

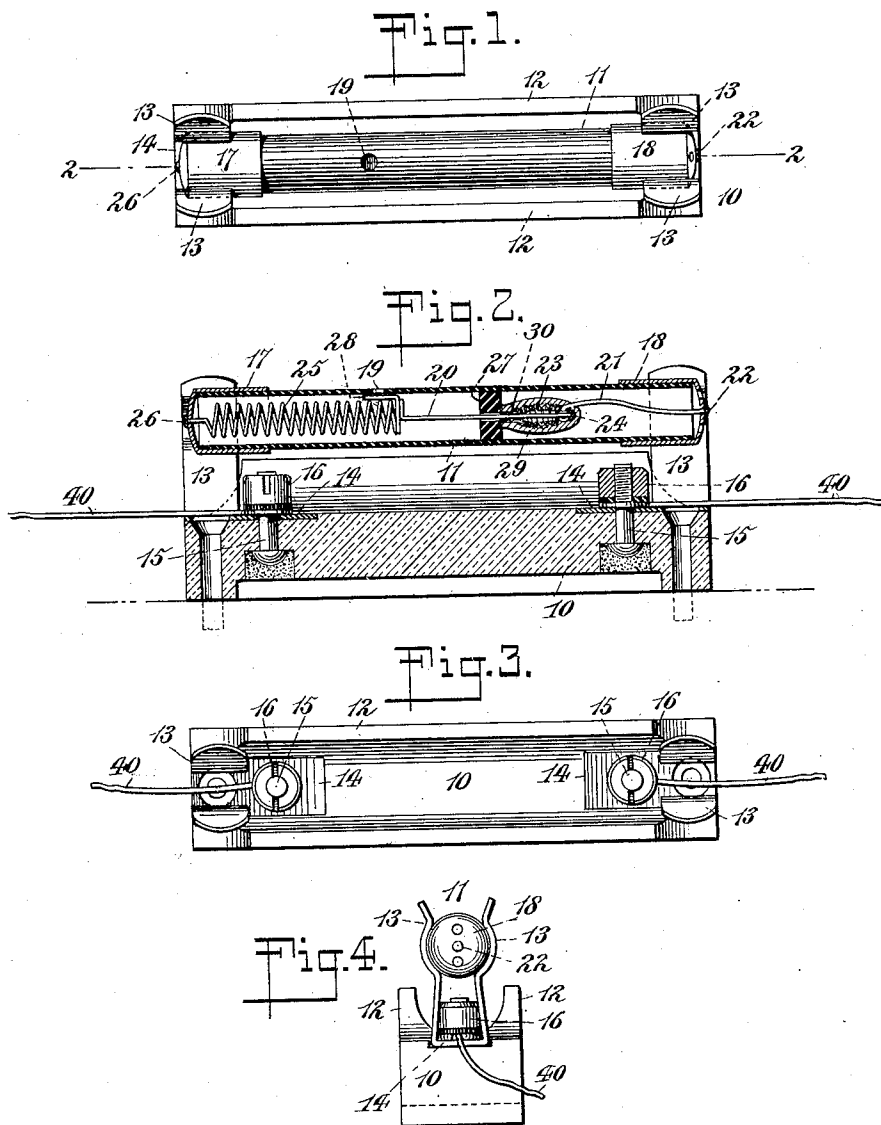
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Patented May 13, 1902.

D. G. BLACK.  
SAFETY FUSE FOR ELECTRIC CIRCUITS.

(Application filed Jan. 3, 1902.)

(No Model.)



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

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## SAFETY-FUSE FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 699,647, dated May 13, 1902.

Application filed January 3, 1902. Serial No. 88,287. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID G. BLACK, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Safety-Fuses for Electric Circuits, of which the following is a specification.

The invention relates to improvements in safety-fuses for electric circuits; and it consists in the novel features and combinations of parts hereinafter described, and particularly pointed out in the claims.

