

July 2, 1940.

W. C. LINTON

2,206,782

PLUG FUSE

Filed March 6, 1939

2 Sheets-Sheet 1

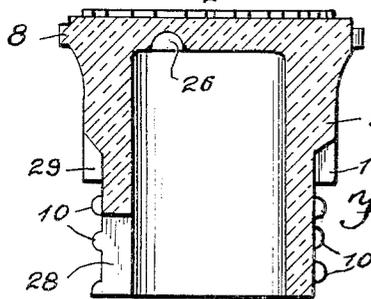
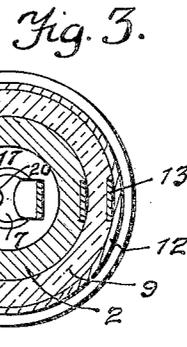
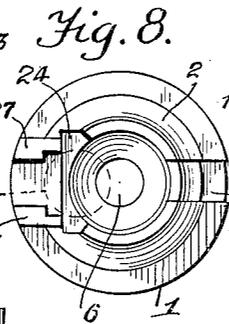
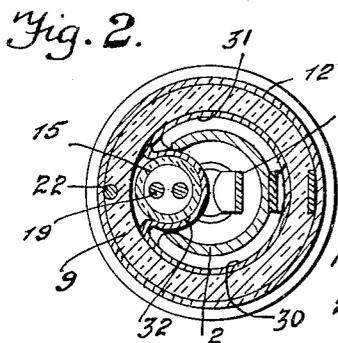
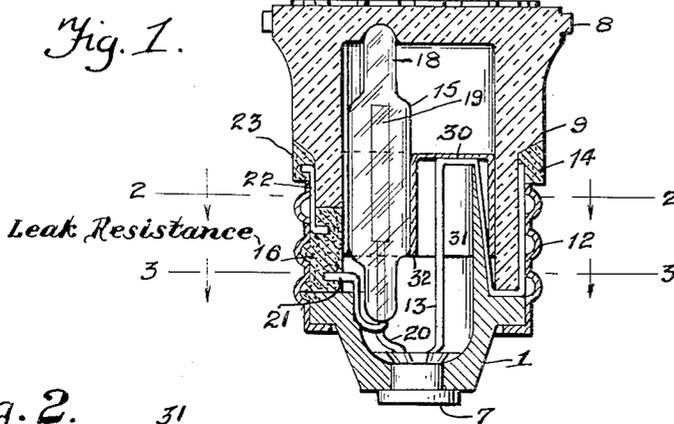


Fig. 5.

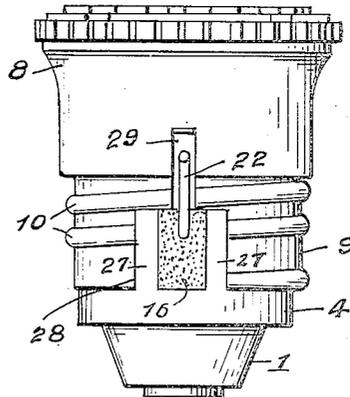


Fig. 4.

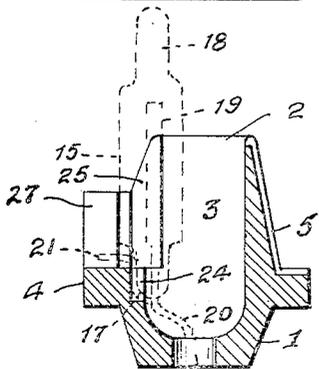


Fig. 6.

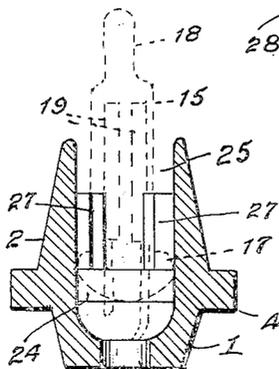


Fig. 7.

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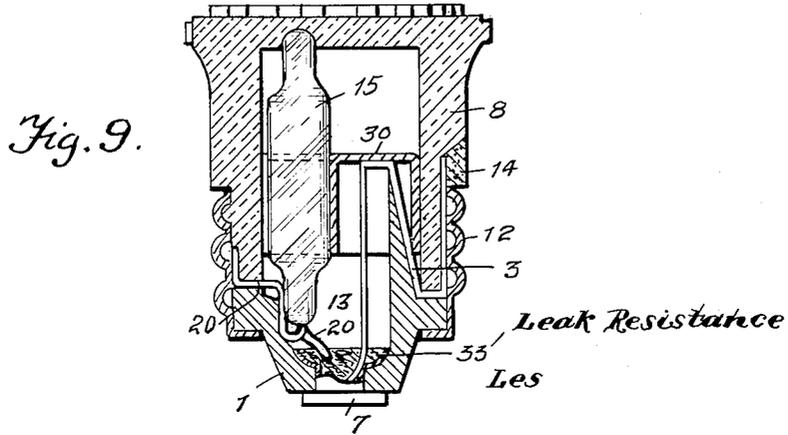


Fig. 10.

