May 10, 1932. J. LAGANDRO 1,858,157

FUSE

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Fig. 1

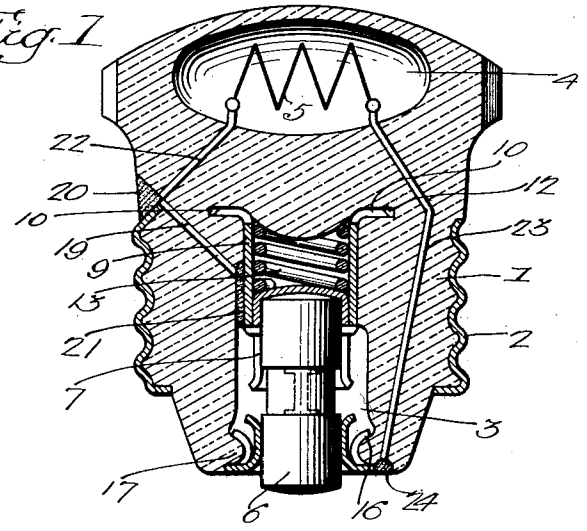


Fig. 3

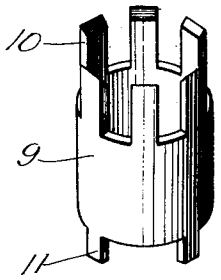


Fig. 2.

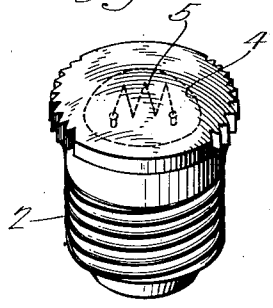


Fig. 4.

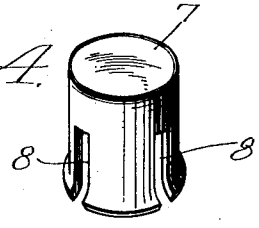
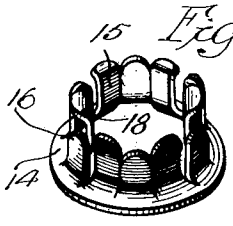


Fig. 5.



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Fig. 6.

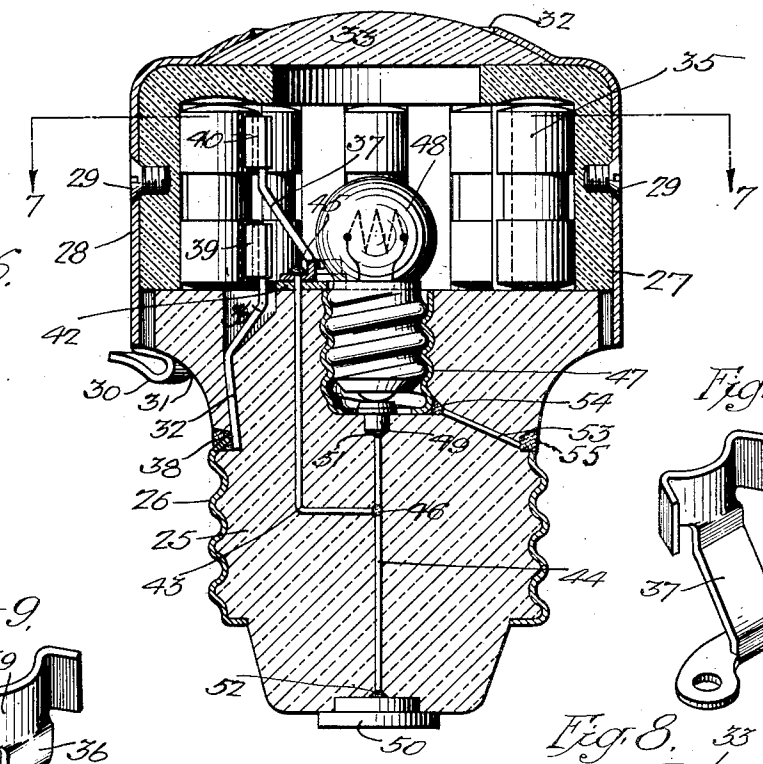


Fig. 10.

