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ELECTRICAL CONNECTOR

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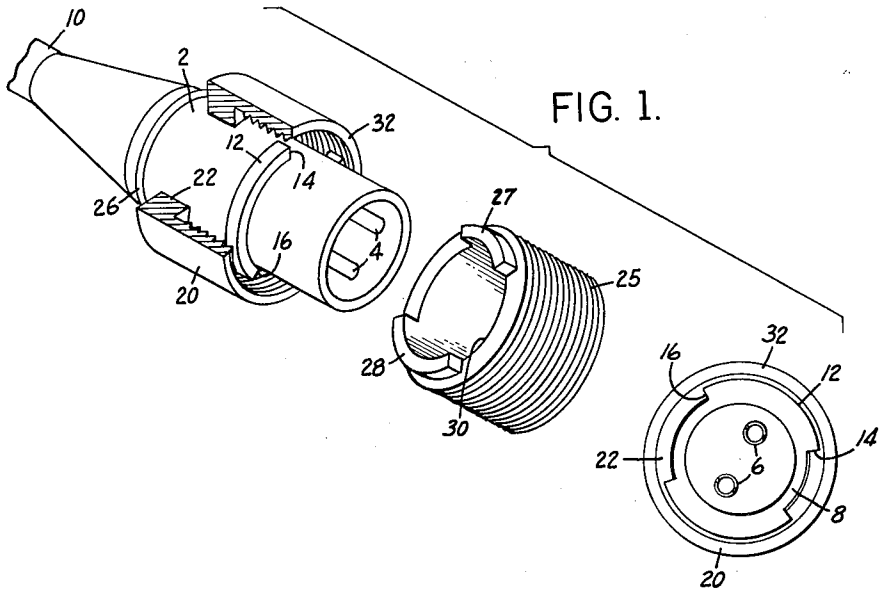
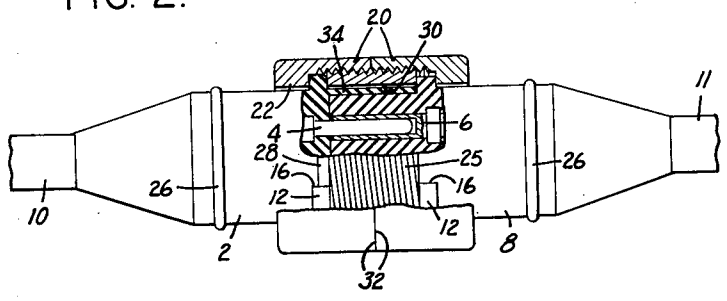


FIG. 1.

FIG. 2.



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ELECTRICAL CONNECTOR

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This invention relates to a wiring device and more particularly to a new and improved electrical connector comprising two elongated electrical conductor carrying members which are electrically connectible upon axial movement towards each other and which are provided with novel releasable means for holding such contact carrying members in engagement with each other.

At the present time there are various structures commercially available for holding elongated electrical contact carrying members in axial engagement with each other. Most of such prior devices have been characterized by structures which require one particular mating structure to engage another particular mating structure. One disadvantage of such different structures of mating parts is that it requires the user thereof to stock each part of the mating structures to insure replaceability in the event of damage to either part. In addition such different mating structures eliminate flexibility in a wiring system in that the engageable ends of the conductors must have the requisite mating structure.

Accordingly one object of this invention is to provide a new and improved wiring device for connecting two electrical conductors together comprising a pair of contact carrying housings each having a coupling member thereon which are releasably connectible to an intermediate coupler of simplified structure.

Another object of this invention is to provide a new and improved wiring device for connecting two electrical conductors together comprising a pair of contact carrying housings each having a coupling member thereon which are releasably connectible to an intermediate coupler and which coupling members completely enclose the coupler.

Still another object of this invention is to provide a new and improved wiring device for connecting two electrical conductors together comprising a pair of contact carrying housings each having a coupling member thereon which is sequentially releasably connectible to an intermediate coupler and which can only be removed from the coupler in the reverse manner in which it is connected.

