

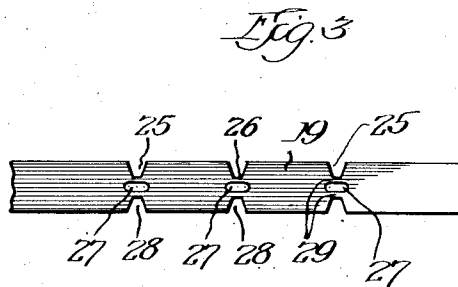
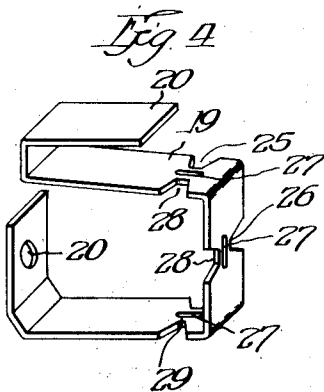
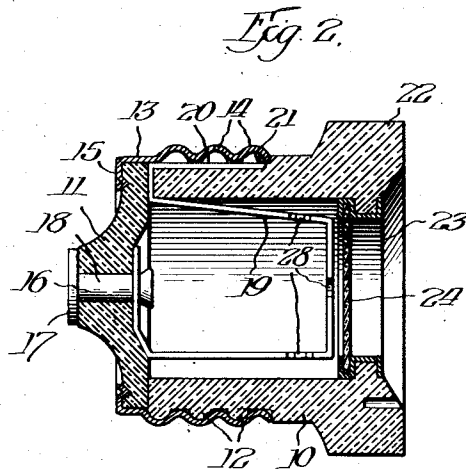
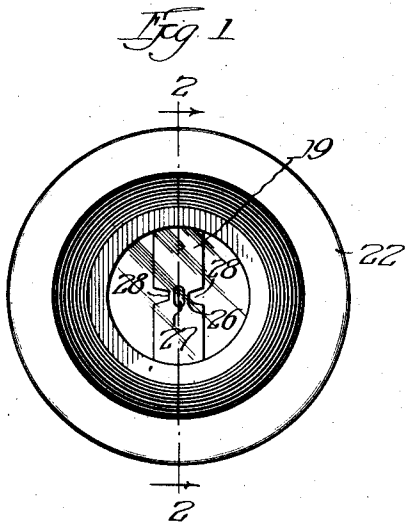
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A. L. EUSTICE

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FUSE

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Witness:

Ed. C. Jones

Inventor

Alfred L. Eustice,

By Wilkinson, Huxley, Bynum & Knight,

Attys.

UNITED STATES PATENT OFFICE.

ALFRED L. EUSTICE, OF CHICAGO, ILLINOIS.

FUSE.

Application filed February 15, 1922. Serial No. 536,624.

The present invention relates to fuses. More particularly the present invention relates to electric fuses of metal which upon electrical overload will melt and interrupt the electric circuit in which it is connected. It has been common practice to provide such fuses with restricted portions of greater electrical resistance than the remainder of the fuse whereby said restricted portions will be the parts to fuse in case the capacity of the fuse is exceeded. Certain successful types of fuse, as shown for example in my Patent No. 1,217,289, have involved dropout fusible elements or links in which a plurality of restricted portions are provided along the length of the fusible element or link, so that on blowing the fuse a portion of the fusible element or link between said restricted portions will be separated from the rest of the link. As described in my previous patent just referred to, I have found that, particularly, when the link is enclosed in a casing of the usual type, this dropout action takes place. A decided advantage accrues from the fact that only relatively small portions of the fusible member or link are volatilized and consequently, the pressure in the fuse casing is greatly reduced beyond that occurring in the case of blowing a fuse having a link with only one restricted portion. This dropout action results, of course, only in connection with fusible elements or links having a plurality of restricted portions. While my invention, described in my prior patent above referred to, has reduced the volatilization of metal and consequent pressure very materially from prior practice, I have found that the characteristics of the fuse described in my said prior patent can be improved, and one of the objects of the present invention is to provide an improvement over the structure of my prior patent above referred to with respect to the conformation of the restricted portions of the link, so that the volatilization of metal and resulting pressure in the fuse casing will be still further reduced.

It is a further object of the present invention to provide a construction of link which while having the electrical efficiency and reduction of pressure above referred to, will have adequate mechanical strength.

