

[54] **TRACTOR-TRAILER ELECTRICAL CONNECTOR**

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[22] Filed: **Mar. 27, 1973**

[21] Appl. No.: **345,349**

[52] **U.S. Cl.** **339/44 M; 339/103 R**

[51] **Int. Cl.** **H01r 13/44**

[58] **Field of Search** 339/44, 43, 36, 176, 94,
339/63, 101-103

[56] **References Cited**

UNITED STATES PATENTS

1,750,014	3/1930	Lofgren.....	339/44 M
2,715,212	8/1955	Swanson et al.	339/44 M X
3,125,394	3/1964	Appleton.....	339/44 M X
3,239,791	3/1966	Fyrk.....	339/44 M

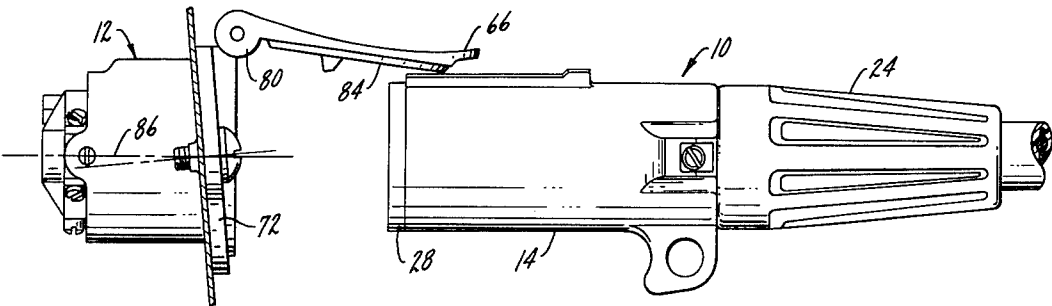
3,284,753 11/1966 Goldbaum et al..... 339/44 M

