March 17, 1942. F. C. LA MAR 2,276,785

FUSE INDICATOR

Filed Nov. 19, 1940

Fig. 1.

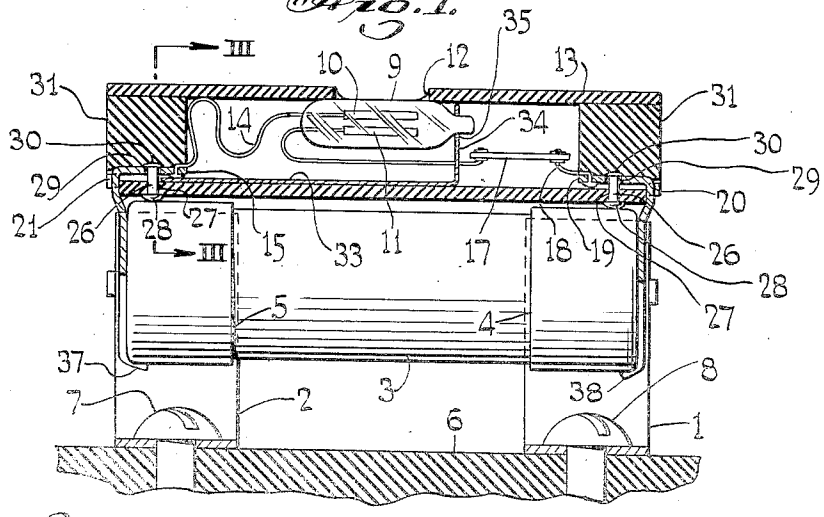


Fig. 2.

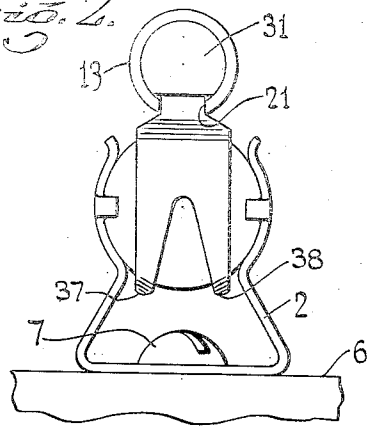


Fig. 4.

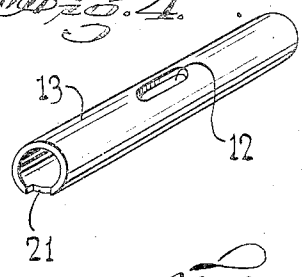


Fig. 5.

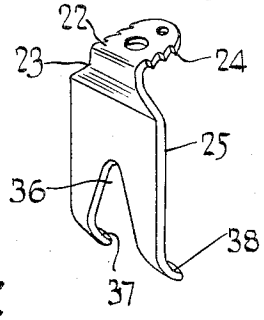


Fig. 3.

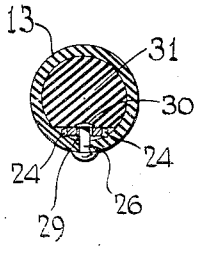
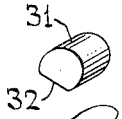


Fig. 6.



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2,276,785

FUSE INDICATOR

Frank C. La Mar, Tucson, Ariz.

Application November 19, 1940, Serial No. 366,255

4 Claims. (Cl. 200—121)

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 that all circuits which carry, or are capable of carrying, an appreciable amount of current shall have inserted therein safety devices 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 undesirably heavy current.

Fuses are made of many forms, amongst which the cartridge fuse is a common form. The cartridge fuse may be either of the ferrule type or of the knife blade type. In either case, it is desirable to provide a convenient and simple form of means adapted to indicate the fact that the fusible metal has melted without making it necessary to first remove the fuse from its position and to disassemble the fuse.

It is also desirable to provide a means by which the cartridge can be readily removed manually from the supporting structure, and restored thereto without making it necessary to insert the operator's hand between the contact clips, or in proximity thereto, which is of course very dangerous when a current of high voltage is flowing in the working circuit protected by the fuse.

An object of the invention is to provide an indicator device formed as a hollow body of insulating material enclosing an indicator lamp visible through an orifice in said body and which serves also as a fuse puller by which the cartridge may be moved bodily into and out of its supporting clip; also to provide metal connecting devices for interconnecting the lamp and cartridge electrically and mechanically, whereby the indicator lamp is included in shunt with the cartridge in the working circuit when the cartridge is assembled therewith in said clips. The removal of the cartridge from the contact terminal clips can also be effected conveniently by means of the integrity indicator when constructed suitably for that purpose.

An important object of the invention is to provide an integrity indicator in which extension terminals comprising metal clips which serve to interconnect the indicator means electrically with the ferrules at the ends of a cartridge fuse, so that the indicator will be in shunt to the fuse, and which also serve to connect the fuse puller mechanically with the cartridge, will be so disposed that only those parts which contact with the fuse cartridge ends, to carry current thereto, will be exposed, and that to a minimum extent, the rest of these connecting members being insulated.

