Oct. 17, 1933. L. C. HART 1,930,804

FUSE

Filed March 16, 1932

Fig. 1.

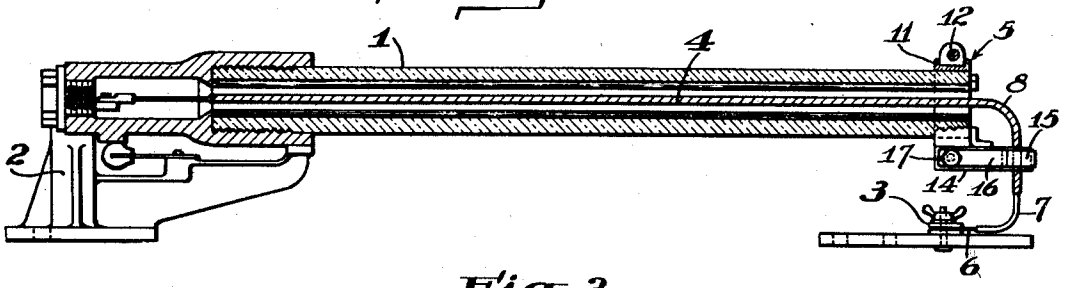


Fig. 2.

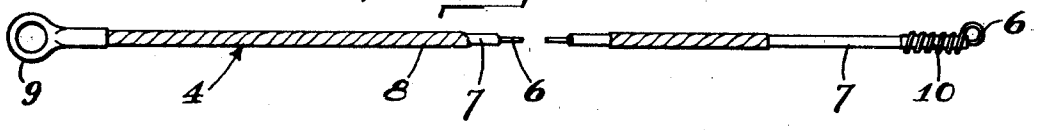


Fig. 3.

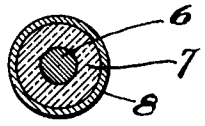


Fig. 4.

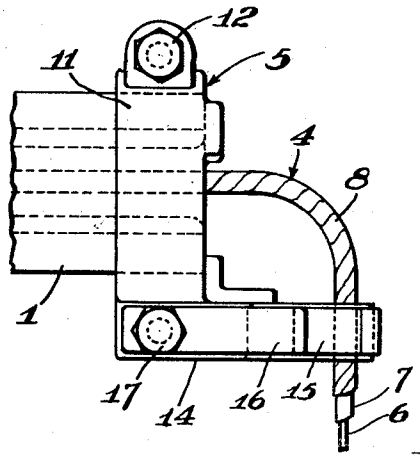


Fig. 6.

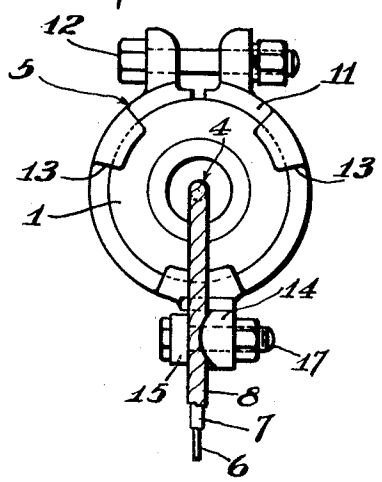
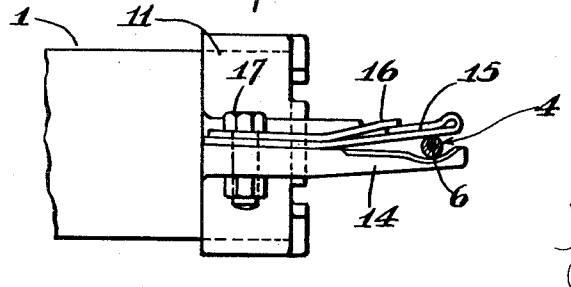


Fig. 5.



INVENTOR

Lester C. Hart

by James C. Bradley

Atty

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UNITED STATES PATENT OFFICE

1,930,804

FUSE

Lester C. Hart, Cleveland, Ohio, assignor to Hi-Voltage Equipment Company, a corporation of Ohio

Application March 16, 1932. Serial No. 599,202

7 Claims. (Cl. 200—127)

The invention relates to fuse equipment for use in high voltage work. The primary object of the invention is to prevent deterioration of the fuse link or element due to corona discharge. On the higher voltages, especially 22,000 volts or higher, there is a corona discharge from the small diameter conductors. There is, however, a wire diameter for each voltage at which corona discharge does not occur, and without such discharge, there will be no deterioration due to the ionization or breaking down of the air surrounding the conductor. One of the objects of the invention is to provide a fuse link which will take advantage of this principle and thus avoid he disadvantages incident to corona discharge.

Another difficulty incident to corona discharge, arises at the end of the fuse tube where the link leaves the bore of the tube. When a high voltage is applied, that is about 70,000 volts, to a fuse tube, such as that shown in the drawing, a discharge is noticeable from the fuse link to the fuse tube. This may be described as a radical discharge, brightest right at the link, and radiating along the end of the tube. This is apparently a charging current which is necessary to hold the outer end surface of the tube at line potential. This causes ionizing of the air, and disintegration of the link where it leaves the tube. An object of the present invention is to obviate this difficulty. One embodiment of the invention is shown in the accompanying drawings, wherein:

Figure 1 is an assembly view. Fig. 2 is a side elevation of the fuse link. Fig. 3 is a section through the link on a greatly enlarged scale to more clearly illustrate the different layers of material entering into the link. And Figs. 4, 5 and 6 are enlarged detail views of the spring clip.

