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L. B. BUCHANAN.

INDICATING DEVICE FOR ELECTRIC FUSES OR CUT-OUTS.

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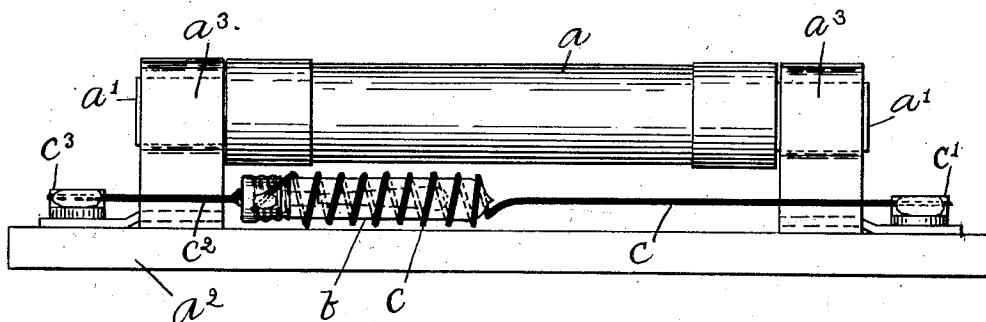


Fig. 1.

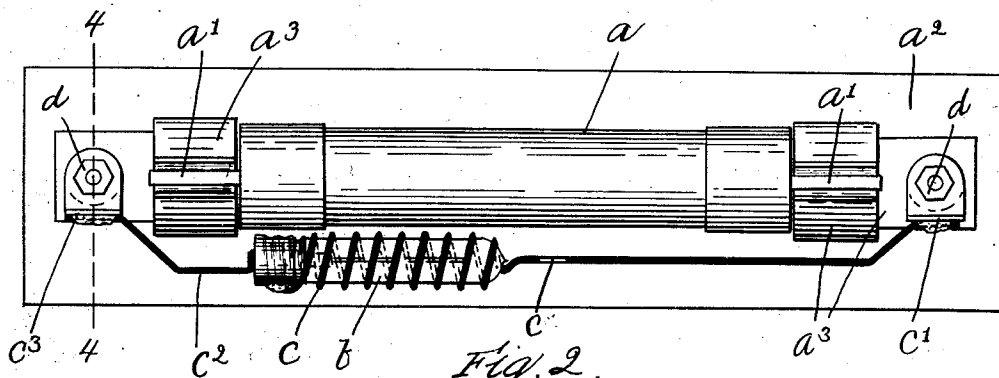


Fig. 2.

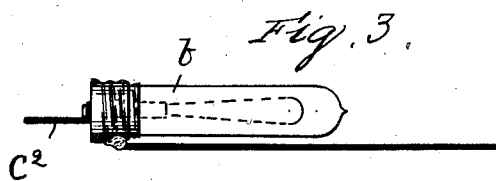


Fig. 3.

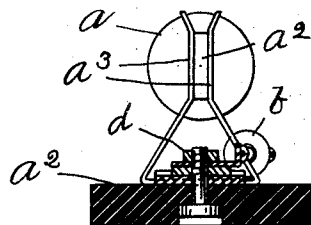


Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## INDICATING DEVICE FOR ELECTRIC FUSES OR CUT-OUTS.

No. 852,539.

Specification of Letters Patent.

Patented May 7, 1907.

Application filed December 17, 1906. Serial No. 348,328.

*To all whom it may concern:*

Be it known that I, LEONARD B. BUCHANAN, of Woburn, county of Middlesex, State of Massachusetts, have invented an Improvement in Indicating Devices for Electric Fuses or Cut-Outs, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to indicating-devices for electric fuses or cut-outs adapted to visually indicate the disrupted condition of the fuse-wire, and has for its object to construct a permanent indicating-device for the fuse or cut-out, which, when operated to indicate the disrupted condition of the fuse or cut-out will not become disarranged and thereby prevented from being again operated, as occasion may require; also, to connect the indicating-device in a high resistance shunt circuit around the fuse or cut-out, so that normally the current is caused to pass through the fuse or cut-out, but in case the fuse-wire is disrupted the current will pass over the shunt circuit and cause the indicating-device to operate; also, to connect the indicating device with the terminals on the fuse base, to which the fuse or cut-out is connected, thereby providing a permanent connection for the indicating device and enabling the fuse or cut-out to be replaced whenever desired, without disturbing the indicating-device or its mechanical or electrical connections.

