

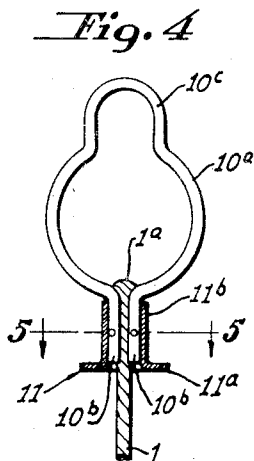
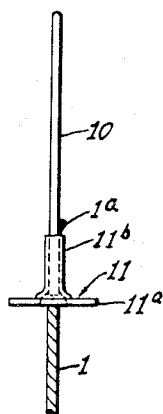
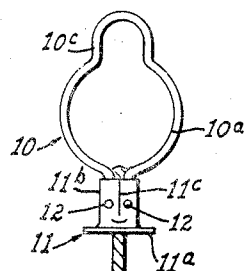
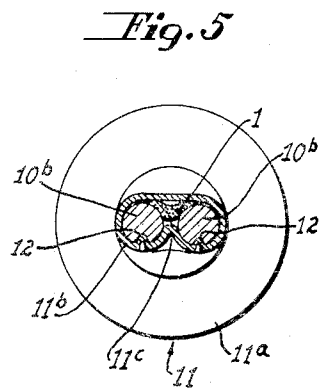
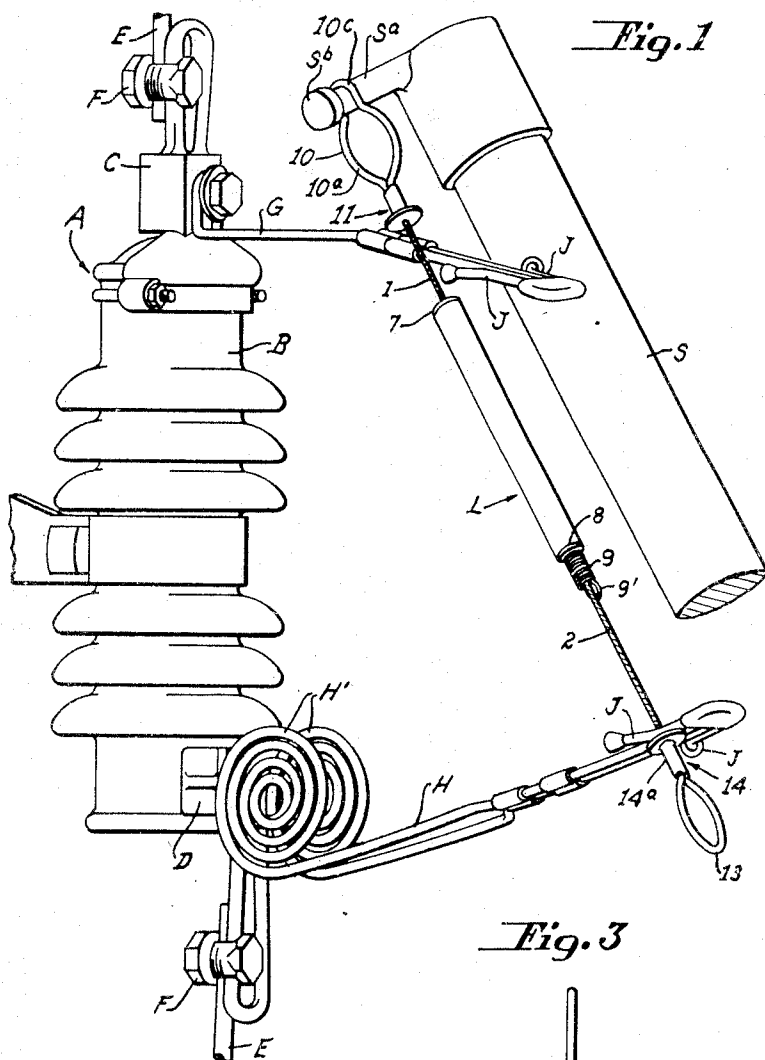
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FUSE LINK

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FUSE LINK

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3 Claims. (Cl. 200—135)

This invention relates generally to fuse links adapted for use in association with electrical switches, and more specifically to fuse links intended for use with fuse switches of the type disclosed in United States Letters Patent No. 2,086,028, issued July 6, 1937, the predominant object of the invention being to provide a fuse link which is of such improved construction and arrangement that the operation of applying the fuse link to a switch of the type covered by the patent identified above is rendered much more convenient than was the case when fuse links of the type heretofore used with these switches were employed.

