

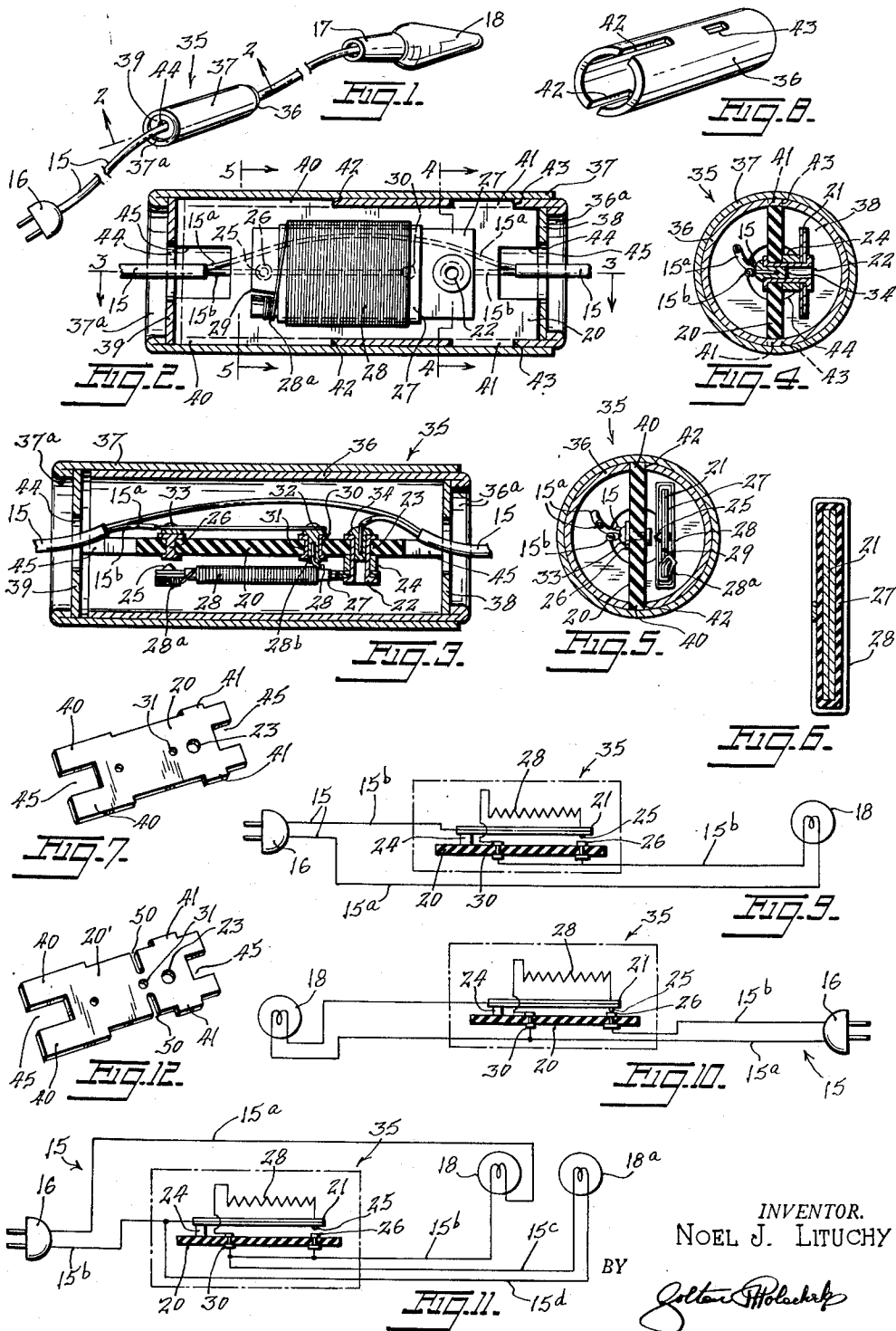
Jan. 26, 1954

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2,667,550

ELECTRIC LIGHT FLASHER

Filed June 4, 1951



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2,667,550

ELECTRIC LIGHT FLASHER

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Application June 4, 1951, Serial No. 229,800

13 Claims. (Cl. 200-122)

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This invention relates to new and useful improvements in lighting circuits and, more particularly, to an improved flasher for mounting directly in an electric line to control the intermittent flashing of one or more electric lamps.