The indicating device consists essentially of an electric lamp, as for example, a miniature electric lamp of any required voltage, although so far as connecting the indicating-device with the terminals on the fuse base is concerned, my invention is not limited to the employment of an electric lamp as an indicating-device. When using a miniature electric lamp as the indicating-device, a resistance coil or some form of resistance will be employed, which is connected in series with the lamp, or if desired more than one lamp may be employed, and in such case the amount of resistance required will be correspondingly reduced or possibly eliminated.

Figure 1 shows in side view an electric fuse or cut-out and an indicating-device embodying this invention for indicating the disrupted condition of the fuse wire. Fig. 2 is a plan view of the fuse or cut-out and indi-

cating-device shown in Fig. 1. Fig. 3 is a detail of the indicating-device. Fig. 4 is a cross-section of the fuse or cut-out shown in Fig. 2 taken on the dotted line 4-4.

$a$  represents an electric fuse or cut-out, which, so far as this invention is concerned may be of any well known or suitable construction, the form herein shown being of the well-known cartridge type.

$a'$ ,  $a'$  represent the terminals of the fuse or cut-out which are made as blades.

$a^2$  represents the base and  $a^3$ ,  $a^3$  the terminals thereon which are constructed and arranged to receive the terminals of the fuse or cut-out. The terminals  $a^3$ ,  $a^3$  provide for supporting the fuse or cut-out and also for electrically connecting it with the circuit.

$b$  represents a miniature electric lamp, which, as herein shown forms the essential element of the indicating-device. This lamp is of the usual incandescent variety having a glass bulb containing a filament in vacuum.

$c$  represents a resistance coil, which may or may not be required, depending upon the voltage of the lamp or the number of lamps employed, and in lieu thereof any other well-known form of resistance may be employed. The coil  $c$  is connected at one end to the lamp and at the other end with a terminal  $c'$ , and a wire  $c^2$  is also connected to the lamp which is connected with a terminal  $c^3$ , hence the lamp and resistance-device are connected in series between the terminals  $c'$  and  $c^3$ . The terminals  $c'$  and  $c^3$  of the indicating-device are preferably respectively connected to the terminals  $a^2$ ,  $a^3$ , of the base, and when thus connected the indicating-device is included in a shunt circuit around the fuse or cut-out. The wire  $c^2$  and the wire composing the resistance device are both covered with insulating material, and they are so arranged that they cannot carry the current across the fuse terminals when the fuse is blown. The terminal plates  $c'$ ,  $c^3$  are attached to or held in engagement with the terminals  $a^2$ ,  $a^3$ , by nuts  $d$ , but they may be otherwise connected therewith. As a simple means of supporting the lamp the resistance coil  $c$  is wound spirally around it, but it is obvious that said lamp may be otherwise supported.

The resistance-device and electric lamp, when connected in series in a shunt circuit around the fuse or cut-out, offer so much resistance that but little current passes through them, the larger part of the current

passing freely through the fuse or cut-out, but in case the fuse-wire ruptures all of the current will pass over the shunt circuit and will cause the lamp to glow and thus indicate the disrupted condition of the fuse-wire.

By employing an electric lamp as an indicating-device it will be seen that when operated it will not become disrupted and therefore may be repeatedly operated. Furthermore, by connecting the circuit of the indicating-device with the terminals of the base entirely separate from the fuse or cut-out, the fuse or cut-out may be replaced whenever required without disturbing the indicating-device or its mechanical or electrical connections.

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

1. The combination with an electric fuse or cut-out, of an electric lamp included in a high resistance shunt circuit around said fuse or cut-out, substantially as described.

