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JUMPER FOR INTERCONNECTING POWER CONTROL CONDUCTORS OF RAILWAY DIESEL UNITS AND THE LIKE

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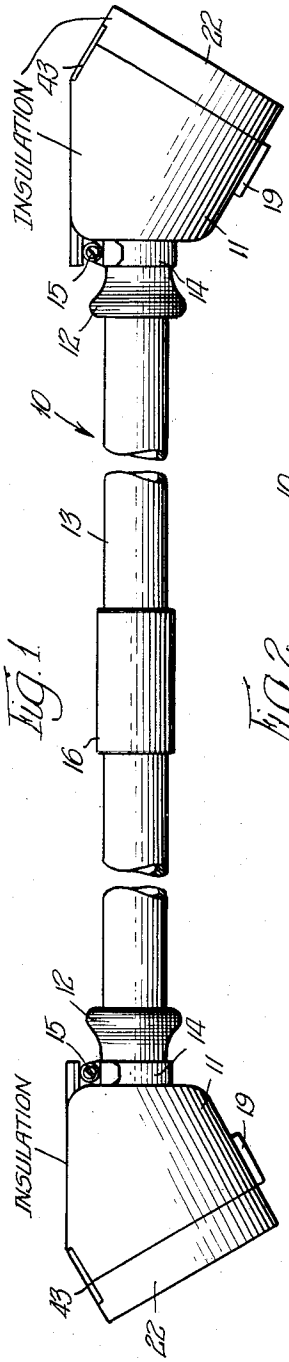


