MULTIPLE FUSE AND SIGNAL PLUG

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The invention relates to devices employed in connection with electric circuits for controlling the continuity thereof, which devices may be and frequently are, of the type known as fuses, but which may be of other types, such as thermal cutouts or circuit breakers employing switches actuated by springs and electric coils or magnets.

When the installation includes a plurality or multiplicity of such devices, and a fuse blows, it is not easy to find which fuse it is that needs renewal; and if the devices are of a switch type and one opens, then one cannot determine which one is open unless he is close enough to see it and know by the position of its handle that it is open.

One of the objects of our invention is to provide such a plurality of devices with a light indicator, such as a neon lamp, which is normally inactive but automatically lights up and actively indicates the blowing of a fuse or the circuit breaker which is open.

With said object in view, and others, herein-after described, our invention consists in the mechanism or devices substantially as herein-after described and claimed.

Of the accompanying drawing in which we have chosen to illustrate the invention in connection with a multiple fuse plug:

Figure 1 is a plan view of the plug.

Figure 2 represents a section on line 2—2 of Figure 1.

Figure 3 is a plan view of the outer member or body alone, the inner member which holds the lamp being removed.

Figure 4 is a side elevation, partly in section on the line 4—4 of Figure 3.

Figure 5 is a detail sectional view on line 5—5 of Figure 3.

Similar reference characters indicate similar parts or features in all of the views.

The outer body 12, of suitable insulating material is formed with a central recess or pocket 13 for the inner body presently described. The lower end of said body 12 is provided with a well-known type of screw contact 14, and its upper end is formed to provide an annular recess surrounded by a ring 15 the upper surface of which bears a series of numerals illustrated in Figures 1 and 3 as from 1 to 12 inclusive. Inside of said ring 15 the body 12 is formed or provided with a corresponding number of twelve ratchet-shaped notches 16.

The body has fuse-receiving openings 17, one extending down from each of the twelve notches 16, said openings being of a size sufficiently larger than the slender fuses 18 contained therein to provide for ventilation so that when a fuse blows, the resulting gases may vent either upward or downward.

The twelve fuse members 18 are cut to predetermined length, and each carries a connector at its upper end consisting of a small brass or copper tube 19 slipped partially onto the upper end of the fuse and secured thereto by crimping it, and bent over to provide a flat contact lip 20 (Fig. 5). The lower end of each fuse contact at 21 with the inwardly extending flange of the screw contact 14 (Fig. 2) and for this purpose a small globule of solder may be employed.

The inner body, which is also of suitable insulating material, comprises a tubular portion 22 which is rotatably adjustable in the pocket 13 of the outer body 12, and has an enlarged head portion 23 extending out over the notched portion 16 of the outer body. Said head portion has an integral raised part shaped to serve both as a pointer 24, and as a handle when it becomes necessary to bring a new fuse into the circuit as hereinafter described. The head portion 23 has, suitably secured to it, a block 25 in position to cooperate with one, or another, of the lips 19 of the fuses (Fig. 5). And it has arrows (Fig. 1) to indicate the proper direction of rotation. The block 25 also cooperates with the ratchet-shaped notches of the outer body 12 to prevent rotation in other than the proper and single direction indicated by said arrows.

The lower end of the inner body (Fig. 2) has secured to it a circular ring 26 of conducting metal, somewhat tapering in form, to act as a sliding contact with a surrounding ring 27 of conducting metal secured in the bottom of the pocket 12 of the outer body. The contacting surfaces of the rings 26, 27, are preferably inverted cone-shaped. In Figure 2, the rings 26, 27, are shown slightly apart from each other, for the sake of clarity of illustration, but in practice, said rings are normally in contact.

Partly to hold them in contact, and partly to serve as circuit connections, a spring 28 is connected at one end to the eye 29 of a bottom contact plate 30, and at the other end to the eye 31 of a metal stem or pin 32 mounted in the lower end of the inner tubular body 22.

Snugly mounted in the chamber provided in the body 22 is a lamp 33 illustrated as of the type known as a neon tube lamp, and the top of said chamber is closed by a disk 34 of mica or 51
glass or other suitable translucent or transparent material, preferably red in color. It not only seals the lamp socket against admission of dust and dirt, but also permits the light from the lamp to serve as a visible warning that, as presently described, the fuse that was in the used circuit has blown.

Suitable circuit connections illustrated in Figure 2 will now be described:

A metal connector 25 carried by the head 23 of the inner body is in permanent connection at one end with the block 25 and at the other end is connected by a wire 36 in the lamp chamber with the pin 32 in the bottom of the inner body.

Therefore, a circuit which includes a fuse is completed by the screw contact 24, and the fuse and its top lip 20, the block 25, connector 35, wire 36, pin 32, spring 28, and contact plate 30. Of the two wires 37, one is connected to the wire 36 and the other is connected to a metal member 38 extending through the bottom portion of the inner body to the inner ring contact 28. A similar metal member 39 extending through the bottom portion of the outer body connects the outer ring contact 27 with the base contact 14. Therefore, when the fuse in the active circuit blows, the circuit for the lamp is completed by the screw contact 24, the connector 38, the ring contacts 27 and 28, the connector 39, the lamp wires 37, a portion of the wire 36, the pin 32, spring 28 and contact plate 30.