More specifically, the present invention especially proposes a simple flasher unit to be mounted in the lines of a Christmas tree lighting circuit to be an integral part thereof in a manner to function to cause the periodic blinking of the lamps the moment the circuit is completed by being connected to a source of electric current.

Still further, the present invention proposes characterizing the flasher unit by a single elongated base strip of dielectric material upon which the flasher parts are mounted in a manner so that the base strip can be enclosed within a casing composed of a pair of interfitted tubes slipped into position over said base strip from opposite ends thereof.

Another object of the present invention proposes closing the outer ends of the interfitted tubes by discs engaged against intumed end portions of the tubes and which discs are formed with centrally located apertures for the passage of the electric wires which are to be connected to the flasher parts mounted on the base strip.

A further object of the present invention proposes the provision of means for retaining the base strip fixedly in position within the inner tube in a manner so as to retain the base strip against possible longitudinal movement relative to the tubes.

The present invention further proposes providing the longitudinal side edges of the base strip with laterally extended lugs which engage complementary slots formed in the inner tube in a manner to fixedly retain the base strip in position within the tubes.

Still another object of the present invention proposes forming the inner tube to have an external diameter to be frictionally received within the outer tube in a manner so that the tubes will frictionally retain their engaged positions to be free to be pulled apart when required for inspection and repair of the flasher parts contained within the casing.

Another object of the present invention proposes various circuit arrangements embodying the flasher unit of the present invention.

It is a further object of the present invention to construct a flasher unit which is simple and durable, which is effective for its intended purposes and which can be manufactured and sold at a reasonable cost.

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For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a perspective view of a lighting string incorporating a flasher unit constructed in accordance with the present invention.

Fig. 2 is an enlarged longitudinal sectional view of the flasher unit, per se, taken substantially on the line 2-2 of Fig. 1.

Fig. 3 is a longitudinal sectional view taken on the line 3-3 of Fig. 2.

Fig. 4 is a transverse sectional view taken substantially on the line 4-4 of Fig. 2.

Fig. 5 is a transverse sectional view taken on the line 5-5 of Fig. 2.

Fig. 6 is an enlarged transverse cross-sectional view of the contact strip and heater, per se.

Fig. 7 is a perspective view of the base strip, per se.

Fig. 8 is a perspective view of the inner tube, per se.

Fig. 9 is a schematic wiring diagram of the lighting string shown in Fig. 1 in which the flasher operates as an open circuit flasher.

Fig. 10 is a schematic wiring diagram in which the flasher is wired to operate as a closed circuit flasher.

Fig. 11 is a schematic wiring diagram in which the flasher is wired to alternately illuminate two lamps.

Fig. 12 is a view similar to Fig. 7, but illustrating a slight modification of the base strip.

The improved flasher unit, according to the first form of the present invention shown in Figs. 1 to 9, is to be mounted in position on an electric wire 15 provided at one end with a conventional plug 16 for insertion into a conventional electric outlet receptacle for supplying the required electric current. The wire 15 is extended through the flasher unit and has a socket 17 mounted on its other end into which a conventional lamp 18 is screwed. The flasher unit functions to cause the lamp 18 to be intermittently blinked.

The flasher unit includes a base strip 20 of a suitable dielectric material. The base strip 20 can be made of fiber, hard rubber, Bakelite or one of the synthetic resinous materials. Extended along one side of the base strip 20, there is a contact strip 21 of bi-metallic construction to have a high expansion side and a low expansion

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side. The contact strip 21 is secured to the side of the base strip 20 in a position spaced therefrom by means of an eyelet 22. The eyelet 22 is passed through a complementary hole 23, see Figs. 3, 4 and 7, formed in the base strip 20 adjacent one end thereof and is milled over on the side of the base strip removed from the contact strip 21. To maintain the contact strip 21 spaced from the base strip 20, a spacer washer 24 sleeves the eyelet 22 between the adjacent faces of the base strip 20 and the contact strip 21. That mounting of the contact strip 21 leaves its other end free to move toward and away from the adjacent side of the base strip 20 as the contact strip becomes alternately heated and cools off.

