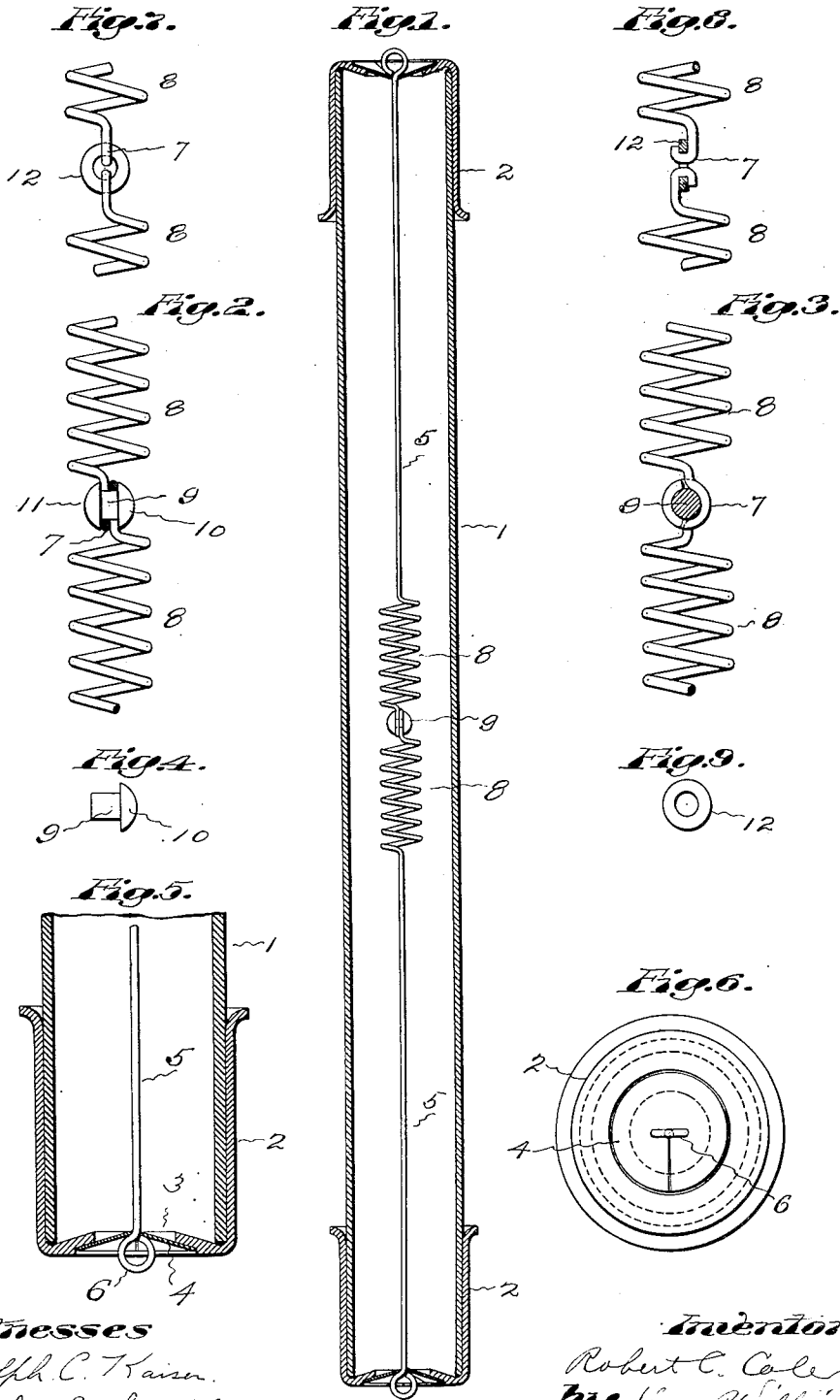


R. C. COLE.
ELECTRIC SAFETY FUSE.
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1,122,478.

Patented Dec. 29, 1914.



Witnesses

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UNITED STATES PATENT OFFICE.

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ELECTRIC SAFETY-FUSE.

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To all whom it may concern:

Be it known that I, ROBERT C. COLE, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented a new and useful Improvement in Electric Safety-Fuses, of which the following is a specification.

This invention relates to the construction of a fuse which is particularly adapted for protecting the conductors and apparatus of telegraph, telephone, signal and similar circuits, in which the amount of current used is relatively small.

The object of the invention is to provide a sensitive fuse of small capacity, which, while simple and inexpensive to manufacture, will be very durable and quite accurate and efficient in action, and will plainly indicate when the fusible element has been disrupted and the conductors separated so as to open the circuit.

