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Link

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[54] **SHIELDED HIGH VOLTAGE CONNECTOR**

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[51] **Int. Cl.**..... **H01r 3/06**

[58] **Field of Search**..... 339/59 R, 59 L, 59 M, 339/60 R, 60 C, 60 M, 61 R, 61 C, 61 L, 61 M, 111, 114 R, 143 R, 143 L, 143 S, 14 R, 14 D, 14 L, 14 RP, 176; 174/73, 51; 338/208

[56] **References Cited**

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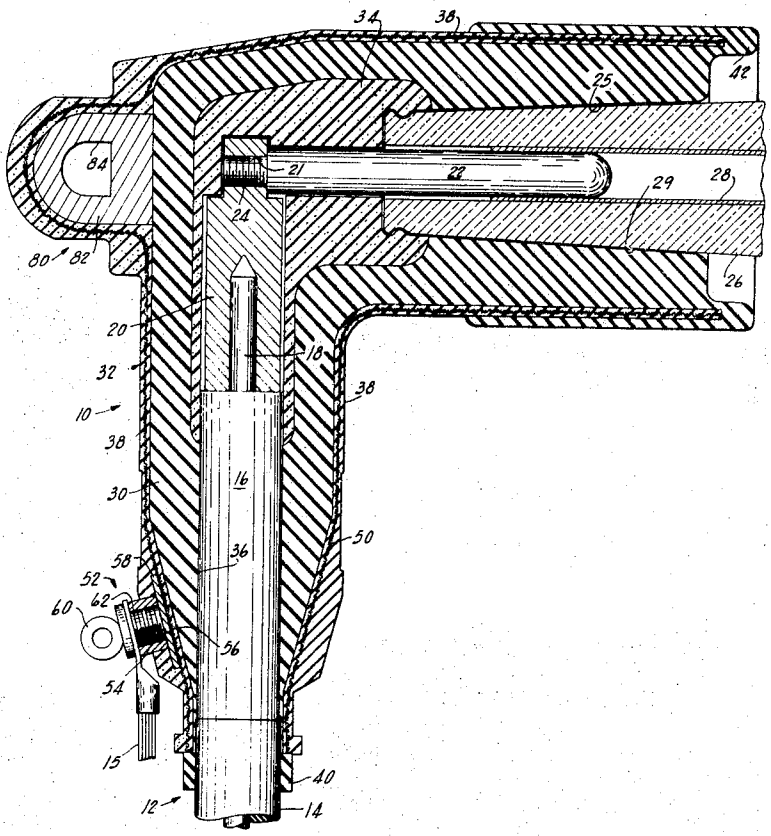
[57] **ABSTRACT**

A shielded electrical connector for a high voltage cable having a section of the cable insulation removed to expose a conductor, the connector including an electrically insulating member surrounding the cable insulation and conductor, and an electrically conductive shield surrounding said insulating member. The conductive shield is formed from a layer of electrically conductive material and a metallic mesh, the shield being bonded to the outer surface of the insulating member. A disconnect assembly can be provided for selectively connecting and disconnecting the shield to the cable.

