

Aug. 18, 1959

C. ROSSO
ELECTRIC FUSE

2,900,475

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2 Sheets-Sheet 1

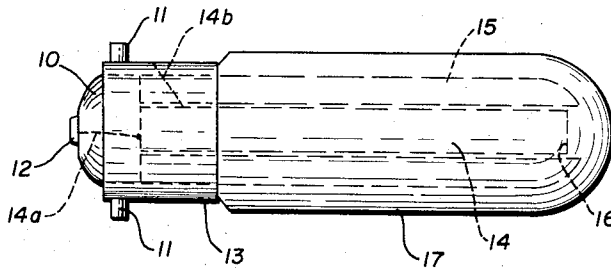


Fig. - 1

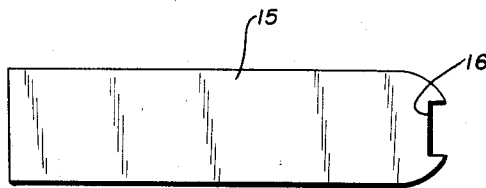


Fig. - 2

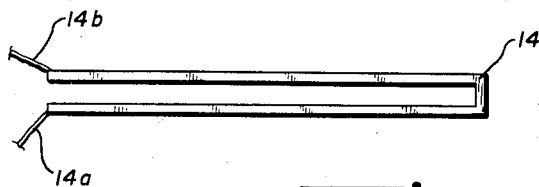


Fig. - 3

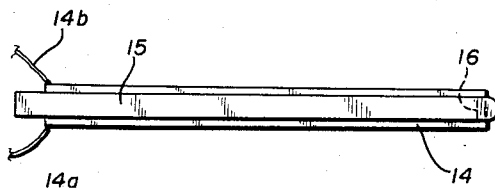


Fig. - 4

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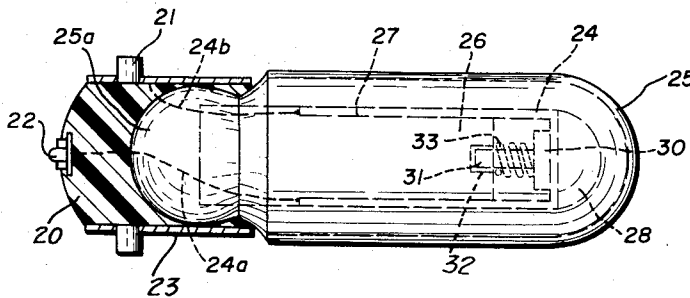


Fig. - 5

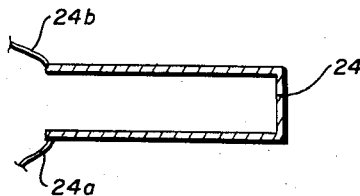


Fig. - 6

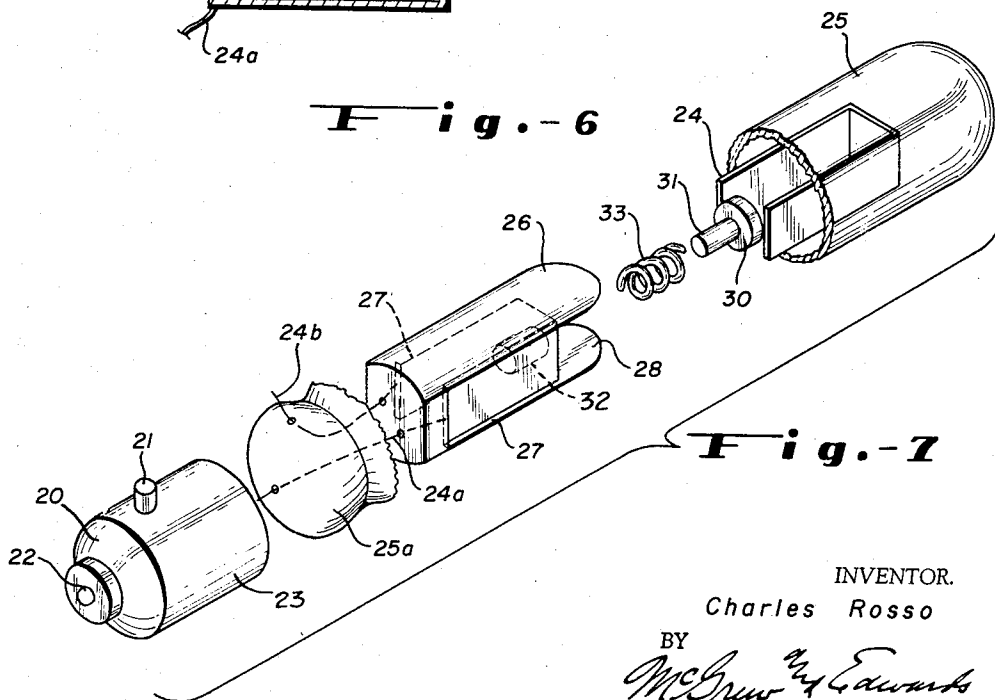


Fig. - 7

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ELECTRIC FUSE

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6 Claims. (Cl. 200—131)

This invention relates to electric fuses of the plug type and particularly to an improved fuse which is suited to applications on aircraft and under heavy vibration conditions.

