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S. QUISLING
ELECTRIC FUSE CUT-OUT

2,115,428

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Fig. 1.

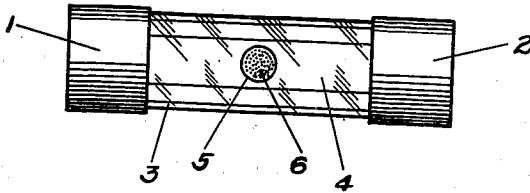


Fig. 2.

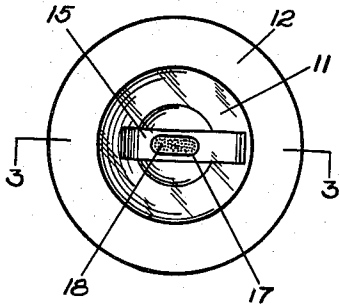


Fig. 3.

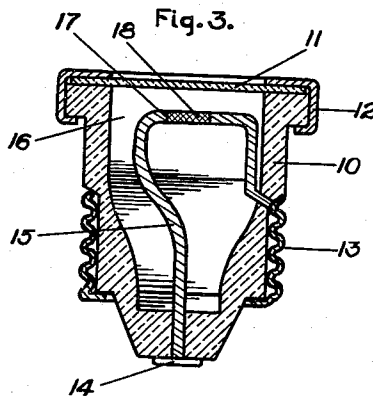


Fig. 4.

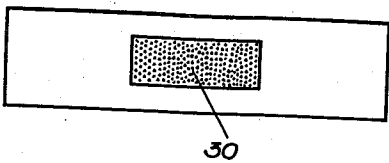


Fig. 5.

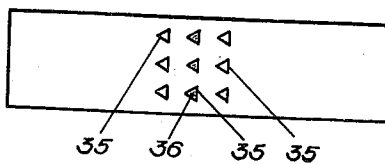


Fig. 6.

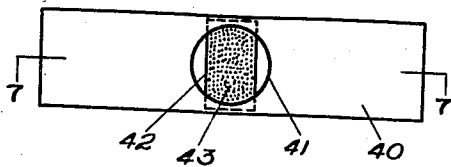
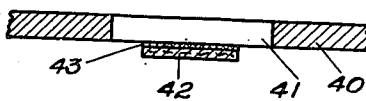


Fig. 7.



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ELECTRIC FUSE CUT-OUT

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11 Claims. (Cl. 200—121)

This invention relates to fuses for electric circuits, and, more particularly, to means for positively indicating the condition of the fuse link in electric fuse cut-outs having an observation window therein, under any and all conditions.

Various means and methods have been proposed and employed to indicate the condition of the fuse link, but none of these methods have been found completely satisfactory and reliable under all conditions. In one method a thin paper or other film material coated with an easily decomposable chemical has been placed across the observation window, immediately above the fusible link. When the fusible link ruptures, the heat produced is intended to cause a visible chemical change in the coating. If the fusible link is ruptured by a small overload current, the heat produced is very low and as a result the coating does not undergo any visible chemical change.

A further method employed is the use of a luminescent coating applied directly to the visible portion of the fusible link. This coating material is visible in darkness when the link is intact and is intended to lose its luminescence when the link ruptures. Frequently, however, the link ruptures at a point removed from the visible field thereby failing to destroy the luminescence of the coating, and thereby giving a false indication. It has also been found that the luminescent coating, when applied directly to the fusible link, frequently loses its luminescence because of the alternate heating and cooling of the link caused by currents passing through the link which are not sufficiently high to cause the link to rupture. This loss of luminescence also gives a false indication.

Other methods, including rather complicated mechanical means, have enjoyed passing popularity, but have increased the cost of production to a point where these means could not compete commercially with standard fuse cut-outs because of their questionable merits.

My invention provides a positive means for indicating the condition of a fusible link at practically no increased cost of production. It combines both the fusible link and the indicator and may indicate the condition of the fusible link in darkness as well as in light. My present invention is an improvement on the fuse indicator disclosed in my copending application Serial No. 5,189, filed February 6, 1935, in which application is disclosed an indicator in the form of a thin perforated or notched strip of sheet material coated with heat unstable chemical materials disposed in spaced relation to and between the fu-

sible link and observation window; the chemical coating being adapted to undergo a visible chemical change caused by the heat produced when the fusible link is ruptured by an overload current.

I have found that it is more practical and dependable to perforate the fusible link and suspend in or across the opening or openings, thus formed, a visible film of relatively poor electrical conductivity. Such film is disposed at a point where the heat is produced and the indicator is therefore, more sensitive and provides an accurate indication of the condition of the link. I have found that by perforating the fusible link at a point midway between its longitudinal extremities, the link would invariably rupture at the perforated portion.

