No. 680,968. Patented Aug. 20, 1901.

L. W. DOWNES.

ELECTRIC FUSE OR CUT-OUT.

(Application filed May 2, 1901.)

(No Model.)

Fig. 1.

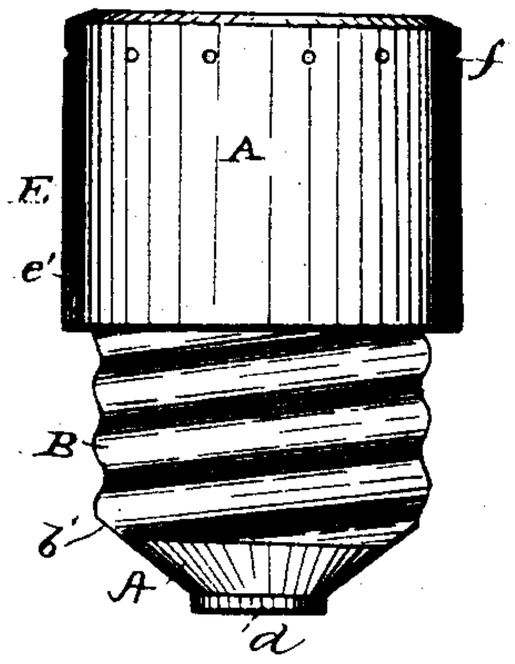


Fig. 2.

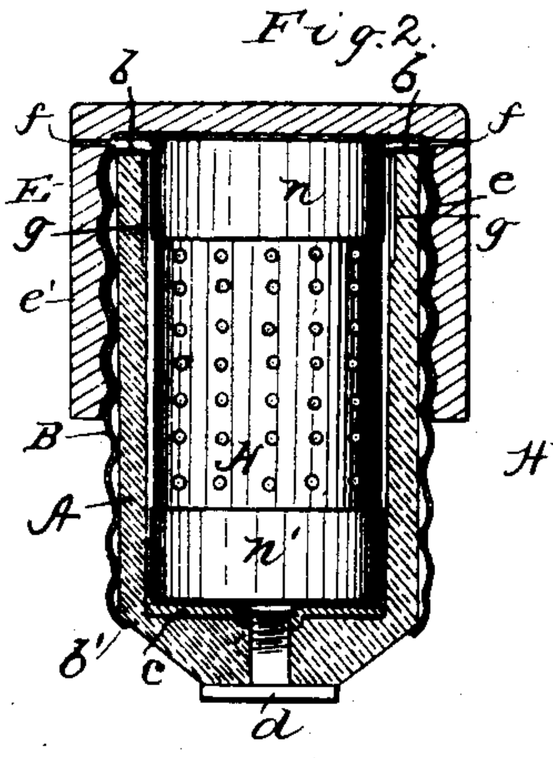


Fig. 3.

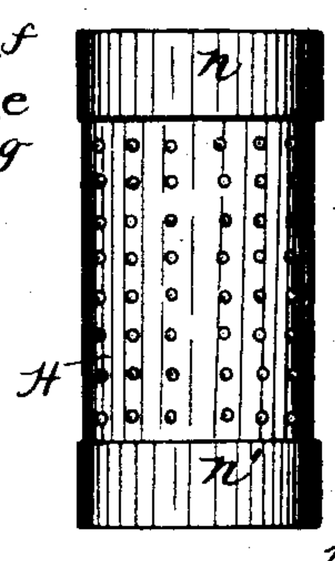


Fig. 4.

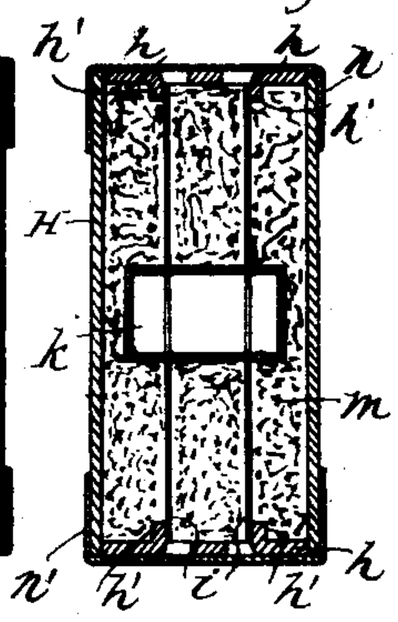


Fig. 7.