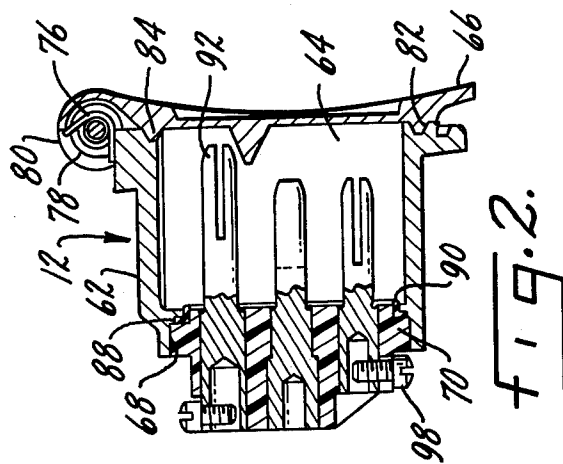
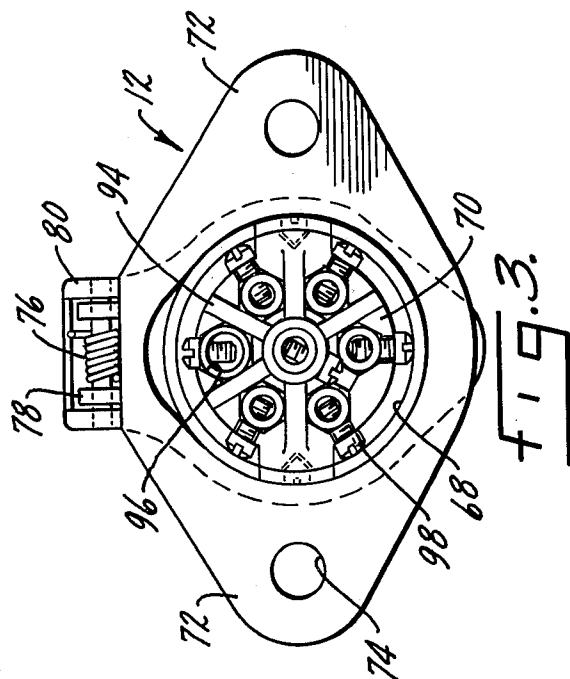
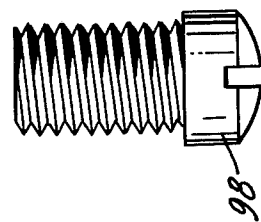
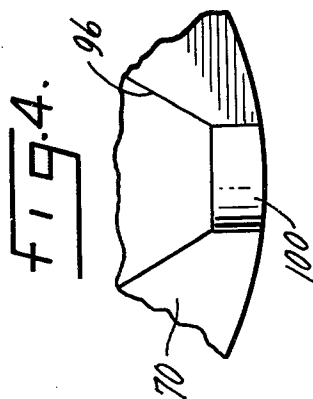
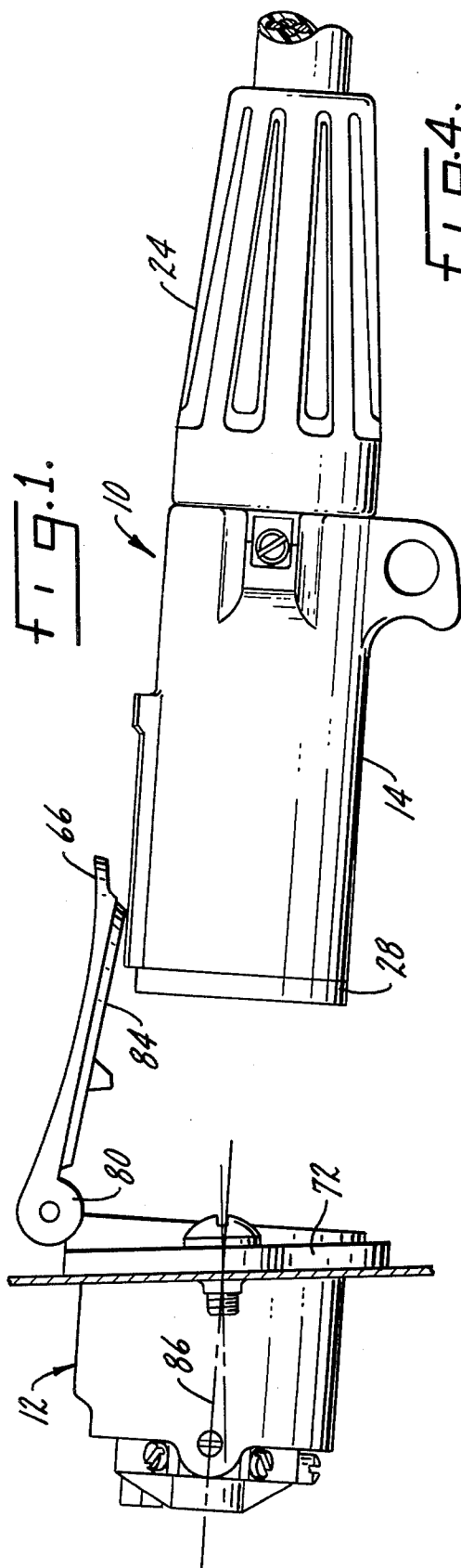
