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LOCK NUT BUSHING FOR ELECTRICAL CONNECTORS

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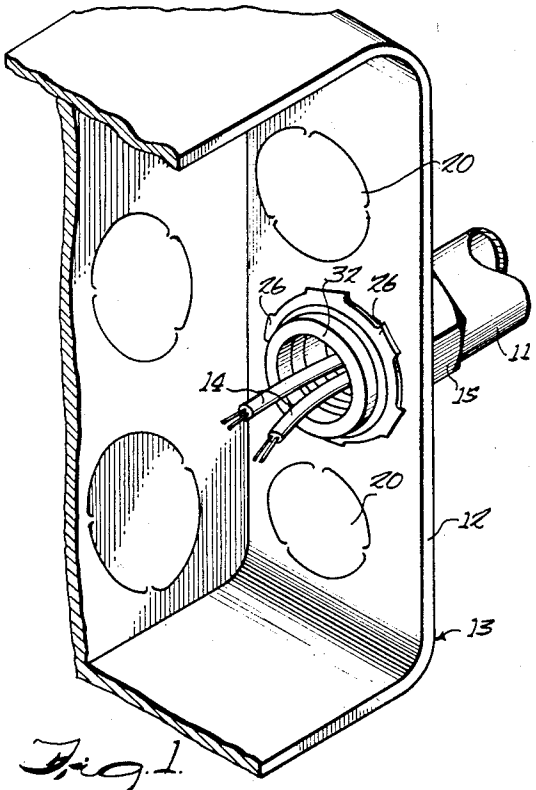


Fig. 1.

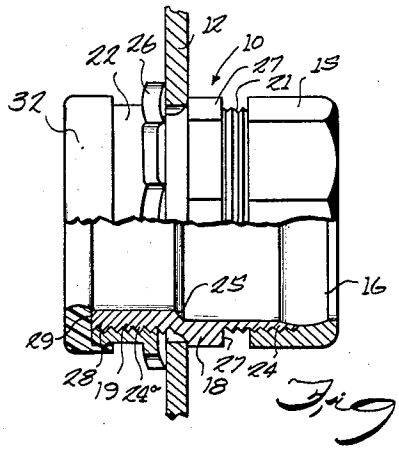


Fig. 2.

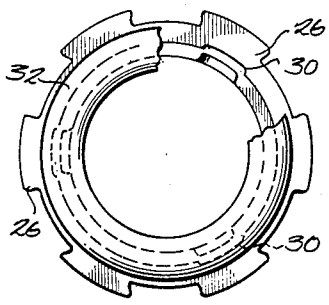


Fig 3

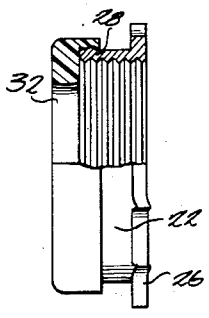


Fig. 4.

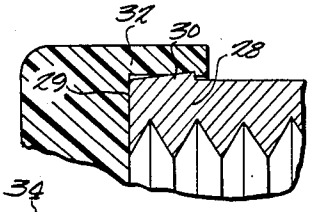


Fig. 5.

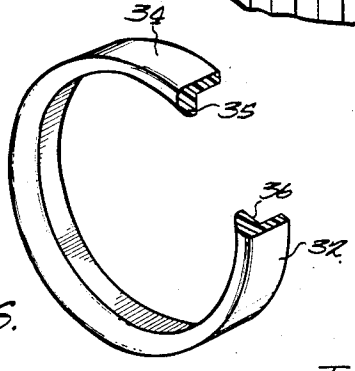


Fig. 6.

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LOCK NUT BUSHING FOR ELECTRICAL CONNECTORS

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2 Claims. (Cl. 174—137)

The present invention pertains generally to insulating bushings for association with electrical connectors employed in connecting pipe or conduit to fixed anchorages. More specifically, the invention pertains to a novel insulating bushing for use with a connector of the type employed in securing electrical conduit to junction boxes, outlet boxes, and the like, and especially for use with such a connector having a portion projecting into the box and a lock nut threaded on such portion.

