L. W. DOWNES & R. C. PATTON.

FUSE.

APPLICATION FILED OCT. 23, 1915.

1,214,903. Patented Feb. 6, 1917.

Fig. 1

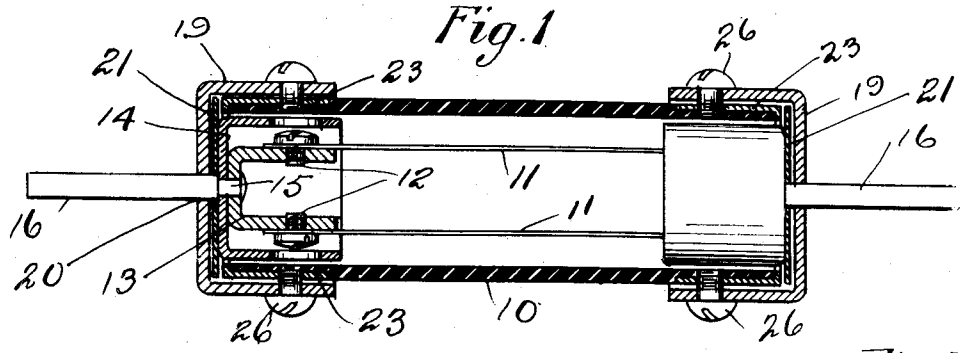


Fig. 2

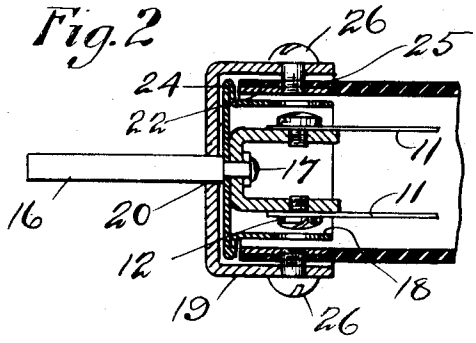


Fig. 3

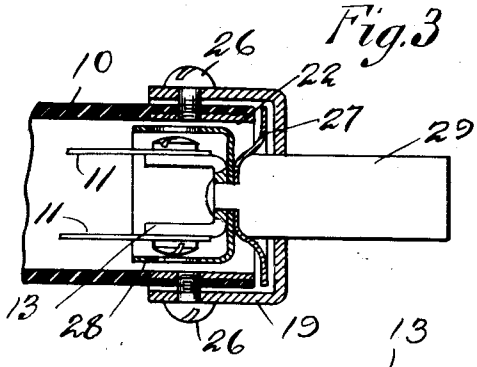


Fig. 4

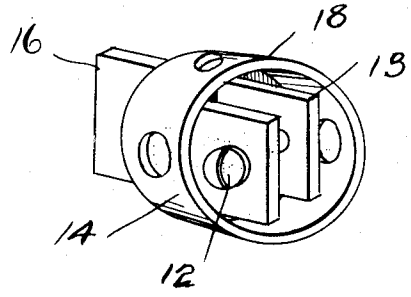


Fig. 5

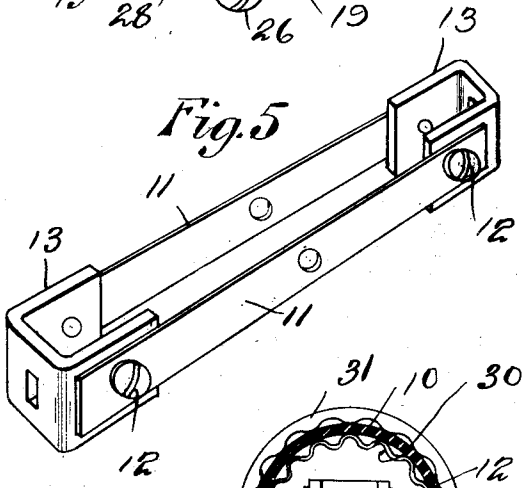


Fig. 6

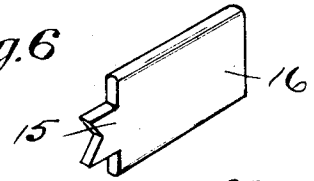


Fig. 7

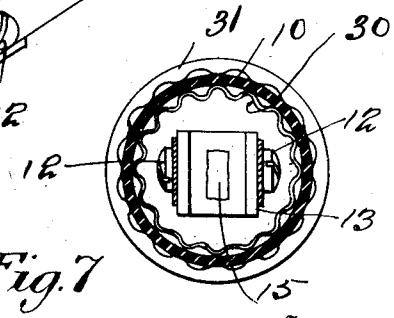
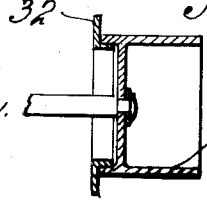


Fig. 8



Witnesses

W. H. Barsley.

M. Hutter

Inventors

Louis W. Downes.

Ralph Clifton Patton.

By Howard E. Barlow

Attorney

UNITED STATES PATENT OFFICE.

LOUIS W. DOWNES AND RALPH CLIFTON PATTON, OF PROVIDENCE, RHODE ISLAND, ASSIGNORS TO D & W FUSE COMPANY, OF PROVIDENCE, RHODE ISLAND, A CORPORATION OF RHODE ISLAND.

FUSE.

1,214,903. Specification of Letters Patent. Patented Feb. 6, 1917.

Application filed October 23, 1915. Serial No. 57,584.

To all whom it may concern:

Be it known that we, LOUIS W. DOWNES and RALPH CLIFTON PATTON, both citizens of the United States, and residents of the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Fuses, of which the following is a specification.

This invention relates to electric fuses of the class designed to open the circuit when an excessive current passes through the line.

In some instances it is found desirable by the engineer or person in charge of the line controlled by these fuses, to personally renew each fuse after having been blown, by inserting a fresh fuse link therein. The ordinary fuse is filled with granular arc suppressing material and upon taking the same apart this material is often scattered about and lost, and when the parts are returned, little or none is replaced in the casing. It will therefore be seen that a fuse which is designed to operate safely by the use of such arc suppressing material, may now be improperly assembled and therefore dangerous.

The object of this invention is to avoid this contingency by constructing a fuse that may be safely operated without the use of such a filling. This is accomplished by providing the usual tubular casing with closures for its ends which are so formed that they provide a tortuous restricted passageway for permitting and controlling the escape of the gas which is generated therein by the volatilizing of the inclosed metallic fuse link.

