

(No Model.)

W. E. HARRINGTON.
ELECTRIC FUSE.

No. 581,460.

Patented Apr. 27, 1897.

Fig. 1.

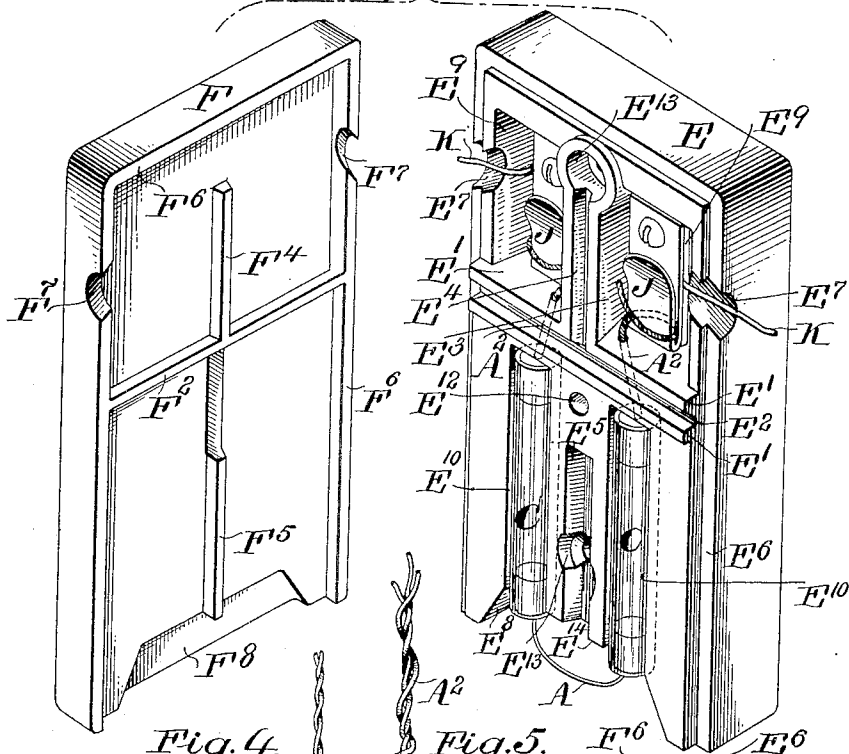


Fig. 4.

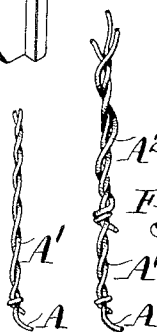


Fig. 5.

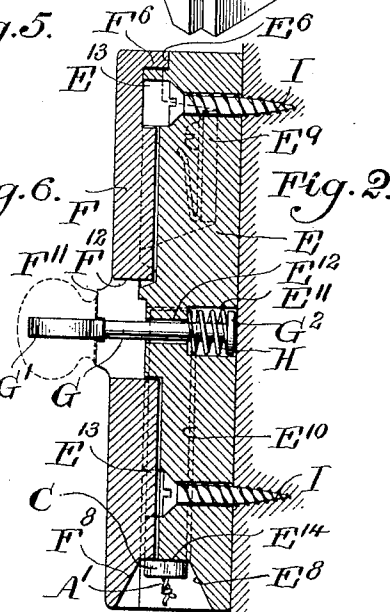
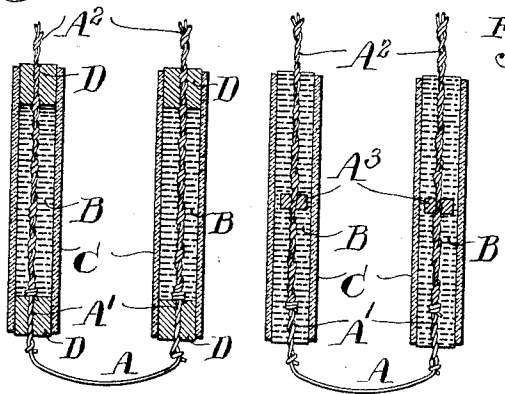


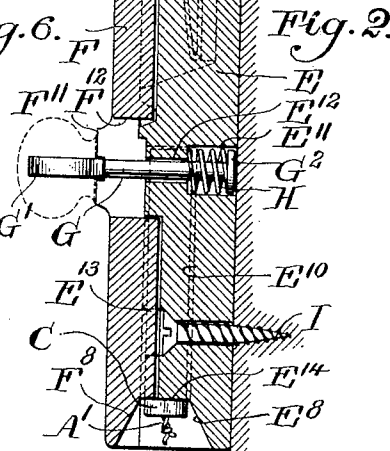
Fig. 3.



WITNESSES:

Henry D. [Signature]
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Fig. 6.



INVENTOR:

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UNITED STATES PATENT OFFICE.

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TO THE CUTTER ELECTRICAL AND MANUFACTURING COMPANY, OF
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ELECTRIC FUSE.