One object of the invention is to provide an insulating bushing for an internally-threaded lock nut of a connector assembly which protects the insulation of lead wires passing therethrough against chafing on the internal threads, burrs, or other sharp protuberances.

Another object is to provide an insulating bushing which is adaptable to be simply mounted on a connector used in connecting conduit to a junction box, so that such bushing projects into the box a minimum distance thereby permitting use of a maximum of the space inside the box.

Still another object is to provide an insulating bushing for electrical conectors which is cheaply manufactured, simply formed, and economically assembled with the lock nut portion of the connectors. It is an ancillary object of the invention to provide an insulating bushing which may be affixed to an electrical connector without employment of screw-threads, which are expensive to form, and accordingly without necessitating the use of any special tool for screwing the bushing onto the connector.

Further objects and advantages will become apparent as the following description proceeds, taken in connection with the accompanying drawings wherein:

Figure 1 is a perspective view of an illustrative bushing embodying the invention, such view showing a bushing mounted on a connector which is in turn mounted in the knock out opening of a junction box wall.

Fig. 2 is a partially cutaway elevational view of the connector assembly shown in Fig. 1, including the illustrative bushing.

Fig. 3 is a view of the left-hand end of the bushing and connector assembly shown in Fig. 2 with the bushing partially cut away.

Fig. 4 is a partially cutaway elevational view of the illustrative bushing mounted upon a conventional connector lock nut.

Fig. 5 is an enlarged fragmentary of the contemplated mounting of the illustrative bushing upon a conventional connector lock nut, as shown in Fig. 4.

Fig. 6 is a perspective view of the illustrative bushing embodying the present invention.

While the invention is susceptible of various modifications and alternative constructions, a preferred embodiment has been shown in the drawings and will be described below in considerable detail. It should be understood, however, that there is no intention to limit the invention to the specific form disclosed, but on the contrary, the intention is to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Referring in greater detail to the drawings, the invention is there exemplified in an illustrative connector **10** adapted to secure a length of conduit **11** to the side wall **12** of a junction box **13**. The conduit **11** carries electrical conducting wires **14** and may be fastened to the connector **10** in any convenient manner as, for example, by the use of a shoulder nut **15** and a pressure ring **16**.

The connector **10** comprises a hollow body (Figs. 2 and 3) in the form of a relatively short sleeve **18** having a nose end **19** adapted for insertion into a generally circular opening formed upon removal of one of the knock-out plugs **20** from the box wall **12**, and in addition has a nut end **21** which projects outwardly from the box wall when the connector is mounted in place. To receive a connector lock nut **22** as well as the shoulder nut **15**, the sleeve **18** is fashioned with external threads **24** and **24***a* running along a substantial portion of its length. Internally the sleeve **18** is formed with a stepped axial bore adjacent the nose end **19** defining a stop shoulder **25** for the end of the conduit **11**.

To achieve positive engagement between the connector **10** and the box wall **12**, one end of the lock nut **22** is provided in the present instance with a flange having one or more radially projecting teeth **26** preferably of generally segmental shape. Thus when the connector **10** is installed in the opening provided upon removal of a knock-out plug **20** from the box wall **12**, and the lock nut **22** is in screw thread engagement with the external threads **24***a*, the teeth **26** serve to engage the interior face of the box wall. Intermediate the ends of the body **18** a radially outstanding flange **27** is provided which is unthreaded and defines the separate external threads **24** and **24***a*. Thus the engagement of the teeth **26** with the interior face of the box wall **12** is in opposition to the thrust of the flange **27** against the exterior face of the box wall, so that the connector **10** is firmly held within the opening and to the box **13**.

Attention is drawn to the particular design employed in the construction of the lock nut **22**. As hereinbefore described, the lock nut **22** is formed with projecting teeth **26** on one end thereof. The other end **28** of the lock nut **22** is annularly shaped having an end surface **29**. As will be seen upon reference to Figs. 2, 3 and 5, a plurality of staked-out portions **30**, three in this instance, are provided about the outer periphery of the end **28** of the nut **22**. Such portions **30** are formed by punching the nut **22** at spaced intervals perpendicularly about the end surface **29** thereof with a suitable tool.

