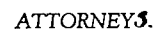


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FUSEHOLDER

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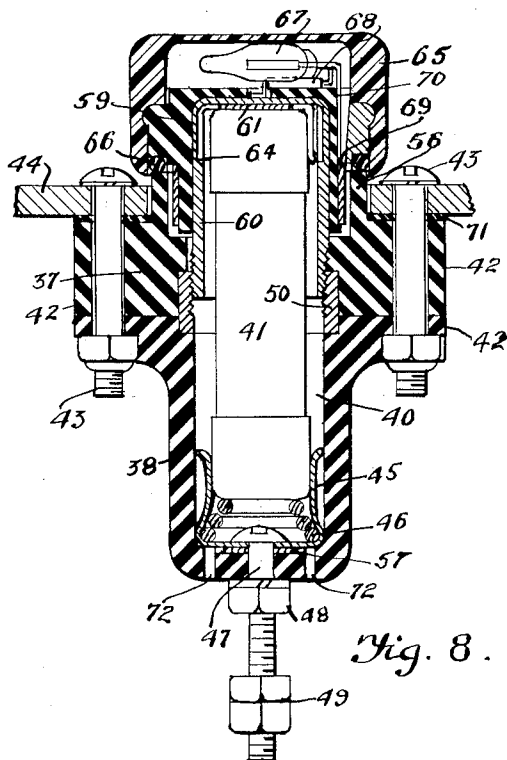


Fig. 8.

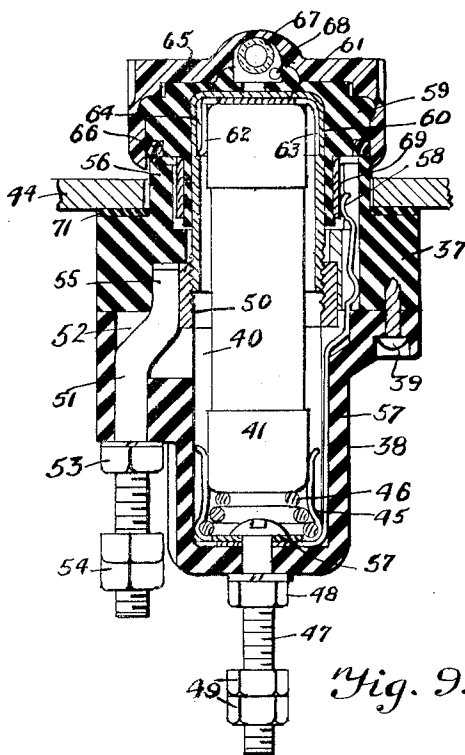


Fig. 9.

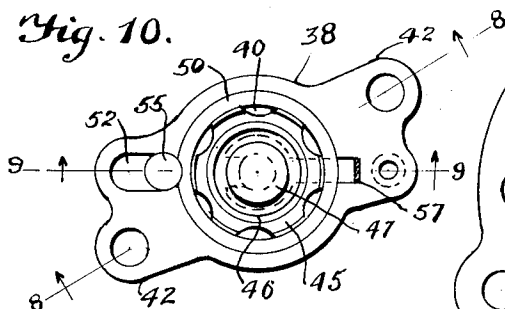


Fig. 10.

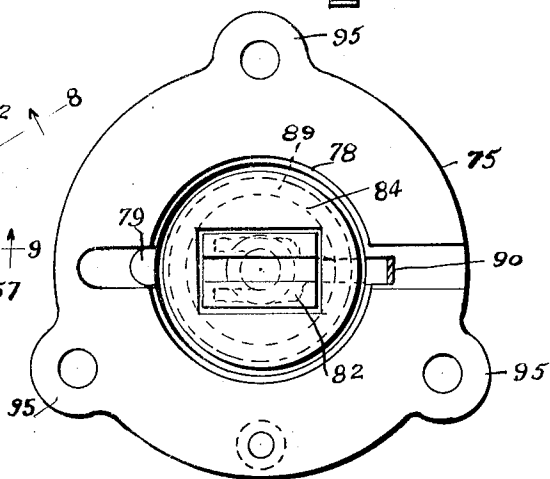


Fig. 15.

