Dec. 7, 1943. W. O. SCHULTZ ET AL 2,336,304

FUSE LINK CONSTRUCTION

Original Filed Aug. 3, 1940

Fig. 2

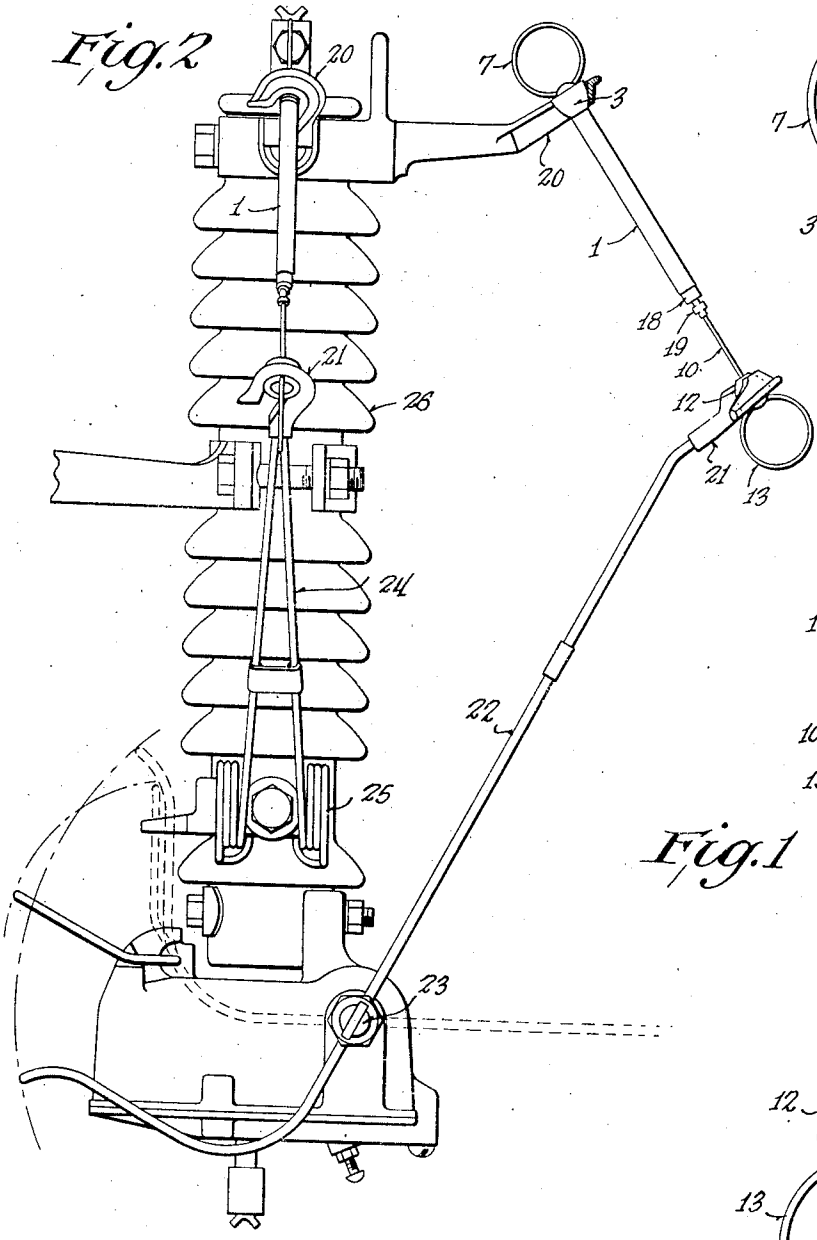


Fig. 1

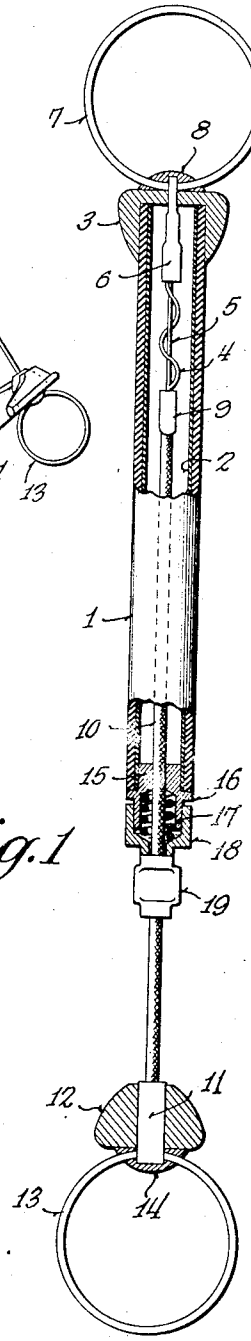
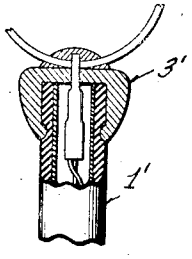


Fig. 3



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FUSE LINK CONSTRUCTION

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Original application August 3, 1940, Serial No. 350,994. Divided and this application August 9, 1941, Serial No. 406,128

7 Claims. (Cl. 200—135)

This invention relates to a fuse link construction and is a division of our application filed August 3, 1940, Serial Number 350,994, for Repeating cut-out constructions, which application matured into Patent No. 2,311,092 on February 16, 1943.