Referring first to the general arrangement which shows the invention as applied to the construction of my Patent No. 1,605,543 of November 2, 1926, 1 is a fuse tube of insulating material supported at one end on the terminal member 2, and having its other end spaced above the other terminal member 3; 4 is the fuse link which constitutes one feature of the invention; and 5 is the spring clip which constitutes a second feature of my invention.

The construction of the fuse link 4 will be seen by reference to Figs. 2 and 3 which show the link on an enlarged scale. The link comprises the central wire 6 of fusible metal surrounded by the insulating layer 7, which in turn is surrounded for a part of its length by the metal sheath 8. The wire 6 terminates at its left hand end in the copper loop 9, and at its right hand end is coiled around the insulation, as indicated at 10. The sheath 8 is preferably of metal foil which makes contact at its left end with the loop 9. At the other end of the link, the sheath terminates several inches short of the end of the insulation 7.

The object of this construction is to provide a metallic shield around the fuse link which will be charged at line potential, but which will not carry any current. This metallic shield is of the proper diameter for the voltage on which it is used, and as a result, there is no corona discharge and no deterioration. The shield is charged from the terminal in the closed end of the fuse tube 1 and ends close to the outside terminal 3.

The spring clip 5 is carried by the end of the tube, and makes contact with the metallic shield 8 of the fuse link. The clip brings the corona shield of the link in positive contact with the fuse tube end. Being in positive contact, there will be no discharge, as the discharging current will be carried through the metal path, thus eliminating the corona discharge which otherwise ionizes the air and causes disintegration of the link where it leaves the tube.

The spring clip is always used with the corona shield links, but is not limited to such use, as it may be used to advantage with plain metallic links. The spring pressure is relatively light and the clip is so formed that when the fuse blows, the link is blown free of the clip.

The precise construction of the clip will be seen by reference to Figs. 4, 5 and 6. It is in the form of a split bronze ring 11 clamped over the end of the tube by the bolt 12, the lugs 13 overlying the end of the tube, and assisting in holding it in position. The ring has a projecting arm 14 and in opposition to this, is clamped to the strip 15 of spring material backed up by an auxiliary spring 16. The bolt 17 secures the members 15 and 16 in position, the fuse link 4 lying between 14 and 15, as indicated in Fig. 5. A yielding contact is thus made which is readily released when the fuse blows.

What I claim is:

1. In combination in a fuse construction, a flexible link comprising a wire of fusible metal coated with a layer of insulating material, and a thin flexible metallic shield surrounding said insulation and stopping short of one end of the link, said shield being in electrical connection with the fuse wire at its other end.

2. In combination in a fuse construction a flexible link comprising a wire of fusible metal, a flexible insulating sheath surrounding the wire in direct contact therewith throughout and extending substantially the length thereof, and a thin flexible metallic shield surrounding the insulation from one end of the link to a point short of the other end, said shield being in electrical connection with the fuse wire at the first mentioned end.

3. In combination in a fuse construction, comprising a fuse tube supported at one end and free at the other end with an electrical terminal adjacent the free end of the tube but spaced away therefrom to provide an air gap, a fuse wire extending through the tube and connected to said terminal, means for making electrical connection between a second terminal and the end of the wire in the tube, insulation surrounding the fuse wire, and a metallic shield surrounding the insulation on that portion of the fuse wire extending through the tube and to a point outside the free end thereof, said shield having electrical connection with the end of the fuse wire lying in the tube, but not having electrical connection with the end lying outside the tube.

4. In combination in a fuse construction comprising a fuse tube suported at one end and free at the other end with an electrical terminal adjacent the free end of the tube but spaced away therefrom to provide an air gap, a fuse wire extending through the tube and connected to said terminal, means for making electrical connection between a second terminal and the end of the wire in the tube, insulation surrounding the fuse wire, a metallic shield surrounding the insulation on that portion of the fuse wire extending through the tube and to a point outside the free end thereof, said shield having electrical connection with the end of the fuse wire lying in the tube, but not having electrical connection with the end lying outside the tube, and a metal member carried by the end of the tube and making contact with the shield on the fuse wire.

5. In combination in a fuse construction, comprising a fuse tube supported at one end and free at the other end with an electrical terminal adjacent the free end of the tube but spaced away therefrom to provide an air gap, a fuse wire extending through the tube and connected to said terminal, means for making electrical connection between a second terminal and the end of the wire in the tube, insulation surrounding the fuse wire, a metallic shield surrounding the insulation on that portion of the fuse wire extending through the tube and to a point outside the free end thereof, said shield having electrical connection with the end of the fuse wire lying in the tube, but not having electrical connection with the end lying outside the tube, and a metal member carried by the end of the tube and having releasable spring engagement with the shield outside the fuse tube.

6. In combination in a fuse construction, comprising a fuse tube supported at one end and free at the other end with an electrical terminal adjacent the free end of the tube but spaced away therefrom to provide an air gap, a fuse wire extending through the tube and connected to said terminal, means for making electrical connection between a second terminal and the end of the wire in the tube, and a metal member carried by the end of the tube and having releasable engagement with the wire intermediate the end of the tube and the terminal adjacent such end.

7. In combination in a fuse construction comprising a fuse tube supported at one end and free at the other end with an electrical terminal adjacent the free end of the tube but spaced away therefrom to provide an air gap, a fuse wire extending through the tube and connected to said terminal, means for making electrical connection between a second terminal and the end of the wire in the tube and a metal member carried by the end of the tube and having an arm lying at the side of the tube extending out past such end and releasably engaging the fuse wire.

LESTER C. HART.