July 29, 1924. 1,502,881

M. J. SANDIN

FUSE

Filed May 13, 1918

Fig. 1.

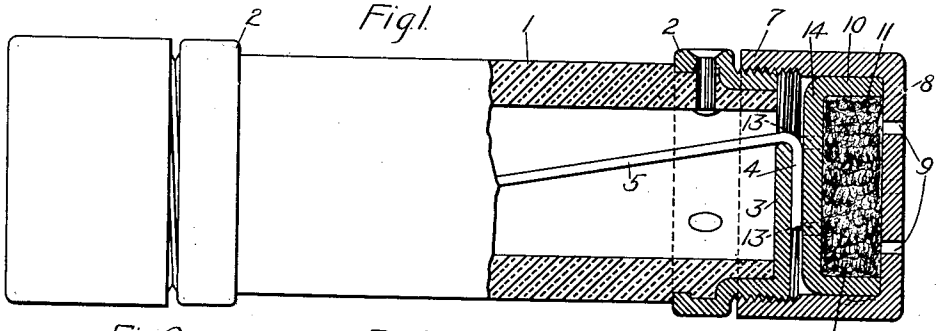


Fig. 2.

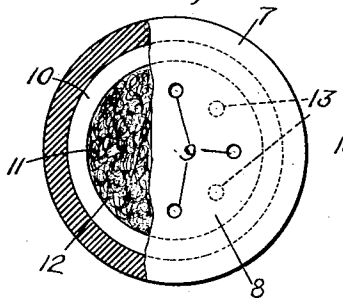


Fig. 3.

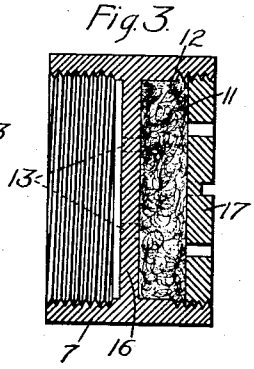


Fig. 4.

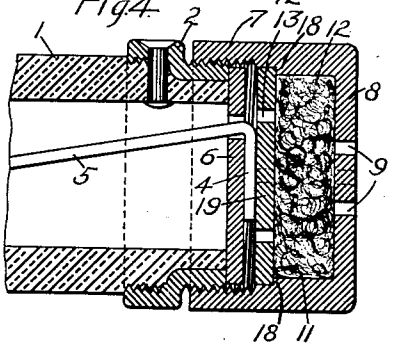


Fig. 5.

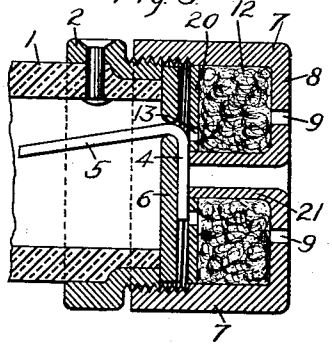


Fig. 6.

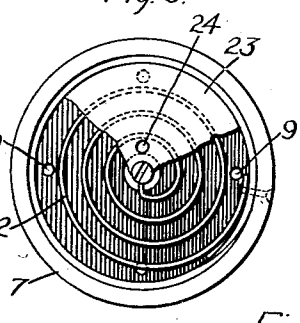


Fig. 7.

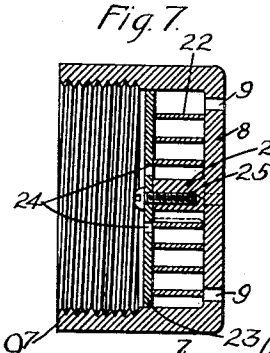


Fig. 8.

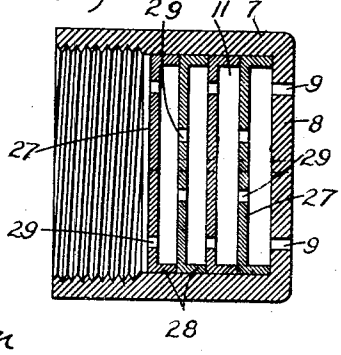
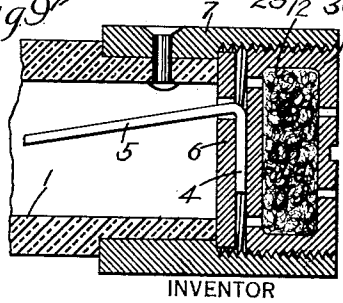


Fig. 9.



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UNITED STATES PATENT OFFICE.

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FUSE.

Application filed May 13, 1918. Serial No. 234,060.

To all whom it may concern:

Be it known that I, MAURITS JEROME SANDIN, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Fuses, of which the following is a specification.

My invention relates to fuses and particularly to refillable cartridge fuses.

One object of my invention is to provide a device of the above indicated character that shall have removable means for preventing the escape of flame, dangerous hot gases and fused metal caused by the volatilization of its enclosed fusible element and permit the escape of gases that have been rendered harmless.

Another object of my invention is to provide a refillable fuse cartridge of the above indicated character that shall be simple and economical to construct and effective in its operation.