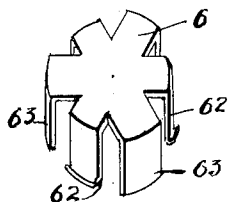


Fig. 11.

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Fig. 12.

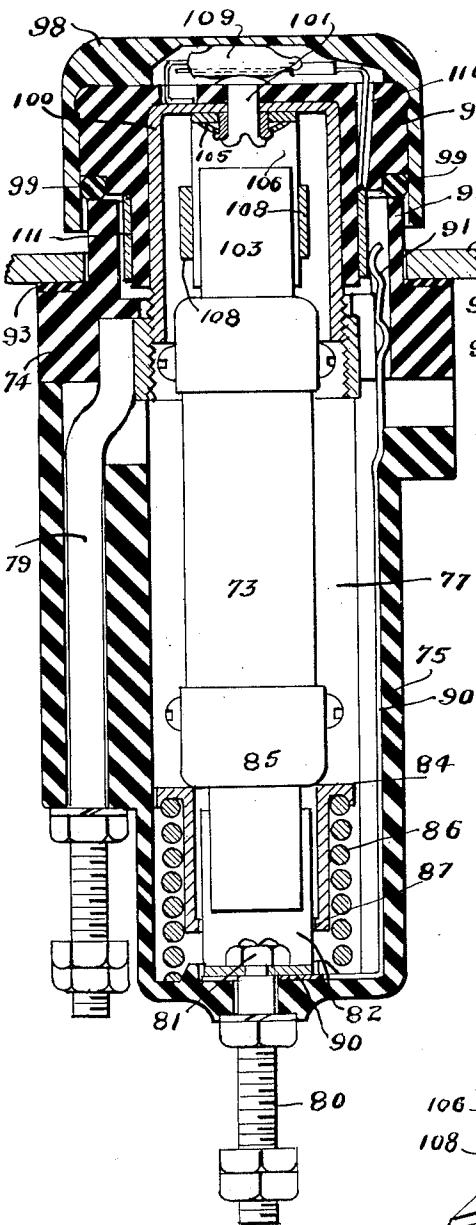


Fig. 13.

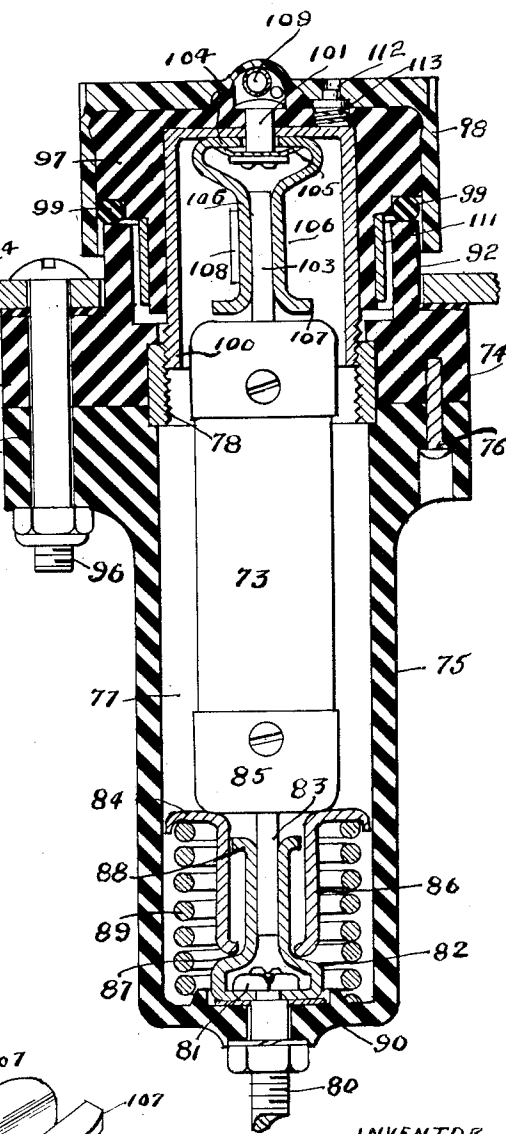
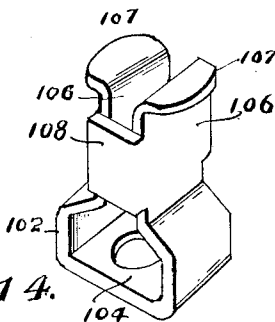


Fig. 14.