Suitable material may be suspended within or across such perforation. This material readily drops or falls away from the link when its support, the link, fuses or ruptures. With indicators constructed of clearly visible material and disposed so as to close such opening, no difficulty was encountered in easily determining the condition of the fuse link. Various materials, including luminescent and non-luminescent, chemically heat stable and chemically heat unstable, may be used to fill or close the perforations. I have found that particularly good results may be obtained by the use of radio-active and other luminescent paints. Good results may also be obtained by placing a clearly visible strip of paper over the perforated portion of the link. Such paper may be coated with luminescent or brightly colored paint to make it more easily visible. I have found that the paper or other material readily falls from the link when the perforated support fuses, positively indicating that the link has been ruptured.

Fusible links of various current ratings may be made from a standard width and thickness of ribbon instead of several sizes as required to manufacture fusible links as made at present. The current rating is dependent upon the cross-sectional area of the link and this may be governed by the size of the perforation or the number of perforations in the link. The cross-sectional area of the portion of the link between the edge of the perforation and the lateral edges of the link will determine the current carrying capacity of the link.

Electric fuse cut-outs employing my invention may be manufactured without changes in methods of making and assembling the cut-outs, thus permitting the production of cut-outs having in-

creased utility at substantially no increased cost of production.

These and other advantages will become apparent from the following detailed description which is to be considered in conjunction with the accompanying drawing, wherein:

Fig. 1 is a longitudinal plan view of a cartridge type fuse plug embodying my invention;

Fig. 2 is a top plan view of a plug type fuse embodying my invention;

Fig. 3 is a sectional view of the fuse plug of Fig. 2 on line 3—3;

Fig. 4 is a top plan view of a fusible link made in accordance with my invention;

Fig. 5 is a top plan view of a fusible link having a plurality of perforations;

Fig. 6 is a top plan view of a fusible link illustrating a modification of my invention; and,

Fig. 7 is an enlarged sectional view of the link of Fig. 6 on line 7—7.

The fuse illustrated in Fig. 1 is of standard construction as recommended for cartridge type fuses. The fuse comprises the usual brass or other metal ferrules or end caps 1 and 2, a body or tube 3 of insulating material, such as glass, synthetic plastics or other suitable materials, and a fusible link 4. The tube 3 may be made of opaque materials, such as vulcanized fiber and the like, but such tubes must be provided with an observation window for use with my improved fusible link. The fusible link 4 may be made of magnesium, zinc or suitable metals or alloys which are generally used for these elements. Link 4 is provided with a circular opening 5, preferably centrally located with respect to the lateral and longitudinal extremities of the link. The opening 5 is closed by means of suitable material, such as a film of paint, coated paper, regenerated cellulose, cellulose esters, mucilage, glue, gelatin and the like. Film 6 may be preformed or formed in situ.

I prefer to form the indicator by mixing or dispersing a suitable paint pigment or luminescent material in a solution or plastic mixture of the film forming material. Sulfides of barium, calcium, strontium or zinc may be added to the pasty or plastic film forming material and dispersed therein by mixing thoroughly. A small globule of the mixture is then placed in the opening and allowed to set or dry, forming a closure for the opening. Radioactive materials, such as compounds of mesothorium, radium or uranium and the like, may also be added and have been found to increase the luminescence of the sulfides.

A bright colored film may be made by using a colored pigment such as iron oxide, lead chromate, or other pigments, or, if a white film is desired, white lead, zinc oxide, titanium dioxide, and the like. Obviously, where the fuse is to be used in well illuminated locations, simple pigments may be used and selected for the desired color of the film. If the fuse is to be used in dark locations, the luminescent pigments are desirable as they will emit a soft glow and are visible without the necessity of an independent source of illumination.

As stated herein before, I have found that the fusible link invariably ruptures at the perforated portion and the colored or luminescent film, on the destruction of its support, falls from the opening. To insure even more positive results, an oxidizing material may be added to the mixture of the film forming material and pigment. I have found the salts such as potassium

chlorate, potassium dichromate, sodium nitrate and the like may be used successfully. The addition of these materials serves to destroy the color or luminescence of the coating and may aid in the destruction of the film when the link is heated and ruptured by the overload current.

Although I have described indicators formed in situ within opening 5, the film may be formed with the pigment by the usual extrusion or other processes and small discs punched from the formed sheets. The discs are then placed in the opening and held frictionally in position. Paper may be coated with a thin film of paint and discs punched from the paper sheet. Paper which has been dyed may be used and the coating thereby dispensed with.

