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JUMPER ASSEMBLY HAVING REPLACEABLE PARTS

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Fig 1

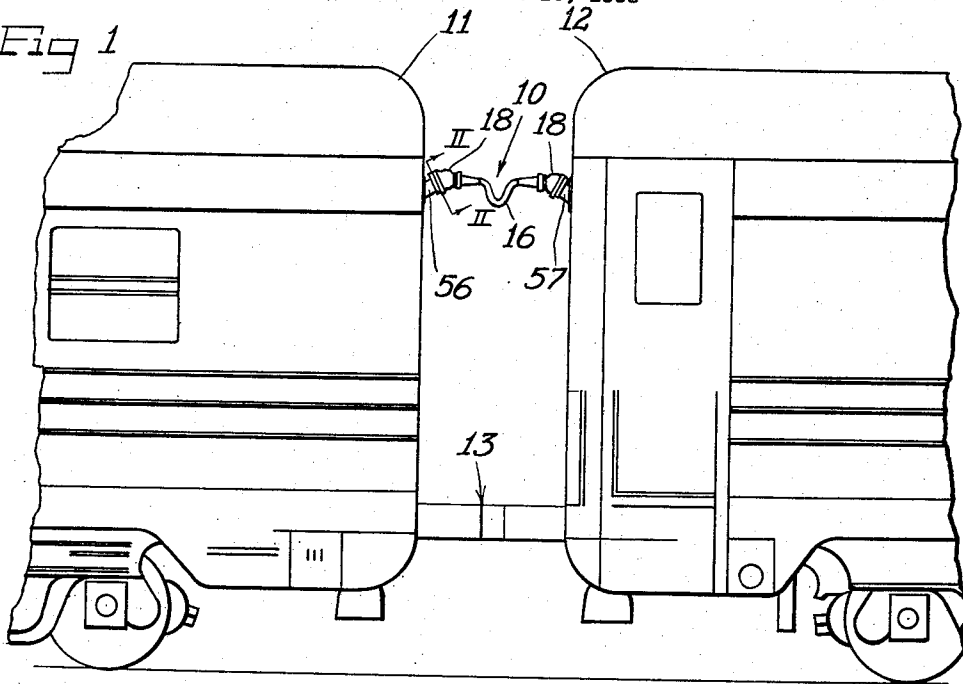


Fig 3

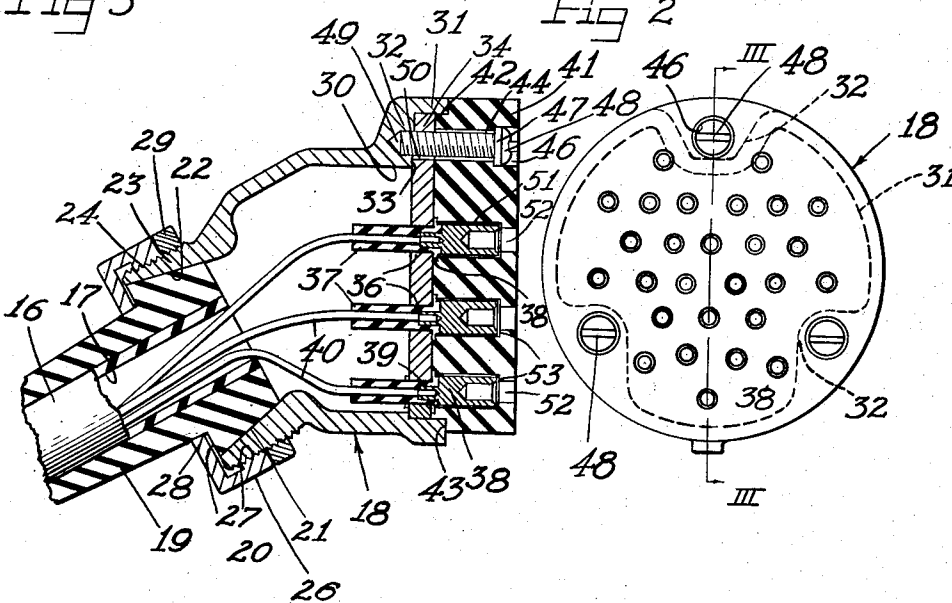


Fig 2

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1

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3 Claims. (Cl. 339—29)

This invention relates generally to electrical connectors and more particularly to an electrical jumper connection which can be used in conjunction with articulative coupling connectors between adjoining pairs of vehicles forming a train of vehicles.

Although the principles of the present invention are of general utility, the preferred structural embodiment herein disclosed by way of illustrative example and incorporating the principles of the present invention finds a particularly useful application in connection with an articulative coupling connector between two units of a railway diesel engine, or between any adjoining pair of cars in a line of cars made up as a train.

There has heretofore been provided jumper connectors having a large number of conductor wires, each associated with a corresponding large number of contact terminals. In some instances, jumpers of this kind have been made of molded rubber, a rubber sheath cable having molded connector bodies bonded to the respective ends thereof and integrally embedding contact members pre-assembled to the bared ends of the conductor wires in the cable.