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FUSEHOLDER

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Filed Apr. 4, 1958, Ser. No. 726,440
5 Claims. (Cl. 200-133)

The present invention relates to fuseholders for housing standard cartridge type fuses and is a continuation in part of the invention set forth in my Patent No. 2,851,558, dated September 9, 1958.

An object of the invention is to provide fuseholders with lamp indicators having the desirable dead front characteristics and yet render the fuses housed therein splashproof from the outer face of the panel board when mounted thereon or, when necessary, completely seal the fuses against water or water vapors.

Other objects of the invention will be in part obvious and in part pointed out as the description continues.

In the drawings:

FIG. 1 is a side elevation of one form of fuseholder.

FIG. 2 is a top plan view of the same.

FIG. 3 is a side elevation of the knob when removed from the fuseholder.

FIG. 4 is a vertical sectional view of the complete fuseholder with a fuse housed therein.

FIG. 5 is a horizontal section taken on the line 5-5 of FIG. 1 in the direction of the arrow points.

FIG. 6 is a detail plan view of the blank from which the spring contact blade is formed.

FIG. 7A is a perspective view of the upper fuse clip.

FIG. 7B indicates a vertical cross sectional view of the fuse clip.

FIG. 7B shows in plan elevation a blank from which the fuse clip is formed.

FIG. 8 is a vertical sectional view of the complete fuseholder taken on the line 8-8 of FIG. 10 in the direction of the arrow points and illustrating another form of fuseholder with the invention applied thereto.

FIG. 9 is another vertical sectional view taken in the line 9-9 of FIG. 10 in the direction of the arrow points.

FIG. 10 is a plan view of the base section of the fuseholder.

FIG. 11 is a perspective view of the upper fuse clip.

FIG. 12 is a vertical sectional view of a fuseholder housing the standard knife blade type fuse.

FIG. 13 is another vertical sectional view of the latter fuseholder taken at right angles.

FIG. 14 is a perspective view of the upper fuse clip; and

FIG. 15 is a plan view of the base section thereof with the fuse removed.

That form of fuseholder shown in FIGURES 1 to 7 inclusive of the drawing is for housing standard ferrule cartridge type fuses of the 3AB or 3AG class which are 1/4" long and 1/4" in diameter, but by slightly enlarging the size of the fuseholders and yet maintaining this conventional design standard ferrule cartridge type fuses up to the 5AB class which are 1/2" long and 13/32" in diameter may be housed therein. This fuseholder comprises a base or body section 1 molded from thermo-setting plastic compositions and preferably such as glass fiber alkyd or diallyl phthalate insulating materials with a terminal stud bolt 2 molded in the lower end thereof and the latter being pro-

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vided with the usual flat washer 3, lockwasher 4 and hex nut 5 for attaching a terminal lead wire thereto.

Molded with the body 1 and extending within the upper open end recess 6 formed in the latter is an internally threaded sleeve 7 which has secured thereto by brazing an angle bar 8. One end of this angle bar 8 projects from the body 1 and has a threaded opening 9 formed therein for receiving the terminal screw 10 to which the other terminal lead wire may be connected.

A base flange 11 is formed with the body and has seated thereon a flat washer 12 which latter rests against the inner face of the panel board 13. An extension 14 is formed with the washer 12 for insulating the terminal screw from the panel board. Formed with the upper end of the body 1 is an annular flange 15 projecting through and from an opening formed within the panel board 13. A hexagonal nut 16 engages the threads formed with the annular flange 15 for retaining the body to the panel board 13. A lock washer 17 is arranged between the nut 16 and panel board which together with the washer 12 effects a water-tight seal between the body 1 and the opening formed within the panel board.

