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ELECTRICAL CONNECTOR BOX

- Electrical wiring is commonly extended through conduits which may be joined at connector boxes, for example. Oftentimes in home construction, for example, connector boxes may be located where they may be subject to the elements and inasmuch as the box provides the only protection for electrical wires joined therein it is necessary that the box be truly watertight to prevent electrical shorts from moisture.
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- 10 According to the present invention there is provided a waterproof connector box comprising an open sided or topped housing and a removable cover, the box further comprising
- 15 i) at least one hollow cylindrical spigot extending from the housing to accommodate a conduit in the bore of the spigot, there being an opening therein with a shoulder within the bore for abutment of the conduit, the spigot having external threads thereabout
- 20 and thin longitudinal slots therethrough for threaded engagement with a nut having tapered internal threads and adapted for disposition about the conduit when inserted in said spigot against said shoulder for tightening said spigot about said conduit to lock said
- 25 conduit in place;
- ii) at least one knock-out plug in the housing; and
- 30 iii) at least one hollow externally threaded cylinder for fitting snugly in an aperture produced by

knocking out the said knock-out plug, the cylinder having a sealing ring and nut, a flange and a gasket whereby, with the cylinder extending through said housing opening, the gasket is locatable between said
5 flange and the interior of said housing about said opening and an inwardly tapered edge about the outer end thereof, the sealing ring is fitted about a conduit extending into said cylinder, for sliding on the
10 conduit with a tapered end surface of the sealing ring facing the cylinder, and the nut, which has an internal shoulder about an outer end thereof, can be slid along the said conduit for threaded engagement with said
15 cylinder for forcing said ring against a tapered end surface of said cylinder to lock said conduit in place.

15 In one embodiment, the present intention provides a connector or junction box adapted to engage the ends of a plurality of electrical conduits in watertight relation. Electrical wires extending through these
20 conduits may be joined in desired manner within the box hereof and to this end a removable cover plate is provided for access to substantially the entire interior of the box. Particular physical structure is herein provided to ensure positive gripping and locking
25 of conduit ends and complete watertight integrity of the interior of the connector box.

The connector box may be formed as an integral unit including one or more hollow, externally threaded
30 extensions for receiving conduit ends therein. A nut with tapered internal threads disposed about a conduit is threaded onto the extension to clamp the extension about a conduit end for locking the latter in place and

a thin waterproof tape may be positioned between the threads to maximize the watertight relationship of the connection.

5 The connector box may also be provided with several
"knock-out" plugs for providing openings through the
box walls where additional conduits are to be joined to
the box. Such a joinder is herein accommodated by a
hollow externally threaded cylinder having a flanged
10 end adapted to bear upon a gasket against the interior
of the box with the cylinder extending through a
knock-out opening. The threaded cylinder has an
inwardly tapered outer edge for engagement by a tapered
edge of a split ring having internal serrations for
15 gripping a conduit extending therethrough. A nut
having internal threads and an internal shoulder about
the outer end slidably engages a conduit and when
threaded onto the threaded cylinder firmly locks the
conduit in the extension by compressing the ring and
20 may also compress a gasket against the exterior of the
box. A thin waterproof tape may be employed in the
above-noted threaded connections.

The connector box may be provided with a removable
25 cover attachable by screws over an open side or top of
the box and having internal projections disposed to
engage internal walls about the open side or top of the
box to prevent lateral movement of the cover. A
waterproof gasket internally of the cover has openings
30 for the internal cover projections and is clamped
between the cover and a rim about the opening for
sealing the cover to the box.

The present invention is illustrated by way of example in the accompanying drawing of a preferred embodiment thereof wherein:

5 Figure 1 is a perspective view of the exterior of a connector box in accordance with the present invention;

10 Figure 2 is a vertical sectional view taken in the plane 2-2 of Figure 1;

 Figure 3 is an enlarged partial sectional view as indicated at 3 in Figure 2;

15 Figure 4 is a longitudinal sectional view taken in the plane 4-4 of Figure 1;

20 Figure 5 is an exploded view of cover, gasket and top of the connector box of Figure 1;

 Figure 6 is an exploded view of the front side connector of Figure 1; and

25 Figure 7 is an exploded view of the right end connector of the connector box of Figure 1.

30 The improved watertight connector box of the present invention, as illustrated in the drawings, will be seen to include an integral metal or plastic housing 11 which may have a generally rectilinear configuration with side walls 12-12¹, end walls 13-13¹, a bottom wall 14 and an open top 16. The cover 17 is adapted to fit

upon the open top 16, as further described below, to thus fully enclose the interior 18 of the housing.