A cognate object of the invention is to encase in the insulating structure of the hollow integrity indicator body as much as possible of the current carrying parts, so that there is substantially no metal exposed beyond the mutually contiguous regions of the indicator tube and the fuse, nor beyond the line of contact extending lengthwise therebetween; and the invention provides also at the ends of the tube for protection of the end parts by insulating material, in order to close in the contained current carrying parts at that region.

A further object of the invention is to provide an improved means for mounting the indicator lamp in the tubular insulating support and for completing the electrical connections between the indicator lamp, its associated resistance, and the connecting prongs or exterior terminals by which the indicator is coupled mechanically and electrically to the fuse cartridge.

Still another object of this invention is the provision of a means by which the integrity of the fusible element of a fuse may be ascertained by a visual inspection without disassembling the fuse or disturbing the position thereof, and which may be applied to the common forms of ferrule type fuses, or fuses including a ferrule or cap by a simple manual operation, not involving permanent fastening means.

Other objects and advantages will appear as the description of the particular physical embodiment selected to illustrate the invention progresses and the novel features 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 thereon, wherein like characters of reference designate corresponding parts. and in which:

Figure 1 is a side elevational view of a ferrule type fuse and clips with a fuse integrity indicator of new and improved form shown in connection therewith, the fuse integrity indicator being shown in section; Fig. 2 is an end view of the device as shown by Fig. 1; Fig. 3 is a cross-sectional view upon the plane indicated by the line III—III of Fig. 1, viewed in the direction

of the arrows at the ends of the line; Fig. 4 is a perspective view of a fibre tube prepared for use with my invention; Fig. 5 is a perspective view of a talon member used with my invention; Fig. 6 is a perspective view of a plug holding member used with my invention.

Referring especially to Fig. 1, numerals 1 and 2 designate the ordinary and well known metallic clips used for receiving and positioning the ordinary and well known ferrule type fuse 3 having the metallic end members 4 and 5. These clips 1 and 2 are attached to a suitable base, as 6, by any suitable or appropriate manner, as by screws 7 and 8.

As is well understood, the cartridge fuse 3 contains a fusible strip connecting the metallic end ferrules 4 and 5 and upon an undue flow of electric current therethrough the fusible strip melts. When the fusible strip connecting metallic ferrules 4 and 5 melts, applicant's device gives a visual indication thereof.

The visual indicating device or fuse integrity indicator of applicant's invention includes a lamp 9. This lamp 9 may be of any suitable or appropriate form but it is preferred to have it of the gas filled discharge type in that it has an electrode 10 and an electrode 11 therein separated to form a discharge gap which upon the application of the proper electrical potential provides for a discharge between the electrodes and the lamp 9 being filled with a rare gas, such as neon and perhaps argon and helium, an illumination is produced which may be observed through the cut out portion 12 of the tube 13.

The electrode 10 is connected by electrical conductor 14 to a talon member, or conductor clip 15, which contacts with the metallic ferrule 5. The electrode 11 is connected by the electrical conductor 16 to one end of a resistance 17, the other end of which is connected by an electrical conductor 18 to the metallic talon, or conductor clip 19, which is in contact with the metallic ferrule 4.

The resistance 17 may be of any suitable and appropriate form but is preferably of very high resistance of the order of thirty to fifty thousand ohms and is constructed, preferably, in the form of the ordinary and well known grid leak resistance as used in radio. It is preferred to enclose the lamp 9 within a shield. This shield is preferably formed of an insulating plastic or fibre such as the well known horn fibre. The tube 13 is preferably elongated and substantially as long as the cartridge fuse 3. Each end of the tube 13 is preferably formed with a cut away portion, or recess, as 20 and 21.

Each end of the tube 13 carries a talon member, as 15 and 19. Each talon member is formed, as best shown in Fig. 5, in that it has a right angled portion, or tongue 22, which extends within the tube 13 and a neck portion 23 which just fits within a cut away portion 21 of the tube 13. The right angle portion 22 when assembled lies right against the material of the tube and is formed with serrations 24 which are bent slightly downwardly, as shown in Fig. 5, and point toward the main portion 25 of the talon member. These serrations 24 cut into the material of the tube 13 and so assist in keeping the talon member 15 in place.

In order to be entirely secure it is preferred to attach each talon member to the tube by a rivet. Both talon members are similarly attached. Talon member 15 is attached by the rivet 26 which passes through an orifice 27 in the tube 13, has a head 28 which bears upon the outside periphery of the tube, passes through an orifice 29 in the talon 15, and is headed at 30. When the rivet 26 is positioned and headed on both ends, as described, the talon member is firmly secured in place in the end of the tube.

In some situations it may be unnecessary to employ the rivets as 26 but whether they are employed or not, a plug member as 31 is driven into each end of the tube 13. This plug member is made of any suitable or appropriate insulating material but preferably of a hard rubber which is slightly resilient. The plug 31 is provided with a flattened face 32 and when the plug is adjusted to be driven into the end of the tube 13, the flattened portion or face 31 is positioned parallel to the right angle end 22 of a talon member so that when the plug is driven into the end of the tube, even if no rivet 26 is employed, the talon member is securely held in place.