A common plug type fuse is illustrated in Figs. 2 and 3. The plug comprises a body 10 of insulating material such as glass, porcelain, phenolic resins, and the like. The top open end is closed by means of an observation window 11 of glass, mica or the like held in position by metal cap 12. A threaded metallic sleeve 13 is disposed at the opposite end of body 10. Contact button 14 is mounted externally at the bottom of body 10. A fusible link 15 is disposed in cavity 16 of body 10 and connected electrically between contact button 14 and threaded sleeve 13. Link 15 is provided with an elongated opening 17 which is closed by means of indicator disc 18. Link 15 is disposed in cavity 16 in such a manner so that the indicator disc is positioned behind window 11 and in close proximity thereto. The indicator disc 18 may be formed as is disc 6 described in connection with Fig. 1.

The fusible link may be provided with a rectangular opening 30, as illustrated in Fig. 4, or with a plurality of perforations 35, as illustrated in Fig. 5. Although the perforations 35 are illustrated as being triangular in shape, it is obvious that they may be circular, elongated, square or any other desired shape. Some or all of the perforations may be closed with indicator discs 36.

A further modification of my invention is illustrated in Figs. 6 and 7. The fusible link 40 is provided with an opening 41 or a plurality of openings (not shown). A strip of paper 42 is secured to link 40 by a suitable adhesive 43 and partially covers opening 41. The pigment or pigment and oxidizing material may be dispersed in the adhesive. The action of this indicator is similar to that described in connection with Fig. 1. It is obvious that the paper having a suitable coating may be mounted on the upper surface of the fusible link, if desired. Other film materials may be used in place of paper.

It is to be understood that the above description is merely illustrative of my invention and various modifications may be made without departing from the scope of my invention. The terms "top" and "bottom" and other like terms are not used herein as limitations but are used to simplify the description.

I claim:

1. A fuse link for electric circuit cut-outs comprising a fusible strip of electrical conducting material having a centrally located opening therein, and a poorly conducting visible material disposed within said opening, said visible material being adapted to fall from its position on rupture of said link.

2. A fuse link for electric circuit cut-outs comprising a fusible strip of electrical conducting material having an opening therein and a closure

for said opening, said closure comprising a poorly electrical conducting material and a visible pigment dispersed therein.

3. A fuse link for electric circuit cut-outs comprising a fusible strip of electrical conducting material having a centrally located opening therein, and a poorly conducting visible organic material disposed within said opening, said visible organic material being adapted to fall from its position on rupture of said link.

4. A fuse link for electric circuit cut-outs comprising a fusible strip of electrical conducting material having a centrally located opening therein, and a poorly conducting visible organic material with luminescent pigment dispersed therein, disposed within said opening, said visible organic material being adapted to fall from its position on rupture of said link.

5. A fuse link for electric circuit cut-outs comprising a fusible strip of electrical conducting material having a centrally located opening therein, and a poorly conducting visible organic material with a luminescent pigment and an oxidizing salt dispersed therein, disposed within said opening, said visible organic material being adapted to fall from its position on rupture of said link.

6. A fuse link for electric circuit cut-outs comprising a fusible strip of electrical conducting material having a centrally located opening therein, and a poorly conducting visible adhesive material with a pigment dispersed therein, disposed within said opening, said visible adhesive material being adapted to fall from its position on rupture of said link.

7. A fuse link for electric circuit cut-outs comprising a fusible strip of electrical conducting material having a centrally located opening therein, and a poorly conducting visible material

comprising a film of luminescent paint disposed within said opening, said film of luminescent paint being adapted to fall from its position on rupture of said link.

8. A fuse link for electric circuit cut-outs comprising a fusible strip of electrical conducting material having a centrally located opening therein, and a poorly conducting visible material comprising a strip of paper coated with pigment, disposed within said opening, said paper being adapted to fall from its position on rupture of said link.

9. A fuse link for electric circuit cut-outs comprising a fusible strip of electrical conducting material having a centrally located opening therein, and a poorly conducting visible material comprising a strip of paper coated with luminescent paint, disposed within said opening, said paper being adapted to fall from its position on rupture of said link.

10. An electric fuse cut-out comprising a substantially closed receptacle having an observation window therein and a fusible metallic ribbon disposed within said receptacle, said ribbon having an opening therein located in a position behind said window and in close proximity thereto and a closure for said opening visible through said window, said closure being adapted to fall from said opening on rupture of said ribbon.

11. An electric fuse plug comprising a substantially closed receptacle having an observation window therein and a fusible metallic ribbon disposed within said receptacle, said ribbon having an opening therein located in a position behind said window and in close proximity thereto, and a closure for said opening visible through said window, said closure comprising a film of organic material and a pigment dispersed in said film.

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