A further object of the invention is to provide means in the casing near its ends for exerting a cooling influence on the escaping gases, whereby the excessive heat in the gas may be absorbed or conducted away before reaching the open, to such an extent as to prevent the possibility of a flame passing through the escape passages to the outside of the fuse casing.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1— is a sectional side elevation illustrating one form of fuse in which the closure members provide a tortuous restricted passageway for the escape of gas generated in the casing.

Fig. 2— shows the end portion of a fuse having another construction of end closure members.

Fig. 3— shows the end portion of a fuse having still another construction of end closure members.

Fig. 4— is a perspective view showing one form of an inner cup shaped closure member with the link supports mounted therein.

Fig. 5— is a perspective view showing a pair of fuse links connected at their ends to their respective link supports.

Fig. 6— is a perspective view showing one of the contact blades and the riveting projection on one end thereof.

Fig. 7— is a sectional end view through the casing showing the end closure cup shaped members as corrugated so as to form a multiplicity of passageways to divide the escaping gases into small streams.

Fig. 8, is a sectional view showing a removable flange ring positioned on an inner cup member.

Referring to the drawings 10 designates the usual tubular form of casing which is preferably constructed of fiber or other suitable pressure resisting insulation material.

In this particular instance we have shown a pair of flat strip fuse links 11 but any desired form of fuse link may be employed. These two links are shown as being connected by screws 12 to the yoke 13, and this yoke is shown as being secured to the inner cup shaped end closure member 14 by means of the lug 15 on the end of the contact blade 16, which lug passes through corresponding apertures in both the cup and the yoke, and is spread, riveted or headed over as at 17 on the inside of the latter, thus forming a unit as illustrated in Fig. 4.

