July 2, 1940. W. C. LINTON 2,206,787

NONTAMPERABLE FUSE

Filed March 6, 1939 2 Sheets-Sheet 1

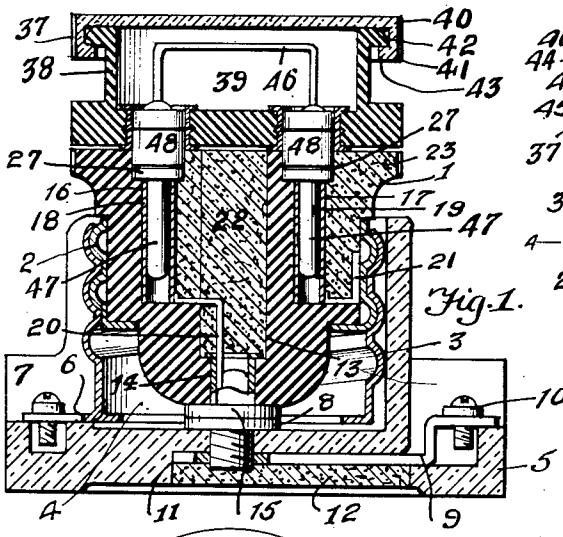


Fig. 1.

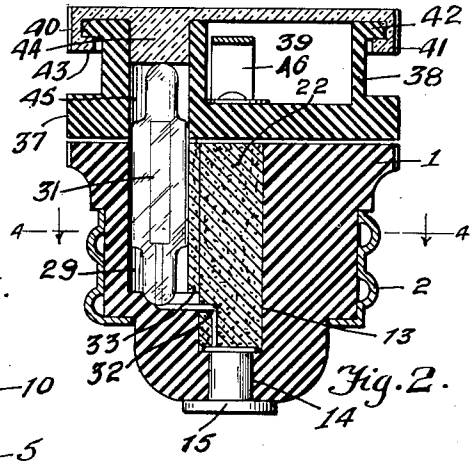


Fig. 2.

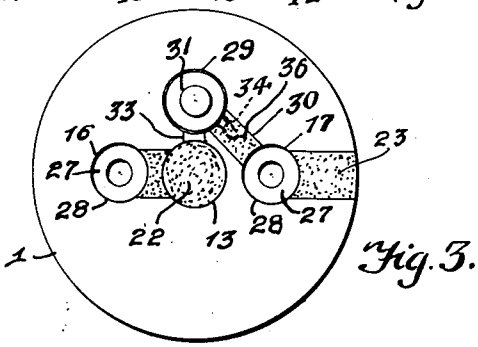


Fig. 3.

Fig. 4.

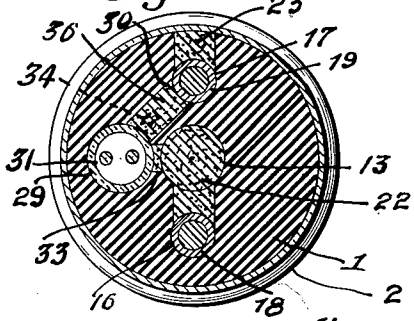
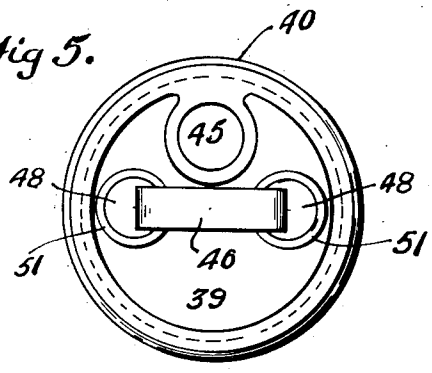


Fig 5.



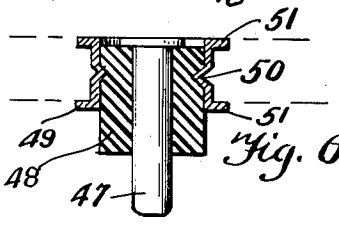


Fig. 6.

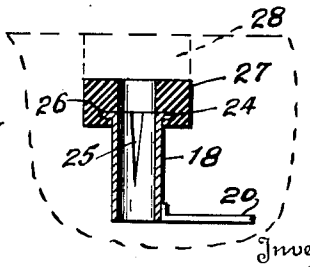


Fig. 7.