When such a jumper connection is applied between two relatively movable units coupled by an articulative connection, the jumper is subjected to unusually rigorous operating conditions because the jumper is constantly fixed. If one of the conductor wires becomes worn, however, it will be evident that replacement in a molded rubber connector is virtually impossible. Accordingly, interchangeability of either single conductor wires or of an entire cable unit is likely to be very costly.

Molded jumper connectors are also likely to be fairly rigid and are likely to embody excessive weight, particularly when a jumper connector is provided which utilizes a large number of contact terminals. In many instances, the electrical jumper connection is made between articulated units of vehicles, for example, in an overhead location. The manipulation of a jumper assembly provided in accordance with the teachings of the prior art is likely to be cumbersome and difficult under such conditions.

According to the present invention, a jumper connector is provided which comprises a flexible tube having a rigid hollow housing on each end thereof preferably made of a lightweight metal. Locking means retain each of the housings in firm assembly with the tube. A peripherally flanged opening is provided in each housing to receive a terminal retainer carrying a plurality of outwardly projecting contact terminals. A conductor wire for each contact terminal extends between the housings and through the tube. In order to protect the end of the housing and the contact terminals against deformation and damage, a resilient cushioning member is assembled over the opening of the housing. Removable fastening means are provided to retain the housing, the

2

retainer and the cushioning member in firm assembly so that individual replacement of any single conductor wire and its associated contact terminal may be readily accomplished merely by threading a new conductor wire through the jumper assembly.

It is an object of the present invention, therefore, to provide a jumper connector which overcomes the deficiencies of the jumpers heretofore provided.

Another object of the present invention is to provide a jumper connector which may be conveniently fabricated from a plurality of metal and rubber components in order to obtain a lightweight assembly of economical cost.

Another object of the present invention is to provide a jumper assembly wherein conductor wires and contact members may be individually replaced with great facility.

Yet another object of the present invention is to provide a jumper assembly of maximized flexibility.

Another object of the present invention is to provide a jumper connector of minimized weight.

Many other features, advantages and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description which follows and the accompanying sheet of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example only.

On the drawing:

Figure 1 is a fragmentary somewhat diagrammatic view of a train including a line of cars having articulative coupling connectors between each adjoining pair of cars, each connector including an electrical jumper connection provided in accordance with the principles of the present invention.

Figure 2 is an enlarged end elevational view taken substantially on line II—II of Figure 1; and

Figure 3 is a fragmentary cross-sectional view with parts shown in elevation taken substantially on line III—III of Figure 2.

As shown on the drawings:

In Figure 1 there is shown at 10 a jumper connection incorporating the principles of the present invention which, by way of illustrative example only, is applied as a part of an articulative coupling connector between an adjoining pair of cars 11 and 12 forming a part of a line of cars in a train. Each of the cars 11 and 12 is joined by an articulative coupling connection, the mechanical coupling portion thereof being indicated generally at 13.

The jumper connection 10 comprises a tube 16 which takes the form of tubular length of insulating material. The tube 16 is preferably flexible and is provided with an open ended bore 17. One suitable material would be rubber or a rubber substitute.

On opposite ends of the tube 16 is provided a rigid hollow housing indicated generally by the reference numeral 18.

Each of the housings 18 is identical and each preferably comprises a lightweight metal casting such as an aluminum casting.

Retainer means are provided between the housing 18 and each end of the tube 16 in order to place the tube and the housing in firm assembly with one another.

In the particular structural embodiment herein described by way of illustrative example, a grommet 19 is bonded by vulcanization to the tube 16 and provides an annular radially outwardly extending shoulder 20 adjacent each end of the tube 16.

3

The external peripheral surface of each shoulder 20 is convergently tapered as at 21 and mates with a bore 22 tapered complementally to the taper 21 and formed in a reduced neck 23 externally threaded as at 24 and provided on one end of the housing 18.

A nut 26 internally threaded as at 27 is provided with a radially inwardly extending flange 28 to engagingly abut the shoulder 20. Upon drawing up the nut 26 on the neck 23, the housing 18 and the tube 16 will be wedged into firm assembly with one another. A sealing wedging action will occur between the mating tapered surfaces 21 and 22.

In order to lock the components in firm assembly, a lock nut 29 is provided which can be threaded on the neck 23 against the nut 26.

Generally opposite the neck 23, the housing is provided with an opening 30 surrounded by a peripheral axially extending flange 31. A plurality of spaced bosses 32 are provided inwardly of the flange 31 and form shoulders 33 in the opening 30, the shoulders 33 together with the flange 31 providing a seating recess.

Received in the recess and abutting the shoulders 33 is a contact terminal retainer 34 which preferably takes the form of a disk or plate made of an insulating material and shaped to be complementary in configuration to the recess inwardly of the peripheral flange 31.

