March 22, 1932. R. C. SMALLEY 1,850,813

FUSE

Original Filed Jan. 18, 1926

Fig. 1

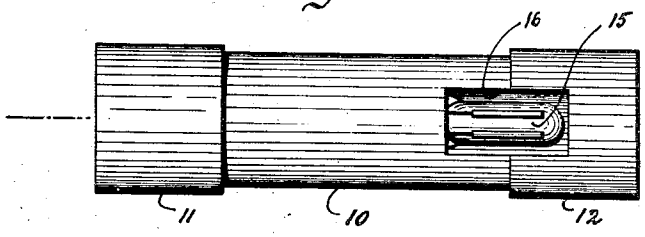
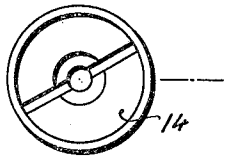


Fig. 2



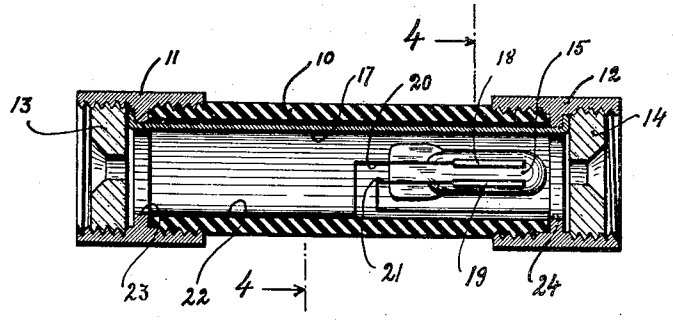


Fig. 3.

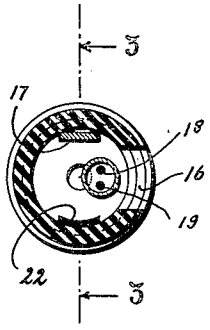


Fig. 4

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UNITED STATES PATENT OFFICE

ROBERT C. SMALLEY, OF ARLINGTON, NEW JERSEY, ASSIGNOR TO CLAUDE NEON LIGHTS, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

FUSE

Application filed January 18, 1926, Serial No. 81,909. Renewed March 31, 1930.

My invention relates to a fuse capable, upon the rupture of the fusible element thereof, of giving or emitting a visible signal or indication.

As is well known, the fusible element of a cut-out must necessarily be enclosed with the result that much difficulty is encountered in ascertaining whether or not the fusible element is ruptured. This is particularly true where a plurality of fuse units are employed in a series of related circuits, as is generally the case, for the reason that each fuse must be removed and the circuit tested. It is therefore an exceedingly troublesome, time consuming and even dangerous practice because the blown fuse must not only be located but repaired or replaced usually in the dark.

One of the more important features of my invention consists in effectively overcoming or obviating, among other things, the difficulties above mentioned and to that end I construct the fuse itself along entirely new lines by providing within the casing thereof a miniature glow lamp containing a mixture of inert gases which pass electric currents between electrodes having a relatively low potential difference, the electrodes of which are in series with a leak resistance, both the lamp and the leak resistance being in series with the conducting terminals of the fuse, but mounted in parallel so far as the fusible element is concerned. This mixture of gases will hereinafter be referred to as a low potential mixture. The interior of the fuse is hollow to receive the lamp and the shell is provided with a port or light emitting opening opposite the lamp to render the latter visible. This opening, if desired, may be covered by any suitable transparent or translucent means.

Other objects, advantages and features of construction will more fully hereinafter appear from the detailed description of my invention below taken in connection with the accompanying drawings in which:

Fig. 1 is a perspective view of a fuse illustrating one embodiment of my invention;

Fig. 2 is an end view of the fuse;

Fig. 3 is a longitudinal central section of the fuse illustrated in Fig. 1; and

Fig. 4 is a section on the line 4—4 of Fig. 3.

Referring to the drawings in detail the reference numeral 10 designates the fibre shell or casing of a fuse of the cartridge type, and the numerals 11 and 12 the terminals thereof preferably screw-threaded to the shell 10. The reference numerals 13 and 14 designate the clamping nuts for the fuse having external screw-threads to engage corresponding threads on the terminals 13 and 14. Within the confines of the shell is located a glow lamp 15 containing a low potential mixture of inert gases. It is mounted so as to be visible through an opening 16 located in the wall of the shell.

To the fuse terminals 11 and 12 the fusible element 17 is electrically connected. The lamp is provided therewithin with spaced electrodes 18 and 19 and leading-in wires respectively 20 and 21. The leading-in wire 21 of the lamp is connected directly to the terminal 12 of the fuse and the leading-in wire 20 is connected to one end of a leak resistance 22 the other end of the latter being connected to the terminal 11 of the fuse. In the form shown it will be noted that the fusible element 17 is arranged in parallel with the leak resistance 22, the leading-in wires of the lamp and the electrodes of the lamp. It will also be seen that the leading-in wires of the lamp, the electrodes of the lamp and the leak resistance are in series with the terminals of the fuse. It will therefore be seen that if the fusible element 17 is disrupted or blown a small quantity of the current will pass through the lamp causing it to glow and then indicate the destroyed condition of the fuse. The leak resistance may be made of any suitable material such as paper having a coating of graphite or calcium carbonate or bakelite.

A miniature lamp filled, as it is, with a low potential mixture of inert gases will serve the purposes herein intended irrespective of the voltage which can be readily regulated by a suitable increase or decrease in the resistance.