SPECIFICATION forming part of Letters Patent No. 581,460, dated April 27, 1897.

Application filed October 29, 1895. Serial No. 567,248. (No model.)

To all whom it may concern:

Be it known that I, WALTER E. HARRINGTON, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a certain new and useful Improvement in Electric Fuses or Cut-Outs, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to what are known as "electric fuses" or "cut-outs," being devices secured in electric circuits and fusing or burning in the transmission of electric currents of greater amount than the main wires are intended to carry. As heretofore constructed much trouble has occurred owing to the burning or fusion of the terminals by means of which the fuse is connected with the main wires, this burning or fusion of the terminals being due to the fact that in the burning of the fuse the current is not at once interrupted, but is continued through an arc made up largely of metallic vapor from the burning fuse and maintained through considerable distances by the progressive burning of the fuse from the center toward the terminals, such burning continuing back to and actually consuming a portion of the terminals themselves in many cases.

The object of my invention is to provide a fuse the burning or "blowing" of which can and will take place without injury to the terminals of the main wire and generally to improve the construction of the fuse.

The leading feature of my invention consists in making up a fuse with a primary central portion having a cross-section determined by the amount of current it is intended to carry without blowing, and of terminal sections or end pieces of greater cross-section than the primary section and by which connection is made with the terminals of the main wires. By this construction I obviously insure that the burning of the fuse shall begin in its central or primary part and also provide metal which will burn more readily than the main terminals and by the combustion of which the arc is instituted at the first parting of the fuse is maintained, though with increasing resistance. I have also found it

advisable in certain cases to firmly screw to the terminal sections of the fuse metallic buttons which should be situated at some distance from the primary section of the fuse, and which, when the terminal sections have burned back to them, will supply metallic vapor to maintain the arc, but by dissipating the heat, owing to their relatively large masses, gradually check the supply of vapor until the arc is dissipated and the current ceases. The main function of the metallic button is, however, the dissipation of the heat, and therefore its place is filled to a large degree by securing to or around the terminal sections of the fuse masses of any substance which will tend to dissipate the heat and by doing so check the burning of the metal and break the arc. The most efficient materials I have found to be substances which are liquid or semiliquid at a temperature below that at which the terminal sections of the fuse will melt or burn, and which, by reason of this peculiarity, will, as the fuse is burned down into them, close over its end and thus afford a barrier to the passage of the metallic vapor upon which the arc is maintained. Preferably I employ substances which are solid at ordinary temperatures and be fused at a comparatively low point, say 200° Fahrenheit, and among these substances I greatly prefer to employ those which in fusing assume a viscous condition, as material of this kind can best be relied upon to close over the end of the burned fuse and is also less likely to escape. To prevent the escape of such material, I prefer to employ a casing or tube which contains the liquid or liquefiable material and through which the terminal section of the fuse passes, and preferably the ends of this tube or casing are sealed by non-conducting and infusible material.

My invention relates to certain improvements in the block or casing in which the fuse is situated and by which it is connected with the line-wire. These improvements, together with certain details of the construction of the fuse which I have not above specifically referred to, will be best described in connection with the drawings, in which—

Figure 1 represents in perspective the fuse-box and its lid, each part being shown sepa-

ately, a fuse being illustrated in position within the box. Fig. 2 is a central vertical section through the fuse-box, the lid being shown in position. Fig. 3 represents my fuse in its preferred form of construction, Fig. 4 being a section of a fuse embodying the general idea of my invention; Fig. 5, a section of a fuse such as is represented in Fig. 3; and Fig. 6, a view of a complete fuse, illustrating a modification.

A indicates the primary central section of the fuse proper. From each end of this primary section extend terminal sections of greater cross-sectional area. Thus in Fig. 4 a second wire is twisted together with terminals of the wire making up the primary section A to form the terminal section A' of double the area of A, and in Fig. 5 I show a construction in which the portion A' of double the area of the portion A is supplemented by a portion A², having three times the sectional area of A and making up the final terminals of the fuse-wire.

At B, I indicate the enveloping mass of material which I prefer to use in connection with the terminal sections of the fuse, both to dissipate the heat and preferably also to furnish a liquid seal to close over the end of the fuse-section when it is burned down into the surrounding mass. In case of the use of sealing-wax or like material it is evident that it can be melted around the wire with a surrounding jacket or casing, but manifestly the use of a containing-jacket, such as indicated at C, is always preferable, and I have found that sections of glass tubes will answer in a very satisfactory way for such casings, the terminal sections of the fuse being passed through the tubes and the filling material B run into the tubes and allowed to solidify therein. Preferably I seal the ends of the tubes by plugs D of infusible non-conducting material, such as plaster-of-paris. These plugs will prevent the escape of the liquefied material in the tubes, at least until after it has performed its function in breaking the arc, and obviously it would be practicable, when the ends of the tubes are hermetically sealed, to use a filling material B, which is liquid even at normal temperature. By preference I form my fuse with the intermediate sections A', between the primary section A and the terminal sections A², and I cause the mass of material B, relied upon for interrupting the arc, to extend over the joint between A' and A², but not over the joints between A' and the primary section A.

