

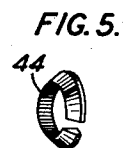
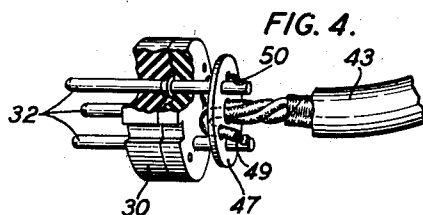
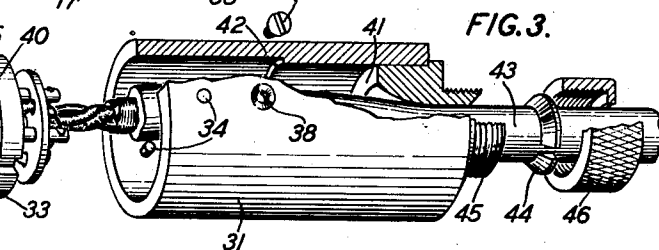
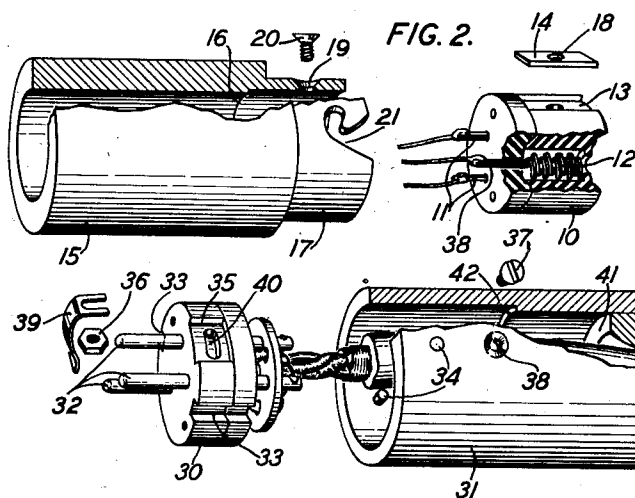
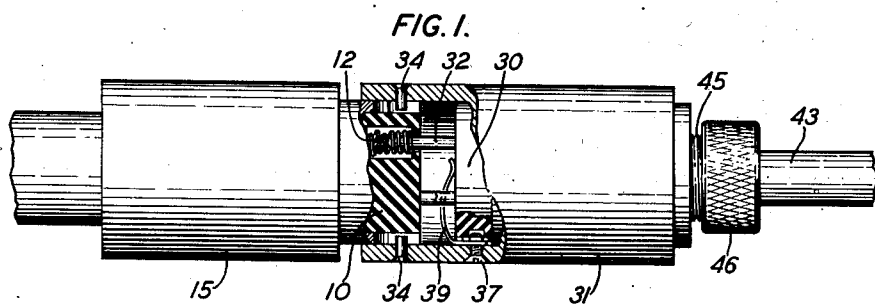
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ELECTRIC CONNECTER

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ELECTRIC CONNECTER

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3 Claims. (Cl. 173—322)

This invention relates to electric circuit connectors and particularly to connectors commonly known as the jack and plug type.

As the term "connector" obviously implies, when employed in the electrical art, the union of two or more electric circuits, it is essential that such apparatus be so designed as to insure perfect electrical engagement of associated circuits and to be of such a nature as to permit the circuits to be disrupted with a minimum of effort. It is also essential, particularly where the elements of the connector must necessarily be big and heavy, that some simple means be provided for locking the plug and jack elements together to preclude the possibility of the circuits served by the connector becoming accidentally opened.

It is the object of this invention, therefore, to provide an improved design of multi-conductor connector which is simple of construction, durable and effective and one which insures against the accidental disruption of the circuits served thereby.

This object is attained in accordance with a feature of the invention by the provision of a multi-conductor connector of the jack and plug type in which the jack and plug elements, per se, are mounted within a metallic shell and in which the element carrying the plug contacts of the pin type is rotatable through a small arc within its respective shell to permit the shell portions to cooperate with each other and lock by means of a bayonet slot and pin mechanism.

