United States Patent [19]

Campbell

[11] **3,883,681**

[45] **May 13, 1975**

[54] **ANCHOR ASSEMBLY FOR STRENGTH MEMBER OF COMMUNICATION CABLE**

[75] Inventor: **Robyn M. Campbell**, San Diego, Calif.

[73] Assignee: **The United States of America as represented by the Secretary of the Navy**, Washington, D.C.

[22] Filed: **Dec. 17, 1973**

[21] Appl. No.: **425,357**

[52] **U.S. Cl.** ..... **174/65 R**; 174/89; 350/96 C

[51] **Int. Cl.** **H02g 3/06**

[58] **Field of Search** ..... 174/35 C, 65 R, 65 SS, 174/70 R, 75 C, 89, 151; 350/96 B, 96 C

[56] **References Cited**

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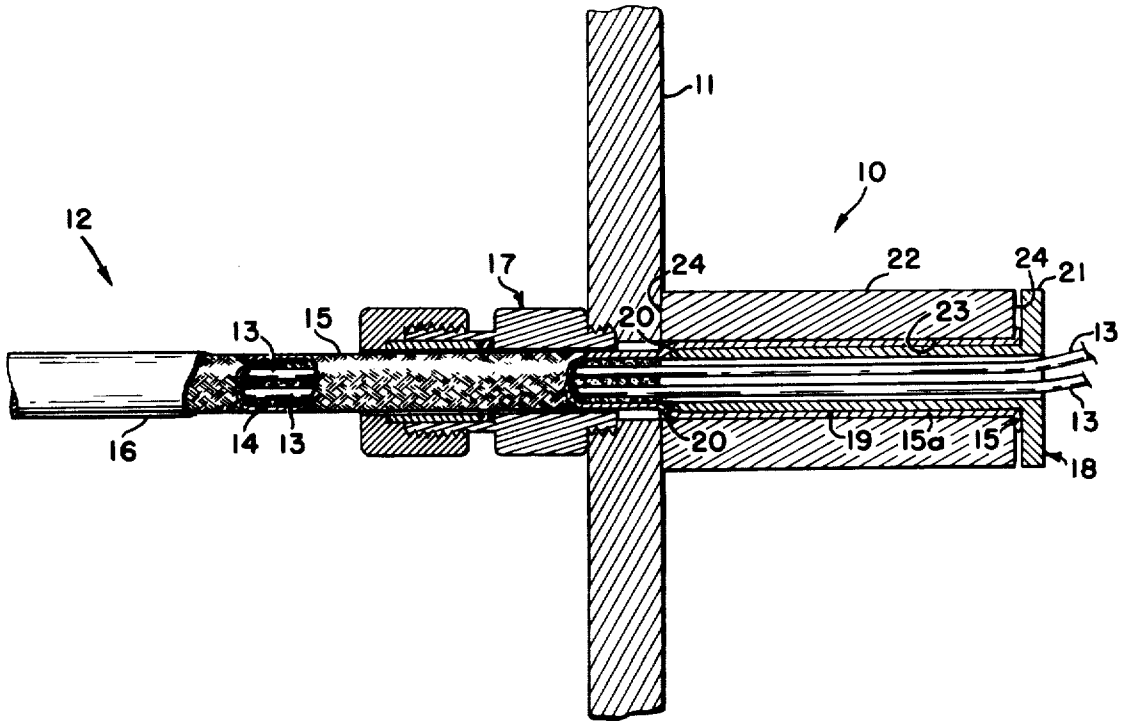
Primary Examiner—Laramie E. Askin

Attorney, Agent, or Firm—Richard S. Sciascia; Ervin F. Johnston; Thomas Glenn Keough

[57] **ABSTRACT**

An improved interconnection between a structural member and a shielded coaxial cable reduces the possibility of there being created uneven, failure inducing, tensile stresses. An elongate fitting member is provided with a passageway for electrical or fiber-optic conductors and is sized to be fitted within the coaxially disposed braided shielding. A cylindrically-shaped retaining member is shaped with a bore having dimensions slightly in excess of the combined diameter of the fitting member and thickness of the braided shielding. As the cable is brought under tension, a slight constriction of the braided shielding occurs. This constriction results in a uniform gripping force along the length of the fitting member. A radially extending rim on the innermost extension of the fitting member is brought to bear against the innermost extension of the retaining member and the cable is anchored in place. The coaction of the aforedescribed elements ensures high reliability since there are uniform stresses exerted and no failure-inducing load concentrations.

