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CONNECTOR FITTING FOR EXTERNALLY INSULATED CONDUITS

Filed Feb. 27, 1963

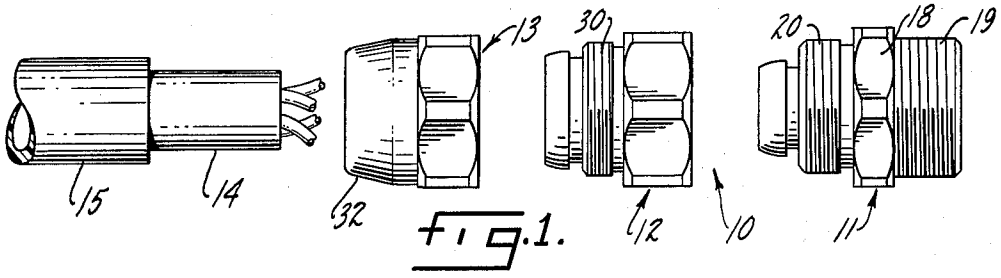


Fig. 1.

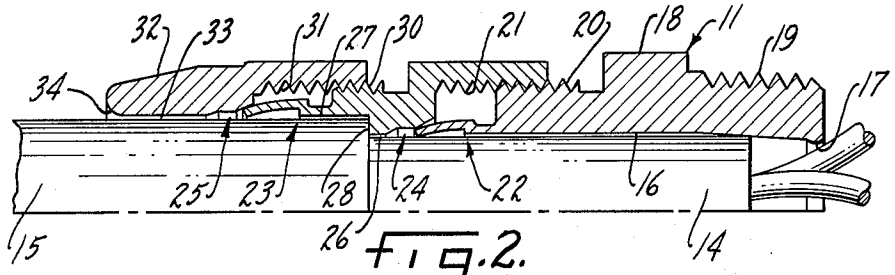


Fig. 2.

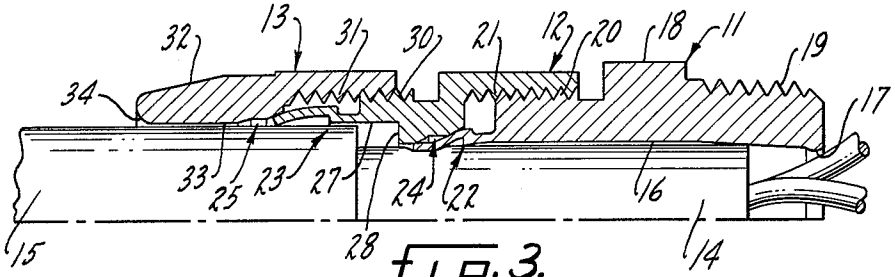


Fig. 3.

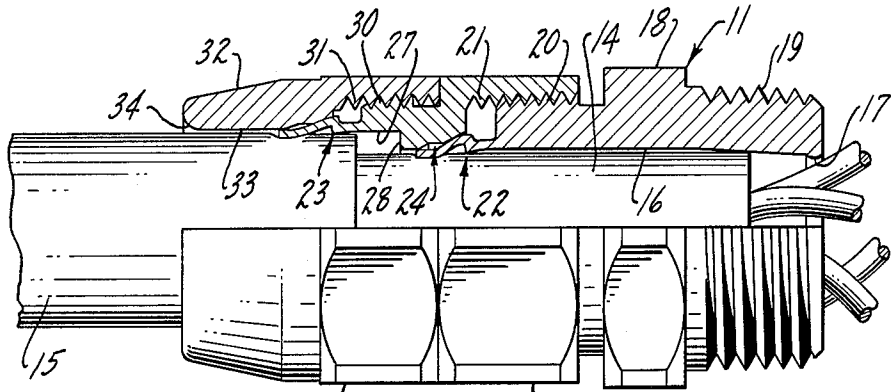


Fig. 4.