The terminals 11 and 12 are provided re-

spectively with interior shoulders 23 and 24 respectively. The inner sides of these shoulders are adapted to abut the ends of the shell 10. Between the shoulder 23 and the end of the shell 10 contiguous thereto, the free end of the leak resistance 22 is clamped, and between the shoulder 24 and the end of the shell 10 contiguous thereto the free end of the leading-in wire 21 is clamped. The ends of the fusible element 17 are clamped by means of the nuts 13 and 14 against the outer faces of the shoulders 23 and 24. The leading-in wires are preferably made rigid enough to resiliently support the lamp free from the walls of the shell 10. This can readily be done because of the fact that the lamp is very small.

The inert gas preferably employed comprises neon combined with a relatively small amount of argon. In the manufacture of the lamps any suitable gas or other substance is added for the purpose of purifying the inert gases. The relatively small amount of current required to render the lamp luminous enables me to use a very high resistance so that in the normal operation of the fuse no current can pass through this resistance, and, so far as I am aware, this is not true with any other fuses. Furthermore, the electric power required to operate the lamp herein illustrated and described is approximately .02 of a watt, and when operated gives the characteristic neon red light. Ordinary lamps arranged in parallel in an electric circuit will not permit of more than fifty per cent variation in the voltage whereas the lamp herein illustrated and described, operates on any voltage above a certain minimum amount. With an ordinary lamp used for a similar purpose it is well known that the resistance must be of a suitable current carrying capacity whereas with my invention the current consumed is practically nil.

From the foregoing it will be seen that I have devised a fuse which adds very little to the cost of the ordinary fuse but which is capable of giving a visible indication when the fuse is blown. In the preferred form the indicating means are located on the interior of the fuse thus enabling the fuse to be employed in any and all relations in which the ordinary fuse is used. It will be readily apparent that the device may be employed with any type of fuse and also in conjunction with thermal cut-outs; also in conjunction with those fuses and cut-outs in which the fusible element is renewable.

I have illustrated and described herein the preferred embodiment of my invention but it is to be expressly understood that I do not limit myself to the exact construction shown and described as many changes may be made in points of detail and other embodiments resorted to without deviating from the true spirit and scope of my invention.

What I claim is:

1. A fuse comprising a shell, terminals located upon the ends of said shell, a fusible element connected at its ends to said terminals, a glow lamp containing a low potential mixture of inert gases in said fuse, and a leak resistance, said lamp and leak resistance being located independently of said fuse but in series with said terminals.

2. A fuse unit comprising a lamp containing a low potential mixture of inert gases, terminals for said fuse unit, a fusible element connected to said terminals, and a leak resistance in parallel with said fusible element but in series with said terminals and with said lamp.

3. A fuse unit comprising a lamp containing a low potential mixture of inert gases, terminals for said fuse, a fusible element connecting said terminals, and independent means for electrically connecting said lamp with said terminals including a leak resistance.

4. A fuse unit comprising a lamp within the fuse containing a low potential mixture of inert gases, terminals for said fuse unit, a fusible element connected to said terminals, and independent means in parallel with said fusible element for connecting the lamp in series with said terminals.

5. A fuse unit comprising a lamp containing a low potenial mixture of inert gases and provided with internal electrodes, terminals for said fuse, a fusible element connecting the terminals of the fuse, and means including a leak resistance for connecting the lamp in series with the terminals and in shunt with said fusible element.

6. As an article of manufacture a fuse unit comprising a lamp located within said fuse and containing a low potential mixture of inert gases, the said lamp being arranged to receive current from the terminals of the fuse.

7. As an article of manufacture a fuse unit having an opening through its wall, and a lamp in said fuse visible through said opening and containing a low potential mixture of inert gases, the said lamp being arranged to receive current from the fuse terminals.

8. As an article of manufacture of fuse unit comprising a low potential lamp having internal electrodes and located within said fuse, terminals for said fuse unit, a fusible element connected to said terminals, and independent means for electrically connecting the electrodes of said lamp to said terminals.

9. As an article of manufacture a fuse comprising a lamp visibly located within said fsue and containing a low potential mixture of inert gases, the said lamp being arranged to receive current from the fuse terminals.

10. As an article of manufacture a fuse unit having a light emitting opening in the wall thereof, a low potential lamp having internal electrodes located within said fuse op-

posite said opening, terminals for said fuse unit, a fusible element connected to said terminals, and independent means for electrically connecting the electrodes of said lamp to said terminals.

11. A fuse unit comprising a gaseous discharge lamp within the fuse containing neon and argon, terminals for said fuse unit, a fusible element connected to said terminals, and independent means in parallel with said fusible element for connecting the lamp in series with said terminals.

12. A fuse unit having a light emitting opening in the wall thereof, a luminescent gaseous discharge tube containing neon and argon and having internal electrodes, the said tube being located within said fuse opposite said opening, terminals for said fuse unit, a fusible element connected to said terminals and independent means for electrically connecting the electrodes of said lamp to said terminals.

13. A fuse unit comprising in combination a cylindrical hollow shell having threaded end portions, threaded end caps engaging the said threaded end portions, each cap having an internal annular shoulder adapted to engage the corresponding end of the shell, a fusible element, threaded clamping nuts securing said element between said nuts and the said internal annular shoulders, a leak resistance and a lead wire secured respectively between respective ends of the shell and the said internal annular shoulders, a miniature lamp positioned within the shell and containing neon and electrodes, connections between the electrodes and the said leak resistance and lead wire, respectively, and a window in the said shell adapted to transmit light emitted by the lamp.

In testimony whereof, I have hereunto set my hand this 16 day of January, 1926.

ROBERT C. SMALLEY.