March 23, 1937. L. A. KAUFFMAN 2,074,917

ELECTRIC FUSE

Filed April 24, 1935

Fig. 1.

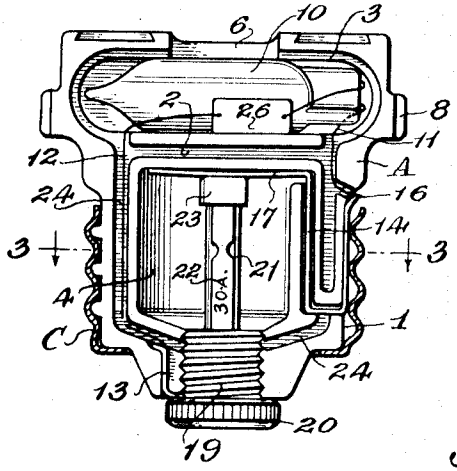


Fig. 2.

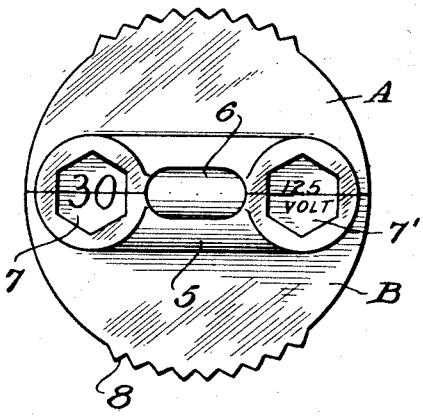


Fig. 3.

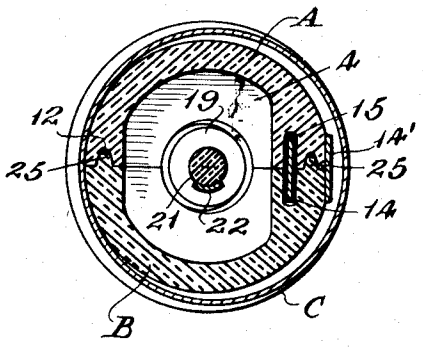


Fig. 4.

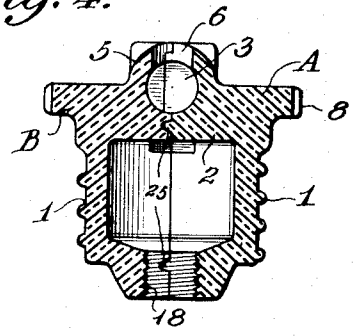
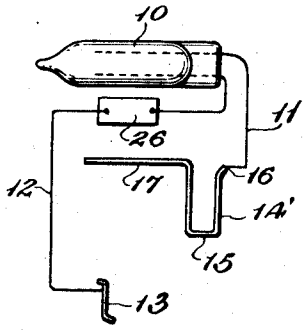


Fig. 5.



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2,074,917

ELECTRIC FUSE

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Application April 24, 1935, Serial No. 18,037

10 Claims. (Cl. 200—121)

The present invention relates to circuit breakers used in connection with electrical wiring systems and more particularly to that type of terminal cut-out employing a fusible link and a visible signal or indicator, which latter will automatically disclose at a glance, the "blown" or inoperative condition of the fuse link. The plug type fuse of this character usually consists of a casing having the usual terminals arranged thereabout, and one of these terminals consisting of a threaded shell which is capable of being fitted within the standard cut-out base of the electrical wiring system, and this casing having properly positioned therein a fuse link connecting the terminals arranged about the casing as well as a suitable indicator which is also electrically connected to said terminals, whereby should the fuse link become ruptured, the indicator will be brought into play for visibly indicating the blown or ruptured condition of the link. I preferably and do, use an indicator consisting of a miniature glow lamp which derives its energy through a capacity effect, not leakage, and will operate in circuit having the highest insulating resistance, and in addition, will continue to glow even after the overload or short circuit is removed. This glow lamp having a current limiting resistance in series therewith for not only preventing the passage of excessive current through the same, but being arranged in parallel with the fuse link so that as long as the fuse link remains intact, the current will readily pass therethrough. When a short circuit occurs that causes the fuse link to become blown, the lamp deriving its energy through the capacity effect, will glow, thereby visibly indicating the ruptured condition of the fuse link as long as the circuit remains open, but upon replacing the fuse link, the current will again flow through the circuit and the resistance element will prevent sufficient energy entering the lamp which would cause the same to become luminous.

