

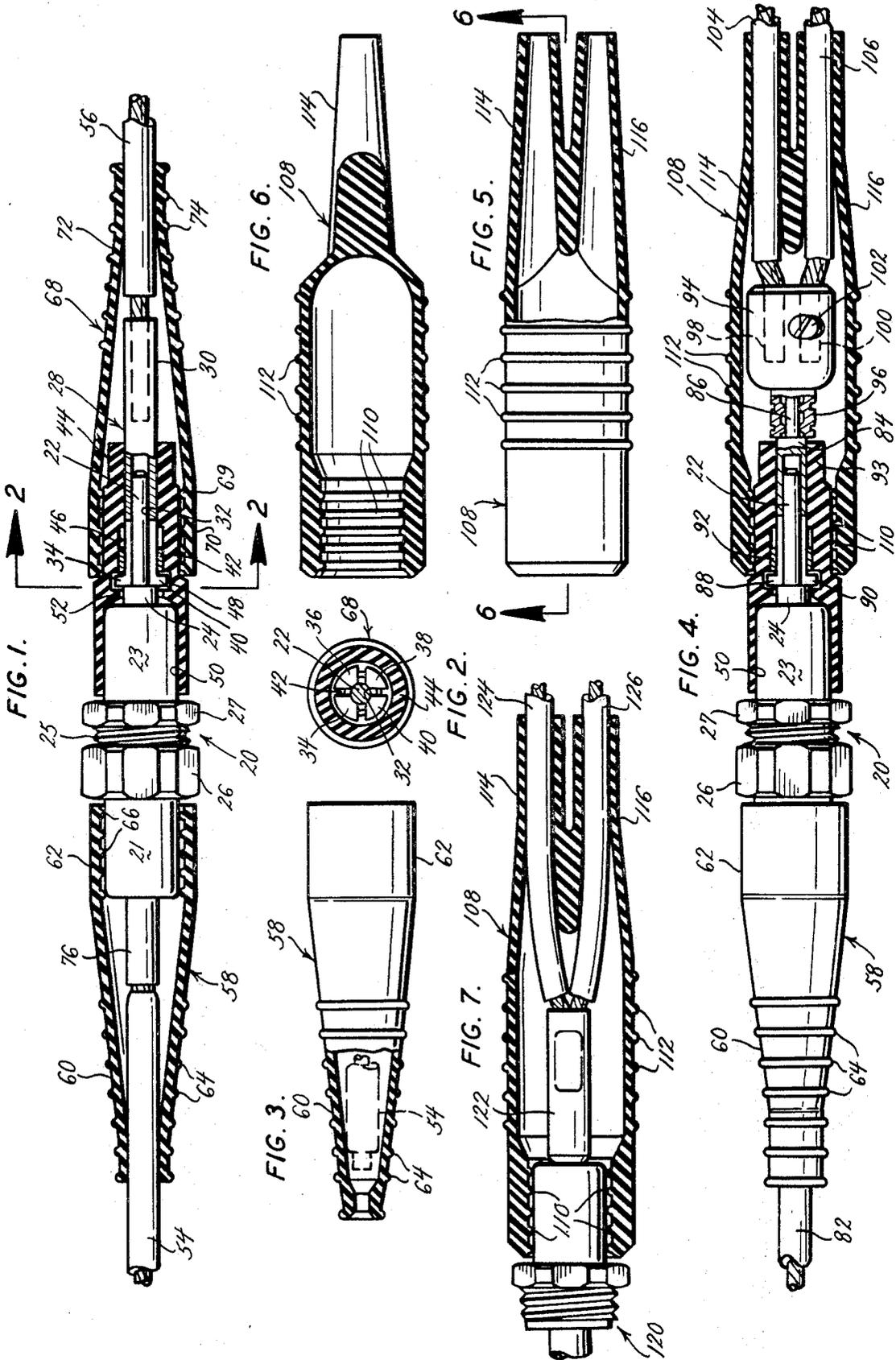
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PROTECTOR FOR ELECTRIC CIRCUITS

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PROTECTOR FOR ELECTRIC CIRCUITS
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U.S. Cl. 337—201 **12 Claims**

ABSTRACT OF THE DISCLOSURE

A sleeve of insulating material encases and insulates a female connector which is connected to a conductor and which normally telescopes over a male connector on one end of a fuseholder, and a boot of insulating material normally encases and insulates the connection between that female connector and that conductor. That boot and that sleeve of insulating material will remain with that female connector whenever that female connector releases that male connector, and will thereby continue to encase and insulate that female connector and that conductor.

This invention relates to improvements in protectors for electric circuits. More particularly, this invention relates to improvements in fuseholders and in separable connectors used therewith.

It is, therefore, an object of the present invention to provide an improved fuseholder and an improved separable connector used therewith.

It is desirable to interpose fuseholders between the sockets for street lamps and the power lines connected to those sockets; because the fuses within those fuseholders can provide important electrical protection. That electrical protection can be impaired, and those fuseholders can be damaged, when vehicles strike and break off those street lamps; because the conductors within those street lamps can, as those street lamps are broken off, apply destructive tensile forces to the fuseholders and to the connections between those fuseholders and the power lines. It would be desirable to equip a fuseholder, to be interposed between the socket of a street lamp and the power line connected to that socket, with a separable connector which would respond to forces smaller than the elastic limit of that fuseholder to separate from that fuseholder; and it would be desirable to provide that separable connector with insulation which would remain with that separable connector as it is separated from that fuseholder. Such a separable connector and the insulation therefor would keep that fuseholder from being subjected to destructive forces, and would continue to effectively insulate that separable connector after it was separated from the fuseholder. It is, therefore, an object of the present invention to equip a fuseholder, to be interposed between the socket of a street lamp and the power line connected to that socket, with a separable connector which will respond to forces smaller than the elastic limit of that fuseholder to separate from that fuseholder, and to provide that separable connector with insulation which will remain with that separable connector as it is separated from that fuseholder.

