

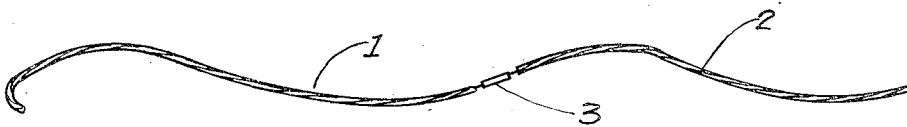
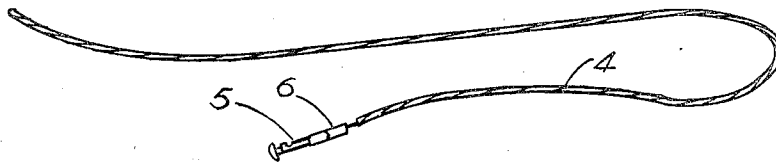
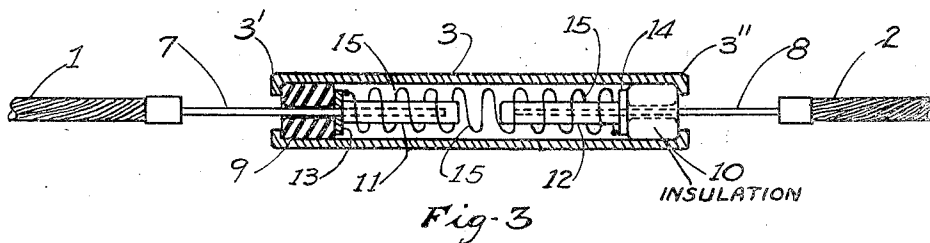
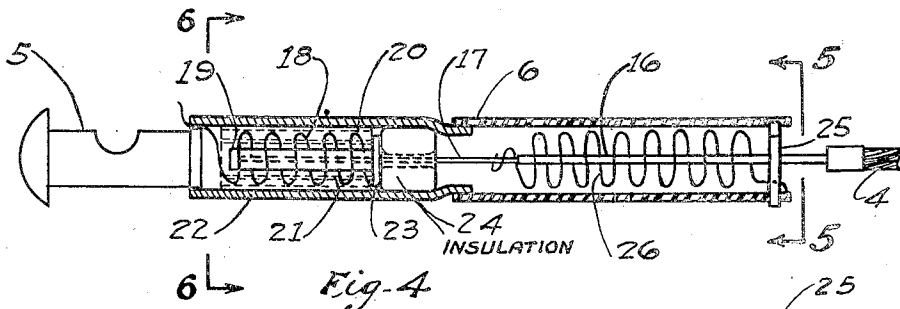
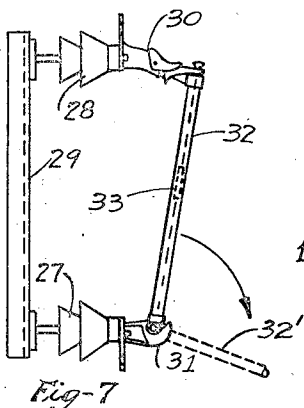
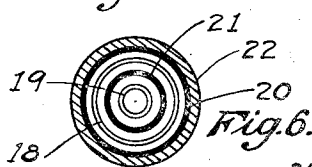
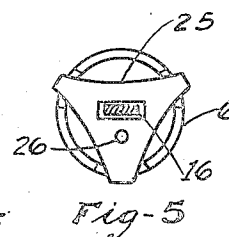
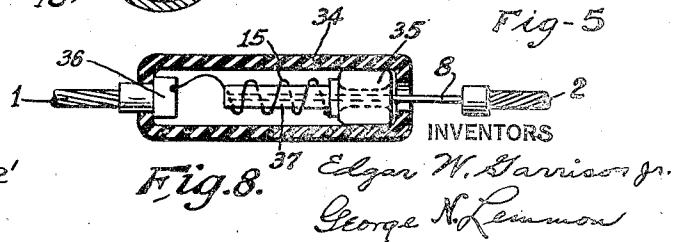
March 10, 1942.

E. W. GARRISON, JR., ET AL

2,276,184

## ELECTRIC FUSE

Filed, Aug. 31, 1940



Edgar W. Garrison Jr.  
George H. Lemon

## UNITED STATES PATENT OFFICE

2,276,184

## ELECTRIC FUSE

Edgar W. Garrison, Jr., Birmingham, and George N. Lemmon, Homewood, Ala., assignors to Southern States Equipment Corporation, Birmingham, Ala.

Substituted for abandoned application Serial No. 247,574, December 24, 1938. This application August 31, 1940, Serial No. 355,370

5 Claims. (Cl. 200—123)

One purpose of the invention is to provide a fuse in which a relatively small conductor is in series with two relatively large conductors together with reinforcing means whereby the complete fuse unit can withstand considerable mechanical strain. A further purpose is to provide a high voltage fuse which shall open the circuit on a slight overload only after a relatively long time but which shall open the circuit very quickly upon the occurrence of a heavy overload. Other purposes will be evident from the specification and claims.

When fuses are used on high voltage systems, such as transmission lines or primary distribution circuits, it is customary to have the fuse rupture inside an insulating tube so that the resultant arc shall be quenched. It is also customary to remove the insulating tube from the circuit after the fusible element shall have ruptured.

Referring to the drawing, Fig. 1 shows one type of fuse embodying this invention, with the fusible portion between two long flexible conductors; Fig. 2 shows a similar fuse but with a button head at one end of the unit; Fig. 3 is an enlarged cross section showing the fusible elements of the unit in Fig. 1; Fig. 4 similarly shows the details of the unit in Fig. 2; Figure 5 is an end view of the members in Fig. 4, on the line 5—5; Fig. 6 shows a cross section through one portion of the fuse on the plane 6—6; and Fig. 7 shows in small scale how the fuses are used. Fig. 8 shows some possible modifications of details.