Inventor

William C. Linton.

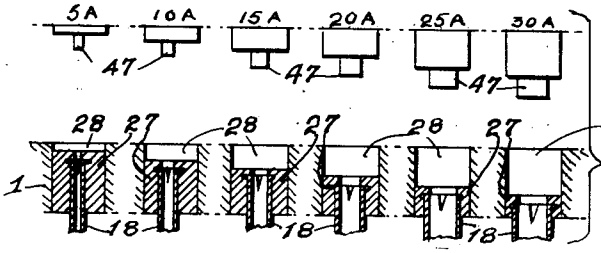


Fig. 8.

July 2, 1940. W. C. LINTON 2,206,787

NONTAMPERABLE FUSE

Filed March 6, 1939 2 Sheets-Sheet 2

Fig. 9.

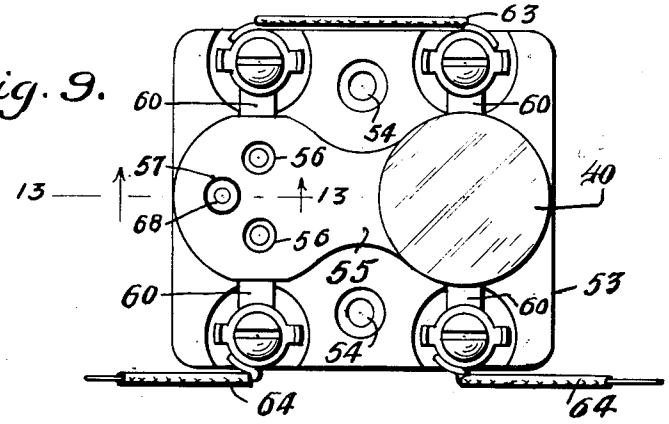
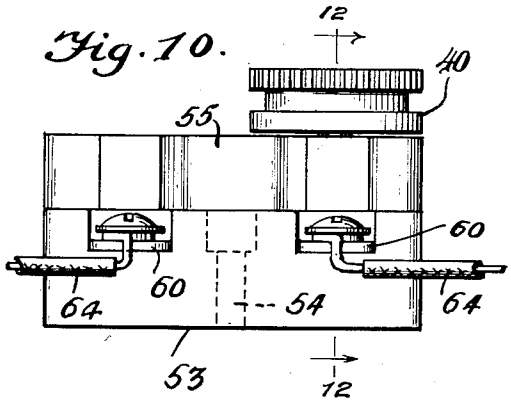


Fig. 10.



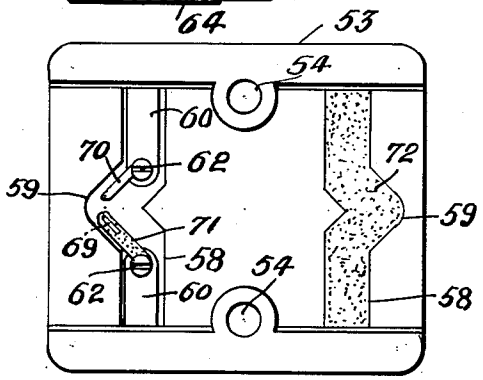


Fig. 11.

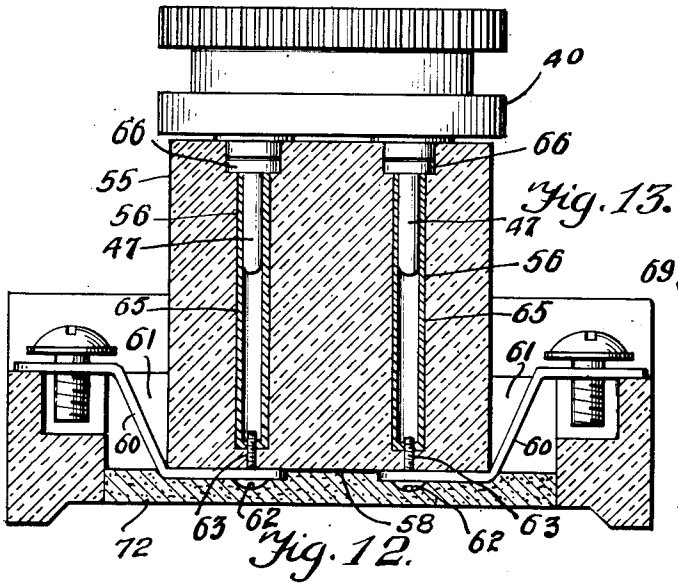
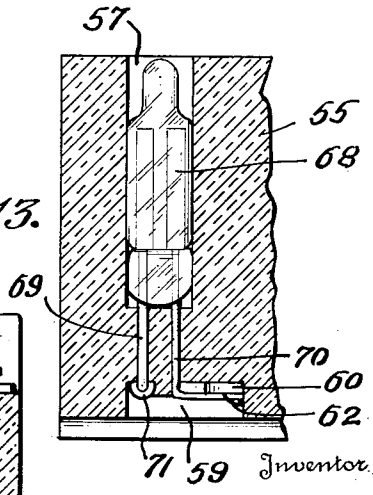