Amongst the principal objects of the present invention is to provide a commercially feasible indicating fuse plug, by reducing to a minimum, the cost of manufacture of the various parts thereof, and permitting such parts to be easily and readily assembled without the aid of special tools or machines. To effect this object of the invention, I provide a casing for the fuse, consisting of two molded sections which sections when separated will readily receive, without additional fastening elements or connections, the indicator, and such sections being secured together with the indicator properly positioned therein by the standard threaded shell. The fuse link may or may not be removably inserted within this shell or casing, but when properly placed therein, will bridge the contacts arranged about the casing and this fusible element being carried by a support which may, together with the ruptured element, be readily discarded, thereby permitting the fuse casing and its indicator to be re-used after a new fusible element has been inserted therein.

A still further object of the present invention is to provide a casing for completely housing a fuse link and indicator therefor, and when such fuse link and indicator are placed within the casing, they will be properly separated so as to prevent the forces liberating from the fuse link when the same is blown from coming in contact with such indicator.

A still further object of the present invention is to provide a sectional fuse casing which may be easily and readily connected together when so connected, will form a sealed fuse compartment so as to prevent lint or dust collecting therein, yet at the same time having an outlet opening or vent in order that the gases given off during the blowing of the fuse link may readily escape from such fuse compartment.

Other objects of the invention will be in part obvious and in part pointed out hereinafter.

In order that the invention and its mode of operation may be readily understood by persons skilled in the art, I have in the accompanying illustrative drawing and in the detailed following description based thereon, set out one possible embodiment of the same.

In this drawing:

Figure 1 is a vertical sectional view through a plug type fuse embodying this invention, having one of the sections of the casing removed;

Figure 2 is a top plan view of this same fuse when assembled;

Figure 3 is a horizontal section of the fuse taken on the line 3—3 of Figure 1 in the direction of the arrow points;

Figure 4 is a vertical section on a reduced scale through the fuse casing taken at right angles to Figure 1, and,

Figure 5 is a plan view of the indicator and its electrical connections before being inserted in the fuse casing.

Referring now more particularly to the accompanying drawing, wherein like and corresponding parts are designated by similar reference characters throughout the several views, I have herein illustrated a fuse enclosure or cas-

ing as consisting of two sections A and B. These sections are preferably made identical in design and of insulating material, such as glass, bakelite, porcelain, or the like, and these sections being connected together by means of the screw shell C.

These sections are preferably cold-molded from bakelite, having formed upon their outer periphery, the screw threads 1 which receive the threads of the shell C. Rabbets are formed upon the contacting edges of each section in order that they will overlap one another when the sections of the casing are secured together by the screw shell C, whereby such overlapping edges or joints will prevent lint or dust entering the casing or collecting about the fusible links therein, which would become ignited when the fusible link is blown.

A semi-circular ledge 2 is also molded with each section in order that when the sections are joined together in the manner as better illustrated in Figure 4 of the drawing, a partition is formed which divides the interior of the fuse casing into a light compartment 3 and a fuse compartment 4. The outer walls 5 of the lamp compartment are preferably dome-shaped and extend across the outer face of the fuse, having formed therein a sight opening or window 6 from which the rays of light from the lamp arranged within this lamp compartment 3 may be emitted. The outer face of the walls 5 of the lamp compartment have also formed therein two recesses 7 and 7', the purpose of which will be later described. A flange 8 surrounds the outer end of the fuse casing having its outer face or wall milled or corrugated as shown, in order that the operator may readily manipulate the fuse casing for screwing the same in or removing the same from the usual cut-out base.

The opening or window 6 within the lamp compartment of the casing may be elongated as shown, circular, or hexagonal, but the recess 7 should be hexagonal in shape wherein the fuse element employed rates at from 0 to 15 amperes, inclusive, and a more distinguishing shape, such as round, if the rating of the fuse is over 15 amperes. The fuse rating in volts may be embossed, stamped or otherwise placed within the recess 7', and the outer faces of the walls 5 may have the usual markings thereupon, such as the trade mark and name of the manufacturer. The markings upon the fuse in the manner as above set forth will be plainly visible when the fuse casing is in its cut-out base.

