April 7, 1936. H. LÄPPLE 2,036,223

MEANS FOR INDICATING THE BLOWING OF HIGH TENSION FUSES

Filed April 2, 1931

Fig. 1.

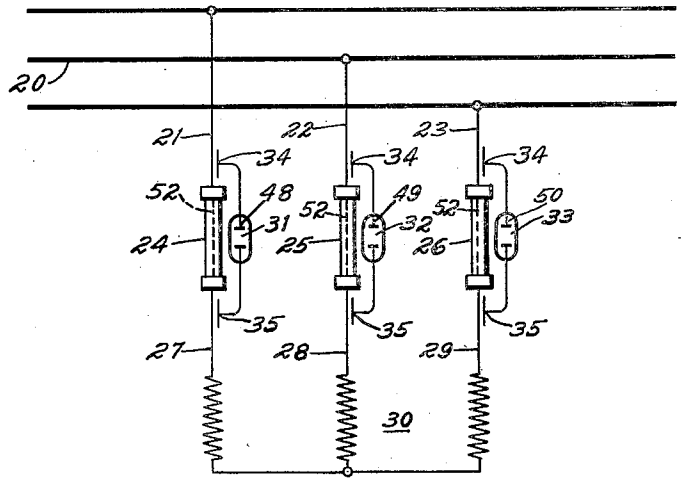


Fig. 2.

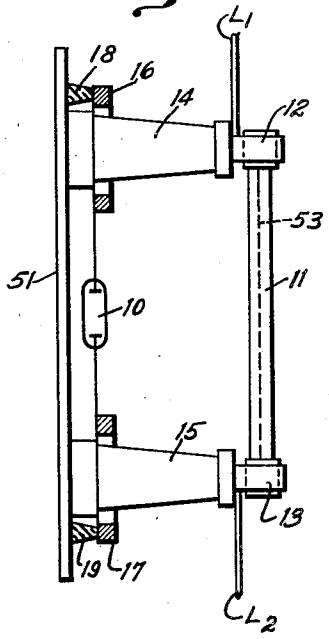


Fig. 3.

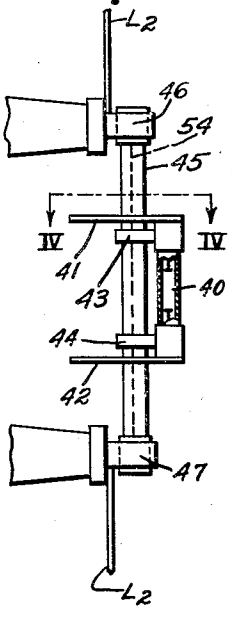
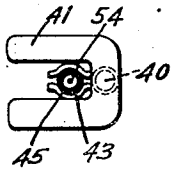


Fig. 4.



WITNESSES

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MEANS FOR INDICATING THE BLOWING OF HIGH-TENSION FUSES

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2 Claims. (Cl. 177—311)

My invention relates to high-tension fuses and particularly to means for indicating the fusing thereof.

When high-voltage fuses are utilized in polyphase circuits, all of the fuses do not necessarily burn out in case of an overload or a short circuit. Thus, in a three-phase system having an ungrounded neutral, for instance, it is sufficient to interrupt two phases of the circuit to stop the flow of any current in the circuit.

If the construction of the fuses is such that the fusible conductor cannot be seen in operation as, for instance, if the fusible conductor is embedded in an arc-extinguishing material, special means must be provided in order to be able to determine quickly which, if any, of the fuses have been blown. One of the usual means is the provision of an indicator on the cartridge itself, such as a window in the tube or a special device which is thrown off by the effect of the blowing of the fuse wire or by a released spring. These expedients have the disadvantage that they must be provided as a part of each cartridge, thereby increasing the expense of the cartridge.

It is an object of my invention, therefore, to provide means for indicating the rupture of a high-tension fuse by utilizing the voltage existing across the fuse, when the fuse is ruptured.

It is a further object of my invention to provide means for indicating the rupture of a high-voltage cartridge fuse without adding to the cost of the cartridge.

It is a still further object of my invention to provide means for indicating the fusing of a high-voltage cartridge fuse which may be used repeatedly as an indicating means.

Other objects and advantages of the invention will become apparent from the following description and the drawing, wherein

Figure 1 is a wiring diagram of a three-phase power system supplying power to a load and embodying my invention.

Fig. 2 is a side view of a cartridge fuse and glow lamp connected in accordance with my invention.

Figs. 3 and 4 are, respectively, a side elevation and a sectional view taken on line IV—IV of Fig. 3 of my invention showing another embodiment thereof.

According to the present invention, the voltage conditions existing at a fuse and which change when the fuse is blown are utilized for indicating the operation of the fuse. The invention comprises the use of a glow lamp which is energized capacitatively from the high-voltage source connected to the fuse, by the increased voltage at the fuse which occurs after the melting of the fusible conductor. Thus, the glow lamp may be energized capacitatively from the potential drop which exists between a terminal of the fuse and the ground. Preferably, however, the potential existing between the terminals of the fuse is utilized.