Other and further objects and advantages of the present invention should become apparent from an examination of the drawing and accompanying description.

In the drawing and accompanying description several preferred embodiments of the present invention are shown and described but it is to be understood that the drawing and accompanying description are for the purpose of illustration only and do not limit the invention and that the invention will be defined by the appended claims.

In the drawing,

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FIG. 1 is a partially sectioned view of a fuseholder, of a separable connector used with that fuseholder, of a sleeve of insulating material used with that separable connector, and of two boots of insulating material used with that fuseholder and with that separable connector,

5 FIG. 2 is a cross-sectional view that is taken along the plane indicated by the line 2—2 in FIG. 1,

FIG. 3 is a partially broken-away, side elevational view of one of the boots of insulating material shown in FIG. 1,

10 FIG. 4 is a partially sectioned side view showing the fuseholder of FIG. 1 assembled with a different separable connector and with a different boot for that separable connector.

FIG. 5 is a partially sectioned view of the different boot shown in FIG. 4,

15 FIG. 6 is a sectional view through the different boot shown in FIG. 4, and it is taken along the plane indicated by the line 6—6 in FIG. 5, and

FIG. 7 is a partially sectioned view of a different fuseholder and of a boot of insulating material therefor.

20 Referring to the drawing in detail, the numeral 20 generally denotes a fuseholder of the type shown in my Pat. No. 3,356,806 for Protectors for Electric Circuit which was granted Dec. 5, 1967; and that fuseholder has a body portion 21 and a body portion 23. The body portion 23 has an external thread 25 at the left-hand end thereof, has a hexagonal wrench-receiving surface 27 adjacent that thread, and has a male connector 22 projecting outwardly beyond the right-hand end thereof. The male connector 22 has an enlarged diameter portion 24 that abuts the body portion 23. The body portion 21 has a nut 26 with an internal thread rotatably mounted on the right-hand end thereof and has a terminal 76, with an elongated recess in the shank thereof, projecting outwardly beyond the left-hand end thereof. The body portions 21 and 23 are hollow; and they coact to form a recess which will accommodate a cartridge type electric fuse, all in the manner shown by my said patent.

25 The numeral 28 generally denotes a separable connector of tubular configuration; and that separable connector has a continuous and unbroken sleeve-like portion 30 at the right-hand thereof, and has elongated, flexible fingers 34, 36, 38 and 40 at the left-hand end thereof which define an elongated recess 32. The fingers 34, 36, 38 and 40 have radially-extending flanges at the free ends thereof; and the inner surfaces of those fingers can be spread far enough apart to accommodate the male connector 22 on the body portion 23 of the fuseholder 20. As a result, the fingers 34, 36, 38 and 40 enable the separable connector 28 to act as a female connector. However, a split ring 42 of resilient material, such as spring steel, encircles the free ends of the fingers 34, 36, 38 and 40; and that split ring biases those free ends into a position wherein they define an opening with a diameter smaller than the diameter of the male connector 22 on the body portion 23. This means that the male connector 22 must distend that split ring as it is moved into the elongated recess 32 defined by the fingers 34, 36, 38 and 40. After that male connector has been moved into the elongated recess 32, the force which the split ring 42 applies to the fingers 34, 36, 38 and 40 will hold those fingers in intimate engagement with the male connector 22, thereby providing good mechanical securement and good electrical contact between those fingers and that male connector.

30 The numeral 44 denotes a sleeve of insulating material, such as neoprene; and the inner diameter of the right-hand end of that sleeve is slightly smaller than the diameter of the separable connector 28. As a result, that right-hand end of that sleeve has a press fit with that separable connector. An annular recess 46 is provided in

the sleeve 44; and that recess is dimensioned to accommodate the split ring 42. A further annular recess 48 is provided in the sleeve 44; and that recess is dimensioned to accommodate the radially-directed flanges at the free ends of the fingers 34, 36, 38 and 40 of the separable connector 28. A larger diameter recess 50 is provided in the left-hand end of the sleeve 44; and the inner diameter of that sleeve is slightly smaller than the diameter of the body portion 23 of the fuseholder 20. As a result, the recess 50 will provide a close fit with that body portion when the left-hand end of the sleeve 44 is telescoped over that body portion. A shoulder 52 is provided in the sleeve 44 between the annular recess 48 and the larger diameter recess 50; and that shoulder will help prevent accidental separation of that sleeve from the separable connector 28.

The numeral 54 denotes an insulated conductor which has the right-hand end thereof freed of insulation; and that right-hand end is telescoped within the elongated recess in the shank of the terminal 76 of the body portion 21 of the fuseholder 20. Once that end of that conductor has been telescoped within that recess, the terminal 76 will be crimped, staked, or otherwise deformed to provide a permanent electrical and mechanical connection between that terminal and that end of that conductor. The numeral 56 denotes an insulated conductor which has the left-hand end thereof freed of insulation; and that left-hand end is telescoped within the continuous and unbroken sleeve-like portion 30 at the right-hand end of the separable connector 28. Once that end of that conductor has been telescoped within that portion, that portion will be crimped, staked or otherwise deformed to provide a permanent electrical and mechanical connection between that conductor and the separable connector 28.

