July 19, 1932. F. C. LA MAR 1,868,464

FUSE INDICATOR

Filed Oct. 3, 1929

Fig. 1.

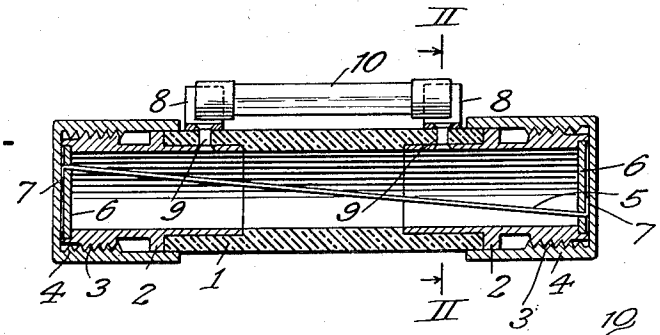


Fig. 2.

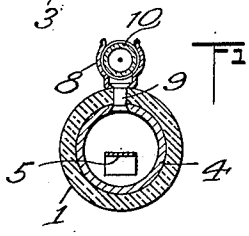


Fig. 3.

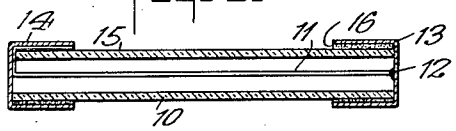


Fig. 5.



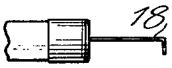


Fig. 4.

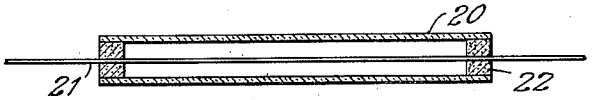


Fig. 7.

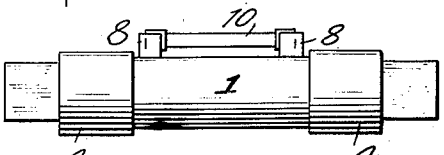


Fig. 6.

Fig. 8.

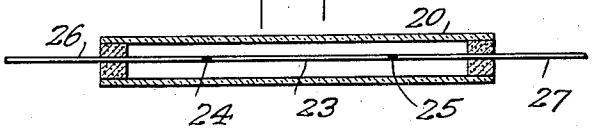


Fig. 9.

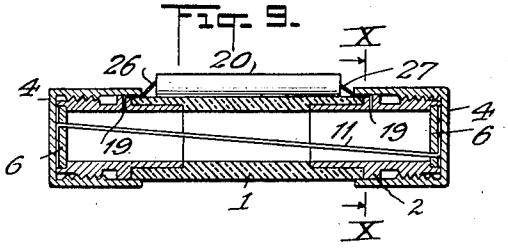


Fig. 10.

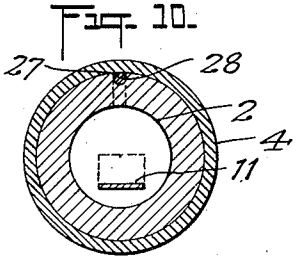
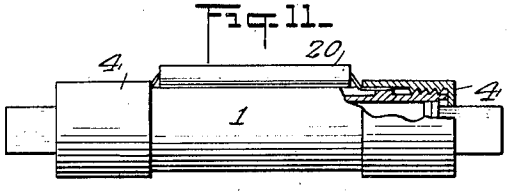


Fig. 11.



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Patented July 19, 1932 1,868,464

UNITED STATES PATENT OFFICE

FRANK C. LA MAR, OF NEW YORK, N. Y., ASSIGNOR TO GREAT WESTERN FUSE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

FUSE INDICATOR

Application filed October 3, 1929. Serial No. 396,987.

This invention relates to electrical fuses, especially to electrical fuses of the cartridge type, and more particularly to an indicator for such fuses which acts to give information as to the integrity of the fusible element.

It is well understood by those skilled in the electrical art that safety requires all circuits which carry or are capable of carrying an appreciable amount of current must have inserted safety devices in them to prevent an excessive flow of current under abnormal conditions.

A common safety device is the well known fuse made of a strip of metal which will melt upon the flow therethrough of an undesirable heavy current.

Fuses are made of many forms amongst which the cartridge fuse is a common type. The cartridge fuse may be either of the ferrule type or the knife blade type. In either case, if it is of the renewable type, there is no convenient and desirable means of simple form by which the fact that the fusible metal has melted may be indicated except by removing the fuse from its position and disassembling it.

A principal object of applicant's invention is the provision of a means by which the integrity of the fusible elements of a fuse may be ascertained by a visual inspection without disassembling the fuse or disturbing the position thereof.

Other objects and advantages will appear as the description of the particular physical embodiment selected to illustrate the invention progresses and the novel features of the invention will be particularly pointed out in the appended claims.