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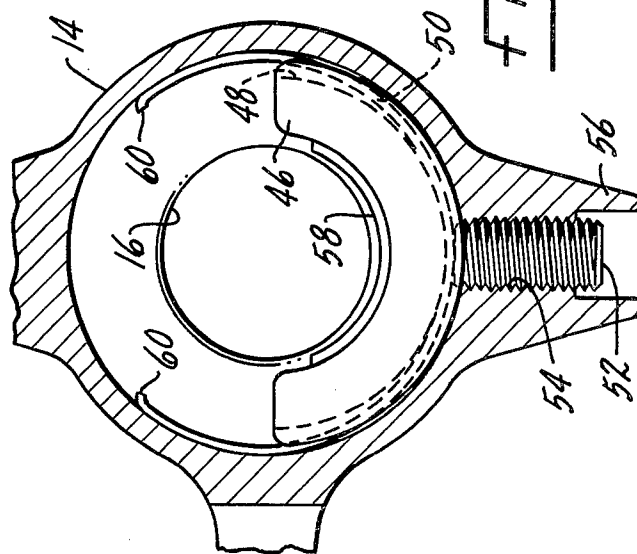
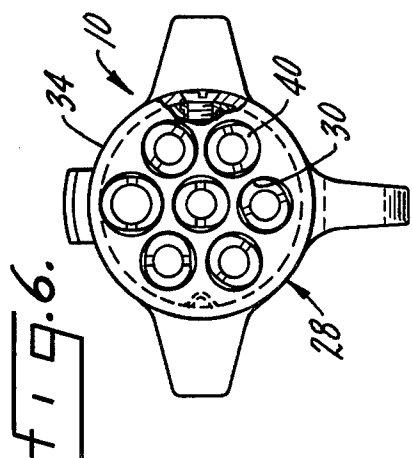
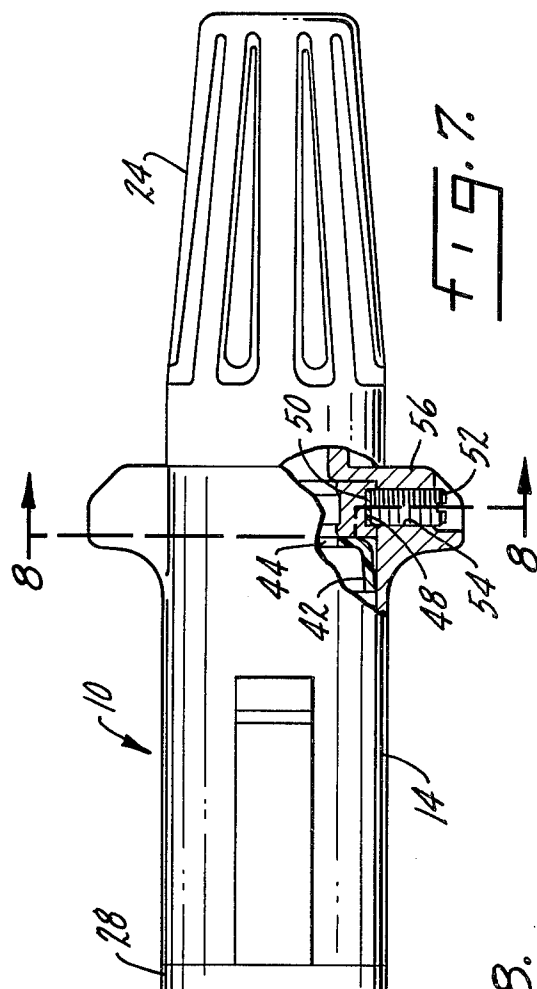
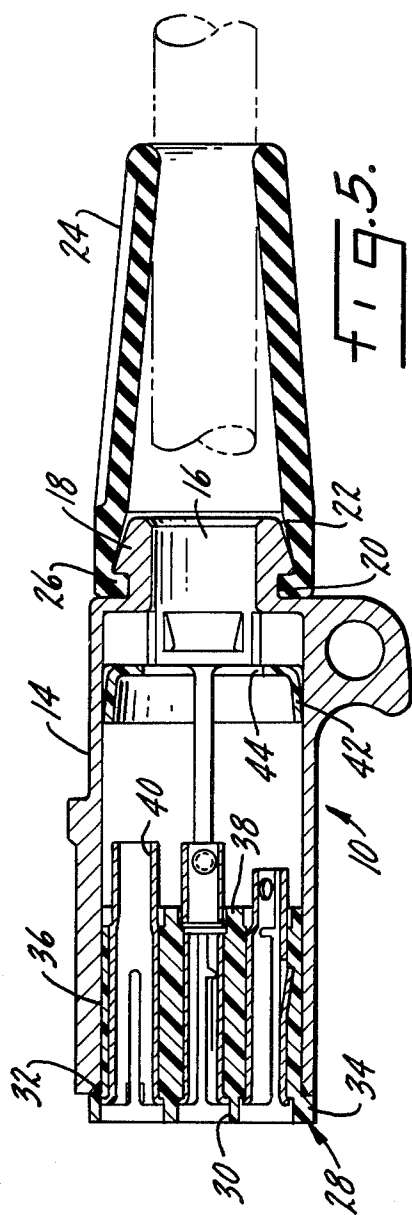
[57] **ABSTRACT**

