Sept. 11, 1934. A. G. STEINMAYER 1,973,120

FUSE LINK

Filed June 1, 1931

Fig. 1

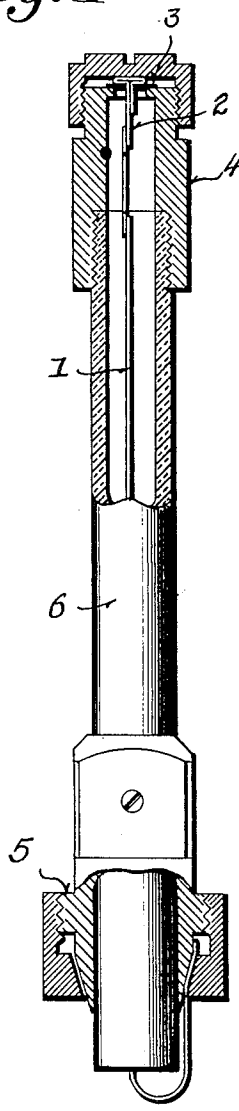


Fig. 2

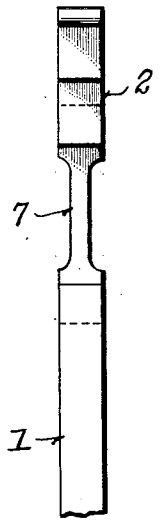


Fig. 3

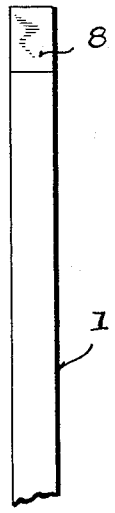


Fig. 4

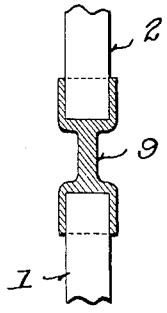
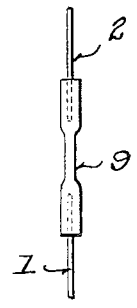


Fig. 5



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FUSE LINK

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10 Claims. (Cl. 200—135)

This invention relates to fuse links and is particularly directed to a fuse link for use with expulsion type fuses.

It has been found that when a fuse link is composed of copper, that objectionable results occur in the operation of the fuse for the reason that the copper arcs readily and the vapor is highly conductive. This condition produces a tremendous strain on the fuse cartridge and on all parts of the structure, and frequently results in a complete destruction of the fuse. Low melting point alloys or metals have been employed, but when the leader is formed of this low melting point alloy, the same undesirable results have occurred as when copper was used. In both these cases it has been found that an overload frequently melts the entire leader and produces an enormous amount of gas and heat, both of these results being highly undesirable in fuses.

This invention is designed to overcome the defects noted above, and objects of this invention are to provide a novel form of fuse link which is composed primarily of substantially non-arcing metal, for example aluminum, and to so construct the fuse link that the principal objections to copper and other materials as discussed above are wholly overcome.

Further objects are to provide a novel form of fuse link in which the non-arcing spaced main portions are joined by a small amount of low melting point material, which may be formed with a reduced section if desired, and which will melt at a lower temperature than the main portion of the fuse link, and which melts at a definite temperature so that the fuse link will break the circuit for a small overload, but which also will break the circuit for a large overload without producing the enormous volume of gases and without producing a large body of highly conductive vapor, thereby greatly lessening the stresses imposed upon the fuse structure.

In greater detail, objects of this invention are to provide a fuse link which has all of the desirable features of a low melting point alloy link, but which further has all of the desirable features of an aluminum link, and which is more stable in operation, which will respond in a satisfactory manner to a small overload, and which, when a large overload occurs, will not produce an enormous amount of gas, but in which the link will separate into sections and drop out or blow out of the cartridge in separate sections.

A specific object of this invention is to provide a fuse link in which the main sections are formed of aluminum with the spaced adjacent ends treated and securely united to a relatively low melting point intermediate section of short length, the treating of the spaced ends of the aluminum section securing a firmer and more easily produced union between the aluminum portions and the intermediate low fusing point section.

Embodiments of the invention are shown in the accompanying drawing, in which:

Figure 1 is a view of an expulsion fuse with one form of the link in place, portions of the figure being in section.

Figure 2 is a fragmentary view of the upper portion of the link shown in Figure 1, such view being at right angles to Figure 1.

Figure 3 is a view of a section of the aluminum leader.

Figure 4 is a fragmentary view, partly in section, of a modified form of fuse link.

Figure 5 is a fragmentary view of the structure shown in Figure 4, such view being taken at right angles to Figure 4.

Referring to Figures 1, 2 and 3, it will be seen that the fuse link comprises two main sections 1 and 2 formed of aluminum. The upper section 2 may be threaded through a terminal clip or metal button 3 in any suitable manner and is clamped to the upper contact 4 of the expulsion fuse. The lower end of the fuse is clamped to the lower contact 5, the fuse extending downwardly through the insulating tubular section 6, and being looped outwardly around the bottom of such tubular section in accordance with the usual practice.