Fig. 9.

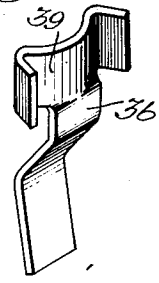


Fig. 8.

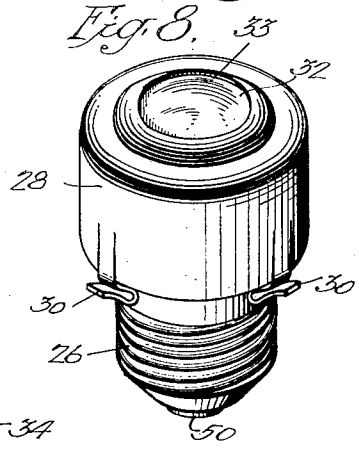
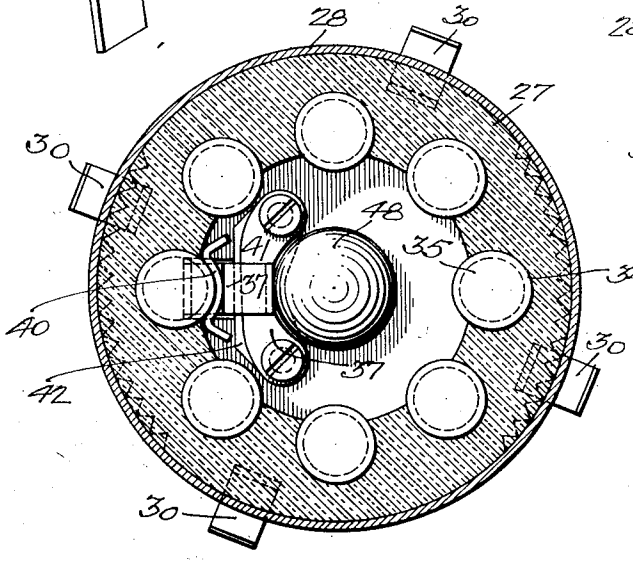


Fig. 7.



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UNITED STATES PATENT OFFICE

JOHN LAGANDRO, OF CAMDEN, NEW JERSEY

FUSE

Application filed December 5, 1930. Serial No. 500,387.

This invention relates to improvements in fuse or thermal cut-out devices, and has particular reference to such devices generally known as plug fuses which are adapted to be screwed into a threaded socket.

The invention has for its primary object the provision of a device of this character which incorporates two main features, viz., the provision of one or more removable cartridge fuses and the provision of means for visually indicating the rupture of the fuse element of a cartridge fuse which is in operative position. With this object in view, the invention contemplates the provision of a device of the nature indicated which is simple in construction, easily and economically manufactured, and which can be used by any inexperienced person or layman.

A more specific object of the invention is the provision of a plug fuse having the above-mentioned features and which is adapted to removably carry a single cartridge fuse.

Another specific object of the invention is to provide a plug fuse of the multiple type also incorporating the above-noted features. In this form of device, a plurality of cartridge fuses are removably carried by a rotatable magazine, by means of which the cartridge fuses may be successively brought into operative relation with a pair of contacts included in the circuit with which the device is associated.

The above and other objects and features of the invention, as well as the details of construction of specific embodiments thereof, will be clearly apparent from the following description and the accompanying drawings.

In the drawings:

Fig. 1 is a sectional view of one form of device constructed in accordance with the invention;

Fig. 2 is a perspective view of the device of Fig. 1;

Figs. 3, 4 and 5 are perspective views of various elements of the device of Fig. 1;

Fig. 6 is a sectional view of a modified form of device constructed in accordance with the invention;

Fig. 7 is a sectional view of the device of Fig. 6 taken along line 7—7;

Fig. 8 is a perspective view of the device of Fig. 6; and

Figs. 9 and 10 are perspective views of the contact spring elements of the device of Fig. 6.

