April 14, 1936. L. S. BRACH 2,037,062

CONDITION INDICATING MEANS FOR FUSES

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Fig. 1

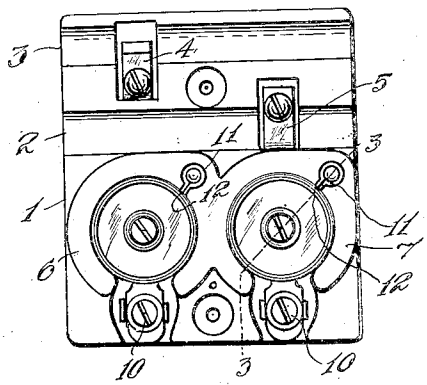


Fig. 4

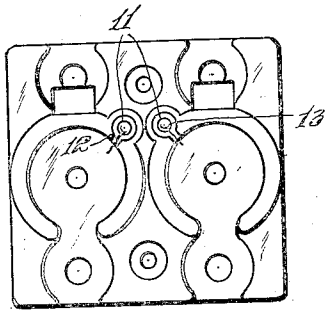


Fig. 5

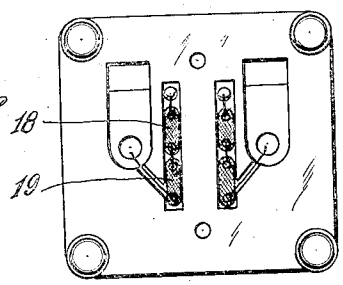


Fig. 2

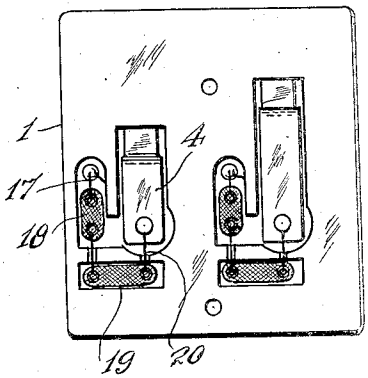


Fig. 3

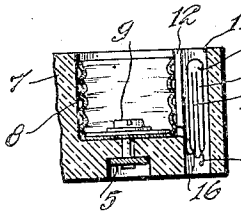
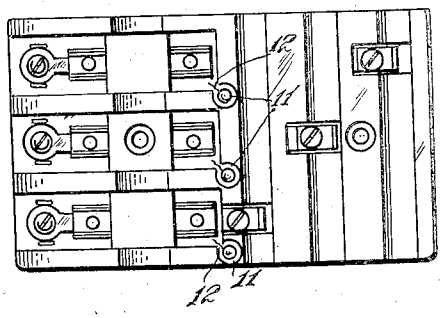