While the separable connector 28 will be permanently connected to the conductor 56 by the crimping, staking, or other deforming of the sleeve-like portion 30, that separable connector will have only a frictional engagement with the male connector 22 of the body portion 23 of the fuseholder 20. That frictional engagement will provide holding forces which are strong enough to prevent accidental separation of the separable connector 28 from the male connector 22, and which are strong enough to provide a low resistance electrical connection between that separable connector and that male connector; but those holding forces will be smaller than the elastic limit of the fuseholder 20. This is important; because it enables the separable connector 28 to release the male connector 22 before the fuseholder 20 can be subjected to potentially-hurtful forces. Also, the separable nature of the connectors 22 and 28 is important in rendering a broken-off street lamp electrically "dead"—so persons coming in contact with that street lamp will not receive an electrical shock.

The numeral 58 generally denotes a boot of insulating material, such as neoprene; and that boot has a frusto-conical left-hand end 60 and a cylindrical right-hand end 62. Annular ribs 64 are provided at the exterior of the frusto-conical end 60, and annular ribs 66 are provided at the interior of the cylindrical end 62. The unstressed diameters of the annular ribs 66 at the interior of the cylindrical end 62 are slightly smaller than the diameter of the body portion 21, and hence those annular ribs will provide a close fit with that body portion as those ribs are distended and telescoped over that body portion. The smallest diameter of the frusto-conical left-hand end 60 of the boot 58 is smaller than the diameter of the insulation on the smallest-diameter wire which will be connected to the terminal 76 of the fuseholder 20. As a result, that frusto-conical left-hand end will be able to provide a close fit with the insulation on that conductor, as that left-hand end is distended to permit that conductor to be passed through it.

FIG. 3 shows the configuration of the boot 58 as that boot is sold; and it will be noted that the boot 58 in FIG.

1 has had part of the left-hand end 60 thereof cut off. That part was cut off because the insulation on the conductor 54 has a diameter which is appreciably larger than the inner diameter of the smallest diameter portion of the left-hand end 60 of the boot 58, as that boot is sold. Specifically, it will be noted that there are eight ribs 64 at the exterior of the left-hand end 60 of the boot 58 shown in FIG. 3, but there are only seven ribs 64 at the exterior of the boot 58 shown in FIG. 1—the left-hand-most rib 64 and the portion of the left-hand end 60 between that first rib and the second rib having been cut off.

In determining where the frusto-conical left-hand end 60 of the boot 58 should be cut, one end of the insulated conductor 54 will be telescoped through the cylindrical end 62 of the boot 58 and moved into engagement with the inner surface of the frusto-conical left-hand end 60. When a light pressure on the conductor 54 is unable to cause the left-hand end of that conductor to move any further through the frusto-conical left-hand end 60 of the boot 58, the portion of that frusto-conical left-hand end into which the insulated conductor 54 did not extend will be cut off, by appropriate use of a knife, scissors or the like. The cut will be made to the left of the right-handmost annular rib 64 through which the end of the insulated conductor 54 did not extend; and hence that rib and the part of the frusto-conical left-hand end 60 which is adjacent to, and slightly to the right of, that rib will have to be distended as the conductor 54 is subsequently pressed through that frusto-conical left-hand end. After the frusto-conical left-hand end 60 of the boot 58 has been cut, the insulated conductor 54 will be introduced into that boot by first passing it through the frusto-conical left-hand end 60 and then moving it through the cylindrical end 62. At such time, the bared end of that conductor will be telescoped into the terminal 76 of the body portion 21 of the fuseholder 20 and then that terminal will be crimped, staked or otherwise deformed to provide a permanent electrical and mechanical connection between that conductor and that terminal. Thereafter, the boot 58 will be shifted to the right, relative to the conductor 54, until the cylindrical end 62 telescopes onto the body portion 21 of the fuseholder 20.

The engagement between the frusto-conical end 60 of the boot 58 and the insulation on the conductor 54 will be snug and will be water-resistant. Similarly, the engagement between the annular ribs 66 at the inner surface of the cylindrical end 62 of that boot and the body portion 21 of the fuseholder 20 will be snug. Those annular ribs will coact with that body portion to provide a plurality of spaced seals; and those seals will effectively resist the entry of water into the joint between the boot 58 and the fuseholder 20.

The numeral 68 generally denotes a boot which can be identical to the boot 58. The annular ribs 69 within the cylindrical, left-hand end 70 of the boot 68 will be distended to telescope over the right-hand end of the sleeve 44; and those ribs will coact with that sleeve to provide a plurality of spaced seals. The frusto-conical right-hand end 72 of the boot 68 will be cut to provide a snug and intimate engagement with the insulation on the conductor 56; and, as with the boot 58, there are just seven annular ribs 74 at the exterior of the right-hand end 72 of the boot 68. The boot 68 will coact with the sleeve 44 on the separable connector 28 and with the insulation on the conductor 56 to provide water-resistant joints on opposite sides of the electrical connection between that conductor and that separable connector.

The fuseholder 20 has a water-tight seal between the body portion 21 and the terminal 76 thereof, has a water-tight seal between the body portion 23 and the male connector 22 thereof, and will provide a water-resistant seal between the body portions 21 and 23 thereof. The boot 58 will coact with the body portion 21 and with the insulation on the conductor 54 to keep water away from

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the electrical connection between that conductor and the terminal 76; and the sleeve 44 of insulating material and the boot 68 will coact with the body portion 23 and with the insulation on the conductor 56 to keep water away from the electrical connection between that conductor and the separable connector 28 and away from the electrical connection between that separable connector and the male connector 22. As a result, the fuse within the fuseholder 20 and the connections between that fuseholder and the conductors 54 and 56 are protected against moisture and water.

