Feb. 27, 1923. 1,446,554.

E. H. ELLISON.

FUSIBLE LINK.

FILED APR. 27, 1920.

Fig. 1.

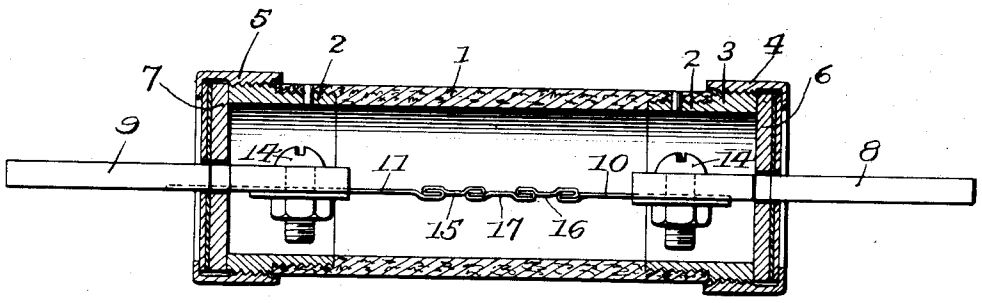


Fig. 2.

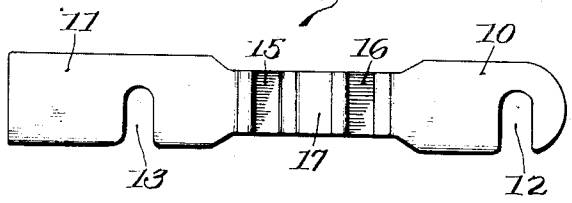


Fig. 3.

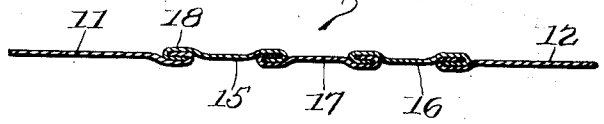
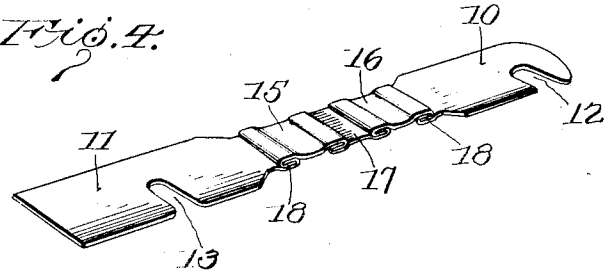


Fig. 4.



Witness
H. W. Divall

Inventor
E. H. Ellison

By Sturtevant & Mason Attorneys

Patented Feb. 27, 1923. 1,446,554

UNITED STATES PATENT OFFICE.

EDWARD H. ELLISON, OF JAMESTOWN, NEW YORK, ASSIGNOR TO MONARCH REFILLABLE FUSE CO., OF JAMESTOWN, NEW YORK, A CORPORATION OF NEW YORK.

FUSIBLE LINK.

Application filed April 27, 1920. Serial No. 376,933.

To all whom it may concern:

Be it known that I, EDWARD H. ELLISON, a citizen of the United States, residing at Jamestown, in the county of Chautauqua, State of New York, have invented certain new and useful Improvements in Fusible Links, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

This invention relates to inclosed fuses of the renewable link type and more particularly to an improved link adapted to reduce to a minimum the volatilization of the metal of the link on the rise of an excess of current therethrough.

Heretofore it has been proposed to detachably connect the copper terminals projecting into the inclosing casing by a link having spaced portions of substantially reduced cross section so that when an excessive current occurs, the link will fuse only at said reduced portions, the intermediate part of said link dropping out without volatilizing. Experience has shown however, that because of the uniform melting point of such single metal fuse links, particularly when they are of low melting point, such as zinc, the heat generated by the fusing not infrequently is sufficient to volatilize the remainder of the link, and since the natural direction of escape of the gases is toward the ends of the casing, and the path of melting follows the path of the gases, the fusing is often carried beyond the terminal connections at the ends of the casing, either so badly fuming them as to preclude a good electrical connection when a new link is to be inserted, or the connection is so impaired as to render the fuse worthless.

These objectionable features are overcome in the present invention by providing a metallic link between its ends, with a portion or portions of such relatively low melting point as compared with the relatively high melting point of the remaining metal portions of the link, that the heat generated by the melting of such portions of relatively low melting point is sufficient to fuse the remainder of the link so that no arcing occurs.

Another feature of the present invention resides in arranging the portion or portions of low melting point along the link in such a manner that the fusing is reduced to a minimum and is localized at the intermediate portion of the link so that there is practically no tendency for the melting to spread toward the link ends and fuse the terminal connections.

A further feature of this invention is to provide a link as above described having intermediate its ends a series of metallic sections or portions of uniform cross section united to each other and to the link ends by interfolding the ends of said adjoining sections.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings, which show by way of illustration, one embodiment of the invention:

Figure 1 is a sectional side view of my improved link so applied to a knife blade fuse,

Fig. 2 is a plan view of said link,

Fig. 3 is a section thereof, and

Fig. 4 is a perspective thereof.

The invention in general embraces an improved link consisting of copper ends and an intermediate series of metallic sections of uniform cross section joined together and to said copper ends by interfolded seams. These metallic sections, preferably three in number, are composed of alternate zinc and copper metal, arranged so that the zinc sections are adjacent the copper link ends with the copper section intermediate said zinc sections. In a link of this construction, due to the substantially lower melting point of the zinc sections, on the rise of an excessive current through said link, the zinc sections will volatilize and permit the intermediate copper section to drop out and furthermore, the melting point of the outer copper link ends being substantially higher than said adjacent inner zinc sections, the heat generated by the fusing of the latter will be insufficient to melt the copper link ends so that the volatilization is reduced to a minimum and the melting zone is isolated from the terminal connections of the fuse which are kept intact.