Fig. 6



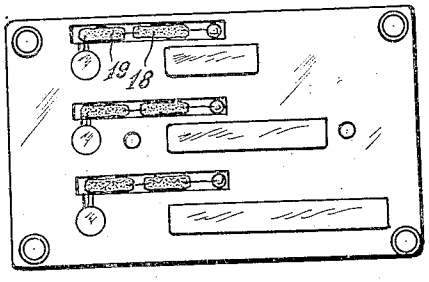


Fig. 7

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Fig. 10

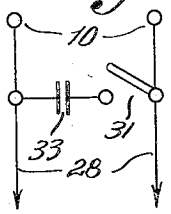


Fig. 8

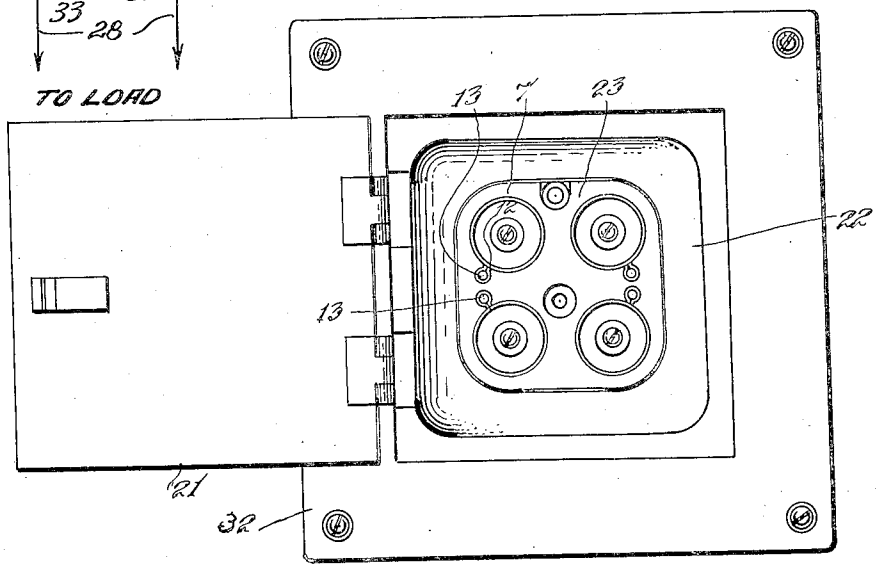
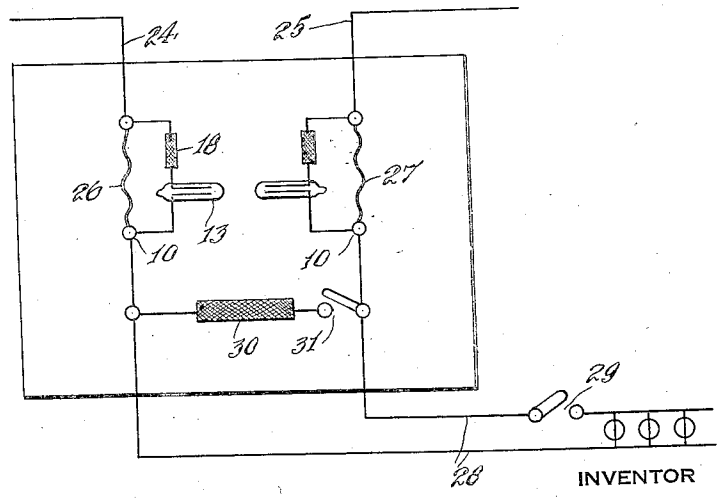


Fig. 9



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UNITED STATES PATENT OFFICE

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CONDITION INDICATING MEANS FOR FUSES

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Application November 18, 1933, Serial No. 698,729

19 Claims. (Cl. 177—311)

This invention relates to indicating means for showing the operating condition of fuses used in electrical circuits.

One of the objects of my invention is to provide a condition indicating means for such fuses which may be incorporated in the structures carrying said fuses, for example in the fuse-blocks themselves, without changing the outside or mounting dimensions of the fuse-blocks which have become standardized to a great extent, whereby the fuse-blocks will fit into cabinets designed to take a certain number of the blocks.

Another object of my invention is to provide an indicating means for fuses which does not alter or affect the design and cost of the fuse itself; that is to say, my indicating means is incorporated as a permanent part of the block and not of the fuses, so that the purchaser of fuses is not burdened with the cost of certain indicating means which have been heretofore proposed and used as a part of the fuses per se, or offered as an auxiliary.

Another object of my invention is to provide means whereby the indicating means will show the condition of a fuse even though the load on the circuit in which the fuse is connected be on open circuit.

Another object of my invention is to provide condition indicating means for fuses which adds but little to the change and cost of the standard fuse-block, yet one that is highly efficient in operation and has a long life.

These and other objects will be clear to one skilled in the art to which my invention may be applied.

In order to illustrate the application of my invention, I have shown it applied to several designs of fuse-blocks which are illustrated in the attached drawings, wherein:

Figure 1 is a plan view of a single circuit branch block with my invention applied thereto for use in connection with fuses of the screw-plug type.

Figure 2 is a plan view of the bottom of the block shown in Figure 1, illustrating one method of connecting the indicating means to the circuit terminals.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a plan view of another type of block without the current-connecting terminals.

Figure 5 is a bottom view of the block shown in Figure 4, illustrating another method of connecting the indicating means across the fuses.

Figure 6 is a plan view of a three-way block adapted to receive a cartridge type fuse.

Figure 7 is a view of the bottom of the block shown in Figure 6.

