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Weatherup et al.

[11] **3,723,946**

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[54] CABLE CONNECTOR

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[52] **U.S. Cl.** .....**339/89 R,** 85/32 R, 85/32.1, 285/12, 285/354, 285/386, 339/177 R

[51] **Int. Cl.**.....**H01r 13/54,** F16b 37/00, F16l 19/02

[58] **Field of Search** ..339/177, 89; 285/12, 389, 386, 285/354; 85/32.1; 287/107, 116

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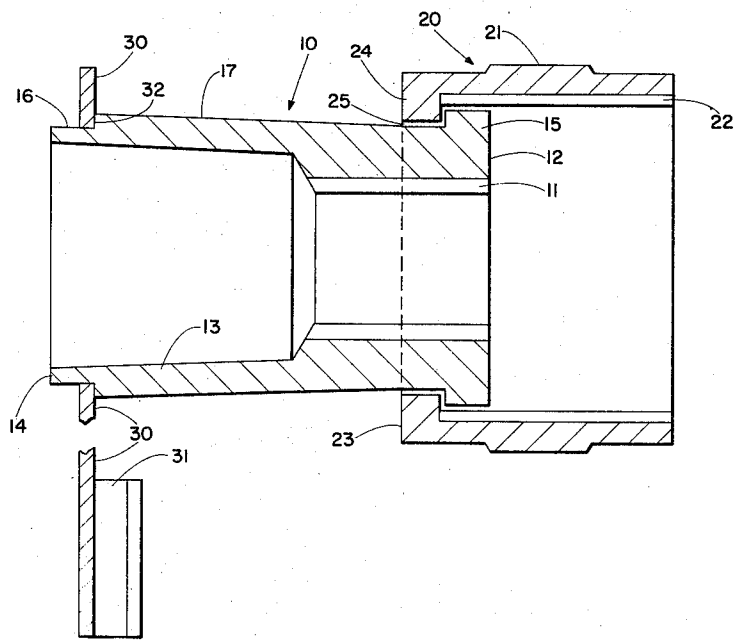
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[57] **ABSTRACT**

A connector for threaded engagement with a cable — particularly a coaxial cable — has a captive nut which is moved axially on the connector and becomes frictionally or otherwise into engagement with the outer surface of the connector. The nut can then be used to screw the connector onto the cable. A typical example is for the connector to have a tapered outer surface and the nut is jammed onto the taper by axial movement. After screwing on the connector the nut is freed by a small axial movement.