The conductor 56 will be connected to the "line" side of the circuit, and the conductor 54 will be connected to the "load" side of the circuit. The male connector 22 will thus be the "load" connector and the female connector 28 will thus be the "line" connector of the connection provided by those two connectors; and this is important, because that male connector will be exposed whereas that female connector will be protected whenever that connection is interrupted. Specifically, the portion of the sleeve 44 of insulating material which defines the recess 50 will project outwardly beyond the left-hand end of the female connector 28, and will thus keep that female connector from contacting any nearby objects or the ground as that female connector and the male connector 22 are separated. Further, that portion of the sleeve 44 of insulating material will keep a repairman from being shocked as he picks up the "line" connector of the connection provided by the male connector 22 and the female connector 28.

It should also be noted that the boot 68 will remain in engagement with the conductor 56 and with the sleeve 44 of insulating material whenever the connection provided by the male connector 22 and the female connector 28 is interrupted. Specifically, the annular ribs 69 at the interior of the cylindrical portion 70 of that boot will continue to remain in engagement with the exterior of the right-hand portion of the sleeve 44 of insulating material, and the small diameter right-hand end 72 of that boot will remain in engagement with the insulation on the conductor 56. As a result, that boot will continue to encase and to insulate the connection between the conductor 56 and the female connector 28 whenever the connection between that female connector and the male connector 22 is interrupted. The overall result is that the female connector 28 will continue to be protected and shielded and the connection between that female connector and the conductor 56 will continue to be encased and shielded whenever the connection provided by the male connector 22 and the female connector 28 is interrupted.

To restore the connection provided by the male connector 22 and the female connector 28 the repairman will grip the cylindrical end 62 of the boot 58, will grip the cylindrical portion 70 of the boot 68, and will guide the tapered tip of the male connector 22 into the female connector 28. Thereafter, that repairman will apply relatively strong telescoping forces to the body portion 21 of the fuseholder 20 and to the female connector 28 to effect full telescoping of the male connector 22 into that female connector. Because the split ring 42 will cause the ends of the fingers 34, 36, 38 and 40 to strongly resist the telescoping of the male connector 22 into the female connector 28, the repairman may want to press against the left-hand end of the body portion 21 of the fuseholder 20 and to grip the sleeve-like portion 30 of the female connector 28; and the walls of the boots 58 and 68 will be made thin enough to enable that repairman to do so. Consequently, although the connection provided by the male connector 22 and the female connector 28 is a "blind" connection, the boots 58 and 68 will enable the repairman to make that connection and to sense that the connection has been made.

Where the walls of the boots 58 and 68 are made quite thin, the frusto-conical ends of those boots can tend to tear as those frusto-conical ends are telescoped over, and are then slid along, the insulation on the conductors 54

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and 56. The walls of the boots 58 and 68 can be made quite thin, and yet the frusto-conical ends of those boots can be made very resistant to tearing by providing the annular ribs 64 and 74, respectively, at the exteriors of the frusto-conical ends 60 and 72 of the boots 58 and 68.

Referring to FIG. 4, the numeral 82 denotes a conductor which can be identical to the conductor 54, and which will be electrically and mechanically connected to the terminal, not shown, on the left-hand body portion of the fuseholder 20. The junction between that conductor and that terminal will be encased and insulated by a boot 58, which can be identical to the boot 58 shown in FIGS. 1 and 3. The numeral 84 denotes a female connector with a rod-like projection 86 at the right-hand end thereof and with four circumferentially-spaced fingers adjacent the left-hand thereof. Because FIG. 4 is a side view, only two of those fingers, namely the fingers 88 and 90, are shown. The female connector 84 of FIG. 4 will closely resemble the separable connector 28 in FIGS. 1 and 2, except for the fact that the female connector 84 has a rod-like projection 86 at the right-hand end thereof whereas the separable connector 28 has a sleeve-like portion 30 at the right-hand end thereof.

A split ring 92 encircles the free ends of the fingers 88 and 90 plus the other two fingers of the female connector 84, in the same manner in which the split ring 42 encircles the free ends of the fingers 34, 36, 38 and 40 of the female connector 28. The split ring 92 will normally hold the free ends of the fingers 88 and 90 and of the other two fingers of the female connector 84 closer together than the diameter of the male connector 22 on the body portion 23 of the fuseholder 20; but that split ring will yield to permit that male connector to be telescoped into position between the free ends of those fingers. The numeral 93 denotes a sleeve of insulating material which can be identical to the sleeve 44 of insulating material in FIGS. 1 and 2; and that sleeve of insulating material will enclose and insulate the fingers 88 and 90 and the other two fingers of the female connector 84, will enclose and insulate the split ring 92, and will enclose and insulate the body portion 23 of the fuseholder 20.

The numeral 94 denotes a connector which has a tubular projection 96 extending outwardly from the left-hand end thereof, which has a cylindrical socket 98 in the right-hand end thereof, which has a cylindrical socket 100 in the right-hand end thereof, which has a set screw 102 communicating with the cylindrical socket 100, and which has a second set screw, not shown, communicating with the cylindrical socket 98. The tubular projection 96 is dimensioned to telescope freely over the rod-like projection 86 on the female connector 84; but that tubular projection will be crimped, staked or otherwise deformed into permanent engagement with that rod-like projection. Consequently, the connector 94 will, effectively, serve as part of the female connector 84. The socket 98 is dimensioned to accommodate the bared end of an insulated conductor 104, and the socket 100 is dimensioned to accommodate the bared end of an insulated conductor 106. The set screw 102 will be tightened to provide a good electrical and mechanical connection between the connector 94 and the conductor 106; and the second set screw, not shown, will be tightened to provide a good electrical and mechanical connection between the conductor 104 and the connector 94. The connector 94 and the female connector 84 are used where it is desirable to interconnect two conductors to the male connector 22 of the fuseholder 20.