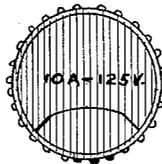


Fig. 11.



Fig. 12.



Fig. 13.

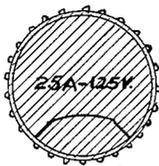


Fig. 14.

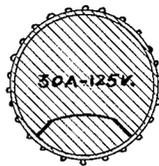


Fig. 15.

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UNITED STATES PATENT OFFICE

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PLUG FUSE

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Application March 6, 1939, Serial No. 260,156

6 Claims. (Cl. 200—121)

The present invention relates to circuit breakers for electrical wiring systems of the plug type having a lamp indicator for giving or emitting a visible signal or indication when the fusible element of the circuit breaker becomes blown or ruptured and it is the purpose of the present invention to provide a plug fuse with a lamp indicator completely housed therein without materially increasing the external diameter thereof, whereby it may be placed within a standard fuse socket of a cutout block and the cover of the fuse box containing the cutout block readily closed without coming in contact with the fuse plugs arranged therein.

Another equally important object of the present invention is to provide a translucent casing for fuses having a fusible link or element and lamp indicator therefor housed therein and such translucent casing being of a color corresponding to the amperage rating of the fuse link, whereby upon inspection of fuses arranged within a fuse block, the exact capacity of each fuse may be instantly known and when the fuse link becomes blown or ruptured, a colored light will be emitted from such casing for not only indicating the particular blown fuse but for designating the particular amperage rating of the blown fuse so that one may instantly select a fuse for replacement of the required capacity.

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 drawings and in the detailed following description based thereupon, set out an embodiment of the same.

In the drawings:

Fig. 1 is a vertical section through the plug fuse embodying the present invention.

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1 in the direction of the arrow points.

Fig. 3 is another horizontal section taken on the line 3—3 of Fig. 1 in the direction of the arrow points.

Fig. 4 is a side elevation of the fuse plug with the threaded contact shell removed.

Fig. 5 is a vertical sectional view through the translucent top or cover for the plug fuse.

Fig. 6 is a vertical section through the base of the plug fuse illustrating in dotted lines the position of the lamp indicator when mounted therein.

Fig. 7 is a similar vertical sectional view taken at right angles to that shown in Fig. 6.

Fig. 8 is a plan view of the base.

Fig. 9 is a vertical sectional view through a plug fuse showing a slightly modified form of the invention, and

Figs. 10 to 15 inclusive, are top plan views of the fuse showing the several colors used in designating the capacity of the fusible element arranged therein.

Referring now more particularly to the accompanying drawings wherein like and corresponding parts are designated by similar reference characters throughout the several views, I have illustrated a plug fuse comprising a base 1 having a tubular extension 2 formed therewith and in which is arranged the explosive chamber 3. An outwardly extending and annular flange 4 is formed with the base and a groove 5 is formed within the outer face of the tubular extension 2 and annular flange 4 for receiving the link of a fusible element. Secured within an opening 6 formed within the base is the rivet 7 which provides the usual central contact terminal of the fuse.

The top or cover 8, preferably made of a translucent material, is formed with a tubular portion 9 having externally molded threads 10 formed therewith. A groove or recess 11 is also formed in the outer wall of the tubular portion of the cap for receiving one extremity of the fusible element.

This cap or cover extends over the tubular portion 2 of the base and its lower edge rests upon the upper face of the annular flange 4. A threaded contact shell 12 connects the top and base together in the manner as best illustrated in Fig. 1 of the drawings. The fuse link or element 13 has one extremity connected to the rivet 7 and extends over the tubular portion 2 of the base. The opposite end of this fuse link is seated within the groove 5 of the base and is connected to the threaded contact shell 12 by means of the solder 14.

Fuse plugs of the above conventional type usually have a top or cover made of glass, Pyrex or similar transparent materials whereby, upon close inspection, one may look through the top of this cover to inspect the fuse link 13 arranged therein. When the fuse link becomes blown or ruptured, the gases generated thereby tend to force the top and base apart, whereby these gases may eventually escape between the top and base and by the threaded contact shell to the atmosphere.