1 Claim, 3 Drawing Figures



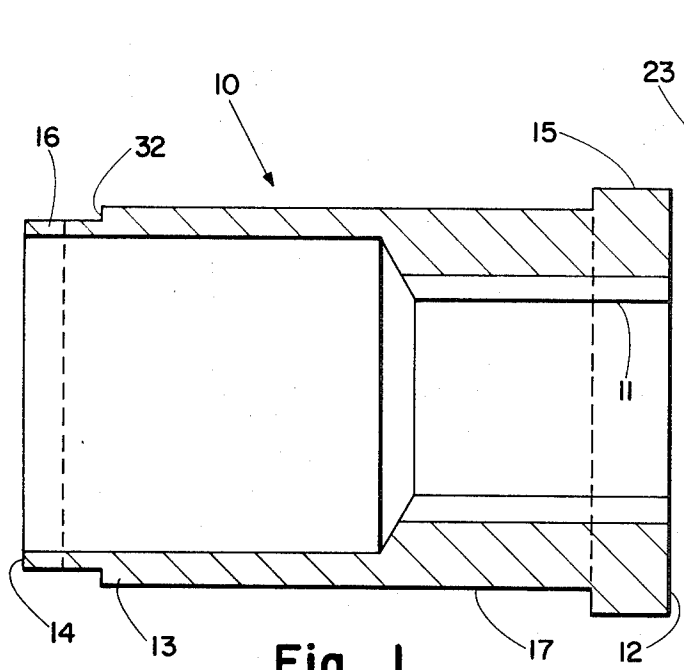


Fig. 1

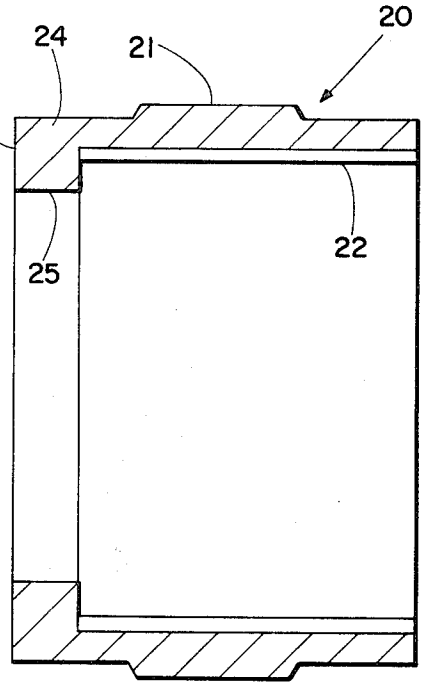


Fig. 2

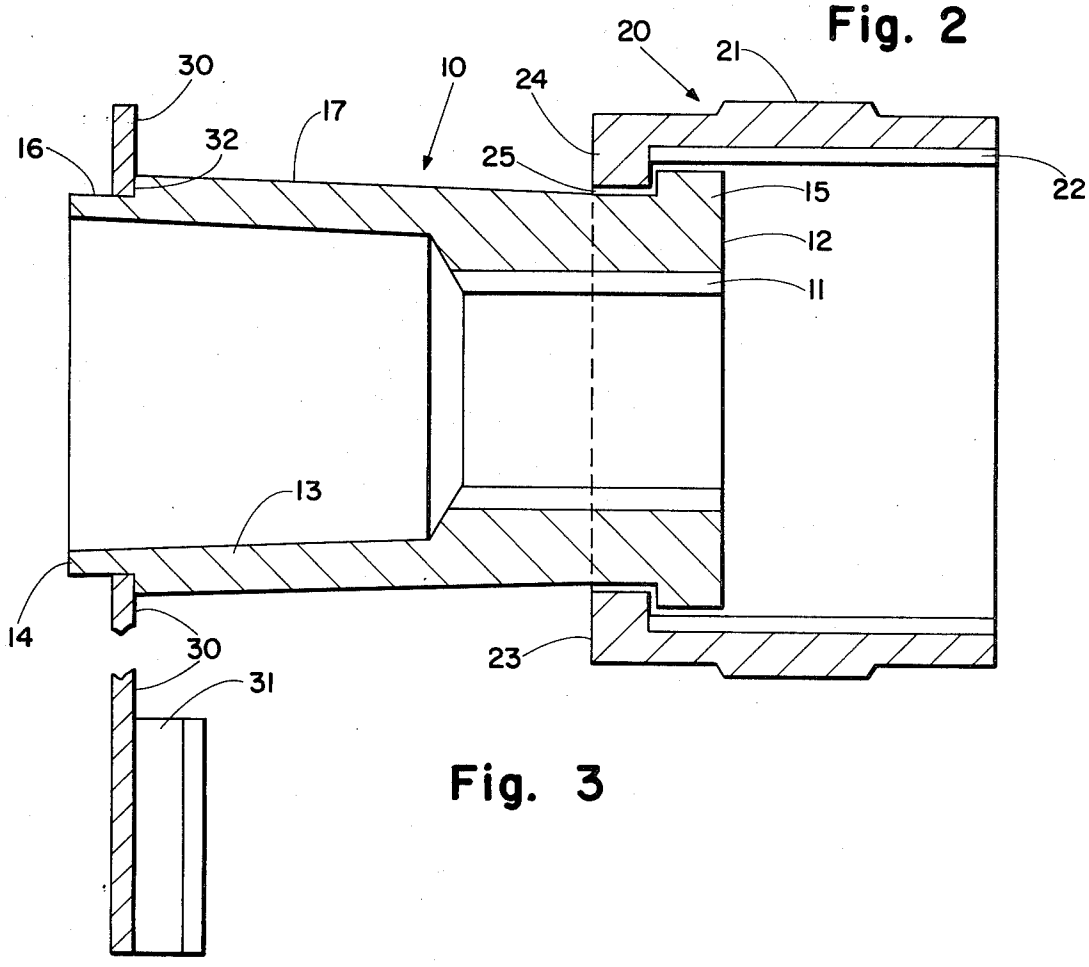


Fig. 3

CABLE CONNECTOR

This invention relates to cable connectors, and in particular, though not exclusively, to connectors such as are used for connecting coaxial and similar cables.

A cable connection usually comprises two connectors, one connector for attachment to the end of one cable and another connector for attachment to the end of a second cable. The two connectors are then connected together by a captive nut on one connector engaging a threaded portion on the other connector. Such connectors are also used to connect a cable to some structure, in which case one connector is attached to or forms part of the structure.

One way of attaching a connector to a cable is by crimping, or otherwise deforming a sleeve portion into firm engagement with the exterior of the cable. This requires a special tool and furthermore does not permit removal and reattachment of a connector. Also crimping is often not satisfactory and it is often difficult to ensure a firm enough gripping action on the cable exterior sufficient to prevent the connector slipping off the cable.

An alternative method of attaching a connector is to form an internally threaded portion which can be caused to engage with the exterior of the cable sheath, or with some other part such as the outer tubular conductor of a coaxial cable. The connector is attached by screwing it on and difficulties arise in providing for satisfactory gripping of the connector to screw it on. For that connector which does not have the captive nut a suitable shape can be formed thereon -both to assist in attaching the connector to the cable and for holding it against rotation and other movement when the two connectors are joined together.

However the connector having the captive nut is not readily gripped as the loose nut prevents a firm hold on the part. To provide a formation for gripping would increase the length —which is inconvenient— and also increases the cost.

The present invention provides a connector for threaded engagement with a cable or other member and having a captive nut thereon for attachment to a further connector, in which the captive nut itself is used to provide a satisfactory grip to cause the threaded engagement with the cable.