The object of my invention is to produce a more efficient and desirable safety-fuse than those heretofore known to me.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which—

Figure 1 is a top view of the fuse and its holder for application in the electric circuit. Fig. 2 is a central vertical longitudinal section of same on the dotted line 2 2 of Fig. 1. Fig. 3 is a top view of the lower portion of the fuse-holder, and Fig. 4 is an end view of the complete fuse-holder.

In the drawings, 10 designates the lower portion of the fuse-holder, and 11 the upper or removable part thereof and within which the fuse and its connections are placed.

The lower portion 10 of the fuse-holder is adapted to be secured to the board, panel, or other support by means of suitable screws, as usual, and said portion 10 is of elongated form and has its opposite sides (numbered 12 12) extended upward to form between them a trough, as indicated. The lower portion 10 of the fuse-holder is provided at its opposite ends with the metallic clips 13 13, integral with the plates 14 14, which lie upon the upper surface of the portion 10 between the sides 12 12 and are there secured by means of the screws 15 and binding-nuts 16, which are utilized to hold the ends of the main conducting-wires 40 upon said plates 14 in a well-known manner. The clips 13 and plates 14 are in electrical connection with the main conducting-wires 40.

The upper portion 11 of the fuse-holder is in the form of a tube of non-conducting material having at its ends the metallic terminal

caps 17 18, which close the ends of the tube and are adapted to the clips 13, said caps 17 18 being in electrical contact with said clips, and said caps and said tube being in themselves of known construction, with the exception of the spy-hole 19, formed in said tube.

The features distinguishing the present invention are more especially those inclosed within the tubular upper part 11 of the holder, and in Fig. 2 it will be observed that within the tubular portion of the upper part 11 is inclosed a conductor comprising the wire 20 and insulated resistance-wire 21, the wire 21 at its outer end being secured, preferably by solder, at 22, to the cap 18 and at its inner end being wound about the inner end of the wire 20 to form the heat-coil 23 and also being secured by a small amount of solder or easily-fusible metal 24 to the end of the said wire 20.

The wire 20 is throughout a part of its length fashioned into the coiled spring 25 and at its outer end is secured at 26, preferably by a small amount of solder, to the cap 17. The spring 25 is normally in an expanded condition, and from the inner end of the spring 25 the wire 20 extends through an aperture in the plug or partition 27, of non-conducting material, provided within the tubular portion 11 intermediate the heat-coil 23 and said spring 25. Adjacent to the inner end of the spring 25 the wire 20 carries a small plate 28, which when the spring 25 is in its expanded condition will lie below the aperture 19, where it may be observed, the presence of said plate 28 below said aperture 19 indicating that the features within the tubular portion 11 of the fuse-holder are in proper operative condition.

The heat-coil 23 will preferably be inclosed by a casing 29, of non-conducting and non-inflammable substance, such as plaster-of-paris, which will be applied while soft and plastic to the coil 23 and then allowed to harden. The plaster-of-paris or other casing 29 will form substantially an air-tight coating for the heat-coil 23, and the resistance-wire 21 will extend through one end of the same to the point at which said wire is secured to the cap 18, while the other end of said coating or casing will encompass the inner end of the wire 20, about which within said casing 29 may with advantage be applied a

small quantity of asbestos 30, which will afford a smooth yielding bore for the wire 20 and upon the breaking of the circuit will substantially close the opening through which the inner end of the wire 20 will pass upon the retracting of the spring 25, the closing of this hole by the asbestos in the casing 29 preventing a flash or spark from following the end of the wire 20, and hence avoiding any injury which might otherwise be caused by said flash.