4 Claims, 4 Drawing Figures



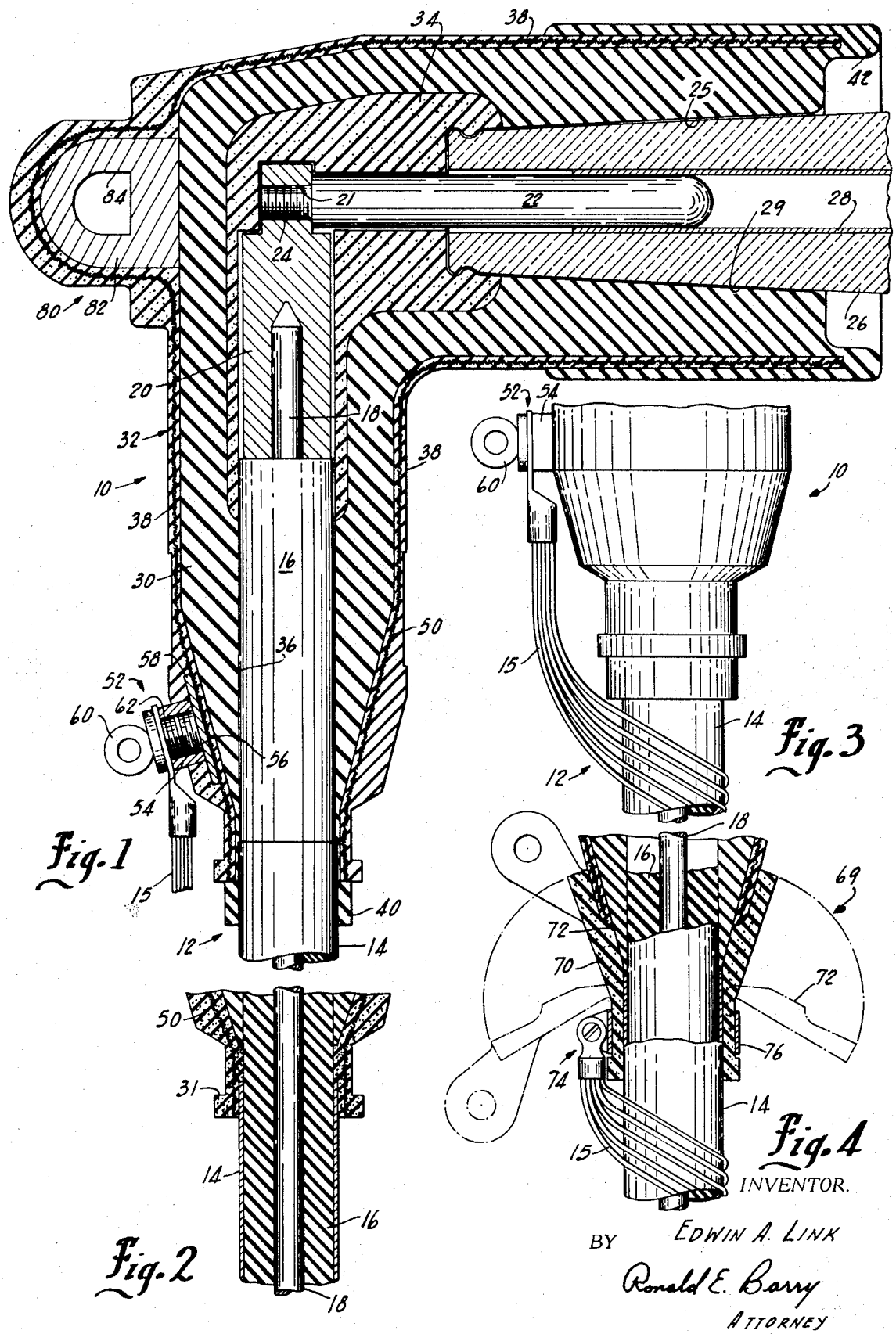


Fig. 1

Fig. 2

Fig. 3

Fig. 4

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SHIELDED HIGH VOLTAGE CONNECTOR

BACKGROUND OF THE INVENTION

An electrical connector or terminator of the type contemplated herein is shown in U.S. Pat. No. 3,376,541 entitled "Safe Break Terminator." This connector includes a plug assembly having an insulating member surrounding the cable and a conductive shield on the outer surface of the insulating member, either coated thereon or formed as a separate layer which is then bonded to the insulator. The conductive shield is provided to protect the lineman from high voltages which may be present in the conductor. However, in the event of a fault, the high current present on the insulator tends to be grounded by the lineman rather than through the shield. This is due to the high resistance of the electrically conductive shield.

SUMMARY OF THE PRESENT INVENTION

The electrical connector of the present invention includes an insulating member for the cable and a low resistance electrically conductive shield on the outer surface of the insulator. The conductive shield includes a metallic mesh to provide a low resistance path from the external conductive shield to the cable sheath. The shield can be connected to the semi-conductive sheath of the cable by a disconnectable type assembly provided on the conductive shield. The conductive shield can also be permanently connected to the sheath by an interference fit at the sheath end of the connector. If the shield is insulated from the grounded sheath, the shield can then be used as a means for detecting the presence of a voltage on the cable. This is due to the capacitive relationship of the conductive shield to the conductor in the cable.