Fig. 1

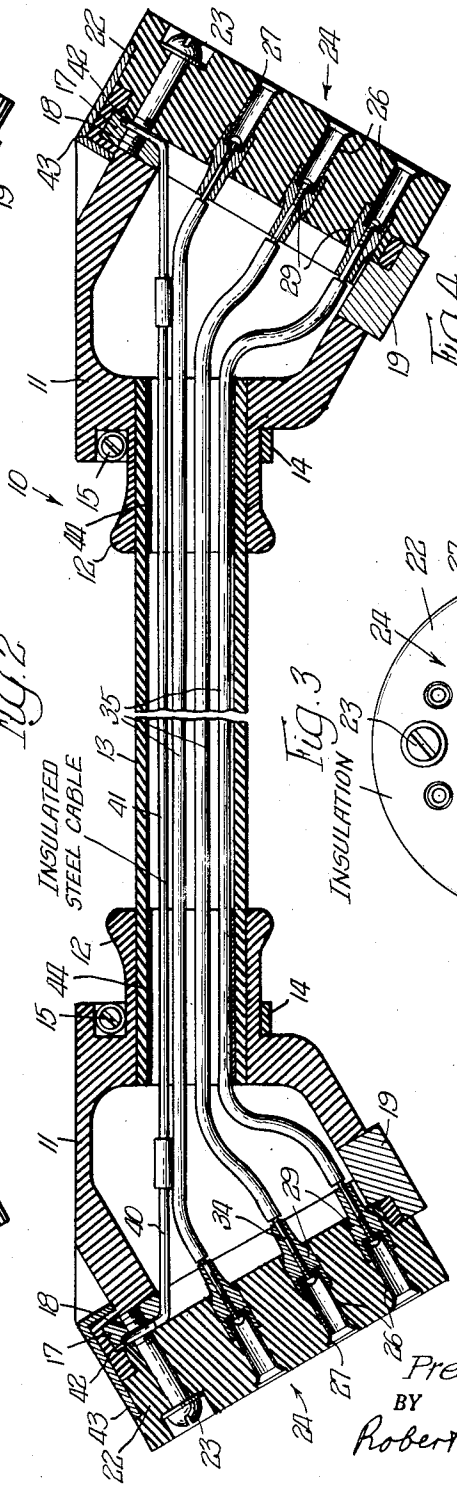


Fig. 2

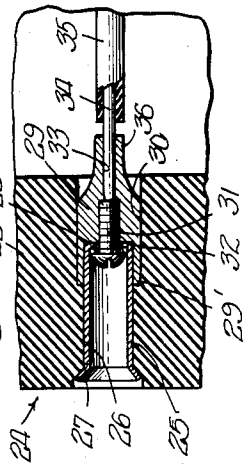


Fig. 4

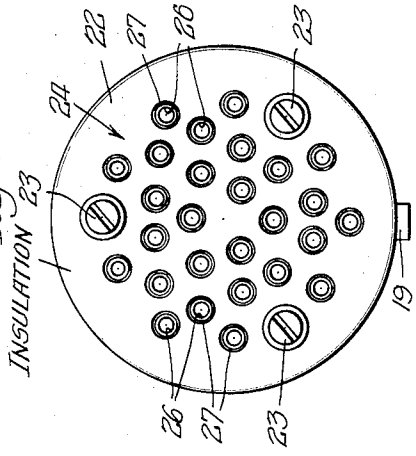


Fig. 3

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JUMPER FOR INTERCONNECTING POWER CONTROL CONDUCTORS OF RAILWAY DIESEL UNITS AND THE LIKE

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This invention relates, generally to electrical connecting means and it has particular relation to jumpers for interconnecting the power control conductors of railway diesel units and the like.

It is customary to interconnect two or more diesel units for operating trains depending upon their length. In such case the several diesel units are controlled from the front or head end station.

It is customary to provide power control receptacles at the ends of the diesel units and to employ jumpers for interconnecting the terminals of these receptacles so as to permit control of the several units from one station.

The receptacles are provided with contact pins and provision is made for interconnecting them through the use of a flexible jumper that is provided with contacts for engaging individually these contact pins.

These flexible jumpers are subjected to severe endwise stresses, particularly when they are detached from the receptacles. While the operating instructions set forth that the power control jumpers are to be manually detached from the receptacles, it is often the case that the units are uncoupled and the power control jumper is detached as an incident to the moving of one unit away from the other. Even when the power control jumpers are manually detached from the receptacles, it is often the case that the trainman exerts a pull on the intermediate portion of the jumper rather than on the head at the end.

The present invention has to do particularly with the construction of the power control jumper so that it can withstand these unusual stresses to which it may be subjected without injury. Among the objects of this invention are: To relieve the power control conductors in the jumper from tension stress incident to disconnection from the power control receptacles; to accomplish this by employing a strain cable that is shorter than the power control conductors and is secured to each end of the jumper so that all endwise strain is applied to the cable; to connect the power control conductors to the contacts at the ends of the jumper in such manner that all of the contacts and the ends of the conductors are removable unitarily; to accomplish this by securing the contacts to a removable insulating face piece; and to employ two part contacts and to apply them to the face piece in such manner that it is held in compression therebetween.

Other objects of this invention will, in part, be obvious and in part appear hereinafter.

This invention is disclosed in the embodiment thereof shown in the accompanying drawing and it comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which is indicated in the appended claims.

For a more complete understanding of the nature and scope of this invention reference can be had to the following detailed description, taken together with the accompanying drawings, in which:

Figure 1 is an elevational view of a power control jumper in which the present invention is embodied;

Figure 2 is a longitudinal sectional view, at an enlarged scale, of the power control jumper shown in Figure 1;

Figure 3 is an elevational view of one of the insulating face pieces at one end of the power control jumper; and

Figure 4 is a sectional view, at an enlarged scale, showing the details of construction of one of the contact assemblies, this being typical of all of the contact assemblies.