At A³, I have indicated a metallic button secured on the terminal sections of the fuse-wire and surrounded by the liquefiable material B. This construction will, I believe, be found advantageous in dealing with certain currents of high voltage, the buttons A³ not only serving, as does the material B, to dissipate the heat, but furnishing a reservoir of metal which will prevent the burning of the fuse from extending back toward the

main-line terminals and supply metallic vapor to keep up the arc through an appreciable time which will probably be sufficient to insure the breaking of the arc and of the current passing through it.

E indicates the fuse-block, having chambers E⁹ E⁹ for containing the terminals of the main wire and chambers E¹⁰ E¹⁰ for containing the terminal sections of the fuse. The chambers E⁹ are separated from each other by the bridge-wall E³ and from the chambers E¹⁰ by the bridge-wall E', while the chambers E¹⁰ are separated from each other by the bridge-wall E¹¹.

E², E⁴, and E⁵ indicate grooves in the tube of the bridge-walls mentioned, into which fit ridges F², F⁴, and F⁵ of the block-lid F, which also has an edge rib F⁶, which fits down into a depressed seat E⁶ on the edge of the block E.

E⁷ and F⁷ represent registering openings in the block and its lid by which the main-line wires K K enter the chambers E⁹. At the end of the chambers E¹⁰ is formed the flared chamber E⁸, which, together with the flared portion F⁸ of the lid, makes up the "blow-chamber" of the fuse-block.

E¹¹ is a cavity formed in the back of the block E, E¹² being a continuation of smaller diameter. The corresponding portion of the lid F is provided with a raised portion F¹¹, slotted as indicated at F¹². Through the perforation E¹² E¹¹ passes bolt G, having a thumb-head G' at one end and a round head G² at the other. A spring H is situated in the cavity E¹¹ and retained in place by the head G². When the lid is to be placed on the fuse-block, the thumb-head G' is turned to the position indicated in dotted lines in Fig. 6, when it will readily pass through the slot F¹². It is then turned outward until it lies above the platform F¹¹ and turned, as indicated in full lines, so as to rest on the platform on each side of the slot. The two portions E and F of the fuse-block are thus held together by the resilient action of the spring H, which will yield to a sufficient extent in case of any explosive action occurring in the burning of the fuse to prevent material harm.

E¹³ E¹³ indicate screw-holes by which the fuse-block can be secured to a wall through screws I, as indicated in Fig. 6.

J J indicate terminals of the main-line wires to which the terminal sections of the fuse proper are secured also, these terminal sections passing through small perforations in the wall E', as indicated in Fig. 1.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An electric fuse having a central primary section, terminal sections of greater cross-section and masses of non-conducting material arranged to surround portions of each of said terminal sections without inclosing the central primary section.

2. An electric fuse having a central primary section, terminal sections of greater

cross-section, and masses of fusible non-conducting material arranged to surround portions of each of said terminal sections without inclosing the central primary section.

5 3. An electric fuse having a central primary section, and terminal sections of greater cross-section in combination with metallic buttons secured to said terminal sections, and non-conducting material inclosing said
10 buttons and the portions of the terminal sections adjacent thereto.

4. An electric fuse having a primary central section and terminal sections of greater cross-section in combination with tubes B
15 surrounding the terminal sections but not inclosing the central section, and a tube-filling of non-conducting material liquid at temperatures below that at which the terminal sections fuse.

20 5. An electric fuse having a primary central section and terminal sections of greater cross-section in combination with tubes B surrounding the terminal sections but not inclosing the central section and a tube-filling
25 of non-conducting material solid at ordinary temperatures but fusible at temperatures below that at which the terminal sections fuse.

6. An electric fuse having a primary cen-

tral section and terminal sections of greater cross-section in combination with tubes B
30 surrounding the terminal sections but not inclosing the central section and a tube-filling of sealing-wax or equivalent material.

7. An electric fuse having a primary cen-
35 tral section and terminal sections of greater cross-section in combination with tubes B surrounding the terminal sections, but not inclosing the central section, a tube-filling
40 of non-conducting material liquid at temperatures below that at which the terminal sections fuse, and the tube-stoppers D of infusible material.

8. An electric fuse having a primary central section and terminal sections of greater
45 cross-section in combination with tubes B surrounding the terminal sections, but not inclosing the central section, a tube-filling of non-conducting material solid at ordinary
50 temperatures but fusible at temperatures below that at which the terminal sections fuse, and tube-stoppers D of infusible material.

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Witnesses:

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