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FUSE CONSTRUCTION

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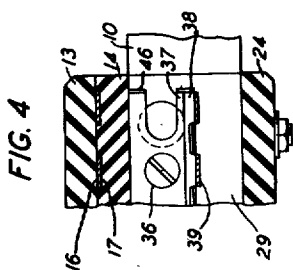


FIG. 4

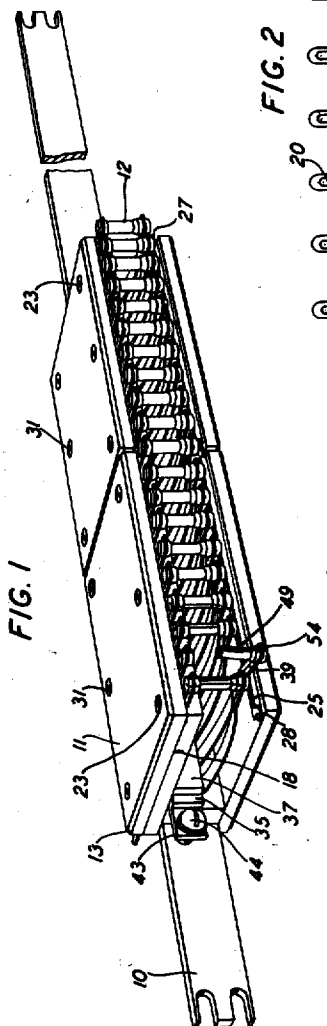


FIG. 1

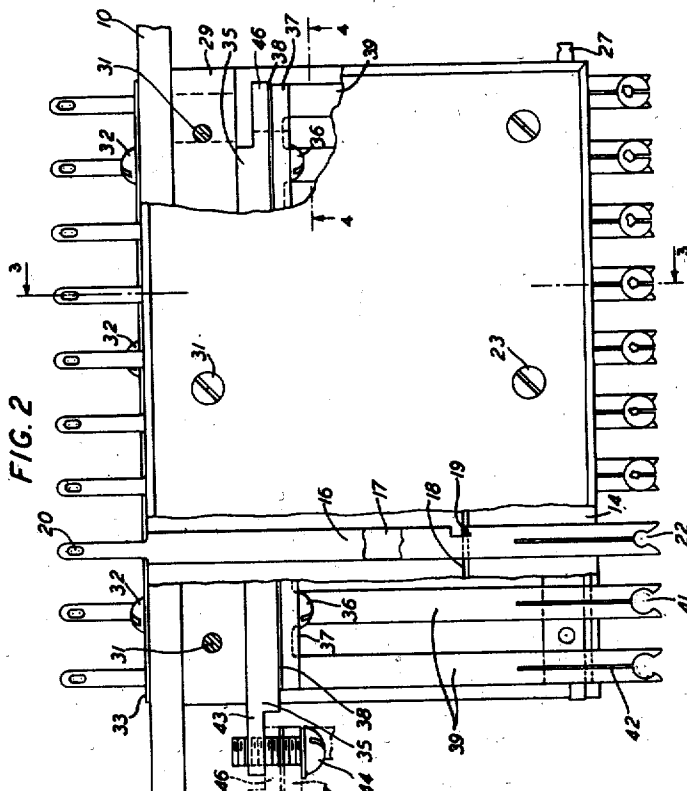


FIG. 2

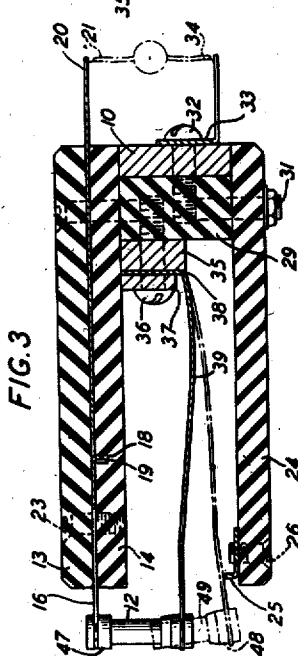


FIG. 3

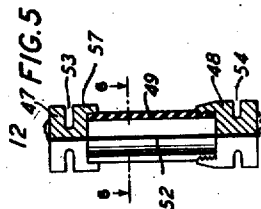


FIG. 5

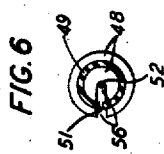


FIG. 6

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FUSE CONSTRUCTION

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8 Claims. (Cl. 200—117)

This invention relates to electric circuit interrupters generally used in telephone exchanges and particularly to alarm fuses for guarding the apparatus against abnormal currents.