In Fig. 2 I illustrate the parts of the fuse and its holder in operative condition, there being a circuit formed from the wire 40 at one end of the holder to the wire 40 at the opposite end thereof. Upon an undue current passing over the main conductors 40 the heat-coil 23 will become heated and the solder 24, by which the inner end of the wire 20 is held, will melt and permit the spring 25 to retract and draw the inner end of the wire 20, then freed, from the heat-coil 23 and casing 29, the inner end of said wire 20 passing into the chamber at the left of the partition 27 and the plate 28 being carried from under the aperture 19. The withdrawal of the inner end of the wire 20 from the heat-coil 23 will of course break the circuit, and the fact that the circuit has been broken will be indicated by the absence of the plate 28 from below the aperture 19. It will thus be seen that the circuit is opened by the softening or weakening of the fusible metal 24, due to the thermal effect of the current in a coil of insulated resistance-wire 21, the softening of said metal 24 permitting the spring 25 to withdraw the conductor 20 from the conducting-wire 21. By means of the invention I prevent or suppress the arc or flash customarily following the opening of the circuit, and this is accomplished in part by the instantaneous and wide separation of the meeting ends of the conductors 20 21, said ends upon separating being within independent chambers of the tube 11. The non-conducting and non-inflammable casing 29 for the heat-coil 23 is of importance in that it will prevent or suppress the flaming of the insulation on the wire of the said coil 23 upon the opening of the circuit.

In the construction and arrangement shown in the drawings the plate 28 by its presence below the hole 19 in the tube 11 indicates visually that the concealed fuse has not operated or opened the circuit; but it is obvious that within the scope of my invention the absence of the plate 28 from below a hole 19 in the tube 11 may be made to denote that the fuse has not operated or that either the presence or absence of said plate below a hole in the tube 11 may be made to denote that the fuse has operated or opened the circuit, this all depending merely on the location of the hole 19, which will be disposed in accordance with the wish of the manufacturer. The plate 28 constitutes simply a colored spot whose appearance at or disappearance from

asuitable hole or opening in the wall of the inclosing casing indicates visually the condition of the fuse and conductor concealed within said casing.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The safety-fuse for electric circuits comprising the inclosing casing subdivided into substantially independent chambers, the conductor 21 in one of said chambers, the conductor 20 mainly in the other of said chambers but extended into the first chamber where it is connected with the conductor 21 by a small quantity of easily-fusible metal, the heat-coil in the conductor 21 adjacent to said fusible metal, and means for withdrawing the conductor 20 entirely within its own chamber upon the softening of said metal; substantially as set forth.

2. A safety-fuse for electric circuits comprising the conductors 20, 21, and a small quantity of easily-fusible metal connecting said conductors, one of said conductors having a heat-coil adjacent to said fusible metal, and the other conductor having the spring for effecting the separation of the conductors upon the softening of said metal, combined with a substantially air-tight coating covering said heat-coil and fusible metal, said coating being composed of non-conducting and non-inflammable substance; substantially as set forth.

3. A safety-fuse for electric circuits comprising the conductors 20, 21, and a small quantity of easily-fusible metal connecting said conductors, one of said conductors having a heat-coil adjacent to said fusible metal, and the other conductor having the spring for effecting the separation of the conductors upon the softening of said metal, combined with the plaster-of-paris coating covering said heat-coil and fusible metal; substantially as set forth.

4. A safety-fuse for electric circuits comprising the conductors 20, 21, and a small quantity of easily-fusible metal connecting said conductors, one of said conductors having a heat-coil adjacent to said fusible metal, and the other conductor having the spring for effecting the separation of the conductors upon the softening of said metal, combined with the substantially air-tight coating covering said heat-coil and fusible metal and having an asbestos lining about the conductor 20; substantially as set forth.

5. A safety-fuse for electric circuits comprising separable conductors normally connected together by a small quantity of metal fusible under the thermal effect of the current, a substantially air-tight coating applied at the point where said conductors are to separate, and means for effecting the separation of said conductors upon the softening of said metal; substantially as set forth.

6. A safety-fuse for electric circuits comprising the inclosing casing and the conductors 20, 21, inclosed within said casing and

normally connected together by a small quantity of fusible metal, one of said conductors having a heat-coil adjacent to said fusible metal, and the other conductor having a  
5 spring for effecting the separation of the conductors upon the softening of said metal, and said casing having a spy-hole, combined with the indicating-plate connected with the movable conductor and visible at the proper time  
10 at said spy-hole to denote the relation of the

said conductors to each other; substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 2d day of January, A. D. 1902.

DAVID G. BLACK.

Witnesses:

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