Other objects and advantages of this invention will become apparent from the following description when read in connection with the accompanying drawings.

THE DRAWINGS

FIG. 1 is a side elevation view in section showing the connector of the present invention;

FIG. 2 is an enlarged view of a portion of the stress cone of the connector showing the conductive shield permanently connected to the cable sheath;

FIG. 3 is a view of a portion of the connector showing the connector shield connection to the cable concentric neutral; and

FIG. 4 is a view of an alternate form of disconnect assembly for disconnecting the cable sheath and concentric neutral to the conductive shield of the connector.

DESCRIPTION OF THE INVENTION

The connector **10** of the present invention is shown and described herein as an elbow connector for terminating a high voltage cable **12.** It should be recognized, however, that the connector **10** can also be used to form a splice in a high voltage cable by providing similar connections to the cable sheath at each end of the connector as described hereinafter.

Referring to FIGS. **1** and **3** of the drawings, the electrical connector **10** of the present invention is shown as a terminator for a high voltage cable **12** of the type having a cable sheath **14** including a concentric neutral formed of a number of electrically conductive strands **15,** a cable insulation **16,** and a conductor **18.** The cable **12** is normally prepared for termination by unwinding the strands **15** of the concentric neutral from the end of the cable and stripping the semi-conductive sheath **14** from the cable **12** to expose a portion of the cable insulation **16.** A portion of the cable insulation **16** is then removed from the end of the cable **12** to expose a portion of the conductor **18.**

As is generally well known, cable termination is made by securing or crimping a conductive member **20** to the conductor **18** and inserting the end of the cable **12** with the conductive member **20** attached into the connector **10.** The conductive member **20** includes a threaded opening **21** and is retained in the connector **10** by means of a conductive contact **22** which has a threaded section **24.** The threaded section **24** is screwed into the threaded opening **21** provided in the conductive member **20.** The conductive contact **22** extends outwardly into a recess **25** provided in the connector **10.**

The electrical connector **10** is mounted on a receptacle **26** which has an outer surface **29** corresponding to the inner surface of the recess **25** and a conductive sleeve **28** positioned to receive the tubular contact **22.** The receptacle **26** can be any form of high voltage contact such as used on a transformer, cable splice, etc. or another high voltage cable if the connector is used to form a splice.

The connector **10** generally includes an insulating member **30** and an electrically conductive shield **32.** An electrically conductive insert or lining can be provided on the inner surface of the insulator to eliminate electrical stress on the void around the conductive member **20** and contact **22.**

The insulating member **30** is generally molded from a dielectric material and includes the tapered recess **25** and a cable passage or opening **36.** The insulating member **30** is shielded by means of the electrically conductive shield **32** which includes a coating or layer **38** of electrically conductive material secured to the outer surface of the insulating member **30.** The coating or layer **38** is insulated from the cable **12** by means of small sections **40** and **42** of the insulating member which extend beyond the end of the shield **32.**

The insulating member **30,** the shield **32,** and the lining **34** are all formed of an elastomer or rubber. A conductive material such as lampblack, graphite or carbon black is combined with the elastomer or rubber used for the shield **32** and lining **34.** The member **30,** shield **32** and lining **34** are molded to the desired shape as is generally understood in the art.

In accordance with the invention, means are provided in the connector **10** to provide a low resistance current path to ground. Such means is in the form of a metallic material **50** which is shown embedded in the conductive layer **38.** It should be noted, however, that the metallic material **50** can be embedded in the outer surface of the insulating member **30** in the space between the insulating member **30** and the layer of conductive elastomer **38** or within the layer **38** as shown. The metallic material in the preferred form shown in the drawing is in the form of a metallic mesh. Metallic material in the form of strands of metal or metallic chips can also be used. A high conductive metal such as copper should be used to provide the low resistance path for any fault currents which may occur in the connector.