A more specific object of this invention is to provide a new and improved wiring device for connecting two electrical conductors together comprising a pair of contact carrying housings each having an outwardly extending flange either one of which is used to non-rotatably hold a tubular coupler which is releasably engageable at each of its ends with separate coupling members mounted on the housings, respectively.

These and other objects of this invention will become more apparent upon consideration of the following detailed description of a preferred embodiment thereof when taken in conjunction with the following drawings, in which:

FIGURE 1 is an exploded partially perspective and partially from elevational view of an electrical connector constructed in accordance with the principles of this invention with a portion thereof broken away to more clearly show the structure thereof.

FIGURE 2 is an assembled side elevational view of the connector as shown in FIG. 1 with portions thereof broken away to more clearly show the structure thereof.

Referring to the drawings it will be noted that a wiring device constructed in accordance with the principles of this invention comprises a cylindrical insulating housing 2

having a pair of elongated electrical male contacts 4 extending in part axially outwardly therefrom with the inner ends thereof being embedded within the housing 2. The contacts 4 are electrically engageable with a pair of elongated female contacts 6 which are suitable embedded to extend axially of an elongated insulating housing 8 upon axial movement of the housings 2 and 8 towards each other. The ends of the contacts 4 and 6 remote from their engageable ends are suitably electrically connected to suitable electrically insulated conductors carried by cables 10 and 11, respectively, and which cables 10 and 11 are suitably connected to the housings 2 and 8, respectively. As shown, the housings 2 and 8 are preferably formed of a molded structure with the ends of the conductors 10 and 11 integrally molded therein.

Each housing 2 and 8 is provided with an integral circular flange 12 which extends radially outwardly therefrom and each of which has a pair of arcuately spaced arcuately extending openings 14 and 16 therein. As shown the inner edge of the openings 14 and 16 are located flush with the outer cylindrical surface of the housings 2 and 8 and the openings 16 are of a greater arcuate length than the openings 14. The flange 12 on the housing 2 is located with the outer side thereof facing its engageable end located substantially in radial alignment with the surface of the housing 2 from which the contacts 4 extend. As will become more apparent hereinafter the flange 12 on the housing 8 is spaced axially inwardly from the free end of the housing 8 a sufficient distance to permit full engagement of the contacts 4 and 6.

A tubular shaped coupling member 20 having a circular clearance opening 22 in the base thereof is slidably received on the cylindrical portions of each of the housings 2 and 8 intermediate the flanges 12 thereof and the non-engageable ends thereof. An opening (not shown) extends radially outwardly from the opening 22 in the base of each of the coupling members 20 to facilitate mounting the coupling members 20 on the housings 2 and 8 inwardly of the flanges 12 from the engageable ends of the housings 2 and 8. For a more particular description of one manner in which the coupling members 20 may be so mounted on the housings 2 and 8, reference is made herein to the copending application entitled Wiring Device of William C. Russell, Serial No. 681,767, filed September 3, 1957, and now abandoned, which has been assigned to the same assignee as this invention wherein such structure has been more fully shown, described and claimed. Each housing 2 and 8 is also provided with an integral circular outwardly extending stop ledge 26 adjacent the non-engageable end thereof which extends radially outwardly of the outer surface of the housings 2 and 8 a sufficient distance to captively mount the coupling members 20 thereon.