The contact strip 21 carries at its free end a contact 25. Mounted through the base strip 21 in alignment with the contact 25, there is a contact rivet 26. In the circuit arrangement of Figs. 1 to 9, the contact strip is positioned with its high expansion side facing away from the base strip 20 and with the contact 25 spaced from the contact rivet 26. Thus, when the contact strip 21 is heated, the free end of the contact strip will move toward the base strip 20 engaging the contact 25 with the contact rivet 26.

The contact strip 21 between its attached end and the contact 25 is enclosed within a sleeve of insulation material 27. The sleeve of insulation material is preferably a piece of heavy paper or asbestos sheeting wrapped about the contact strip 21, but if desired can be a tube of any desired dielectric material fitted into position on the contact strip. Wound about the contact strip over the sleeve of insulation material 27, there is a heater coil 28 which in this first circuit arrangement is of the high resistance type. One end of the heater coil 28 is connected to the contact carrying end of the contact strip 21. This is accomplished by providing the contact strip 21, at one side of the contact 25, with a slit 29, see Figs. 2 and 4, extended in from the free end of the contact strip. The end 28^a of the heater coil 28 at the free end of the contact strip 21 is wound about that portion of the contact strip 27 between the slit 29 and the adjacent longitudinal side of the contact strip to complete the electric contact with the contact strip. As shown in Fig. 2, the slit 29 extends inward at an oblique angle to the adjacent longitudinal side of the contact strip 21. Thus, the material of the contact strip 21 between the slit 29 and the adjacent longitudinal side of the contact strip will be of less width at the inner end of the slit than at the outer end of the slit. This is an important feature, as the end 28^a of the heater coil 28 is wound about the material of the contact strip 21 closely adjacent the inner end of the slit 29 so that the convolutions of the end 28^a will be retained against sliding off the strip by the greater width of the material of the contact strip at the outer end of the slit.

The material of the contact strip 21 on the side of the slit 29 adjacent the respective longitudinal side of the contact strip is bent out of the plane of the contact strip to provide clearance into which the end 28^a of the heater coil can be passed when winding the same about the material of the contact strip at the inner end of the slit.

Mounted through the base strip 20, between the contact rivet 26 and the eyelet 22 which mounts the contact strip 21 in position, there is a tubular contact rivet 30, see Fig. 3. The base strip 20 is formed with a hole 31 to accommodate the con-

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tact rivet 30. The other end 28^b of the heater coil 28 is extended into the tubular contact rivet 30 and is secured in position by the use of solder 32 or the like.

As shown in Figs. 2, 3 and 9, the electric wire 15 is extended along the side of the base strip 20 removed from the contact strip 21. The electric wire 15 has two leads 15^a and 15^b. The lead 15^a which extends through the flasher unit is continuous between the plug 15 and the lamp 18. The lead 15^b is cut within the flasher unit with the cut ends being bared. The bared end leading from the plug 16 is secured to the contact rivet 26 by solder 33 or the like and is also secured to the tubular contact rivet 30 by the same solder 32 which secures the end 28^b of the heater coil 28 to that tubular contact rivet 30. The other bared end of the lead 15^b is extended into the eyelet 22. That other bared end is secured in position within the eyelet 22 by means of solder 34, see Figs. 3 and 4.

A casing 35 is provided for enclosing the base strip 20 and the parts of the flasher unit mounted thereon. The casing 35 comprises an inner tube 36 fitted into an outer tube 37. Both of the tubes 36 and 37 are preferably made of a dielectric material and, more particularly, those tubes are made of cardboard but may be made of any other dielectric material. One end of the inner tube 36 is closed by a disc 38 which is engaged against the intumed edge portion 36^a of that inner tube 36. Thus, the inner tube 36 is slipped into position over the base strip 20 until the adjacent end of the base strip 20 strikes the inner face of the disc 38. Likewise, the one end of the outer tube 37 is closed by a disc 39 which is engaged against the intumed edge portion 37^a of the outer tube. With the disc 39 in position, the outer tube 37 is slipped into position over the open end of the inner tube 36 until the disc 39 abuts the adjacent end of the base strip 20, see Figs. 2 and 3. The two discs 38 and 39 are formed of a dielectric material such as cardboard, fiber or the like.