Of the accompanying drawings, Figure 1 shows a central longitudinal section of a fuse which embodies this invention. Fig. 2 is a view on larger scale showing a portion of the heat-coil ends of the interior tension conductors which are joined by a rivet made of easily fusible metal. Fig. 3 is a similar view of the parts shown in Fig. 2 turned 90°. Fig. 4 is a view of the easily fusible rivet which is used to join the coiled ends of the interior conductors. Fig. 5 is a longitudinal section on enlarged scale of one end of the fuse. Fig. 6 is a view looking at the end of the fuse. Fig. 7 shows the ends of the conductor heat coils joined by a ring of low melting point metal. Fig. 8 is a similar view of the parts shown in Fig. 7 turned 90°. Fig. 9 shows a view of the easily fusible ring.

The tubular casing 1 of this fuse is made of fiber or other suitable insulating material in the usual way and of approved diameter and length. Fitted on each end of this tube is a metallic ferrule 2. These ferrules, usually made of brass, form the exterior conducting terminals of the fuse and are designed to be engaged with the commonly used clips or contacts to which the terminals of the circuit wires are fastened. The end of each ferrule has a central opening 3 and is desirably made reëntrant about the opening for the reception of a metal disk 4. Each of these disks is perforated for the

passage of the conductor 5 and is slitted so that the conductor, which has an enlarged end 6, may be slipped into the perforation. The conductors 5 are preferably made of German silver wire, although they may be wires of steel or other metal. The inner end of each conductor has a loop 7 and adjacent to the loop is coiled as at 8. These coils serve as heat coils and at the same time act as spiral springs.

The disks at the ends of the fuse are held in place so as to close the openings through the ferrules by the pull of the heat-coil sections of the conductors. The looped inner ends of the conductors may be joined together by means of a rivet 9. This rivet has a head 10 at one end and after it has been thrust through the loops in the conductors, its other end is punched to form a head 11. If desired, the inner ends of the conductors may be connected with a ring 12. The rivet or ring is made of an alloy of metal that melts at a very low temperature, desirably about 212° F. Links formed of conductors with spring heat-coils, joined by rivets or rings in the manner described can be made in large quantities cheaply and with such uniformity that they can be depended upon to operate within very close limits, for the conductors with the spring heat-coils can be made with an absolutely determined electrical and thermal capacity and mechanical pull, and the rivets or rings may be made in large quantities so that every one will have the same strength, conductivity, and degree and time of fusion. Furthermore this method of forming the links insures such a strong and durable connection that there is no liability of mechanical rupture and disconnection of the parts from any cause except that resulting from the heat evolved by the predetermined abnormal rise of current.

The construction described herein is of particular advantage in fuses provided for telegraph lines, such for instance as is the fuse illustrated in the accompanying drawings, wherein the currents used are less than ten amperes, and commonly from one tenth of an ampere to one ampere in quantity. The fuse illustrated is designed to be rated for six tenths of an ampere and to open at eight tenths of an ampere, which means that the rivet or ring must be heated and fuse so that the conductors will pull apart with an increase of only two tenths of an

ampere in the current. The fusible element must, consequently, be made small and of an alloy that will fuse every time at a low temperature, and yet must be strong and durable so as to withstand the strains of ordinary use and the variations of atmospheric conditions. These fuses are easily and cheaply renewed after being blown. The conductors joined together as described and put in the tube with the ferrules at the ends, are engaged with the disks by bending the slitted portions and slipping the ends of the conductors into the central perforations and then bending back the disks. The tension of the coiled portions of the conductors draws the disks into the reentrant ends of the ferrules and holds the parts in place while the link is in normal condition. As these fuses in use are usually arranged vertically, when the rivet or ring is melted by the slight excess of the small current, the heat-coil springs pull the conductors apart, and the lower conductor with its disk drops down and thus plainly indicates that the conductor has been disrupted and that the circuit is open. If the fuse is arranged horizontally, the reaction of the springs as the rivet or ring gives way, tends to thrust out the disks at both ends.

The invention claimed is:

1. A fuse consisting of an insulating casing, metallic ferrules at the ends of the casing, conductors with spring heat-coils in the casing and having their outer ends electrically connected with said ferrules, and a rivet formed of a low melting metallic alloy connecting the inner ends of the conductors.

2. A fuse having an insulating casing, metallic ferrules with perforated reentrant ends fitting the ends of the casing, metallic disks loosely located in said reentrant ends, conductors within the casing, the outer ends of the conductors engaging and holding said disks and the inner ends of the conductors being coiled into the form of spiral springs, and a link of low melting point metallic alloy joining the coiled ends of the conductors.

3. A fuse consisting of an insulating casing, metallic ferrules with openings through their ends, set on the ends of the casing, disks on the exterior of the open ends of the ferrules and closing the openings there-through, and main conductors with their inner ends joined by a fusible rivet and their outer ends engaging and normally holding said disks in place against the ends of the ferrules.

4. A fuse consisting of a casing, metallic ferrules with openings through their ends, fitting the ends of the casing, a main conductor with enlarged outer ends extending through the casing and the ferrules at the ends, sections of said conductor having the form of heat-coils and a section of said conductor between the heat-coils being of low fusing metal, and disks loosely occupying the openings in the end ferrules and normally held there with a yielding force by the enlarged outer ends of said main conductor.

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