The cover or knob for closing the upper open end of the recess 6 formed within the body 1 comprises a plug 18 molded from insulating materials and having an O-ring 19 retained therein so that when the O-ring is seated upon the upper end of the annular flange 15 of the body a water-tight seal will be effected. A cap 20 fits over the plug 18 and is retained thereon by means of the knob projections 21 as more fully described in my Patent No. 2,851,558. Molded with the plug 18 is one end of a fuse socket 22 and its opposite threaded end engages the threads of the sleeve 7 for detachably connecting the cover to the body 1. A conical coil spring 23 is seated within the fuse socket 22 and retains the cartridge type fuse 24 in contact with the terminal stud 2. A fuse clip 25 retains the coil spring 23 within the fuse socket as one end thereof rests upon the innermost or larger coil of the spring 23. This fuse clip is formed from a single sheet of spring beryllium copper cut or punched as illustrated in FIGURE 7B to provide the arms 25A and base section 25B. This blank is thereafter formed into a split six sided tube and the arms 25A are flared outwardly. One of the arms 25A at its outer extremity is soldered to the fuse socket so as to retain the fuse clip and coil spring within the latter. The arms 25A engage about one ferrule of the fuse 24 and the coil spring forces the opposite end of the fuse against the contact stud 2. The arms 25A sufficiently grip the fuse so as to cause the latter to be withdrawn from the recess 6 of the base or body of the fuseholder with the knob 20 and yet though the pressure exerted by the coil spring 23 upon the fuse 24 causes the upper ferrule of the fuse to freely slide within the arms 25A of the fuse clip and retain the lower ferrule of the fuse in electrical contact with the terminal stud bolt 2 when the fuse is retained within the body of the fuseholder.

Extending around and secured to the plug 18 is an annular contact ring 26. Connected to this contact ring 26 is one wire 27 of the indicator lamp 28 whereas the other wire from this lamp is connected to a resistor 29 and the opposite lead wire 30 from this resistor is soldered to the fuse socket 22. A contact blade 31 preferably formed in one continuous piece of spring hardened beryllium copper has a forked end 32 bent at right angles to one end thereof

so as to have contact with the stud terminal stud 2. A portion of this strip 31 has prongs 33 formed with the opposite sides thereof for engagement with the body 1 as it is seated within the groove 34 of the body. The opposite end of this strip 31 extends through an opening 35 formed in the body so that its extremity 36 will ride upon and have contact with the ring 26. The free extremity 36 of this contact blade terminates short of the upper end of the flange 15 so that no live parts are so exposed from the body when the cover is removed therefrom as would likely cause shock or damage to the instruments included in the electrical system to which the fuseholder may be connected.

The body 1 of the fuseholder is preferably impregnated with a waterproofing composition which latter seals the material of the body around the terminals 2 and 8 and which together with the O-ring 19 prevent an air, moisture or moisture vapors entering the recess 6 of the body as would interfere with the successful operation of the fuse 24 mounted therein. The waterproofing composition employed is preferably a polyester resin with a hardener or similar synthetic thermo-setting resin adhesives.

That form of fuseholder as shown in FIGURES 8 to 11 inclusive of the drawings is for housing a standard ferrule type cartridge fuse of the 31 to 60 ampere size which are $1\frac{3}{16}$ " in diameter and 3" long. However by slightly reducing the overall size of this fuseholder, but maintaining the same design a standard ferrule type cartridge of the 0-30 ampere size may be housed therein which are 2" in length and $\frac{9}{16}$ " in diameter.

This type of fuseholder comprises a sectional body molded from plastic insulating materials comprising a rear housing 37 and a base 38 and these sections when connected together by means of the drive screws 39 form an upper open end recess 40 for receiving the fuse 41. Each of the sections 37 and 38 are provided with the apertured extensions 42 through which extend the bolts 43 of the hardware for attaching the sectional body to the rear face of the panel board 44.

Seated within the base section 38 is a fuse clip 45 having formed therewith an annular recess in which is retained the lower or larger coil of the spring 46. A terminal stud bolt 47 extends through the lower end of the base section 38 for retaining the fuse clip 45 within the latter by means of the lockwasher and hex nut 48. Other hex nuts 49 are for connecting one wire of an electrical system to the terminal stud bolt 47.