Objects of this invention are to provide a novel construction of fuse link which is so made that the fuse link is housed in a fiber lined insulating tube, such for example as a phenolic condensation product, in which means are provided for sealing the tube at both ends so that the tube may be used with either end uppermost without danger of water entering the tube, and specifically to provide a weather seal for the end of the tube which will be open upon blowing of the fuse link, the weather seal being spring pressed towards tube closing position as long as the fuse link is intact.

Further objects are to provide a fuse link construction in which the lining of the enclosing casing surrounding the fusible portion of the fuse link provides an arc extinguishing inner surface for the casing to assist in the extinguishing of the arc upon rupture of the fuse link.

An embodiment of the invention is shown in the accompanying drawing, in which:

Figure 1 is a view of the fuse link, such view being partly in section.

Figure 2 is an elevation showing the manner in which the fuse link is used, such view showing the parts in full line in operative position and showing in dotted lines the position the device occupies after the fuse link has blown.

Figure 3 is a fragmentary sectional view of a further form of the fuse link.

The fuse link consists of a sleeve of a phenolic condensation product or other insulating sleeve 1 which is provided with a fiber sleeve liner 2. The upper end of the sleeve 1 is closed by means of the upper metal fitting or cap 3 which frictionally engages the outer side of the tube 1. The fusible wire is indicated at 4 and a strain wire at 5. These may be of the usual types. The upper ends are gripped by the contacting portion 6 which extends outwardly through the cap 3 and is engaged by a manipulating ring 7. Preferably the parts are secured together by means of solder as indicated at 8.

The lower ends of the fusible wire 4 and strain wire 5 are secured as indicated at 9 to a flexible leader 10 which extends outwardly through the lower end of the tube 1 and terminates in a portion 11 which is secured within a lower approximately conical member 12 corresponding in external contour to the metal cap 3. A manipulating ring 13 is secured to the member 11 and preferably the parts are joined by means of solder 14, or in any other suitable way.

A weather seal in the form of a tubular member 15 is provided for the normally lower end of the fuse tube 1. This tubular member 15 is provided with a flange 16 which is held in sealing engagement with the normally lower end of the tube 1 by means of a spring 17 located internally of the tubular member 15. One end of the spring bears against such tubular member 15 and the other end of the spring bears against the member 18 which slidably receives the lower end of the tubular member 15, as shown in Figure 1.

The sleeve 18 is provided with a portion 19 which may take the form of a collar and which is firmly secured to the leader 10. It is obvious that the collar portion 19 could be either integral with the sleeve 18 as described hereinabove or could be a separate member.

It is to be noted that the spring 17 has a small number of convolutions and is, therefore, relatively stiff in its action against twisting and, as it bears against each of the members 15 and 18, it will tend to prevent twisting of the fusible element.

It is obvious from the description hereinabove given that the weather seal prevents water from entering the fuse tube and permits the fuse tube to be used in the inverted position from that shown in Figure 1 if so desired. It is also apparent that when the fuse link blows, one end of the fuse tube is always immediately opened to provide free venting of the gases. The upper cap 3, as stated, frictionally grips the tube 1.

It may be desirable to have an even more permanent grip with the tube 1 in which event the construction shown in Figure 3 is provided. This construction is exactly like that previously described, except for the fact that the cap 3' is knurled into a groove formed in the tube 1'. The members 3 and 12 are approximately conical and may be slightly rounded if desired. They are received within inwardly opening hooked ends of stationary and movable arms and provide adequate contacting surfaces for engaging such hook-shaped or eyelet portions. However, they are free from binding from such eyelet or hook-shaped portions and are not gripped by such portions.

Figure 2 shows the usual manner in which this fuse is used. It shows a repeating fuse construction which forms the subject matter of our copending application Serial No. 350,994 filed Au-

gust 3, 1940, for Repeating cut-out constructions, which application matured into Patent No. 2,311,092 on February 16, 1943, and forms no portion of this invention. It is shown merely to illustrate one way in which the fuse forming the subject matter of this invention may be used. Briefly, Figure 2 shows a repeating fuse construction in which a series of fuses as described hereinabove are used. These fuses have their upper ends received by the hook-shaped upper contacts 20 and their lower ends received by the hook-shaped lower contacts 21. The lower contacts 21 are urged downwardly. One of the lower contacts may be carried by means of an arm 22 which is carried by a rotatable shaft 23 which is spring urged for rotation in a clockwise direction, as viewed in Figure 2, in a manner not shown and not included in this invention. The other arm 24 may be provided with a coil spring portion 25 which urges such other arm downwardly. The upper and lower contacts of the repeating fuse construction are carried by an elongated insulator 26 and the lower contacts are insulated one from the other, all as described in detail in our copending application.

