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A. F. BERRY

ELECTRIC FUSE, HEATING ELEMENT, AND THE LIKE

Filed Aug. 24, 1920

Fig. 1.

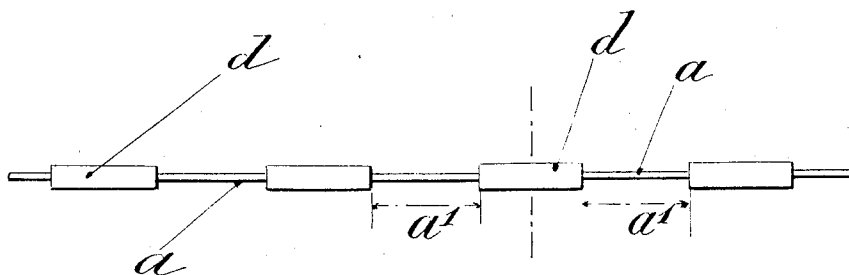
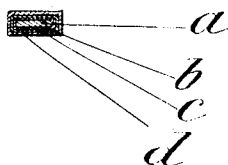


Fig. 2.



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ELECTRIC FUSE, HEATING ELEMENT, AND THE LIKE.

Application filed August 24, 1920. Serial No. 405,586.

To all whom it may concern:

Be it known that I, ARTHUR FRANCIS BERRY, a subject of the King of Great Britain and Ireland, residing at London, England, have invented Improvements in or Relating to Electric Fuses, Heating Elements, and the like, of which the following is a specification.

This invention relates to that class of electrical means wherein regional high temperature or luminosity in a conductor is, for any reason, desired, such as fuses designed to serve as current indicators, heating elements or windings of various apparatus and the like.

In the case of a fuse indicator it is of importance that the section of the high resistance wire should be reduced to as small dimensions as possible in order to reduce the voltage drop and consequently the watts absorbed and heat generated. Reduction of mass of metal furthermore is desirable in order to prevent the establishing and maintenance of an arc due to volatilization of the metal upon a dead short circuit.

These desirable features obtain to a greater degree than heretofore in conductors made according to the present invention which consists in utilizing as a base, high resistance metal of a gauge or cross sectional dimensions as small as is feasible for the purpose of being raised to a high temperature, or to a degree of luminosity, and augmenting, with metal of relatively high conductivity, all but the region or regions that it is required shall become heated to a high temperature or luminosity in use. This augmentation may be effected in any suitable way but appropriately by electro-deposition. The metal, alloy or combination thereof to be employed may be of any kind possessing the requisite characteristics.

In the accompanying drawings, Fig. 1 shows in side elevation and to an enlarged scale, and Fig. 2 in cross section on the line II—II of Fig. 1, how an electric fuse or heating element according to the invention is constructed.

According to this example, a strip *a* of nickel chromium alloy may be used upon which there is first deposited a layer *b* of nickel followed by a layer *c* of copper, this latter being in turn protected by a layer *d* of nickel or the like that will resist oxidation. The deposition of the requisite layer or layers of relatively good conducting

metal or alloy may be effected, as in the example shown, upon a long strip *b* of nickel chromium steel as a whole, to be subsequently cut into the required lengths, steps being taken to mask or apply to the strip *d* at the required regions or portions *a'*, a layer or film of material that will resist deposition.

By means of the invention it is possible very materially to reduce the amount of metal in the fuse as a whole, so that the weight may be reduced to a fraction of the weight of an equivalent fuse as ordinarily constituted.

The reduction in weight of metal furthermore permits of means, such as mica arc-quenching sheets or strips, to be arranged more closely together in relation to the fuse and hence enhance their efficiency in minimizing risk of continuous arcing.

In the case of electrical heaters, the invention may in some instances advantageously be adopted, such as for example, where it is desired to have a winding or element with ends well protected by good conducting metal for carrying current from terminals to the region or regions to be brought to a high temperature.

A fuse indicator, electrical heater, or like device according to the invention, is referred to generically in the claims as an electric heating element, and metal or alloy is also therein referred to generically as metal.

The wire or strip at the region or regions referred to, may be straight coiled, waved or of other desired shape to suit requirement.

What I claim is:—

1. An electrical heating element comprising a conductor formed of a high resistance metal having a high melting point and of a cross sectional area as small as is feasible to secure the desired heating and augmented in thickness with metal of relatively high conductivity except at the region thereof that it is required shall become electrically heated when in use, substantially as described.

2. An electrical heating element comprising a conductor formed of a high resistance metal having a high melting point and metal of relatively high conductivity applied at parts of such conductor to augment the thickness thereof at parts of its length, the cross sectional area of the conductor between its thickened portions being of a cross sectional area as small as is possible to secure

the desired heating of such portion of conductor.

3. An electrical heating element comprising a length of high resistance metal having
5 a high melting point, covered with successive layers of copper and nickel at parts of its length the nickel being outmost, such covered length of metal being separated by an
10 uncovered portion of conductor where the production of heat therein is required, substantially as described.

4. An electrical heating element comprising a length of nickel chromium alloy having upon portions thereof successive layers
15 of copper and nickel, the portion of the length of nickel chromium alloy between portions covered with the layers of copper

and nickel being of as small cross sectional area as is feasible to secure the desired heating thereof when traversed by electric current.
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5. An electrical heating element comprising a strip of nickel chromium alloy upon which there is deposited a layer of nickel followed by a layer of copper in turn protected by a layer of metal that will resist
25 oxidation, such covered strip of nickel chromium alloy being left bare where heating of the strip is required, substantially as described.
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Signed at London, England, this 30 day of July, 1920.

ARTHUR FRANCIS BERRY.