Referring to the drawings, and particularly to Figs. 1 to 5, there is shown a plug fuse device having a body 1 which may be composed of any suitable insulating material, such as glass, porcelain, or the like. The body is formed circumferentially to receive the usual threaded shell 2, which may be of brass or similar suitable conducting material. The body 1 is provided at its rear end with a recess 3, the purpose of which will be brought out in detail hereinafter. The body is preferably molded as a unit and is provided at its front end with a void 4, which houses a filament 5 or other suitable indicating means. As will appear more clearly hereinafter, the purpose of the indicating element is to indicate visually the rupture condition of the fuse associated with the device. It will, therefore, be apparent that the front wall of the void must be of translucent material so that the illumination from element 5 will be clearly visible. If the body is molded as a unit, it would, therefore, be necessary to compose it of translucent material. However, the front wall of the void may take the form of a separate element which may be detachable from the body. Also, the indicating means may take the form of a removable lamp instead of a permanent device.

The purpose of recess 3 in the body is to receive a removable cartridge fuse 6 of well-known construction. To this end, a cup 7 (see Fig. 4) having slots 8 in the wall thereof is resiliently mounted within the recess. A sleeve 9 (see Fig. 3) having extending resilient fingers 10 at one end and tabs 11 at the other end is rigidly attached to body 1. As shown clearly in Fig. 1, fingers 10 of sleeve 9 are adapted to be bent and to extend within a ring shaped opening 12 in the body. The body may be formed with the opening, and member 9 may be attached thereby by forcibly inserting fingers 10 into the opening, causing them to bend. Tabs 11 at the

other end of sleeve 9 are adapted to extend within slots 8 of cup 7, to thereby slidably mount the cup within the sleeve. In assemblying the device, the cup would be operatively associated with the sleeve, and the assembly would then be attached to the body as described. Prior to attaching the assembly to the body, however, a coil spring 13 is inserted within the sleeve so that it will be disposed between the body 1 and the cup 7, as clearly shown in Fig. 1. The purpose of this spring is to exert a constant pressure upon the base of cup 7, to thereby resiliently mount the cup upon the body. As previously stated, the cup is adapted to slide within the sleeve 9 against the action of spring 13.

Cup 7 is of such size and shape that it firmly engages and retains an end of the cartridge fuse when the latter is inserted within the body receptacle. A spring retainer construction is provided by having the lower edge of the cup flared and by virtue of slots 8 previously mentioned. A ring element 14 (see Fig. 5) having a plurality of spring fingers 15 is adapted to be attached to the body, and functions to firmly engage the lower end of the cartridge fuse. This ring element has inner and outer series of spring fingers. The outer fingers 16 are adapted to be bent to engage a bead 17 formed on the wall of recess 3, while the inner fingers 18 are adapted to engage the lower end of the cartridge fuse. It will be apparent, therefore, that fingers 16 serve to firmly attach the ring element to the body, while fingers 18 act as contact springs and to hold the cartridge fuse.

A conductor or wire 19 passes through the body of the device and serves to connect shell 2 with one end of the removable cartridge. This conductor may be soldered to the shell and to the sleeve 9, as indicated at 20 and 21, respectively. Any other suitable means for forming a good electrical connection may, of course, be utilized. As is usual in such devices, the threaded shell forms one terminal of the device and, in the present instance, one end of cartridge 6 is adapted to form the other terminal. It will be apparent that insertion of the device within a socket adapted to receive it will cause the lower end of cartridge 6 to engage the centrally-disposed contact in the socket by virtue of the action of spring 13. It will, therefore, be clear that the cartridge fuse will be connected into the circuit which it is desired to protect.