2 Claims, 2 Drawing Figures



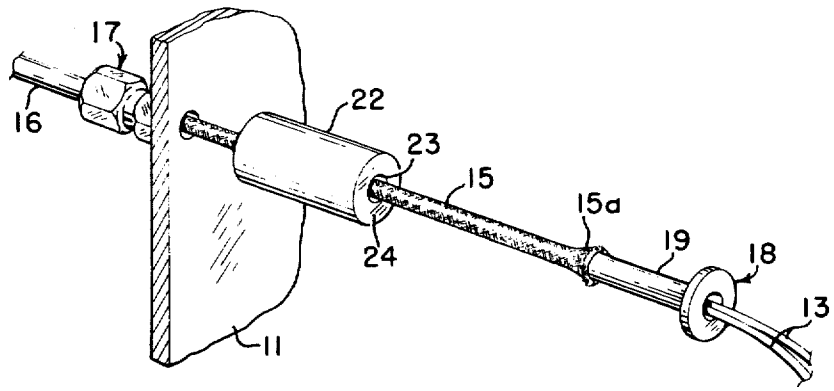

17
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23
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15a
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24
11

FIG. 1

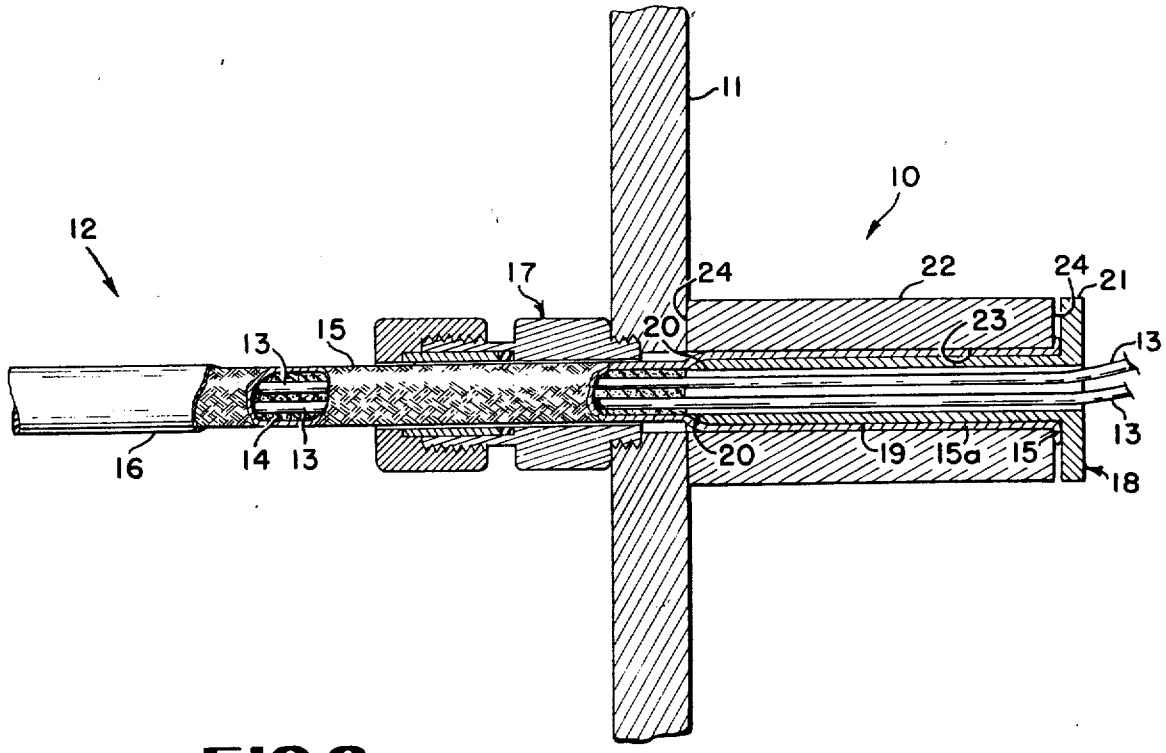

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FIG. 2

ANCHOR ASSEMBLY FOR STRENGTH MEMBER OF COMMUNICATION CABLE

STATEMENT OF GOVERNMENT INTEREST

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

Routinely, engineers and technicians provide auxiliary supporting lines for fiber-optics or electrical cables. In some instances, the added weight of the auxiliary line in a data transfer or power supply system has seriously impaired the system's ability to function properly. Particularly in the case of an electrical or an electronic system, the added bulk and weight of coaxial cables have increased this problem. While the coaxial cables avoid the problems associated with cross talk and the data transfer capability is increased substantially, excessive weight remains a primary design problem. Noteworthy attempts have been made to meet this problem by including appropriately configured connectors at suitable intervals and at opposite ends of the coaxial link. Most of these connectors use clamping arrangements or a variety of flange-and-cone combinations to couple the braided shields to structural members. In all of these connectors there is created certain critical areas where the braided shielding is subjected to concentrated tensile or torsional stresses. Therefore, along these areas it is not uncommon for failure to occur, especially where towed sensors or suspended loads need be borne. Furthermore, those connectors using above referred to approaches and also seeking to avoid the creation of high-stress areas on the shielding are needlessly complex. Such connectors are fabricated from a number of machined components and, consequently, their per unit cost is raised and their reliability is impaired. There is a continuing need in the state-of-the-art for an uncomplicated coaxial cable connector which is inexpensive and highly reliable.

SUMMARY OF THE INVENTION

The present invention is directed to providing an improved interconnection between a coaxial cable and a structural member. An elongate fitting member is inserted between an electrical conductor and its coaxially disposed braided shield and a retaining member is fitted over the fitting member and shield. Since the internal bore of the retaining member is only slightly larger than the diameter of the fitting member and the thickness of the coaxially disposed braided shield, there is effected a uniform tensile stress on each of the wires of the braided shield, thereby resulting in increased reliability at a minimum complexity.