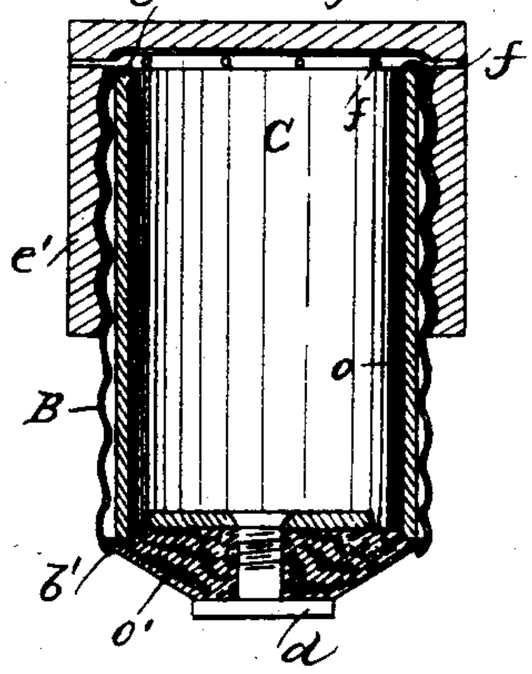


Fig. 8.

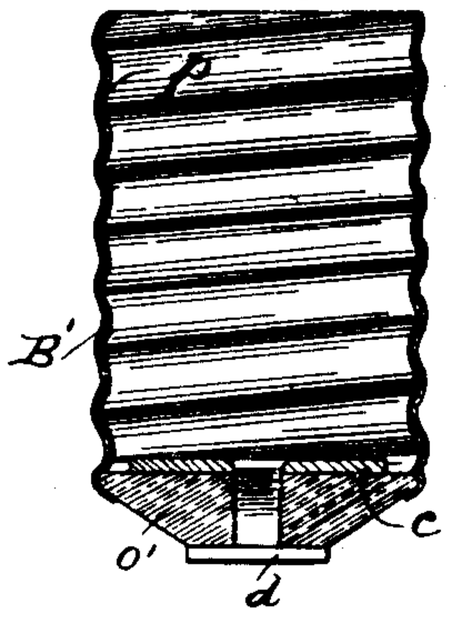


Fig. 9.

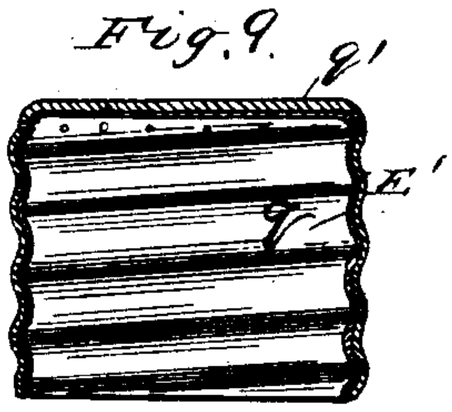


Fig. 5.

Fig. 6.

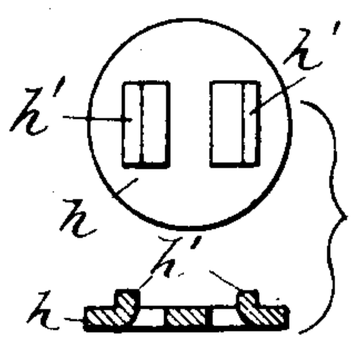


Fig. 10.

