

H. C. HERSHEY.
SAFETY FUSE FOR ELECTRIC CIRCUITS.
APPLICATION FILED JAN. 25, 1913.

1,124,133.

Patented Jan. 5, 1915.

Fig. 1.

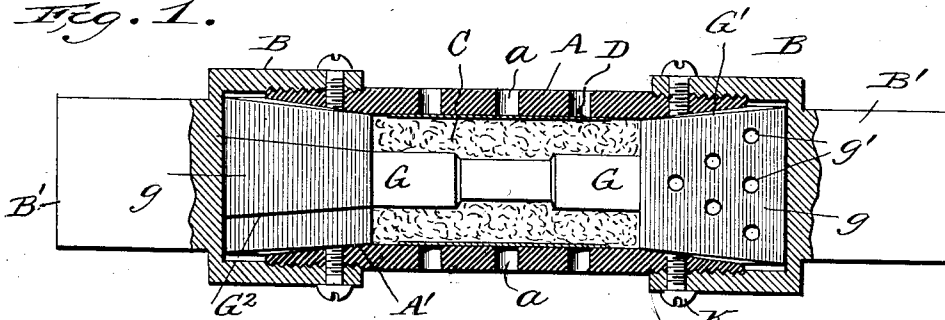


Fig. 2.

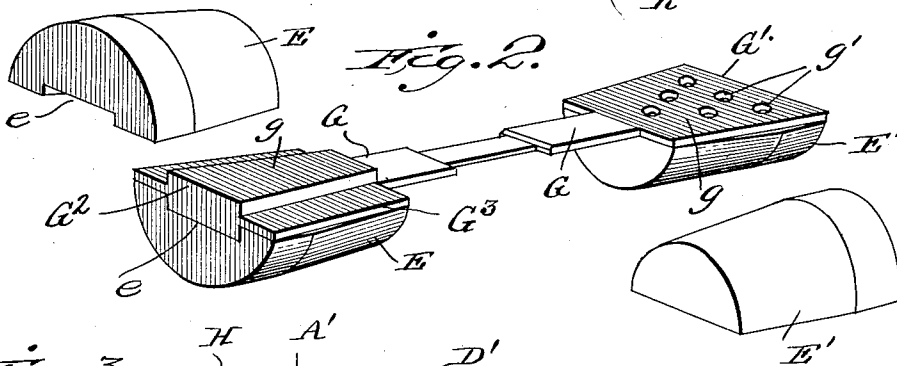


Fig. 3.

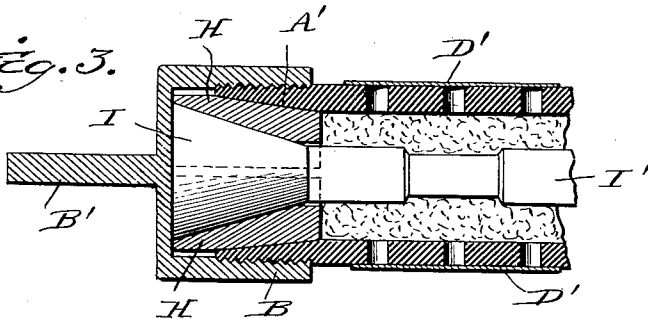
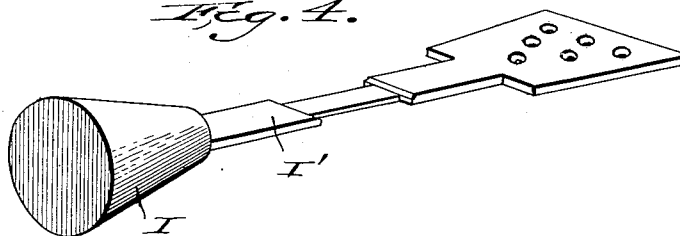


Fig. 4.



Inventor

Herbert C. Hershey

Witnesses

Thomas Durant
Halbert Brown.

By

Church & Thimble

his Attorney

UNITED STATES PATENT OFFICE.