Plug-type fuses employing fusible links which rupture upon the occurrence of excessive current have been employed in many forms or types and in a wide range of applications. For some applications, ease of checking for burn out is essential and it is desirable that the fuse link be readily visible from substantially any angle so that removal of a fuse for inspection is not necessary. Many applications, such as those in aircraft, require that the fuse link withstand heavy or violent vibration and also maintain its calibration and reliability over a wide range of temperature changes such, for example, as the temperature changes in the atmosphere which are experienced by an aircraft when climbing rapidly. Accordingly, it is an object of this invention to provide a plug-type electric fuse of improved construction having a fusible element which is readily visible from all directions.

It is another object of this invention to provide an electric fuse of the plug-type of improved construction having a readily-visible fusible element and capable of withstanding heavy vibration and sudden and periodic temperature changes.

Briefly, in carrying out the objects of this invention in one embodiment thereof, a plug-type fuse is provided which comprises a base having electrical contacts thereon and an insulating support member extending from the base and having a U-shaped fusible element extending from the base over the support member through a notch in the remote end thereof and back to the base; the fusible element and support member are enclosed in a transparent envelope and are visible from all directions.

In another embodiment, the insulating support is made in the form of a generally-cylindrical post having flat grooves extending along opposite sides and connected by a notch across the end which includes a recess in the end concentric with the axis of the post. The fusible element is in the form of a flat strip through the grooves and across the end and retained under tension by a spring mounted in the recess in the end. In both forms, the transparent envelope about the supporting post and fusible element renders the element visible from substantially all directions and makes it unnecessary to remove the fuse for inspection purposes. The spring-tension arrangement of the second embodiment is particularly useful for applications wherein there are temperature changes within wide ranges and minimizes cyclic fatigue of the element.

The features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. The invention itself, however, both as to its organization and method of operation, will be more readily understood from the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a side elevation view of a plug-type fuse embodying the invention;

Fig. 2 is a plan view of the insulated supporting member of the fuse of Fig. 1;

Fig. 3 is a longitudinal side elevation view of the fusible element of the fuse of Fig. 1;

Fig. 4 is a longitudinal side elevation view of the fuse of Fig. 3 assembled on the support of Fig. 2;

Fig. 5 is a side elevation view of a plug-type fuse illustrating another embodiment of the invention;

Fig. 6 is a longitudinal sectional view of the fuse of Fig. 5; and

Fig. 7 is an exploded perspective view of the fuse of Fig. 6.

Referring now to the drawings, the plug-type fuse illustrated in Figs. 1, 2, 3 and 4 comprises a base 10 having pins 11 arranged to secure the base in a bayonet-type socket in the usual manner. The base provides a central contact 12 and the conventional sleeve contact 13 for making electrical connections to the fuse element. A fusible element 14 is supported from the base 10 on an insulated supporting member 15 extending longitudinally from the base and having a notch 16 at the top thereof through which the outer end or turn of the element 14 extends and in which the element is held. The fuse element and supporting member are enclosed within and completely surrounded by a transparent envelope 17 which is secured in the base by a suitable cement and protects the fusible element from the atmosphere and from injury due to accidental contact. The ends of the fuse link 14 are connected to the contacts 12 and 13 by lead wires 14a and 14b, respectively, which press through the envelope 17 so that the element may be connected in an electrical circuit by inserting it in the conventional plug socket. As shown in Figs. 2 and 4, the supporting member 15 is an elongated flat strip, rounded at one end, in which the notch 16 is formed and, as shown in Fig. 3, the fuse element 14 is of U-shaped form and of substantially uniform cross section throughout. When the element 14 is arranged on the support 15 and retained in position by the notch 16, it is held securely in position on both sides of the support and is prevented from jarring loose from the support during periods of vibration; furthermore, the notch 16 is made of sufficient depth that the element 14 will not expand beyond the notch during the changes in temperature throughout the range of temperatures within which the fuse is required to operate. It will be noted that the fuse element is visible from all sides of the envelope 17 and may easily be inspected from any angle to determine whether or not the element 14 remains intact. The arrangement for mounting the U-shaped fuse link on both sides of the insulating support member 15 makes it possible to provide a long length of fusible element while maintaining the element readily visible substantially throughout its length.

