United States Patent

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[54] **SHIELD TERMINATION FOR ELECTRICAL CONNECTORS**
2 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** ..... **339/177 R,** 174/89
[51] **Int. Cl.** **H01r 17/18**
[50] **Field of Search** 339/14, 176, 177; 174/75.2, 89

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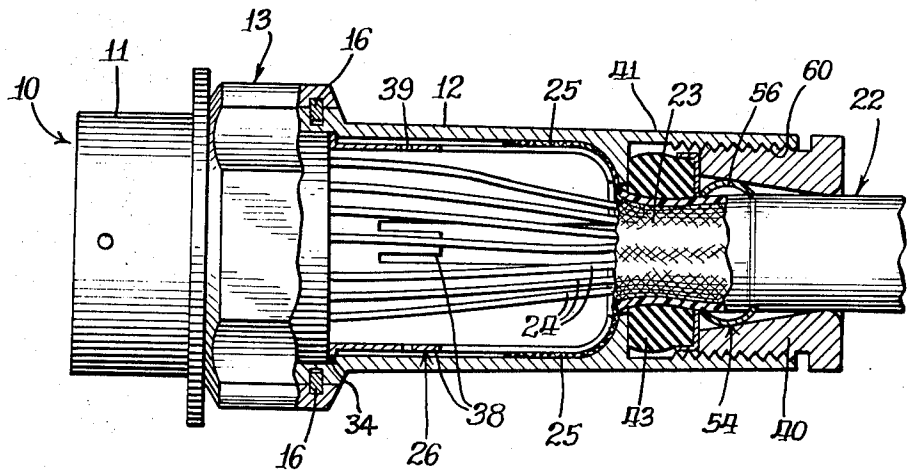
ABSTRACT: Shield termination including clamp means are used for connection to a connector shell and for clamping engagement with an end portion of an outer flexible metallic shield of a cable, such clamp means being operable independently of strain relief means engaged with a portion of the cable shield spaced from the end portion. The clamp means comprises a first metallic member arranged to fit within the cable shield and including a thin wall having axially extending angularly spaced slots and a second metallic member surrounding the cable shield and coupled to the connector shell through a threaded ring. The second member has an inner surface portion of frustospherical shape while the wall of the first member is of complementary shape, resulting in a wedge enegagement and resilient deformation of the weall of the first member. Ground lugs are provideded on the first member for connection to contacts and conductors to be grounded.