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CONNECTOR FITTING FOR EXTERNALLY INSULATED CONDUITS

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1 Claim. (Cl. 285—149)

The present invention relates generally to conduit connectors, and more particularly, to a novel connector fitting for use with shielded electrical cables, conduits or the like which have an external covering of insulating material.

In recent years there has been a rapid growth in production and use of externally insulated conduits, shielded electrical cables and similar devices. Typically, such cables and conduits are insulated with a uniform covering of rubber or plastic material such as "neoprene." This type of material not only provides electrical insulation for these special cables and conduits, but also protects the metallic portion of the cable or conduit from corrosive action due to moisture, gases, and other materials.

Previously, when such externally insulated conduits have been coupled to a junction box or other connecting device, it has been necessary to use conventional type connectors which are not especially adapted for use with this improved conduit. One connector which has been found to be particularly popular for this purpose is the type disclosed in my copending application Serial No. 739,618, filed June 3, 1958. However, with this type connector it has not been possible to afford a strong sealing connection between the connector and both the conduit and its insulated covering. Thus, it has been necessary to strip the insulation away from the end of the conduit to which the connector is attached, and frequently this leaves an exposed portion of the bare conduit adjacent the connector. Furthermore, there is often a tendency for the insulating covering to work back from the connector and thus leave an additional portion of the bare conduit unprotected. In either of these situations, the conduit is particularly vulnerable to corrosive moisture and gases or other substances which tend to collect on the conduit adjacent the connector. The present invention, which is an improvement in connectors of the type covered in my above mentioned application, is, accordingly, intended to obviate the foregoing difficulties.

It is the primary aim of the present invention to provide a connector fitting for externally insulated conduits or the like which is constructed to firmly grip and seal both the conduit and the insulated covering to the connector.

A more particular object is to provide such a connector with individual sealing elements which respectively grip the conduit and the insulated covering and which are complementarily coupled to the connector in ganged relation.

Another object is to provide a connector of the above type in which the intermediate sealing element operates to urge the connector into gripping engagement with the conduit and also forms the gripping element which is urged into sealing relation with the insulated covering.

It is a further object to provide a novel connector that is particularly economical to manufacture and readily adapted for mass production in that it comprises only three parts that may be simply formed using common tools and methods.

Other objects and advantages of the invention will become more readily apparent upon reading the attached detailed description and upon reference to the drawings, in which:

FIG. 1 is an exploded view of the parts of a connector embodying the present invention together with a section of an insulated conduit or the like;

FIG. 2 is a fragmentary sectional view of the connector

shown in FIG. 1 in position on the end of an insulated conduit prior to being tightened and secured;

FIG. 3 is a view similar to FIG. 2 showing the parts in an intermediate position with one element fully tightened; and

FIG. 4 is an elevational view partially in section, of the connector shown in FIG. 1, fully tightened and secured on the end of an insulated conduit.

While the invention will be described in connection with a preferred embodiment, it will be understood that I do not intend to limit the invention to that embodiment. On the contrary, I intend to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claim.

Turning first to FIGURE 1, there is shown an illustrative connector **10** embodying the present invention, comprising a threaded fitting member **11**, a first sealing element or nut **12** and a second sealing element or nut **13**, positioned for connection to an electrical shield or conduit **14** having a covering **15** of insulating material. When attached, the connector **10** becomes a rigid and substantially integral part sealing and gripping both the conduit **14** and covering **15** and thereby permitting the insulated conduit to be threadedly secured to a connection box or similar structure.

In regard to the illustrative fitting member **11**, reference may be made to my above mentioned copending application Serial No. 739,618, which describes in detail the construction and function of such a fitting member. However, the following brief description of the fitting will provide an ample understanding for the purpose of the present invention. Referring more particularly to FIGS. 2–4, it can be seen that the fitting **11** is a single, integral, annular member having a main central bore **16** of a diameter to closely, but slidably, surround the particular conduit outer diameter with which the connector **10** is intended to be utilized. A ridge **17** at one end of the bore **16** provides a stop for accurately positioning the fitting **11** over the end of the conduit **14**. The fitting **11** also includes a nut portion **18** which separates a pipe threaded portion **19** for attachment to a connecting box (not shown) and an externally threaded portion **20** for threadably receiving an internally threaded portion **21** of the first sealing nut **12**.