A connector assembly includes a connector having female contact members and a receptacle having male contact members. The receptacle has a normally closed cover which forms an angle of other than 90° with the axis of the receptacle. The connector has a cable support formed of a rubber or rubberlike material which not only supports the cable, but forms a seal with it. There is a seal member within the receptacle which not only forms a seal within the receptacle, but is formed and adapted and positioned to form a seal with the connector member when the two are assembled.

3 Claims, 8 Drawing Figures







TRACTOR-TRAILER ELECTRICAL CONNECTOR

SUMMARY OF THE INVENTION

The present invention relates to electrical connector assemblies particularly adapted for use in tractor-trailer combinations.

A primary purpose of the present invention is a connector assembly having an improved cable clamp for the connector.

Another purpose is a connector assembly of the type described in which the cable support is formed of a rubberlike material to provide both support for the cable and a seal with the cable preventing the intrusion of moisture into the connector assembly.

Another purpose is a connector assembly of the type described in which the connector receptacle is inclined, relative to its cover, to permit the draining of any water which has accumulated within the receptacle.

Another purpose is an improved connector assembly of the type described utilizing a seal to both seal a portion of the receptacle and form a seal with the connector.

Another purpose is an improved cover sealing arrangement for use in a connector assembly receptacle.

Another purpose is a connector assembly of the type described in which individual cable clamps utilize self-tapping screws and holes of approximately screw pitch diameter to tightly hold the screws within the material of the receptacle.

Other purposes will appear in the ensuing specification, drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated diagrammatically in the following drawings wherein:

FIG. 1 is a side view of the connector assembly showing the connector and receptacle separated, one from another,

FIG. 2 is a section through the receptacle of FIG. 1,

FIG. 3 is an end view of the receptacle,

FIG. 4 is a partially exploded view illustrating a cable clamp for the receptacle,

FIG. 5 is a section through the connector,

FIG. 6 is an end view of the connector,

FIG. 7 is a side view of the connector, with portions broken away to illustrate the cable clamp, and

FIG. 8 is a section along plane 8—8 of FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The connector is indicated generally at 10 and the receptacle is indicated generally at 12. The two components of the connector assembly are generally utilized in forming an electrical connection between the tractor and trailer of a tractor-trailer combination. The particular construction of the connector assembly lends itself to such an application, although the invention should not be so limited.

Turning particularly to the connector as shown in FIGS. 5-8, a housing is indicated at 14 and may be generally cylindrical in form. The right-hand end of the housing, as shown in FIG. 5, has a cable receiving opening 16 in the shape of a cylindrical passage. A portion of the housing 14, indicated at 18, extends outwardly to form the passage 16 and to provide an external annular groove 20. That portion of the housing extension 18

outwardly of the groove 20 may be somewhat conical in configuration, as indicated at 22.

A cable support 24, which is preferably formed of a flexible material, for example rubber or a suitable rubber substitute, has an inwardly-directed flange 26 which fits into the groove 22 to hold the cable support to the housing 14. A cable is indicated in broken lines in FIG. 5 and it can be seen that the smaller right-hand end of the conically tapered cable support 24 will firmly grip the cable and because of the flexible properties of the rubberlike material forming the cable support, there will be a seal formed between the support and the cable to preclude the seepage of water into the connector.

