

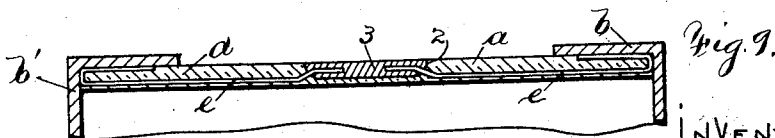
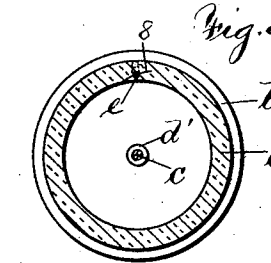
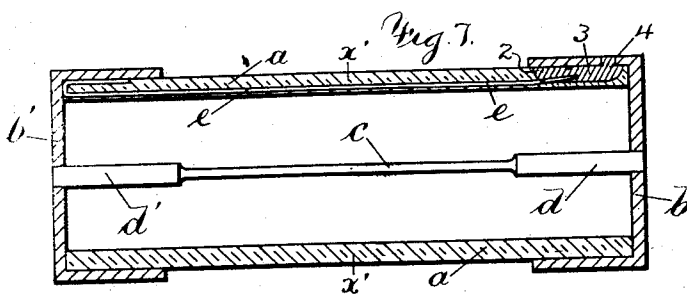
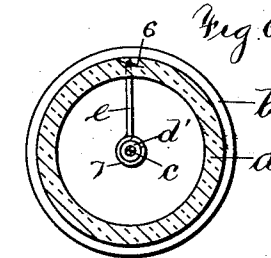
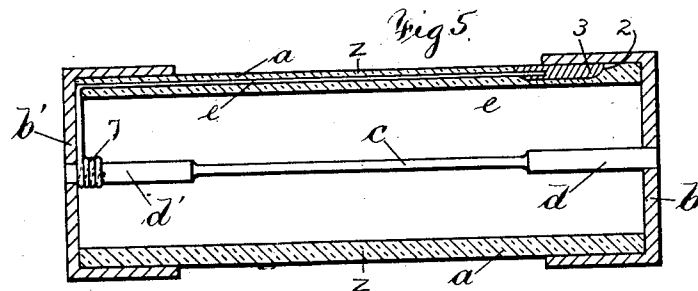
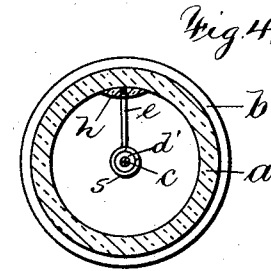
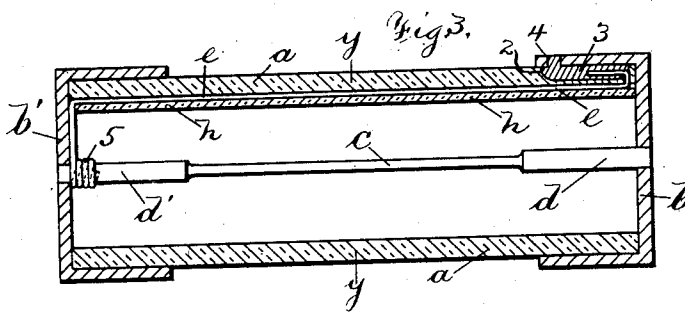
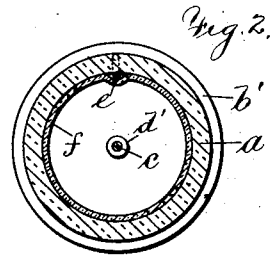
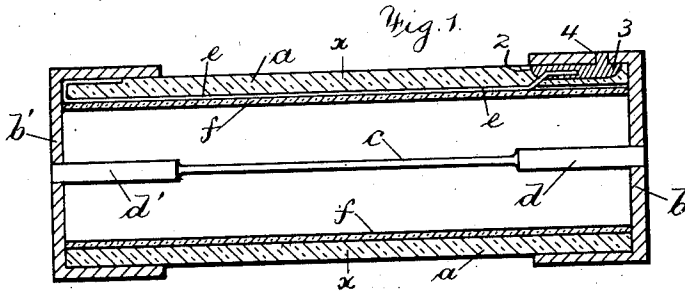
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SAFETY FUSE.

APPLICATION FILED JULY 28, 1906.

914,043.

Patented Mar. 2, 1909.



WITNESSES

Charles Smith

INVENTORS

Gerald W. Hart

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THEIR ATTY

UNITED STATES PATENT OFFICE.

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TO THE SACHS COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF CON-
NECTICUT.

SAFETY-FUSE.

No. 914,043.

Specification of Letters Patent.

Patented March 2, 1909.

Application filed July 28, 1906. Serial No. 328,160.