Another feature of the invention resides in the provision of pressure exerting means in the form of a resilient bowed leaf spring interposed between the jack and plug contact carriers which tends to force the plug member away from the jack when the latter is inserted in the former, thereby maintaining the locking pin in position in its respective bayonet slot and minimizing the possibility of accidental disassociation of the connector elements which might otherwise be caused by jarring or rough handling.

A further feature of the invention is embodied in a novel method of securing the cable conductors to the plug contacts which serves to relieve the strain or pull at the point of engagement between the conductor end and the plug contact element and reduces to a minimum the likelihood of the conductors breaking away from their respective plug contacts.

These and other novel features of construction not specifically identified will be readily understood from the following detailed description made with reference to the accompanying drawing in which:

Fig. 1 is an elevation of the jack and plug elements constituting the connector of this invention, partially united;

Fig. 2 is an exploded view of the various elements which constitute the jack portion of the connector;

Fig. 3 is an exploded view of the various elements which constitute the plug portion of the connector;

Fig. 4 is a partial fragmentary view of the plug contact carrier showing the method employed in securing the conductor ends to the plug contacts; and

Fig. 5 is a view of the split collar or bushing which serves to rigidly locate the cable at its point of entry in the plug shell to prevent undue wear of the cable insulation.

In the following description like numerals indicate like parts throughout the several figures.

The jack element of the connector is made up of a jack contact carrier 10 of insulating material and of substantially cylindrical formation. A plurality of contact terminals 11 terminate in coil springs 12, housed in cylindrical holes in the carrier 10. At one portion of its periphery the carrier 10 is provided with a rectangular slot which accommodates a rectangular metallic plate 14, the purpose of which will be pointed out presently. A metallic shell or casing 15 is provided as a receptacle or housing for the jack contact carrier 10 and is provided with a shoulder 16 which limits the extent to which the carrier 10 may be inserted therein. The internal dimensions of the outer portion 17 of shell 15 are such as to permit a substantially snug fit of the carrier 10 therein.

In assembling the jack portion of the connector the plate 14, which is provided with a tapped hole 18, is placed in the slot 13 and the carrier 10 forced into the shell portion 17 until it abuts against the shoulder 16 with the hole 18 in alignment with a corresponding hole 19 in the shell. A screw 20 is then passed through the hole 19 and made up in the tapped hole 18 of plate 14. In this manner the jack carrier 10 is secured in position in the shell and prevented from longitudinal and rotational movement. The shell portion 17 is provided with diagonally disposed bayonet slots 21 for locking purposes as will be described hereinafter.

The plug element of the connector, as seen in Fig. 3, is made up essentially of a plug contact carrier 30 and a metallic shell 31 which houses the carrier. The plug contact carrier 30 consists of a cylindrical insulating block in which a plurality of pin contacts 32 are embedded in any suitable manner. The carrier 30 is provided with two diagonally disposed longitudinal slots 33 which permit the carrier to be inserted in the shell 31 beyond the internally protruding pin 34. On one portion of its periphery the carrier 30 is provided with a slot 35 which accommodates a nut 36 which, when the plug element is assembled, is

made up on screw 37 which fits into a hole 38 in the shell 31 and is adapted to pass through the bifurcated end of the bowed spring 39 to secure it in position, as clearly seen in Fig. 1. The inner peripheral boundary of slot 35 is provided with an auxiliary slot 40 which is of such dimension as to receive the end of screw 37 and at the same time permit a limited relative rotational movement between the carrier 30 and its respective shell or casing 31.

The inner portion of the shell 31 is provided with a shoulder 42 which limits the extent to which the carrier 30 may be inserted in the shell 31. The internal diameter of the shell portion extending between the end and the shoulder 42 is such as to permit a fairly snug fit of the carrier 30 therein and at the same time allow the carrier to rotate relatively to the shell 31. The extent to which the carrier 30 may be rotated relatively to its respective shell is limited by the dimension of slot 40.

In assembling the plug portion of the connector, the cable conductors are secured to the pin contacts 32 in a manner to be described hereinafter and the carrier, with the nut 36 and spring 39 held in position in the slot 35, pulled into the shell 31 until the carrier abuts against shoulder 42. The slot 35 with the nut 36 and spring 39 are then brought into alignment with the hole 38. The screw 37 is then inserted in hole 38 to engage the nut 36. The extension of screw 37 into slot 40 prevents any substantial longitudinal movement of the plug carrier in the shell 31 and permits a limited rotational movement thereof.