A small indicating or pilot lamp 10 as herein shown and arranged within the lamp compartment of the casing, has one lead-in wire 11 thereof electrically connected to the upper end of the contact terminal shell C and through a metallic strip 15 and its other lead-in wire 12 is connected to the central contact terminal through a metallic strip 13 which latter is secured within a groove arranged at the lower end or base portion of the fuse casing. A certain portion of the adjacent longitudinal edges of the sections A and B of the shell have alining grooves or recesses 14 formed therein, as are better illustrated in Figures 1 and 3 of the drawing, and arranged within these recesses is the contact strip 15. This contact strip 15 is preferably made of brass having a U-shaped portion, one leg of which extends within the recess 14 whereas, the outer leg 14' of the U-shaped portion of this contact strip is positioned on the outer face of the fuse casing beneath the screw shell C in order that it will be in contact therewith. The outer free end of this contact strip 15 is soldered or otherwise connected at the point 16 to the shell C. The inner free end 17 of this contact strip extends within the fuse compartment 4 of the casing below the partition 2 and is so shaped as to have spring contact with the fusible element when inserted within the compartment 4. The fuse inlet opening which communicates with the compartment 4 has formed in the walls thereof, screw threads 18 of a different pitch than that of the threads 1 upon the exterior walls of the casing.

The renewable fuse member comprises a brass plug 19 having screw threads formed with the outer periphery thereof which are adapted to engage the threads 18 of the casing and also to have electrical contact with the strip 13. This plug 19 has formed therewith, a knob 20 which is adapted to have electrical contact with the cut-out base when the fuse is inserted therein, and also for permitting the operator to manipulate the plug for removing the fuse link or inserting the same within the compartment 4 of the fuse casing. The opposite face of the plug 19 to which the milled nut or knob 20 is formed has provided therein, a recess in which is seated one end of a rod or standard 21. This standard 21 is preferably cylindrical in shape and made of suitable insulating material for supporting the fusible link or element 22. The brass cap 23 is placed over the upper end of the standard 21 for locking the upper end of the fusible element thereto and when the renewable member is inserted within the fuse casing, this cap 23 has contact with the spring contact end 17 of the conductor member 15. The screw shell C having contact in the usual manner with one of the contacts of the cut-out base when the plug is inserted therein, and from the construction as herein set forth, it is quite obvious that when the renewable member is inserted within the fuse casing, that the fuse element 22 will complete the circuit between the contact members of the fuse, herein indicated by the numeral 20 and the letter C.

As it is absolutely necessary to separate the fusible link 22 from the indicating lamp 10 in order to prevent the forces given off from the rupture of the fusible element from crushing the glass globe of the lamp, the lamp compartment is separated from the fuse compartment by the partition 2 and the rabbet joints between the sections of this partition 2 are held closely together by means of the screw shell C in order that there will be no leakage between the lamp compartment and the fuse compartment. The rabbet joint as herein shown around the fuse compartment consists of grooves 24 formed within the section A of the casing, and the raised portions 25 formed with the section B. When the two sections of the casing are connected together the projections 25 extend within the grooves 24 in the manner as better illustrated in Figures 3 and 4 of the drawing. The upper ends of these grooves 24 communicate with the lamp compartment 3 in order that the conductors 11 and 12 may extend through the grooves 24 to their respective contact terminals and thereby effecting a seal between the joints of these sections in order to prevent lint or dust from entering the fuse compartment, which will be likely to come in contact with the fusible element 22 and become ignited when this fusible element is blown. The recess 14 in which is positioned the U-shaped section of the conductor 15, is covered at one end by means of the screw shell C, but

this channelway or groove 14 acts as a vent in order that the gases formed within the compartment 4 when the fusible element 22 is blown, may readily escape from this compartment 4 through the channelway 14 and around the outer periphery of the casing beneath the screw shell C. This rabbet joint also extends below the lamp compartment 3 so as to hold the upper end of the sections in contact with one another, and establish a seal between the lamp compartment and the fuse compartment.