Fig. 12.

Fig. 13.



Inventor.

William C. Linton.

Patented July 2, 1940

2,206,787

UNITED STATES PATENT OFFICE

2,206,787

NONTAMPERABLE FUSE

William C. Linton, Washington, D. C., assignor to Fuse Indicator Corporation, Washington, D. C., a corporation of Delaware

Application March 6, 1939, Serial No. 260,162

8 Claims. (Cl. 200—119)

The present invention relates to electrical circuit breakers of the plug fuse type and more particularly to the so-called nonrenewable and nontamperable plug fuses designed so as to be subject to tampering or bridging only with difficulty. The improved fuse plug may be applied to a specially designed cutout base or when used in connection with standard plug fuse cutout bases, a specially designed adapter is installed in these standard cutout bases which when once installed are nonremovable and will accommodate fuses of my special design only. When the adapters and fuses are fully assembled and installed, no live parts are exposed. My specially designed fuses are not necessarily interchangeable with other conventional types of plug fuses and can be replaced only with a fuse having the proper and required amperage rating.

An important object of the invention is the provision of a visual signal or indicating means which will normally announce the opened condition of the electrical circuit in which the cutout base or adapter thereof is installed and which will also visibly indicate the integrity of the fuse plug connected to such adapters or cutout bases.

Another object of the invention is to provide a cutout base or block for electrical circuits which can be readily substituted for the standard cutout block now in general use and which will be less in the cost of manufacture than the standard cutout block, thereby rendering the same commercially desirable.

A still further object of the invention is to provide an adapter for the standard cutout blocks, which when once applied, will be retained against removal and a visual signalling means incorporated therein for announcing the condition of the electrical circuit and to which may be applied a plug fuse so designed that only plugs of correct or predetermined amperage ratings may be used for completing the electrical circuit.

Another object of the invention is to provide a cap or plug carrying a fuse strip and also embodying in its construction a cover of light penetratable material so formed that when the plug is in use, a portion of the cover will be disposed in engagement with the outer end of a glow lamp indicator within the cutout base or adapter therefor, which will cause the cap to be illuminated for prominent display when the fuse strip is ruptured.

Other objects of the invention will be in part obvious and in part pointed out hereinafter.

In order that the invention and its mode of operation may be readily understood by persons skilled in the art, I have in the accompanying drawings and in the detailed following description based thereupon, set out an embodiment of the same.

In the drawings:

Fig. 1 is a transverse sectional view taken through a standard or conventional type of cutout base having my improved adapter and plug applied thereto.

Fig. 2 is a sectional view taken at right angles to Fig. 1 through the adapter and the fuse plug therefor.

Fig. 3 is a plan view looking at the outer end of the adapter.

Fig. 4 is a horizontal sectional view taken through the adapter along the line 4—4 of Fig. 2 in the direction of the arrow points.

Fig. 5 is a plan view looking at the top of the plug with its cover removed.

Fig. 6 is a fragmentary sectional view upon an enlarged scale illustrating the manner in which pins of the plug are mounted.

Fig. 7 is a similar view illustrating the construction and mounting of the pin receiving sockets within the adapters or cutout blocks.

Fig. 8 is a diagrammatic view illustrating the manner in which the parts cooperate to only accommodate current of predetermined amperage.

Fig. 9 is a top plan view of a specially constructed fuse block or cutout base embodying the invention.

Fig. 10 is a side elevation of the fuse block shown in Fig. 9.

Fig. 11 is a bottom plan view of the fuse block having a portion of the plastic cement covering removed.