To all whom it may concern:

Be it known that we, GERALD W. HART and FRANK D. REYNOLDS, both citizens of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented an Improvement in Safety-Fuses, of which the following is a specification.

Our invention relates to safety fuses and particularly to that class of inclosed safety fuses which heretofore have been so constructed as to comprise a tube or casing, a fuse strip, terminals for the same, a conductor wire shunted across the said terminals and an indicating means electrically interposed between one end of the said conductor wire and one of the said terminals. In these safety fuses, the conductor wire has commonly been passed within the tube or casing from its said connection with the indicating means and electrically connected at its other end to the other terminal, the function of the indicating means being to indicate the condition of the fuse strip and this indication is due not to the rupture of the said conductor wire but to the direct action of the current on the said indicating means. The conductor wire in these fuses is therefore unprotected within the tube or casing and we have found by experiment that in the blowing of the fuse strip, the point of rupture of the same being approximately centrally thereof, that the current may be short circuited at the moment the fuse is ruptured through the conductor wire to the terminal at the non-indicating end of the fuse device. This is due to the resistance of the indicating connection and it will be manifest that when such action takes place, the indicating means being unaffected, does not perform its function and there is no way of ascertaining exteriorly thereof, whether or not the fuse strip is blown.

Now the object of our present invention is the provision of an inclosed safety fuse in which the aforesaid short-circuiting of the conductor wire is impossible, and in carrying out the same, we employ a tube or casing, a fuse strip, terminals therefor, an inclosed conductor within the casing and connected at one end to one of the said terminals, and an indicating means electrically interposed between the other end of the said conductor

wire and the other terminal,—as will be hereinafter more particularly described.

In the drawing, Figure 1 is a central longitudinal section of a safety fuse embodying our present invention. Fig. 2 is a section on line *z, z*, Fig. 1. Figs. 3, 5 and 7 are central longitudinal sections of fuse devices illustrating modifications of that form of the invention shown in Fig. 1. Fig. 4 is a cross section on line *y, y*, Fig. 3. Fig. 6 is a cross section on line *z, z*, Fig. 5. Fig. 8 is a cross section on line *x', x'*, Fig. 7, and Fig. 9 is a partial central longitudinal section of the safety fuse illustrating further modifications of the invention.

a designates a casing which, as is common in safety fuse devices, is preferably tubular and made of any good insulating material. The casing *a* is provided with end caps or terminals *b, b'*, and within the casing we employ a fuse strip *c* which is electrically connected to the terminals *b, b'*, by the fuse terminals *d, d'*. The casing *a*, preferably adjacent to one end and in the outer surface thereof, is provided with a longitudinally disposed recess indicated at 2 and within this recess we employ a resistance material 3, such for instance as carbon or graphite or a mixture of either or both of the same with a small quantity of combustible and explosive material, such as gun-powder, and this material preferably completely fills the said recess and forms therein a means for indicating the condition of the fuse strip *c*.

Referring particularly to Figs. 1 and 2, we employ a conductor wire *e* electrically connected at one end with the terminal *b'*. This conductor wire *e* is carried along the inner surface of the casing *a* to a point below the resistance material 3 within the recess 2 and then through a suitable aperture in the casing *a* and has its other end embedded within the said resistance material 3. In this particular form of the invention, the terminal *b* is provided with an aperture indicated at 4 and the terminal *b* is so placed on the casing *a*, that this aperture 4 comes immediately above the recess 2, which when the terminal *b* is placed in position is completely covered thereby, the aperture 4 being also filled with the resistance material 3 which is caused to contact with the said material in the recess 2, whereby this resistance material

forms an indicating contact electrically interposed between one end of the said conductor wire and one of the said terminals and moreover is exteriorly visible at the aperture 4 to indicate the condition of the fuse strip. In this form of the invention we employ a lining *f* within the casing *a* and this lining *f* is preferably made of asbestos paper, but as will be readily understood, it may be made of plaster of paris or varnish or any other good electrical and heat insulating material, in order to prevent the short circuiting of the conductor wire *e* upon the blowing of the fuse.

Referring to Figs. 3 and 4, one end of the conductor wire *e* may be electrically connected to the fuse terminal *d'* as is indicated at 5 and the opposite end of the conductor wire *e* passed through a notch provided therefor in the other end of the casing *a* and into the recess 2 therein and embedded in the insulating material 3 forming the indicating contact, and in this instance, the aperture 4 is placed adjacent to the edge of the terminal, and is also filled with insulating material 3, whereby the indicating contact is visible exteriorly of the terminal. *h* designates a strip of asbestos paper or plaster of paris or other similarly good electrical and heat insulating material passed longitudinally along and secured to the inner surface of the casing *a* and inclosing the said conductor wire *e* in order to prevent the same being short-circuited.

