

United States Patent [19]

Melugin

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[54] IN-LINE FUSE HOLDER

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[58] Field of Search **337/201, 205, 206, 213, 337/241, 265; 339/252**

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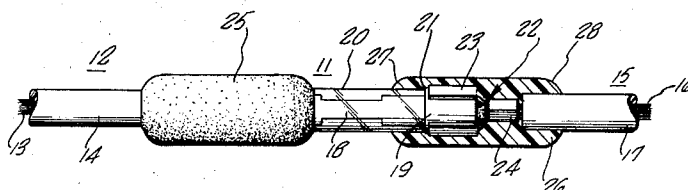
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[57] ABSTRACT

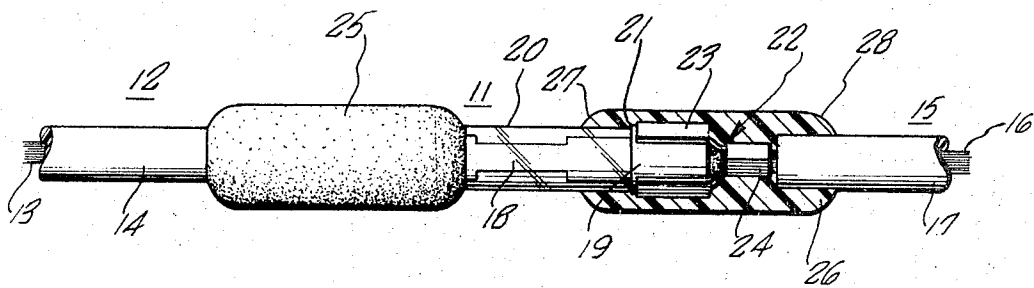
A moisture and waterproof seal for a fuse is provided while allowing for fuse visibility. The fuse holder includes a flexible molded member which is formed with a lip at the end proximate to the fuse thereby allowing the lip to engage and envelop the rim of the conductive cap or ferrule on the end of the fuse. Internal to the molded member is a yieldable clip which is not readily permanently deformed by the insertion of the fuse ferrule therein because of the surrounding molded member.

15 Claims, 1 Drawing Figure



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IN-LINE FUSE HOLDER

BACKGROUND OF THE INVENTION

This invention relates to in-line fuse holders.

More particularly, this invention relates to moisture and waterproof in-line fuse holders which allows the visibility of a fuse wire and the replacement of the fuse by pulling an attached conductor, and thus an insulation member from about the fuse.

In the past, in-line fuses have typically been connected by conductive inserts which require a separate insulating member to prevent the conductive inserts from causing sparks or short circuits when the inserts come in contact with other conductive objects.

Further, the conductive inserts tend to deform and thus are rendered poor electrical contacts with repeated replacement of their associated fuse. Other prior art devices included snap clip arrangements which were awkward and difficult to handle when replacing their associated fuses and also typically resulted in poor insulators.

Still further, prior art arrangements which were adequate insulators did not provide for substantially complete fuse wire visibility. Thus, if an in-line fuse assembly was properly insulated, difficulties occurred in either the replacement aspect, or the visibility aspect of the associated fuse.

By the practice of this invention, an in-line fuse holder is formed which provides a moisture and waterproof seal for the conductive cap members or ferrules at each end of the fuse. A molded flexible or pliable material is formed over the ferrule and its associated clip, and, at a lip of the molded member proximate the fuse, engages the rim or bead of the ferrule to provide an insulating means to the fuse without hampering the visibility of the fuse wire. The in-line fuse holder provides a vacuum fit or seal which gives good insulation properties while allowing for replacement of the fuse by pulling the associated conductor, which may also be connected or bonded to the insulation of the molded member.

SUMMARY OF THE INVENTION

It is an object of this invention to provide an in-line fuse holder which insulates the fuse while allowing relatively full visibility of the fuse wire.

It is another object of this invention to provide an in-line fuse holder which provides an insulation disposed about the ferrule of an associated fuse and also the ready replaceability of the fuse.

It is a further object of this invention to provide a method for forming an in-line fuse holder which will result in a readily replaceable insulated and substantially visible fuse wire, in an in-line fuse holder.

BRIEF DESCRIPTION OF THE DRAWING

This invention both as to its organization and principles of operation together with further objects and advantages thereof, may better be understood by referring to the following detailed description of the embodiment of the invention when taken in conjunction with the accompanying drawing in which the drawing is a side view partially in cross-section illustrating an exemplary embodiment of the basic concepts of method and apparatus for forming an in-line fuse holder in accordance with this invention.