Means are provided for connecting the shield **32** to the semi-conductive sheath **14** of the cable **12.** Such means is in the form of a disconnect assembly **52** which

is partially embedded in the shield **32.** In this regard, the assembly **52** includes a sleeve **54** having a threaded opening **56** and a flange **58** at the inner end. The flange **58** and a portion of the sleeve **54** are embedded within the conductive layer **38,** with the open end of the sleeve **54** extending outward from the outer surface of the shield **32.** A hot stick type screw **60** having a threaded section **62** is threadedly received in the sleeve **54** and a number of strands **15** of the concentric neutral are connected to the screw **60.** In the event of a fault current occurring in the conductor **18,** the low resistance metallic material will provide a low resistance path through the assembly **52** and cable sheath **14** to ground.

The conductive shield **32** can be permanently connected to the cable sheath by means of an interference fit as shown in FIG. **2.** In this embodiment, the section **40** has been removed from the insulating member **30** and the diameter of the opening at the end **31** of the insulating member has been made slightly smaller than the diameter of the cable sheath **14.** An interference fit is thereby provided which assures electrical contact between the conductive shield **32** and the cable sheath. The strands of the concentric neutral can be wrapped around the end **31** of the insulating member.

The conductive shield **32** can be used to detect the absence or presence of a voltage on the cable by disconnecting the conductive shield **32** from the cable sheath **14.** This is accomplished by means of the disconnect assembly **52.** In this regard, on removal of screw **60** and strands **15** from the sleeve **54,** the conductive shield will be insulated from the cable sheath **14** by the small sections **40** and **42** of the insulating member **30.** The layer of conductive material **38** will then provide a capacitive reaction to any voltage present in conductor **18.** Contacting the conductive shield **32** with a voltage sensing device will then provide an indication of the absence or presence of voltage on the cable.

In the alternate form of the means for connecting the shield **32** to the sheath **14** in FIG. **4,** a disconnect assembly **69** having an electrically conductive collar **70** and a conductive contact **74** is mounted on the cable **12.** The collar **70** is formed of an electrically conductive material as described above in connection with conductive layer **38** and includes a conical section **72.** The collar **70** is connected to the semi-conductive sheath **14** by means of the electrically conductive contact **74** which is provided on a metal ring **76** mounted on the collar **70** and is connected to the strands **15** of the concentric neutral. After cable termination has been completed, the collar **70** is pushed upward into engagement with the connector **10** with the conical section **72** in engagement with the shield **32** on the connector **10.** A low resistance connection is then provided from the shield **32** through the collar **70** and the connector **74** to the sheath **14.** When it is desired to disconnect the conductive shield **32** from ground, the conical section **72** is turned back as shown in phantom line in FIG. **4.**

The elbow connector **10** can be disconnected from the bushing **26** by means of an eye **80** provided in the conductive shield **32.** The eye **80** can be reinforced by providing a metallic insert or plate **82** having an opening **84** within the conductive material. The inserts **82** should extend around a portion of the outer surface of the insulating member **30** to anchor the insert firmly into the conductive material.

RESUME

The connector **10** of this invention protects the lineman from possible electrical shocks due to high currents which may be present on the connector. This is accomplished by incorporating a metallic material in the conductive shield of the connector to provide a low resistance current path to ground. The low resistance current path should have a resistance less than the resistance path through the body of a man to assure that high currents will be grounded through the connector. The incorporation of the metallic mesh in a semi-conductive resilient shield allows the connector to be forced onto a bushing without adversely affecting the conductive shield. The conductive shield can also be used to detect voltage by disconnecting the conductive shield from the cable sheath.

I claim:

1. A cable connector for a high voltage cable having a cable sheath, said connector comprising,

an electrically insulating member adapted to be mounted on the cable and having an interference fit therein,

an electrically conductive shield on the outer surface of said insulating member,

said shield being formed from an electrically conductive low resistance metallic mesh and a layer of electrically conductive high resistance resilient material,

and electrically conductive means for grounding said shield and metallic mesh to the cable sheath whereby high fault currents present in the cable are grounded through the cable sheath.

2. The connector according to claim **1** wherein said metallic material is embedded in said layer of electrically conductive resilient mesh.

3. The connector according to claim **1** wherein said metallic mesh is mounted in tight engagement with the outer surface of said insulating member and said resilient layer completely covers the mesh and the outer surface of said insulating member.

4. The connector according to claim **1** wherein said grounding means comprises a conductive disconnect assembly partially embedded in said shield in direct contact with said mesh and adapted to be connected to the semi-conductive sheath of the cable.

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