The numeral 108 denotes a boot which has a cylindrical left-hand end with internal annular ribs 110, which has a cylindrical central portion with external annular ribs 112, and which has two frusto-conical sections 114 and 116 at the right-hand end thereof. The diameters of the ribs 110 are slightly smaller than the outer diameter of the right-hand portion of the sleeve 93 of insulating

material which encases the fingers **88** and **90** plus the other two fingers of the female connector **84**; and hence those ribs will be distended as they are telescoped over that portion of that sleeve. Thereafter, the restorative forces within those ribs and within the cylindrical left-hand end of the boot **108** will cause those ribs to provide a plurality of water-resistant seals with that portion of the sleeve **93** of insulating material.

The frusto-conical section **114** of the boot **108** will accommodate the conductor **104**, which has the left-hand end thereof held within the socket **98** of the connector **94**; and the frusto-conical section **116** of that boot will accommodate the conductor **106**, which has the left-hand end thereof held within the socket **100** of that connector. The unstressed inner diameter of the outer end of each of the frusto-conical sections **114** and **116** will be smaller than the diameter of the insulation of the conductors **104** and **106**; and hence those outer ends will be distended as the conductors **104** and **106** are telescoped through those sections. Thereafter, the restorative forces within those outer ends will provide water-resistant seals between the boot **108** and the insulation on those conductors.

The sleeve **93** of insulating material will encase and insulate the connection between the male connector **22** and the female connector **84**; and the boot **108** will encase and insulate the connection between that female connector and the connector **94**, and also will encase and insulate the connection between the connector **94** and the conductors **104** and **106**. In the event a force is applied to the conductor **82** or to either of the conductors **104** and **106** which causes the female connector **84** to move away from the male connector **22** on the body portion **23** of the fuseholder **20**, the sleeve **93** will remain in engagement with that female connector, and the boot **108** will remain in engagement with that sleeve and with those conductors. As a result, the female connector **84**, the connector **94**, the connection between them, and the connection between the connector **94** and the conductors **104** and **106** will continue to be encased and insulated after the female connector **84** has been separated from the male connector **22** on the body portion **23** of the fuseholder **20**.

As shown by FIG. 7, the boot **108** can be assembled with the body portion of a fuseholder which has a tubular terminal that is large enough to accommodate the ends of two conductors. Specifically, the boot **108** can have the internal annular ribs **110** at the cylindrical left-hand end thereof distended to telescope over the right-hand body portion of a fuseholder **120** which has a tubular terminal **122** that is large enough to accommodate the bared ends of two conductors **124** and **126**. The frusto-conical sections **114** and **116** at the right-hand end of the boot **108** will snugly accommodate the insulation on the conductors **124** and **126**; and the bared ends of those conductors will be held by the crimped, staked or otherwise deformed tubular terminal **122**.

The annular ribs **122** on the boot **108** strengthen the cylindrical central portion of that boot; but they permit that cylindrical central portion to be flexible. If desired, external annular ribs, similar to the annular ribs **64** and **72** of FIG. 1 can be formed on the frusto-conical sections **114** and **116** at the righthand end of the boot **108**.

While the fuseholders, separable connectors, insulating sleeves, and insulating boots of the present invention are very useful in street lighting circuits, they are useful elsewhere too. In fact, those fuseholders, separable connectors, insulating sleeves, and insulating boots are usable anywhere external forces can accidentally separate a fuseholder from the "line" or "load" side of a circuit.

The boots **58**, **68** and **108** and the sleeves **44** and **93** will be made from material that is resilient as well as non-conductive . . . as a result, those boots and those sleeves will be able to withstand blows and stresses—when the street lamp or other power consuming device with which they are used is struck—which rigid and

brittle elements could not withstand. The overall result is that the fuse-holders, separable connectors, insulating sleeves and insulating boots of the present invention can minimize and largely eliminate the risk of electrical shocks when street lamps and other power consuming devices are struck.

Whereas the drawing and accompanying description have shown and described several preferred embodiments of the present invention it should be apparent to those skilled in the art that various changes may be made in the form of the invention without affecting the scope thereof.

What is claimed is:

1. A combination which comprises:

a fuseholder with a connector projecting outwardly from one end thereof,

a separable connector which normally has one end thereof in telescoped engagement with the first said connector and which has the other end thereof connectable to a conductor,

the first said connector and said separable connector being dimensioned to provide a mechanical securement therebetween which is strong enough to normally maintain a low resistance electrical connection between said fuseholder and said separable connector but which will permit the first said connector and said separable connector to separate in response to a separating force which is smaller than the elastic limit of said fuseholder,

a sleeve of insulating material that is secured to and carried by said separable connector and that has one end thereof projecting outwardly beyond said one end of said separable connector and normally telescoped over said one end of said fuseholder to encase and insulate said low resistance electrical connection between said fuseholder and said separable connector, and

a boot of insulating material that has one end thereof engaging and overlying part of said sleeve of insulating material and that has the other end thereof engagable with said conductor to encase and insulate the connection between said separable connector and said conductor,

said sleeve of insulating material remaining with said separable connector, and said boot of insulating material remaining with said sleeve of insulating material and said conductor, whenever the first said connector and said separable connector are separated,

whereby said connection between said separable connector and said conductor will continue to be encased and insulated, and whereby said one end of said sleeve of insulating material will continue to project beyond and to protect said one end of said separable connector, whenever the first said connector and said separable connector are separated.