The skirt portion 18 of this inner closure cup member is arranged to extend some distance into the end of the tube 10, to reinforce the end, and also provide an extended cooling surface over which the escaping gases must pass, and another cup

shaped member 19 is provided of a size to fit over the outside of the casing 10. The bottom portion of this cup is slotted at 20 to permit the blade 16 to pass snugly therethrough. The skirt of this cup also serves to provide an additional extended area across which the gases must also pass before reaching the open.

As the object of this invention is to provide a tortuous restricted passage at the ends of this casing through which the gases may escape, we have formed the inner cup with an outside diameter a little less than the inside diameter of the casing, and the inside diameter of the outer cup, a little greater than the outside diameter of the casing, whereby a narrow space is left between the walls or skirt of both cups and the casing for the passage of the gas.

In some cases to further restrict and better control this passageway we have inserted a packing 21 of leather, or other suitable flexible material, this nearly fills in the space between the bottom of the outer cup and the end of the casing, the same serving to form a packing and more surely close the central opening 20 about the contact blade 16 against the passage of gases. It also guides the heated gases up and around the end of the tubing to cause them to pass back beneath the skirt of the outer cup, whereby the thin sheet of gas becomes more thoroughly cooled and the flame completely extinguished before being permitted to pass out.

It has been found in practice that the passing of heated gases over a metal surface serves to absorb the heat therefrom. To further take advantage of this effect, we have in some cases provided an inner metallic lining 22 at the end of the casing to cooperate with the cup shaped inner closure cup, to increase the cooling surface. In still other cases we have provided a metal ferrule 23 on the outer surface of the tube end. In either of these constructions it will be seen that the escaping gas will have to flow between two metal walls while passing through the escape passages. Thus very complete cooling is effected and even under the most severe conditions no flame can be forced from the fuse.

In some cases instead of providing a packing member 21 for deflecting the course of the gas, we have, as illustrated in Fig. 2, provided an outwardly turned flange 24 on the edge of the inner cup shaped closure, whereby the escaping gases are deflected upward and then outward through the space 25 left between the outer cup and the casing.

Fig. 3 illustrates still another construction in which a separate plate 27, is secured to the inner cup 28, and to the link supports 13 by riveting the contact blade 29 thereto, which plate is of a size to extend over the ends of the tube 10 to serve as a deflector for the outwardly rushing gases to direct them radially outward and cause them to pass back beneath the surface of the outer cup.

When a flange construction such as that illustrated at 24 in Fig. 2, is employed, we have found it necessary to provide its equivalent at the opposite end, in the form of a loose flange ring, such as that illustrated at 32 in Fig. 8 or at 27 Fig. 3. This ring is formed separate and independent of the cup member and is removably positioned thereon, by which construction this cup member may be passed through the casing after the fuse links have been connected to their yoke members. This permits this unit to be repositioned in the casing, and the flange ring 32 to be subsequently positioned on its cup 33, the whole then being secured in position by the outer caps and screws as above described.

Another advantage of the structure shown in Fig. 2, is that the escaping gas passes between the inner skirt 18 and the reinforcing ferrule 22 with great velocity. Therefore these gases impinge strongly against the projecting flange 24 which serves to cool the gases and condense the metallic vapor to a great extent. This is due to the fact that when these gases strike directly against a flat metallic surface, the gas stream is broken up into innumerable eddies and cross-currents bringing practically all particles of the gases into contact with the cooling surface. The temperature of the gases after contact with the flange 24, is further lowered by its subsequent passage through the annular opening between the outer cap 19 and the tube 10.

In other cases instead of forming the inner closure cup smaller than the inside of the tubing, and the outer cup member larger than the outer surface of the tubing, we have corrugated the outer surface of the skirt of the inner cup 30, see Fig. 7, and also corrugated the inner surface of the skirt of the outer cup 31 thereby providing a multiplicity of passages through which the gases escape in small streams.