The upper face of the base section 38 is provided with an annular recess in which is seated the lower end of the internally threaded ring nut 50 and connected to this ring nut 50 is a terminal stud 51 which latter extends down through an opening 52 within the base section 38. Before assembling the fuseholder the ring nut 50 and stud 51 are connected in one unit and the latter is thereafter inserted in place within the annular recess of the molded base section 38. By tightening the hex nut 53 this unit will be locked in place against turning in or withdrawal from the base section 38. Other hex nuts 54 are carried by the terminal stud 51 for connecting another lead wire of the electrical system thereto.

The lower face of the rear section 37 has an annular recess formed therein for receiving the upper end of the ring nut 50 and also another recess for receiving the upper end 55 of the stud bolt 51. This upper end 55 of the stud bolt and ring nut 50 prevent the section 37 and 38 from turning or being slipped sideways with respect to one another and the drive screw 39 merely holds the section together until the body is attached to the panel board 44 by means of the attaching hardware comprising the bolts 43 whereat the section of the body are further prevented from separating from one another. The upper end of the rear housing 37 is provided with an annular flange 56 which latter extends through an opening provided within the panel board 44 and projects from the latter. A contact blade 57 has its lower end connected to the terminal

stud 47 and its upper free end 58 projects within the annular flange 56 of the rear housing but below the upper extremity thereof.

The knob or cover for closing the upper open end of the recess 40 comprises a plug 59 having one end of a fuse socket 60 molded therein and the lower threaded end of the fuse socket engages the threads of the ring nut 50 for detachably retaining the cover upon the body of the fuseholder. A fuse clip 61 is seated within the fuse socket 60 and has three blades 62 that contact the outer face of the upper ferrule of the fuse 41. Three prongs 63 are also formed with this fuse clip and are arranged in a larger diameter than that of the blades 62. An undercut providing an annular recess 64 is formed in the inner end of the fuse socket so that when the fuse clip is forced within the latter the prongs 63 will snap-fit within the recess 64 and thereby prevent the fuse clip from being withdrawn from the fuse socket and yet provide a good electrical contact between the fuse 41 and the fuse socket. The knob or cover will securely hold the fuse 41 within its respective fuse clips 45 and 61 and when removing the knob or cover, the coil spring 46 will eject the fuse from the clip 45 and permit the fuse to be carried by the knob due to the grip of the blades 62 about the upper end of the fuse whereby the latter can be more readily removed from the recess 40 of the body.

A cap 65 is secured to the plug 59 and arranged between the same is an O-ring 66 capable of being seated upon the upper extremity of the annular flange 56 of the rear housing 37 whereby a water tight seal can be effected for preventing moisture entering the recess 40 that may interfere with the successful operation of the fuse 41. An indicator lamp 67 and resistor 68 are mounted within the cap 65.

An annular contact ring 69 is secured to the plug 59 having contact with the upper free end 58 of the blade 57. One lead wire 70 from the lamp is connected to the contact ring 69 whereas one lead wire for the resistor 68 is connected to the fuse socket 60 and its opposite lead wire to the lamp. When the knob or cover is in place upon the body of the fuseholder it is obvious that the fuse 41 will be connected in series with the terminals 47 and 51 and the lamp 67 and resistor connected in series with the terminals, but in parallel with the fuse whereby when the fuse blows the lamp will glow to indicate its inoperative condition.

A gasket 71 is arranged between the body of the fuseholder and panel board 44 so as to effect a water-tight seal therebetween whereby the outer face of the panel board will be splashproof. The sectional body may be impregnated with any suitable waterproofing composition so that the fuse can be completely sealed against moisture when fuses are employed, on low voltage circuits otherwise it is best when connected to higher voltage circuits or when the body should be vented to provide the vent openings 72 in the base section 38.

In that form of invention shown in FIGURES 12 to 15 inclusive of the drawings, the fuseholder is for housing standard knife blade type cartridge fuses. The fuse 73 as shown represents a standard 61 to 100 ampere size, but by slightly enlarging the fuseholder parts, and maintaining the same design larger knife blade type fuses of 101 to 200 amperes may be housed therein.