Thus, in its broadest aspect the connector has a surface formation with which the captive nut can be removable engaged; the nut, while so engaged, acting as means by which the connector can be rotated and thus screwed on to the cable. Once the connector is in position the nut is removed from engagement with the surface formation.

In a particular example the connector comprises a sleeve and a captive nut freely rotatable on the sleeve, the sleeve having a tapered formation with its external diameter increasing in the direction away from a forward end of the sleeve, that is the end adapted for engagement with the other connector. The nut can be pushed axially away from the forward end to frictionally lock onto the taper. The nut is then used to rotate the connector to attach it to the cable. After attachment the nut is released by movement forward towards the forward end.

The invention will be readily understood by the following description of a particular embodiment, by way

of example, in conjunction with the accompanying drawings, in which:

FIG. 1 is a cross-section through the inner member of a connector;

FIG. 2 is a cross-section through a nut, for positioning on the member of FIG. 1; and

FIG. 3 is a cross-section through an assembled connector comprising a nut positioned on an inner member.

The member or sleeve **10** illustrated in FIG. 1 is tubular having bore **11** extending from a forward end **12**, the bore being threaded to engage with a cable. The inner diameter of the threaded portion is such as will screw onto the outside of a cable, or on to some other part such as the outer tubular conductor of a coaxial cable or onto an insulating layer for example. A further, larger diameter, bore **13** extends from the rearward end **14**. Bore **14** is of a diameter which will pass freely over the outside of the cable. At the forward end **12** of the member **10**, on the outer periphery, there is formed a shallow flange **15**. At the rear end **14** there is formed a shallow recess **16**. The purpose of flange **15** and recess **16** will be described later. The outer circumference **17** of the member is cylindrical and of substantially constant diameter at this stage.