In carrying out the present invention, an annular bushing **32**, of hard insulating material, is provided to be snapped onto the end **28** of the lock nut **22** so that the electrical wires **14** passing therethrough are maintained free from contact with the internal threads, burrs and the like, of the lock nut in passing into the box **13**. Accordingly, the arrangement of the above-described staked-out portions **30** spaced about the end **28** of the lock nut **22** is such that the bushing **32** may be pressed over the end **28** and firmly held thereon by means of frictional forces set up through a slight expansion of the bushing in being so operated upon. It is also found in practice that the staked-out portions **30** bite into the bushing **32** so that a positive type engagement of the bushing with the lock nut **22** is utilized as well as the aforementioned frictional engagement.

Upon inspection of Fig. 6, it will be seen that the bushing **32**, preferably formed from Bakelite or the like, is generally ring shaped and includes a rim portion **34** of generally rectangular cross section and having smooth inner and outer surfaces, and an inturned arcuately shaped flange **35**. The inner periphery of the rim **34** is adapted for engagement with and retention by the staked out portions **30** of the lock nut **22** as previously set forth. It will be noted that the undersurface **36** of the inturned

flange 35 forms a shoulder which abuts against the end surface 29 of the lock nut 22 so that the bushing 32 and lock nut may be rigidly and solidly mated.

The inturned flange 35 of the bushing 32 is arcuately shaped to facilitate a smooth sliding contact between the wires 14 and the bushing, so that such wires may easily be passed therethrough and, more importantly, in order that there will be no exposure of bare wires which might result from tearing of insulation wrapped about the wires.

By the use of the foregoing construction, the bushing 32 can be installed on the lock nut 22 quickly, simply, and economically. Starting with the bushing 32 as shown in Fig. 6, such bushing is simply placed over the staked out end 28 of the lock nut 22 and pressed thereon by employing a simple pressing device. As a result, a firmly engaged bushing and lock nut combination 32, 22, is provided which may be simply used with the connector assembly. It is thus seen that one of the advantages of the present invention is that the bushing 32 may be economically manufactured and simply assembled with the lock nut 22. Such assembly entails only a stamping operation in forming the staked out portions 30 on the lock nut 22 and a simple pressing operation for snapping the bushing 32 over the end 28 of the lock nut. No expensive screw threads need be formed on either the lock nut 22 or the bushing 32. Similarly no special tools need be employed to tightly secure the bushing 32 and a lock nut 22, such as are necessary in tightening the conventional screw threads provided on these members.

Another of the features of the present invention is that the bushing not only insulates the lead wires from grounding to the junction box through the lock nut, but also prevents puncture of or damage to insulation carried by the wires due to contact of the insulation with jagged edges on the inner end of the lock nut. This feature is especially advantageous when the illustrative bushing is used with conventional lock nuts of the type which employ internal threads, which threads present sharp edges which tend to chafe and tear the lead wire insulation.

It is well known that electrical junction boxes are sized as small as possible to occupy a minimum of space on a mounting panel. Consequently space is at a premium inside of such boxes and any projection within the box is objectionable. Accordingly, another advantage of the present invention lies in the provision of an insulating bushing which is short in length and which may be nested into the inner end of a lock nut used with an electrical connector, so that a minimum of space is occupied by the bushing thus permitting maximum productive use of the limited space within a junction box to which the connector is affixed.

I claim:

1. In an electrical connector assembly adapted for mounting in the knock out opening of a box wall for securing to the box electrical conduit containing lead wires, a sleeve type lock nut internally disposed within the box and having one end thereof flanged for rigidly securing the assembly to the box, the other end of said lock nut provided with a plurality of staked-out portions about its outer periphery, and an annular bushing of hard insulating material for frictionally fitting over said staked-out portions and thereby insulating the lead wires from contact with the lock nut.

2. In an electrical connector assembly adapted for mounting in the knock out opening of a box wall for securing to the box electrical conduit containing lead wires, a sleeve type lock nut internally disposed within the box and having one end thereof flanged for rigidly securing the assembly to the box, the other end of said lock nut provided with a plurality of staked-out portions about its outer periphery, and an annular bushing of hard insulating material for fitting over said staked-out portions, said staked-out portions acting to bite into said bushing and thereby retain the bushing positively on said lock nut for insulating the lead wires from contact with the lock nut.

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