2. The combination with an electric fuse or cut-out, of an electric lamp and a resistance device connected in series, and included in a shunt circuit around the fuse or cut-out, substantially as described.

3. The combination with a base bearing terminals, and an inclosed electric fuse of the cartridge type having its terminals electrically connected with said base terminals, of a high resistance shunt circuit around said fuse which is electrically connected with said base terminals, and is not attached to said fuse terminals, and a permanent indicating-device for said fuse included in said shunt circuit, substantially as described.

4. The combination with a base bearing terminals, an electric fuse or cut-out electrically connected with said terminals, of an electric-lamp and a high resistance shunt circuit for the fuse or cut-out, containing said lamp, which is connected with the terminals on said base, substantially as described.

5. The combination with a base bearing terminals, an electric fuse or cut-out electrically connected with said terminals, of an electric-lamp and a resistance-device, connected in series, in a shunt circuit, which is connected to the terminals on said base, substantially as described.

6. The combination with a base bearing terminals and an inclosed electric fuse of the cartridge type electrically connected with said terminals, of a shunt circuit wire around said fuse, terminals to which the ends of said shunt wire are connected, means for electrically connecting said terminals with the terminals on the base, and a permanent indicating-device for the fuse connected in said shunt circuit wire, substantially as described.

7. The combination with a base bearing terminals, an electric fuse or cut-out electrically connected with said terminals, of an in-

dicating-device for the fuse or cut-out consisting of an electric lamp and a resistance-device, connected in series, and having terminals, and means for connecting said terminals, respectively, with the terminals on said base, substantially as described.

8. The combination with a base bearing terminals and clips adapted to receive and form an electric connection with an inclosed electric fuse of the cartridge type, of an indicating-device for said fuse, entirely separate from said fuse, consisting of a small glass bulb vacuum incandescent lamp and a resistance-device, connected in series, and means for connecting it electrically with the terminals on the base, substantially as described.

9. The combination with a base bearing terminals, and an electric fuse or cut-out electrically connected with said terminals, of an indicating-device for said fuse or cut-out consisting of a small glass bulb vacuum incandescent lamp and a resistance-device, connected in series, and means for connecting them mechanically and electrically with the terminals on the base, substantially as described.

10. The combination with an electric fuse of the cartridge type, of a permanent indicating-device adapted to be repeatedly operated, included in a high resistance shunt circuit around said fuse, substantially as described.

11. The combination with an inclosed electric fuse of the cartridge type, of a permanent indicating-device and a resistance-device, connected in series and included in a shunt circuit around the fuse, substantially as described.

12. The combination with a base bearing terminals and an inclosed electric fuse of the cartridge type, removably supported by and electrically connected with said terminals, of a shunt circuit wire around said fuse, permanently supported independent of said fuse supports, and a permanent indicating-device for the fuse connected in said shunt circuit wire, substantially as described.

13. The combination with an inclosed electric fuse, fuse supports to which it is removably and electrically connected, of a permanent indicating device for the fuse, and means for electrically connecting said indicating device with said fuse supports, substantially as described.

14. A removable indicator for attachment to electric fuse bases consisting of terminals adapted to be attached to the terminals of the fuse base and a resistance and a permanent indicating-device electrically connected in series to said terminals, the indicating device being adapted to be repeatedly operated by the passage of a current through it, substantially as described.

15. An indicating device for an electric

fuse or cut-out consisting of a miniature electric lamp and a resistance device, connected in series, and terminals therefor adapted to be connected with the circuit at opposite  
5 ends of the fuse or cut-out, substantially as described.

16. An indicating-device for an electric fuse or cut-out consisting of a miniature electric lamp and a resistance coil connected in  
10 series, having terminal plates at its ends,

adapted to be connected with the circuit at opposite ends of the fuse or cut-out, substantially as described.

In testimony whereof, I have signed my name to this specification, in the presence of 15 two subscribing witnesses.

LEONARD B. BUCHANAN.

Witnesses:

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H. B. DAVIS.