Fig. 12 is a sectional view taken along the line 12—12 of Fig. 10 in the direction of the arrow points, but illustrating the plug in elevation, and

Fig. 13 is a fragmentary sectional view taken along the line 13—13 of Fig. 9 in the direction of the arrow points.

The improved fuse illustrated in Figs. 1 through 8 is of the adapter type and has a body 1 formed of insulating material and carrying shell 2 of conductive material which is threaded in order that the plug or adapter may be screwed into the shell or socket 3 mounted in the well 4 of the conventional cutout block 5. The socket 3 of conductive material is mounted in the well 4 in a conventional manner and is provided with the usual ear 6 carrying a screw 7 by means of which a conductor wire is connected with the ear. There has also been provided a center terminal 8 having a threaded shank which passes through the bottom of the well and is threaded through the inner end of a conductor strip 9. A screw 10 is carried by the outer end of the conductor strip and the groove or recess 11 through which the strip extends is filled with plastic cement 12 to shield the strip and maintain it in place.

The central portion of the adapter plug or body is bored to form a pocket 13 having its lower end portion 14 reduced in diameter for holding a center terminal or rivet 15 which contacts the

terminal 8 when the plug is in place. There have also been provided pockets 16 and 17 for receiving sleeves or sockets 18 and 19 formed of conductive material, and upon referring to Figs. 3 and 4, it will be seen that the pocket 16 communicates with the center bore 13 while the pocket 17 extends through a side portion of the body. Therefore, the conductor strip 20 of the sleeve 16 may extend into the bore 13 and have an end portion soldered to the center terminal or rivet 15 and the conductor strip 21 of the sleeve 19 may be soldered to the sleeve 2 as shown in Fig. 1. After the sleeves are set in place and their conductor strips soldered to the center terminal and the sleeve terminal, the pockets 16 and 17 and the center bore of pocket 13 are filled with plastic cement, as shown at 22 and 23, and the sleeves will be firmly held in place with the upper or outer ends of the sockets exposed, as shown in Fig. 3.

The sockets 18 and 19 are each formed from a tube of conductive metal having an outstanding annular flange 24 about its upper end, as shown in Fig. 7, and referring to this figure, it will be seen that the sleeve is split from its upper end, as shown at 25. The flange 24 of each socket is engaged in the internal annular groove 26 of a cylindrical block 27 made of insulating material and which fits into an enlarged portion 28 at one end of the pockets 16 or 17. These blocks or insulating rings 27 completely cover the upper ends of the resilient sockets or contacts 18 and 19 so that no live conductors are exposed from the upper opened face of the body 1 of the adapter. Also, the blocks 27 are of varying thicknesses, as illustrated in Fig. 8, for a purpose which will be later described. In each adapter the size and length of the rings 27 and sockets 18 and 19 are the same. It will also be noted from an inspection of Fig. 8, that the sleeves 18 and 19 may be of a narrow diameter, as shown at the left of Fig. 8, or of increased diameter, as shown at the right of this figure, according to the use to which the plug is intended.

In addition to the center bore 13, the body 1 is also bored to form a pocket 29 connected with the pocket 17 by a channel 30. A neon glow lamp 31 fits snugly within the pocket 29 and has a conductor 32 extending from its inner end through a channel 33 into the center bore where it is soldered to the center terminal or rivet 15, the channel 33 being then filled with the plastic cement with which the center bore is filled. The other conductor 34 of the glow lamp extends into the channel 30 for a portion of the length of this channel and has its end embedded in a leak resistor composition extending to and making contact with the sleeve 19 and constituting means for permitting current to leak to the lamp for causing the latter to give off a visible signal, but preventing any excessive current from passing through the electrical circuit. After the conductor 34 has been embedded in the composition, the channel 30 is filled with sealing cement 36. This leak resistor being positioned in the bottom of the channel 33 and covered with the plastic cement 36 does not appear upon the drawings but is of the same construction as that of the leak resistor 71 shown in Fig. 11. The casing 1 is preferably molded from porcelain, having the central bore 13 and 14 extending therethrough and parallel pockets 16, 17 and 29. The pockets 16 and 29 communicate throughout their entire length with the central bore 13 by means of the vertically extending passageways, whereas, the pocket 17 communicates with the pocket 29 by means of a vertically extending passageway 30 and a vertically extending passageway leading to the outer face of the body 1. This arrangement permits the lamp and conductors to be easily placed within the so-molded body 1 and after they are assembled, the plastic cement completely fills the remaining portions of the pockets, central bore and passageways, whereby the lamp and conductors are permanently retained within the body 1.

