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E. V. SUNDT ET AL

2,041,383

ELECTRIC FUSE

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Fig. 1

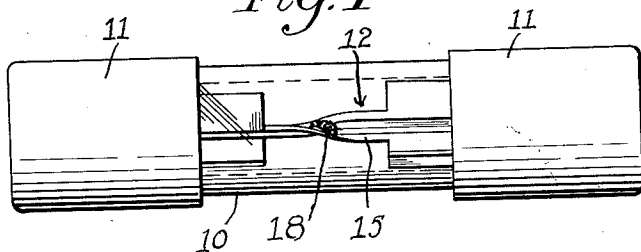


Fig. 2

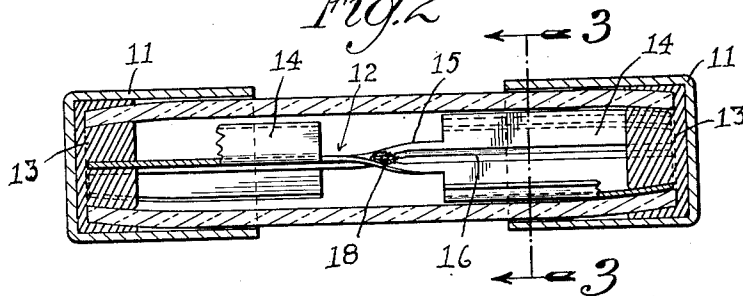


Fig. 3

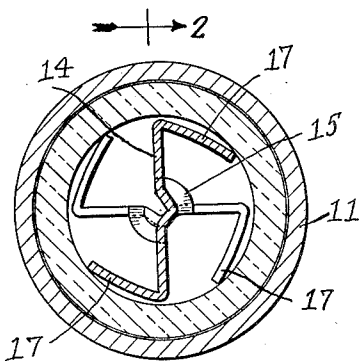


Fig. 5

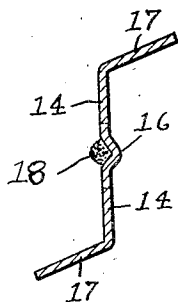
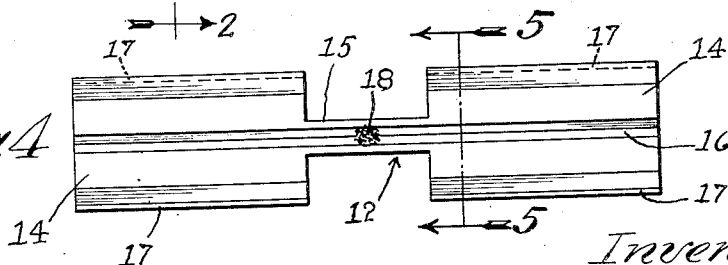


Fig. 4



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ELECTRIC FUSE

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2 Claims. (Cl. 200—131)

This invention relates to improvements in electric fuses.

Fuses subjected to intense vibration frequently are fractured thereby, especially fuses of relatively low amperage capacity which require the use of thin and fragile fuse elements.

In aircraft use the failure of such fuses due to the vibration imposed by the motors has presented an annoying problem and one object of the invention is to provide a fuse of improved construction for resisting fracture by mechanical vibration.

Another object of the invention is to provide a fuse having a fusion zone so shaped as to increase its natural period of vibration to a frequency substantially above the frequency encountered in actual use, thereby precluding the establishment of destructive sympathetic vibration in the element with consequent failure of the fuse in use.

Other objects relate to various features of construction and arrangement of parts which will be apparent from a consideration of the following specification and accompanying drawing, wherein:

Figure 1 is a plan view of a fuse embodying the present improvements,

Figure 2 is a broken longitudinal section taken on line 2—2 of Figure 3.

Figure 3 is a section taken on line 3—3 of Figure 2.

Figure 4 is an elevation of a detached fuse element with the fusion zone thereof lying in the plane of the end sections.

Figure 5 is a section taken on line 5—5 of Figure 4.