2. A combination which comprises:

a fuseholder with a connector projecting outwardly from one end thereof,

a separable connector which normally has one end thereof in telescoped engagement with the first said connector and which has the other end thereof connectable to a conductor,

the first said connector and said separable connector being dimensioned to provide a mechanical securement therebetween which is strong enough to normally maintain a low resistance electrical connection between said fuseholder and said separable connector but which will permit the first said connector and said separable connector to separate in response to a separating force which is smaller than the elastic limit of said fuseholder,

a sleeve of insulating material that is secured to and carried by said separable connector and that has one end thereof projecting outwardly beyond said one end of said separable connector and normally

telescoped over said one end of said fuseholder to encase and insulate said low resistance electrical connection between said fuseholder and said separable connector, and

a boot of insulating material that has one end thereof engaging and overlying part of said sleeve of insulating material and that has the other end thereof engageable with said conductor to encase and insulate the connection between said separable connector and said conductor,

said sleeve of insulating material remaining with said separable connector, and said boot of insulating material remaining with said sleeve of insulating material and said conductor, whenever the first said connector and said separable connector are separated,

whereby said connection between said separable connector and said conductor will continue to be encased and insulated, and whereby said one end of said sleeve of insulating material will continue to project beyond and to protect said one end of said separable connector, whenever the first said connector and said separable connector are separated,

said boot of insulating material having a thin wall to enable the user thereof to feel said separable connector as said one end of said separable connector is telescoped into engagement with the first said connector.

3. A combination which comprises:

a fuseholder with a connector projecting outwardly from one end thereof,

a separable connector which normally has one end thereof in telescoped engagement with the first said connector and which has the other end thereof connectable to a conductor,

the first said connector and said separable connector being dimensioned to provide a mechanical securement therebetween which is strong enough to normally maintain a low resistance electrical connection between said fuseholder and said separable connector but which will permit the first said connector and said separable connector to separate in response to a separating force which is smaller than the elastic limit of said fuseholder,

a sleeve of insulating material that is secured to and carried by said separable connector and that has one end thereof projecting outwardly beyond said one end of said separable connector and normally telescoped over said one end of said fuseholder to encase and insulate said low resistance electrical connection between said fuseholder and said separable connector, and

a boot of insulating material that has one end thereof engaging and overlying part of said sleeve of insulating material and that has the other end thereof engageable with said conductor to encase and insulate the connection between said separable connector and said conductor,

said sleeve of insulating material remaining with said separable connector, and said boot of insulating material remaining with said sleeve of insulating material and said conductor, whenever the first said connector and said separable connector are separated,

whereby said connection between said separable connector and said conductor will continue to be encased and insulated, and whereby said one end of said sleeve of insulating material will continue to project beyond and to protect said one end of said separable connector, whenever the first said connector and said separable connector are separated,

said boot of insulating material having a thin wall to enable the user thereof to feel said separable connector as said one end of said separable connector

is telescoped into engagement with the first said connector, and

said other end of said boot of insulating material having a plurality of strengthening ribs of annular configuration at the exterior thereof.

4. A combination which comprises:

a fuseholder with a connector projecting outwardly from one end thereof,

a separable connector which normally has one end thereof in telescoped engagement with the first said connector and which has the other end thereof connectable to a conductor,

the first said connector and said separable connector being dimensioned to provide a mechanical securement therebetween which is strong enough to normally maintain a low resistance electrical connection between said fuseholder and said separable connector but which will permit the first said connector and said separable connector to separate in response to a separating force which is smaller than the elastic limit of said fuseholder,

a sleeve of insulating material that is secured to and carried by said separable connector and that has one end thereof projecting outwardly beyond said one end of said separable connector and normally telescoped over said one end of said fuseholder to encase and insulate said low resistance electrical connection between said fuseholder and said separable connector, and

a boot of insulating material that has one end thereof engaging and overlying part of said sleeve of insulating material and that has the other end thereof engageable with said conductor to encase and insulate the connection between said separable connector and said conductor,

said sleeve of insulating material remaining with said separable connector, and said boot of insulating material remaining with said sleeve of insulating material and said conductor, whenever the first said connector and said separable connector are separated,

whereby said connection between said separable connector and said conductor will continue to be encased and insulated, and whereby said one end of said sleeve of insulating material will continue to project beyond and to protect said one end of said separable connector, whenever the first said connector and said separable connector are separated.

said other end of said boot of insulating material tapering down to an unstressed diameter smaller than the diameter of the insulation on said conductor, and said other end of said boot of insulating material being in stressed condition whenever it is telescoped over the insulation on said conductor,

thereby providing a water-resistant seal between said other end of said boot of insulating material and said insulation on said conductor.

5. A combination which comprises:

a fuseholder with a connector projecting outwardly from one end thereof,

a separable connector which normally has one end thereof in telescoped engagement with the first said connector and which has the other end thereof connectable to a conductor,

the first said connector and said separable connector being dimensioned to provide a mechanical securement therebetween which is strong enough to normally maintain a low resistance electrical connection between said fuseholder and said separable connector but which will permit the first said connector and said separable connector to separate in response to a separating force which is smaller than the elastic limit of said fuseholder,

a sleeve of insulating material that is secured to and carried by said separable connector and that has one

end thereof projecting outwardly beyond said one end of said separable connector and normally telescoped over said one end of said fuseholder to encase and insulate said low resistance electrical connection between said fuseholder and said separable connector, and

a boot of insulating material that has one end thereof engaging and overlying part of said sleeve of insulating material and that has the other end thereof engageable with said conductor to encase and insulate the connection between said separable connector and said conductor,

said sleeve of insulating material remaining with said separable connector, and said boot of insulating material remaining with said sleeve of insulating material and said conductor, whenever the first said connector and said separable connector are separated,

whereby said connection between said separable connector and said conductor will continue to be encased and insulated, and whereby said one end of said sleeve of insulating material will continue to project beyond and to protect said one end of said separable connector, whenever the first said connector and said separable connector are separated,

said boot of insulating material having a thin wall to enable the user thereof to feel said separable connector as said one end of said separable connector is telescoped into engagement with the first said connector, and

said one end of said boot of insulating material having a plurality of ribs at the interior thereof in engagement with said sleeve of insulating material,

said ribs strengthening said one end of said boot of insulating material and also coacting with said sleeve of insulating material to define a plurality of spaced, water-resistant seals of annular configuration between said one end of said boot of insulating material and said sleeve of insulating material.