An intermediate section of low melting point metal is provided. This intermediate section is indicated by the reference character 7 and may have a reduced section. It is composed preferably of tin, although lead or a composition low melting point alloy may be substituted for the tin.

In order to simplify the matter of a satisfactory joint between the aluminum and the tin or other intermediate section, it has been found desirable to plate the adjacent ends of the aluminum sections 1 and 2 with nickel, as indicated at 8, for the section 1 in Figure 3. The tin or other low melting point section 7 may be readily soldered to the plated ends of the aluminum sections. It is obvious that other materials could be used in place of nickel, if desired, without departing from the spirit of this invention. It has further been found possible to satisfactorily join the intermediate section 7 to the aluminum sections by using an aluminum solder, although in production, it has been found more desirable

to employ some mode of treating the ends of the aluminum sections, such, for example, as the illustration given above. Better and more consistent results have been obtained where the adjacent ends of the aluminum sections are plated or treated prior to soldering the tin or intermediate section 7 in place.

A further form that the invention may take is shown in Figures 4 and 5. In this form of the invention the intermediate section is indicated by the reference character 9 and joins the upper and lower aluminum sections 2 and 1. In this form of the invention the tin or other low melting point metal or alloy is cast in place about the adjacent ends of the aluminum sections, as indicated in the drawing. If desired, the adjacent ends of the aluminum sections 1 and 2 may be nickel-plated or otherwise treated prior to the casting operation.

In casting the intermediate section 9 of low melting point metal, it is preferable to form this section with a reduced intermediate portion, as indicated in Figures 4 and 5.

In actual tests with this type of fuse link it has been found that the amount of vapor produced by the low melting point section is relatively small and consequently, it has been observed that the fuse structure is not subjected to great stresses. Further, a peculiar result has been observed with this fuse. Under small overloads the intermediate section melts at a very definite temperature. With high, suddenly applied overloads it has been found that the entire aluminum section is not fused, but that it tends to separate into sections and to drop or blow from the fuse cartridge. It has been found, on the other hand, that when the entire link is composed of low melting point alloy, that the entire link is volatilized and a tremendous evolution of gas occurs. Further, it has been found that when the upper and lower sections of the fuse link are composed of copper, that highly conductive vapors are produced, and also an excessive amount of gas is produced, thus prolonging the arc and producing the tremendous and dangerous strains discussed previously.

However, with this invention, it has been found that a very small amount of gas is produced for both small overloads and large overloads, and that the fuse link is more stable in its operation and subjects the fuse structure to materially lesser strain than with the heretofore known types of fuse links.

Although the invention is not limited to a tape like fuse link, it has been found highly satisfactory to form the fuse link of tape like material as illustrated in the drawing.

It will be seen that a very simple and easily produced type of fuse link has been provided by this invention and one that may be readily made in quantity production.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

I claim:

1. A fuse link for an expulsion fuse comprising two main sections formed of aluminum, and an intermediate section formed of a low melting point metal adherently joined thereto.

2. A fuse link comprising two main sections of non-arcing metal having spaced ends, and a low melting point intermediate section adherently attached to said spaced ends, said spaced ends being treated to increase the adherence of said intermediate section.

3. A fuse link for expulsion fuses comprising a section of low melting point and of short length in relation to the total length of the fuse link, and a section formed of aluminum of relatively greater length, the adjacent ends of the sections being adherently joined, and the end of the aluminum section being tinned to increase the adherence.

4. A fuse link comprising two aluminum sections having spaced electroplated ends, and an intermediate section of low melting point, soldered to the electroplated spaced ends of said aluminum sections.

5. A fuse link comprising two main sections of non-arcing metal and having spaced ends, and an intermediate section of low melting point metal cast about and joining said spaced ends.

6. A fuse link comprising two main sections of non-arcing metal and having spaced ends, and an intermediate section of low melting point metal cast about and joining said spaced ends, said intermediate cast section having enlarged portions surrounding said spaced ends and having a reduced portion joining said enlarged portions.

7. A fuse link for an expulsion fuse comprising an end button formed of aluminum and having a downwardly projecting aluminum prong, an elongated leader spaced therefrom and formed of aluminum, and an intermediate section formed of low melting point metal adherently joining the lower end of said aluminum prong and the upper end of said aluminum leader.

8. A fuse link for an expulsion fuse comprising an upper contact member having a relatively heavy upper clamping portion provided with a downwardly extending portion, an aluminum leader spaced from said downwardly extending portion and extending a material distance downwardly therefrom, and an intermediate low melting point alloy section joining said downwardly extending portion and the upper end of said aluminum leader.

9. A fuse link comprising two main metal sections having spaced ends, one of said sections being relatively long and formed of non-arcing material, and an intermediate section of low melting point metal cast about and joining said spaced ends, said intermediate cast section having enlarged portions surrounding said spaced ends and having a reduced portion joining said enlarged portions.

10. A fuse link having an upper portion formed of non-arcing metal and having a long leader spaced from said upper portion and formed of non-arcing metal, and having an intermediate portion joined to the lower end of the upper portion and to the upper end of the lower portion, said intermediate portion being relatively short and being formed of a low melting point metal.

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