Heretofore, it has been usual, in certain non-refillable enclosed fuses, to surround the fusible elements thereof with granular or fibrous flame-smothering materials, but the latter have not been adapted for effective repeated use in connection with refillable fuses by reason of the inconvenience attending the operation of surrounding the fusible elements with the same.

In practicing my invention, I provide a refillable fuse cartridge having means associated with a removable portion thereof whereby granular or fibrous materials may be located permanently therein without interfering with the facility with which such a fuse may otherwise be manipulated and in which arc gases are permitted to escape through a tortuous path or a tortuous and filtering path and arc flame and fused metal are prevented from being emitted therefrom.

Figure 1 of the accompanying drawings is a longitudinal view, partially in section and partially in elevation, of a fuse device embodying my invention; Fig. 2 is an end view of the device shown in Fig. 1, with parts broken away; Fig. 3 is a side sectional view of a modified form of ferrule; Fig. 4 is a side sectional view of a portion of a fuse device embodying another modified form of my invention; Fig. 5 is a view similar to Fig. 4, but of another modification of the same; Figs. 6 and 7 are, respectively, an interior end view, with parts broken away, and a side sectional view of another modification of ferrule; Fig. 8 is a side sectional view of another modification of my invention, and Fig. 9 is a side sectional view of a portion of a fuse device embodying a further modification of my invention.

A tubular casing 1, of fiber or other suitable insulating material, is provided with screw-threaded end rings or ferrules 2, riveted or screwed thereon. A layer of cement or varnish, or other suitable means, is disposed on the end of the casing 1 to insure an air-tight joint between the casing and the ferrule 2. In Fig. 1, the ferrule 2 is provided with a transverse web 3 over which one end 4 of a fusible element 5 may be bent. In Figs. 4 and 5, a slotted washer 6 takes the place of the web 3 and bears against the end of the ferrule 2. In Figs. 1 and 2, an interiorly threaded end cap or ferrule 7 is provided with a transverse outer wall 8 having openings 9 therethrough and embraces a smaller and similar oppositely facing member 10 to form a chamber 11 in which a body of fibrous or granular fire proof material 12, such as asbestos, is disposed. Openings 13, in a transverse wall 14 of the member 10, may be in alignment with the openings 9 in the ferrule 7 or they may be angularly displaced or staggered with respect to the same, depending upon the density of the material 12. By either relation, tortuous paths for arc gases, caused by volatilization of the element 5, are formed. By advancing the ferrule 7 toward the casing 1 on the ferrule 2, the wall 14 may be caused to force the end 4 of the element 5 tightly against the web 3 to form good electrical contact between the element 5 and the member 10. The cylindrical flanged portion of the member 10 closely engages the interior of the ferrule 7 to complete the electrical path from the element 5 to suitable terminal clips (not shown) of any circuit in which it is desired that the fuse be inserted.

The material 12 is preferably of such density that, while permitting the passage of arc gases within safe limits of pressure, it effectually cools the accompanying flame thereof, by diverting it through a number of thin tortuous passages, prevents the same

from communicating with the exterior of the receptacle 1 and collects or filters out the fine particles of fused metal produced by volatilization of the element 5.

In Fig. 3, an alternative form of ferrule 7 may have an integral mid-wall 16 and a separate threaded outer cap 17 to form the chamber 11.

In Fig. 4, the ferrule 7 has different interior diameters to provide an annular shoulder 18 against which rests a perforated washer 19 that takes the place of the walls 14 and 16.

In Fig. 5, a washer 20, similar to the washer 19, is attached, in any suitable manner, to the end of a hollow shank 21 that may be integral with the ferrule 7 and may bear against the end 4 of the element 5 to serve as a direct-conducting means between the element and the outer ferrule 7. The hollow shank 21 provides means for viewing the interior of the device to determine whether the element 5 is in position.

In Figs. 6 and 7, the chamber 11 is formed as a tortuous gas path by a spiral partition member 22 that may be secured to the wall 8 or to a washer 23 in any suitable manner, as by soldering, or it may be integral with either of the same. In this form of ferrule, the gases enter the spiral path through openings 24 in the washer 23 near the center of the latter and pass around a relatively long path between the walls of the member 22 to the outer openings 9 in the wall 8. The washer 23 may be secured to the ferrule 7 by a screw 25 and an interiorly threaded hollow shank 26 on the ferrule 7 or by other suitable means.

In Fig. 8, the chamber 11 of the ferrule 7 may be divided into a plurality of smaller chambers by a plurality of relatively thin washers 27 that are spaced apart by integral flanges 28 thereon or by other suitable means. In this form, the tortuous gas path is obtained by the relation of a plurality of staggered openings 29 in the washers 27. The material 12 may be also used in connection with the forms of devices shown in Figs. 6, 7 and 8.

In Fig. 9, the wall 8 is omitted and an exteriorly threaded hollow plug or box-like structure 30 placed in the end of the ferrule 7 that may, in this instance, be directly secured to the casing 1. The space enclosed by the plug 30 may be filled with a body of the material 12 or divided into tortuous paths by the above described means or have a combination of such material and means, as desired.