In describing the invention in detail and the particular physical embodiment selected to illustrate the invention, reference will be had to the accompanying drawing, and the several views thereof, wherein like characters of reference designate corresponding parts, and in which:

Figure 1 is an elevational longitudinal sectional view of a well known type of renewable ferrule type cartridge fuse with my invention applied thereto; Fig. 2 is an elevational cross-sectional view on the plane indicated by the line II—II of Fig. 1, viewed in the direction of the arrows at the ends of the line; Fig. 3 is an elevational longitudinal sectional view of an indicator made in accordance with my invention; Fig. 4 is a fragmentary end view of a modified form of fuse indicator; Fig. 5 is a fragmentary view of another modified form of fuse indicator; Fig. 6 is an elevational side view of a knife blade type of renewable cartridge fuse with my indicator in place thereon; Fig. 7 is a longitudinal sectional view of another modified form of fuse indicator; Fig. 8 is a longitudinal sectional view of another modified form of fuse indicator embodying my invention; Fig. 9 is an elevational longitudinal sectional view of a well known form of a renewable ferrule type of cartridge fuse with an indicator thereon of the genus illustrated by Figs. 7 and 8; Fig. 10 is an elevational cross-sectional view on the plane indicated by the line X—X of Fig. 9, viewed in the direction of the arrows at the ends of the line; Fig. 11 is a side elevational view with some parts broken away to more clearly show the construction of a knife blade type of renewable cartridge fuse with my invention in place thereon.

In Fig. 1, numeral 1 designates a hollow cylindrical body made of insulating material, preferably of hard fibre. At each end of the body 1 there is positioned a ferrule 2 formed with an external screw thread 3 for cooperation with an internally threaded cap 4. The strip of metal which forms the fusible element to be inserted in an electrical circuit and the integrity of which is to be visually indicated by my indicator is designated 5. It extends longitudinally through the body 1 and through washers 6, one at each end of the body and is then bent over as indicated at 7 so as to be held in place by the cap 4 when screwed home upon the ferrule 1.

The caps 4 at each end of the body 1 provide the electrical means by which the fuse is inserted in an electrical circuit and by which the current is conducted to the fusible member 5 within the fuse.

As one form of the indicator, applicant has shown in Fig. 1, metallic clips, as 8, one adjacent each end of the fuse. Each

clip is fastened in any appropriate manner electrically to the circuit in which the fusible element 5 is inserted, as by metallic rivets 9, passing through the wall of the body 1 and into and through the skirt or rear portion of the ferrule 2. Between the clips extends the indicator proper 10, shown in detail in Fig. 3. This indicator proper consists in principle of fusible strip or wire 11 which in use is electrically connected between the ferrule 2 at one end of the cartridge and the ferrule 2 at the other end thereof and is of comparatively low current carrying capacity. In Fig. 3, the fusible indicator wire 11 is attached at one end, by cementing as by soldering 12, to a metallic thimble 13 and at the other end is preferably bent over with two approximate right angle turns and bears against a metallic thimble 14, the intermediate portion of the fusible indicator wire 11 being preferably protected by a surrounding body preferably made of a refractory material, such as 15 in the form of a tube, which serves to provide a means by which the bent over ends of the fusible indicator wire 11 may be wedged in contact with the metallic thimble 14 and also forms a suitable support for the metallic thimble 13 which may be secured thereto by friction or by a cementing material as 16. If, as is preferable, the refractory tube 15 is transparent the condition of the fusible indicator wire 11 is at all times visible.

If a device such as has been illustrated in Figs. 1, 2 and 3 is inserted into an electrical circuit then the drop of potential from the ferrule 2 at one end of the fuse to the ferrule 2 at the other end thereof, if the fusible element 5 is of a considerable cross-section, is so small that an infinitely small amount of current will flow through the fusible indicator wire 11, so that, just so long as the fusible element 5 is intact and its integrity preserved there is no appreciable visible effect upon the fusible indicator wire 11, but if an abnormal flow of current occurs in the circuit, then, in accordance with the desired arrangement, the fusible element 5 will melt, thus causing the entire flow to pass through the fusible indicator wire 11 which, of course, immediately melts, and such condition is made evident by a mere visual inspection through the transparent tube 15, without disassembling the fuse or removing it from its position. When such an event occurs, the fuse is then removed, disassembled, and a new fusible strip 5 inserted therein, and a new indicator 10 slipped into the clips 8, and the fuse replaced.

In some cases it may be desirable to dispense with the use of clips, as 8, and to that end, applicant contemplates using a modified form of indicator 10, that is, the metallic thimbles, as 13 and 14, will be provided with outstanding contacting wires, one as shown in Fig. 5 and designated 17; and, another form as shown in Fig. 4 and designated 18. When the forms as shown in Figs. 4 and 5 are used the wire, as 17, will be slipped in between a ferrule, as 2, and a cap, as 4, in which position it will be held securely in place by wedging between the ferrule and the cap. In order to be more secure, the wire may be bent downwardly, as shown in 18, and inserted in a small cavity in the ferrule, as 2 as shown in Fig. 9 at 19.