The sectional body of the fuseholder comprising a rear housing 74 and a base section 75 connected together by means of the drive screw 76 forming the open upper end and recess 77 for receiving the fuse 73. A ring nut 78 is seated between the section of the body and has the side terminal stud bolt 79 connected thereto. Another terminal stud bolt 80 is retained within the base section 75 of the body and connected thereto by means of the nut 81 is a fuse clip 82 for receiving the lower knife blade 83 of the fuse.

This fuse clip 82 firmly grips the blade of the fuse and therefore I provide an ejector for releasing the same so that the fuse may be more readily removed from

the body. This ejector comprises a plate 84 upon which rests the lower end of the fuse ferrule 85. This plate 84 is provided with an opening through which passes the knife blade 83 of the fuse and projecting therefrom is a sleeve 86 capable of sliding upon the fuse clip 82. Lugs 87 are formed with the sleeves and are adapted to contact the lugs 88 formed with the upper end of the fuse clip for limiting the upward movement of the ejector plate. A coil spring 89 normally tends to move the ejector plate upwardly within the recess 77 of the body against the action of the fuse 73 housed within the fuseholder.

A contact blade 90 has its lower end connected to the terminal stud 80, whereas its upper free end 91 projects with the annular flange 92 formed with the rear housing 74.

A gasket 93 is seated between the rear housing 74 and panel board 94 so that when the annular flange 92 projects through an opening within the panel board a water tight seal will be effected between the body of the fuseholder and panel board. Aligning apertured lugs 95 are formed with the rear housing 74 and base section 75 for receiving the bolts 96 of the fuseholder attaching hardware to the panel board.

The knob or cover for closing the upper open end of the recess 77 formed in the body of the fuseholder comprises a plug 97 molded preferably from the same material as that of the sections of the body. A cap 98 molded from the translucent material is secured to the plug 97 and arranged therebetween is an O-ring 99 capable of effecting a water-tight seal with the upper extremity of the annular flange 92 of the rear housing.

A fuse socket 100 has one end molded within the plug 97 and its opposite end is threaded for engagement with the ring nut 78 when attaching the cover to the body of the fuseholder. Rotatably received within the fuse socket 100 by means of the rivet 101 is a fuse clip 102 for engaging the upper knife blade 103 of the fuse 73. This fuse clip is preferably formed from a single strip of sheet metal having an apertured medial section 104 through which extends the rivet 101 and arranged between the section 104 and rivet is a spring 105 for permitting the fuse clip to rotate upon the rivet 101, but yet be securely retained within the fuse socket 100.

A pair of parallel side jaws 106 extend from the medial section 104 of the fuse clip for gripping the blade 103 of the fuse and the outer free end of each jaw 106 is provided with a flared tip 107 so as to guide the blade 103 between the jaws. To further permit and guide the entrance of the blade 103 between the jaws 106 one of the latter has a pair of parallel side lugs 108 formed therewith.

The indicator lamp 109 mounted within the cap 98 has one lead wire connected to the fuse socket 100 whereas the other lead wire of the lamp has a resistor connected thereto and from the latter a lead wire extends through an opening 110 to a contact ring 111 secured to the plug 97. The upper end 91 of the contact blade rides upon this contact ring for connecting the lamp 109 and its resistor in series to the terminals 79 and 80, but in parallel to the fuse 73 so that when the fuse blows the lamp 109 will glow to indicate the inoperative condition of the fuse.

A test hole 112 is formed within the cap 98 and this hole is sealed against moisture by the metal plug insert. A coil spring 113 makes contact between this metal plug and fuse socket 100 whereby one may insert a prong of an indicator into the hole 112 to ascertain from the outside of the panel board as to whether a line connection between the terminal 79 and 80 is established.

I claim:

1. A fuseholder comprising a body having a recess therein for housing a knife blade cartridge type fuse, a removable cover for closing the recess of said body, a fuse socket carried by said cover, a fuse clip rotatably mounted within said fuse socket having contact with one knife

blade of said fuse, a fuse clip mounted within said body having contact with the other knife blade of said fuse, contact terminals connected to said fuse socket and fuse clip mounted within said base, and a spring actuated ejector arranged about the fuse clip in said body for ejecting the knife blade of the fuse therefrom when said cover is removed from said body.