HERBERT C. HERSHEY, OF HANOVER, PENNSYLVANIA, ASSIGNOR TO N-W EQUIPMENT CO. INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SAFETY-FUSE FOR ELECTRIC CIRCUITS.

1,124,133.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HERBERT C. HERSHEY, a citizen of the United States, and resident of Hanover, in the county of York and State of Pennsylvania, have invented certain new and useful Improvements in Safety-Fuses for Electric Circuits; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, and to the figures and letters of reference marked thereon.

This invention relates to fuses of the type adapted to be included in an electric circuit, and the fuse member of which is adapted to be dissipated by any excess current through the same, such, for instance, as would be caused by a short circuit beyond the fuse.

The object of the invention is primarily to provide a fuse in which the fuse member may be readily renewed when destroyed by the action of an excess current, but with which it will be practically impossible to substitute for the fuse member a wire or strip of metal which does not possess the proper characteristics to afford the desired safety for the circuit beyond the fuse.

A further object of the invention is to provide a fuse with which liability of injury either to the fuse structure itself or to surrounding objects by the formation of an arc or high resistance point in the adjacent members of the fuse shall be reduced to a minimum.

A further object of the invention is to provide an exceedingly simple and efficient structure which may be repaired or a new fuse member inserted by unskilled labor and without any danger of the parts being re-assembled in such wise as to reduce the efficiency of the fuse.

The invention consists in certain novel details of construction and combinations and arrangements of parts all as will be now described and pointed out particularly in the appended claims.

Referring to the accompanying drawings,—Figure 1 is a longitudinal section through a fuse embodying the present improvements. Fig. 2 is a perspective view of the fuse member with its clamps, the two upper clamps being separated from the fuse member. Fig. 3 is a section corresponding

to Fig. 1 through one end of a fuse embodying the present improvement, but showing a modified and, in some respects, a more desirable form of fuse member and clamps. Fig. 4 is a perspective view of fuse member of the construction embodied in Fig. 3.

Like letters of reference in the several figures indicate the same parts.

In some respects the fuse of the present invention follows the accepted lines of fuse construction now well understood and therefore in so far as general features of construction are concerned, the illustrations are only typical of the application of the invention. For example the fuse may embody a cylindrical inclosing casing A of vulcanized fiber or other suitable non-conducting material upon the ends of which caps B are secured by screw threads and are adapted to form the terminal members to which the circuit terminals are connected. As shown, the caps B are provided with tongues or extensions B' adapted to be held between suitable clamping devices forming the circuit terminals, as is customary with devices of this kind, particularly where the fuses are of large size and adapted to carry a heavy current.

The fuse member proper is located within the casing A and is preferably surrounded by a comminuted or pulverulent material such as asbestos, indicated at C, and vent apertures *a* may be formed in the casing for the escape of any gases which may be generated at the time the fuse blows or is volatilized or melted. Normally such vent apertures may be closed by a lining such as D, in Fig. 1, or a covering D', in Fig. 3 which may be of thin papers or of a foraminous material such as netting, all as is customary in the art.

The ends of the casing A are, in accordance with the present invention, preferably provided with tapering internal walls or faces as at A', and adapted for the reception of conical sectional plugs E, E'. Between the sections of the plugs E and E' the ends of the fuse member G are adapted to be clamped, the desired clamping action and contact between the parts being secured by the pressure exerted by the caps, as they are screwed on to the ends of the casing, and exert a tendency to drive said conical plugs toward each other.

The intermediate portion of the fuse member G which is adapted to be ruptured by the current and dissipated in the filling within the casing may be of relatively narrow and thin construction as illustrated, or of any other preferred cross sectional shape, and it will be understood it is properly proportioned and of a proper alloy to permit of the passage of a current of the desired amperage without rupture, but to be instantly ruptured and dissipated by the passage of an excess current. At its ends, the fuse member is preferably made to conform to the shape of the proximate faces of the sections of the conical plugs or clamps, and while these ends may, as shown at the right hand end of Fig. 2, be substantially flat, and adapted to be clamped between flat proximate faces of the plug sections, one end at least is preferably made of such conformation as to fit between proximate faces of plug or clamp sections which will be so shaped as to preclude the possibility of a simple strip of metal or of a wire being successfully clamped therebetween, the object being to prevent the substitution of such ordinary devices for a fuse whereby the prejudice and objection to the use of fuses with removable fuse members is overcome.