In accordance with the present invention, the fitting member **11** and first and second sealing nuts **12**, **13** are so constructed that a strong sealing connection is afforded between the connector **10** and both the bare end of the conduit **14** and its insulated covering **15**. For this purpose, the fitting member **11** and the first sealing nut **12** are each formed with respective thin-walled deformable portions **22** and **23** which are individually urged into gripping contact about the exposed conduit **14** and insulated covering **15** by internal cam portions **24** and **25** of the respective sealing nuts **12**, **13**. Thus, threadably drawing the first and second sealing nuts respectively onto the fitting **11** and first nut **12**, causes the cam portions **24**, **25** on the nuts to inwardly deflect the respective deformable portions **22**, **23** into sealing engagement with the conduit **14** which has been inserted into the fitting and with the covering **15** which has been inserted into the first sealing nut.

To facilitate the sealing connection between the connector **10** and the conduit **14** and its insulated covering **15**, the first sealing nut **12** is formed with a bore **26**, similar in diameter to the bore **16** of the fitting **11**, so as to closely, but slidably, receive the diameter of the conduit **14** and an enlarged counterbore **27**, for closely, but slidably, receiving the enlarged diameter of the cylindrical covering **15**. The bore **27** terminates at its inward end by a shoulder **28** which provides a stop for accurately positioning the first sealing nut **12** against the

insulated covering 15. An externally threaded portion 30 on the first sealing nut 12 surrounds the enlarged bore 27 and is adapted to threadably receive an internally threaded portion 31 of the second sealing nut 13.

Referring now to the second sealing nut 13, it is provided with an axially extending nose 32 having a smooth bore 33, approximately the same diameter as the enlarged bore 27 of the first sealing nut 12, for closely, but slidably, surrounding the insulated covering 15. At its outer end, the bore 33 is flared outwardly to define a rounded throat 34 which eliminates the danger of having a sharp edge on the sealing nut 13 dig into the insulation 15 when the latter is flexed relative to the connector 10.

The function of the individual parts can best be seen by briefly describing the operational steps involved in the preferred procedure for installing the connector 10 on the insulated conduit 14.

The first and second sealing nuts 12, 13 are each loosely threaded on the fitting body 11 and the first sealing nut 12 with the respective cam portions 24, 25 lightly engaging the deformable portions 22, 23. This couples the connector 10 together as an integral unit ready for reception of the conduit 14. At this time the fitting body may also be secured to a connection box or the like. The conduit 14 is then inserted into the bore 16 with the covering 15 entering the enlarged bore 27 until it strikes the shoulder 28 (see FIG. 2). In this position, it may be seen that the enlarged bore 27 of the second sealing nut 13 closely, but slidably surrounds the outer diameter of the covering 15 and the bore 16 of the first sealing nut closely, but slidably surrounds the diameter of the conduit 14.

By engaging the mating threads 20, 21, the first sealing nut 12 is then threadably drawn onto the fitting member 11. As the nut 12 is rotated along the fitting 11, the cam portion 24 strikes the deformable portion 22, deflecting it inwardly with a turning action, so as to grippingly seal the body 11 with the cylindrical portion of the conduit 14. Similarly, the mating threads 30, 31 are then engaged and the second sealing nut 13 is threadably drawn onto the first sealing nut 12. In corresponding fashion, as the nut 13 is rotated along the nut 12, the cam portion 25 strikes the deformable portion 23, deflecting it inwardly with a turning action, so as to sealingly grip the insulated covering.

