A. L. EUSTICE & J. B. GRIFFITH.

INCLOSED SAFETY FUSE.

APPLICATION FILED AUG. 2, 1915.

1,278,322. Patented Sept. 10, 1918.

Fig. 1.

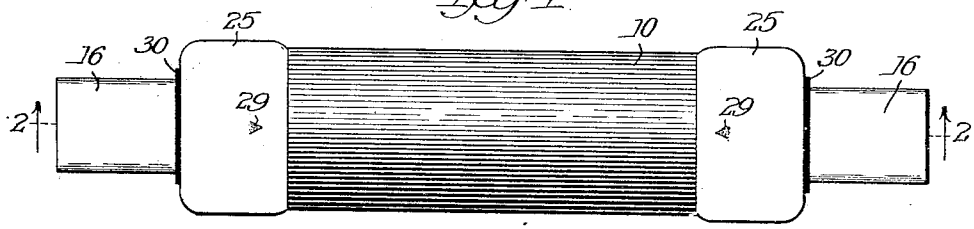


Fig. 2.

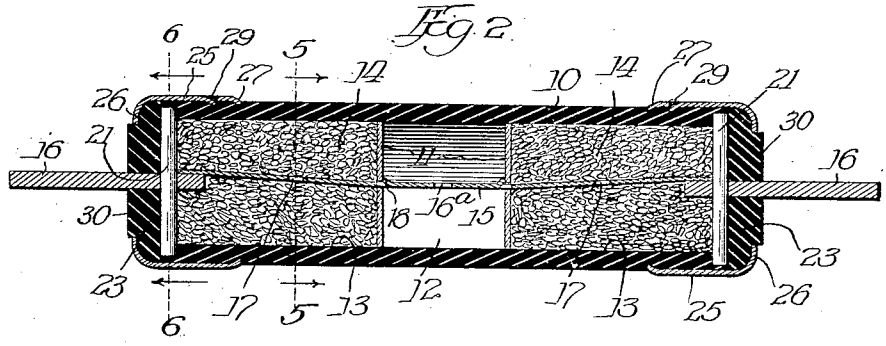


Fig. 3.

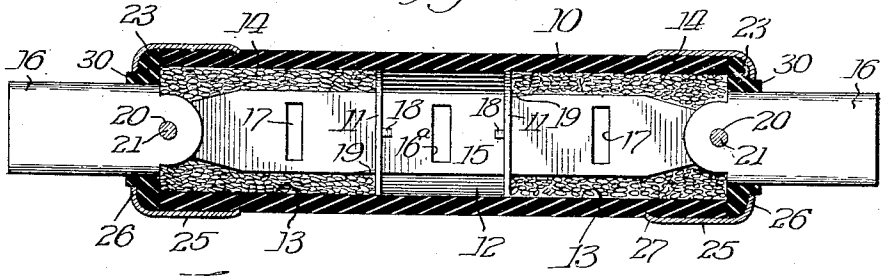


Fig. 4.

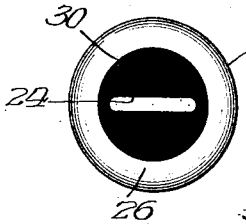


Fig. 5.

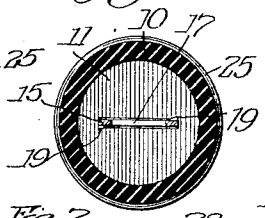


Fig. 6.

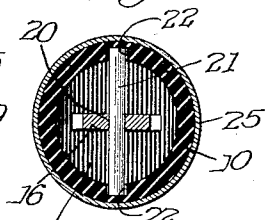
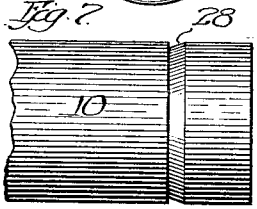


Fig. 7.



Witnesses:

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UNITED STATES PATENT OFFICE.

ALFRED L. EUSTICE AND JOHN B. GRIFFITH, OF CHICAGO, ILLINOIS; SAID GRIFFITH ASSIGNOR TO SAID EUSTICE.

INCLOSED SAFETY-FUSE.

1,278,322. Specification of Letters Patent. **Patented Sept. 10, 1918.**

Application filed August 2, 1915. Serial No. 43,078.