From Figs. 2 and 3, it will be noted that the base strip 20 is of a length slightly greater than the length of the inner tube 36 from the inner face of its disc 38 to its open end. Thus, with the inner end of the base strip 20 abutting the inner face of the disc 38, the other end of the base strip will protrude from the open end of the inner tube 36. That protruding end of the base strip 20 will bear against the inner face of the disc 39 of the outer tube 37 so that when the inner tube 36 is completely in position within the outer tube 37, the base strip 20 will be clamped in position between the adjacent faces of the discs 38 and 39.

The inner tube 36 has an external diameter to have a frictional fit within the outer tube 37 so that the tubes will maintain their interfitted positions without the use of any glues, mucilages or other securing means. That construction leaves the tubes 36 and 37 free to be pulled apart when it is desired to expose the parts of the flasher unit for repair and inspection without having to destroy the casing.

Means is provided for maintaining the base strip 20 fixedly in position within the inner tube 36. That means is characterized by laterally aligned pairs of lugs 40 and 41 formed along the longitudinal sides of the base strip 20. Those lugs 40 and 41 are engaged with complementary slots 42 and 43 formed in diametrically opposite sides of the inner tube 36. When the tubes 36 and 37 are assembled, the outer tube 37 main-

tains the roundness of the inner tube 36 retaining the lugs 40 and 41 in engagement with the slots 42 and 43 to in turn fixedly maintain the base strip 20 against possible longitudinal movement. The interfitted lugs 40 and 41 and slots 42 and 43 also maintain the base strip in position parallel to the longitudinal axis of the tubes and further retain the base strip against assuming angular positions within the tubes. However, when the outer tube 37 is pulled off the inner tube 36, the inner tube 36 can be compressed slightly into an oval cross-sectional shape with its greatest dimension extended parallel to the width of the base plate 20. That compression of the inner tube 36 will move the slots 42 and 43 out of contact with the lugs 40 and 41 freeing the base strip 20 to be pulled out of the open end of the inner tube.

To return the base strip 20 to its position within the inner tube 36, that tube must be held compressed while inserting the base strip until the lugs 40 and 41 reach positions aligned with the slots 42 and 43 when compression is released permitting the inner tube 36 to reassume its round configuration reengaging the lugs and slots to hold the base strip.

To provide the necessary clearance so that the wire 15 can be passed into and out of the casing 35, the discs 38 and 39 are formed with concentric holes 44 and the adjacent ends of the base strip 20 are formed with cutouts 45. As shown in Figs. 2 and 3, the cutouts 45 are aligned with the holes 44 of the discs 38 and 39 so that the wire 15 passes freely into and out of the casing 35.

The operation of the flasher unit can be best seen from the schematic wiring diagram of Fig. 9, which illustrates the open circuit flasher. The heater coil 28 is of the high resistance type wired in series with the lamp 18, which is of low resistance. The contacts 25 and 26 are spaced and the contact strip 21 is positioned with its high expansion side facing away from the base strip 20. With the plug 16 inserted into an outlet receptacle, the heater coil 28 will be energized heating the contact strip 21 causing it to bend toward the base strip 20 engaging the contact 25 with the contact 26 shutting off the voltage drop across the heater coil 28. That deenergizes the coil 28 allowing it to cool causing it to bend away from the base strip 20 again spacing the contacts 25 and 26. That reopens the circuit through the heater coil 28 causing it to heat up again bending the contact strip again toward the base strip 20, and so on.

When the contacts 25 and 26 are spaced, most of the voltage is applied across the comparatively high resistance of the heater coil 28 and a negligible amount of current is applied across the lamp 18 which will be out. On the other hand, when the contacts 25 and 26 are engaged, the heater coil 28 is shorted out of the circuit and full voltage is applied to the lamp 18 illuminating the same. Therefore, as the contacts 25 and 26 are alternately engaged and disengaged the lamp 18 will be caused to blink on and off.