A further object of the present invention is to provide a fuse member comprising an elongated strip of material having restricted

portions, said restricted portions being so designed that without sacrificing any of the electrical advantages a greater mechanical strength is obtained.

Further objects will appear as the description proceeds.

Referring to the drawings—

Figure 1 represents a fuse plug containing a fuse link embodying the present invention;

Figure 2 is a sectional view taken along the line 2—2 of Figure 1;

Figure 3 illustrates a flat fuse strip embodying the present invention;

Figure 4 represents a fuse strip such as illustrated in Figure 3, but bent into a form to fit within the fuse plug illustrated in Figures 1 and 2.

Referring first to Figures 1 and 2, a fuse plug is provided having a pair of holding members 10 and 11 which may be of insulating material capable of being molded, such as hard rubber. Member 10 comprises a cylindrical member which may be provided with screw-threads 12 for a purpose which will be apparent. The member 11 comprises a cap member adapted to abut one end of the cylindrical member 10. The cap member 11 is held in fixed relation with the cylindrical member 10 by means of the shell or casing 13, which may be of relatively thin conducting material swaged to form screw-threads 12—12. The shell 13 also has a turned over end portion 15 for engaging the outer side of the cap 11.

Mounted centrally of the cap 11 is the contact member 16 provided with a head 17 and shank 18, which shank lies axially of the cylindrical member 10. The fusible element which is indicated by the numeral 19 is provided with a hole 20 for the reception of the shank 18 of the contact member 16. Said fusible element 19 is bent intermediate of its length in a plurality of places whereby to fit within the chamber formed by the cylindrical member 10. The shank 18 of the contact member 16 may be upset after the fusible element 19 has been mounted thereon, and a rigid connection between said fusible element and said shank 18 may be insured by soldering said members together. The contact member 18 will be firmly held within the cap 11 between the abutments formed by the head 17 and the end of the fusible element 19. Any preferred means may be provided for preventing rotation of the fusible element 19 relative to the cap 11

and undesirable rotation between the cap 11 and the cylindrical member 10.

The manner in which the fusible element 19 may be bent in order to lie within the chamber provided by the cylindrical member 10 and the cap 11 will be clear without detailed explanation from an inspection of Figures 2 and 4. As shown in these figures, the fusible element 19 is bent to provide a substantially right-angular conformation within the cylindrical member 10 and has an end portion 20 lying outside of the cylindrical member 10, which end portion 20 may lie in a corresponding slot on the outside of said cylindrical member 10. Said end portion 20 of the fusible element 19 may have an outer surface engaged by the shell or casing 13. In order to insure a perfect contact between said end member 20 and shell 13, said members may be soldered together, as indicated by the numeral 21 of Figure 2.

The right hand end of the cylindrical member 10 is provided with the enlarged grip portion 22, by means of which the fuse plug may be readily manipulated. Said right hand end of the fuse plug is provided with a sight opening 23 which may have a mica, glass, or other transparent closure 24. Said closure 24 may be held in place by any preferred means.

It has been found in practice that a fusible element having restricted portions operates with decided advantages if the number of said restricted portions is an odd number. By this arrangement one of the restricted portions lies midway of the others and, assuming substantial uniformity of dimensions of said restricted portions, may be depended upon to fuse either in case of continued overload or sudden rush of current such as accompanies a short circuit, whether the other restricted portions fuse or not, the latter condition sometimes being met with in the event of a gradual overload in distinction to short circuit conditions.

In the fuse member illustrated in Figures 3 and 4 three restricted portions are indicated, the two outer of said restricted portions being indicated by the numeral 25 and the central restricted portion being indicated by the numeral 26. Each of the restricted portions has an elongated aperture 27 preferably arranged on the longitudinal center line of said fuse member. Said fuse member 19 is notched adjacent to said elongated aperture 27 as indicated by the numerals 28—28, said notches being preferably in the form of a truncated V whereby to provide elongated strips 29—29 for carrying current. The aperture 27 should preferably have substantially parallel walls at least as great in length as the base of the truncated V and may have rounded ends or ends on any other preferred contour. The

strips 29—29 may be designed so that they will fuse when a predetermined load on the fuse member is exceeded. As pointed out above, the central restricted portion 26 will blow either upon extended overload or upon heavy rush of current, whether the other restricted portions blow or not.

