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ELECTRICAL FUSE

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Fig. 1.

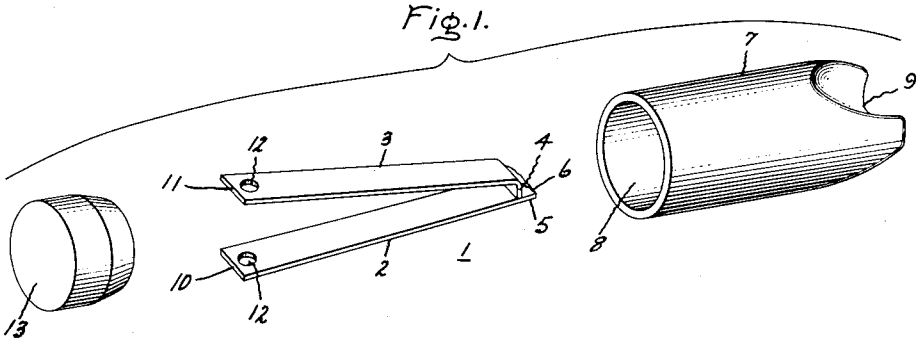
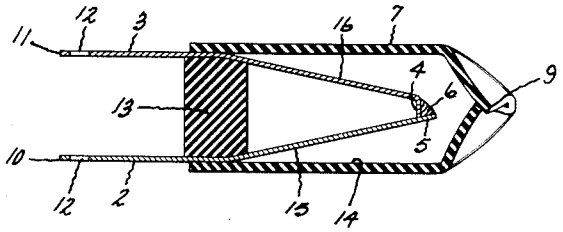


Fig. 2.



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ELECTRICAL FUSE

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This invention relates to electrical fuses and more particularly to fuses for providing internal protection for small electrical apparatus.

In the design of certain small electrical apparatus, for example ballast transformers for fluorescent lamps, it may be desirable to incorporate a fuse device to provide internal protection against overheating. Such a device must either respond to the internal temperature of its associated apparatus, or to a combination of the temperature and current flow therethrough. Thus, if such a fuse device is incorporated in a fluorescent ballast transformer, it will deactive the ballast if the compound in which the core and windings are encased overheats. Such a fuse device intended for incorporation in small electrical apparatus, such as fluorescent ballast transformers, must accordingly be small, easy to assemble and to connect to the associated apparatus, and inexpensive. In addition, in the case of fluorescent ballast transformers, such a fuse device may be surrounded by the potting compound and it is thus necessary that it be encased in a material of poor thermal conductivity so that the device will not operate while the hot potting compound is being poured around the device during initial assembly.

It is therefore an object of this invention to provide an improved fuse incorporating the desirable features set forth above.

Further objects and advantages of this invention will become apparent by reference to the following description and the accompanying drawing, and the features of novelty which characterize this invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

This invention in its broadest aspects provides a fuse element comprising a pair of elongated conductive members having spaced apart body portions. One of these members has an end portion bent towards the other member and forming substantially a right angle therewith. A mass of fusible material joins the bent portion of the one member and the other member. This fuse element may be enclosed in a casing member having a closed end and an open end with the free ends of the elongated conductive members projecting out of the open end of the casing to form terminals. A plug member may then be arranged between the body portions of the elongative conductive members closing the open end of the casing member and holding the conductive members firmly against the inner walls of the casing member.

In the drawing, Figure 1 is an exploded view in perspective illustrating the components of this improved fuse; and

Figure 2 is a cross-sectional view showing the assembled fuse of Figure 1.

Referring now to the drawing, the improved fuse comprises a fuse element generally identified as **1**, having a pair of elongated conductive members **2** and **3**. These conductive members are preferably formed of a relatively

thin strip of spring metal. Member **2** is substantially straight throughout its entire length while member **3** has its end portion **4** bent toward member **2** and defining substantially a right angle therewith. End portion **4** of member **3** preferably, but not necessarily, engages the upper surface of member **2** and it will be seen that the end **5** of member **2** extends beyond end portion **4** of member 3. The extension **5** of member **2** and the end portion **4** of member **3** are shown as forming an edgewise or line contact and are held together by a mass of fusible material **6**, such as any well known tin-lead alloy. Such fuse alloys are well known in the art and one may be selected which will melt at the desired temperature.

A tubular casing member **7** is provided having an open end **8** and a closed end **9**. Casing member **7** is formed of insulating material, preferably of low thermal conductivity, such as paper. Fuse element **1** is arranged in tubular casing member **7** with the outer ends **10** and **11** of conductive members **2** and **3** respectively extending out of opening **8** to form terminals. Openings **12** may be formed in ends **10** and **11** of conductive members **2** and **3** to facilitate their connection to external leads (not shown). In order to complete the assembly, a cylindrical plug member **13** formed of suitable insulating material, such as rubber, neoprene, paper, or other insulating material is positioned between conductive members **2** and **3** filling the open end of tubular casing member **7** and holding conductive members **2** and **3** firmly against the inner wall **14** of tubular conductive member **7**.

It will be seen that plug member **13** biases midportions **15** and **16** of conductive members **2** and **3** apart so that the fuse element **1** has a generally V-shaped configuration. It will be seen in Fig. 2 that plug member **13** places conductive members **2** and **3** under bending stress. Thus, when the fusible material **6** is melted due to excessive ambient temperature or excessively high current, or a combination of both, end portion **4** of conductive element **3** and end **5** of conductive element **2** will fly apart due to their inherent springiness and the bending stress applied by plug member **13** thus breaking the connection.