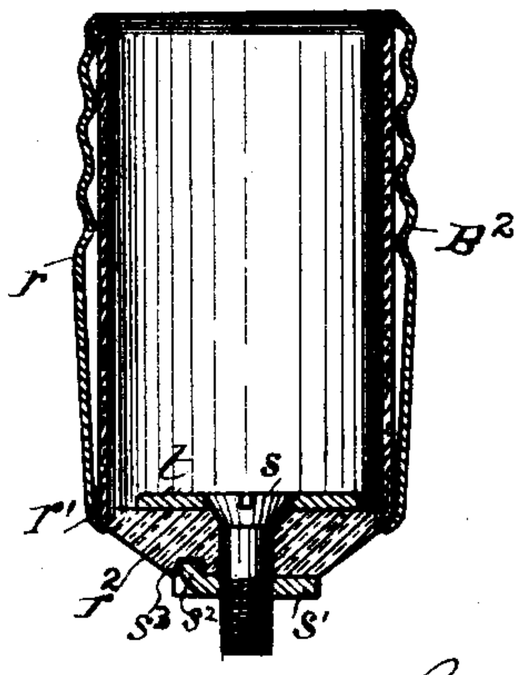
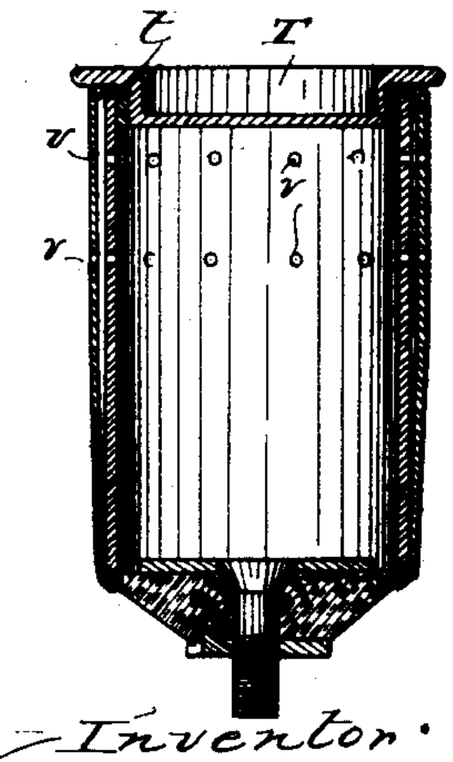


Fig. 11.



Witnesses.

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LOUIS W. DOWNES, OF PROVIDENCE, RHODE ISLAND.

ELECTRIC FUSE OR CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 680,968, dated August 20, 1901.

Application filed May 2, 1901. Serial No. 58,487. (No model.)

To all whom it may concern:

Be it known that I, LOUIS W. DOWNES, a resident of Providence, Rhode Island, have invented a new and useful Improvement in Electric Fuses or Cut-Outs, which invention is fully set forth in the following specification.

The object of this invention is to provide a fuse, particularly of the plug type, adapted for use on circuits carrying electric current of high capacity—say, for example, as high as one hundred amperes—possessing structural compactness and simplicity enabling it to be produced and sold at a comparatively low initial cost and capable of being readily renewed or re-fused at slight expense after it has burned out. Without this last-mentioned qualification the use of high-capacity fuses of this type would be prohibitive, as a repetition of the initial cost every time the fuse burns out would probably involve greater expense than the user could economically incur. My improved fuse comprises an insulating-casing capable of resisting the destructive forces and gases generated upon the burning out of the fuse-link and a drum or sheath removably inserted in the casing and inclosing the fuse-link and its surrounding non-conducting heat-dissipating material. The casing carries suitable external circuit-contacts adapted to engage corresponding contacts when in place in a socket or the like. The drum or sheath has contacts (between which the fuse link or links are connected) adapted to engage corresponding contacts on the interior of the casing, whereby the circuit is completed through the fuse-link.

The invention also embraces special features of construction, all of which will be best understood by reference to the accompanying drawings, illustrating several embodiments of the invention, and wherein—

Figure 1 is an elevation, and Fig. 2 a sectional view, of one embodiment. Fig. 3 is an elevation, and Fig. 4 a sectional view, of the removable drum or sheath inclosing the fuse link or links. Fig. 5 is a detail view of one of the fuse-links, and Fig. 6 is a detail view of one of the plates to which the fuse-links are connected. Figs. 7, 8, 9, 10, and 11 are sectional views of different forms of casings and covers therefor.