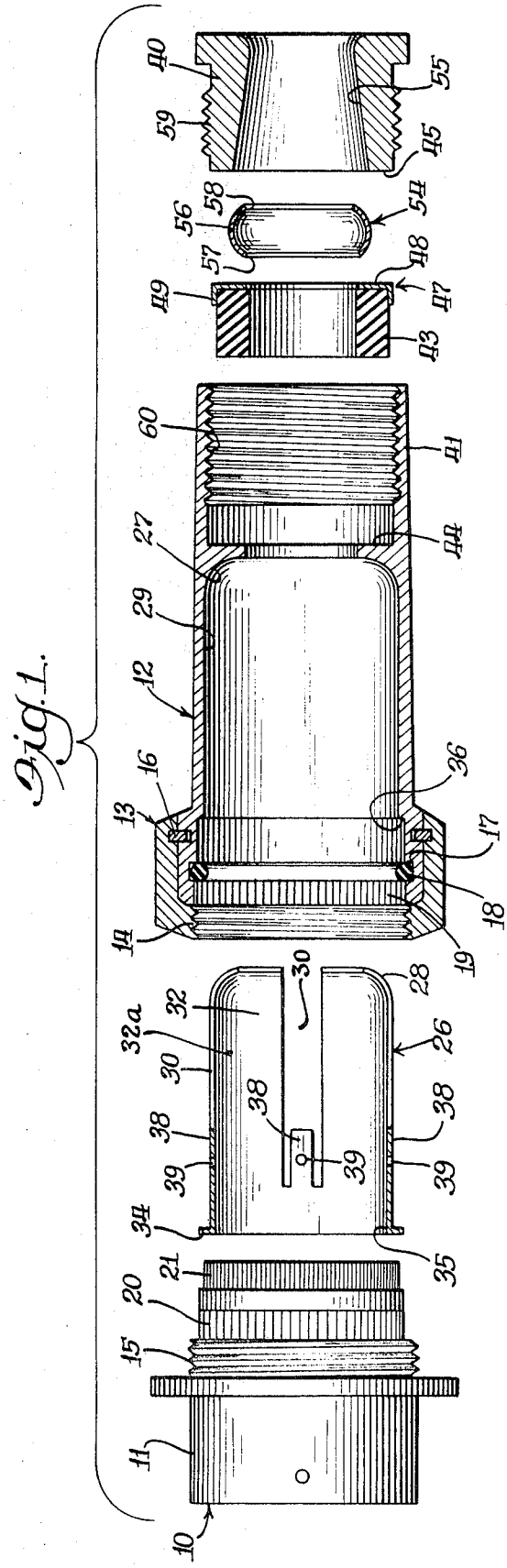


Fig. 1.

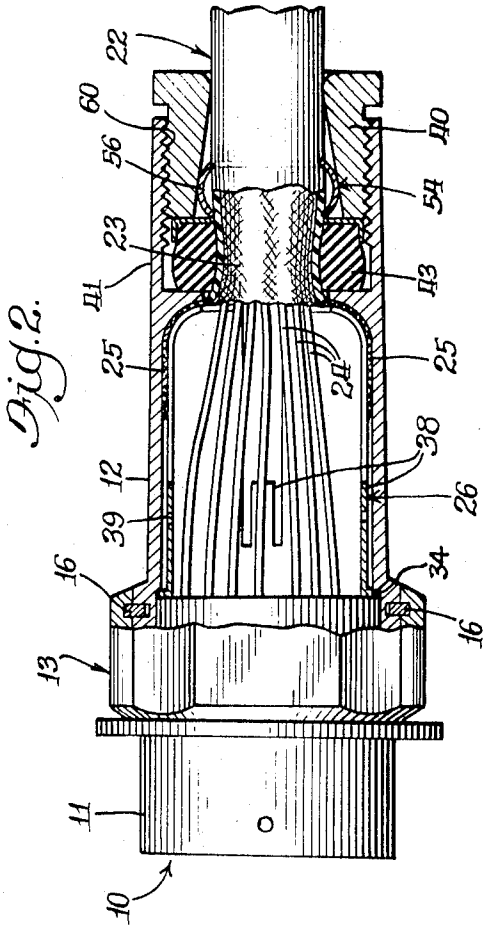


Fig. 2.

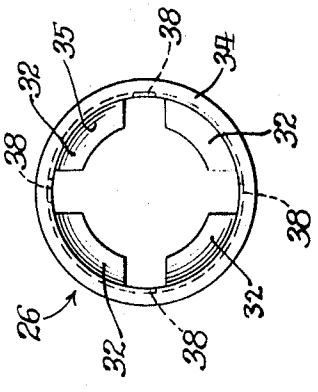


Fig. 3.

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SHIELD TERMINATION FOR ELECTRICAL CONNECTORS

This invention relates to a shield termination for electrical connectors and more particularly to a shield termination which provides a durable and reliable connection and which is easily installed while facilitating the connection of cable conductors to connector contacts.

This invention was evolved with the general object of overcoming disadvantages of prior art arrangements and of providing an improved shield termination which is readily installed on a connector while firmly holding the cable shield and providing a reliable ground connection.

The shield termination of this invention is designed for use at the connection of one end of a cable to an electrical connector, wherein the cable includes an outer flexible metallic shield and conductor means therewithin, the conductor means being connected to contact means insulatingly supported within a shell of the connector. In accordance with this invention, the shield termination comprises clamp means arranged for connection to the connector shell and for clamping engagement with an end portion of the cable shield. Preferably, the clamp means comprises a first metallic member arranged to fit around the cable conductor means and within the end portion of the cable shield, a second metallic member arranged to surround the end portion of the cable shield and connection means for connecting the second metallic member to the connector shell. With this arrangement, the end portion of the cable shield is firmly clamped between the first and second members engaged with the inner and outer surfaces thereof. At the same time, the conductors of the cable can be readily connected to the connector contacts.

