to provide, in such a relay, means visually indicating whether trouble is in the illuminating lights of the street lighting circuit or in the relay itself and thereby to reduce the cost of servicing.

In its broad aspect, my improved relay construction consists of an incandescent lamp, a spacing collar, a thermosdisc, and an electric switch mounted in spaced relation in a transparent case with connector means for the switch and lamp, and a partially transparent housing protecting the relay and providing means for indicating a fault condition.

For a complete understanding of my invention, reference should be had to the following specification and the accompanying drawing, wherein Fig. 1 is an elevational view partly in cross section of a relay and housing in accordance with my invention; Fig. 2 is an end view in elevation of a switch used in my invention; Fig. 3 is a diagrammatic view of a street lighting circuit showing the application of my invention thereto.

Referring to the drawing, my invention in general consists of a relay 1 mounted in a housing 2, as shown in Fig. 1. Relay 1 comprises a thermosdisc 8 arranged to operate an electrical switch 9 when heated by an incandescent lamp 5.

Lamp 5 is secured in a bayonet type socket 19, as shown in Fig. 1 and is electrically connected to a pilot circuit 29 through a resistor 23, as shown in Fig. 3. Switch 9 is connected in series with a street lamp 30 which is to be controlled by relay 1, and the two are connected to a multiple street lighting circuit 31, as shown in Fig. 3.

For a complete understanding of the structure of relay 1 and housing 2, attention is directed to Fig. 1. As shown in Fig. 1, I provide a cylindrical casing 3 made of any suitable transparent, non-conducting material and having one open and one closed end. The closed end of casing 3 is apertured as at 4. Within casing 3, I provide a glass enclosed heat producing incandescent lamp 5 of the reflector type whose terminal end 6 projects through aperture 4. Resting horizontally on the top of lamp 5, I provide a circular, non-conducting spacing collar 7 whose outer diameter is approximately equal to the inside diameter of casing 3. Thus, the inside surface of casing 3 serves as a guide to prevent tilting of spacing

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collar 7. A thermodisc 8 having a diameter slightly less than the inside diameter of casing 3 is placed on top of spacing collar 7. To prevent breakage of the top of lamp 5 during operation of thermodisc 8, spacing collar 7 is provided with sufficient depth to allow a clearance between the top of lamp 5 and the center position of thermodisc 8. Above thermodisc 8, I provide a switch 9 rigidly suspended in any suitable manner as by rigid support members 10 secured to both sides of switch 9 by nuts and bolts or other suitable means and to two through connectors 11, as shown in Figs. 1 and 2. Through connectors 11 are secured in any suitable manner in an insulating support member 12 having a flanged portion 13 overlapping the open end of casing 3. Support member 12 seals the open end of casing 3 and is secured thereto by set screws 14 in the flanged portion 13 of support member 12, as shown in Fig. 1, or by any other suitable means.

On switch 9, I provide a spring biased actuating member 15 engaging the central portion of thermodisc 8 and arranged to operate switch 9. Switch 9 is electrically connected to through connectors 11 through two conductors 16. Since the movement of the central portion of thermodisc 8, upon heating and cooling in response to heating lamp 5, is small, it is necessary for proper operation of switch 9 to bias the center of thermodisc 8 against actuating member 15 of switch 9. To do so, the position of lamp 5 is vertically adjusted by means of a resilient securing collar 17, one portion of which is secured to the bottom of case 3 by cement or other suitable means, as at 18.

In order to support relay 1 in housing 2, the terminal end 6 of lamp 5 is secured in a bayonet type socket 19 or other suitable connector and is thereby mounted on and secured to a mounting block 20. Mounting block 20 is made of any suitable non-conducting material. A pair of lead conductors 21 are electrically connected one to each of through terminals 11, and a second pair of lead conductors 22 are connected one to a resistor 23 and the other to one terminal of socket 19. The other terminal of socket 19 is connected to resistor 23.

Relay 1, as above described, is placed in housing 2, as shown in Fig. 1, and the pairs of lead conductors 21 and 22 are brought through a watertight snubbing gland 24 or other suitable sealing means centrally located in an apertured screw cover 25, which cover and snubbing gland close the open end of housing 2.

Housing 2, with relay 1 enclosed, may then be mounted on a pole 26 or other suitable structure by means of a mounting bracket 27 and screws 28 or other suitable means.

Housing 2, in addition to serving as a support and protection for relay 1, is provided with a transparent section 34 in order that the glow from lamp 5 may be seen without mounting the pole 26 and removing the cover 25 of housing 2. This enables a service crew to distinguish between a fault in the relay itself and a street light fault.

To show the operation of relay 1 in a multiple street lighting circuit, Fig. 3 is provided. As shown in Fig. 3, lamp 5 is electrically connected to a pilot circuit 29. Switch 9 is connected in series with a street lamp 30, which is to be controlled by relay 1, and the two are electrically connected to the multiple street lighting circuit 31. Pilot circuit 29 and the multiple street lighting circuit 31 are supplied with power from a

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distribution transformer 32. To control the power supply to lamps 5, I provide an astronomical switch or photo-electric device 33 in series in one line of the pilot circuit 29.