It will now be seen that this invention provides a simple, readily assembled and readily connected fuse which is further characterized by its low cost and small size. It will be readily apparent that in the event that fusible material **6** is a conductive alloy, end portion **4** of conductive element **3** may not actually engage the upper surface of conductive element **2**. On the other hand, it will also be readily apparent that a nonconductive fusible material may be used in which event, of course, end portion **4** of conductive element **3** must be in engagement with the upper surface of conductive element **2**.

While we have shown and described a particular embodiment of this invention, further modifications and improvements will occur to those skilled in the art. We desire that it be understood therefore that this invention is not limited to the form shown and we intend in the appended claims to cover all modifications which do not depart from the spirit and scope of this invention.

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

1. A fuse element comprising a first elongated conductive member formed of a relatively thin strip of spring material, a second elongated conductive member formed of a relatively thin strip of spring material and having a body portion alongside and spaced from said first member, said second member having an end portion bent toward said first member and forming substantially a right angle line contact therewith, and a mass of fusible

material joining said first member and said second member end portion.

2. A fuse element comprising a first elongated conductive member formed of a relatively thin strip of spring material, a second elongated conductive member formed of a relatively thin strip of spring material and having a body portion spaced from said first member, said second member having an end portion bent edgewise toward said first member and forming substantially a right angle therewith, said end portions of said first and second members mutually defining a pocket having substantially V-shaped configuration, and a mass of fusible material within said pocket and joining said first member and said second member end portion.

3. A fuse comprising a first elongated conductive member formed of a relatively thin strip of spring material and having a body portion and a substantially straight end portion, a second elongated conductive member formed of a relatively thin strip of spring material and having a body portion alongside and spaced from said first member body portion, said second member having an end portion bent toward said first member end portion and forming substantially a right angle line contact therewith, a mass of fusible material joining said first and second member end portions, and means acting upon said body portions for biasing said spring member to fly apart when said fusible mass is melted.

4. A fuse element comprising a first elongated conductive member formed of a relatively thin strip of spring material and having a body portion and a substantially straight end portion, a second elongated conductive member formed of a relatively thin strip of spring material and having a body portion spaced from said first member body portion, said second member having an end portion bent towards and engaging said first member end portion edgewise forming substantially a right angle therewith, said first member end portion extending beyond said second member end portion, to form a V-shaped pocket, and a mass of fusible material within said pocket joining said first member end portion extension and said second member end portion, said first and second members mutually defining a substantially V-shaped figuration.

5. A fuse comprising a first elongated conductive member formed of spring material having a body portion, a second elongative conductive member formed of spring material having a body portion spaced from said first member body portion, said second member having one end bent towards one end of said first member and forming substantialy a right angle therewith, a mass of fusible material joining said one end of said first member to said bent end of said second member, a casing member having an open end, said first and second conductive members being positioned in said casing member with their other ends respectively projecting from said open end thereof to form terminals, and a plug member positioned between said first and second conductive member body portions, said plug member being positioned in said casing member open end holding said first and second conductive members in engagement with the inner wall of said casing member and placing said conductive member under bending stress whereby said conductive members fly apart when said fusible material is melted.

6. A fuse member comprising a first elongated conductive member formed of spring material having a body portion, a second elongated conductive member formed of spring material having a body portion spaced from said first member body portion, said second member having one end bent towards one end of said first member and forming substantially a right angle therewith, a mass of fusible material joining said one end of said first member to said bent end of said second member, a casing member formed of insulating material having an open end, said first and second conductive members being positioned in said casing member with their other ends respectively projecting from said open end thereof to form terminals, and a plug member formed of insulating material positioned between said first and second conductive member body portions, said plug member being positioned in and filling said casing member open end holding said first and second conductive members in engagement with the inner wall of said casing member and placing said conductive member under bending stress whereby said conductor members fly apart when said fusible material is melted.

7. A fuse comprising a first elongated conductive member formed of spring material having a body portion, a second elongative conductive member formed of spring material having a body portion spaced from said first member body portion, said second member having one end bent towards one end of said first member and forming substantially a right angle therewith, a mass of fusible material joining said one end of said first member to said bent end of said second member, a tubular casing member formed of insulating material having a closed end and an open end, said first and second conductive members being positioned in said casing member with their other ends respectively projecting from said open end thereof to form terminals, and a cylindrical plug member formed of insulating material positioned between said first and second conductive member body portions, said plug member being positioned in and filling said casing member open end holding said first and second conductive members in engagement with the inner wall of said casing member and placing said conductive members under bending stress whereby said conductive members fly apart when said fusible material melts.

8. A fuse comprising a first elongated conductive member formed of a relatively thin strip of spring material and having a body portion and a substantially straight end portion, a second elongated conductive member formed of a relatively thin strip of spring material and having a body portion spaced from said first member body portion, said second member having one end bent towards and engaging said first member end portion and forming substantially a right angle therewith, said first member end portion extending beyond said second member bent end, a mass of fusible material joining said first member end portion extension and said second member bent end, said first and second member body portions mutually defining a substantially V-shaped configuration, a tubular casing member formed of insulating material having a low thermal conductivity, said casing member having a closed end and an open end, said first and second conductive members being positioned in said casing member with their other ends respectively projecting from said open end thereof to form terminals, and a cylindrical plug member formed of insulating material positioned between said first and second conductive member body portions, said plug member being positioned in and filling said casing member open end holding said first and second conductive members in engagement with the inner wall of said casing member and placing said conductive member under bending stress whereby said conductive members fly apart when said fusible material melts.

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