The cable 43 is provided with a split collar or bushing 44 which is forced up against the threaded extension 45 of shell 31 by means of the knurled nut 46. This is intended as a means for securing the cable in place.

Reference is now made to Fig. 4. A disc-like insulating washer 47 is provided with a centrally located large hole and a plurality of smaller holes, six in the case of a three-conductor cable, disposed about the center hole. In making the electrical connection of the cable 43 with the plug, the disc 47 is placed upon the pin terminal ends and forced on them for a short distance, leaving a space between the end of the plug carrier 30 and the disc 47. The conductors of the cable are then passed through the central hole and fanned in such a manner as to permit connection of each conductor with its respective pin contact to be made as seen at 49 and 50. Each wire after having been threaded through the central hole is turned back and threaded individually through a separate hole nearest to the pin contact to which it is to be secured. The actual connection may be made by soldering. It will be noted that with this arrangement any pull or twist on the cable will be taken up by the disc 47 which is tightly fitted on the pin contacts, and that no pull or strain is experienced at the point where the conductor is actually secured to the plug terminals.

In effecting a connection between the jack and plug elements of the connector, the plug shell 31 is slipped over the portion 17 of the jack shell 15 so that the pins 34 engage with the outer opening of the bayonet slot 21. In this manner the pin contacts are immediately inserted in their respective jack spring sockets indicated at 12, Fig. 2. The two shell portions 15 and 31 are then

pushed together and relatively turned slightly to force the pins 34 into their locking positions in their respective bayonet slots.

The relative rotation of the jack and plug elements is essential to permit the pins 34 to take up their locking positions in the bayonet slots 21 and is effected in this design, by the formation of slot 40 in the plug carrier 30 and the engagement thereof by the screw 37. Heretofore, in multi-conductor connectors of this type wherein a bayonet slot and pin were used for locking purposes it was necessary to resort to a complicated receding pin plug design to permit the proper functioning of the locking mechanism.

As the two connector elements are forced together the bowed spring 39 is forced against the face of the jack contact carrier and stressed out of its normal shape so that when the pins 34 are in their locking position in the bayonet slot, the spring 39, tending to resume its normal condition, exerts a pressure between the two connector elements tending to push them apart. In so doing the pins 34 are securely maintained in their locking positions in the bayonet slots, thereby insuring against any accidental disengagement of the pins from their slots and the consequent separation of the connector elements.

What is claimed is:

1. In combination, an electric plug comprising a shell, a contact carrier supporting a plurality of pin contacts mounted within said shell, said pin contacts having terminal ends protruding from said carrier, an insulating disc having a central aperture and a plurality of smaller apertures disposed about said central aperture, some of said smaller apertures adapted to receive the terminal ends of said pin contacts and a multi-conductor cable passing through the central aperture in said insulating disc and the individual conductor ends of said cable threaded through other of said smaller apertures and secured to the protruding ends of said pin contacts.

2. In combination, an electric plug comprising a plurality of pin contacts supported by a contact carrier, said pin contacts having terminal ends protruding from said carrier, an insulating disc having a central aperture and a plurality of smaller apertures disposed about said central aperture, some of said smaller apertures adapted to receive the terminal ends of said pin contacts and a multi-conductor cable, the conductors of which are collectively passed through the central aperture in said disc, individually reversed and passed through other of the smaller apertures in said disc and secured to the terminal ends of said pin contacts.

3. In combination, an electric plug comprising a plurality of pin contacts supported by a contact carrier and having terminal ends protruding from said carrier, a multi-conductor cable having its individual conductor ends secured to the protruding ends of said pin contacts and a strain relieving device consisting of an insulating disc mounted on the protruding ends of said pin contacts at a point substantially mid-way of their ends and the base of said carrier provided with a central aperture through which the conductors of said cable are collectively threaded and a plurality of smaller apertures through which the conductors are individually threaded prior to their connection to the terminal ends of said pin contacts.

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