In further accordance with my invention, I provide means for visually indicating the ruptured condition of the fuse element of the cartridge fuse, as mentioned above. To this end, a conductor 22 extends through the body and has one end connected to shell 2, while its other end is connected to an end of filament 5. A second conductor 23 also extends through the body and has one end connected to the other end of filament 5, while the other end of the said conductor is connected to ring element 14 in any suitable manner, such as by soldering, as indicated at 24. Conductor 22 may, of course, be soldered or otherwise suitably connected to shell 2. It will be clearly apparent that filament 5 is connected in shunt relation to the removable cartridge fuse, and that normally the fuse provides a short-circuit path around the filament. However, upon rupture of the fusible element of the fuse, this short-circuit path is opened and the line current flows through filament 5, thereby heating it to incandescence. The illumination given off by the filament will, of course, indicate the ruptured condition of the fuse, and the device may be removed from its socket and a new cartridge fuse inserted.

In Figs. 6 to 10, I have shown a modified form of device, which is adapted to removably receive a plurality of cartridge fuses. In this form of device, a body 25 is provided which may likewise be formed of any suitable insulating material, such as glass, porcelain or the like. This body is also formed to receive the usual threaded shell 26, which again forms one terminal of the device. A magazine 27, composed of insulating material such as bakelite or hard rubber, is adapted for removable mounting upon body 25. To this end, the magazine is preferably retained within a retaining cap 28 by means of suitable screws 29, or the like. The retaining cap may be composed of metal and is provided with integral inwardly-extending springs 30, which function to firmly hold the cap in place by engaging the curved surface 31 of the body. The upper surface of cap 28 is provided with an opening 32, and this surface is formed in a manner to retain a lens or window element 33, which may be composed of any suitable translucent material, such as glass.

As shown in Fig. 7, the magazine preferably takes the form of a ring having a plurality of circumferentially arranged recesses 34 in the inner wall thereof. These recesses are each circular in shape and are adapted to receive cartridge fuses 35. As will be more clearly understood later, the magazine is adapted to rotate upon the body to thereby bring the cartridge fuses successively into operative position. A pair of contact springs 36 and 37 are carried by the body so as to be disposed vertically within the magazine. These contact springs are shown clearly in Figs. 9 and 10. Spring 36 has its lower portion extended within the body 25 and connected electrically, by means of solder 38 or the like, to shell 26. Spring 36 is provided with a head contact portion 39, while spring 37 comprises a like contact portion 40 and an attaching foot portion 41 having holes therein for the reception of attaching screws or the like. As shown in Fig. 6, spring 37 is

mounted upon body 25 by means of its attaching foot portion. This portion may be mounted upon a suitable fibre supporting plate 42, which may be attached to body 25 by the screws which attach the spring to the body 25. The contact springs are so disposed within the magazine that their contact portions are vertically disposed, one above the other, and are adapted to firmly engage the ends of the cartridge fuse which happens to be in operative position.

Spring 37 is connected by means of conductor 43, which extends through the body, to a conductor 44 also extending through the body. The necessary connections may be made by means of solder joints 45 and 46, or other suitable means. The upper end of conductor 43 may pass through openings in plate 42 and foot 41. The upper portion of body 25 is recessed and formed to receive a shell insert 47, which constitutes a socket for an indicating lamp 48. The wall of the insert comprises one terminal, as is customary, while a second terminal 49 is provided in the base of the socket, and is adapted to be contacted by the lower tip of the lamp as well understood. Terminal 49 is, of course, insulated from the remainder of the socket insert by means of a suitable insulating bushing or the like. One end of conductor 44 is connected to terminal 49, while the other end of the conductor is connected to a terminal 50 carried by body 25 at the lower end thereof. These connections may again be made by suitable solder joints 51 and 52. The wall of insert 47 is connected by means of conductor 53 to shell 26 by means of suitable joints 54 and 55. This conductor also passes through the body of the device .