Attached to flexible conductors 1 and 2 are the smaller conductors 7 and 8, which pass through the insulating beads 9, 10 and terminate inside the blocks or sleeves 11, 12, to which the wires 7 and 8 are soldered. A small heater coil 15, 15 completes the circuit, being separated from the tube 3 and soldered to the small rings 13, 14; and the tube 3 holds the assembly together by means of the crimped ends 3', 3''.

On a slight overload the coil 15 will develop heat enough to melt the solder in blocks 11 and 12; and the tension due to the fuse holder mechanism will thereupon separate conductors 1 and 2 and so open the circuit in the well-known manner of expulsion tube fuses. If in case of very heavy overload the heater coil 15 should be fused, the arc thereby produced might instantly melt the solder in 11 or 12, but if not then one or both of the small conductors 7, 8 would be instantly fused and the circuit inside the tube 32 would be opened thereby. If desired, the conductor 1 and the ring 13 may be fastened directly to the sleeve 3. This would dispense with

members 7, 9 and 11, and the fuse would have only one releasable joint 37 as shown in Fig. 8, instead of two releasable joints 11 and 12 as shown in Fig. 3.

In Figs. 2 and 4 is shown another form of fuse which also embodies this invention. In this form the large conductors 4 and 5 are joined together by the strap 16, the small conductor 17, and the heater coil 18. The block or sleeve 19 is soldered to the wire 17, and mica sleeves 20 and 21 insulate the coil 18 from the sleeve 19 and the metal tube 22.

The tube 22, the conductor 5 and one end of the coil 18 are fastened together by solder or other suitable means. The other end of coil 18 is secured to the washer 23 which also serves as a seat for one end of block 19. The insulating bead 24 separates the tube 22 from the wire 17. The insulating tube 6 fits tightly over the reduced end of tube 22 and the other end of tube 6 is recessed to receive the triangular washer 25. The conductor 16 passes through the elongated hole in washer 25 and is thereby prevented from turning. The tension spring 26 is connected to washer 25 and its other end is looped about conductor 17.

When a continuous slight overload is imposed on this fuse, the coil 18 develops enough heat to melt the solder in the block 19. Whereupon the spring 26 jerks 17 out of block 19 and ejects 16 and 17 from tube 6. The washer 25 and the collapsed spring 26 are also usually separated from the tube 6 by the jerk of the spring 26.

Tension from the fuse-holder devices will cause still further separation between conductors 4 and 5 and the circuit is opened as is usual in an expulsion fuse. Excessive overload would instantly fuse the conductor 17, similarly to the effect on conductors 7 and 8.

Fig. 7 shows a typical mounting for one of our fuses. The insulators 27, 28 are mounted on the base 29 and support the expulsion tube 32 within which is one of our fuses, thereby completing the circuit between terminals 30, 31. The fusible portion is at 33 and the latch members on the device impose a strain on the fuse within tube 32. When the fuse ruptures, the latch is released so that the tube drops automatically to the position 32'. Similar latch mechanism is shown in Lemmon Patent No. 1,954,634, April 10, 1934.

Without departing from the purpose and spirit of this invention many changes and modifications can be made of the designs now shown. The fuse shown in Figs. 1 and 3, can be made single-ended instead of double-ended; instead of a metal

tube with an insulating block held at the end, as shown in Fig. 3, a fibre tube 34 may be used with a metallic block 35 held by the crimped end of the tube, as shown in Fig. 8. The block or sleeve 11, 12 or 19 within which the small conductor is soldered, may be replaced by a block of low-fusing metal 37 at the center of which is held the small conductor. And still other modifications can be made by one skilled in the art without departing from the purpose of the following claims.

This application is a substitute for abandoned application No. 247,574, filed December 24, 1938.

We claim:

1. In an electric fuse, a tubular container, a heating coil within the container and forming part of the circuit therethrough; an annular insulating ring secured within each end of the container; two metallic blocks within the coil and adjacent, respectively, to the two insulating rings and electrically connected to the said heater coil; a small fusible conductor soldered to each of the said metal blocks, extending through the adjacent said insulating ring and secured to a relatively larger conductor which extends beyond the said container.

2. In an electric fuse, a tubular container, a circuit therethrough, a heating coil within the container and forming a portion of the circuit therethrough, a metallic block within the coil, a small conductor forming a continuation of the heater coil circuit and having one end secured to the block by a fusible joint and extending as a small fusible member beyond the block, and a larger conductor connected to the outer end of the said small fusible member.

3. In an electric fuse, a tubular container, a circuit therethrough, a heating coil within the container and forming part of the circuit therethrough, a metallic block at least partially surrounded by the coil, an annular insulating ring secured within one end of the said container, a small conductor forming a continuation of the heater coil circuit and secured to the said metallic block by a fusible joint and extending through the annular ring to form a small fusible member, together with a larger conducting member secured to the outer end of the said small fusible member.

4. In an electric fuse, a tubular insulating container, a heating coil within the container and forming a part of the circuit therethrough; an annular ring secured within one end of the container; a metal block within the coil; a continuation of the heater coil circuit consisting of a small conductor fusibly connected with the said metal block, passing through the said annular ring and extending beyond the ring as a small fusible member; together with a larger conductor secured to the outer end of the said small fusible member.

5. In an electric fuse, a tubular container, a circuit therethrough, a heater coil within the container and forming a portion of the circuit therethrough, a small conductor held at one end by a fusible connection inside the said heater coil and extending beyond the said coil as a small fusible member, together with a relatively larger conductor secured to the outer end of the said small fusible member.

EDGAR W. GARRISON, JR.  
GEORGE N. LEMMON.