In following the above procedure it will also be seen that by first tightening the first sealing nut 12 to urge the deformable portion 22 into gripping relation with the conduit 14, the second sealing nut 13 is freely slid along the covering 15 without scuffing or marring the protective covering. On the other hand, if the second nut 13 is tightened first, considerable scuffing of either the conduit 14 or covering 15 or both results. Therefore, to facilitate the preferred procedure and to insure that an adequate sealing engagement is afforded with both the conduit 14 and covering 15, the axial dimension of the enlarged bore 27 of the first sealing nut is greater than the axial dimension of the cam portion 24. Thus, when the cam portion 24 is fully engaged with the deformable portion 22, the enlarged bore 26 and its attached deformable portion 23 are still positioned well over the insulated covering 15.

It will be noted as a feature of the invention embodied in the connector 10 that when the connector is installed, on the end of the insulated cable, the conduit or the like is not only rigidly supported by the biting engagement of the connector, but also, the connector entirely covers the exposed portion of the conduit 14 and sealingly grips the insulating covering to the connector. The importance of this feature can be more fully appreciated, bearing in mind the conduit 14 has a relatively thin wall and that moisture and corrosive substances most frequently accumulate on the conduit adjacent such a connector. However, in the present instance, since the connector 10 entirely covers the bare conduit 14 and sealingly engages the covering 15, the possibility of holes forming in the conduit 14 is substantially minimized. Moreover, with the covering 15 firmly gripped by the connector 10, the tendency of the covering to peel away from conduit 14 is also diminished.

It will also be appreciated that when installing the connector 10, neither the conduit 14 nor the fitting member 11 need be rotated since the entire connecting operation can be performed by rotating the two sealing nuts 12, 13 relative to both the conduit 14 and the fitting member 11. Thus, if it is desired to secure the end of the conduit 14 to a connection box or the like, the fitting 11 can first be threadably installed in the connection box before being secured to the conduit. Once the fitting member 11 has been properly positioned, the conduit 14 can then be slid into the bore 16 and the sealing nuts 12, 13, respectively, rotated to lock the assembly into the desired position.

The connector 10 embodying the present invention is also quite simple and economical to manufacture since only three pieces are required and each of these are readily adapted for mass production with ordinary machine tools. Moreover, it is important to note that the connector 10 may be readily formed from light, easily shaped materials, such as aluminum.

I claim as my invention:

A connector fitting intended for attachment to a conduit or the like having an exposed cylindrical end with an enlarged cylindrical covering adjacent thereto of greater outside diameter, comprising, a fitting body having a first central bore for closely but slidably receiving said exposed end and having an externally threaded portion, a first sealing nut adapted to rotatably engage said threaded body portion and having a second central bore of substantially the same diameter as said first central bore and extending entirely therethrough, said first sealing nut having an enlarged counterbore coaxial with said second central bore and extending partially therethrough for closely but slidably receiving said enlarged cylindrical covering, said first sealing nut having an externally threaded portion surrounding said second central bore and said counterbore, a second sealing nut adapted to rotatably engage said externally threaded nut portion, said body and said first sealing nut each having a deformable thin-walled portion extending axially beyond said respective externally threaded portion, said counterbore of said first sealing nut joining said second central bore by means of a substantially radial shoulder to form a stop to be engaged by the end of said cylindrical covering to limit axial insertion of said conduit into said first nut, and said first and second sealing nuts each formed with an internal cam portion so that as said sealing nuts are respectively threaded in sequence onto said fitting body and first sealing nut, said deformable body portion is first urged into gripping engagement about said exposed conduit end and said deformable nut portion is then urged into gripping engagement about said enlarged cylindrical covering, the axial dimension of said counterbore being greater than the axial dimension of said cam portion of said first sealing nut so that when said cam portion of said sealing nut is fully engaged with said deformable body portion, the wall of said counterbore still overlies said covering whereby the deformable nut portion of said first sealing nut will overlie said covering and be deformed into engagement therewith upon operation of said second sealing nut.

References Cited by the Examiner

UNITED STATES PATENTS

1,904,617	4/1933	Buchanan	285—169
2,268,263	12/1941	Newell	285—138
2,564,302	8/1951	Fraser	285—149
2,858,358	10/1958	Hawke	339—270
3,039,796	6/1962	Lawman	285—382.7 X
3,079,182	2/1963	Appleton	285—382

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