As shown in Fig. 2, while the right hand end G' of the fuse member G is flat and of extended area so as to be clamped between the proximate flat faces of the sections E' of the plug, the opposite end is provided with a relatively large and tapered central portion G² with lateral wings G³ all adapted to seat in the correspondingly shaped proximate faces of the plug sections E. Each of the plug sections E is for the purpose stated provided with a central tapered recess e rectangular in cross section so as to secure an extended contact surface between the section and fuse member, but at the same time to preclude the successful clamping or use of a device which it might be attempted to substitute for the fuse member, but which is not of the proper conformation.

A construction which is perhaps somewhat better calculated to prevent the possible use of an unauthorized substitute for the fuse member is illustrated in Figs. 3 and 4; wherein it will be seen that the plug sections, lettered H in this instance, are provided in the proximate faces with semi-conical recesses and are adapted for the reception of the conical or frusto-conical end I of the fuse member I'. While the opposite end of the fuse member may be of similar form it is preferably flat as shown and adapted to be clamped between proximate flat faces of plug sections as shown in Fig. 2.

It will be noted that the conical or tapering formation of the end of the fuse member tends, when the plug sections are forced inwardly, to exert an outward pull

or tension on the fuse member itself, thus insuring a proper seating of the outer face of the end of the fuse member against the cap and overcoming a tendency which might otherwise exist to buckle the fuse member intermediate its ends.

In fuses of this general type it has been found in some instances that owing to defective contact between the ends of the fuse member and caps heat would be generated because of the resistance there offered to the passage of the current, or an arc would be formed having a violent heating effect, resulting in the destruction of the fuse with the passage of a current well within the capacity of the fuse member, or in some instance causing adjacent objects to be set on fire. With the present construction the liability of such a thing happening is reduced to the minimum, but in order to completely eliminate danger from the cause stated, I now coat the contacting faces of the ends of the fuse member, the sections of the plugs, and preferably also the inner faces of the caps with an easily fusible solder indicated by the shaded areas g in Fig. 2. The flat end of the fuse member may be provided with openings or apertures g', into which the solder will run, should any undue heating occur. Obviously, with such a construction the first effect of the generation of any heat between the contacting members will be to melt the solder and establish a good electrical and mechanical contact, whereupon the heating will immediately disappear and the parts will remain in proper effective operative relation.

In the preferred construction, the cap members B, in addition to being fitted on the ends of the casing A by means of screw threads, are provided with retaining screws K which are passed in through the sides of the caps, the apertures for the reception of said screws being accurately positioned as to register properly when the parts have been advanced to a point where proper contact will have been established, but without exerting any injurious longitudinal pressure on the fuse member itself. These retaining screws, therefore, constitute a gage for indicating when the parts have been set up to the proper degree and, of course, it will be understood, as incidental thereto that the size and length of the plug sections and fuse member are properly proportioned to attain the desired ends.

In case a fuse is blown, it is with the present construction, a comparatively simple and inexpensive matter to remove the caps and substitute a new fuse member for the one destroyed, and again replace the parts in position for use, thus overcoming entirely the necessity of returning the fuse to the factory or of providing an entirely new fuse.

Having thus described my invention what

I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a safety fuse, a non-conducting casing, terminal caps adjustably mounted thereon and closing the ends of the casing, sectional tapering plug members having their larger ends of greater diameter than the internal diameter of the ends of the casing mounted in the ends of the casing with their outer and larger ends beyond the ends of the casing, whereby the sections will be moved toward each other when the caps are moved inwardly, the proximate faces of the plug sections at one end of the casing forming between them a chamber of greater sectional area than the body of the fuse, and a fuse member clamped by the plug members when forced inwardly by the caps and having one of its ends enlarged to conform to and filling the said chamber whereby ordinary non-fusible strips can not be substituted for the fuse member and clamped in position.