In Fig. 10 there is illustrated an arrangement in which the flasher is employed in a closed flasher circuit. In this arrangement, the heater coil 28 is connected to shunt the input voltage. This is due to the fact that the contacts 25 and 26 are closed in the cool condition of the contact strip 21 so that the electrical energy travels through the closed contacts 25 and 26 and the contact strip 21 completing one of the legs of

the circuit to the lamp 18. The other leg of the circuit to the lamp 18 is completed by the lead 15^a which in this circuit is also connected to the contact rivet 30. The contact strip 21 in this closed circuit arrangement is mounted with its high expansion side facing toward the base strip 20 so that when the contact strip heats up it bends away from the base strip moving the contacts 25 and 26 out of contact with each other. Separation of the contacts 25 and 26 breaks the circuit to the heater coil 28 and to the lamp 18 deenergizing both. The contact strip 21 then cools and bends to reengage the contacts 25 and 26 to again complete the circuit to both the lamp 18 and the heater coil 28. The heater coil 28 heats up again and the lamp is again illuminated and the cycle repeats itself.

The alternating flashing circuit shown in Fig. 11 includes two lamps 18 and 18^a and is like the open circuit arrangement of Fig. 9 in that the heater coil 28 is of the high resistance type, the contact strip 21 has its high expansion side faced away from the base strip 20 and the contacts 25 and 26 are spaced when the contact strip 21 is cool. The electric wire 15 has its lead 15^a connected directly between the plug 16 and the lamp 18. Its lead 15^b is connected to the contact strip 21 and to the contact rivets 26 and 30 between the plug 16 and the lamp 18. Leads 15^c and 15^d are connected to the lamp 18^a. The other end of the lead 15^c is connected with the lead 15^b to the contact rivet 30 and the lead 15^d has its other end connected with the lead 15^b to the contact strip 21. The lamp 18 has a low resistance while the lamp 18^a has a resistance twice the resistance of the lamp 18. The lamp 18 could be 50 watts while the lamp 18^a is 100 watts.

Tracing the circuit of Fig. 11 and starting at the top terminal of the plug 16, the current goes through the lamp 18 and in series with the heater coil 28 back to the other terminal of the plug 16. The lamp 18^a is a shunt with the heater coil 28. The resistance of the bulb 18 and the heater coil 28 shunting the lamp 18^a is such that most of the voltage drop is across the lamp 18^a. A negligible amount of voltage is across the lamp 18. Consequently, the heater coil 28 heats up causing the contact strip 21 to bend toward the base strip 20. During this period, up until the time that the contacts 25 and 26 are actually engaged, the lamp 18^a gets practically the full voltage and is illuminated. As soon as the contacts 25 and 26 engage one another, the lamp 18^a is short-circuited and the full voltage is impressed on the lamp 18 illuminating that lamp and short-circuiting the heater coil 28. During the short-circuiting of the heater coil 28, the contact strip 21 cools off and returns to its starting position disengaging the contacts 25 and 26. The lamp 18^a again receives the full voltage load and the lamp 18 receives a negligible amount of voltage. The heater coil 28 is again in operation and the contact strip 21 is heated and the cycle repeats itself.

In Fig. 12, there is illustrated a modified form of the base strip 20'. In this form of the invention, the base strip 20' is formed with short slots 50 extended in from its longitudinal sides and located on opposite sides of the hole 31 which mounts the rivet 30. With this construction, the end 28^b of the heater coil 28 can be extended to the other side of the base strip 20' through either of the slots 50 to be soldered to the rivet 30 together with the end of the lead 15^b

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of the wire 15. The addition of the slots 50 eliminates the need for a tubular contact rivet, so that the contact rivet 30 can be a duplicate of the contact rivet 26.

In all other respects, the form of the invention shown in Fig. 12 is similar to that previously described and like parts are identified by the same reference numerals.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

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

1. A flasher comprising a base strip of dielectric material, a bi-metallic contact strip mounted at one end on said base strip and having a contact at its free end, a second contact mounted on said base strip in alignment with said contact of said contact strip, a third contact mounted on said base strip between the attached end of said contact strip and said second contact, a heater coil mounted on but insulated from said contact strip and having one end secured to said contact strip and its other end secured to said third contact, and a casing enclosing said base strip and including a pair of interfitted tubes slipped into position over said base strip from opposite ends thereof, said tubes having their outer ends closed by discs positioned between the ends of said base strip and inturned end portions of said tubes.