When electric fuses are employed in applications requiring wide differences in ambient temperature, the fuse lengths undergo expansion and contraction; and, if they are allowed to sag or move, cyclic fatigue may cause crystallization and resulting fracture of the fuse link. In order to minimize cyclic fatigue and thereby prevent crystallization and fracture of the fuse link due to temperature changes, the fuse may be constructed in the manner illustrated in Figs. 5, 6 and 7. The fuse of this embodiment comprises a base 20 having catching pins 21 and providing contacts 22 and 23 at the ends and sides of the base, respectively. An elongated fuse link 24 is mounted in a transparent envelope 25 on a post 26 which is secured within the base 20. The envelope 25 is of a construction similar to that employed for miniature lamp bulbs and the base of the envelope,

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indicated at 25a, is of globular form and is connected in the fuse base 20. The post 26 is of generally-cylindrical form and is provided with grooves 27 along two sides thereof, and a connecting notch 28 at the outer end remote from the base 20. The fuse link 24 fits within the grooves 27 which are flat-bottomed and of substantially the same width as the fuse link, and the end of the link extends across the top of the notch 28 and is engaged by a shoe or foot 30; the foot is formed at the end of a plunger 31 carried within a cylindrical recess 32 in the center of the post at the bottom of the notch 28 and concentric with the longitudinal axis of the post. The foot 30 is urged outwardly against the link 24 by a helical compression spring 33 which thereby maintains the link 24 under tension. The ends of the link 24 lie within the base 20 on either side of the post 26 and are electrically connected to the contacts 21 and 22 by lead wires 24a and 24b passing through the envelope base 25a so that the fuse is connected in the electrical circuit when secured in the usual plug socket. The function of the spring 33 is to hold the fuse link taut and in engagement with the supporting post 26 along the bottoms of the grooves 27; the fuse link is held in this taut condition regardless of changes in temperature. As the ambient temperature changes, both the spring and the fuse expand or contract as the case may be. For example, upon a decrease in temperature which might result as an aircraft rises vertically, the spring decompresses due to its contraction and releases to some extent the stress on the fuse link. At the same time the fuse link contracts and is still held taut by engagement with the plunger foot 30. This minimizes relative motion due to vibration and thus minimizes cyclic fatigue and likelihood of fracture of the link. At the same time an extended length of the fuse link may be employed and maintained visible for ready inspection from substantially any angle.

While the invention has been described in connection with details of construction of specific plug fuses, other applications and embodiments will occur to those skilled in the art; therefore, it is not desired that the invention be limited to the specific details illustrated and described and it is intended by the appended claims to cover all the modifications which fall within the spirit and scope of the invention.

I claim:

1. A plug-type fuse comprising a base, an elongated support member of insulating material extending from said base, said member having a notch at the outer end thereof remote from said base, an elongated U-shaped fusible element extending along both sides of said member and through said notch, external electric contacts on said base, conducting means connecting said ends of said elements and respective ones of said contacts, and

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a transparent envelope secured in said base and extending closely about and completely enclosing said member and said fusible element.

2. A plug-type fuse as set forth in claim 1 including spring means mounted between said support member and said fusible element for maintaining said element under tension and in engagement with said support member along both sides thereof.

3. A plug-type fuse as set forth in claim 1 including spring means mounted at the end of said support member in said notch and engaging the central portion of said fusible element for maintaining said element under tension and in engagement with said support member along both sides thereof.

4. A plug-type fuse comprising a base, an elongated substantially-cylindrical supporting post of insulating material extending from said base, said post having flat-bottom grooves extending along two sides thereof and a cross notch connecting said grooves at the outer end of said post remote from said base, an elongated U-shaped fusible element extending along both sides of said member in said grooves and through said notch, external electric contacts on said base, conducting means connecting the ends of said element and respective ones of said contacts, and a transparent envelope secured in said base and extending closely about and completely enclosing said post and said fusible element.

5. A plug-type fuse as set forth in claim 4 including a compression spring mounted in said notch substantially concentrically with the longitudinal axis of said post and a contact shoe engaging said spring and said fusible element for maintaining said element under tension and in engagement with the bottoms of both said grooves regardless of changes in temperature.

6. A plug-type fuse as set forth in claim 4 wherein said post is formed to provide a central recess in communication with said notch and including a helical compression spring mounted in said notch and a longitudinally-movable plunger entering in and guided by said recess and having a head engaging said spring and said fusible element for transmitting the force of said spring to said element to maintain said element under tension and in engagement with the bottoms of said grooves regardless of changes in temperature.

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