Switch 33, as thus connected in pilot circuit 29, may be operated to supply power to lamps 5, which in turn supply the heat necessary to operate thermodisc 8. Upon heat being supplied thereto, the center portion of thermodisc 8 snaps upward, thus depressing actuating member 15 and closing the contacts of switch 9. When switch 9 is closed, the circuit is complete from street lamp 30 to the multiple street lighting circuit 31 and the street lamp 30 is thereby energized. When switch 33 is opened, thus disengaging the pilot circuit from lamp 5, the reverse action takes place.

Switch 9 may also be supplied with normally closed contacts, in which case operation of switch 33 deenergizes the street lamps 30 and opening of switch 33 re-energizes the same.

To increase the life of lamp 5 and thus reduce the frequency of servicing relay 1, the voltage across the lamp may be reduced by placing a resistor 23 in series with lamp 5. This saving in service calls must be balanced against the resultant slower operation of relay 1 and is, therefore, a question of economics and operation to be determined for each particular installation.

From a consideration of the above, it will be seen that by providing a lamp 5 having its own enclosure and by mounting thermodisc 8 and switch 9 outside the enclosure of lamp 5 and in spaced relation thereto by means of spacing collar 7, the fact that a delicate filament must be used in lamp 5 when applied to a multiple street lighting circuit no longer remains an obstacle because the filament of lamp 5 is protected, by the glass enclosure of lamp 5, from the vibration of thermodisc 8 and switch 9. Therefore, I have provided a relay especially adapted to and suitable for operation in a multiple street lighting circuit, as distinguished from the thermostatic relays of the mentioned patents, 1,982,368 and 2,125,765.

A further advantage of relay 1 consists in the use of the non-conducting collar 7 as a means for support of the thermodisc 8. This construction is less costly than the usual wire supports for such relays and provides a stronger support. Also, the thermodisc can be mounted in a more nearly level position with respect to the vertical axis of actuating member 15 and, therefore, a more closely calibrated support is provided to take care of the small travel distance of the center of thermodisc 8.

Furthermore, the connections to switch 9 and the terminal means 6 of lamp 5 are separate and protrude from opposite ends of case 3. This provides the advantage of being able to replace lamp 5 or switch 9 separately as one or the other fails.

Another advantage of the relay herein provided is that it is light in weight, weighing only a few ounces, simple, and readily adapted to manufacture at a fraction of the cost of conventional armature type relays presently used for multiple street lighting service.

Furthermore, since relay 1 is relatively light as compared to conventional armature type relays, and since it has no coils, armatures, guide rods, etc. requiring a rigid mounting means, the housing required for this relay is simple, light, and relatively inexpensive, as compared to the housing required for the armature type relay.

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Also, since the glow of lamp 5 can be seen from ground level through the partially translucent housing 2, means indicating whether the trouble is in the relay itself or in a faulty street lamp is provided and, therefore, servicing is facilitated.

Furthermore, since relay 1 weighs only a few ounces, housing 2 may, if desired, be mounted at any angle or in a position 180° removed from the position shown in Fig. 1. If mounted in the latter position, the closed end of housing 2 would prevent the entrance of water and a less expensive sealing means than snubbing gland 24 shown may be used.

While I have illustrated and described but one embodiment of my invention, it will be apparent that additions to and omissions from the structural features illustrated may be made and that changes in the shape, position and relationship of some of the parts may be made without departing from the spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A thermostatic relay for a multiple street lighting system comprising a transparent case having one open and one closed end, said closed end of said case having an aperture centrally located therein, an incandescent lamp, a spacing collar, a thermodisc, and an electric switch mounted within said transparent case, said incandescent lamp having its terminal end protruding through said aperture in said case, an actuating member on said switch engaging said thermodisc and arranged to be operated thereby, means rigidly supporting said switch, and means rigidly supporting said incandescent lamp in spaced relation to said switch and said thermodisc, whereby said thermodisc operates in response to heat from said lamp to depress said actuating member and thereby operate said switch.

2. A thermostatic relay for a multiple street lighting system comprising a transparent case

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having one open and one closed end, said closed end of said case having an aperture centrally located therein, an incandescent lamp, a spacing collar, a thermodisc, and an electric switch mounted within said transparent case, said incandescent lamp having its terminal end protruding through said aperture in said case, an actuating member on said switch engaging said thermodisc and arranged to be operated thereby, means rigidly supporting said switch, means rigidly supporting said incandescent lamp in spaced relation to said switch and said thermodisc, whereby said thermodisc operates in response to heat from said lamp to depress said actuating member and thereby operate said switch, a hollow partially transparent housing enclosing said relay, said housing having one open end, an apertured cover secured to said open end of said housing, and a watertight bushing positioned in said aperture of said cover.

3. In a thermostatic relay, the combination of an electric switch, an actuating member on said switch, a thermodisc engaging said actuating member and arranged to operate said switch, a spacing collar arranged to support said thermodisc, an incandescent lamp arranged to support said spacing collar with said thermodisc in spaced relation with said lamps and to supply heat to said thermodisc, means mounting said lamp, spacing collar, thermodisc, and switch, whereby said thermodisc operates in response to heat from said lamp to depress said actuating member and thereby operate said switch, a partially transparent housing enclosing said relay, said housing having one open end, a cover secured to said open end of said housing, said cover having an aperture centrally located therein, a watertight bushing secured in said aperture of said cover, and means for mounting said relay within said housing.

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No references cited.