2. A flasher comprising a base strip of dielectric material, a bi-metallic contact strip mounted at one end on said base strip and having a contact at its free end, a second contact mounted on said base strip in alignment with said contact of said contact strip, a third contact mounted on said base strip between the attached end of said contact strip and said second contact, a heater coil mounted on but insulated from said contact strip and having one end secured to said contact strip and its other end secured to said third contact, and a casing enclosing said base strip and including a pair of interfitted tubes slipped into position over said base strip from opposite ends thereof, said tubes having their outer ends closed by discs positioned between the ends of said base strip and inturned end portions of said tubes, said discs having holes and said base strip having cutouts in its ends aligned with said holes providing clearance for having electric wires passed into and out of said casing.

3. A flasher comprising a base strip of dielectric material, a bi-metallic contact strip mounted at one end on said base strip and having a contact at its free end, a second contact mounted on said base strip in alignment with said contact of said contact strip, a third contact mounted on said base strip between the attached end of said contact strip and said second contact, a heater coil mounted on but insulated from said contact strip and having one end secured to said contact strip and its other end secured to said third contact, and a casing enclosing said base strip and including a pair of interfitted tubes slipped into position over said base strip from opposite ends thereof, said third contact being a tubular rivet and the said other end of said heater coil being extended into said tubular rivet and soldered thereto.

4. A flasher comprising a base strip of dielec-

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tric material, a bi-metallic contact strip mounted at one end on said base strip and having a contact at its free end, a second contact mounted on said base strip in alignment with said contact of said contact strip, a third contact mounted on said base strip between the attached end of said contact strip and said second contact, a heater coil mounted on but insulated from said contact strip and having one end secured to said contact strip and its other end secured to said third contact, and a casing enclosing said base strip and including a pair of interfitted tubes slipped into position over said base strip from opposite ends thereof, said base strip having slots extended in from its longitudinal side edges and on opposite sides of said third contact, said heater coil having its said other end extended through one of said slots and connected to said third contact on the other side of said base strip.

5. A flasher comprising a base strip of dielectric material, a bi-metallic contact strip mounted at one end on said base strip and having a contact at its free end, a second contact mounted on said base strip in alignment with said contact of said contact strip, a third contact mounted on said base strip between the attached end of said contact strip and said second contact, a heater coil mounted on but insulated from said contact strip and having one end secured to said contact strip and its other end secured to said third contact, and a casing enclosing said base strip and including a pair of interfitted tubes slipped into position over said base strip from opposite ends thereof, and means holding said base strip against longitudinal movement relative to the inner of said interfitted tubes.

6. A flasher comprising a base strip of dielectric material, a bi-metallic contact strip mounted at one end on said base strip and having a contact at its free end, a second contact mounted on said base strip in alignment with said contact of said contact strip, a third contact mounted on said base strip between the attached end of said contact strip and said second contact, a heater coil mounted on but insulated from said contact strip and having one end secured to said contact strip and its other end secured to said third contact, and a casing enclosing said base strip and including a pair of interfitted tubes slipped into position over said base strip from opposite ends thereof, and laterally aligned pairs of lugs extending from the longitudinal side edges of said base strip, the inner of said interfitted tubes having aligned diametrically opposed pairs of said slots into which said pairs of lugs are engaged holding said base strip against longitudinal movement relative to said tubes.

7. A casing for enclosing an elongated base strip of insulation material mounting a heater controlled electrical flasher or the like, said casing comprising an inner tube including an inturned rim slipped into position over the base strip from one end thereof, a disc closing one end of said inner tube at said inturned rim, an outer tube slipped into position over said inner tube from the open end of said inner tube and including an inturned rim, a disc closing the end of said outer tube adjacent said rim remote from the closed end of said inner tube, and means holding the base strip fixedly in position within said inner tube.

8. A casing for enclosing an elongated base strip of insulation material mounting a heater controlled electrical flasher or the like, said cas-

ing comprising an inner tube including an intumed rim slipped into position over the base strip from one end thereof, a disc closing one end of said inner tube at said intumed rim, an outer tube slipped into position over said inner tube from the open end of said inner tube and including an intumed rim, a disc closing the end of said outer tube adjacent said rim remote from the closed end of said inner tube, and means holding the base strip fixedly in position within said inner tube, said inner tube having an external diameter to be frictionally received within said outer tube holding said tubes in their engaged positions.