The fuse plug 37 comprises a body molded from insulating material such as Bakelite or the like and has an annular wall 38 defining an explosive chamber 39 closed at its outer end by a cover 40 formed of transparent or translucent material which has its margins formed with a flange 41 surrounding the flange 42 of the annular wall 38 and terminating in an inwardly extending lip 43 engaged under the flange of the wall to firmly hold the cover in place. A portion of the cover is inwardly thickened to form a lug 44 which is snugly received in a well 45 formed through the plug and, upon referring to Fig. 2, it will be seen that the well is so located and of such diameter that when the cap is applied to the adapter 1, the outer portion of the glow lamp will extend into the well and its extremity engage the inner end of the lug 44. Therefore, when the lamp is energized, light will be diffused through the cover of light penetrable material and clearly indicate that the fuse has been blown.

The fuse strip 46 is housed in the chamber 39 and has its ends soldered or otherwise united to pins 47, which are formed of conductive material and pass through collars 48 formed from suitable insulating materials. These collars pass through sleeve 49 which are formed of metal and crimped inwardly to provide annular ribs 50 which grip the collars, as shown in Fig. 6, and firmly hold the collars against slippage longitudinally through the sleeves. These sleeves pass through openings formed in the cap and at their ends are crimped to form flanges 51 which firmly hold them in place. The collars may be very short, as shown at the left of Fig. 8, or of increased length, as shown at the right of this figure and the pins 47 are of predetermined diameter, being either of small diameter, as shown at the left of Fig. 8, or of large diameter, as shown at the right of the figure. By making the collars and the pins of predetermined dimensions, they can only be accommodated in pockets 28 and sleeves 18 of corresponding size. Therefore, a fuse carrier intended to pass current of a certain amperage can only be applied to an adapter or body 1 having pockets 28 and sleeves or sockets 18 of the proper or corresponding size and there will be no danger of damage by applying a plug of the wrong capacity to an adapter intended to receive a fuse carrier of a certain predetermined capacity.

From this arrangement, it is apparent that the lamp 31 and leak resistor are in series with the contact terminals 13 and 15 of the adapter and when the latter is inserted within a threaded socket of a cutout base, as shown in Fig. 1, the current will cause the lamp to glow. When a fuse plug is inserted within the adapter, the fuse link 46 will be in series with the contact terminals 13 and 15 and the current will readily flow through the fuse link, thereby completing the electrical circuit, but should the fuse link be-

come blown or ruptured, the current will pass through the lamp as the latter is in parallel with the fuse link. When the lamp glows, this latter will clearly indicate that the fuse has been blown and its fuse carrier 40 should be removed and a new one applied. As previously explained, only a plug of the proper capacity may be applied to the adapter and danger of damage due to use of a plug of the wrong capacity will be eliminated.

The adapters, when once placed within the threaded shells 3 of the cutout block, should be permanently affixed thereto by means of solder or the like, or the shells 2 may have prongs formed therewith which permit the shells 2 to be screwed within the sockets 3, but which prongs prevent the plug from turning in an anti-clockwise direction or any other conventional means of locking the plug to the cutout blocks may be employed.

Where it is possible to install my improved cutout block, as illustrated in Figs. 9 to 13 inclusive of the drawings, the adapter 1 may be dispensed with. In these latter figures, I have illustrated a twin fuse cutout block but it will be apparent that any number of fuse holders may be employed as required by the electrical circuit in which the block is installed.

The standard or conventional cutout block is molded from porcelain having pockets or recesses formed therein in which may be mounted the threaded shells 3 and other metal conductors, as shown in Fig. 1, but as the threaded sockets 3 are not needed in my improved cutout block, the fuse plug supports are molded from porcelain, having pockets formed therein which correspond to the pockets 16, 17 and 29 formed within the body 1 of the adapter.