I, therefore, obtain a readily refillable fuse device having a removable ferrule in which is provided a path for the escape of gases and means for preventing the escape of fire and volatilized matter and in which the operation of renewing the ruptured fusible elements thereof may be performed as readily as if the said means were not present.

While I have shown and described particular forms of my invention, changes may be effected therein, without departing from the spirit and scope thereof, as set forth in the appended claims.

I claim as my invention:

1. A fuse cartridge for a fusible element having a perforated double-walled end member and means disposed between said walls for preventing the escape of flame and the solid combustion products attending the rupture of said element.

2. A refillable cartridge for a fusible element comprising a removable perforated double-walled end member, and means disposed between said walls for preventing the escape of flame caused by volatilization of said element.

3. A refillable fuse cartridge comprising a receptacle for a fusible element, a perforated removable cap member therefor, a partition disposed in said cap member and a body of material pervious to the arc gases and impervious to the other combustion products caused by rupture of said element disposed between said cap member and said partition.

4. A fuse comprising a casing, a fusible element, a detachable disc mounted on the end of the casing for supporting the fusible element and a cap for clamping the fusible element to the detachable disc detachably secured to the casing and provided with a ventilating disc forming a cooling chamber between the ventilating disc and the cap.

5. A fuse comprising a casing, a fusible element, a detachable disc mounted on the end of the casing and provided with a ventilating perforation through which the fusible element extends, and a cap for engaging the fusible element and retaining it in operative position detachably secured to the casing and provided with a ventilating disc forming a cooling chamber between the ventilating disc and the cap.

6. A fuse comprising a casing, a fusible element, a detachable disc having a perforation for receiving the fusible element and a cap having transverse vented walls spaced apart and being secured to the casing for retaining the fusible element in operative position.

7. A fuse comprising a casing, a fusible element, a detachable disc having a perforation for receiving the fusible element, a cap secured to the casing and having a vented transverse wall, and a transverse vented disc detachably mounted in the cap and spaced from the transverse wall thereof for constituting a cooling chamber therebetween and for securing the fusible element in operative position.

8. A fuse comprising a casing, a fusible

element, a detachable disc for supporting the fusible element, and a cap having a cooling chamber therein for engaging the fusible element and clamping it in operative position.

9. A fuse comprising a casing, a fusible element, a detachable disc for supporting the fusible element, and a vented cap for normally preventing relative longitudinal displacement of the disc and the fusible element and having a transverse wall spaced from the disc for constituting a gas-cooling chamber.

10. A fuse comprising a casing, a fusible element, a detachable disc for supporting the fusible element, a vented cap for normally preventing relative longitudinal displacement of the disc and the fusible element and having a transverse wall spaced from the disc for constituting a gas-cooling chamber therebetween, and a gas inhibiting agent disposed in the said cooling chamber.

11. A fuse comprising a casing, a fusible element, a supporting member mounted on the end of the casing for supporting the fusible element and a cap detachably secured to the casing and provided with a ventilating disc forming a cooling chamber between the ventilating disc and the cap and for clamping the fusible element to the said supporting member.

12. A fuse comprising a casing, a fusible element, a supporting member mounted on the end of the casing and provided with a ventilating perforation through which the fusible element extends, and a cap detachably secured to the casing and provided with a ventilating disc forming a cooling chamber between the ventilating disc and the cap and for engaging the fusible element and retaining it in operative position.

13. A fuse comprising a casing, a fusible element, a supporting member having a perforation for receiving the fusible element and a cap having vented transverse walls spaced apart and being secured to the casing for retaining the fusible element in operative position.

14. A fuse comprising a casing, a fusible element, a supporting member having a perforation for receiving the fusible element, a cap secured to the casing and having a vented transverse wall, and a vented transverse disc mounted in the cap and spaced from the transverse wall thereof for constituting a cooling chamber therebetween and for securing the fusible element in operative position.

15. A fuse comprising a casing, a fusible element, a supporting member for supporting the fusible element and a cap having a cooling chamber therein for engaging the fusible element and clamping it in operative position.

16. A fuse comprising a casing, a fusible element, a supporting member for supporting the fusible element, and a cap detachably secured to the casing and provided with an inwardly-projecting centrally disposed tubular member for clamping the fusible element to the supporting member.

17. A fuse cartridge for a fusible element having a perforated double-walled end member and means disposed between said walls for preventing the escape of flame caused by volatilization of said element.

18. A renewable electric fuse of the cartridge type comprising the combination of a tubular enclosing casing, an exteriorly screw-threaded ferrule having an apertured end wall carried by the end of said casing, and an internally screw threaded end cap having double end walls formed with staggered apertures and spaced from each other to provide a gas passage, said inner end wall arranged to press the end of a fusible element against the end wall of said ferrule.

In testimony whereof, I have hereunto subscribed my name this 8th day of May, 1918.

MAURITS JEROME SANDIN.