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FUSE LINK

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Fig. 1

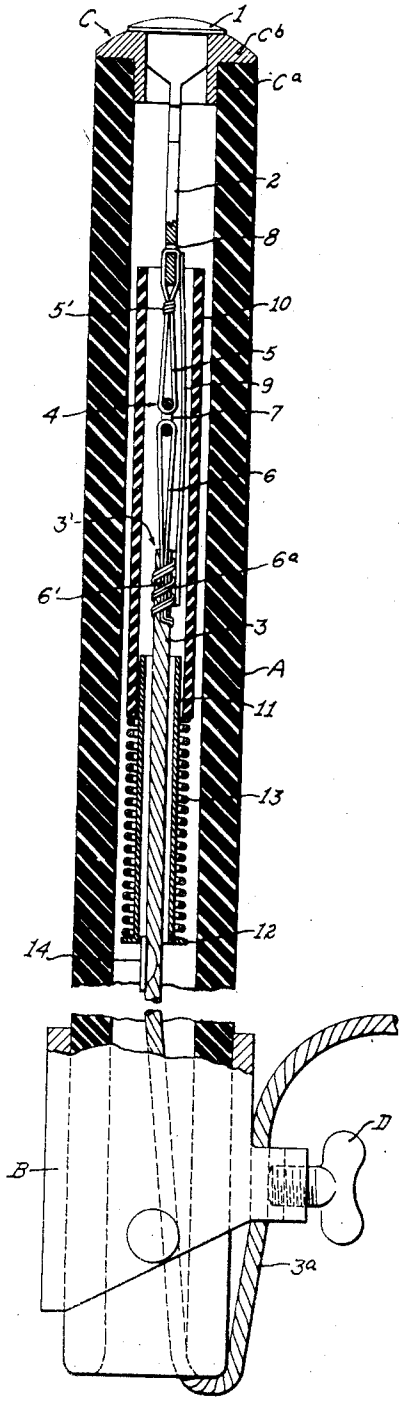
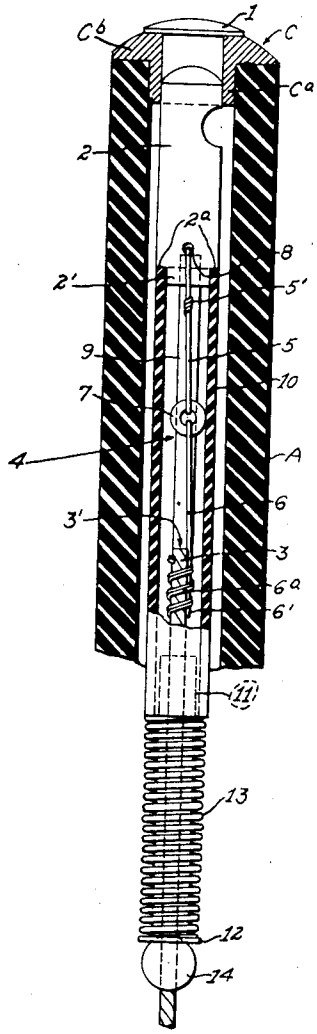


Fig. 2



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FUSE LINK

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4 Claims. (Cl. 200—135)

This invention relates generally to fuse links, and more specifically to fuse links of the tension type, the predominant object of the invention being to provide a tension type fuse link which is of such improved construction and arrangement that it is possessed of much greater tensile strength than were the tension fuse links heretofore known.

Fuse links of the type referred to above ordinarily are adapted to be held under mechanical tension produced either by spring means which form parts of the fuse link structures or parts of the protective apparatus with which the fuse links are associated, the purpose being to create a wide gap between the severed ends of the fusible element of the fuse link after the same has become ruptured by passage of abnormal current, and to quickly extinguish any arc attending the blowing of the fusible element by causing the ruptured ends thereof to fly apart under the action of the spring tension.

A heretofore prevailing difficulty inherent in tension fuse links, particularly those of low or fractional ampere current carrying capacity, results from the tendency of the fusible element to become severed by reason of the mechanical forces applied thereto, or if not actually severed the application of such forces to the fusible element for a long period of time results in alteration of the operating characteristics, or rating of the fuse link. In other words, it has been determined that an unstressed fuse wire which is intended to become ruptured upon passage therethrough of, say, three-fourths of an ampere, when held under mechanical tension of the order produced by spring means found in the usual types of protective apparatus, is ruptured by currents of a magnitude substantially less than the figure specified.

The purpose of this invention, therefore, is to provide a fuse link construction which will not be harmfully affected by the application thereto of relatively high mechanical forces by relieving in an improved manner the fusible element of the improved fuse link structure of the forces produced by the tensioning means.

Fig. 1 is a view partly in vertical section and partly in side elevation of a fuse cartridge having the improved fuse link associated therewith.

Fig. 2 is a fragmentary view of a portion of the structure illustrated in Fig. 1, but viewing same from a different angle.

In the drawing, wherein is shown for the purpose of illustration, merely, one embodiment of the invention, A designates a fuse cartridge adjacent to the lower end of which a terminal member B is fixed, said terminal member B being adapted to aid in electrically associating the fuse cartridge A with a switch apparatus (not shown). At its upper end the fuse cartridge A has associated with it an adapter C which comprises a short tubular portion C^a that is extended downwardly into the upper portion of the fuse cartridge, and an outstanding annular flange C^b which contacts with the top face of said fuse cartridge.