A link constructed as above described is especially advantageous when used in connection with an inclosing casing, not only because of the slight volatilization of the metal but also because the casing terminals which are generally of copper, and are detachably connected to the ends of the fusi-

ble link, are spaced from the fusible sections and are thus preserved from the destructive effects of the inner melting zone. The protection of these terminals in other types of links is slight because of the tendency of the flames and gases during fusing to escape at the ends of the casing and melt the connections in their path of escape.

Referring more particularly to the accompanying drawings, the fuse is illustrated in connection with a knife blade type of fuse, but it is understood that it is equally applicable to any type of fuse having an inclosing casing. This inclosing casing or tube 1 is of fiber or other suitable material and is threaded on its interior extremities to receive the metal sleeves 2 which are provided on their outer ends with the threaded portion 3 on which screw the apertured end caps 4 and 5. These caps are connected with bridge pieces 6 and 7 and are adapted to center and hold from movement the terminals 8 and 9 of any suitable conducting material of relatively high melting point, preferably copper. Inasmuch as the specific construction of the casing, the bridge pieces, and manner of mounting the copper terminals forms no part of the present invention, the same being claimed in a co-pending application filed by me April 27, 1920, Serial Number 376,932.

Connected to the inwardly projecting ends of the copper terminals 8 and 9 is the improved fusible link, comprising the terminals or end portions 10 and 11 of metal of relatively high melting point, such for instance as copper, which fuses at approximately 2000° F. Any desired shape may be given to these link ends depending upon the type of fuse in which the link is used and the manner in which it is connected to the terminals of the inclosing casing. In the present instance these ends 10 and 11 are slotted as at 12 and 13 to receive the bolts 14 which provide a detachable connection to the casing terminals 8 and 9 whereby the fuse link may be renewed on blowing. It is clearly understood that if the link be used in a cartridge type or socket type of fuse, the terminals will be changed as required. In every instance, however, they are of metal of relatively high melting point.

In order to insure the minimum volatilization of the link metal and to localize the fusing at the intermediate portion of the link, the same is formed intermediate its ends 10 and 11 with a series of sections or portions of metal of substantially different melting points. In the preferred arrangement shown in Fig. 4, sections or portions 15 and 16 of relatively low melting point, such as zinc, which fuses at about 787° F., are connected to these ends 10 and 11 while intermediately connected to these portions 15 and 16 is a portion or section 17 of relatively high melting point, such as copper. In certain instances, it may be desirable to have more than three of these sections, and it may also be desirable to make the sections or portions of relatively high melting point a little longer than the sections of relatively low melting point. Any such modifications are within the scope of this invention providing the metal of these sections is uniform in cross sectional area and provided that the metal sections vary substantially as to their melting points. Where this relation between the melting points of the adjacent sections is substantial, it is possible to reverse the relation of the zinc and copper sections by providing the link between its ends with portions of relatively high melting point, such as copper, and a single intermediate portion of relatively low melting point, such as zinc. This construction is particularly successful if this intermediate zinc section is shorter than the adjacent copper sections.

The preferred manner of interconnecting the sections or portions is shown clearly in Fig. 3, wherein the ends of the zinc and copper sections 15, 16 and 17 are connected to each other and also to the inner ends of the copper terminals 10 and 11 by interfolding the metal as at 18. Such interfolded seams or joints, while preserving the uniform cross section of the metal portions in addition provide a secure and economical connection which readily permits the zinc sections to volatilize and the intermediate sections to drop out thereby preventing further volatilizing the metal of the link. It is within the contemplation of this invention to interconnect these sections of different metals in any manner which will thus preserve the uniform cross section.

In a fuse link constructed as set forth the heat generated by the fusing of the zinc sections is not sufficient to volatilize the copper portions, since zinc melts at approximately 787° F, while copper fuses at about 2000° F. Furthermore, the ends of the link being copper, the natural tendency of the melting to follow the movement of the escaping gases endwise of the casing is checked so that the terminal connections are kept intact.

It is obvious that minor changes in the details of construction may be made without departing from the spirit of the invention as set forth in the appended claims.

Having thus fully described the invention, what I claim as new and desire to secure by Letters-Patent, is:—

1. A fusible metallic link having metal terminals of relatively high melting point, and intermediate spaced fusible portions of relatively low melting point.

2. A fusible metallic link having terminals of relatively high melting point and

therebetween a series of metallic portions of substantially uniform cross section, said series including outer sections of relatively low melting point, and an intermediate section of relatively high melting point.

3. A fusible link including between its ends a series of metallic portions of substantially uniform cross section, said metallic portions being connected to each other and to said link ends by interfolded joints.

4. A fusible link including between its ends, portions of relatively low melting point and an intermediate portion of relatively high melting point.

5. A fusible link including in series between its ends a plurality of zinc portions and an intermediate copper portion.

6. A fusible metallic link having copper ends, said link including in series between said ends successive portions of copper and zinc.

7. A fusible link having along its length a series of metallic portions of substantially uniform cross section, certain of said portions being of substantially higher melting point than an intermediate portion.

8. A metallic fuse link comprising intermediate its terminals a series of metallic portions of substantially uniform cross section, said metallic portions being connected to each other and to said terminals by interfolded seams.

In testimony whereof, I affix my signature.

EDWARD H. ELLISON.