In Figs. 5 and 6, we have shown the casing *a* provided exteriorly with a longitudinal slit indicated at 6 and in this form of the invention the conductor wire *e* is connected at one end with the fuse terminal *d'* at 7 and carried over the edge of the casing *a* into and along in the slit 6 to the recess 2 in the other end of the casing, where the same is embedded in the resistance material 3 forming the indicating contact electrically interposed between the terminal *b* and the said conductor wire *e*. In this instance, the recess is so placed in the casing *a* that when the terminal *b* is in position on the end thereof, the edge of the terminal will not completely overlap said recess 2, whereby a portion of the resistance material 3 is visible exteriorly at the edge of the terminal *b*.

Figs. 7 and 8 illustrate a modification of the invention similar to that shown in Figs. 5 and 6, with the exception that in this instance, the casing is provided with an interior slit indicated at 8 and running longitudinally thereof. In this form, one end of the conductor wire *e* is electrically connected with the terminal *b'*, carried over the edge of the casing *a* and along in the slit 8 through an aperture in the casing *a* and into the recess 2 in the opposite end thereof, where the other end of the said conductor wire *e* is embedded in the resistance ma-

terial 3 forming the indicating means electrically interposed between the terminal *b* and the conductor wire *e* and in this instance, the aperture 4 in the terminal *b* is located in a similar position to that shown in Fig. 1.

Referring to Fig. 9, it will be understood as coming within the nature and spirit of our invention to place the recess 2 approximately centrally in the outer surface of the casing *a*, placing therein the resistance material 3 forming the indicating contact as in the other forms of the invention and employing two conductor wires *e*, one end of each of which is connected to a terminal of the fuse device while the other end is embedded in the resistance material 3 and the intermediate portions are protected against short circuiting the said conductor wires in any of the manners hereinbefore described in the other forms of our invention. And it will be further understood that the indicating contact may be entirely under the ferrule or terminal and visible through the same, or partially under the ferrule and projecting beyond the edge thereof, and that in either of these constructions any of the hereinbefore described forms of protecting the conductor wire may be employed.

We claim as our invention:

1. A safety fuse comprising a one-compartment casing, a fuse strip, terminals therefor, a conductor located between the outer and inner surfaces of the casing, and means co-acting with the said conductor for visually indicating the condition of the fuse strip.

2. A safety fuse comprising a one-compartment casing, a fuse strip, terminals therefor, a conductor located between the outer and inner surfaces of the said casing and connected at one end with one of the said terminals and an indicating means electrically interposed between the other terminal and the other end of the said conductor.

3. A safety fuse comprising a tubular casing, a fuse strip, terminals therefor, a conductor located completely within the tube wall and connected at one end with one of said terminals, and an indicating means electrically interposed between the other terminal and the other end of said conductor.

4. A safety fuse comprising a tubular casing provided with a longitudinal slit in a surface thereof for its entire length, a fuse strip, terminals therefor, a conductor located in said longitudinal slit of the tubular casing and connected at one end to one of said terminals, and an indicating means electrically interposed between the other terminal and the other end of said conductor.

5. A safety fuse comprising a tubular casing provided with a longitudinal slit in the surface thereof for its entire length, a fuse

strip, terminals therefor, a conductor located in said longitudinal slit of the tubular casing, and an indicating means co-acting with the said conductor.

5 6. A safety fuse comprising a tubular casing, a fuse strip, terminals therefor, a conductor located between the outer and inner surfaces of the tubular casing, connected at one end with one of said terminals, and an
10 indicating resistance connection electrically interposed between the other end of said conductor and the other terminal and extending through and visible at the surface of the other terminal.

15 7. A safety fuse comprising a tubular casing in the outer surface of which a recess is provided, a fuse strip, terminals therefor, a conductor located between the outer and inner surfaces of the tubular casing, and
20 connected at one end with one of said terminals, and at the other end entering said recess, and a resistance conducting material filling said recess in the casing and surround-

ing the free end of said conductor and visible exteriorly of the tubular casing. 25

8. A safety fuse comprising a tubular casing in the outer surface of which adjacent to one end a recess is provided, a fuse strip, terminals therefor, a conductor located between the outer and inner surfaces of the
30 tubular casing, and connected at one end with one of said terminals and at its other end extending into said recess, and a resistance conducting material filling said recess in the casing surrounding the free end of
35 the conductor located therein and electrically interposed between the other terminal and the body of the tubular casing and which resistance conducting material is visible at the latter terminal. 40

Signed by us this 6 day of July 1906.

GERALD W. HART.

FRANK D. REYNOLDS.

Witnesses:

R. L. JAYNES,
JOSEPH SACHS.