In applying a fuse link to a switch of the type disclosed in the above-identified patent the finger of a switch stick is introduced into an eye at the upper end of the fuse link, there being one of such eyes at each end of the fuse link, and the lower portion of the fuse link is drawn into engagement with the link-engaging portion of the lower, resilient contact of the switch. The switch stick is then elevated to move the fuse link upwardly and thereby draw the outer portion of the lower, resilient contact of the switch upwardly against the tendency of said outer portion of said lower, resilient contact of the switch to move downwardly because of the resilient nature of said lower contact. When the fuse link has been elevated the required distance the upper portion thereof is drawn into engagement with the fuse link-engaging portion of the upper contact of the switch and the finger of the switch stick is removed from the upper eye of the fuse link, whereupon the fuse link will be held under tension between the upper and lower contacts of the switch. On occurrence of a fault on the line with which the switch is associated, which is of a character to rupture the fuse link, the outer portion of the lower, resilient contact is released and snaps downwardly to separate the ruptured ends of the fuse link.

Fuse links employed heretofore with switches of the type described above have included each a pair of eyes which were of substantially circular shape. As a result of this situation it sometimes happened that in applying one of these earlier fuse links to a switch of the type described above, the downward pull exerted on the fuse link by the lower, resilient contact of the switch when the fuse link was being elevated to engage its upper portion with the upper contact of the switch, caused the upper eye of the fuse link to unintentionally slide off of the finger of the switch stick before the upper portion of

the fuse link could be applied to the upper contact of the switch.

In order to eliminate the likelihood of the upper eye of the fuse link sliding off of the finger of the switch stick as described above, the improved fuse link disclosed herein was devised. The improved fuse link is provided with eyes at its opposite ends at least one of which is shaped to provide an inner eye portion of substantially circular shape and an outer eye portion of reduced width. In applying one of these improved fuse links to a switch the finger of the switch stick is introduced into the reduced portion of the eye at the upper end of the fuse link, and because this reduced portion corresponds in shape to a substantial portion of the cross-sectional shape of the switch stick finger the enlarged head at the outer end of said finger will effectively prevent the eye of the fuse link from sliding off of the switch stick finger.

Fig. 1 is a perspective view illustrating the manner in which one of the improved fuse links disclosed herein is applied to a switch with the aid of a switch stick.

Fig. 2 is an enlarged fragmentary sectional elevation illustrating the improved fuse link.

Fig. 3 is an enlarged side elevation of one of the eyes of the fuse link and parts located adjacent thereto.

Fig. 4 is a front elevation of the structure of Fig. 3 but showing in section the button associated with fuse link eye.

Fig. 5 is an enlarged horizontal section taken on line 5—5 of Fig. 4.

In the drawing, wherein is shown for the purpose of illustration, merely, one embodiment of the invention, A designates generally a switch of the type with which the improved fuse link disclosed herein is adapted for association. Briefly stated the switch A comprises a mounting in the form of an insulator B which has mounted thereon at its top and bottom an upper terminal C and a lower terminal D, respectively, portions E of the electrical circuit with which the switch is associated being mechanically and electrically connected to said upper and lower terminals by suitable connecting means F. Secured mechanically and connected electrically to the upper terminal C is an upper contact G, and likewise secured mechanically and connected electrically to the lower terminal D is a lower contact H. The upper and lower contacts of the particular switch illustrated in the drawing are formed of relatively heavy wire shaped to the desired configuration, the upper contact being

relatively rigid and the lower contact being resilient and having coiled portions H' to give the desired resiliency thereto. Also the upper and lower contacts G and H are provided with rearwardly bent portions J at opposite sides of each thereof which cooperate with portions of the contacts located inwardly of said rearwardly bent portions to provide fuse link-engaging portions.

The improved fuse link of the present invention is designated generally in the drawing by the reference character L and said fuse link includes a pair of terminal conductors 1 and 2 which are connected together at their inner ends in a manner to provide the fuse link with a fusible section. The fuse link L may be provided with a fusible section in various ways inasmuch as the precise construction of the fuse link in this regard is not important to the present invention. However in the interest of completeness of disclosure it is pointed out that the inner, adjacent end portions of the terminal conductors 1 and 2 may have clamped, or otherwise secured thereto, a pair of members 3 which are spaced apart longitudinally of the link. The members 3 are connected together by a strain wire 4 which imparts to the fusible section of the link the strength required to resist tensional strains to which the fuse link is subjected, and a fusible element 5 is attached mechanically and connected electrically to the members 3 and is turned about the strain wire 4.