The retainer 34 is provided with a plurality of apertures 36 each seating a tubular rubber grommet 37 flanged as at 38 to overlie the edges of the apertures 36 on one side of the retainer 34, the tubular body portion of each grommet 37 extending inwardly into the housing 18 from the opposite face of the retainer 34.

An electrically conductive socket terminal 38 is inserted into each of the grommets 37, each terminal 38 including a generally tubular body portion and a reduced neck at one end which is received in a correspondingly shaped recess provided by the grommets 37.

The reduced necks of the terminals 38 are indicated at 39 and are, in turn, recessed to receive the bared end of a conductor wire 40. It will be understood that the bared ends of the conductor wires 40 may be firmly connected to the corresponding terminals 38 by means of soldering. The conductor wires 40 extend between the housings 18 on opposite ends of the tube 16, thereby completing an electrical circuit between two corresponding contact terminals 38.

In order to protect the end of the connector and particularly the contact terminals 38 projecting outwardly from one face of the retainer 34, a resilient cushioning member 41 is provided which comprises a block of electrically non-conductive resilient and elastic material such as rubber or a rubber substitute and which is shaped to be complementary in configuration to the flanged end of the housing 18. The cushioning member 41 is provided on one face thereof with a protruding pilot portion 42 which is received by the peripheral flange 31 and which abuts the outside face of the retainer 34. Adjacent the pilot portion 42 is a shoulder 43 which abuts against the end of the housing 18. A plurality of apertures corresponding in number to the bosses 32 are extended through the retainer 34 and the cushioning member 41 to receive fasteners so that the cushioning member 41, the retainer 34 and the housing 18 can be assembled together with one another.

More particularly, the cushioning member 41 includes openings 44, counterbored as at 46, to seat a washer 47 and passing a screw 48 which is turned into a correspondingly threaded aperture 49 provided in each boss portion 32 of the housing 18. The retainer 34 is also apertured as at 50 to pass the screw 48.

On the inner face of the cushioning member 41 there is provided a plurality of recesses 51 which correspond in number and location to the contact terminals 38. The recesses 51 are open-ended, however, a reduced access opening 52 is provided in one end thereof, thereby pro-

4

viding shoulders 53 which abut against the contact terminals 38. Thus, upon drawing up the screws 48, the cushioning member 41 will clamp the contact terminals 38 in firm assembly with the retainer 34 so that the entire terminal subassembly will be firmly locked to the housing 18.

In operation, the jumper connector 10 cooperates with spaced apart terminal boxes at 56 and 57 (Figure 1), thereby to complete an electrical circuit or a multiplicity of electrical circuits between adjoining vehicle units. Because of the flexibility of the tube 16 and the conductor wires 40 extending therethrough, the jumper connection 10 is particularly useful when used in conjunction with an articulative coupling connector.

Although various minor structural modifications might be suggested by those versed in the art, it should be understood that we wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of our contribution to the art.

We claim as our invention:

1. In a connector, a tubular flexible insulating sleeve having a hollow metal housing connected to each end thereof and each housing having an opening, shoulder means in said opening with a retainer plate seated in said opening against said shoulder means, said plate having a plurality of holes therein, a flanged tubular insulating grommet in each hole and projecting inwardly into the interior of said housing from one face of said retainer plate, a socket terminal in each grommet and projecting outwardly of said housing from the opposite face of said retainer plate, a resilient cushioning member extending across said opposite face of said retainer plate and having recesses formed therein seating said socket terminals, and fasteners extending through said cushioning member and said retainer into said housing to retain said socket terminals and said retainer in firm assembly with said housing and with said cushioning member, and a plurality of conductor wires removably threaded through said sleeve corresponding in number to said socket terminals in each respective housing and connected to said terminals.

2. In a connector as defined in claim 1, said sleeve comprising a rubber tube having a grommet on the end thereof providing a radially outwardly extending annular shoulder having a converging annular taper on the peripheral surface thereof, said hollow metal housing having a reduced threaded neck portion with a tapered bore receiving said annular shoulder provided by said grommet and a nut threaded on said housing neck engaging said annular shoulder to wedge the housing and the tube in firm assembly with one another.

3. In a connector, a tubular flexible insulating sleeve having a hollow metal housing connected to each end thereof and each housing having an opening with shoulder means in said opening, an axially extending peripheral flange around said opening, a retainer plate seated in said opening against said shoulder means concentrically inwardly of said axial flange, said plate having a plurality of holes therein, a flange tubular insulating grommet in each hole and projecting inwardly into the interior of said housing from one face of said retainer plate, a socket terminal on each grommet and projecting outwardly of said housing from the opposite face of said retainer plate, a resilient cushioning member extending across said opposite face of said retainer plate and having recesses formed therein seating said socket terminals, said cushioning member having a pilot portion received in said opening inwardly of said axial flange and having peripheral portions overlying said flange, and fasteners extending through said cushioning member and said retainer plate into said housing to retain said socket terminals and said retainer plate in firm assembly with said housing and with said cushioning member, and a plurality of conductor wires removably threaded through

said sleeve corresponding in number to said socket terminals in each respective housing and connected to said terminals.

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