The improved fuse link includes a contact head 1 which is fixedly located at the outer end of a strip 2 of conducting material, said contact head being arranged in contact with the top face of the flange C^b of the adapter C, and said strip 2 being extended downwardly into the cartridge A. Extended upwardly through the fuse cartridge A is an electrical conductor 3 which serves as a terminal element of the fuse link, the end 3′ of said conductor which is located within the fuse cartridge being spaced a considerable distance from the inner or lower end of the strip 2. The opposite end portion of the conductor 3 is turned about the lower end of the fuse cartridge and is extended upwardly with respect thereto, as indicated at 3^a in Fig. 1, said upwardly extended portion of said conductor being mechanically and electrically clamped to the terminal member B through the instrumentality of a clamping screw D.

The strip 2 and the conductor 3 are connected together by connecting means 4, which comprises a pair of strain wires 5 and 6, and a bead or ring 7 formed of electrical insulating material. The strain wire 5 is passed through an aperture 8 formed through the strip 2 and is looped through the bead or ring 7, as shown most clearly in Fig. 1, and portions of said strain wire are twisted together as indicated at 5′ to draw the side portions thereof together. The strain wire 6 is also looped through the bead or ring 7, and said strain wire 6 is secured to the conductor 3 by having a portion thereof wrapped or twisted about said conductor, by preference parallel portions 6′ of said strain wire 6 being extended longitudinally of the conductor 3 in contact therewith, and the end portions 6^a of the strain wire being wrapped about the end portion of the conductor 3 in a manner to embrace both the conductor 3 and the portions 6′ of the strain wire. If desired, solder may be employed to securely fix the strain wires to the strip 2 and the conductor 3.

The fusible element 9 of the fuse link is secured by solder or other suitable means at its opposite ends to the strip 2 and to the conductor 3. The fusible conductor is bowed outwardly slightly, as

shown to the best advantage in Fig. 1, so as to be out of electrical contact with the strain wires 5 and 6.

Extended downwardly from the strip 2 is an expulsion tube 10 formed of electrical insulating material which embraces the extreme lower portion of the strip 2, the connecting means 4, and a portion of the conductor 3, the lower portion 2' of the strip 2 which extends into the expulsion tube being of reduced width and said strip being provided with shoulders 2a with which the upper edge of the expulsion tube contacts (see Fig. 2). Extended upwardly into the expulsion tube from a point a considerable distance below the lower edge of said expulsion tube is an elongated tubular element 11 which at its lower end is provided with an outstanding, annular flange 12, and an expansible coil spring 13 is interposed under compression between said annular flange 12 of the tubular element 11 and the lower edge of the expulsion tube 10. A button 14 is secured to the conductor 3, and this button holds the tubular element in its elevated position so that the coil spring is maintained in compression.

In the use of the improved fuse link, the strain wires 5 and 6 are not in electrical contact with each other because of the presence of the insulating bead or ring 7 which separates the inner end portion of said strain wires from each other, hence all electrical current conducted by the fuse link must flow through the fusible element 9. When a fault occurs in the line protected by the improved fuse link, the fusible element 9 melts and the current flows through the strain wires passing from one to the other in the form of an arc. The arc thus produced breaks one or both of the strain wires, allowing the ends to be pulled apart by the associated switch mechanism or by the coil spring 13. The importance of the insulating bead or ring resides in the fact that a small fraction of an ampere through an arc will break a strain wire of the required strength, whereas, if the strain wire were continuous several amperes would be required in order to melt the strain wire and break the circuit.

It is obvious, therefore, that the connecting means 4 of the improved structure entirely relieves the fusible element 9 of all tensional strains exerted by the coil spring 13 or by parts of a switch with which the fuse link is associated, and therefore the danger that the fusible element might be ruptured or otherwise injured by mechanical strains applied thereto is eliminated.

I claim:

1. A fuse link assembly including a pair of spaced terminal members, a fusible element for electrically connecting said terminal members, connecting means for mechanically connecting said terminal members so as to relieve said fusible element of tension applied to the fuse link assembly, said connecting means comprising strain elements mechanically and electrically connected respectively to said terminal members at their outer remote ends and formed of electrical conducting material, and means for connecting the inner adjacent ends of said strain elements together in spaced relation so that they are out of direct electrical connection with each other.

2. A fuse link assembly including a pair of spaced terminal members, a fusible element for electrically connecting said terminal members, connecting means for mechanically connecting said terminal members so as to relieve said fusible element of tension applied to the fuse link assembly, said connecting means comprising strain elements mechanically and electrically connected respectively to said terminal members at their outer remote ends and formed of electrical conducting material, and means formed of electrical insulating material for connecting the inner adjacent ends of said strain elements together in spaced relation so that they are out of direct electrical connection with each other.

3. A fuse link assembly including a pair of spaced terminal members, a fusible element for electrically connecting said terminal members, connecting means for mechanically connecting said terminal members so as to relieve said fusible element of tension applied to the fuse link assembly, said connecting means comprising strain elements mechanically and electrically connected respectively to said terminal members at their outer remote ends and formed of electrical conducting material, and means comprising an annular member formed of insulating material for connecting the inner adjacent ends of said strain elements together in spaced relation so that they are out of direct electrical connection with each other.

4. A fuse link assembly including a pair of spaced terminal members, a fusible element for electrically connecting said terminal members, connecting means for mechanically connecting said terminal members so as to relieve said fusible element of tension applied to the fuse link assembly, said connecting means comprising strain wires mechanically and electrically connected respectively to said terminal members at their outer remote ends and formed of electrical conducting material, and a member formed of insulating material through which said strain wires are looped for connecting the inner adjacent ends of said strain wires together in spaced relation so that they are out of direct electrical connection with each other.

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