To all whom it may concern:

Be it known that we, ALFRED L. EUSTICE and JOHN B. GRIFFITH, both citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Inclosed Safety-Fuses, of which the following is a specification.

Our invention relates to inclosed safety fuses used for the protection of electric circuits, and refers particularly (although not exclusively) to cartridge fuses of the non-renewable type.

In the co-pending application of Alfred L. Eustice, Serial No. 43,077, filed August 2nd, 1915, a cartridge fuse has been described in which the casing is provided with one or more transverse partitions so that the casing is divided into a plurality of chambers through which the fusible link of the fuse passes. At least one of the chambers is provided with a non-conducting filling, and at least one of the other chambers is free of filling. The fuse link preferably has portions of constricted cross-sectional area in each of the chambers just described. The partitions are preferably made of hardened steel or other tool-resisting metal, so that it is impossible to bore through these partitions in order to improperly renew the connection between the terminals of the fuse.

Our present invention is concerned particularly with cartridge fuses of the knife-blade type, and, in common with the fuse described in the aforesaid application of Alfred L. Eustice, our fuse is preferably divided into a plurality of chambers through which the fusible link passes, said link having portions of constricted cross-sectional area in each of the chambers, certain of these chambers being provided with a filling of non-conducting material.

It is the object of our invention to construct a fuse which shall be cheap to manufacture and of suitable design to successfully resist the explosive effect ordinarily caused by violent short-circuits.

It is a further object of our invention to so construct the fuse that the metallic caps used at the ends of the fuse shall be entirely insulated from the electric circuit in which the terminals and fusible link of the fuse are included, so that it shall be impossible to improperly close the electric circuit in which the fuse terminals are included by soldering a piece of copper wire between the two caps of the fuse, or performing any other similar expedient. To construct a fuse in this manner constitutes a great advance in the art, since it has been very common practice to improperly close the circuit between the fuse terminals, and the fire hazard has been greatly increased thereby.

It is a further object of our invention to construct the fuse so that the metallic end caps cannot be brought into contact with the clips in which the knife-blade terminals of the fuse are inserted.

Further objects and advantages of our invention will be more readily understood by reference to the accompanying drawings, which show a preferred embodiment of our invention, and in which—

Figure 1 is a side elevation of our improved fuse;

Fig. 2 is a longitudinal section taken on the line 2—2 of Fig. 1;

Fig. 3 is a longitudinal section of the fuse shown in Fig. 1, but taken at an angle of 90° to the section shown in Fig. 2;

Fig. 4 is an end elevation of an end cap and insulating washer;

Fig. 5 is a transverse section taken on the line 5—5 of Fig. 2, but with the filling material removal from the interior of the fuse chamber;

Fig. 6 is a transverse section taken on the line 6—6 of Fig. 2, with the filling material removed from the fuse chamber; and

Fig. 7 is a fragmentary side elevation of the end of the fuse casing, showing the groove for receiving the edge of the cap.

The cylindrical casing 10, of fiber or other suitable insulating material, has therein a pair of partitions 11, 11, preferably of hardened steel or other tool-resisting metal. By means of these partitions the fuse casing is divided into a central air chamber 12 and the two end chambers 13, 13. The end chambers 13 are provided with a non-conducting filling 14, of asbestos, plaster of Paris, lime, or the like. A fusible link 15, preferably flat and constructed of zinc, passes through the chambers 12 and 13 and of the fuse casing and through suitable apertures in the partitions 11. This fuse link 15 is attached at its ends by solder or the like to the inner ends of the knife-blade terminals 16.

The fuse link 15 is provided with an aperture 16^a at its central portion within the

chamber 12, so that a portion of constricted cross-sectional area is formed in the link within this chamber, and is also provided with apertures 17 in the portions of the link within each of the chambers 13, forming similar portions of constricted cross-sectional area in these parts of the link. The partitions 11, 11, are held in position by the lips 18, 18, which engage the surfaces of the partitions adjacent the central chamber 12 and the lips 19 engaging the opposite surfaces of these partitions. It will be understood that any suitable means may be used for holding the partitions 11 in position.

Each of the knife-blade terminals 16 has near its inner end an aperture 20, through which passes the retaining bar 21, the ends of which rest in suitable recesses 22 cut in the end of the casing 10. As most clearly shown in Figs. 2 and 6, the recesses 22 do not extend to the outer surface of the casing 10, so that insulating material intervenes between the ends of each of the retaining bars 21 and the outer surface of the casing 10.