DETAILED DESCRIPTION

Referring now to the drawing, there is illustrated an in-line fuse holder electrically connected at a first end of a fuse 11 to a first conductor 12. The conductor 12 has an electrically conductive portion or single or multistrand wire 13 and an insulating portion 14 formed of materials well known in the art, and disposed about the wires 13. Likewise, the in-line fuse holder is electrically connected, at its second end to a second conductor 15 having an electrically conductive portion 16 and an insulating portion 17 disposed about the conductive portion 16.

The fuse 11 is of a standard design and includes a conductive fusible link or fuse wire 18 positioned between spaced ferrules or conductive end cap members, such as ferrule 19. The fuse wire 18 is disposed within a transparent body 20 typically formed of glass, plastic or the like. The ferrule 19 is formed about the fuse 11 in a manner well known in the art and results in a rim 21 formed at the interface of the glass 20 and the ferrule 19. Alternately, the ferrule 19 may be formed with an outer depending flange or bead at the interface of the glass 20 and the ferrule 19.

The fusible link or fuse wire 18 allows electric current to flow through such wire without blowing or melting the wire while the electric current is below a selected or specified ampere rating such as 30 or 40 amps. Such fuse wire blows or melts when current above such selected or specified ampere rating flows through the wire. The sensitivity of the fuse wire, such as the length of time before blowing, may vary, depending on the various compositions and other factors well known to those skilled in the art.

The fuse wire or fusible link 18 may be electrically attached or connected to the conductive cap members or ferrules such as ferrule 19 of the fuse 11 by any manner well known in the art. Typical of such manners are spot welding or soldering of the fuse wire 18 directly to the ferrule 19.

Disposed about the ferrule 19 and frictionally engaging the outer surface of the ferrule 19 is a yieldable conductive clip insert or fuse end holder 22. Fuse end holder 22 may be of any well known construction as long as it ultimately achieves proper electrical contact with the ferrule 19. The fuse end holder 22 is illustrated as comprising a yieldable circular flange portion 23 having a slot therein. The circular flange portion 23 has an inside diameter substantially the same or smaller than the outside diameter of the ferrule 19 in order to provide frictional engagement. The circular flange member 23, as previously mentioned, was a source of prior art difficulty in that movement of the ferrule 19 in and out of the flange 23 tended to permanently deform or stretch the flange 23 thereby providing faulty electrical contact.

The fuse end holder 22 also includes a crimpable portion 24 electrically coupled to the circular flange portion 23 and adapted to be crimpably disposed about the wires 16 in a manner well known in the art. The wires such as wires 16, typically are of a gauge such as a 14 gauge, but may be of any gauge depending upon the application of the fuse. The crimpable member 24 is typically pressed or crimped about the wires 16 to provide proper electrical and mechanical contact thereto. Alternately, a solder composition may be used to assure an electrical connection.

Insulating members 25 and 26 are formed over a portion of the insulators 14 and 17 respectively. At the end proximate the fuse 11, insulating member 26 provides a lip portion 27 which engages and envelops the cap rim, edge, border or bead 21 of the ferrule 19 thereby providing a moisture and waterproof seal with the glass 20 of the fuse 11. The insulating members 25 and 26 are preferably formed by a process of injection molding, well known in the art, of a material which is relatively flexible or pliable so that, while the lip portion 27 is strong enough to provide a vacuum type seal to an end of the fuse 11, the pulling of the conductor, such as conductor 15 will allow the insulating member 26 to be pulled apart from the fuse 11 thereby readily allowing the replacement of the fuse 11.

Insulating members 25 and 26 allow substantially the entire glass portion 20 of the fuse 11 to be visible thereby making it readily apparent whether the conductive fusible link of fuse wire 18 is blown. Further, the insulating members 25 and 26 envelop all the conductive portions of the fuse 11 so that the possibility of sparking and/or shorting out is substantially eliminated.

The insulating portions 14 and 17 formed about the conductors 12 and 15 may readily be provided with a sealant about the insulating portions 14 and 17 respectively to assure a liquid tight and secure fit at the remote end of the insulation members 25 and 26. However, the tapered lip like portion such as portion 28 at the remote end of the insulating member 26 disposed about the conductor 15 provides a suitable frictional seal. Alternatively, the lip portion 28 may, upon being formed, be melted or bonded integrally with the insulation portion 17 to achieve added strength.

The lip portion 27 is formed so that its inside diameter is less than the outside diameter of the ferrule 19. Alternately, and preferably, the inside diameter of the lip 27 is less than that of the outside diameter of the glass portion 18 of the fuse 11.