In telephone exchanges it is the practice to assemble alarm type fuses closely together in an upright position upon slate panels, one terminal of the fuse being connected with the common battery bus-bar and the other terminal thereof being connected with the particular wire of an electric circuit or group of circuits. Each slate panel comprises a plurality of fuses and has mounted thereon a common battery bus-bar and common alarm bar. The fuses are of the flat type, being known in telephone practice as the grasshopper fuse, and when blown this fact is readily ascertainable upon simple inspection. The present arrangement is quite satisfactory for installations requiring a comparatively large number of fuses grouped on fuse bays in a central location. However, where decentralization of fuses, that is, segregation of the fuses with their associated apparatus is required, an arrangement which will provide savings in both space and cost over the present type of fuse is very desirable.

An object of this invention is, therefore, to provide a more economical alarm fuse and tensional fuse mounting, which will conform more readily in assembly with its associated apparatus.

Another object is to provide a fuse and fuse mounting of improved construction which will be compact, light, simple, and cheap to manufacture, being adaptable for machine production.

Still another object is to provide a relatively small alarm type fuse and mounting therefor with consequent savings in mounting space.

A further object of this invention is to provide a fuse assembly in which a blown fuse wire can be readily replaced by a maintenance attendant.

Still a further object is to provide a fuse arrangement whereby rupture of the fuse wire produces a readily visual target.

Other objects and advantages reside in certain novel features of the construction, arrangement, and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claims.

In general, the fuse arrangement comprises a tubular fuse tensionally mounted in a fuse holder having a pair of springs, which upon rupture of the fuse wire separate the fuse ends, one end thereof contacting an alarm bar to furnish an audible alarm, and at the same time providing a visual target to facilitate its replacement. The

fuse consists of an insulating tube slotted for the ready placement therein of a fuse wire which is terminated at each end in a slotted metallic detail. The fuse holder provides springs for mounting a plurality of fuses thereon at close intervals whereby peripheral grooves of the end details are securely engaged by the springs thereof while at the same time easily removable therefrom. A plurality of fuse holders may be mounted upon a panel in tandem or individually, as required.

This invention, accordingly, is disclosed in the embodiment thereof shown in the accompanying drawing, and it comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and scope of this invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 illustrates a perspective view of a pair of fully equipped fuse holders assembled in tandem upon a mounting panel;

Fig. 2 illustrates a top plan view of the right fuse holder of Fig. 1 with portions of the fuse retaining springs and bus-bar extremities exposed;

Fig. 3 illustrates a detailed cross-sectional view of the holder assembly taken along line 3—3 of Fig. 2;

Fig. 4 illustrates a detailed cross section of a view taken along line 4—4 of Fig. 2;

Fig. 5 illustrates a longitudinal section of the fuse; and

Fig. 6 illustrates a cross-sectional view of the fuse taken along line 6—6 of Fig. 5.

Referring now to Fig. 1, a mounting panel 10 of the usual type supports a plurality of fuse holders 11, each of which has a capacity of ten fuses 12, so that for a single mounting panel of 23 inch length four fuse holders 11 or a total of forty fuses 12 may be accommodated thereon in a vertical space of 1¾ inches. The invention, however, is not to be limited to this quantity of fuses as the number of fuses accommodated will be dependent upon various factors including the length of panel 10 and the installation requirements.

The fuse holder 11 (Fig. 3) comprises a receptacle of rectangular shape having a top, bottom, and back with open sides and face. The top

assembly includes a pair of insulating plates 13, 14, the upper plate 13 cooperating with the lower plate 14 to embracingly clamp individual springs 16 of contact material, such as nickel silver. In order to prevent sliding movement of spring 16, longitudinal slots 17 (Fig. 2), one for each spring 16, and a lateral groove 18 are provided in the upper side of plate 14 and a projection 19, punched from the main portion of spring 16, is also provided to enter said groove 18. Spring 16 has formed at one end a terminal 20 for connection to wire 21 of the circuit being protected and at the other end a bifurcation 22 with a longitudinal slot for tensionally supporting the upper part of fuse 12. Upper plate 13 may be fastened to plate 14 in any suitable manner such as by screws 23 threadedly engaged into plate 14.

The bottom assembly comprises an insulating plate 24, similar to plate 13 of the top assembly, and an L-shaped metallic alarm bar 25 extending along the length thereof and fastened thereto in any suitable manner such as by screws 26 engaging threaded apertures of bar 25. The alarm bar 25 is common to all fuses assembled on mounting 11 and is provided with an overlapping means, such as a raised extension 27 (Figs. 1 and 2) at the right end and a tongue 28 at the left end thereof, the extension 27 of one mounting 11 and tongue 28 of a contiguous mounting 11 being connected together by soldering or any other suitable method. Thus a continuous alarm bar is provided for all fuses mounted on panel 10. At one end of continuous bar 25, preferably at terminal 27, connection is made to an alarm circuit wire (not shown).