An insulating washer 23 engages each end of the casing 10 and also engages the outer surface of the retaining bar 21. Each of the insulating washers 23 is provided with a suitable aperture 24 through which the knife-blade terminal 16 passes, and is held in position by a metallic end cap 25, the flange 26 of which engages the edge portion of the outer face of the washer. The edge 27 of the cap 25 is crimped into the groove 28 formed in the casing 10, thereby effectually preventing removal of the cap and its associated parts from the end of the fuse casing 10. The cap 25 is prevented from rotating by forcing the indentation 29 into the body of the casing 10, as most clearly shown in Fig. 2.

The central portion 30 of the insulating washer 23 projects outwardly beyond the flange portion 26 of the end cap 25.

It will be observed that inasmuch as the recesses 22, 22 at each end of the casing 10 are alined with each other, the retaining bars 21 are correspondingly alined, and serve to maintain the two knife-blade terminals 16 in proper alinement with each other. At the same time each of the retaining bars 21 prevents the inward movement of the knife-blade terminals 16 on account of the engagement of the ends of the bar in the recesses 22, while outward movement of the knife-blade terminals is prevented by the fact that the outer surface of each bar 21 is engaged by the insulating washer 23, which, in turn, is held in position by the cap 25.

In the improved fuse of our construction it is impossible to drill through the fuse from end to end for the purpose of inserting a new connecting element between the terminals, on account of the presence within the fuse casing of the partitions 11 made of hardened steel or other similar tool-resisting element. At the same time it is impossible to close the circuit by making an external connection between the caps 25 since these are entirely insulated from the circuit in which the fuse terminals and link are included. By having the insulating washers project outwardly beyond the plane of the ends of the caps 25, it becomes impossible to electrically connect the caps 25 with the clips in which the fuse terminals 16 are inserted.

It will be apparent to those skilled in the art that many changes could be made in the detailed construction of the parts which we have described without departing from the spirit or scope of our invention as defined in the appended claims.

What we claim is:

1. In an inclosed safety fuse, the combination of a casing, a fuse link passing through said casing, an apertured terminal projecting into the end of said casing and to which said fuse link is attached, a retaining member passing through the aperture of said terminal and having its ends engaging said casing, an attaching member engaging the casing, and an insulating member interposed between the attaching member and retaining member, holding the latter in position and also intervening between the attaching member and the terminal.

2. In an inclosed safety fuse, the combination of a casing having a pair of alining recesses therein, said recesses extending from the inner surface of said casing but not reaching to the outer surface thereof, a fuse link passing through said casing, a terminal extending into the end of said casing, a retaining member engaging said terminal and having its ends within said recesses, and means insulated from said terminal and said retaining member for holding the latter in position.

3. In an inclosed safety fuse, the combination of a casing having a pair of alining recesses therein, said recesses extending from the inner surface of said casing but not reaching to the outer surface thereof, a fuse link passing through said casing, a terminal extending into the end of said casing, a retaining member engaging said terminal and having its ends within said recesses, an insulating washer engaging said retaining member, and an end cap for fastening said washer to said casing.

4. In an inclosed safety fuse, the combination of a casing, a fuse link passing through said casing, an apertured terminal projecting into the end of said casing, a retaining bar passing through the aperture of said terminal and with its ends engaging said casing, an insulating washer engaging said bar,

and an end cap attaching said insulating washer to said casing.

5. In an inclosed safety fuse, the combination of a casing having a pair of alining recesses in each end thereof, said recesses extending from the inner surface of said casing but not reaching to the outer surface thereof, an apertured knife-blade terminal extending into each end of said casing, a retaining bar passing through the aperture of each of said terminals and having its ends within said recesses, an apertured insulating washer through which each of said terminals passes, said washers engaging said retaining bars, and a metallic end cap for holding each of said washers in position.

6. In an inclosed safety fuse, a casing, a fuse link in said casing, an apertured terminal secured to the link and protruding from the casing, a retaining member passing through the terminal and seating upon the casing, an insulating member positioning the terminal and holding said retaining member to its seat upon the casing, and an attaching member engaging the casing and embracing the insulating member to position it upon the casing; said insulating member insulating both the terminal and the retaining member from the attaching member.

In witness whereof, we hereunto subscribe our names this 30th day of July, A. D. 1915.

ALFRED L. EUSTICE.
JOHN B. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."