April 26, 1960 T. A. BURDESHAW 2,934,626

ELECTRIC FUSE

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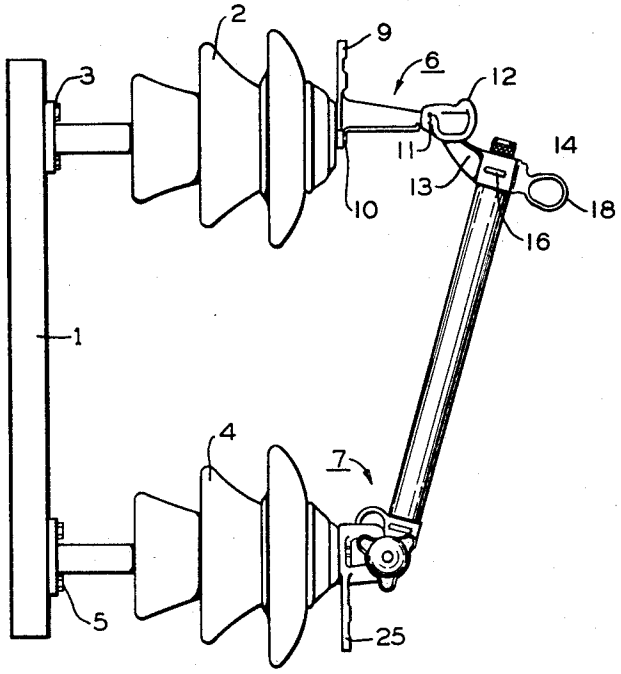

FIG. 1

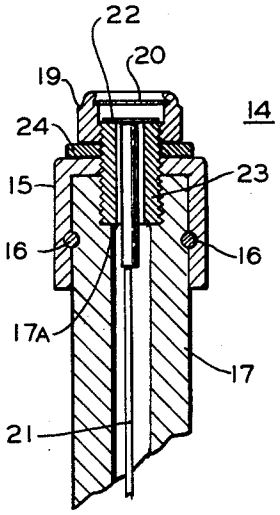

FIG. 4

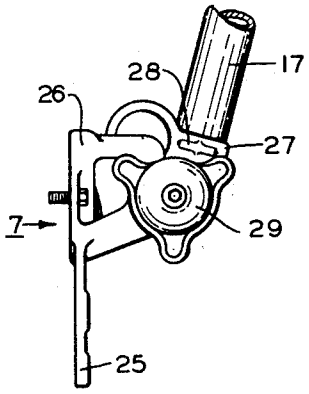

FIG. 2

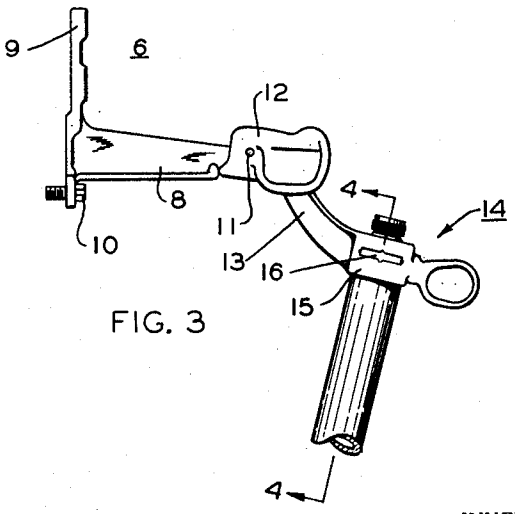

FIG. 3

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ELECTRIC FUSE

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4 Claims. (Cl. 200—132)

This invention relates to electric fuses and more particularly to fuses which are especially adapted to interrupt fault currents of substantial magnitude.

In electric cutouts and fuses having a fuse tube in which a fusible element is mounted, it is common practice to provide means for closing one end of the fuse tube for fault currents of a low order of magnitude and to construct such means so that it will yield upon the occurrence of fault currents of a high order of magnitude thereby to open both ends of the tube and release the high pressures generated therein due to the formation of high current arcs. The arc expulsion action for low current arcs is thus rendered effective due to the single vented effect and for high current arcs the device operates as a double vented cutout thereby to facilitate the quick release of high pressures built up within the tube and to aid in the prompt interruption of such high current arcs.

