Aug. 10, 1937. E. F. BOOTHE 2,089,172

FUSE LINK

Filed April 22, 1935

FIG. 1.

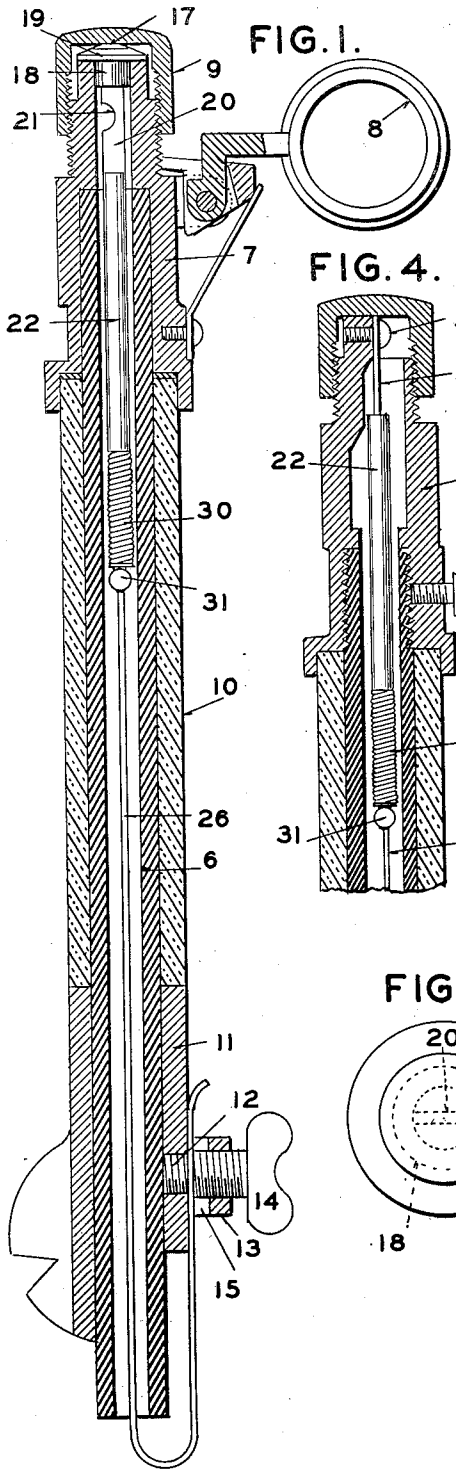


FIG. 4.

FIG. 3.

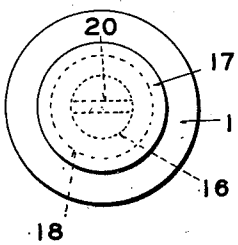


FIG. 5.

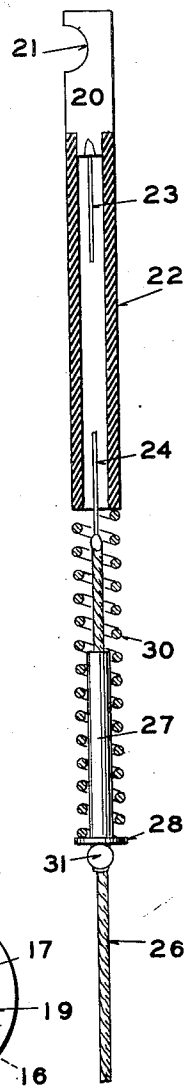
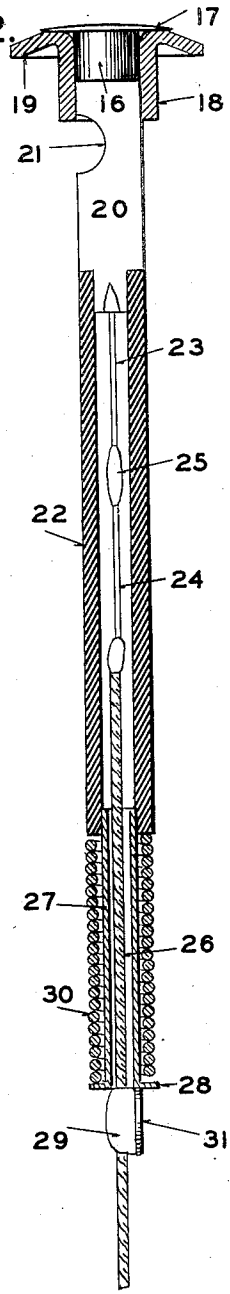


FIG. 2.