According to my invention, the terminals of the glow lamp are connected to two condenser plates which surround the insulators carrying the terminals of the fuse. A device of this kind may be easily mounted on the base or socket of the fuse, if desirable. The glow lamp may also be built into a unitary structure having a holding device by means of which it is removably secured to the fuse member and having two condenser members connected to the terminals of the glow lamp.

The condensers may also be placed at both ends of the conductors leading to the glow lamp and connected across the conductors leading to the cartridge.

Referring specifically to the drawing, in Fig. 1, the invention is shown in principle. The three-phase circuit 20 has branch circuits 21, 22 and 23 leading therefrom, through three fuses 24, 25 and 26 and conductors 27, 28 and 29, to a transformer 30, of which only the primary windings are shown, by way of example. Each of the glow lamps 31, 32 and 33 is connected, through the condensers 34 and 35, across the ends of the corresponding fuse.

The capacitances of the glow-lamp electrodes 48, 49 and 50, relatively to each other and to the ends of the conductors in front and in back of the cartridges 24, 25 and 26, are such that, so long as the fuse wire 52 is traversed by a current, the voltage at the glow lamp is below the shut-down voltage but is above this voltage when the fuse wire 52 melts causing a large potential difference to occur between one or more of the conductors 21, 22 and 23 and the corresponding conductors 27, 28 and 29, respectively. If, in the case of a short circuit in the transformer 30, the fuses 24 and 25 are ruptured but fuse 26 remains intact, the condenser members 34 and 35 of the lamp members 31 and 32 will have a difference of potential existing between them which is above the ignition voltage of the glow lamps. The two lamps 31 and 32 will, therefore, be illuminated but, as soon as a new fuse wire or cartridge is inserted, the voltage at the glow lamp, corresponding to the fuse which has been replaced, either disappears altogether or becomes

smaller than the extinguishing or shut-off voltage, so that the lamp will become extinguished.

In Fig. 2, illustrating one embodiment of my invention, 11 indicates a safety cartridge fuse connected to the line conductors L1 and L2 through terminals 12 and 13. The terminals are supported on a base plate 51 by two supporting insulators 14 and 15. The base plate 51 also supports two metal rings 16 and 17 which form parts of the capacitor by means of insulating members 18 and 19. The glow lamp 10 is connected between the two rings 16 and 17. The cartridge 11 is provided with a fusible conductor 53. The operation is as described in connection with Fig. 1.

Fig. 3 and Fig. 4 show another embodiment of my invention, the glow lamp 40 of this embodiment being provided with two holders 43 and 44 by means of which it may be clamped to the fuse 45. Two metal plates 41 and 42 are connected to the respective lamp terminals to constitute condenser members. The outer layers or members of the condenser are constituted by the supports 46 and 47 of the fuse 45 which contains a fusible conductor 54. When the fuse 45 is blown, the current for the glow lamp 40 traverses the dielectric constituted by the air between the holders 46 and 47 and the metal plates 41 and 42, to such extent as is required by the glow-lamp to cause the lamp to be energized. It is apparent that the glow lamp may be replaced by any other sensitive discharge device.

It is also apparent that an indicating device of this character has the advantage, in spite of its great simplicity, of reliability in operation. It is not necessarily made a part of the fuse, so that it does not become necessary to replace it at the same time as the fuse. The simplicity of the device is due to the high sensitivity of the glow lamp which requires only a small amount of energy, which energy may be supplied or transmitted by condensers of relatively small capacity.

Although I have shown and described specific embodiments of my invention, it is understood that modifications and changes may be made by those skilled in the art without departing from the spirit and scope of the appended claims.

I claim as my invention:

1. The combination with a high-voltage fuse comprising a casing, an electrical terminal member adjacent each end thereof, a fusible conductor positioned in said casing and connected between said terminal members, of indicating means comprising a glow lamp, means for removably mounting said indicating means on said casing, a capacitance member mounted to be removable from the casing with said glow lamp, said capacitance member being positioned to cooperate with one of said electrical terminal members and being connected to one terminal of the glow lamp to form a condenser in series with the glow lamp, and means removable from the casing with the glow lamp for completing the electrical circuit between the other terminal of said glow lamp and the other of said electrical terminal members.

2. The combination with a high-voltage fuse comprising a casing, a fusible conductor in said casing and a pair of electrical terminal members one at each end of said casing between which the fuse is mounted, of an indicating device comprising a glow lamp having a pair of capacitance members mounted on said glow lamp and each connected to one terminal thereof and positioned in juxtaposition to said electrical terminal members to form condensers in series with said glow lamp, whereby said glow lamp is mounted with said fuse and is movable therewith from between said terminals.

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