A body member 28 having a plurality of spaced apertures 30 is positioned to close the left-hand end of the housing 14. A seal 32 may be formed between the end of the housing 14 and a flange 34 of the body 28. The body has an inwardly-extending outer circumferential wall 36 which fits closely within and is in contact with the inner surface of the housing 14. In like manner, there are internal inwardly-directed walls 38 formed in the body member 28 which effectively separate the metallic electrical female contact members 40. Thus the contact members 40, which may be suitably connected to the various individual wires forming a part of the cable attached to the connector are electrically separated, one from another, by the body member which may be formed of a suitable insulating material.

A spacer member 42 is positioned within the housing 14 and has an opening 44 to receive the cable. The cable, positioned within the connector, will be completely enclosed by insulation and will not be separated into its individual wires, except for that portion of the cable to the left of the spacer 42 adjacent the female contacts 40.

The clamp for the cable includes an arcuate-shaped clamp member 46 axially positioned between the spacer 42 and the housing passage 16, and illustrated particularly in FIG. 8. The external surface of the clamp member 46 has a groove 48 which receives a flat spring 50, confined by the inner surface of the housing 14 to the configuration of FIG. 8. An adjustment member or screw 52 is threadably received within a passage 54 in a boss 56 extending from one side of the connector housing 14 and serves to urge the aforesaid spring and clamp member into engagement with the cable. More specifically, the screw 52 is moved inward within passage 54, it will force the inner clamping surface 58 of the arcuate clamp member 46 toward the cable, tending to force the cable toward the opposite side of passage 16 and toward the opposite side of the spacer 42, thus firmly clamping and gripping the cable within the connector. As the arcuate clamp member 46 is moved toward the center of the housing 14, the flat spring 50 will continue to have its ends 60 forced against the inside wall of the housing 14 with the spring, thus adding its biasing and centering force to that from screw 52.

Turning now to the receptacle as shown in FIGS. 2-4, the receptacle 12 has a generally cylindrical housing 62, with an open end 64 closed by a cover 66. The opposite end of the housing has an opening 68 which is closed by a plate member 70.

Extending outwardly from opposite sides of the housing 62 are mounting means 72 each having a conventional hole 74 for use in mounting the receptacle. A

coil spring 76 is mounted to projecting portions 78 of the housing 62 and biases the cover 66 to the closed position of FIG. 2. The spring, as indicated in FIG. 2, is covered by an arcuate portion 80 of the cover 66 so as to prevent any portion of the spring from catching on the clothes of a mechanic or the like. That portion of the housing 62 adjacent the open end 64 has a peripherally extending tapered groove 82 which receives an inwardly directed similarly tapered rib 84 on the cover 66 so as to form a firm seal between the cover and the housing 62 when the connector 10 is not inserted into the receptacle 12.

It is important to note that the axis of the receptacle 12, as indicated at 86 in FIG. 1, forms a slight angle, on the order of about five degrees, with a line perpendicular to the mounting means 72 and the cover 66 when in the closed position. Thus, the housing 62 of the receptacle 12, when mounted, will be slightly tilted to the plane of the mounting means such that any accumulation of moisture within the receptacle will flow down toward the cover and will immediately drain out of the receptacle when the cover is opened. Such moisture will not be on or near the contacts within the receptacle, but instead will be accumulating in the corner of the receptacle adjacent the cover.

The plate member 70 fits within the open end 68 of the housing 62 and there may be a generally L-shaped seal 88 formed between these two elements to preclude the passage of water into the receptacle. It should be noted, as particularly shown in FIG. 2, that the inner end 90 of the seal 88 extends within the receptacle and is in a position to be in sealing contact with the body member 28 of the connector when the connector is inserted into the receptacle. Thus the seal 88 not only performs a sealing function in the receptacle itself, but is also effective to form a seal between the receptacle and the connector.