The housings 2 and 8 are held in engagement with each other by an externally threaded tubular collar 25 which has a pair of circumferentially spaced arcuately extending flanges 27 and 28 extending axially outwardly from one end thereof. The flanges 27 and 28 are of an arcuate length to be closely received with the arcuately extending openings 14 and 16, respectively, in the flanges 12 of either housing 2 or 8. The bore 30 of the collar 25 is slightly greater than the diameter of the cylindrical housings 2 and 8 to permit its insertion over the free ends of either of the housings 2 and 8 and the threads on the outer surface of the collar 25 are located in proper axial alignment with the coupling members 20 to permit their engagement. With the structure as heretofore described the coupling members 20 are initially inserted over the engageable ends of the housings 2 and 8 and thereafter the collar 25 is inserted over the free end of one of the housings 2 and 8 with the flanges 27 and 28

thereof being closely received in the openings 14 and 16 in the housing member over which it is inserted so that the collar 25 is non-rotatably located thereon. With reference to the drawings it will be noted that as shown the collar 25 is insertable over the free end of the housing 2. Thereafter the coupling member 20 on the housing 2 is slipped axially outward of the housing 2 so that its outer thread butts against the inner thread of the collar 25. Thereafter the coupling member 20 on the housing 2 is rotated about the collar 25 so that the threads thereon engage the threads on the collar 25 and the coupling member 20 is moved axially outward of the housing 2. Such axial outward movement of the coupling member 20 preferably continues until the flange 12 on the housing 2 is clamped (see FIG. 2) between the base of the coupling member 20 and the inner end of the collar 25. Thereafter the housing 2 is pushed in axial engagement with the housing 8 so that the contacts 4 and 6 mate with each other and the flange 12 on the housing 8 engages the outer end of the collar 25. The coupling member 20 located on the housing 8 is then similarly rotated over the collar 25 until the outer edge 32 thereof engages the outer edge 32 of the coupling member 20 on the housing 2. When so assembled the flange 12 on the housing 8 is located either in engagement with or closely adjacent the inner surface of the base of the coupling member 20 on the housing 8 to prevent the housing 8 from being withdrawn axially of the coupling member 20 thereon.

In view of the identical flanges 12 provided on each of the housings 2 and 8. it will be obvious that either housing 2 or 8 may be initially provided with the threaded collar 25 and that such heretofore described assembly may be accomplished at the free end of either of the cables 10 or 11. In addition, the collar 25 may at any time be disconnected from either housing and connected to the other. Such flexibility is particularly desirable under field conditions so that it is not necessary to consider whether a particular cable has a desired mating structure at either of its ends. Of particular significance with reference to this invention is the fact that during assembly the flange 12 is firmly clamped between the inner end of the collar 25 and the outer end of the coupling member 20 due to the purchase of the engaged threads on the coupling member 20 and the collar 25 so that the flange 12 is compressed to bias the coupling member 20 and the collar 25 axially away from each other. In order to obtain resilient flanges 12 the housings 2 and 8 are preferably molded from a suitable resilient molding material such as neoprene. By so providing a bias between the collar 25 and the coupling member 20 which is initially secured to the collar 25, the coupling member 20 which is thereafter secured to the collar 25 will be removed upon applying a reverse twist to the coupling members 20 to uncouple them. In order to insure that the flange 12 is compressed the flanges 27 and 28 extend axially from thec ollar 25 a distance less than the axial thickness of the flange 12. Also the flanges 27 and 28 are spaced inwardly from the external threads on the collar 25 to insure engagement between the collar 25 and the coupling member 20.

Although as described a coupling member 20 may be secured to either housing 2 or 8 it can readily be appreciated that when a male contact, such as the contacts 4, are employed they are preferably electrically insulated from the coupling member 20 and collar 25 to prevent an electrical discharge therebetween. Accordingly the housing 2 is preferably provided with an integral tubular shroud 34 which extends outwardly therefrom and surrounds the male contacts 4. With such structure it is to be realized that it is necessary to reduce the outer end of the female contact carrying portion of the housing 8 to insure axial engagement of the contacts 4 and 6. Although as shown and described a pair of mating contacts have been employed it will be obvious that if desired

less or more than two contacts may be so located in the housings 2 and 8. It will be noted that the above described structure provides a very compact and strong connection between the two conductors 10 and 11. One important structural feature of this invention is the fact that the externally threaded collar 25 is completely enclosed by the coupling members 20 to insure that the external threads thereof will not be damaged when the entire assembly is in use. Also, by permitting the coupling member 20 which is last secured to the collar 25 to slightly compress the flange 12 which last engages the collar 25 a water and dust proof joint is obtained.