6. A combination which comprises:

a fuseholder with a connector projecting outwardly from one end thereof,

a separable connector which normally has one end thereof in telescoped engagement with the first said connector and which has the other end thereof connectable to a conductor,

the first said connector and said separable connector being dimensioned to provide a mechanical securement therebetween which is strong enough to normally maintain a low resistance electrical connection between said fuseholder and said separable connector but which will permit the first said connector and said separable connector to separate in response to a separating force which is smaller than the elastic limit of said fuseholder,

a sleeve of insulating material that is secured to and carried by said separable connector and that has one end thereof projecting outwardly beyond said one end of said separable connector and normally telescoped over said one end of said fuseholder to encase and insulate said low resistance electrical connection between said fuseholder and said separable connector, and

a boot of insulating material that has one end thereof engaging and overlying part of said sleeve of insulating material and that has the other end thereof engageable with said conductor to encase and insulate the connection between said separable connector and said conductor,

said sleeve of insulating material remaining with said separable connector, and said boot of insulating material remaining with said sleeve of insulating material and said conductor, whenever the first said connector and said separable connector are separated,

whereby said connection between said separable connector and said conductor will continue to be encased and insulated, and whereby said one end of said sleeve of insulating material will continue to project beyond and to protect said one end of said separable connector, whenever the first said connector and said separable connector are separated,

said one end of said sleeve of insulating material being dimensioned to coact with said one end of said fuseholder to provide a water-resistant seal between said one end of said sleeve of insulating material and said one end of said fuseholder.

7. A combination which comprises:

a fuseholder with a connector projecting outwardly from one end thereof,

a separable connector which normally has one end thereof in telescoped engagement with the first said connector and which has the other end thereof connectable to a conductor,

the first said connector and said separable connector being dimensioned to provide a mechanical securement therebetween which is strong enough to normally maintain a low resistance electrical connection between said fuseholder and said separable connector but which will permit the first said connector and said separable connector to separate in response to a separating force which is smaller than the elastic limit of said fuseholder,

a sleeve of insulating material that is secured to and carried by said separable connector and that has one end thereof projecting outwardly beyond said one end of said separable connector and normally telescoped over said one end of said fuseholder to encase and insulate said low resistance electrical connection between said fuseholder and said separable connector, and

a boot of insulating material that has one end thereof engaging and overlying part of said sleeve of insulating material and that has the other end thereof engageable with said conductor to encase and insulate the connection between said separable connector and said conductor,

said sleeve of insulating material remaining with said separable connector, and said boot of insulating material remaining with said sleeve of insulating material and said conductor, whenever the first said connector and said separable connector are separated,

whereby said connection between said separable connector and said conductor will continue to be encased and insulated, and whereby said one end of said sleeve of insulating material will continue to project beyond and to protect said one end of said separable connector, whenever the first said connector and said separable connector are separated,

said one end of said sleeve of insulating material having a plurality of ribs at the interior thereof in engagement with said one end of said fuseholder,

said ribs strengthening said one end of said sleeve of insulating material and also coacting with said one end of said fuseholder to define a plurality of spaced, water-resistant seals of annular configuration between said one end of said sleeve of insulating material and said one end of said fuseholder.

8. A combination which comprises:

a fuseholder with a connector projecting outwardly from one end thereof,

a separable connector which normally has one end thereof in telescoped engagement with the first said connector and which has the other end thereof connectable to a conductor,

the first said connector and said separable connector being dimensioned to provide a mechanical securement therebetween which is strong enough to normally maintain a low resistance electrical connection between said fuseholder and said separable connector

tor but which will permit the first said connector and said separable connector to separate in response to a separating force which is smaller than the elastic limit of said fuseholder,

a sleeve of insulating material that is secured to and carried by said separable connector and that has one end thereof projecting outwardly beyond said one end of said separable connector and normally telescoped over said one end of said fuseholder to encase and insulate said low resistance electrical connection between said fuseholder and said separable connector, and

a boot of insulating material that has one end thereof engaging and overlying part of said sleeve of insulating material and that has the other end thereof engageable with said conductor to encase and insulate the connection between said separable connector and said conductor,

said sleeve of insulating material remaining with said separable connector, and said boot of insulating material remaining with said sleeve of insulating material and said conductor, whenever the first said connector and said separable connector are separated,

whereby said connection between said separable connector and said conductor will continue to be encased and insulated, and whereby said one end of said sleeve of insulating material will continue to project beyond and to protect said one end of said separable connector, whenever the first said connector and said separable connector are separated,

said fuseholder having two readily-separable sections and having securing means that normally hold said readily-separable sections in assembled relation, and said one end of said sleeve of insulating material stopping short of said securing means.