Referring now to the drawing, it will be observed that the reference character **10** designates, generally, a power control jumper which is intended for interconnecting the power control receptacles at the ends of diesel units and the like. It includes jumper heads **11** that are formed preferably of insulating material, such as neoprene, which has some degree of flexibility and high insulating characteristics. Formed integrally with the jumper heads **11** are extensions **12** which telescope over the ends of a flexible insulating tube **13** which also is formed preferably of neoprene. Stainless steel clamps **14** secured by screws **15** act to hold the extensions **12** securely onto the ends of the flexible insulating tube **13**. Intermediate the ends of the tube **13** is a clamping pad **16** whereby the power control jumper **10** can be clamped without injury to one or the other of the units with which it is associated.

As shown more clearly in Figure 2 each of the jumper heads **11** is provided with a bolting ring **17** that is formed of light weight metal such as aluminum about which each jumper head **11** is molded. Each bolting ring **17** is provided with three threaded openings **18** of which only one is shown in Figure 2. Formed integrally with the lower portion of each bolting ring **17** is a polarizing lug **19** which insures that the jumper heads **11** are properly inserted in the power control receptacles at the ends of the diesel units.

Overlying the bolting ring **17** and closing off the cavities in the jumper heads **11** are insulating face pieces **22**. They are also formed preferably of neoprene and are secured by screws **23**, Figures 2 and 3, to the bolting rings **17**.

Each of the insulating face pieces **22** carries a number of contact assemblies each of which is shown, generally, at **24**. The number of contact assemblies will depend upon the number of pins in the power control receptacles that are to be interconnected. In the particular construction illustrated twenty seven contact assemblies **24** have been shown.

Each of the contact assemblies **24** include a contact sleeve **25** which is arranged to receive the respective contact pin of a cooperating power control receptacle. The contact sleeve **25** is cylindrical in shape and is formed preferably of copper tubing. It is inserted in a cylindrical opening **26** and has a snug fit therewith. The outer end of the contact sleeve **25** is flared outwardly as indicated at **27** for overlying a correspondingly flared outer end of the opening **26**. At its inner end the contact sleeve **25** is provided with a radially inwardly extending flange **28** for a purpose that will be apparent presently. Cooperating with the contact sleeve **25** is a terminal member **29** that is formed preferably of brass. It is arranged, as shown in Figure 4, to telescope over the inner end of the contact sleeve **25** in an opening **30** in the face piece **22** that is slightly larger than the diameter of the opening **26**. The terminal member **29** is provided with a longitudinally extending threaded opening **31** for receiving a screw **32** the head of which overlies the radial flange **28** and, when it occupies the position in Figure 4, it secures the contact sleeve **25** against separation from the terminal member **29**. The construction is such that, when the screw **32** is tightened, the contact sleeve **25** and the terminal member **29** are drawn toward each other so as to place the portion of the insulating face piece between the flared open end **27** and the inner end **29'** of the terminal member **29** in compression. The reaction is such as to

securely hold the contact sleeve 25 and the terminal member 29 in position.

The terminal member 29 is provided with a longitudinally extending opening 33 which constitutes a continuation of the threaded opening 31 but is of smaller diameter and it is arranged to receive endwise thereof a flexible conductor 34 which is provided with a layer of insulation 35. It will be understood that the conductor 34 constitutes one of the power control conductors and, as shown in Figure 2, these conductors extend between the jumper heads 11 through the flexible insulating tube 13. A flexible conductor 34 is provided for each of the terminal assemblies in one of the insulating face pieces 22. In order to secure the end of the flexible conductor 34 in good contact engagement with the terminal member 29, the tubular end 36 of the latter is deformed onto the former so as to provide the desired contact engagement.

As pointed out hereinbefore, when one or the other of the heads 11 is withdrawn from its associated power control receptacles to separate the contact sleeves 25 thereof from the corresponding contact pins, the power control jumper 10 is likely to be subjected to severe stress. In order to relieve the flexible conductors 34 and the flexible insulating tube 13 of this stress, a flexible steel cable 40 is employed. The flexible steel cable 40 constitutes a tension member and it is preferably insulated with a suitable cover 41 of insulation such as nylon. The tension member 40 is slightly shorter than the flexible conductors 34 so that it rather than the conductors will take any endwise strain that is applied to the power control jumper 10. As shown in Figure 2 the ends 42 of the flexible steel cable 40 are looped around the screws 23 and thus are anchored to the heads 11.