When an overload occurs, the fusible section 4 is ruptured and the strain wire 5 is immediately ruptured. The arc is confined within the tube and the spring 17 causes separation of the ends of the ruptured section as the spring is pulling directly longitudinally of the leader 10. In addition to this, there is the expulsion action which blows the leader outwardly from the fuse tube. The fiber lining 2 acts as an arc extinguishing agent as it generates an arc extinguishing gas upon the rupture of the fuse link and assists in extinguishing the arc.

The ends of the fuse link are quickly separated and the arc extinguished and the movable arm 22 moves downwardly to thereby increase the spacing between the arm 20 and the arm 22, see Figure 2.

With regard to the fuse link shown in Figures 1 and 3, it has been found that normally it is preferable to hold the fuse tube rigidly to the upper member or cap 3 and this may be done either by a very tight frictional grip for the construction shown in Figure 1, or by knurling the cap portion into a groove formed in the tube as shown in Figure 3. However, it also may be found desirable, as when it is desired to interrupt very heavy loads, to have the frictional grip between the cap 3 and the tube 1 of Figure 1 of a lesser value so that the tube 1 may blow off free of the cap 3 if desired.

It is to be noted that the telescopic arrangement of the parts 15 and 18 of the weather seal and the spring 17 located therein insures adequate sealing of the end of the fuse tube and though it is preferable to use the fuse tube in the position indicated in the drawing with the weather seal at the lower end thereof, nevertheless the fuse tube may be used in an inverted position as the weather seal seals the end of the tube irrespective of the position in which the apparatus may be used.

It will be seen that a novel form of fuse construction has been provided which is very simple to manufacture, which has a weather seal so arranged that the fuse may be used in any desired position with assurance that water will not enter the fuse tube.

It is to be noted also that the weather seal assists in the initial motion of the leader outwardly from the tube upon rupture of the fuse link, and that this action is augmented by the expulsion action of the gases generated upon rupture of the fuse link and by the downward pull of the arm 22. Also it will be seen that the lining of the fuse tube generates an arc extinguishing gas which assists in the rapid extinguishing of the arc.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

We claim:

1. A fuse link construction comprising a tubular member, fusible means within said tubular member, conducting means extending from said fusible means out of each end of said tubular member, means closing one end of said tubular member, and a weather seal resiliently urged into contact with the other end of said tubular member to close said tubular member, said weather seal consisting of two members one of which is anchored to said conducting means and the other of which is slidable on said conducting means, and resilient means interposed between said last mentioned members.

2. A fuse link construction comprising a tubular member, an end portion on said tubular member having means whereby said end portion may be attached to a fuse link receiver, a fusible link connected to said end portion and located within said tubular member, a flexible leader extending from said fusible link out of the other end of said tubular member and having means whereby said leader may be attached to a fuse link receiver, and a weather seal carried by said leader and resiliently held in sealing engagement with the last mentioned end of said tubular member, said weather seal consisting of two members one of which is anchored to said leader and the other of which is slidable on said leader, and resilient means interposed between said last mentioned members.

3. A fuse link construction comprising a tubular member, fusible means within said tubular member, contacting means extending from said fusible means out of each end of said tubular member, means closing one end of said tubular member, a weather seal consisting of two relatively movable members with a spring interposed between them to resiliently urge one of said members into contact with the other end of said tubular member to close said tubular member, and housing means for said spring.

4. A fuse link construction comprising a tubular member, fusible means within said tubular member, contacting means extending from said fusible means out of each end of said tubular member, means closing one end of said tubular member, and a weather seal consisting of two relatively movable members in telescopic relation, and a spring enclosed within said members and urging them apart and resiliently urging one of said members into contact with the other end of said tubular member to close said tubular member.

5. A fuse link construction comprising a tubular member, an arc extinguishing lining therein, fusible means within said tubular member, contacting means extending from said fusible means out of each end of said tubular member, means closing one end of said tubular member, a weather seal freely slidable on one of said contacting means and resiliently urged into contact with the other end of said tubular member to close

said tubular member, and a spring located on the side of said weather seal away from said tubular member for urging said weather seal towards said tubular member.

6. A fuse link construction comprising a tubular member, fusible means within said tubular member, contacting means extending from said fusible means out of each end of said tubular member, one end of said tubular member being provided with a rigid terminal portion, an attaching ring secured thereto and to the corresponding contacting means, the other contacting means being relatively flexible and extending out of the other end of said tubular member, a weather seal consisting of two members and an interposed spring located exteriorly of said tubular member, one of said members of the weather seal being anchored upon said flexible contacting means and the other member of said weather seal being freely slidable on said flexible contacting means and resiliently urged into contact with the other end of said tubular member, a terminal member secured adjacent the outer end of said flexible contacting means, and a manipulating ring secured adjacent the outer end of said flexible conducting member.

7. A fuse link construction comprising a tubular member, fusible means within said tubular member, contacting means extending from said fusible member out of each end of said tubular member, means closing one end of said tubular member, and a weather seal consisting of two relatively movable members, one of said members being attached to said contacting means and the other of said two members being freely movable on said contacting means, and a spring located between said members and urging them apart and resiliently urging the movable one of said two members into contact with the other end of said tubular member to close said tubular member, said spring having a small number of convolutions and engaging said members and tending to prevent inadvertent twisting of said fusible means.

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