The lamp indicator attachment for a fuse plug as above described consists of a miniature glow

lamp 15 and a leak resistance 16 which when connected in series with the contact terminals 7 and 12 and in parallel to the fuse link 13 will give off a visible signal or indication when the fuse link 13 becomes blown or ruptured. As it is the purpose of a fuse to disrupt the flow of current through an electrical wiring system should a short circuit occur therein, it is necessary to have an indicator attachment which will operate on open circuits as if the indicator or lamp 15 required any appreciable amount of current to operate the same, it would defeat the very purpose for which the fuse was intended. This miniature glow lamp 15 consists of a glass bulb having a flattened base portion 17 and an upper reduced or pointed end 18. A low potential mixture of inert gases comprising neon combined with a relatively small amount of argon and other purifying agents for these inert gases is sealed within this glass tube. Also sealed within the glass tube of the lamp are a pair of electrodes 19 and connected to these electrodes are the lead wires 20 and 21. The lead wire 20 is electrically connected to the rivet 7, whereas the lead wire 21 is embedded within the plastic leak resistance 16.

Leak resistances have been commonly used in connection with this type of glow lamp for permitting sufficient current to pass to the electrodes of the lamp for causing the latter to glow and after once being lighted, to permit sufficient leakage as to cause the lamp to remain lighted as long as a small amount of current is available and during the usual life of the lamp. Such leak resistances also prevent excessive currents from passing around and through the fuse after the fusible element has become ruptured as would cause a fire at the point where the short circuit occurs in the lighting circuit. The leak resistance 16 herein employed is prepared from a dielectric composition composed principally of a thermo-plastic condensation derivative of rubber prepared by the treatment of rubber with a halide of an amphoteric metal or chlorostannic acid and a conductive substance such as finely divided graphite and a finely divided insulating material such as clay. The thermo-plastic condensation rubber derivative employed acts as a binder for holding these powdered substances together and, further, as it has a great affinity for metals, will adhere to and retain in electrical connection the lead wire 21 and the threaded contact shell 12. At times it may be desirable, in order to effect a more positive contact between the inner surface of the contact shell and the resistor 16, to provide a suitable conducting member such as the wire 22. This small piece of wire has one end embedded within the resistor 16, whereas, its opposite end is connected to the contact shell 12 by means of solder and the like, as is indicated by the numeral 23.

In order to mount this lamp indicator within the plug fuse, I form within the base 1 a recess 24 which will receive the flattened end 17 of the lamp. The tubular extension 2 of the base is cut away as at 25 so that the body portion of the lamp may rest therein and the top or cover 8 of the fuse is provided with a recess 26 in which is seated the upper pointed end 18 of the lamp, whereby when the base and cover of the fuse are connected together, the lamp will be supported therein in the manner as best illustrated in Fig. 1 of the drawings. The base 1 has also formed therewith a pair of spaced and upstanding walls 27 which provide a recess therebetween for retaining the plastic resistor 16. The tubular ex-

ension 9 of the top or cover 8 is provided with a recess 28 in order that it may receive the two upstanding walls or partitions 27 of the base and thereby house the resistor 16 therein. The vertically extending recess 29 may also be formed within the outer surface of the cover 8 for receiving the small conductor or wire 22.

A soft, heavy paper cap 30 is seated upon the upper end of the tubular extension 2 of the base so that its flanged or skirt portion 31 extends about the fuse link 13 and this paper cap has a recess 32 formed therein for receiving the body portion of the lamp. This paper cap will protect the glass globe of the lamp from coming in direct contact with any molten metal given off by the fuse link 13 when the latter becomes blown as would possibly break or shatter the glass globe of the lamp.

In the form of invention as shown in Fig. 9 of the drawings, I connect the lead wire 21 of the lamp 15 to the threaded contact shell 12 and the outer end of the lead wire 20 is embedded within the leak resistor 33. This resistor is prepared from a thermo-plastic composition which when in its plastic condition, may be poured or placed within the bottom of the explosive chamber 3 over and around the inner end of the rivet 7 for forming a seal thereabout. The extremities of the fuse link 13 and the lead wire 20 are embedded therein. When the solvent within this plastic compound completely evaporates, the lead wire 20 and fuse element are not only securely fastened thereto, but are in electrical contact with the rivet 7. By this connection, the leak resistance is connected in series with the lamp and contact terminal 7 whereas the fuse link is directly connected to this contact terminal 7.

The top or cap 8 is prepared from a methyl methacrylate resin and thermo-plastic molding powder molded preferably in the design and shape as herein shown and with the application of heat and pressure to the mold, a translucent casing is produced which has light emitting qualities but not of sufficient transparency so that one could look through the casing and see the condition of the fusible link 13 arranged therein.

These molding powders may be obtained in various color tints extending over the spectrum and when forming these covers 8, they may be cast in various colors for designating the particular amperage rating of the fuse link to be housed therein. The outer surface of these caps or covers may have molded thereon the voltage and the amperage rating of the fuse to which the cap is applied.