In order to aid the locking knob of the cover in skidding on insertion of the head in the receptacle aluminum skid plates 43 are provided along the upper portions of the jumper heads 11 and insulating face pieces 22 as shown in Figures 1 and 2.

Within each end of the tube 13 and coextensive with each extension 12 of the heads 11 is a steel compression tube 44. Its purpose is to prevent collapse of these parts when the clamps 14 are tightened by the screws 15.

It will be observed that the flexible steel cable or tension member 40 relieves the flexible conductors 34 of any endwise stress to which they might otherwise be subjected. Thus their sole function is to provide for interconnecting the respective contact assemblies 24 in the face pieces 22 of the heads 11 at the ends of the power control jumper 10.

When it is necessary to dismantle the power control jumper 10 for repair purposes, the three screws 23 are loosened. Enough slack is provided in the flexible conductors 34 so that the ends thereof can be withdrawn slightly from the jumper heads 11 together with the insulating face pieces 22. Since the contact assemblies formed by the contact sleeves 25 and the terminal members 29, secured together by the screws 32, are held tightly in the insulating face pieces 22, the disassembly thereof as a unit is permitted.

Since certain changes can be made in the foregoing construction and different embodiments of the invention can be made without departing from the spirit and scope thereof, it is intended that all matter shown in the accompanying drawing and described hereinbefore shall be interpreted as illustrative and not in a limiting sense.

What is claimed as new is:

1. A power control jumper for interconnecting power control receptacles on adjacent ends of railway diesel power units and the like comprising, in combination, a pair of jumper heads of insulating material at the ends of a flexible insulating tube, a bolting ring at the ends of each jumper head, an insulating face piece secured to each bolting ring, a plurality of contacts carried by each face piece; each of said contacts comprising a contact sleeve extending into its face piece from the exposed side and having a radially inwardly extending flange at its inner end, a terminal member extending into the face piece from the opposite side and telescoped over the inner end of said contact sleeve and having a longitudinally extending aperture therethrough the inner end of which is threaded, and a screw having a head bearing against said flange and engaging said threads and placing said face piece in compression between said contact sleeve and said terminal member; a plurality of flexible conductors in said insulating sleeve interconnecting said contacts by being secured in the outer end of the aperture of the respective terminal member, and a flexible tension member extending through said insulating tube and interconnecting said bolting rings, there being slack in said conductors whereby force applied endwise to said heads is resisted solely by said tension member and no tension stress is applied to said conductors.

2. A power control jumper for interconnecting power control receptacles on adjacent ends of railway diesel power units and the like comprising, in combination, a pair of jumper heads of insulating material at the ends of a flexible insulating tube, a bolting ring at the outer end of each jumper head, an insulating face piece removably secured to each bolting ring, a plurality of contacts carried by each face piece; each of said contacts comprising a contact sleeve extending into its face piece from the exposed side and having a radially inwardly extending flange at its inner end, a terminal member extending into the face piece from the opposite side and telescoped over the inner end of said contact sleeve and having a longitudinally extending aperture therethrough the inner end of which is threaded, and a screw having a head bearing against said flange and engaging said threads and placing said face piece in compression between said contact sleeve and said terminal member; a plurality of flexible conductors in said insulating sleeve interconnecting said contacts by being secured in the outer end of the aperture of the respective terminal member, removal of said insulating face piece from said bolting ring carrying with it the ends of said conductors connected to said terminal members, and a flexible tension member extending through said insulating tube and interconnecting said bolting rings, there being slack in said conductors whereby force applied endwise to said heads is resisted solely by said tension member and no tension stress is applied to said conductors.

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