Figure 8 is plan view of a fuse-block cabinet with the door open, showing a block adapted to receive four fuse plugs of the screw-type with my invention applied thereto.

Figure 9 is a diagram illustrating the method of application of my invention as well as the means for insuring that the fuse indicating means will function, even though the load circuit be open.

Figure 10 is a diagram showing part of Figure 9, but with a condenser adapted to be bridged across the load circuit in place of the resistor of Figure 9.

Referring now to the details wherein like numbers refer to corresponding parts in the various views, and referring particularly to Figures 1 and 2, 1 is a block of good insulating material, such as porcelain, having channels 2 and 3 therein to receive conductors which are engaged by the contactors 4 and 5. The block 1 has moulded integrally therewith circular shaped barriers 6 and 7 extending upwardly from the base portion of the block to form pockets to receive contact members or metallic shells 8 which are formed with screw-threads thereon to receive a screw-threaded type of fuse plug. The contactors 4 and 5 extend below the pockets in the base of the block as indicated in Figure 3, and are fastened to the block by contact members 9 which may be in the form of screws. Each of the shells 8 has outgoing terminals 10 to which the load wires are attached. Thus far, this is the usual construction of a fuse-block.

My invention provides openings 11 positioned in the barriers 6 and 7 or closely adjacent thereto and one edge of each opening 11 breaks through the barriers or has a passageway 12 opening into the pocket carrying the shell 8. Positioned within each opening 11 is a small lamp bulb 13 having spaced electrodes 14 and 15 mounted within the bulb which is filled with an inert gas such as neon. One of the electrodes, such as 14, is connected by a wire 16 to the shell 8, through the passageway 12, while the other electrode 15 is connected by a wire 17 to a very high impedance 18. The impedance 18 may be in the form of a resistance of the grid-leak type such as used in radio, or a very small condenser where fuse-blocks are to be used on alternating current circuits. If direct current is used, then the impedance 18 will be in the form of a very high resistance of the order of fifty thousand to one hundred thousand ohms, or even very much higher. Because of the sensitivity of the neon bulb 13, this impedance, which

is connected in series with the bulb in shunt around the fuse, may vary greatly in its resistance without affecting the ability of the bulb to indicate the condition of the fuse, the essential thing being that the impedance 18 is very high in equivalent ohmic resistance, whether alternating or direct current is used.

In my past experience with the use of these high impedances, when used for testing purposes on voltages above 110, this voltage may sometimes drive too much current through the impedance and thereby cause the same, particularly if the impedance is of the grid-leak type, to heat up and cause it to flash over a short-circuit, in which case it sometimes happens that the neon lamp will explode. To avoid this condition, I may connect another impedance 19 in series with the impedance 18, and then connect the impedance 19 by a conductor 20 to the contact member forming one side of the fuse circuit. By the use of two such impedances I have found that one will give out before the other and no damage is done to the second impedance or to the bulb. As will be seen from Figure 2, the impedances 18 and 19 are set in a recess in the base of the block in a similar manner to the circuit terminal strips 4 and 5 and are covered over or protected by the cement or wax which is used in covering the parts 4 and 5 in the base of the block.

In Figures 4 and 5, the construction is somewhat similar to that shown in Figures 1 and 2, but the bulbs 13 are arranged a little differently on the block and likewise the impedances 18 and 19. The same thing applies to the type of fuse-block shown in Figures 6 and 7. In either of the forms described, the impedances 18 and 19, or where only one is used, may be made integral with the block itself; that is, a mixture of finely pulverized carbon or graphite with a binder may be painted on and allowed to adhere to the unglazed porcelain forming the groove in the base of the block, this coating being connected in series with the bulb 13 and the two across the fuse as has been described. The integral type of impedance just described is protected by rosin, shellac, or the same material used in covering the circuit terminals in the base of the blocks as has previously been described.

In Figure 8, a metal casing 32, preferably of steel, has a door 21 for closing an opening 22 into the fuse-box which, as illustrated, carries a fuse-block 23 of which only the barriers 7 extend through from the back of the box, thereby leaving no wires exposed where they may be contacted by one screwing a fuse into the shell 8. In the arrangement shown, there are four fuse-blocks each having its indicating lamp 13 positioned in the opening provided in said barriers.