Referring to Figs. 1 and 2, the casing is made of a cup-like porcelain part A, surrounded by a sleeve or shell B, of spun brass, rolled to form a screw-thread on its exterior and constituting one of the exterior contacts of the casing. At its opposite extremities sleeve B has inturned flanges *b b'*, the former bearing against the end surface of the porcelain cup at its open end and the latter bearing against the end surface of said cup at its closed end, thereby securing the sleeve and cup together. A metallic plate *c* inside of the cup A and resting against the bottom thereof is held in place by a screw *d*, having a flat head resting against the bottom of the cup A and a screw-threaded shank passing through said bottom and taking into plate *c*. The flat screw-head forming the other contact on the exterior of the casing is thus electrically connected with the plate *c*, which constitutes a contact on the interior of the casing. E is an inverted-cup-like cover for closing the open end of cup A, consisting of a rolled screw-threaded spun-brass shell *e*, (forming one of the internal contacts of the casing,) coated or covered on its exterior with an insulating material *e'*, which should possess a certain amount of resistance to heat, or, in other words, not be readily affected by heat. For this purpose vulcabeston, porcelain enamel, vulcanite, or paper in various forms may be employed, this coating being securely attached to the shell. The interior screw-threads on the shell *e* are adapted to engage and make electrical contact with the screw-threaded sleeve B when the cover is applied to cup A. Perforations *f* through the cover E at intervals about the same constitute vents for the escape of gas generated by the disruption of the fuse. Grooves *g g* along the inner surface of porcelain cup A form passages leading to said vents, thus affording a ready escape for the gas generated upon the disruption of the fuse. As a considerable volume of gas is often generated, it is necessary to thus provide vents through which it may readily escape; otherwise the pressure within the casing would be likely to explode the same.

Referring now particularly to Figs. 3 to 6, H is a perforated drum or sheath, of fibrous material, having circular metallic plates *h h*

fitting in its opposite ends. Each plate *h h* has two upturned lugs *h' h'* formed integral therewith. Two fuse-links *i i*, of fusible metal, extend through the interior of the drum or sheath and are soldered at opposite ends to said lugs *h' h'* on the plates, respectively. At their middle portion the two fuse-links penetrate a small drum *k*, of paper or fibrous material, forming an air-space about the fuse-links. This small drum and the air-space formed thereby may be omitted, if desirable. The interior of drum H about the fuse-links and about the drum *k* is filled with a non-conducting material *m*, preferably in a finely-divided state, (such as slaked lime,) providing a multitude of minute paths or interstices for the escape of the vapor or gas evolved upon the fusing or blowing of the fuse-links by an excessive current. Drum H is closed at its opposite ends by brass caps *n n'*, soldered to plates *h h*, respectively. When the drum is in place in the casing, Fig. 2, cap *n* rests against and makes electrical contact with the brass shell *e*, while cap *n'* rests against and makes electrical contact with plate *c*. The casing being inserted into a socket having circuit-terminals corresponding to those on the exterior of the casing, the circuit is completed through screw *d* to plate *c*, to cap *n'*, plate *h*, through fuse-links *i i*, of any suitable form, to plate *h*, to cap *n*, shell *e*, to sleeve B. Upon the passage of an abnormal and excessive current over the circuit the fuse-links are melted at their narrowest point within the air-drum *k*, thus breaking the circuit. Any gas generated makes its escape through the filling *m* and passes by way of grooves *g* to the vents *f*, as already explained. To renew the fuse, a new drum H is substituted for that wherein the fuse-links have been melted.

The construction illustrated in Fig. 7 differs from that of Figs. 1 and 2 in that for the all-porcelain cup A of the latter figures I have substituted a cup made up of a section of fiber tube *o*, closed at its lower end by a porcelain block *o'*. The flange *b* of shell B, engaging over the upper end of tube *o*, and the flange *b'* of said shell, engaging under block *o'*, secure the tube and block together. The fiber tube may, if desired, be lined with a suitable insulating material, such as mica or thin sheet-asbestos.

In the modification shown in Figs. 8 and 9 the spun-brass shell B', Fig. 8, is lined with an insulating-covering *p*, such as enamel, porcelain, or mica in the form of so-called "micanite." The cover E' consists of a spun-brass screw-threaded shell *q*, covered with an insulating material *q'* similar to those above mentioned.

Fig. 10 illustrates a construction similar to that of Fig. 7 with the following exceptions, to wit: The lower part of shell B^2 instead of being screw-threaded is tapered between the points *r* and *r'*, (to fit a corresponding taper in the socket into which the plug is to be inserted,) and screw *s*, seated in contact-plate *t*, passes outwardly through porcelain block r^2 and a metallic contact-plate *s'*, the latter having lug s^2 projecting into a recess s^3 in the block to prevent turning of the plate *s'* as the screw *s* is turned through it. The projecting lower end of screw *s* is adapted to engage an interiorly-screw-threaded opening of the socket, into which the fuse-casing is adapted to be inserted.