According to the specific feature of the invention, the connection means is arranged to move the second metallic member axially during connection thereof to the connector shell and the second member has a tapered inner surface portion for wedging the end portion of the cable shield into tight engagement with the first member. Preferably, the tapered inner surface of the second member is of generally frustospherical shape and the first member has an outer surface of a shape generally complementary to the frustospherically shaped inner surface of the second member. The second member is preferably relatively rigid while the first member has a relatively thin wall resiliently formable in effecting the clamping engagement. To further increase the flexibility of the first member, it is preferably provided with a plurality of axially extending angularly spaced slots therein.

Another specific feature of the invention relates to the provision of lug means on the first member for ground connection to conductor means of the cable, such lug means being preferably positioned in at least one of the slots of the first member.

A further feature of the invention relates to the provision of strain relief means for effecting clamping engagement with the cable and operable independently of the shield termination clamp means, the strain relief means being preferably associated with the second metallic member and being arranged to effect clamping engagement with a portion of the cable shield spaced axially from the end portion thereof.

This invention contemplates other objects, features and advantages which will become more fully apparent from the following detailed description taken in conjunction with the accompanying drawings which illustrate a preferred embodiment and in which:

FIG. 1 is an expanded view of an electrical connector incorporating a shield termination according to the principles of this invention, showing the parts before assembly;

FIG. 2 is a view partly in cross section and showing an assembled connector connected to a cable; and

FIG. 3 is an end elevational view of a member forming part of the shield termination.

Reference numeral **10** generally designates an electrical connector incorporating a shield termination constructed in accordance with the principles of this invention. The connector **10** comprises a main connector shell **11** within which contacts are supported in an insulating body for connection to mating contacts of another connector shell, not shown. An auxiliary shell **12** is provided arranged to be secured to the main shell **11** by means of a coupling ring **13** having an internally threaded portion **14** which is threaded on an externally threaded portion **15** of the shell **11**. The coupling ring **13** is held on the shell **12** by means of a snap ring **16** engaged in annular grooves provided in the outer surface of the shell **12** and in the inner surface of the coupling ring **13**, the coupling ring **13** being rotatable relative to the shell **12**. An annular groove **17** is provided on the inside surface of the shell **12**, adjacent the end thereof connected to the shell **11**, for receiving a conventional O-ring seal member **18** which is compressed against an outer surface portion of the shell **11**.

To prevent relative rotation of the shells **11** and **12**, the internal surface of the shell **12**, between the end thereof and the notch **17**, is formed with equiangularly spaced notches **19** which receive equiangularly spaced projections **20** on the portion of the outer surface of the shell **11** which is adjacent the threaded portion **15**. A knurled disc **21** is provided at the end of shell **11**.

The shell **12** is arranged to receive an end portion of a cable **22** which includes an outer flexible metallic shield **23**, of a conventional woven or braided construction, and a plurality of conductors **24** therewithin, the ends of the conductors **24** being connected to contacts within an insulating body in the shell **11**. In accordance with this invention, a shield termination is provided including clamp means arranged for clamping engagement with an end portion **25** of the shield **23**. The clamp means comprises the auxiliary shell **12** and a member **26** which is arranged to fit around the conductors **24** and within the end portion **25** of the cable shield **23**, the end portion **25** being clamped between the outside of the member **26** and the inside of the auxiliary shell **12**. The member **26**, the auxiliary shell **12**, the coupling ring **13** and the snap ring **16** are made of metal, i.e., a highly conductive material, to provide a good ground connection between the shield **23** and the shell **11**, also of metal.

In accordance with a specific feature of the invention, the end portion **25** of the shield **23** is wedged between the outside of the member **26** and the inside of the shell **12** when the shell **12** is installed and moved axially by rotation of the coupling ring **13**. Preferably, the shell **12** has a tapered inner surface portion **27** of generally frustospherical shape and the member **26** has outer surface portions **28** of complementary shape. The shell **12** also has an internal surface portion **29** of cylindrical shape adjoining the outer end of the surface portion **27**, and the member **26** has curved surface portions **28** inside the surface portion **27**.