The form of restricted portion disclosed herein provides no distinct line of least mechanical strength along which a bending effect will tend to localize. For this reason the common difficulty of many fuse members of localizing a bending effect to form an abrupt bend with consequent breaking is obviated. Though the illustrated construction is preferred at present, it will be clear that other conformations may be employed to accomplish the result of avoiding the difficulties due to lines of least resistance to breaking effects.

The description above has been limited more or less to a type of fuse member having notches in the form of a truncated V, which notches have located adjacent thereto the elongated slots 27 providing strips of material of restricted dimensions. There is no intention in this case to limit the present invention to any such conformation, however, it being possible to modify the size and shape of the apertures and the notches through wide limits.

The present invention has been illustrated in connection with a plug fuse for the reason that this type of fuse requires considerable bending of the fuse element and therefore presents difficulties in the use of fuse elements having restricted portions. It will be understood, however, that the present invention is useful in other types of fuses in which mechanical strength is required in combination with accuracy of the calibration of the fuse.

One embodiment of the present invention has been described in detail. Many modifications will occur to those skilled in the art. It is intended in this patent to cover all such modifications that fall within the scope of the invention as defined by the appended claims.

I claim:—

1. An enclosed fuse comprising a housing and an elongated fusible member mounted in said housing, said fusible member having a plurality of restricted portions having an aperture in each of said restricted portions.

2. A fusible member comprising an elongated strip of conducting material having a plurality of restricted portions, each of said restricted portions being formed with a notch at an edge of said fusible member and having an aperture between said notch and the other edge of said fusible member.

3. An enclosed fuse comprising a housing, and an elongated fusible member within said housing, said fusible member having a

plurality of restricted portions, each of said restricted portions being provided with an elongated aperture arranged longitudinally of said member and a pair of opposed notches of the shape of a truncated V forming with said aperture a pair of strips having parallel side walls extending longitudinally of said elongated member.

4. An enclosed fuse comprising a housing and an elongated fusible member located within said housing, said fusible member having a plurality of restricted portions arranged along its length, each of said restricted portions being formed with a notch at an edge of said fusible member and an aperture between said notch and the opposite edge of said fusible member.

5. An enclosed fuse comprising a housing and an elongated fusible member located within said housing, said fusible member having a plurality of restricted portions arranged along its length, each of said restricted portions being formed with a notch at an edge of said fusible member and an aperture between said notch and the opposite edge of said fusible member, said notch being wedge-shaped.

6. An enclosed fuse comprising a housing and an elongated fusible member located within said housing said fusible member having a plurality of restricted portions arranged along its length, each of said restricted portions being formed with a notch at an edge of said fusible member and an aperture between said notch and the opposite edge of said fusible member, said notch having the form of a truncated V.

7. A fuse comprising a housing, and an elongated fusible member bent intermediate its length to fit within said housing, said fusible member having a plurality of restricted portions, each of said restricted portions being formed with an elongated aperture arranged along the longitudinal axis of said member and with a pair of notches, each of said notches having the form of a truncated V, said aperture having

parallel walls at least as long as the bases of said truncated V's, said restricted portions being free from any line of least mechanical strength.

8. An enclosed fuse comprising a housing, and an elongated fusible member bent intermediate of its length to fit within its housing, said fusible member having a plurality of restricted portions, each of said restricted portions comprising a pair of elongated strips of material presenting no line of least mechanical strength.

9. An electrical fusible member comprising an elongated strip of fusible material having a plurality of restricted portions, certain of said restricted portions being formed of a notch of wedge-shape and an aperture between said notch and an edge of said strip.

10. An electrical fuse comprising an elongated member having a plurality of restricted portions, each of said restricted portions being formed with a pair of opposed wedge-shaped notches and an elongated aperture between said notches providing a pair of parallel strips presenting no line of least mechanical strength.

11. An enclosed fuse comprising a housing, and an elongated fuse member bent intermediate of its length to fit along a plurality of sides of said housing, said fuse member having a plurality of restricted portions, said portions being free from a line of least mechanical strength, said portions being formed with elongated aperture and a wedge-shaped notch adjacent to said aperture.

12. An enclosed fuse comprising a housing, and an elongated fusible member mounted in said housing, said fusible member having a plurality of restricted portions having an elongated aperture in each of said restricted portions.

Signed at Chicago, Illinois, this 11th day of February, 1922.

ALFRED L. EUSTICE.