It will be apparent that the cartridge fuse, which is in operative position at any particular time and contact springs 36 and 37, as previously described, are included in the circuit with which the device is associated by virtue of the connections between the shell 26 and terminal 50. It will also be apparent that lamp 48 is connected in shunt relation with the said cartridge fuse in the circuit. Here again, then, the cartridge fuse provides a short-circuit path about the indicating lamp until the fuse element of the fuse becomes ruptured. Then, the short-circuit path is opened and current flows through the lamp, causing it to indicate the ruptured condition of the fuse. At such time, the magazine may be rotated upon the body to disengage the blown fuse from contact springs 36 and 37 and to bring the succeeding fuse into operative contact with the contact springs. By virtue of the construction of these springs, the engaging and disengaging of the cartridge fuses therewith is in the nature of a snap action. In other words, the springs offer resistance to the turning of the magazine to disengage one fuse and to engage another.

After the cartridge fuses in the magazine have all become ruptured, the magazine may be removed forcibly disengaging it from the body against the action of springs 30. The ruptured fuses may then be removed and the magazine refilled with the proper number of fresh fuses. It will also be apparent that if the indicating lamp should burn out or become inoperative, it may be replaced by another merely by removing the magazine as indicated above. While I have shown the magazine as designed to accommodate eight cartridge fuses, it will be apparent that it may be designed to accommodate any desired number of such fuses.

From the preceding description and the accompanying illustration, it will be appreciated that my invention provides a simple and compact device which may be readily used by any inexperienced person or layman. While the devices as disclosed herein are provided with specific details, it is to be understood that they are for the purpose of illustration only and that the invention is not to be limited thereby. Various changes in the constructional details may be made without departing from the spirit or scope of the invention.

I claim:

1. A plug fuse device comprising a body having threaded shell and tip contact terminals, means carried by said body and connected across said terminals for visually indicating the rupture of a fusible element, and a cartridge fuse removably carried by said body and connected across said terminals, thereby normally short circuiting said means.

2. A plug fuse device comprising a body having a recess at the rear end thereof, a fuse adapted to be inserted in said recess with one end protruding therefrom to serve as a contact for said device, means in said recess for removably supporting said fuse in operative position, and electrical means connected in shunt with said fuse for visually indicating the rupture of the fusible element of said fuse.

3. A plug fuse device comprising a body having a recess at the rear end thereof, a cartridge fuse adapted to be longitudinally inserted in said recess with one end protuding therefrom to serve as a contact for said device, means in said recess for removably supporting said cartridge fuse in operative position, and electrical means connected in shunt with said fuse for visually indicating the rupture of the fusible element of said cartridge fuse.

4. A plug fuse device comprising a body, a rotatable magazine removably carried by said body, a plurality of cartridge fuses removably carried by said magazine, and a pair of contact springs carried by said body,

whereby said cartridge fuses may be brought successively into operative engagement with said contact springs.

5. A plug fuse device comprising a body carrying threaded shell and tip contacts, fuse rupture indicating means connected across said contacts, and a plurality of fuses selectively connectible across said contacts, a selected fuse normally short circuiting said indicating means.

6. A plug fuse device comprising a body, a rotatable magazine removably carried by said body, a plurality of removable cartridge fuses circumferentially carried by said magazine, a pair of contact springs carried by said body, whereby said cartridge fuses may be brought successively into operative engagement with said contact springs, and means carried by said body for visually indicating the rupture of the fuse element of the operative cartridge fuse.

7. A plug fuse device comprising a body, a rotatable magazine removably carried by said body, a plurality of removable cartridge fuses circumferentially carried by said magazine, a pair of contact springs carried by said body, whereby said cartridge fuses may be brought successively into operative engagement with said contact springs, and means carried by said body for visually indicating the rupture of the fuse element of the operative cartridge fuse, said means comprising a removable indicating lamp surrounded by said cartridge fuses.

JOHN LAGANDRO.