If the indicator is applied to a knife blade fuse the fuse will appear as shown in Fig. 6, that is, if the metallic clips 8 are used. If they are not used then the indicator may be held in place as described in connection with Figs. 4 and 5.

Another form which the indicator may take is illustrated in Fig. 7. This form includes a transparent tube 20, preferably of refractory material, with a fusible indicator wire 21 passing therethrough and extending a convenient distance beyond the ends thereof, and held in place therein by any suitable cementing material as 22.

In Fig. 8, there is illustrated another modified form in which the transparent tube 20 is shown, and which includes a fusible indicator wire 23 joined, as at 24 and 25, to substantial metallic wires, as 26 and 27, by cementing means as by soldering. The purpose of this modification is to provide substantial, not easily damaged wires, as 26 and 27, preferably made of copper, extending without the tube 20. In case the fusible wire 23 itself extended without the tube 20 it would not be so convenient and reliable in use as this wire 23 is generally made of an easily damaged material.

In Fig. 9 the form of fuse as shown by Fig. 8 has been illustrated in place on a ferrule type of fuse with the wires 26 and 27 passing under the caps as 4 and bearing against the ferrules as 2. In this case, the ferrule 2 is formed with a half round curve 28 within which the wires as 26 and 27 lie, thus being more securely held in place. The ferrule 2 is also formed with cavities, as 19, so that the form of indicator as shown in Fig. 4 may be employed by inserting the bent end of the wire 18 in the cavities, as 19, also if found desirable the wires as 26 and 27 may be bent downwardly and inserted in these cavities as 19.

In Fig. 11, a knife blade type of fuse has been illustrated, showing an application thereto of an indicator of the type as shown by Fig. 7.

If indicators of the type as shown by Figs. 7 and 8 are used, the melting of a fuse wire, as 5 is indicated in the same manner as explained in connection with the Fig. 3, that is, in the case of Fig. 7, the fusible wire 21 would be melted and thus would be evident

by a visual inspection through the tube 20. In the case of Fig. 8, the fusible element would melt and would likewise be visible by inspection through the transparent tube 20.

Although I have described several particular physical embodiments of my invention, the principle, and construction thereof, nevertheless, I desire to have it understood that the particular forms selected are illustrative merely and do not exhaust the possible physical embodiment of the idea of means underlying my invention.

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

1. In a cartridge fuse, in combination: an elongated hollow body of insulating material; two metallic ferrules, one attached to each end of the body, said ferrules each formed with a longitudinal groove opening on the outer circumferential suface thereof; a fusible wire of very low current carrying capacity having one end positioned in a groove of one ferrule and the other end positioned in a groove of the other ferrule; caps, one positioned on each of the ferrules and having a portion extending over and covering the groove therein whereby the ends of the fusible wire are held in place, and a fusible link within the body electrically connecting the ferrules.

2. In a cartridge fuse, in combination: an elongated hollow body of insulating material; two metallic ferrules, one attached to each end of the body, said ferrules each formed with a longitudinal groove terminating in a transverse cavity opening on the outer circumferential surface thereof; a fusible wire of very low current carrying capacity having one end positioned in a groove and cavity of one ferrule and the other end positioned in a groove and cavity of the other ferrule; caps, one positioned on each of the ferrules and having a portion extending over and covering the groove and cavity therein whereby the ends of the fusible wire are held in place, and a fusible link within the body electrically connecting the ferrules.

3. In a cartridge fuse, in combination: an elongated hollow body of insulating material; two metallic ferrules, one attached to each end of the body, said ferrules each formed with a longitudinal groove opening on the outer circumferential surface thereof; an indicator of very low current carrying capacity having two terminals, one positioned in a groove of one ferrule and the other end positioned in a groove of the other ferrule; caps, one positioned on each of the ferrules and having a portion extending over and covering the groove therein whereby the ends of the fusible wire are held in place, and a fusible link within the body electrically connecting the ferrules.

4. In a cartridge fuse, in combination: an elongated hollow body of insulating material; two metallic ferrules, one attached to each end of the body, said ferrules each formed with a longitudinal groove terminating in a transverse cavity opening on the outer circumferential surface thereof; an indicator of very low current carrying capacity having two terminals, one positioned in a groove and cavity of one ferrule and the other positioned in a groove and cavity of the other ferrule; caps, one positioned on each of the ferrules and having a portion extending over and covering the groove and cavity therein whereby the terminals of the indicator are held in place, and a fusible link within the body electrically connecting the ferrules.

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