Separating the bottom from the top assembly is an insulating bar 29, which is attached thereto by the usual bolt and nut combination 31 and which is disposed from the rear edges of the top and bottom plates 13, 14 and 24, respectively, so as to form a recess therein, to effect engagement by the holder assembly 11 of three faces of the mounting panel 10. Further engagement of panel 10 is obtained by screws 32 inserted into threaded apertures of bar 29, thereby producing a well supported structure. Screws 32 also secure to panel 10 a continuous terminal strip 33 for connection to ground wires 34 of the circuits being protected.

To the front side of bar 29 is attached a common bus-bar 35, of suitable conducting material such as copper, by means of screws 36 threadedly engaging bar 29. Clamped between bus-bar 35 and a clamping bar 37, also by screws 36, is a continuous spring 38 of a combined retractile and contacting material, such as nickel silver, having individual fingers 39 integral thereto. As shown in Fig. 3, the angle formed by retractile finger 39 with spring 38 in the released state is greater than 90 degrees so that when fuse 12 is in position, finger 39 is under tension. Rupture of fuse 12 releases this tension whereupon bar 25 is immediately contacted by finger 39 to close the usual alarm circuit. As in the stationary contact spring 16, the retractile fingers 39 are provided with bifurcations 41 at the extremities thereof with slots 42 extending inwardly to facilitate installation or replacement of fuse 12. It is to be noted that the diameter of bottom bifurcation 41 is larger than that of the upper bifurcation 22. The reason for this will be apparent herein-after.

In order to insure a continuous battery connection for all fuse mountings 11 mounted on panel 10, each bus-bar 35 is joined to its neigh-

boring bar. As shown in Fig. 2, bus-bar 35 has at its left extremity an extension 43, which may be approximately one-half the thickness of bus-bar 35 proper with a cut-out in the front thereof and which is provided with a threaded aperture for engaging a screw 44, that may be staked at its threaded end to prevent accidental removal. At the right extremity of bus-bar 35 another extension 46 is provided with the cut-out at its back portion, instead, so as to mesh with its contiguous bus-bar extension 43. A slot, as shown in Fig. 4, is provided in extension 46, as well as in clamping bar 37, for facilitating the assembly of contiguous fuse mountings 11. The juncture of one bus-bar 35 with an adjoining one is shown at the left of Fig. 2 wherein the dot-dash lines represent the bus-bar extremity 46 and clamping bar 37 of the left mounting 11 secured to the bus-bar extremity 43 by screw 44 of the right fuse mounting 11. Screw 44 (Fig. 1) also secures a battery lead (not shown) to the bus-bar extremity 43 of the left fuse mounting 11 assembled to panel 10.

Fuse 12, as shown in Fig. 5, comprises four items, two metallic terminal details 47, 48, an insulating tube 49 having a longitudinal slot 51 therein, and a fuse wire 52 connected to terminal details 47, 48, by soldering or by any other suitable means. Terminals 47 and 48 may be silver plated to insure low contact resistance. Both terminals 47 and 48, which can be readily and economically machined, have circumferential grooves 53 and 54, respectively, groove 53 being of smaller diameter than groove 54 in order to insure proper installation of the fuse 12 upon correspondingly slotted springs 22 and 41 of mounting 11. Terminals 47 and 48 also have longitudinal slots 55, which when aligned with slot 51 of tube 49, simplifies installation or replacement of a fuse wire 52. A shoulder 57 on terminal 47 is detachably coupled to one end of tube 49 while terminal 48 is secured to the other end thereof in any suitable manner as by a threaded arrangement, so that upon rupture of a fuse wire 52 tube 49, being attached to terminal 48, acts as a target. To facilitate determination of fuse capacities tubes 49 of various colors may be employed as, for example, a black tube may be used for a 1½-ampere fuse, a red tube may be used for a 2-ampere fuse, etc.

A fuse 12 is assembled upon mounting 11 by forcing the peripheral groove 54 into embracing engagement with slot 41, which holds terminal 48 securely in place by the detent action of the sides thereof, raising the fuse 12 and engaged finger 39 until groove 53 is in alignment with slot 22, and then forcing groove 53 into similar engagement with slot 22. Upon rupture of a fuse 12 insulating tube 49 confines the disturbance so that adjacent fuses 12 are not affected; at the same time since tube 49 follows the movement of spring 39 the free end thereof is carried along the line of the arc lengthening its path and tending to extinguish it. Spring 39 contacts alarm bar 25 and initiates an alarm (not shown) to summon a maintenance man who readily perceives the blown fuse because of the off-normal position of tube 49. A new fuse 12 is installed in the place of the blown one and the maintenance man may then remove portions of fuse wire 52 from both terminals 47 and 48 and install a new fuse wire therein in a manner already described.