The shell is relatively rigid while the member **26** has a relatively thin wall which is resiliently deformable in effecting the clamping engagement. To increase the resiliency of the member **26**, it is provided with a plurality of axially extending angularly spaced slots **30**, four equiangularly spaced slots being provided in the illustrated structure. The slots **30** at one end could terminate at points spaced radially outside a central opening through which the cable **22** extends but, as illustrated, so extend as to form four independent resilient fingers **32**. The opposite ends of the slots **30** terminate at points relatively close to a radial wall **34** having a central opening **35** through which the conductors **22** extend. The cylindrical wall sections **32***a* of the resilient fingers **32** project radially outwardly beyond the curved surface portions **28** which are pressed against the surface portion **27** of the shell **12**, through the fact that after assembly the radial wall **34** is clamped between the disc **21** and the shoulder **36** of the shell **12**.

A further feature is in the provision of the lug means on the member **26**, preferably in the form of integral portions **38** positioned in each of the slots **32** and having openings **39** for receiving the ends of conductors of the cable **22** or of conductors connected to contacts of the connector **11**, to provide a reliable ground connection.

Strain relief means are provided for effecting clamping engagement with the cable **22**, the shield termination being operable independently of the strain relief means. The illustrated strain relief means comprises a tubular member **40** arranged to be moved into an end portion **41** of the shell **12** and to force two forms of compressible means into tight engagement with the outer surface of the cable shield **23**. One of such compressible means comprises an annular member **43** of elastomeric material, such as a relatively soft natural rubber or an equivalent material, which is axially compressed between an internal annular shoulder **44** of the shell **12** and an inner end surface **45** of the member **40**. An annular metal member **47** is provided of generally L-shaped cross section having a first wall **48** between an end surface of the member **43** and the end surface **45** having a second wall **49** surrounding an end portion of the member **43**. The member **47** thus serves to contain the member **43** and to apply the axial compressive forces thereto.

The second form of compressible means comprises a generally C-shaped resilient metal member **54** which is engaged by an internal surface **55** of the member **40** and of generally frustoconical shape to wedge the member **54** into tight engagement with the cable **22** when the member **40** is moved into the end portion **41** of the shell **12**. The C-shaped member **54** preferably has a curved cross-sectional shape to provide a rounded convex outer surface **56** engageable by the surface **55** and to provide a pair of relatively sharp side edges **57** and **58** arranged to bite into the cable at axially spaced points.

The tubular member **40** has an externally threaded portion **59** threaded into an internally threaded portion **68** of portion **41** of shell **12**.

In the assembly of the connector, the shell **12** and the members **40**, **43**, **47** and **54** are slid onto the end of the cable **22** and the end portion **25** of the shield **23** is expanded while the member **26** is slipped therewithin. Before or after installation of the member **26**, the ends of the conductors **24** may be stripped of insulation and connected to contacts of the connector **10**. After installation of the member **26**, any conductors to be grounded may be connected to the lugs **38**. The shell **12** is then moved toward the shell **11** and the ring **13** is threaded onto the threaded portion **15** of the shell **11**. The end portion **25** of the shield **23** is then firmly clamped between the outside of the member **26** and the inside of the shell **12**.

Next, the annular member **43** of elastomeric material together with the member **47** are moved within the end portion **41** of the shell **12** and the member **54** is moved to abut the wall **48** of the member **47**. Finally, the tubular member **40** is threaded into the end portion **41** of the shell **12** which serves to axially compress the member **43** and to force the inner surface thereof into tight sealing engagement of the outer surface of the shield **23**. At the same time, the member **54** is wedged by the surface **55** into tight engagement with the cable jacket with biting engagement between the edges **57** and **58** and the cable jacket. It is noted that the strain relief arrangement is thus operable independently of the shield termination.

It will be understood that modifications and variations may be effected without departing from the spirit and scope of the novel concepts of this invention. I claim as my invention:

1. A shield termination for use at the connection of one end of a cable to an electrical connector, the cable including an outer flexible metallic shield and conductor means therewithin, and the connector including a shell and contact means therewith connected to the conductor means of the cable, said shield termination including clamp means arranged for connection to the connector shell and for clamping engagement with an end portion of the cable shield, said clamp means comprising a first metallic member having a plurality of axially extending angularly spaced slots therein, and arranged to fit around the cable conductor means and within said end portion of the cable shield, a second metallic member arranged to fit around said end portion of the cable shield, and means connecting said second metallic member to the connector shell.

2. A shield termination as defined in claim **1**, wherein said first metallic member has terminal lug means positioned in at least one of said slots.

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