In the drawing which illustrates an embodiment of our improvements on an enlarged scale, 10 is an insulating tube of glass. Terminals such as end caps 11 are carried in the ends of the tube 10 and are electrically connected to the fuse element which is longitudinally disposed within the tube, the fuse element being indicated generally by the numeral 12.

In Figure 2 the means for connecting the fuse element to the terminals and the latter to the tube comprises solder 13. It will be noted that the ends of the tube are reduced slightly in diameter and that as the end of a tube with the fuse element in position therein is placed in one of the caps containing molten solder, the solder will flow into the open end of the tube and also to some extent along the outer surface thereof, and when solidified will connect the cap to the tube as well as electrically connecting the cap to the fuse element.

The fuse element preferably is of the form shown in Figures 4 and 5 prior to assembly with the tube and terminals.

It will be noted that the element 12 is provided with end sections 14 and an intermediate fusion zone 15 of reduced current carrying capacity. The element is shown as being provided with the longitudinal rib 16 which serves to stiffen the element and thus reduce its tendency to vibrate during use. The sections 14 are provided on their longitudinal edges with angularly disposed flanges 17 which give the sections substantially a Z shape in cross section. The distance from the free longitudinal edge of one flange 17 to the corresponding edge of the other is greater than the internal diameter of the tube, thus rendering it necessary to compress the flanges while inserting them in the tube. The flanges thus bear against the inner wall of the tube and provide support for the element to prevent or retard its tendency to vibrate independently of the fuse as a whole.

As shown in Figures 1, 2 and 3, the end sections 14 are disposed substantially at right angles one to the other which angularity is given the section by first twisting the same to give the fusion zone 15 a helical configuration. The result of twisting the fusion zone is that its natural period of vibration is increased to a frequency considerably above that encountered in use, as for example, in airplanes. Thus the fusion zone due to its support by the end sections 14 and its helical configuration does not assume a destructive vibration during use and its period of usefulness is greatly prolonged.

By forming the stiffening rib 16 in the fuse element and giving the fusion zone thereof a helical configuration the improved fuse effectually resists the tendency to vibrate with consequent prolongation of the usefulness of the fuse.

While the rib 16 and the helical configuration of the fusion zone both preferably are used, it will be seen that one or the other may be satisfactory, depending on the intensity of the vibrations to which the fuse is to be subjected in use.

Small capacity fuses used in aircraft, particularly in airplanes, have heretofore been the source of considerable annoyance due to the breakage of the fuse elements by the vibrations to which they are subjected in use. Fuses constructed in accordance with the present improvements have been found to be extremely durable even when subjected to more intense vi-

brations than are present in airplanes of the present day.

When a fuse blows the aviator usually attempts to immediately replace it, and it is desirable that the fuses have means for visually indicating that the same have blown. To this end we have provided indicating material 18 on the fusion zone of the fuse element which discolors the glass tube upon ignition. A suitable indicator comprises phosphorus mixed with a suitable binder and caused to adhere to the fusion zone 15. The phosphorus has an ignition point substantially the same as the fusion point of the fusion zone, and consequently ignites when the fusion zone fuses under an overload of current. The phosphorus gives the interior of the glass tube 10 a yellowish tint which is readily discernible by the aviator, and thus facilitates the location of the blown fuse.

While we have described an embodiment of our improvements for the purpose of illustration, we do not wish to be restricted specifically there-

to except as so limited by the appended claims. We claim:

1. A fuse comprising an insulating tube, end terminals therefor, and a fuse element extending longitudinally of said tube and electrically connected to said terminals, said element comprising end sections relatively angularly disposed within said tube and contacting with the inner walls thereof and an intermediate helical fusion zone of reduced current carrying capacity integral with said end sections.

2. A fuse comprising an insulating tube, end terminals therefor, and a fuse element in said tube electrically connected with said terminals, said element comprising end sections disposed diametrically of said tube and having angularly disposed marginal flanges contacting with the inner wall of said tube and an intermediate fusion zone of reduced current carrying capacity integral with said end sections.

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