It will be noted that in all the constructions described, the openings to receive the lamp bulbs 13 have no sockets therein, and it is therefore not necessary to provide any base for the bulbs 13, the same being held in the openings 11 by the same kind of cement or wax used in covering the impedances and circuit terminals.

In Figure 9, I have shown a diagrammatic arrangement wherein the current supply wires 24 and 25 are connected through the fuses 26 and 27 to the load circuit 28. Each of the fuses 26 and 27 is shunted by a bulb 13 and impedance 18 connected in series therein around the fuse.

Assuming that the load switch 29 is closed and something happens in the load circuit to blow one of the fuses 26 or 27, its associated bulb will immediately become lighted and stay lighted until the fuse has been replaced, and the location of the bulb 13 on the fuse-block, as has been described, will clearly indicate the fuse that has blown.

Should for any reason the load switch 29 be open, then either of the fuses 26 or 27 might be in an inoperative state and give no indication of this condition. Therefore, to overcome this point which might be considered a disadvantage, I have provided an auxiliary impedance 30 which may be permanently connected across the ends of the fuse terminals 10 to which the load circuit is connected. The impedance may be a condenser 33, as shown in Figure 10, or a very high resistor 30, as shown in Figure 9, of the order of one megohm so that the weak current through this, even with the switch 29 open, is very nearly infinitesimal; that is to say, if a large number of these were connected across different circuits all being supplied through one meter, the leakage current would not move the meter; but such a leak is sufficient to cause the lamp bulb connected across the defective fuse to give an indication.

If desired, a simple switch 31 may be connected in circuit with the impedance 30 as shown in Figure 9, or the condenser type impedance 33 of Figure 10 to open that circuit, if any objection is raised to a permanent leak across the circuit. In case the switch 31 is used, this may be closed while an observation test is being made on the fuses and then opened. In fact, the switch may be of a type that will open automatically after the closing force thereon has been removed.

What I claim is:

1. A fuse-block having barriers forming pockets for contact members to receive fuse terminals, said block having at least one opening therein located in one of said barriers, the opening breaking through its barrier into one of said pockets, a small neon gas, or the like, filled bulb positioned in said opening, at least one very high impedance located in a recess in the block and connected in series with said bulb, the two being permanently connected in shunt across said fuse contact members.

2. Condition indicating means for a fuse including a fuse-block of insulating material and of standard dimensions having at least one pocket with contact members therein to be engaged by fuse terminals; a barrier adjacent said pocket; said block having at least one opening therein on the fuse side thereof closely adjacent said pocket and in said barrier, a small gas-filled bulb having spaced electrodes located in said opening, at least one very high impedance located in a recess in the block on the rear side thereof adjacent said bulb opening, the bulb and impedance being connected in series and across said fuse contact members, and in shunt to a fuse when in operative position in the fuse-block.

3. Condition indicating means for a fuse as set forth in claim 2, characterized in that said opening for the bulb breaks into said pocket and the bulb is held in place within said opening by similar sealing compound as used in the assembly of the contact and associated terminal members used in the block and in protecting said impedance.

4. Condition indicating means for a fuse including a fuse-block of insulating material and of standard dimensions having at least one pocket with contact members therein to be engaged by fuse terminals; a barrier adjacent said pocket; said block having at least one opening therein on the fuse side thereof closely adjacent said

pocket and in said barrier, a small gas-filled bulb having spaced electrodes located in said opening, at least one very high impedance located in a recess in the block on the rear side thereof adjacent said bulb opening, the bulb and impedance being connected in series and across said fuse contact members, and in shunt to a fuse when in operative position in the fuse-block, and a further high impedance bridged across a pair of fuse terminals of opposite polarity at the load side thereof.

5. Condition indicating means for a fuse including a fuse-block of insulating material and of standard dimensions having at least one pocket with contact members therein to be engaged by fuse terminals; a barrier adjacent said pocket; said block having at least one opening therein on the fuse side thereof closely adjacent said pocket and in said barrier, a small gas-filled bulb having spaced electrodes located in said opening, at least one very high impedance located in a recess in the block on the rear side thereof adjacent said bulb opening, the bulb and impedance being connected in series and across said fuse contact members, and in shunt to a fuse when in operative position in the fuse-block, a further high impedance bridged across a pair of fuse terminals of opposite polarity at the load side thereof, and a switch for controlling this last-mentioned impedance circuit.