FIG. 2 illustrates a nut **20** intended to be loosely captive on the outside of part **10** illustrated in FIG. 1. The nut **20** has a central portion **21** of its outer periphery with a hexagonal cross-section viewed normal to the axis of the nut. The major length of the nut has a threaded bore **22** for engagement with a corresponding thread on a cooperating connector part. At the rear end **23** of the nut there is a shallow inwardly directed flange **24**. The bore **25** at the flange **24** is such as to be a clearance fit on the outer circumference **17** of the part **10** of FIG. 1. The purpose of the flange **24** and bore **25** will be described later.

FIG. 3 illustrates the assembly of the inner member or sleeve **10** and nut **20**, with the complete, assembled, connector ready for use. The connector is assembled by sliding the nut **20** over the flange **16** at the rearward end **14** of the member **10**. The nut **20** is pushed forward so that flanges **24** and **15** are in engagement, or nearly so, and then a tapered mandrel is pushed into the bore **13** to expand the rearward portion of the member **10**. The expansion is sufficient that the nut **20**, when pushed rearward toward the rear end **14** of the member **10**, will come into frictional engagement with the member **10**, the bore **25** engaging the tapered periphery **17**. The taper is quite slight — a typical example being 4°. The nut effectively jams on the member **10** when moved rearward and can then be used as a gripping means for rotating or twisting the member **10** to cause the threaded bore **11** to screw onto the cable. When the adaptor is in place on the cable the nut is released by being pushed forward. This is done quite easily but if necessary a light tap is sufficient to release the nut.

If an electrical connection is required to be made at the connector, for example to the outer sheath of a shielded conductor and, particularly to the outer conductor of a coaxial cable, the member **10** is attached so as to be in electrical contact with the shield or conductor. A tag **30** is attached to the member **10**, at the rear end **14**. The tag is pushed on to the recess **16** before ex-

pansion of the member **10** and held in contact with the end surface **32** of the recess while member **10** is expanded. The tag is thus firmly and securely retained in position. A conductor can be soldered or crimped to the tubular portion **31** of the tag **30**.

The arrangement described and illustrated in the drawings provides an extremely effective, easy method for attaching the connector, no increase in the normal length of a connector is necessary and manufacture is easy and cheap. The jamming action between the nut **20** and member **10** is very effective, is easily released, and no special tools are required. A connector can readily be removed from a cable by the same method as it was applied. A connector can be reused without difficulty or reduction in its effectiveness.

Other forms of surface formation may be applied to the circumference **17** of the member or sleeve **10**. Thus, for example the member may be expanded by a polygonal mandrel into a corresponding polygonal split die. The nut **20** would then be given a corresponding formation in the bore **25**. Serrated formations can also be used, but the simple tapered formation is easy and cheap to produce and is very effective. The bore **25** may be tapered for all or part of its length.

The invention can also be used where a connector, as illustrated in the drawings, and as described, is to be used as part of a structure. Thus, for example, it is possible to use the surface engagement feature to screw a connector on to a threaded stud, instead of onto a cable.

Although crimping requires a special tool, and prevents reuse of the connector, if desired it is possible to crimp the rearward portion of the member, or sleeve **10** on to the cable, after the member **10** has been screwed on. For example crimping the rearward end can be done to ensure satisfactory sealing of the connector on to the cable, and to reduce flexing of the connection.

What is claimed is:

1. A connector for attachment to a cable comprising a sleeve member and a nut captive on the sleeve member; the sleeve member including a threaded bore extending from a forward end for screwing onto the outer periphery of the cable, a further bore extending from a rearward end toward said forward end for positioning over the outer periphery of the cable prior to screwing the sleeve member onto the cable, an outwardly extending flange at said forward end, and an outer periphery having a slight taper, the taper extending from a minimum diameter adjacent said flange to a maximum diameter adjacent said rearward end; the nut including a threaded bore for engagement with a further member, an inwardly extending flange at a rear end the bore of the flange of a diameter larger than the minimum diameter of the taper of the outer periphery of the sleeve member and smaller than said maximum diameter, the bore of the flange and the taper of the periphery of the sleeve member cooperative to jam the nut on the tape on relative axial movement thereof.

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