While the features of this invention have been disclosed with reference to a specific embodiment

only, it is, of course, understood that various modifications may be made in the details of construction and that the features thereof may be applied to many other and widely varied fields without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. In combination with an electrical fuse holder having interspaced springs, a fuse comprising a plurality of spaced terminals having longitudinal slots, an insulating tube interposed between said terminals, said terminals being slidably engageable with said springs, and a fusible conductor holding said terminals in spaced relationship, said fusible conductor disposed within the tube and within the longitudinal slots for facilitating replacement of said fusible conductor upon rupture thereof.

2. In combination with an electrical fuse holder having interspaced contact springs, a fuse comprising a plurality of spaced, relatively separable terminal members having longitudinal slots, each of said members having a circumferential groove for engagement with said springs, an insulating tube interposed between said members, and a fuse wire holding said members in spaced relationship, said wire disposed within the tube and within the slots of said members.

3. In combination with an electrical fuse holder having interspaced springs one of which is tensioned, a fuse comprising a plurality of spaced, relatively separable terminal members, an insulating element interposed between and secured to one of said members, said element having a slot extending longitudinally therein, each of said members having a peripheral recess for slidable engagement with said springs and having a slot for alignment with said element slot, and a fuse wire disposed within said element and within the slots of said members for holding said members in spaced relationship, said wire being soldered to said members.

4. In a circuit interrupter, in combination, an electrical fuse holder having a lower and an upper slotted contact spring, a fuse comprising an insulating element having a longitudinal slot, a first terminal member having a longitudinal slot, said member fixedly secured to one end of said element and having said slot aligned with said element slot, a second terminal member having a longitudinal slot, said second member detachably coupled to the other end of said element, said first member having a peripheral groove for slidable engagement with the lower contact spring, said second member having a peripheral groove for slidable engagement with the upper contact spring, and a fuse conductor disposed within the element and within the member slots for holding the terminal members in spaced relationship, said element and member slots facilitating installation and replacement of the conductor upon rupture thereof.

5. In a circuit interrupter, in combination, a pair of interspaced line terminals having longitudinal slots, an insulating tubular arcing chamber detachably coupled to one of said terminals and fixedly secured to the other one of said terminals, a fuse wire for interconnecting said terminals, said fuse wire disposed within said arcing

chamber and said slots placed in alignment, biasing means for extinguishing an arc upon rupture of the fuse wire whereby the terminals are separated and the arcing chamber is drawn along the line of the arc, and means for arresting movement of said arcing chamber, said arcing chamber providing a target for said ruptured fuse.

6. In a circuit interrupter, in combination, a fuse comprising a tubular housing of insulating material having line terminals at the ends thereof, said housing and terminals having longitudinal slots therein, a fuse wire extending from one to the other of said terminals and within said slots, said terminals having circumferential grooves thereon, a holder for a plurality of said fuses comprising means for supporting a plurality of pairs of interspaced springs, said springs being arranged in an upper and a lower row and having bifurcated apertures at the extremities thereof for engaging said grooves, a battery bus bar electrically connected with the springs of the lower row, a common bar associated with said lower contact springs for contacting same upon rupture of any one of said fuses, and means for supporting said holder.

7. Circuit interrupting means comprising, in combination, fuse elements, a holder for a plurality of said fuse elements, and a panel for supporting a plurality of said holders in tandem, each of said fuse elements comprising a tubular housing of insulating material having terminals at the ends thereof, said housing and terminals having longitudinally aligned slots therein, a fuse wire disposed within said slots for interconnecting said terminals, each of said terminals having circumferential grooves for facilitating the disposition thereof on said holder, said holder comprising a plurality of cooperating stationary and pretensioned springs for engaging the grooves of said fuse elements whereby said fuse elements are tensionally mounted, a battery bus-bar connected to said pretensioned springs, a right and a left extension on said bus bar, means on said left extension for joining the right extension of one of said tandem holder bus-bars thereto, a common bar associated with said pretensioned springs, a right and a left extension on said common bar for joining a plurality of said common bars disposed in tandem, means on said holder for embracingly engaging said panel comprising an oblong metallic member, a continuous strip of terminals individual to each of said holders secured to said panel, and means for interconnecting said common bars.

8. A renewable fuse consisting only of an insulating tube having a longitudinal slot, an end member adaptable for fixed engagement with one end of said tube, a second end member adaptable for abutting engagement with the other end of said tube, each of said end members having a longitudinal slot, and a fuse link disposed in the longitudinal slots in said end members and having its opposite ends joined by adherence to said end members, said fuse link being substantially enclosed within said insulating tube and capable of moving freely in and out of the slots in said tube and end members to enable its ready replacement.

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