The fusible section of the fuse link L is surrounded by a tube structure which preferably, though not necessarily, comprises an inner tube 6 formed of horn fiber, or similar material, which is characterized by the ability to give off gas in the presence of an electrical arc which tends to extinguish the arc, and an outer tube formed of Bakelite, or other suitable material, which provides the tube structure with the required strength against bursting and gives to said tube structure the necessary weather protection. At one of its ends the tube structure abuts against a disk 7 which is soldered, or otherwise secured, to the conductor 1, and at the opposite end of said tube structure a similar disk 8, which is unattached to the conductor 2, is forced against said end of said tube structure by a coil spring 9 which is interposed under compression between said disk 8 and an abutment 9' which is soldered or otherwise secured to the conductor 2.

Secured to the conductor 1 of the fuse link L, at the outer end thereof, is an eye 10 which is formed of substantially rigid material, such, for instance, as substantially stiff wire. The eye 10 includes an inner portion 10a of substantially circular shape from which is extended a pair of substantially parallel legs 10b, and extended from said inner, circular portion 10a at the end opposite to the end at which the legs 10b are located is an extension 10c of reduced width. The legs, inner circular portion, and extension of the eye 10 are formed from a single length of material, the extension being comprised of opposed, parallel side portions which are joined by a curved bridge portion as shown to the best advantage in Figs. 2 and 4. The eye 10 is secured to the end portion of the conductor 1 by a clamping element 11, said clamping element including a flange portion 11a and a tubular portion 11b of elongated shape. The end portion of the conductor 1 is extended upwardly into the tubular portion of the clamping element 11 and the legs 10b of the eye 10 are extended downwardly into said tubular portion of said

clamping element, as shown in Fig. 4, and clamping pressure is applied to the tubular portion of the clamping element to force it into close clamping engagement with the enclosed legs and end portion of the conductor 1 as shown to the best advantage in Fig. 5. In order to provide additional assurance that the clamping element 11 will be securely fixed to the eye 10 portions of the tubular portion of said clamping element are forced into the material of the legs 10b of said eye 10, by means of punching operations, for instance, as indicated by the reference character 12 and as shown to good advantage in Fig. 5. As shown in Fig. 5 the portion of the conductor 1 located within the tubular portion of the clamping means 11 is flattened and otherwise distorted by the clamping pressure to which the tubular portion of the clamping element 11 is subjected so that it conforms to the shape of a part of the space within the tubular portion of the clamping element 11 and thus is securely clamped within the clamping element. Also the extreme outer end portion 1a of the conductor 1 extends outwardly beyond the tubular portion of the clamping element 11, and as this portion 1a tends to spread because of the clamping pressure applied to the conductor portion located within the tubular portion of the clamping element 11 the gripping action between the conductor 1 and the clamping element 11 is increased.

At the opposite, or lower, end of the fuse link L an eye 13 is attached to the conductor 2 in the same manner in which the eye 10 is attached to the conductor 1 as has been described above. In other words the eye 13 is formed of relatively stiff wire, or other suitable material, and includes substantially parallel leg portions which are extended into the tubular portion 14a of a clamping element 14 which is similar to the clamping element 11 associated with the eye 10. Also the end portion of the conductor 2 is extended into the tubular portion of the clamping element 14 and clamping pressure is applied to the tubular portion of the clamping element 14 to secure the eye 13 to the conductor 2. As shown in Fig. 1 the portion of the eye 13 which is extended beyond the clamping element 14 is substantially circular in shape, but obviously, if desired, this portion of the eye 13 may have the same shape as the corresponding portion of the eye 10.