The circuit connections described are such that when the device is installed for use, the lamp is shunted across the fuse and does not use any current until such time as the connected fuse blows. Only then does the warning lamp become active. If desired, a suitable series resistance not necessary to illustrate may be inserted in the lamp wires 37 or in the connector 38.

Since our improved plugs are especially useful in sets or groups, the light emanating from the one where a fuse has blown as just described identifies an attendant which one needs a new fuse in its circuit. Therefore an object of our invention is to provide such structure of multiple fuse plugs that when a plurality of somewhat typical fuse cabinets or panelboards are installed, each having a door which includes a glass portion, the panelboard contains a plurality of the improved plugs, then an attendant does not have to, as heretofore, make tests to find out which fuse has blown. Instead, he at once sees which panelboard door to open because of the light from one of the plugs therein, and all he has to do is to open that door and turn the illuminated inner body slightly (by means of the pointer member 24), so that the contact block 25 (Fig. 5) shifts from the lip 20 of the blown fuse onto the lip 20 of the next fuse. This brings the next fuse into the circuit, and the lamp ceases to be active.

Rotary movement in the wrong direction is prevented, as hereinbefore explained, by the shape of the notches 16. However, in case the short circuit, or ground, or overload, still persists in the circuit in which the fuse protects, another fuse member 28 will blow and the lamp will remain lit, and therefore active, the trouble being elsewhere in the circuit to which our improved plug belongs, and such trouble must be removed. The mechanism therefore is a safety device which serves as a warning that trouble has existed on the circuit which has blown the fuse, and which device, by a slight turn to the next number opposite the pointer 24, will include a new fuse in the circuit. But if there is a continuing outside trouble in the circuit, the lamp will remain lit and therefore active until such trouble is located and cleared. If any such trouble has caused the second fuse to blow, the inner body need only be turned to another number 28.

While a spring 28 is illustrated as serving the double purpose of being a portion of the circuit and of holding the outer and inner bodies in proper relative positions, we do not limit ourselves thereto, as any other means may be substituted therefor. Whatever such other means may be however, it should, like the spring, be disconnectible so as to permit the two bodies to be separated. This is because after all of the fuses have been blown, it is desirable to substitute a new outer body with new fuses therein, for the body with blown fuses. In other words, the inner body with its lamp is capable of use far longer than the fuses in the outer body, and so the inner body and its lamp can be used in connection with a succession of outer fuse-carrying bodies.

In practice, the capacity of the device, indicating voltage and amperage, may be stampled on any portion of the outer body, or may be etched or otherwise marked on the window 34 or the surface of the head 23.

As illustrated in Figure 2, a yieldable ring 40 surrounds the lamp 23 so as to serve as a cushion between the lamp and the inner wall of the chamber or pocket in the body 22, and to hold the lamp in position and prevent it from setting deeper or higher in said pocket. The ring 40 may be a curved flat spring, or rubber, or equivalent friction device that will minimize danger of shock to the lamp due to mechanical handling or the electrical erosion which might follow blowing of a fuse. It also ensures the existence of a space between the walls of the lamp and its pocket to 40.

We do not limit ourselves to the type of lamp should be active for a long time.

As illustrated in Figures 3 and 5, the notches or ratchet teeth 16 register with the fuses 18 so that the laterally extending lips 20 of the fuse tips 19 are located above the bottoms of the recesses of the notches 16 which provide the ratchet teeth. Therefore, whenever the inner body is turned to disconnect a blown fuse and bring the next fuse into use, the contact member 25 first rides over the top of a tooth 16 and is stopped by the next one and snaps down onto the lip 20 of said next one.

Said lip however, being yieldable, prevents any such shock being transmitted to the slender fuse as might fracture it. By this structure, and expending the slender fuses extending from end to end of the body 12, we provide a structure which carries a very large number of successively usable fuses, such as twelve, without having to increase the diameter of the whole plug much, if any, beyond the diameter of an ordinary single-plug. Consequently our improved plugs, each having an unusual number of fuses, are usable in any well-known ordinary fuse plug cabinet.

Having now described our invention, we claim:

1. A combined fuse plug and lamp comprising an outer body carrying a series of fuses and having a central pocket, a contact ring in the
bottom of said pocket, and a rotatable lamp-carrying body in said pocket and having a contact ring at its lower end, means being provided for preventing rotation of the lamp-carrying body in other than a single direction.

2. A combined fuse plug and lamp comprising an outer body carrying a series of fuses and having a central pocket, a contact ring in the bottom of said pocket, and a rotatable lamp-carrying body in said pocket and having a contact ring at its lower end, means being provided for preventing rotation of the lamp-carrying body in other than a single direction, the said rings being circular in shape and having inverted cone-shaped contact surfaces.

3. A combined fuse plug and lamp comprising an outer body carrying a series of fuses and having a central pocket, a contact ring in the bottom of said pocket, and a lamp-carrying body in said pocket and having a contact ring at its lower end, the said rings being circular in shape and having inverted cone-shaped contact surfaces, a spring being provided to effect contact of the cone-shaped rings.

4. A combined fuse plug and lamp comprising an outer body carrying a series of fuses and having a central pocket, an inner rotatable body having a chamber, a lamp in said chamber, a window member sealing said chamber, and circuit connections for rendering the lamp active when a fuse blows, means being provided for preventing rotation of said inner body in other than a single direction.

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