In operation, when the insulating members 25 and 26 are molded over the conductor 12 and 15 respectively, and over the fuse end holders to engage the rim of the fuse end holders, the circular flange member 23 is prevented from being substantially deformed by repeated insertions and extractions of the ferrule of the associated fuses by the strength or resiliency of the molded member 26.

A suitable material for forming the insulating members 25 and 26, through the use of well known injection molding techniques, is the use of polyvinyl chloride plastic compound. The insulating members 25 and 26 may also readily be formed from rubber, neoprene or other pliable plastic or rubber like material. Suitable candidates are the use of semi-rigid vinyl, nylons, and teflons, etc.

The in-line fuse holder of the instant invention also results in a strain relief mechanism in that, when lip 27 is bonded, or securely grips the insulating portion 17 of the conductor 15, the strain of a lateral force applied to the conductor 17 is not transmitted to the fuse end holder 22, but is directed directly to the conductor 15.

By the practice of this invention, not only the above mentioned advantages are realized, but also the unique construction of the instant in-line fuse holder allows the color coding of the insulating members to allow for readily identifying the desired associated fuse. This

color coding may be accomplished by manners well known in the art either prior or subsequently to the molding of the insulating members on their associated conductors.

Although the instant invention has been described as having the unique insulating member disposed about and enveloping beads or rims of both ferrules at each end of the fuse, it is believed apparent that the invention is as applicable to in-line fuse holders in which only one such insulating member is used and the ferrule, without the insulating member of the instant invention, is electrically connected or mounted in any of the manners known in the art.

By the practice of this invention, an attractive, easy to manufacture, reliable and secure in-line fuse holder has been achieved. The in-line fuse holder may readily be color coded and also allows for the easy replacement of fuses with a readily viewable portion. The instant fuse holder also provides an electrical insulation as well as a moisture and waterproof seal.

While an embodiment and application has been shown and described, it will be apparent to those skilled in the art that many more modifications are possible without departing from the inventive concepts herein described. The invention is therefore, not to be restricted except as is necessary by the prior art and by the spirit of the appended claims.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. An in-line holder for a fuse having a conductive end portion coupled to a fuse body, comprising:
 - a conductor having an electrically conductive portion and an insulating portion disposed about said electrically conductive portion;
 - a conductive fuse end holder means electrically connected to said electrically conductive portion of said conductor, said fuse end holder means adapted to receive and electrically couple the conductive end portion of the fuse; and
 - a flexible member disposed about a part of said insulating portion of said conductor, and about said conductive fuse end holder means and about the entire conductive end portion of the fuse, said flexible member forming an aperture allowing the insertion of a portion of the fuse including the conductive end portion, into electrical and mechanical contact with said fuse end holder means, said flexible member forming a resilient lip means which engages a rim at the junction of the conductive end portion and the fuse.
2. The holder as in claim 1 wherein said resilient lip has an inner diameter less than the outer diameter of the conductive end portion of the fuse.
3. The holder as in claim 1 wherein the diameter of said resilient lip has an inner diameter less than the outer diameter of the fuse body thereby forming a vacuum seal with the fuse body.
4. The holder as in claim 3 wherein the fuse body is substantially transparent.
5. The holder as in claim 4 wherein said flexible member includes a second lip means engaging a part of said insulating portion of said conductor.
6. The holder as in claim 5 wherein said flexible member substantially prevents the outward deformation of said fuse end holder means.
7. The holder as in claim 6 wherein said fuse end holder means includes a circular flange means disposed

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about the end portion of the fuse and in electrical contact therewith, and a crimping means electrically connected to said circular flange means for providing electrical and mechanical connection to the electrically conductive portion of said conductor.

8. The holder as in claim 7 wherein the flexible member is color codable.

9. The holder as in claim 8 wherein the flexible member is a molded member.

10. The holder as in claim 9 wherein the flexible molded member is injection molded.

11. The holder as in claim 10 wherein the flexible molded member is formed of polyvinyl chloride.

12. The holder as in claim 10 wherein a like second flexible molded member is formed about a like second end of the fuse.

13. The method of forming an in-line fuse holder comprising the steps of:

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electrically connecting a fuse end holder to an electrically conductive portion of a conductor and molding an insulating material about the fuse end holder and the insulating portion of the conductor thereby forming an aperture for receiving a conductive end cap member of an associated fuse having a rim thereon at the border of the cap member and the fuse body, a first lip of the molded member releasably engaging the rim of the cap member thereby providing an insulated moisture proof seal for the fuse.

14. The method as in claim 13 including the repeating of each of said steps for each end of the fuse.

15. The method as in claim 14 including the step of bonding a second lip of the molded member with a part of the insulating portion of the conductor.

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