Before the talon member 15 is positioned in the tube, a lamp positioner 33 is positioned in the tube so as to position the lamp 9. This lamp positioner extends under a talon member, as 15, so that it is thereby held securely in place and the lamp positioner has the right angle bend 34 having an orifice 35 therein into which the reduced tube end of the lamp 9 is positioned thereby holding the lamp in place. The conductors 14 and 16 are so stiff that they also cooperate to maintain one end of the lamp in place.

The order of assembly of the parts is to position the lamp 9, as shown in Fig. 1, with the lamp holder 33 in place, as shown in Fig. 1, after the resistance 17 has been connected to the electrical conductor 16 and the electrical conductor 18 has been attached to the resistance and attached to the talon member 19 in any suitable and appropriate manner, as by soldering. Then, if a rivet is used, it is put in position and headed and then a plug as 31 is driven into the end of the tube in place, as shown in Fig. 1. The conductor 14 is of such length that it may be soldered to talon member 15 before talon member 15 is inserted into the end of the tube. After it has been so soldered to talon member 15, the talon member 15 is put in position, as shown in Fig. 1, and rivet 26 put in position and headed, taking care that lamp positioner 33 has its end under the talon member, and then plug 31 is driven in, completing the assembly.

The talon members 15 and 19 have their body portions, as 25, as shown in Fig. 5, preferably bifurcated at 36, forming talons, and each of the talons have their ends as 37 and 38 bent almost at a right angle with the body 25 of the talon member and the talon member is of such length that when so formed and as positioned in the tube as shown in Fig. 1, it may be pushed down over the end of a ferrule type fuse and the parts 37 and 38 will clasp under the lower peripheral edge of the ferrules as 4 and 5. This clasping about the ferrules 4 and 5 may be made to take place so strongly that the fuse integrity indicator may be used as a fuse puller, that is, it may be used to withdraw the fuse from the clips or to replace a fuse in the clips.

As the talon members 15 and 19 are made of metal and preferably a good electrical conducting metal such as brass, the discharge electrodes 10 and 11 of the lamp are thereby electrically connected to the current carrying parts 4 and 5 of the fuse and so to the clips 1 and 2 so that when the fusible metal within the tube 3 melts

the circuit is formed through the lamp 9 which thereby is illuminated and gives notice visually by arrestive indication due to the peculiar coloring of the neon that the fuse is not intact, but has blown.

By the construction hereinbefore described, it will be seen that a fuse integrity indicator has been formed in which no metal parts are exposed above the bend in the metal talons 15 and 19 where they project into the tube 13 and even here the bends are protected by insulating material on the top and both sides and that the cut away portion as 21 in the tube is preferably of such depth that the outer face of a talon does not go to the end line of the tube so that a foreign body approaching the end of the tube would not be likely to get in contact with the current carrying talon body.

The lamp positioned 33 may be made of any suitable or appropriate material, it is preferred to make it of an insulating material such as a thin strip of fibre.

Although I have particularly described a particular embodiment of my invention and explained the principle, construction and mode of operation thereof, nevertheless, I desire to have it understood that the form selected is merely illustrative but does not exhaust the possible physical embodiments 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. An indicator for fuses, including a casing, a lamp within the casing, conductor clips, means for electrically connecting said conductor clips to said lamp, each of said conductor clips formed with a tongue and one projecting into one end of the casing and another into the other end of the casing, insulating plugs, each formed with a flat face, one driven into each end of the casing with the flat face abutting the said tongue, said conductor clips adapted to make contact with the ferrules.

2. An indicator for fuses, including a casing, a lamp within the casing, conductor clips, means for electrically connecting said conductor clips to said lamp, said casing having recesses formed at each end thereof, tongues formed with said conductor clips and projecting into said casing, said clips also formed with a neck portion fitting into said recesses, rivets, one passing through each tongue and the casing and securing the tongues to the casing, insulating resilient plugs, each formed with a flat face, one driven into each end of the casing with the flat face abutting the said tongue and each conductor clip formed with a talon for detachably connecting the indicator to a fuse.

3. An indicator for fuses, including a casing, a lamp within the casing, conductor clips, means for electrically connecting said conductor clips to said lamp, said casing having recesses formed at each end thereof, tongues formed with said conductor clips and projecting into said casing, said clips also formed with a neck portion fitting into said recesses, insulating resilient plugs, each formed with a flat face, one driven into each end of the casing with the flat face abutting the said tongue and each conductor clip formed with a talon for detachably connecting the indicator to a fuse.

4. An indicator for fuses, including a casing, a lamp within the casing, conductor clips, means for electrically connecting said conductor clips to said lamp, said casing having recesses formed at each end thereof, tongues formed with said conductor clips and projecting into said casing, each tongue formed with serrations on opposite edges, said clips also formed with a neck portion fitting into said recesses, rivets, one passing through each tongue and the casing and securing the tongues to the casing, insulating resilient plugs, each formed with a flat face, one driven into each end of the casing with the flat face abutting the said tongue and each conductor clip formed with a talon for detachably connecting the indicator to a fuse.

FRANK C. LA MAR.