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FUSE LINK

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Application April 22, 1935, Serial No. 17,632

8 Claims. (Cl. 200—117)

In the protection of electrical equipment fuse links are enclosed in casings known as "cartridges", numerous forms of which are in common use. The present invention relates to a fuse link of the expulsion type adapted for use in such cartridges.

One object of my invention is to provide a fuse link which will not only be electrically efficient but will be of superior mechanical construction imparting desirable rigidity to the device.

Another object of my invention is to so construct the link that it may be applied to various types of cartridges in common use whether such cartridges were designed for tension or expulsion links.

Still another object of my invention is to provide a fuse link which will embody in its structure such features as will enable it to function as an effective protective device when connected directly in a circuit without the use of a cartridge of any kind.

In the accompanying drawing which illustrates a fuse link made in accordance with my invention, Figure 1 is a longitudinal section through one form of cartridge to which my fuse link may be applied and is shown therein; Figure 2 is an enlarged sectional view of the fuse link; Figure 3 is a top plan view of the link; Figure 4 is a longitudinal section of the upper end of another form of cartridge; and Figure 5 is a sectional view of the link after the fuse is blown, such view also showing the alteration of the link to adapt it for use in the form of cartridge shown in Figure 4.

Referring first to Figure 1, in which one form of cartridge is shown for purposes of illustration only, the numeral 6 is a tube of fiber or other insulating material. Secured to the upper end of the tube 6 is a metal contact block 7 provided with the usual latch ring 8 and having its upper end closed by a threaded cap 9. Surrounding the tube 6 is a protective porcelain sleeve 10 below which is a metal contact block 11, preferably removably secured to tube 6 by a set-screw 12. This block is provided with a lug 13 threaded to receive a thumb-screw 14 for securing one terminal of the fuse which passes through a vertical opening 15 in the lug.

The upper end of the fuse link is formed of three parts, an attached button head comprising a cylindrical portion 16 and a disc 17, a detachable button head comprising a tubular part 18 and a flange 19, and a flat terminal 20 provided with a notch 21. The lower end of terminal 20 is reduced and enters a tube 22 of fiber or other insulating material. Contained within the tube 22 is a fusible section which, in the form shown, comprises a pair of wires 23 and 24 secured together by a fusible joint 25. The wire 23 is connected to the terminal 20 and wire 24 to a stranded cable 26 forming the other terminal of the link. This latter terminal is adapted to pass down through the tube 6 and be connected to contact block 11 by thumb-screw 14. Entering the lower end of the insulating tube 22 is a thin metal tube 27 provided at its lower end with a flange 28. This tube is secured to the flexible conductor 26 by any suitable means such as solder 29 and is surrounded by a coil spring 30 compressed between the lower end of the tube 22 and the flange 28. The solder 29 may be used to attach a small disc 31 on which the rating of the fuse may be marked.

In using my fuse link in connection with a cartridge such as shown in Figure 1, the flexible conductor is dropped down through the tube 6, the tubular member 18 entering the bore, and the flange 19 of the removable button head resting upon the upper end of the contact block 7 where it is secured by screw-cap 9. The lower end of the flexible conductor or terminal 26 is now secured by screw 14. It need not, however, be drawn taut as is necessary in the case of a link using a tension spring, but may be allowed to hang loosely as shown.

In case a cartridge is used having a smaller opening than the tubular part 18 of the removable button head, this head is slipped down over the link, the cylindrical part 16 of the fixed head entering the bore of the tube and the disc 17 bearing on the upper end of the block.