Positioned within apertures in the plate member 70 are a plurality of male contact members 92 which may be metallic and formed in a conventional manner. When the connector and receptacle are assembled, the contact members 92 will be positioned within the female contact members 40 of the connector.

Looking particularly at FIG. 3, the plate member 70 may have a plurality of ribs 94 which separate adjacent apertures 96 which are cable or wire receiving apertures. Thus, there is electrical isolation between adjacent contacts.

Looking particularly at FIGS. 3 and 4, cable clamping screws 98 extend into the apertures 96 to hold the cables or wires within the apertures. The screws 98 may be inserted into openings 100 in the wall forming the apertures 96 and it should be noted that the diameter of the openings 100 is approximately equal to the pitch diameter of the screws 98. The axial length of the openings 100 is somewhat short and there is initially no thread formed in these openings. The screws 98 are self-tapping and with the relationship between hole diameter and pitch size, when the screws are inserted, they will form a thread with the insulative plastic material surrounding the openings 100, thus tightly gripping the screws. When the screws are backed off to permit the cables to be removed from the receptacle, even though there is a short distance of actual contact between the screw and the material forming the opening 100, the screws will still be held to the plate assembly

and not lost because of the binding contact between the screw threads and the material.

Of importance is the fact that the receptacle, when mounted, forms an angle such that any accumulated moisture flows to an area adjacent the cover so that when the cover is first opened, the moisture will be immediately drained from the receptacle. In like manner, the particular means of mounting the cables to the receptacle is important. By the use of self-tapping screws and by the particular relationship between the pitch diameter of the screw and the size of the openings, it is not necessary for the length of the openings 100 to be of substantial axial extent. The close contact between the screw threads and the threads formed by the action of the screw will hold the screws within the plate assembly and they will not be lost.

Relative to the connector, the particular cable clamp is important and its location and disposition within the connector. Also, the use of a flexible rubberlike material to form the cable support is important, as it provides not only a seal with the cable, preventing the entrance of moisture, but also a firm support for the cable as it is mounted to the connector.

Whereas the preferred form of the invention has been shown and described herein, it should be realized that there may be many modifications, substitutions and alterations thereto.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In an electrical connector assembly having a connector and a receptacle,

said connector including a housing, a cable receiving aperture at one end thereof, a flexible cable support attached to said housing at said cable receiving aperture, said cable support being formed of a material to be in sealing contact with a cable therein, a plurality of female contact members positioned within the housing adjacent the opposite end thereof, and a plurality of openings in said opposite end in alignment with said female contact members, a cable clamp within said connector housing including a clamp member and a spring having end portions and a central portion positioned about said clamp member, an adjustment member engaging said spring and urging said clamp member into engagement with a cable therein, said clamp member having a generally arcuate outer surface including a groove and an inner surface formed and adapted to mate with a cable outer surface, said central portion of said spring being positioned within said groove of said clamp member, with the outer surface of said end portions of said spring being in contact with and restrained by an inner surface of said connector housing, movement of said adjustment member radially inward of said housing causing at least said central portion of said spring to translate radially of said housing and apply greater clamping pressure upon said clamping member and the cable positioned within the housing,

said receptacle including a housing, a plurality of cable receiving apertures at one end thereof, the opposite end of said housing having an opening and a cover therefor, a plurality of male contact members in said receptacle housing in alignment with said apertures, said male contact members being

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adapted to be inserted in said female contact members when said connector and receptacle are assembled, mounting means attached to said receptacle housing, the longitudinal axis of said receptacle housing forming an angle with said mounting means which is slightly different from 90° and sufficient to cause any moisture within said receptacle housing to accumulate adjacent the cover thereof.

2. The structure of claim 1 further characterized by and including an annular seal positioned within the re-

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ceptacle housing said annular seal forming a seal with the connector housing, when the receptacle and connector are assembled.

3. The structure of claim 1 further characterized by and including an annular slot circumferentially positioned about the open end of the receptacle housing, said cover having an annular rib formed and adapted to mate with said slot when the cover is closed.

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