My improved cutout block consists of a base 53 formed with openings 54 through which fasteners are passed for securing the same to a supporting board or the like in a fuse box of an electric circuit of a lighting system or the like. A block 55 extends from the base and has its end portions enlarged, as shown in Fig. 9, to provide a support for two fuse plugs of the same design as those shown in the preferred embodiment of the invention. These end portions are each formed with two pockets 56 and an intermediate pocket 57 in offset relation to the pockets 56. Below each pair of pockets 56 the base has its under face formed with a transversely extending groove 58 having a transversely extending offset portion 59. Conductor strips 60, which pass through openings 61 in the base, have their outer ends provided with terminal screws and their inner end portions extend into the groove 58 and formed with threaded openings to receive screws 62 which pass through openings 63 drilled or formed within the block and engage through openings in lower or inner ends of tubular sleeves 65 to hold these sleeves in the pockets 56. The strips 60 at one side of the base are connected by a conductor wire 63 engaged with the terminal screws of these strips and the circuit wires 64 are applied to the terminal screws of the strips at the other side of the base. This latter is a conventional setup in fuse cutout blocks or bases and it will be readily understood that when my fuse plugs 40 are applied with their pins 47 in contact with the sockets 65, a circuit will be closed for permitting current to flow through the same until the fuse link 46 of one of the so applied plugs is ruptured by overload or a short circuit. The sockets 65 are similar in construction to the sockets 18 and 19 of the adapter and have their outer ends engaged with rings 66 corresponding to the rings 27. As previously set forth, the sockets and the pins and their collars must be of companion dimensions in order to permit insertion of the pins and, therefore, only fuse carriers intended to accommodate current of predetermined amperage may be applied to a block installed in a fuse box. The glow lamp 68 which fits into the pocket 57 corresponds to the glow lamp 31 and its conductors 69 and 70 extend into the offset portion 59 of the groove 58. The lead wire 70 of the lamp is engaged with the screw 62 of one of the companion conductor strips 60 while the other is embedded in the plastic leak resistor composition 71. This composition extends from the conductor 69 to the screw 62 of the other companion conductor strip 60 and after it has hardened, the groove 58 and offset portion 59 are filled with plastic cement 72. Ordinarily, the current flows through the fuse link but when one of these fuse links is ruptured, current will then pass through the companion glow lamp and illuminate the cover of light penetrable material for the fuse plug, thus indicating that its fuse strip has been ruptured. The faulty fuse plug may thus be easily located and replaced.

Manifestly, the construction herein shown is capable of considerable modification and such modifications as come within the scope of my claims, I consider within the spirit of my invention.

I claim:

1. In a fuse structure of the character described, a body of insulating material formed with longitudinally extending pockets, terminals, sleeves of conductive material in certain of said pockets having conductors extending to said terminals, a glow lamp in one pocket having a shunt circuit connection with said sleeves including a leak resistor, sockets mounted in said sleeves and being of predetermined dimensions, a filling of plastic cement for said pockets, and a companion fuse plug consisting of a body, pins carried by the body of said fuse plug and being of dimensions adapting them to fit only into sockets of companion dimensions carried by said sleeves, and a fuse strip housed in the fuse plug and connecting said pins.

2. In a fuse structure of the character described, a body of insulating material formed with pockets, terminals, sleeves in certain of said pockets in electrical connection with said terminals, tubular sockets carried by said sleeves, blocks of insulating material connected with outer ends of said sockets, the sockets and blocks being of predetermined length and formed with registering bores of predetermined diameter, an indicator lamp in one pocket having a shunt circuit connection with said sleeves including a leak resistor, and a fuse plug consisting of a body defining an explosion chamber, blocks of insulating material carried by the body of said fuse plug and passing through a wall thereof, pins of conductive material passing through the blocks of the fuse plug body, the pins and companion blocks being of predetermined dimensions adapting the pins to be only snugly engaged in sockets of companion dimensions, and a fuse strip in the explosion chamber of said fuse plug in bridging connection with said pins.

3. In a fuse structure of the character described, a body of insulating material formed with pockets, terminals, sleeves in certain of said

pockets in electrical connection with said terminals, sockets carried by said sleeves, an indicator lamp in one pocket having a shunt circuit connection with said sleeves including a leak resistor and a fuse plug consisting of a body, pins housed in the body of said fuse plug for engaging in said sockets, a fuse strip housed in said fuse plug in bridging connection with said pins, and a cover of light penetrable material for the fuse plug body, said fuse plug body having a well for receiving the outer portion of said lamp, and said cover having a portion extending into the well for engaging the outer end of said lamp.