6. A fuse-block having a contact member on one side thereof to receive a fuse, also an opening on the same side and having therein a gas-glow lamp with spaced electrodes and on the opposite side of said block at least one recess to receive a circuit contact member, and a high impedance element which is connected in series with the lamp and across its associated fuse and further characterized in that a high impedance is adapted to be connected across a pair of fuses of opposite polarity at the load side thereof.

7. In the combination of a fuse and gas-filled bulb having spaced electrodes connected in shunt thereto, means for insuring that the bulb will give an indication when the fuse opens, said means including a very high impedance connected across the fuse or fuses in a given circuit on the load side thereof.

8. A fuse-block having on one side thereof barriers forming pockets for contact members to receive fuse terminals, and on the other side, channels for contact members and certain impedances, said block having an opening adjacent each pocket and located in a side barrier for said pocket, a gas-filled bulb positioned in each of said openings, at least one very high impedance for each bulb located in one of said channels and connected in series with its associated bulb, the two being permanently connected in shunt across said fuse contact members.

9. A fuse-block of the type set forth in claim 8, further characterized in that the block is of standard commercial dimensions and the fuses to be used in the block are also of standard commercial construction, size and shape.

10. A fuse-block as set forth in claim 8, further characterized in that a further high impedance is bridged across a pair of fuse terminals of opposite polarity at the load side thereof.

11. A fuse-block having on one side thereof contact members to receive a fuse or fuses of standard commercial construction, size and shape, said fuse-block having openings therein adjacent each fuse, a gas-filled bulb positioned in each of said openings and at least one high impedance for each bulb positioned within a space provided in the block and connected in series with its associated bulb, the two being permanently connected in shunt across said fuse contact members.

12. A fuse block as set forth in claim 11, further characterized in that the block as well as the fuses are of standard commercial construction, size and shape.

13. A fuse block as set forth in claim 11, further characterized in that a further high impedance is bridged across a pair of fuse terminals of opposite polarity at the load side thereof.

14. A fuse block as set forth in claim 11, further characterized in that the block as well as the fuses are of standard commercial construction, size and shape, and further characterized in that a further high impedance is bridged across a pair of fuse terminals of opposite polarity at the load side thereof.

15. In a system of the type which includes electrical supply buses and branches therefrom in which thermal fuses are inserted in each leg of a branch and indicator lamps are connected in shunt of the fuse links, the combination of means permanently connected between the two legs of a branch whereby a path is afforded for current flow for lighting one or both of the indicator lamps.

16. In a fuse block of the type in which means are provided for receiving two electrical supply conductors and terminals for connecting a branch circuit from said conductors in which a fusible link is connected between each electrical supply conductor and each leg of the branch circuit, the combination of means connected between said terminals affording a current path whereby when fusible links are inserted between each leg of the branch circuit and the supply conductors and are shunted by indicator lamps, the said indicator lamps may be illuminated even when no other path exists for current flow between the conductors of said branch.

17. In a fuse block of the type providing for connection with supply mains and providing terminals for a branch circuit with receptacles for the insertion of plugs provided with fuses, and with indicator lamps in shunt with said fuses, the combination of a resistance connected across said terminals for insuring the certainty of illumination of the indicator lamps, upon failure of any or all of said fuses.

18. In a system of the type which includes electrical supply buses and branches therefrom in which thermal fuses are inserted in each leg of a branch and in which indicator lamps are connected in shunt of the fuse links, and responsive automatically each upon failure of one of said fuse links, the combination of means permanently connected between the two legs of a branch whereby a path is afforded for lighting one or both of the indicator lamps upon failure of either or both of said fuse links.

19. In a fuse block of the type providing for connection with supply mains and providing terminals for a branch circuit with receptacles for the insertion of plugs provided with fuses, and with indicator lamps in shunt with said fuses, the combination of a condenser connected across said terminals for insuring the certainty of illumination of the indicator lamps, upon failure of any or all of said fuses.

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