It will be seen by our improved construction that in order to remove the internal parts of the fuse, it is only necessary to remove the screws 26 at both ends of the casing, withdraw the end members, then remove the screws 12 from the link supports, insert a pair of fresh fuse links 11, and return the whole to original position and this by the use of no tools except an ordinary screw-driver, and further by this construction it will be seen that when the fuse is thus repaired and the parts replaced that the same is as good as new and when returned to duty will perform its work with its original efficiency.

We have shown and described four forms

of closure members, but other constructions and arrangements of parts may be employed if desired, the scope of the invention being defined and limited only by the appended claims.

We claim:

1. An electric fuse comprising a fuse link, a link inclosing casing, end closures therefor, and means including a sleeve portion on the outside of the casing end and a sleeve portion on the inner side of the casing end providing between them an extended cooling area over which the escaping gas generated within the casing must pass.

2. An electric fuse comprising a fuse link, a link inclosing casing, end closures therefor, means including a sleeve member on the side of the casing end and a sleeve member on the outer side of the casing end providing between them an extended cooling area over which the escaping gas generated within the casing must pass, and means for reversing the direction of travel of the gas on its way to the open.

3. An electric fuse comprising a fuse link, a casing therefor, cup-shaped closures covering the ends of said casing, said closures being provided with vent openings, and means within said casing coöperating with said closures for spreading the escaping gases into a thin film both inside and outside of the casing to facilitate cooling.

4. An electric fuse comprising a fuse link, a casing therefor, a cup-shaped closure extending into the inside and one extending over the outside of said casing ends and attached thereto, passageways being provided between the casing walls and those of both the inner and outer cups for relieving the gas pressure when generated within the casing.

5. An electric fuse comprising a fuse link, a casing therefor, a cup-shaped closure extending into the inside and one extending over the outside of said casing ends and attached thereto, passageways being provided between the casing walls and those of both the inner and outer cups for relieving gas pressure when generated within the casing.

6. An electric fuse comprising a fuse link, a link inclosing casing, two cup-shaped closure members secured to each end thereof, one of said members extending inside and one over the outside of said casing end, said inner cup being provided with an end gas deflecting flange and passageways being provided between the walls of said closures and casing for the escape of gas.

7. An electric fuse comprising a fuse link, a link inclosing casing, two cup-shaped metallic closure members secured to each end thereof, one of said members extending inside and one over the outside of said casing end, passageways being provided between the walls of said closures and casing for the escape of gas, and means between the inner and outer closures for deflecting the escaping gases outward.

8. An electric fuse comprising a fuse link, a link inclosing casing, two cup-shaped closure members secured to each end thereof, one of said members extending inside and one over the outside of said casing end and attached thereto, said inner cup being provided with an end flange for deflecting the gas, and passageways being provided between the walls of said closures and casing for the escape of gas.

9. An electric fuse comprising a fuse link, a link inclosing casing, two cup-shaped metallic closure members secured to each end thereof, one of said members extending inside and one over the outside of said casing end, the latter being secured to the casing, passageways being provided between the walls of said closure and casing for the escape of gas, and means between the inner and outer closures for deflecting the escaping gases outwardly.

10. An electric fuse comprising a fuse link, a link inclosing casing, two cup-shaped metallic closures, one fitting loosely into and one over the outside of each end of said casing, the skirts of each closure providing an extended cooling area over which the heated escaping gases must pass, both cups at each end being secured together and one of each pair being secured to the casing.

11. An electric fuse comprising a fuse link, a link inclosing casing, two cup shaped metallic closures secured to the casing, one fitting loosely into and one over the outside of each end of said casing, the skirts of each providing an extended cooling area over which the heated escaping gases must pass and means coöperating with said cups for increasing the cooling effect upon the escaping gases.

12. An electric fuse comprising a fuse link, a link inclosing casing, two cup shaped closure members secured to each end thereof, one of said members extending inside and the other over the outside of said casing end, passageways being provided between the walls of said closures and casing for the escape of gas means coöperating with the walls of said closures for increasing the cooling effect upon the escaping gases, said closures being removably connected to said casing.

In testimony whereof we affix our signatures in presence of two witnesses.

LOUIS W. DOWNES.
RALPH CLIFTON PATTON.

Witnesses:
GEORGE W. STEERE,
P. O. BAKER.