In applying the improved fuse link L disclosed herein to a switch of the general type illustrated in Fig. 1, a switch stick S is employed and the finger Sa of this switch stick is introduced into the extension 10c of the eye 10 of the fuse link as shown in Fig. 1. The fuse link L is then elevated to the location of the switch with the aid of the switch stick, and a portion of the conductor 2 which is located adjacent to the clamping element 14 is introduced between one of the rearwardly bent portions J of the lower contact H and an adjacent portion of said lower contact which is located inwardly of said rearwardly bent portion J, the fuse link L being pulled outwardly relative to the switch to draw said portion of the conductor 2 deep in the fuse link-engaging portion provided by said rearwardly bent portion J of the lower contact and said adjacent portion of said lower contact so that the conductor 2 will be securely gripped by said fuse link-engaging portion of the lower contact. The fuse link L is then elevated with the aid of the switch stick S, carrying with it the outer portion of the lower contact H, and a portion

of the conductor 1 located adjacent to the clamping element 11 is drawn forwardly into one of the fuse link-engaging portions provided by one of the rearwardly bent portions J of the upper contact and an adjacent portion of said upper contact located inwardly of said rearwardly bent portion J. The finger of the switch stick is then withdrawn from the extension 10c of the eye 10 and the switch A is in a fused condition with the fuse link held in tension because of the tendency of the outer portion of the lower, resilient contact to move downwardly. When, in the use of a switch so fused, a fault occurs on the line with which the switch is associated, the outer portion of the lower contact of the switch is freed from the restraint normally imposed on it by the unruptured fuse link because the excessive current passing through the fuse link due to the occurrence of the fault, melts the fusible element and the strain wire. This permits the outer portion of the lower contact of the switch to snap downwardly and pull the separated portions of the fuse link apart and thereby extinguish the electrical arc within the tubular structure of the fuse link, the gas produced within the inner tube of the tubular structure of the fuse link by the presence of the electrical arc aiding in such extinguishment of the arc.

It is obvious that because of the shape of the eye 10 at the upper end of the fuse link L there is very little likelihood that this eye will unintentionally slip off of the finger Sa of the switch stick S when the fuse link is being elevated with the aid of the switch stick against the downward pull of the lower contact H of the switch A to apply the upper portion of the fuse link to the upper contact G of the switch. This is so because the extension 10c of said eye 10 closely embraces the finger Sa of the switch S throughout the greater portion of its circumference and therefore the enlarged head Sb at the outer end of the switch stick finger will prevent the eye extension 10c from sliding from the switch stick finger.

I claim:

1. A unitary fuse link comprising terminal conductors, a fusible portion in electrical connection with said terminal conductors, a tube formed of electrical insulating material arranged in embracing relation with respect to said fusible portion, means for maintaining said tube in position in embracing relation with respect to said fusible portion, an eye attached to one of said terminal conductors and adapted to be engaged by a headed finger of a fuse stick when the fuse link is being introduced into place for use, said eye having an inner portion of sufficient diameter to permit the head portion of the fuse stick finger to pass

laterally therethrough and said eye having an outer portion which is adapted to closely embrace the fuse stick finger and which is of such reduced width relative to the diameter of the inner eye portion that the head portion of the fuse stick finger may not pass laterally therefrom, and means for securing said eye to the terminal conductor with which it is associated.

2. A unitary fuse link comprising terminal conductors, a fusible portion in electrical connection with said terminal conductors, a tube formed of electrical insulating material arranged in embracing relation with respect to said fusible portion, means for maintaining said tube in embracing relation with respect to said fusible portion, an eye attached to one of said terminal conductors and adapted to be engaged by a headed finger of a fuse stick when the fuse link is being introduced into place for use, said eye having an inner portion of sufficient diameter to permit the head portion of the fuse stick finger to pass laterally therethrough, an outer portion that it adapted to closely embrace the fuse stick finger and which is of such reduced width relative to the diameter of the inner eye portion that the head portion of the fuse stick finger may not pass laterally therefrom, and an extension projected from said inner eye portion, and clamping means for attaching said extension of the eye to the terminal conductor with which the eye is associated.

3. A unitary fuse link comprising terminal conductors, a fusible portion in electrical connection with said terminal conductors, a tube formed of electrical insulating material arranged in embracing relation with respect to said fusible portion, means for maintaining said tube in embracing relation with respect to said fusible portion, an eye attached to one of said terminal conductors and adapted to be engaged by a headed finger of a fuse stick when the fuse link is being introduced into place for use, said eye having an inner portion of sufficient diameter to permit the head portion of the fuse stick finger to pass laterally therethrough, an outer portion that is adapted to closely embrace the fuse stick finger and which is of such reduced width relative to the diameter of the inner eye portion that the head portion of the fuse stick finger may not pass laterally therefrom, and substantially parallel extensions projected from said inner eye portion, and clamping means which embraces said parallel extensions of the eye and a portion of the terminal conductor with which the eye is associated for securing the eye to the terminal conductor with which it is associated.

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