Although a pair of flanges 27 and 28 have been described on the collar 25 to prevent turning of the collar 25 with reference to the housings 2 or 8 for the purposes of this invention only one such flange need be employed to non-rotatably locate the coupling 25 on either housing 2 or 8. Nor is it necessary that arcuately elongated flanges 27 and 28 be employed as any suitable indexing structure between the coupling member 25 and the housings 2 or 8 may be employed. In addition, although various components have been described as circular, various cooperable configurations may be employed. As shown in the drawings the arcuate openings 14 and 16 in the flanges 12 are in axial alignment with each other, however, such alignment need not be employed.

Although a preferred embodiment of this invention has been described in accordance with the patent statutes, it is to be realized that modifications thereof may be made without departing from the broad spirit and scope of the invention; accordingly, it is respectfully requested that this invention be interpreted as broadly as possible and be limited only by the prior art.

What we claim is:

1. An electrical connector comprising: a first elongated housing member having at least one contact therein which contact is engageable from one end of said first housing member; a second elongated housing member having at least one contact therein which contact is engageable from one end of said second member; said contacts in said first and second housing members respectively being engageable with each other; said first housing member having integral external resilient flange means spaced axially inwardly of said one end of said first housing member; a first coupling member engageable with said flange means to limit movement of said coupling member toward said one end of said first housing member; a second coupling member captively located on said second housing member and spaced axially inwardly from said one end of said second housing member; a tubular member located on said housing members and axially movable over portions of said housing members adjacent said one end thereof; said tubular member having at least one axially extending means located on the end thereof adjacent said resilient flange means; said flange means having means extending axially of said housing and interlockable with said axially extending means on said tubular member to prevent relative rotation between said tubular member and said housing; cooperable means on said tubular member and said coupling members releasably securing said housings together; and said axially extending means on said tubular member being of a length to permit said resilient flange on said first housing member to be deformed between said tubular member and said first coupling member when said housings are secured together.

2. An electrical connector comprising: a first elongated housing member having at least one contact therein which contact is engageable from one end of said first housing member; a second elongated housing member having at least one contact therein which is engageable from one end of said second housing member; said contacts in said first and second housing members respectively being engageable with each other; said housing members having integral external flange means spaced axially inwardly of said one end thereof respectively; said flange means on

at least one of said housings being resilient and having at least one recess therein extending axially from the side of said flange means adjacent said one end of said first housing member; coupling members engageable with said flange means respectively to limit movement of said coupling members toward each other; a tubular member located on said housings and axially movable over portions of said housings adjacent said one end thereof; said tubular member having at least one axially extending means located on the end thereof adjacent said resilient flange; said axially extending means being located in said recess in said flange means; cooperable means on said tubular member and said coupling members for releasably securing said housings together; and said axially extending means on said tubular member being of a length to permit said resilient flange to be deformed between said tubular member and a cooperating one of said coupling members.

3. An electrical connector comprising: a first elongated housing member having at least one contact therein which contact is engageable from one end of said first housing member; a second elongated housing member having at least one contact therein which is engageable from one end of said second housing member; said contacts in said first and second housing members respectively being engageable with each other; said housing members having integral external flange means spaced axially inwardly of said one end thereof respectively; said flange means on at least one of said housings being resilient and having

at least one recess therein extending axially from the side of said flange means adjacent said one end of said first housing, coupling members engageable with said flange means respectively to limit movement of said coupling members toward each other; a tubular member located on said housings and axially movable over portions of said housings adjacent said one end thereof; said tubular member having at least one axially extending means located on the end thereof adjacent said housing having said resilient flange; said axially extending means being of a shorter axial length than the axial extent of said resilient flange means on said first housing, said axially extending means being receivable in said recess in said flange means; cooperable thread means on said tubular member and said coupling members for releasably securing said housings together.

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