In cutouts and fuses of the aforementioned type there is a tendency for gases formed within the fuse tube during current interruption to escape to atmosphere at the closed end of the tube due to the fact that it is difficult to affix the tube hardware to the fuse tube in a gas tight manner. Such gas leakage may cause the tube hardware to be blown off of the fuse tube thereby destroying the fuse and endangering other apparatus and personnel.

A principal object of this invention is to provide an improved electric fuse in which the tube hardware is mounted on the fuse tube in a gas tight manner.

The invention in one form as applied to an electric power fuse comprises a fuse tube having internal threads in one end thereof, a terminal element of generally cup shaped construction disposed about said one end of the fuse tube and having a threaded axial opening therein, an externally threaded sleeve disposed within said one end of said fuse tube and extending through said opening in said terminal element, the sleeve being in threaded engagement with the tube and with the terminal element, and holding means in threaded engagement with the sleeve and in engagement with the terminal element for applying an axial force to the sleeve relative to the terminal element and tube thereby to establish a gas tight relation between the tube and terminal element. If desired the adjoined parts may be further secured by cement of suitable characteristics.

For a better understanding of the invention reference may be had to the following detailed description taken in conjunction with the accompanying drawings in which Fig. 1 is a side view of a conventional power fuse; Fig. 2 is an enlarged view of the lower end of the structure shown in Fig. 1; Fig. 3 is an enlarged detailed view of a portion of the upper end of the fuse tube shown in Fig. 1; and in which Fig. 4 is a cross-sectional view taken on line 4—4 of Fig. 3 showing a sleeve mounted within the fuse tube and arranged to form a gas tight connection between the fuse tube and the terminal element.

With reference to Fig. 1 the numeral 1 designates a metallic base on which an insulator stack 2 is mounted by means of bolts 3. Also affixed to the channel base 1 is an insulator stack 4 which is mounted by means of bolts 5. Mounted to the right-hand extremity of the insulator stack 2 is the terminal structure generally designated by the numeral 6. Similarly, terminal structure generally designated by the numeral 7 is mounted on the insulator stack 4. As is well understood the circuit protected by the power fuse is connected to the terminals 6 and 7 respectively.

As is best shown in Fig. 3 the upper terminal 6 comprises a body portion 8 and a terminal portion 9. The terminal 6 is affixed to the insulator stack 2 by bolts 10. Affixed at pivot 11 to the body portion 8 is a sleet hood 12. Although not shown in detail in the drawings the sleet hood 12 incorporates a conventional latching surface together with a biasing element which tends to impart clockwise rotation to the sleet hood 12 about the pivot 11 as viewed in Fig. 3. Such rotation of sleet hood 12 is limited by a stop element (not shown). Also mounted under the sleet hood is a contact element which is arranged to engage a contact on conducting element 13 of the terminal structure generally designated at 14 and which is mounted atop the fuse tube 17.

Terminal structure 14 comprises a cup shaped body portion 15 which is secured by pins 16 to fuse tube 17 constructed of suitable insulating material such as fiber glass fabric and the like. The left-hand end of conducting element 13 is provided with a latching surface which engages the corresponding latch forming a portion of sleet hood 12. The fuse may be operated manually by simply lifting the sleet hood 12 with a switch stick thereby releasing the latching surfaces and allowing the fuse tube 17 and associated parts to swing downwardly in known manner.

A conventional ring 18 is formed integrally with body portion 15 of terminal element 14 for engagement with a hook stick in known manner.

Mounted atop the terminal element 14 and constituting a releasable closure is the internally threaded sleeve 19 and its releasable disc 20. Elements 19 and 20 form no part of the present invention but are disclosed in detail and claimed in application Serial Number 663,479, filed June 4, 1957, and assigned to the assignee of this invention.

Disposed within the fuse tube 17 is a conventional fuse link 21 having a button head 22 at the upper end thereof.