It is a prime object of the invention to provide an improved connector for a coaxial cable.

Yet another object is to provide a coaxial cable connector or reduced complexity.

Another object is to provide a coaxial cable connector employing its braided shielding as the load bearing member and which does not introduce excessive, localized stress.

Still another object is to provide a connector which is readily installed.

Still another object is to provide a connector suitable for electric, metallic conductors or fiber-optic conductors.

These and other objects of the invention will become more readily apparent from the ensuing specification when taken with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an isomeric exploded view of the invention.

FIG. **2** is a longitudinal cross-sectional view of the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the drawings, there is shown a preferred embodiment of a connector **10** mounted in place on a structural member **11**, such as a wall or bulkhead. The connector is so disposed to serve as an anchor point for a cable **12**, the primary purpose of which is to transfer electromagnetic energy.

The details of the connector are more clearly depicted in FIG. **2** of the drawings. Here, the cable is disposed to function as a load bearing member for a towed sensor trailing from the left side. Conductors **13**, either metallic or fiber optic, bidirectionally couple power and data to and from machinery and instrumentation at opposite ends of the cable. The conductors positioned and protected by a dielectric, fibrous packing **14** are in widespread use in cables of this type. A coaxial, braided shielding **15** covers the conductors and packing and is routinely so disposed to serve its primary purpose, that being to prevent remotely originating spurious signals from being picked up by metallic conductors **13**. In a secondary role, the braided shielding functions to protect the conductors and is woven in a conventional pattern from a number of alloy wires. Lastly, a flexible plastic-like or rubber covering **16** ensures that the watertight integrity of the cable is not impaired.

Where the cable approaches structural member **11**, it is first fed through a gland **17** of conventional design. A popular type of gland includes a first lock nut threaded into the structural member. A second lock nut is tightened and forces a collar into a grommet. The grommet is deformed by the collar and is brought to bear against the outer surface of either covering **16** or coaxial braided shielding **15**. The main purpose of the gland is to seal the connection although it does partially act in a secondary role as a connector or a retainer of the cable.