The indicating or pilot lamp 10 must be relatively small in order to fit within the lamp compartment 3 of the fuse casing and consists of a glass tube filled with a rare gas, such as neon gas, and this tube has the usual electrodes arranged therein. These lamps employ a relatively low current, and when they are operated on commercial circuits, it is desirable to provide a resistance in series therewith, for the purpose of preventing the passage of excessive current therethrough. In the drawing, I have illustrated a stabilizing resistance 26 as consisting of a separate unit disposed in the line or lead-in wire 12, but other types of lamps may be employed which have the resistance element either in the interior of the lamp or in the base thereof. From the arrangement as herein shown and described, it is obvious that the fusible element 22 when properly placed within the compartment 4 of the casing will be electrically connected with the terminals of the fuse, but independent means are employed and connected in parallel with said fusible element for connecting the lamp in series with said terminals in order that should the fusible element become blown or ruptured, the lamp will give a visible indication to that effect. Whereas, I have shown and described the visible indicating means as being an electrical lamp, it is, of course, to be understood that other indicating means now commonly known in this particular art may be substituted therefor.

In assembling this fuse, the operator, by taking the section A places within the lamp compartment of that section, one of the small indicating lamps 10 together with its resistor 26 and the lead-in wires are arranged within the grooves provided within the opposite and parallel vertical side edges thereof. The contact strip 13 is placed within the recess provided in the base end of the section, whereas the free outer end of the lead-in wire 11 is left exposed at one side of this section. The contact strip 15 is then placed in the position as better illustrated in Figure 1 so that its free end projects within the fuse compartment 4 whereas its outer end 14' extends parallel with the outer face of the sides of this section. The other section B is then placed in position upon this section A of the casing in which the lamp and contact strip have been inserted, and after the two sections are properly positioned, the threaded shell C is then screwed thereupon. This threaded shell C not only comes into contact with the exposed end 14' of the strip, but tightly draws the sections A and B together, whereby a sealed joint is formed between the sections around the fuse compartment 4. This exposed end 14' of the strip being of spring metal, gives an outward thrust to the shell C thereby causing the sections A and B of the casing to be drawn closely together. By placing a drop of solder at the point 16 the threaded shell is not only retained against rotation or being unscrewed therefrom, but the free ends of the wire 11 together with the free end of the contact strip 15 are electrically connected to this shell C.

When this plug 19 is properly positioned within the inlet opening of the casing the cap 23 carried thereby will be in electrical contact with the free end 17 of the contact strip and the fuse is now completely assembled and ready for use. Each fusible element 22 is plainly marked with the capacity for which the link is designed, according to the markings as shown thereupon in Figure 1, and the renewable plug may also be plainly marked as to the name or trade-mark of the manufacturer, and the capacity for which the fuse link is designed.

A fuse manufactured and assembled in accordance with the above may be inserted within a standard cut-out base, and no live parts will be exposed, yet, should the fusible link become ruptured or blown, the visible indicator will be automatically brought into use for designating the blown or ruptured condition of this fuse link, and such indicator being visible from that end of the fuse which is exposed after being placed in a standard cut-out base.

To renew the link 22 it is necessary that the fuse casing be removed from the cut-out base, but by having the threaded connection between this plug 19 and the fuse casing of a different pitch than the threads of the screw shell C, it is quite obvious that the fuse casing may be readily unscrewed from a standard cut-out base without loosening the renewable element or fuse holder, which would likely cause the fuse holder to remain within the socket of the cut-out base. After the fuse casing has been removed from the cut-out base, the fuse holder may be easily and readily removed from the fuse casing and a new fuse element substituted therefor, whereupon the fuse casing and its indicator may be again used.

Manifestly, the construction herein shown is capable of considerable modification and such modifications as come within the scope of my claims, I consider within the spirit of my invention.

I claim:—

1. A fuse casing molded from insulated material and being split longitudinally in order to form two separate sections, said casing being hollow throughout a greater portion of its length and having openings formed in the opposite ends thereof, a ledge formed with each section, and a threaded shell for connecting said sections together, whereby the ledge formed with each section will form a partition for dividing the hollow interior of the casing into a plurality of sections.

2. A fuse casing comprising a hollow body molded from insulating material, a partition formed with and arranged within said hollow body for dividing the same into a fuse compartment and a lamp compartment, said body having an opening formed within one end thereof and communicating with said lamp compartment, the opposite end of said casing having an opening therein communicating with said fuse compartment, said body and partition being split longitudinally to form two separate sections, and a threaded shell engageable with said body for connecting said sections together.

3. A fuse comprising a split casing dividing the same into two separate sections, contact terminals for said casing, a partition formed with the sections of said casing and dividing the same into two compartments, a fusible element arranged within one of said compartments and electrically connected to said contact terminals, an indicator

arranged within the other of said compartments and electrically connected to said terminals, and a threaded shell engageable with said casing for permanently connecting the sections thereof together.