The construction illustrated in Fig. 11 is similar to that of Fig. 10, except that the screw-threads at the upper part of the brass shell are omitted, and cover T has ordinary machine screw-threads adapted to engage similar threads on part *t* of the brass shell which is bent over the upper edge of the fiber tube and depends within the same. Vents *v* through the fiber tube and brass shell permit the escape of gases from within the casing.

What I claim as new is—

1. An electric fuse or cut-out comprising an inclosing casing, external contacts on said casing for engagement with suitable line-terminals, and internal contacts on the casing electrically connected with the external contacts respectively, a fuse-link, an inclosing sheath therefor removably inserted in the casing, contacts on the sheath connected by the fuse-link and adapted to engage the internal contacts on the inclosing casing to complete the circuit through the fuse-link.

2. In an electric fuse or cut-out, an inclosing casing having a removable cap or cover, external contacts on said casing for engagement with suitable line-terminals, and internal contacts on the casing electrically connected with the external contacts respectively, a fuse-link, an inclosing sheath therefor removably inserted in the casing, contacts on the sheath connected by the fuse-link and adapted to engage the internal contacts on the inclosing casing to complete the circuit through the fuse-link.

3. In an electric fuse or cut-out, an inclosing casing comprising a metallic shell or sleeve constituting an external contact, an insulating or non-conducting lining for the sleeve closed at one end, a second external contact on said closed end of the lining, a removable cover for closing the open end of the sleeve, an internal contact on and removable with the cover and adapted to make electrical connection with the metallic shell when the cover is in place, and a second internal contact electrically connected with the second external contact.

4. In an electric fuse or cut-out, an inclosing casing comprising a metallic shell or sleeve constituting an external contact, an insulating or non-conducting lining for the sleeve closed at one end, a second external contact on said closed end, an internal contact electrically connected therewith, a removable metallic cover for closing the open end of the sleeve having an external covering of insulating or non-conducting material

and adapted when in place to electrically engage the metallic shell and form a second internal contact.

5. In an electric fuse or cut-out, an inclosing casing comprising a metallic shell or sleeve constituting an external contact, an insulating or non-conducting lining for the sleeve closed at one end, a second external contact on said closed end of the lining, a removable metallic cover screw-threaded to electrically engage a screw-threaded part of the sleeve for closing the open end of the same, said cover having an external covering of insulating or non-conducting material and forming a second internal contact.

6. In an electric fuse or cut-out, a fuse-link, an inclosing sheath for the fuse-link, contacts on the opposite ends of said sheath between which the fuse-link is connected, a casing in which the sheath containing the fuse-link is removably inclosed said casing comprising a cup-like part having a contact at its closed end against which the contact on one end of the sheath bears and a cover for closing the open end of said cup-like part having a contact thereon bearing against the contact on the other end of the sheath.

7. In an electric fuse or cut-out, an inclosing sheath of insulating or non-conducting material for the fuse-link, metallic caps closing the opposite ends of the sheath and between which the fuse-link is conductively connected, a casing in which the sheath is removably inclosed, said casing comprising a cup-like part and a removable cover for closing the open end of said part, a contact-plate in the closed end of the cup-like part against which the metallic cap at one end of the sheath bears, and a contact-plate on the under side of the cover against which the cap at the other end of the sheath bears, thereby completing the circuit through the fuse.

8. In an electric fuse or cut-out, a fuse-link, a perforated tubular inclosing sheath of non-conducting material, metallic caps closing the opposite ends of the perforated sheath and conductively connected by the fuse-link, a casing in which the sheath is removably inclosed comprising a cup-like part in which the sheath closely fits and a removable cover for closing the open end of said part, a contact-plate in the closed end of the cup-like part against which the metallic cap at one end of the sheath bears, and a contact-plate on the under side of the cover against which the cap at the other end of the sheath bears, thereby completing the circuit through the fuse.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

LOUIS W. DOWNES.

Witnesses:
JOHN HENSHAW,
EDWIN P. ALLEN.