The cable, having passed through structural member **11**, now protrudes away from its inner wall. Packing **14** is removed from the inside of a protruding portion **15***a* of coaxial braided shielding **15**. With the packing removed there is now defined a cylindrically-shaped void between the shielding and the conductors. A fitting member **18** is sized to fit within the cylindrically-shaped void and is shaped with a coaxial passageway for receiving the conductors. The outer surface of an elongate portion **19** of the fitting member has a diameter being slightly in excess of the inner diameter of coaxial braided shielding **15**. When the elongate portion is inserted therein, the braided shielding lightly grips it uniformly along its entire length. Because a first end of the fitting member is formed with a rounded shoulder **20**, it is a relatively simple matter to insert the fitting member within the braided shielding. The configuration of the rounded shoulder also prevents the build-up

of excessive stresses when the cable is under tension. At the opposite end of the fitting member a radially extending rim **21** limits the degree of longitudinal travel in the braided shielding and helps to engage the shielding in a manner to be explained below.

An essentially cylindrically-shaped retaining member **22** is provided with a coaxial bore **23** having a diameter which is slightly in excess of the diameter of elongate portion **19.** Since the coaxial bore is so dimensioned, a small shell-shaped space is formed within which protruding portion **15***a* of the braided shielding is contained to be held adjacent elongate portion **19.**

When a load pulls from left to right on cable **12,** see FIG. **2,** protruding portion **15***a* of the coaxial braided shielding uniformly constricts along the outer surface of elongate portion **19** to engage the fitting member. The resultant constricting force is uniform along the elongate outer surface and the aforedescribed rounded shoulder avoids the creation of an area of high stress where the coaxial braided shielding engages the fitting member. Because of the shielding's gripping, the load is coupled to fitting member **18.** This causes the fitting member to be pulled toward retaining member **22.** Flat, opposite ends **24** of the retaining member abut against the inner surface wall of structural member **11** and radially extending rim **21** of the fitting member and the load is transferred to the structural member.

There is no clamping of the braided shielding or otherwise uneven transfer of the load through the aforedescribed elements. The ease of assembly of the disclosed connector enables a rapid electrical coupling of the conductors to a load bearing structural member. Because of the few easily machined parts involved, this connection is inherently trouble-free.

In this invention the well known high strength capabilities of finely drawn metal alloys used as electrical shielding are utilized to function as the load bearing member for a coaxial cable. This high strength capability is not compromised at the connector, due to the novel configuration and coaction of the disclosed invention. The sound engineering considerations embraced by this invention have produced a connector which is more reliable and less expensive than contemporary connectors.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings, and, it is therefore understood that within the scope of the disclosed inventive concept, the invention may be practiced otherwise than specifically described.

What is claimed is:

1. A secure mechanical interconnection comprising:

a wall member having an opening therethrough;

a coaxial cable having at least one axially extending conductor of electromagnetic energy, insulation covering said conductor, an elongate braided conductive shielding coaxially disposed about said insulation and an elongate flexible covering coaxially carried on said shielding, said cable extending through said opening in said wall member;

a rigid elongate tubular-shaped member having an inner diameter sized to contain and containing said conductor therethrough and further having an outer diameter sized to fit and fitting within said braided conductive shielding in a slidable relationship, said elongate tubular-shaped member being provided with an annular rounded shoulder at one end and a radially extending rim at its opposite end and;

a rigid cylindrically-shaped member coaxially carried on said rigid elongate tubular-shaped member by having a coaxial bore sized to fit about said tubular-shaped member and said braided conductive shielding, said cylindrically-shaped member being configured with oppositely facing ends for mechanically engaging an inner surface of the wall member and said radially extending rim of said tubular-shaped member, as a tensile force is exerted on said coaxial cable, said braided conductive shielding uniformly gripping said elongate tubular-shaped member along the surfaces defined by said outer diameter and said rounded shoulder and said radially extending rim bearing against one oppositely facing end of said rigid cylindrically-shaped member to transfer the tensile force to the wall member via the other oppositely facing end of said rigid cylindrically-shaped member.

2. A secure mechanical interconnection according to claim **1** further including:

a gland fitting mounted in said opening of said wall member being sized to receive and receiving said coaxial cable therethrough for ensuring a watertight interconnection.

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