According to the present invention means are provided for preventing the escape of gas between the fuse tube 17 and the terminal element 14 during a circuit interrupting operation. Such means may comprise a sealing element in the form of a metallic sleeve 23 and a locking element 24 arranged as shown in Fig. 4. More specifically, the terminal 14 is first affixed to the tube 17 by the pins 16. Thereafter both parts are drilled and tapped to receive the externally threaded sleeve 23. Suitable sealing fluid such as epoxy resin is spread over the tapped recess in tube 17 and over the innermost part 17A of the recess in tube 17. The sleeve 23 is then screwed tightly into the terminal element 14 and fuse tube 17 and locked in position by lock nut 24 which is drawn down against the upper surface of terminal element 14. The locking nut 24 serves not only to lock the sleeve 23 against turning movement but also tends to establish a good electrical connection between sleeve 23 and terminal element 14. Such a connection is important in view of the fact that the button head 22 is in electrical contact with the upper end of sleeve 23.

As is best shown in Fig. 2 the lower terminal structure 7 constitutes a terminal portion 25 and a main supporting portion 26. Although not shown in detail in the drawing the supporting structure 26 is of conventional arrangement and constitutes a pair of spaced jaws which engage trun-

nions pivotally mounted on the terminal structure 27 which in turn is secured to the lower end of the fuse tube 17 by pins 28.

For the purpose of arresting circuit opening swinging movement of fuse tube 17 and parts associated therewith a suitable conventional snubber 29 is mounted on the terminal element 7 and cooperates with one of the trunnions forming a part of the lower terminal structure 27.

Although not shown in the drawings the above trunnions are formed on an element which is pivotally connected to terminal element 27 and which is normally held in its normal position by the fuse link 21 to which the pivotally mounted element is connected. Also a contact brush engages the pivotally mounted element and urges such element toward the right as viewed in Fig. 2. Thus when the fuse link 21 ruptures the pivotally mounted element is released and the tube 17 swings clockwise and down to its open position. Similar structure is shown in Patent 2,750,470, issued June 12, 1956, and assigned to the assignee of this invention.

While a particular embodiment of the invention has been shown and described, the invention is not limited thereto and it is intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed as new is:

1. An electric fuse comprising a fuse tube of insulating material, a terminal element having a cup shaped hollow portion disposed about and in snug engagement with one end of said fuse tube and secured thereto, said cup shaped portion having a central aperture disposed coaxially on said tube, said aperture and the internal surface of said one end of said tube being threaded, sealing material in said tube and generally covering the said threaded portion thereof, an externally threaded hollow sleeve of conducting material tightly screwed into said aperture and tube, and a locking nut in threaded engagement with said sleeve and in frictional engagement with said terminal element, said locking nut being effective to impart an axial thrust to said sleeve relative to said tube and terminal element so as to aid in establishing a fluid tight relationship therebetween.

2. An electric fuse comprising a fuse tube of insulating material having an axial recess, a terminal element of conducting material mounted externally on one end of said fuse tube and secured thereto against relative turning movement, an externally threaded sealing sleeve in threaded engagement with said recess in said tube and with said terminal element, epoxy resin on the threaded portion of said recess and on the innermost part thereof, and a locking nut in threaded engagement with said sleeve and arranged tightly to engage said terminal element thereby to establish a fluid tight junction between said sleeve and tube and a highly conductive relation between said sleeve and said terminal element.

3. An electric fuse comprising a fuse tube of insulating material, a terminal element having a cup shaped hollow portion disposed about and in snug engagement with one end of said fuse tube and secured thereto, said cup shaped portion having a central aperture disposed coaxially on said tube, said aperture and the internal surface of said one end of said tube being threaded, an externally threaded hollow sleeve of conducting material tightly screwed into said aperture and tube, an internally threaded closure sleeve in threaded engagement with the outer end of said sealing sleeve, and a locking nut in threaded engagement with said sleeve and in frictional engagement with said terminal element, said locking nut being effective to impart an axial thrust to said sleeve relative to said tube and terminal element to aid in establishing a substantially fluid tight relationship therebetween.

4. An electric fuse comprising a fuse tube of insulating material having an axial recess, a terminal element of conducting material mounted externally on one end of said fuse tube and secured thereto against relative turning movement, an externally threaded sealing sleeve in threaded engagement with said recess in said tube and with said terminal element, an internally threaded closure sleeve in threaded engagement with the outer end of said sealing sleeve, a fuse link in said tube and having a button head in engagement with the outer end of said sealing sleeve, and a locking nut in threaded engagement with said sleeve and arranged tightly to engage said terminal element thereby to establish a fluid tight junction between said sleeve and tube and a highly conductive relation between said sleeve and said terminal element.

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