2. In a safety fuse, a non-conducting casing, terminal caps adjustably mounted thereon and closing the ends of the casing, sectional inwardly tapering plug members having their larger ends of greater diameter than the internal diameter of the ends of the casing mounted in the ends of the casing with their outer and larger ends in engagement with the caps whereby they are confined in the casing, the proximate faces of the sections of the plug members at one end of the casing having enlarged inwardly tapering recesses therein forming between said sections an inwardly tapering chamber of greater sectional area than the body of the fuse member, and a fuse member clamped by the plug members and having one of its ends enlarged to conform to the inwardly tapering chamber, said enlarged end being clamped by the plug sections when forced inwardly by the cap, whereby a longitudinal tension is exerted on the fuse member by the clamping action of the plug sections.

3. In a safety fuse, a non-conducting casing, a terminal cap adjustably mounted on one end of the casing, a sectional inwardly tapering plug member having its larger end of greater diameter than the internal diameter of the end of the casing mounted in the said end of the casing with the outer and larger ends of the sections in engagement with the cap, the proximate faces of said sections forming between them a chamber of greater sectional area than the body of the fuse, a fuse member having one end enlarged to conform to and filling said chamber, and means for holding and establishing electrical contact between the opposite end of the fuse member and the terminal cap at that end of the fuse.

4. In a safety fuse, a non-conducting cas-

ing, terminal caps adjustably mounted thereon and closing the ends of the casing, a sectional inwardly tapering plug member having its larger end of greater diameter than the internal diameter of the end of the casing mounted in one end of the casing with the outer and larger ends of the sections projecting beyond the casing for engagement by the cap, the proximate faces of the plug sections being formed with inwardly tapering recesses forming between the sections an inwardly tapering chamber of greater sectional area than the body of the fuse, a fuse member having one of its ends enlarged and tapered to conform to and filling the said chamber, and means for holding and establishing electrical contact between the opposite end of the fuse member and the terminal cap at that end of the fuse.

5. In a safety fuse, a non-conducting casing, terminal caps adjustably mounted thereon and closing the ends of the casing, sectional inwardly tapering plug members having their larger ends of greater diameter than the internal diameter of the ends of the casing mounted in the ends of the casing with their outer and larger ends in engagement with the caps, the proximate faces of the sections of one of said plug members having enlarged recesses therein forming a chamber of greater sectional area than the body of the fuse member, and the proximate faces of the sections of the other of said plug members being substantially flat, a fuse member having its terminals mounted between said plug sections, one of said terminals being substantially flat to conform to the flat proximate faces of the plug sections at one end of the casing, and the other of said terminals being enlarged to conform to and filling the chamber between the proximate faces of the plug sections at the other end of the casing.

6. In a safety fuse, a non-conducting casing, terminal caps adjustably mounted thereon and closing the ends of the casing, sectional inwardly tapering plug members having their larger ends of greater diameter than the internal diameter of the ends of the casing mounted in the ends of the casing with their outer and larger ends in engagement with the caps, the proximate faces of the plug sections at one end of the casing having enlarged recesses therein of angular formation in cross-section whereby a chamber angular and of greater area in cross-section than the body of the fuse is formed between the plug sections, and a fuse member clamped by the plug members and having one of its ends enlarged to conform to and filling the said chamber whereby a strip or wire cannot be substituted for the fuse member and clamped in position by the sections of the plug member.

7. A safety fuse embodying an inclosing

sheath, a fusible conductor, metal terminals connected with the sheath and having mechanical clamping means for the ends of the fusible conductor the contact making surfaces of the terminals being provided with a soldering composition fusible at a lower temperature than the fusible conductor adapted to effect a mechanical and electrical union of the parts when heated by electric action due to defective contact between the parts. 10

HERBERT C. HERSHEY.

Witnesses:

EDWARD A. MICHAEL,
G. W. BUSHNER.