9. A casing for enclosing an elongated base strip of insulation material mounting a heater controlled electrical flasher or the like, said casing comprising an inner tube including an intumed rim slipped into position over the base strip from one end thereof, a disc closing one end of said inner tube at said intumed rim, an outer tube slipped into position over said inner tube from the open end of said inner tube and including an intumed rim, a disc closing the end of said outer tube adjacent said rim remote from the closed end of said inner tube, and means holding the base strip fixedly in position within said inner tube, said discs being positioned between the ends of the base strip and intumed end portions of the respective tubes.

10. A casing for enclosing an elongated base strip of insulation material mounting a heater controlled electrical flasher or the like, said casing comprising an inner tube including an intumed rim slipped into position over the base strip from one end thereof, a disc closing one end of said inner tube at said intumed rim, an outer tube slipped into position over said inner tube from the open end of said inner tube and including an intumed rim, a disc closing the end of said outer tube adjacent said rim remote from the closed end of said inner tube, and means holding the base strip fixedly in position within said inner tube, said discs having concentric holes for the passage of electric wires through the casing.

11. A casing for enclosing an elongated base strip of insulation material mounting a heater controlled electrical flasher or the like, said casing comprising an inner tube including an intumed rim slipped into position over the base strip from one end thereof, a disc closing one end of said inner tube at said intumed rim, an outer tube slipped into position over said inner tube from the open end of said inner tube and including an intumed rim, a disc closing the end of said outer tube adjacent said rim remote from the closed end of said inner tube, and means holding the base strip fixedly in position within said inner tube, said holding means comprising laterally aligned pairs of lugs extending from the longitudinal side edges of the base strip, said inner tube having aligned diametrically opposed pairs of slots into which said pairs of lugs are engaged.

12. A casing for enclosing an elongated base strip of insulation material mounting a heater

controlled electrical flasher or the like, said casing comprising an inner tube slipped into position over the base strip from one end thereof, a disc closing one end of said inner tube, an outer tube slipped into position over said inner tube from the open end of said inner tube, a disc closing the end of said outer tube remote from the closed end of said inner tube, and means holding the base strip fixedly in position within said inner tube, said holding means comprising laterally aligned pairs of lugs extending from the longitudinal side edges of the base strip, said inner tube having aligned diametrically opposed pairs of slots into which said pairs of lugs are engaged, said base strip being of a length greater than the length of said inner tube between the inner face of its disc and its open end so that the end of said base strip adjacent the open end of said inner tube will project slightly therefrom causing said base strip to be clamped between said discs when said inner tube is extended fully into said outer tube.

13. A flasher comprising a base strip of dielectric material, a bi-metallic contact strip mounted at one end on said base strip and having a contact at its free end, a second contact mounted on said base strip in alignment with said contact of said contact strip, a third contact mounted on said base strip between the attached end of said contact strip and said second contact, a heater coil mounted on but insulated from said contact strip and having one end secured to said contact strip and its other end secured to said third contact, and a casing enclosing said base strip, the attachment of the said one end of said heater coil to said contact strip comprising a slit extended from the free end of said contact strip, said slit being arranged at an oblique angle to the adjacent side of said contact strip so that the material of said contact strip between the inner end of said slit and the adjacent longitudinal side of said contact strip will be of less width than the material of said contact strip between the outer end of said slit and the adjacent longitudinal side of said contact strip, the said one end of said heater coil being wound about the narrower material of said contact strip at the inner end of said slit.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,084,657	Nash	Jan. 20, 1914
1,510,847	Holler	Oct. 7, 1924
1,789,640	Shoenberg	Jan. 20, 1931
1,922,022	Barnett	Aug. 15, 1933
1,974,472	Seghers	Sept. 25, 1934
2,132,097	Bryant	Oct. 4, 1938
2,272,976	Geer	Feb. 10, 1942
2,295,202	Davis	Sept. 8, 1942
2,302,603	Davis	Nov. 17, 1942
2,529,212	Coulter	Nov. 7, 1950