In Figure 4 I have shown a form of cartridge in which the contact block 7' is provided with a vertical face against which a flat terminal is adapted to be clamped by the head of a screw 32. To adapt my link for use in such a cartridge, not only is the large button head removed but the small button head is cut off, producing a terminal such as shown in Figure 5 which may be readily secured in position as shown, the body of the screw 32 entering notch 21 in the terminal.

In the use of my fuse link, when an overload occurs the fusible joint 25 will be melted and wires 23 and 24 will be separated by the expansion of spring 30. Rapid and wide separation of the conductors to prevent arcing is secured, as due to the light construction there is but little inertia to be overcome by the spring. As the expansive action of the spring is wholly inde-

pendent of the cartridge, the link may be connected directly in the line to be protected to secure the same results as when enclosed in a cartridge.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A fuse link comprising a tubular member, a fusible section lying in said tubular member and having a connection extending from one end of the tubular member, an electrical conductor secured to the fusible section and extending out of the other end of the tubular member, an abutment on the conductor, a coil expansion spring surrounding the conductor and having one end engaging the abutment and the other end engaging the tubular member, and rigid means extending the length of the coil spring for supporting said spring.

2. A fuse link comprising a tubular member, a fusible section lying in said tubular member and having a connection extending from one end of the tubular member, an electrical conductor secured to the other end of the fusible section and extending out of the other end of the tubular member, an abutment on a portion of the conductor exterior of the tubular member, a sleeve surrounding the conductor and having one end engaging the abutment and the other end telescoping with the tubular member, and a coil expansion spring surrounding the sleeve and interposed between the abutment and the adjacent end of the tubular member.

3. An expulsion fuse comprising a tubular casing closed at the top and open at the bottom, a fusible section in said casing and connected to the top thereof, an electrical conductor connected to the fusible section and extending to the exterior of the casing at its open end, a tubular member surrounding the fusible section, an abutment on the conductor, and a coil expansion spring interposed between the abutment and the tubular member.

4. A fuse link comprising a tubular member of insulating material, a fusible section in said tubular member, a terminal connected to said fusible section and extending beyond the tubular member, a second tubular member surrounding the terminal and secured thereto, and an expansion spring surrounding said second named tubular member and operating thereon when the fusible section is melted to separate the tubular members.

5. A fuse link comprising a tubular member of insulating material, a fusible section in said tubular member, a rigid terminal at one end of the tubular member, a flexible terminal at the other end thereof, a second tubular member surrounding the flexible terminal and secured thereto, and an expansion spring surrounding said second named tubular member and operating thereon when the fusible section is melted to separate the tubular members.

6. A fuse link comprising a tubular member of insulating material, a fusible section in said tubular member, a rigid terminal at one end of the tubular member, a flexible terminal at the other end thereof, a second tubular member surrounding the flexible terminal and secured thereto, said second named tubular member entering the first named tubular member and being provided with an abutment, and an expansion spring surrounding said second named tubular member and bearing against the first named tubular member and the abutment.

7. A fuse link comprising a tubular member of insulating material, a fusible section in said tubular member, a flexible terminal at one end of said tubular member, a flat rigid terminal at the other end of said tubular member, a fixed head on said terminal, said fixed head comprising a cylindrical portion and a projecting disc, and a removable head, said removable head comprising a tubular part surrounding the cylindrical portion of the first named head and having a projecting flange.

8. A unitary fuse link structure adapted to be positioned in a fuse cartridge, said link structure comprising a tubular element, a conducting element carried by the upper end of said tubular element for engagement with a terminal, conducting means extending from the other end of said tubular element and of sufficient length to extend out of the fuse cartridge for connection to a second terminal, a fusible element electrically connecting said conducting means and said first mentioned conducting element, and resilient means strained between the tubular element and the conducting means and acting on the upper end of said conducting means to quickly increase the gap between the parts of the fusible element when the latter is ruptured by overload current, said conducting means being unattached to the tubular element and movable relative to the lower end thereof by the action of the resilient means after rupture of the fusible element.

EUGENE F. BOOTHE.