In Fig. 10 of the drawings, I have illustrated the top of the fuse casing having molded thereupon "5A-125" which indicates that this top or cover is to be applied to a plug fuse having a rating of 5 amperes and to be used on electrical circuits of 125 volts. The molding powder from which this casing is made could be yellow in color, as this latter color may be used for denoting a plug fuse having a rating of 5 amperes. The indication "5A" upon a fuse is not always readily visible but a colored casing would be readily visible so that one could determine the exact rating of the fusible element therein. For a 10 ampere fuse the cover could be molded from a red molding powder, as is illustrated in Fig. 11; a 15 ampere fuse could be molded from a blue molding powder, as is illustrated in Fig. 12; a 20 ampere fuse could be molded from a purple molding powder, as is illustrated in Fig. 13; a 25 ampere fuse could be molded from a brown molding powder, as is il-

illustrated in Fig. 14, and a 30 ampere fuse could be molded from a green molding powder, as is illustrated in Fig. 15. The color of the casing will be readily visible so that upon inspection thereof, the exact amperage rating of the fuse to which it is applied will be instantly known. As the capacity of a fuse will then become recognized by these designating colors, one may more easily select a fuse for replacement and, furthermore, these colored fuses will greatly facilitate merchandising.

Should a fuse become blown or ruptured, it will, when arranged within an ordinary wiring system of 125 volts, give off a glow in color corresponding to the colored top of the fuse, thereby not only indicating the particular blown fuse but at the same time, denoting the particular amperage rating of the blown fuse so that one may also instantly select a fuse for replacement having the exact or required capacity.

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. An indicating plug fuse comprising a base, a central contact terminal carried by said base, a translucent cover, a threaded contact shell connecting said base and cover together, a fuse link connected to said central contact terminal and said contact shell, said base having a recess formed therein, a leak resistance element arranged within said recess and having contact with said contact shell, a glow lamp arranged within said translucent cover and having lead wires connected to said central contact terminal and said leak resistance, and a paper cap seated about said fuse link for separating the latter from said glow lamp.

2. An indicating fuse plug comprising a base, a tubular extension formed with said base providing an explosive chamber therein, an annular flange formed with said base, said tubular extension having an opening formed therein, a pair of spaced walls formed with said tubular extension and annular flange of said base providing a recess communicating with the opening formed within said tubular extension, a translucent cover extending over said base and the recess formed between the spaced walls thereof, a threaded contact shell connecting said base and cover, a fuse link arranged within the explosive chamber of said base and connected to said central contact and said threaded contact shell, a glow lamp, a leak resistance seated within the recess formed between said spaced walls of the base and means for connecting said lamp and leak resistance in series with said central contact and said threaded contact shell, but in parallel to said fuse link.

3. An indicating fuse plug comprising a base, a tubular extension formed with said base and having an explosive chamber formed therein, an annular flange formed with said base, a pair of

spaced walls formed within said annular flange providing a recess therebetween, a central contact secured to said base, a translucent cover, a threaded contact shell connecting said cover with said base, a fuse link arranged within the explosive chamber of the tubular extension of said base and connected to said central contact and said threaded contact shell, a glow lamp arranged within and supported by said base and cover, a leak resistance seated within the recess formed between the spaced walls of said base for connecting a lead wire of said lamp to said threaded contact shell, the other lead wire of said lamp being connected to said central contact shell, and a paper cap arranged over said tubular extension of said base for separating said glow lamp from said fuse link.

4. An indicating plug fuse comprising a base and a transparent cover having aligning pockets formed therein to form an explosive chamber, contact terminals, a fusible element arranged within said explosive chamber and connected in series with said contact terminals, a glow lamp indicator having reduced end portions, means whereby when said base and cover are connected together, they will engage the reduced end portions of said lamp for retaining the same in a longitudinal position within said explosive chamber and means including a leak resistance for connecting said lamp in series with said contact terminals and in shunt with said fusible element.

5. An indicating plug fuse comprising a base, a central contact secured to said base, a transparent cover, a threaded contact shell for connecting said base and cover together, a fusible element connected in series with said contacts, a glow lamp comprising an elongated tube having reduced end portions, said cover having a recess formed therein for receiving one of the reduced end portions of said lamp whereby when said cover and base are connected together, said lamp will be rigidly retained therein and means including a leak resistance for connecting said lamp in series with said contacts but in parallel with said fusible element.

6. An indicating plug fuse comprising a base having a central contact, a transparent cover, a threaded contact shell for connecting said transparent cover to said base, said cover and base having aligning pockets formed therein for establishing an explosive chamber when they are connected together, a fuse link arranged within said explosive chamber and connected in series with said contacts, a glow lamp comprising an elongated tube having reduced end portions, said reduced end portions of said lamp being retained in contact with said cover and base whereby when said cover and base are connected together, said lamp will be rigidly supported therein, means for separating said lamp from said fusible element and means including a leak resistance for connecting said lamp in series with said contact terminals and in shunt with said fusible element.

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