The connector box of the present invention is adapted to receive a plurality of electrical conduits 21 in watertight relation thereto. These conduits are adapted to carry insulated electrical conductors which may be joined together in any desired manner within the connector box with these connections then being sealed therein by the cover 17. Access to the connections is readily provided through the open top 16 of the housing by removal of the cover 17. The connector box is normally provided with one more integral, hollow, cylindrical projections 22 opening to the interior of the housing and in the illustrated embodiment there is shown a cylindrical extension from an end and a bottom of the housing. The interior opening of the extensions 22 are dimensioned to slidably receive a conduit 21, as indicated in Figure 2 and an interior shoulder about the inner end of the cylinder openings, as indicated at 23, serves to receive the inner end of the conduit in abutting relationship thereto. The exterior of the cylinder 22 is threaded, as indicated at 24, and the outer end of the cylinder has an inwardly tapering edge as indicated at 26. Reference in this respect is also made to Figure 3. A split ring 27 having tapered edges, as indicated, is disposed about the conduit 21 adjacent the outer end of the cylinder 22 and a nut 28 also disposed about the conduit is threaded upon the cylinder 22. This nut 28 has an internal shoulder 29 slidable engaging the conduit 21 with the interior of the nut opening tapering outwardly therefrom to the

threaded portion of the nut, again as illustrated in Figures 2 and and 3.

It will be seen that tightening of the nut 28 on the
5 threaded cylinder 22 about the conduit 21 will cause
the split ring 27 to be forced against the tapered end
of the cylinder 22. This will compress the ring 27 and
the flared portion of the nut will also compress the
10 ring 27 so that it will be tightened about the conduit
21 to lock the latter in place. There may also be
provided a thin waterproof tape 31 disposed between the
threads on the cylinder 22 and nut 28 which will then
be crushed by the threaded engagement of these two
15 elements so as to ensure a watertight connection at the
threaded engagement.

In the illustrated embodiment of the present invention
there are in fact provided two integral threaded
cylinder extensions and the one shown in the end 13¹ of
20 the housing is also illustrated in exploded view in
Figure 7.

Referring to Figures 4 and 7 in this respect it is
noted that the cylindrical extension 22 with threads 24
25 about the exterior thereof is provided with a plurality
of longitudinal slits 36 therethrough and spaced
equally thereabout. This cylinder 22 is adapted to
receive the conduit 21 in slidable relationship therein
for abutting against the shoulder or internal flange 23
30 in the same manner as described above; however, the nut
37 adapted to cooperate therewith is slightly different
from the one described above. The nut 37 has a
shoulder or internal flange 38 about the outer end

thereof adapted to slidably engage the exterior of a conduit 21; however, the internal threads 39 of the nut taper slightly outwardly from this nut shoulder toward the inner end of the nut. This is illustrated in Figure 4; however, the taper is quite small and thus emphasized herein as it might not be noticed in viewing the drawing. With the conduit inserted in the cylinder 22 the nut is then tightened on the cylinder and as it is threaded thereon it will compress the cylinder or actually the cylindrical sections between the longitudinal slots 36 therein. This will cause the cylinder to firmly grip the conduit and, consequently, to lock the conduit in place. It is also desirable in this instance to apply a thin waterproof tape about the external threads 24 of the cylinder 22 so that threading of the nut onto the cylinder will compress or crush the tape to ensure a watertight joinder of nut and cylinder.

20 The connector box of the present invention may require the connection of conduits to various sides, bottoms or ends of the unit and thus in addition to the integral hollow cylindrical projections 22 described above there is also provided circular knock-out portions 41 in the housing 11 which may be physically removed by striking same a sharp blow. The knock-out 41 may be provided as a portion of the wall with reduced diameter or weakened periphery so that it may be relatively readily removed but which does retain the water-tight integrity of the interior 18 of the housing 11.

The drawings hereof illustrate one of these knock-out 41 as having been removed in the side wall 12 of the

housing and reference in this respect is made to Figure 4 and 6 illustrating provisions hereof for engagement with an electrical conduit 21 at such location. An externally treaded cylinder 51 is provided with a

5 flange 52 about the inner end thereof and a shoulder 53 internally of the hollow cylinder for abutting the end of a conduit 21 slidably fitting into the cylinder. This threaded cylinder 51 is adapted to extend through an opening 41¹ in a wall 12 of the housing produced by

10 removal of the knock-out element 41 and a gasket 54 is disposed about the cylinder internally of the housing for compression between the rear cylinder flange 52 and the housing wall 12. Exteriorly of the wall 12 there is provided a waterproof gasket 56 adapted to be

15 disposed about the threaded cylinder 51 and a nut 57 having internal threads and a shoulder slidably engaging a conduit 21 is adapted to be threaded upon the cylinder 51. Between the nut 57 and the cylinder 51 there is provided about the conduit 21 a split ring

20 58 having tapered edges, as indicated, and formed of a resiliently deformable material such as metallic or plastics material. The outer end of the cylinder 51 has the edge thereof tapered radially inward, as indicated at 61 and the internal shoulder on the nut 57

25 is tapered radially outward toward the housing, as described above in connection with the illustration of Figures 2 or 3, so that tightening of the nut 57 on the threads of the cylinder 51 will force the split ring 58 against the tapered edge or rim of the cylinder 51 and

30 will thus compress the split ring again in the manner illustrated in Figures 2 and 3. There are provided longitudinal serrations 66 on the internal surface of the split ring 58 for gripping the conduit 21 as the

split ring is compressed thereabout. This provides a firm joinder of conduit to connector box. Should it be deemed necessary the threaded engagement of the cylinder 51 and nut 57 may be additionally waterproofed by the provision of the thin waterproof tape as employed in other connections of the present invention. Such a tape may be provided as a "thread seal tape" in the form of a thin polytetrafluoroethane material, preferably having an adhesive on one surface so as to be readily attached in position upon the external threads of the cylinder 51, for example, whereby threading the nut thereon will cause the nut to ride over the tape and to compress same between the threads of the nut and cylinder.