4. In a fuse structure of the character described, a body, and a companion fuse plug, tubular sockets of conductive material mounted in said body, said sockets being split longitudinally from their outer ends and at their outer ends formed with outstanding annular flanges, collars surrounding outer ends of said sockets and formed with interval seats receiving the flanges of the sockets, the sockets and their collars being of predetermined length and formed with registering bores of predetermined diameter, said fuse plug being formed of insulating material and defining an explosion chamber open at its outer end, sleeves extending through the bottom of said fuse plug, blocks in said sleeves projecting outwardly therefrom, pins of conductive material passing through said blocks and projecting outwardly therefrom, the blocks and pins being of predetermined length and the pins being of predetermined diameter adapting the pins to be snugly received only in sockets of companion dimensions, a fuse strip in said explosion chamber in bridging engagement with said pins, and a cover for the open outer end of said explosion chamber formed of light penetrable material.

5. In a fuse structure of the character described, an adapter comprising a body bored from its outer end to form a central pocket and a pair of pockets spaced from opposite sides of the central pocket radially of the body, one of the pair of pockets having an open side communicating with an open side of the central pocket and the other pocket of the said pair of pockets extending through a side portion of the body, the body being also bored to form a lamp receiving pocket and channels leading therefrom to the central pocket and the second mentioned one of the said pair of pockets, a center terminal secured through the lower end portion of the central pocket, a terminal shell fitting about said body, sleeves of conductive material in the pair of pockets having conductors leading one to the center terminal and the other to the shell terminal, a glow lamp in the lamp receiving pocket having conductors leading one to the center terminal and the other into the channel leading to the second mentioned one of the said pair of pockets, a leak resistor plastic composition in the last mentioned channel engaged by the conductor therein and the last mentioned sleeve, plastic cement filling the channels and the center pocket and the side extension of the second mentioned one of the said pair of pockets, sockets of conductive material mounted in said sleeves with open ends exposed through the outer end of said body, and a fuse plug consisting of a body defining an explosion chamber, pins of conductive material extending through the bottom of the fuse plug body for engaging in said sockets, a fuse strip in the explosion chamber in bridging connection with said pins, said fuse plug being formed with a well exposing the outer end of said glow lamp, and a cover for the fuse plug formed of light penetrable material.

6. In a fuse structure of the character described, an adapter having a body of insulating material, a center terminal, a terminal shell, sleeves of conductive material mounted in said body and connected with the center terminal and the sleeve terminal, sockets of predetermined dimensions mounted in said sleeves, a glow lamp mounted in said body and having conductors, one of which leads to the center terminal, a leak resistor connecting the other conductor of said lamp with the sleeve connected to the terminal shell, and a fuse plug consisting of a body defining an explosion chamber, pins mounted through the bottom of the fuse plug body and of predetermined dimensions adapting the pins for engagement only in sockets of companion dimensions, a fuse strip in the explosion chamber of the fuse plug in bridging engagement with said pins, and a cover of light penetrable material for the explosion chamber of said fuse plug, the fuse plug being formed with a well for exposing the outer end of said lamp.

7. In a fuse structure of the character described, a fuse plug adapted for use in connection with an adapter including pin-receiving sockets and a signal lamp having a shunt circuit, said fuse plug comprising a body of insulating material defining an explosion chamber, pins of conductive material mounted through the bottom of said chamber and projecting from the body for engagement with sockets of the adapter, a fuse strip in said chamber mounted in bridging engagement with said pins, said body having a well for receiving the outer end of the signal lamp, and a cover of light penetrable material closing the outer end of said chamber and having a boss extending inwardly into said well for engaging the outer end of the signal lamp.

8. In a fuse structure of the character described, a mounting comprising a body of insulating material having a base for said body adapted to be secured against a support, the under face of said base being formed with a transverse groove extending across the base under the body and having its intermediate portion offset laterally, said body having formed therein sleeve-receiving pockets and a lamp-receiving pocket, sleeves of conductive material mounted in the sleeve-receiving pockets, sockets of conductive material carried by lower end portions of said sleeves, conductor strips extending through openings formed in the base at opposite sides of said body with their inner end portions disposed longitudinally in said groove, terminal screws carried by outer end portions of said strips, securing screws passed through inner ends of said strips and into the sleeve-receiving pockets with their inner ends in threaded engagement with said sleeves, and a fusible element detachably connected to the upper end portion of said sleeves.

WILLIAM C. LINTON.