4. A plug fuse comprising a hollow casing, a partition arranged within said casing for dividing the same into a fuse compartment and a lamp compartment, a threaded terminal shell connected to said casing, a plug terminal engageable with said shell, a fuse link carried by said plug terminal, a glow lamp arranged within said lamp compartment and being electrically connected to said terminals, a contact strip positioned within said fuse compartment and electrically connected to said threaded shell terminal, and said casing having a vent opening formed therein communicating with said fuse compartment and said contact strip extending through said vent opening.

5. A plug fuse comprising a casing formed of two separate sections, a threaded shell terminal engageable about said casing for retaining said sections together, said casing having a fuse compartment formed therein, the alining edges of said sections having recesses therein for forming a vent opening communicating with said fuse compartment, a fuse link, a plug terminal detachably engageable with said casing and said fuse link being carried by said plug terminal whereby when the latter is in engagement with the casing, said fuse link will be electrically connected to said threaded shell terminal.

6. A plug fuse comprising a casing formed of insulating material and said casing being split longitudinally to form two separate sections, a ledge formed with each section for providing an indicator compartment and a fuse compartment, an indicator, said indicator comprising a glow lamp capable of being positioned within said indicator compartment, a threaded terminal shell engageable with said casing for holding the sections thereof together, a contact ring secured to said casing, lead-in wires connecting said lamp with said contact ring and threaded terminal shell, a contact strip having one end positioned within said fuse compartment and its opposite end connected to said threaded shell, and a fuse link positioned within said fuse compartment for electrically connecting said contact ring with said contact strip.

7. An indicator plug fuse comprising a hollow body consisting of two sections, the medial portion of said body being cylindrical in contour and having a fuse compartment therein, a threaded contact shell engageable with the medial portion of said body for connecting the sections thereof together, a removable contact plug connected to said casing, a fuse link carried by said plug and extending within said fuse compartment of the casing, said fuse link being connected at its ends to said contact shell and contact plug, an indicator located within said casing and electrically connected in series to said contact shell and contact plug independently of said fuse link, said casing having a vent opening communicating at one end with said fuse compartment, and said contact shell extending over the opposite end of said vent opening.

8. A fuse comprising a casing formed of companion longitudinally extending sections disposed in face to face engagement with each other and defining a lower fuse compartment and an upper indicator compartment, a center terminal, a fuse link in the fuse compartment having one end connected with the center terminal, a terminal shell about said casing in threaded engagement therewith, abutting faces of the casing being notched to form a side opening leading from an end of the upper compartment and the abutting side faces being also grooved to provide a channel leading from the upper end of the fuse chamber, a resilient contact strip extending from the upper end of said fuse link through said channel and having an outer arm extending between the casing and shell longitudinally thereof and terminating at the side opening and being adapted to exert outward pressure against the shell to bind the shell in place, an indicator in the indicator chamber, and conductors leading from the indicator, one conductor being connected with the center terminal and the other extending through the side opening and having its outer end conductively united to the outer end of the contact strip.

9. A fuse comprising a sectional casing having its sections in face to face engagement with each other and defining a fuse compartment and an indicator compartment, a center terminal, a terminal shell threaded about said casing, a fuse link in the fuse compartment having one end connected with the center terminal, a contact strip held between the contacting faces of said sections with one end portion entering the fuse compartment and engaging the other end of said fuse link and its other end portion extending outwardly from a side of the casing and longitudinally between the casing and shell and exerting outward pressure against the shell to bind the shell upon the casing, and an indicator in the indicator compartment having conductors leading therefrom, one conductor being connected with the center terminal and the other extending out of the compartment and projecting from the casing and being conductively united to the outer end of said contact strip.

10. A casing for plug fuses molded from insulating material and being split longitudinally to form two separate sections, said sections each having a laterally extending recess formed therein whereby when said sections are connected together a compartment will be formed capable of retaining an indicator lamp, said sections each having a vertically extending recess formed therein whereby when the sections are connected together a compartment will be formed capable of retaining a fusible element, one of said sections of the casing having grooves therein extending about the recesses thereof and projections formed with the other of said sections and extending about the recesses formed therein whereby said projections may be seated within said grooves when the sections are connected together.

LEROY A. KAUFFMAN.