2. The combination with a fuseholder comprising a body having an open end recess therein for receiving a cartridge type fuse, a central contact terminal secured to said body and extending within the open end recess thereof whereby one ferrule of the cartridge type fuse, may have contact therewith, a side contact terminal extending within the open end recess of said body, a cover for closing the open end recess within said body and detachably connected to the latter, a fuse socket secured to said cover and having an open end recess formed therein, means for connecting said fuse socket to said side contact terminal, of a conical shaped coil spring mounted within the open end recess of said fuse socket, and engaging the cartridge type fuse, a fuse clip of resilient conductive material and being formed into an elongated split tube normally of a larger exterior diameter than that of the diameter of the open end recess of said fuse socket whereby it will have frictional engagement with the latter when inserted therein, one end of said fuse clip engaging the larger coil of said conical shaped coil spring for retaining the latter within said fuse socket, outwardly flared arms formed with the opposite end of said fuse clip, the medial portion of each said arms being adequately flexed as to permit sliding contact with the other ferrule of the cartridge type fuse, and the outer extremities of said arms engaging said fuse socket whereby said coil spring may freely force and retain the first mentioned ferrule of the cartridge type fuse in contact with said central contact terminal.

3. A fuse clip for engagement with the inner wall of an electrically conductive fuse socket comprising an elongated split tube formed from a single sheet of resilient conductive material with its opposed ends opened, one end of said fuse clip having a preset unstressed polygonal configuration in cross section, said end of said fuse clip of a polygonal configuration in cross section assuming and maintaining substantially the same rectilinear elevational configuration upon flexed engagement with the inner wall of said fuse socket to maintain an electrical contact with the latter, a plurality of arms formed with and extending from said end of said fuse clip having a polygonal configuration in cross section, and each arm being preset in outwardly flared configuration whereby the inner face of the medial portion of each arm will have direct electrical contact with the fuse when inserted within said fuse socket and the outer extremity of each arm being bent outwardly whereby those outer extremities will engage the inner wall of the fuse socket when inserted therein.

4. A fuseholder comprising a body having an open end recess therein for receiving a fuse and consisting of a base section and a rear housing section, a contact terminal mounted within said base section, said sections having aligning annular recesses formed in the opposed faces thereof, an internally threaded ring conductor having its opposite ends seated within the aligning recesses formed within said sections, a contact terminal having one end connected to said ring conductor and its opposite end extending through and beyond said base section, means for connecting said sections of the body together whereby said ring conductor and contact terminal connected thereto will be removably retained therebetween, a cover for closing the open end recess of said body, a fuse socket secured to said cover and having a threaded end engageable with the threads of said ring conductor.

5. A dead front fuseholder and indicator for a cartridge fuse having blade type contacts comprising in combination a sectional base having an open end recess for receiving

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the fuse, a ring nut conductor seated within the sections of said base, a side contact terminal connected to said ring nut and extending from said base, means for connecting the sections of said base together whereby said ring nut and contact terminal will be retained therebetween, a fuse clip formed from a single strip of flexible conducting material for receiving one blade of the fuse, a bottom contact terminal extending through the base of said fuse clip for retaining the latter within the open end recess of said body, a cover for closing the open end recess of said body, including a plug molded insulating material, a fuse socket received within said plug and having a threaded end engageable with said ring nut, a fuse clip formed from a single strip of flexible conducting material for receiving the other blade of the fuse, means for rotatably connecting the last mentioned fuse clip to said fuse socket, a lamp indicator mounted upon said plug, and electrically connected to said fuse socket thereof, a translucent cap extending over said lamp indicator and connected to said plug, a contact ring connected to said plug and electrically connected to said lamp indicator, said body having a longitudinally extending groove formed therein, a contact blade arranged within the groove of said body and formed from a single strip of flexible conducting material, means for electrically con-

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necting said contact blade with said bottom contact terminal, prongs formed with the opposite sides of said contact blade for retaining the latter within the groove of said body whereby the opposite or free end of said contact blade may be retained in contact with said contact ring secured to said plug.

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