The connection described immediately above will be seen to provide for a substantially permanent and waterproof connection of conduit and housing so that electrical wires extending through the conduit may also extend into the interior 18 of the housing for desired connections therein.

The closure of the housing 11 of the present invention is accomplished as briefly noted above by a cover 17 adapted to fit over an open top 16 of the housing. This cover is provided as a single, integral generally planar unit adapted to rest upon a rim 71 about the open top 16 of the housing. The cover is provided with internal or lower projections 72 which are positioned to engage the side walls of the housing when the cover is placed in closing relationship to the open top thereof for preventing any lateral movement of the cover with respect to the housing. There is also

provided a waterproof gasket 73 having openings therethrough accommodating passage of the projection 72 of the cover and disposed in contact with the underside of the cover 17. Attachment of the cover to the housing may be accomplished by a pair of screws 76 which are adapted to extend through openings 77 in the cover and into threaded engagement with tapped bores 78 in end extensions of the rim 71 about the open top of the housing.

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In this respect it is noted that the openings 77 in the cover 17 are somewhat longitudinally elongated but have a width slightly less than the outside diameter of the threads on the screw 76. This allows forcing of the screws 76 through the opening 77 so that the screws are retained in the cover but are not threaded therein. Instead, the screws are threaded only into the tapped bores 78 in the top of the housing rim 71. This is advantageous in machine assembly of the present invention.

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The present invention has been described above with respect to a single preferred embodiment thereof and incorporating a number of improvements over the prior art. The housing 11 has been noted to include integral hollow, externally threaded extensions whereat electrical conduits may be secured to the housing for extension of electrical wiring into the interior of the housing. The housing of the connection box hereof is also noted to include knock-out portions whereat particularly configures and highly advantageous attachment of electrical conduits may be accomplished in accordance with the present invention, as

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illustrated, for example, in Figure 6. Furthermore, the present invention provides a truly watertight engagement of housing and conduits as well as a truly watertight closure of the cover of the housing which is, however, removable for access to the interior thereof in order to complete electrical connections or repair same. There is thus provided hereby a highly practical electrical connection box for engagement with electrical conduits and adapted to contain and fully protect electrical connections between wiring within such conduits.



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CLAIMS:

1. A waterproof connector box comprising an open sided or topped housing and a removable cover, the box
5 further comprising

i) at least one hollow cylindrical spigot extending from the housing to accommodate a conduit in the bore of the spigot, there being an opening therein
10 with a shoulder within the bore for abutment of the conduit, the spigot having external threads thereabout and thin longitudinal slots therethrough for threaded engagement with a nut having tapered internal threads and adapted for disposition about the conduit when
15 inserted in said spigot against said shoulder for tightening said spigot about said conduit to lock said conduit in place;

ii) at least one knock-out plug in the housing;
20 and

iii) at least one hollow externally threaded cylinder for fitting snugly in an aperture produced by knocking out the said knock-out plug, the cylinder
25 having a sealing ring and nut, a flange and a gasket whereby, with the cylinder extending through said housing opening, the gasket is locatable between said flange and the interior of said housing about said opening and an inwardly tapered edge about the outer
30 end thereof, the sealing ring is fitted about a conduit extending into said cylinder, for sliding on the conduit with a tapered end surface of the sealing ring facing the cylinder, and the nut which has an internal

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shoulder about an outer end thereof, can be slid along the said conduit for threaded engagement with said cylinder for forcing said ring against a tapered end surface of said cylinder to lock said conduit in place.

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2. A connector box as claimed in Claim 1, wherein both end surfaces of said split ring are tapered and the internal shoulder of the sealing nut has a tapered shape for mating with the tapered end surface of the sealing ring, for compressing said ring about a conduit extending therethrough.

3. A connector box as claimed in Class 2 wherein said ring has longitudinal serrations on the inner surface thereof for positive gripping of a conduit as said ring is compressed thereabout.

4. A connection box as claimed in Claims 1, 2 or 3 further comprising waterproof tape disposed about the threads on said cylinder beneath the threads on said nut and a gasket about said cylinder and compressed against the exterior of said housing by said nut.

5. A connector box as claimed in any one of the preceding claims wherein said housing has a flat rim about said open top, said cover extends over said rim with means for securing the cover to the rim and said cover having interior projections disposed to engage the interior sides of said open top in position to prevent lateral movement of said cover on said housing with the cover in place, and a waterproof gasket is disposed on the interior side of said cover with openings for said projections to extend therethrough and adapted for



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clamping between said cover and housing rim to ensure watertight closure of said housing with said cover secured in closing relation to the open top thereof.

- 5 6. A connector box substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.
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