9. A combination which comprises:

a fuseholder with a connector projecting outwardly from one end thereof,

a separable connection which normally has one end thereof in telescoped engagement with the first said connector and which has the other end thereof connectable to a conductor,

the first said connector and said separable connector being dimensioned to provide a mechanical securement therebetween which is strong enough to normally maintain a low resistance electrical connection between said fuseholder and said separable connector but which will permit the first said connector and said separable connector to separate in response to a separating force which is smaller than the elastic limit of said fuseholder,

a sleeve of insulating material that is secured to and carried by said separable connector and that has one end thereof projecting outwardly beyond said one end of said separable connector and normally telescoped over said one end of said fuseholder to encase and insulate said low resistance electrical connection between said fuseholder and said separable connector, and

a boot of insulating material that has one end thereof engaging and overlying part of said sleeve of insulating material and that has the other end thereof engageable with said conductor to encase and insulate the connection between said separable connector and said conductor,

said sleeve of insulating material remaining with said separable connector, and said boot of insulating material remaining with said sleeve of insulating material and said conductor, whenever the first said connector and said separable connector are separated,

whereby said connection between said separable connector and said conductor will continue to be encased and insulated, and whereby said one end of said sleeve of insulating material will continue to

project beyond and to protect said one end of said separable connector, whenever the first said connector and said separable connector are separated, said separable connector being a sleeve with a plurality of fingers at said one end thereof.

10. A combination which comprises:

a fuseholder with a connector projecting outwardly from one end thereof,

a separable connector which normally has one end thereof in telescoped engagement with the first said connector and which has the other end thereof connectable to a conductor,

the first said connector and said separable connector being dimensioned to provide a mechanical securement therebetween which is strong enough to normally maintain a low resistance electrical connection between said fuseholder and said separable connector but which will permit the first said connector and said separable connector to separate in response to a separating force which is smaller than the elastic limit of said fuseholder,

a sleeve of insulating material that is secured to and carried by said separable connector and that has one end thereof projecting outwardly beyond said one end of said separable connector and normally telescoped over said one end of said fuseholder to encase and insulate said low resistance electrical connection between said fuseholder and said separable connector, and

a boot of insulating material that has one end thereof engaging and overlying part of said sleeve of insulating material and that has the other end thereof engageable with said conductor to encase and insulate the connection between said separable connector and said conductor,

said sleeve of insulating material remaining with said separable connector, and said boot of insulating material remaining with said sleeve of insulating material and said conductor, whenever the first said connector and said separable connector are separated,

whereby said connection between said separable connector and said conductor will continue to be encased and insulated, and whereby said one end of said sleeve of insulating material will continue to project beyond and to protect said one end of said separable connector, whenever the first said connector and said separable connector are separated,

said separable connector being a sleeve with a plurality of fingers at said one end thereof, and

a split ring encircling said one end of said separable connector to enable said one end of said separable connector to apply a substantial pressure to the first said connector.

11. A combination which comprises:

a fuseholder with a connector projecting outwardly from one end thereof,

a separable connector which normally has one end thereof in telescoped engagement with the first said connector and which has the other end thereof connectable to a conductor,

the first said connector and said separable connector being dimensioned to provide a mechanical securement therebetween which is strong enough to normally maintain a low resistance electrical connection between said fuseholder and said separable connector but which will permit the first said connector and said separable connector to separate in response to a separating force which is smaller than the elastic limit of said fuseholder,

a sleeve of insulating material that is secured to and carried by said separable connector and that has one end thereof projecting outwardly beyond said one end of said separable connector and normally telescoped over said one end of said fuseholder to en-

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case and insulate said low resistance electrical connection between said fuseholder and said separable connector, and

- a boot of insulating material that has one end thereof engaging and overlying part of said sleeve of insulating material and that has the other end thereof engageable with said conductor to encase and insulate the connection between said separable connector and said conductor, 5
- said sleeve of insulating material remaining with said separable connector, and said boot of insulating material remaining with said sleeve of insulating material and said conductor, whenever the first said connector and said separable connector are separated, 10
- whereby said connection between said separable connector and said conductor will continue to be encased and insulated, and whereby said one end of said sleeve of insulating material will continue to project beyond and to protect said one end of said separable connector, whenever the first said connector and said separable connector are separated, 20
- a plural-conductor connector interposed between said separable connector and said conductor, and
- a second conductor connected to said separable connector by said plural-conductor connector. 25

12. A combination which comprises:

- a fuseholder with a connector projecting outwardly from one end thereof,
- a separable connector which normally has one end thereof in telescoped engagement with the first said connector and which has the other end thereof connectable to a conductor, 30
- the first said connector and said separable connector being dimensioned to provide a mechanical securement therebetween which is strong enough to normally maintain a low resistance electrical connection between said fuseholder and said separable connector but which will permit the first said connector and said separable connector to separate in response to a separating force which is smaller than the elastic limit of said fuseholder, 40
- a sleeve of insulating material that is secured to and carried by said separable connector and that has one end thereof projecting outwardly beyond said one end of said separable connector and normally telescoped over said one end of said fuseholder to en- 45

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case and insulate said low resistance electrical connection between said fuseholder and said separable connector, and

- a boot of insulating material that has one end thereof engaging and overlying part of said sleeve of insulating material and that has the other end thereof engageable with said conductor to encase and insulate the connection between said separable connector and said conductor,
- said sleeve of insulating material remaining with said separable connector, and said boot of insulating material remaining with said sleeve of insulating material and said conductor, whenever the first said connector and said separable connector are separated, 5
- whereby said connection between said separable connector and said conductor will continue to be encased and insulated, and whereby said one end of said sleeve of insulating material will continue to project beyond and to protect said one end of said separable connector, whenever the first said connector and said separable connector are separated, 10
- a plural-conductor connector interposed between said separable connector and said conductor,
- a second conductor connected to said separable connector by said plural-conductor connector, and 15
- said other end of said boot of insulating material having a tapered portion through which the first said conductor extends and having a second tapered portion through which said second conductor extends. 20

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