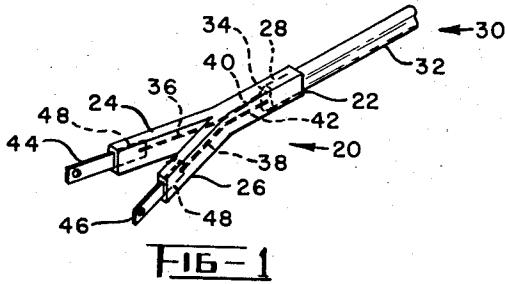
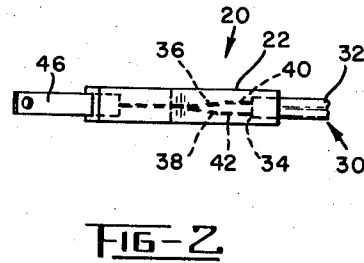
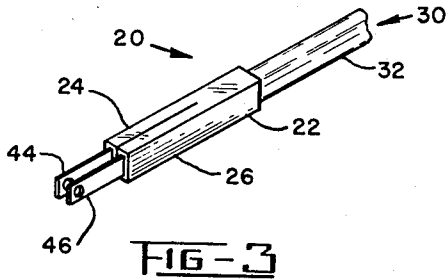
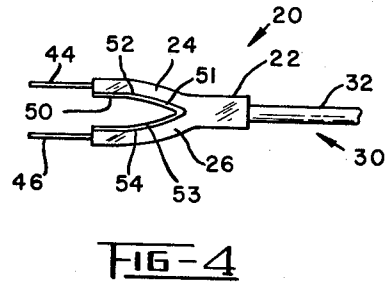
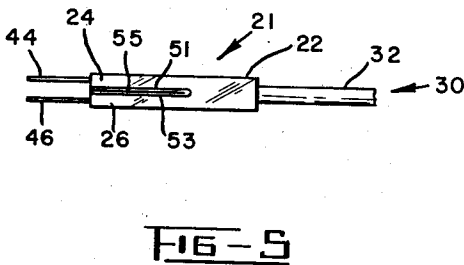
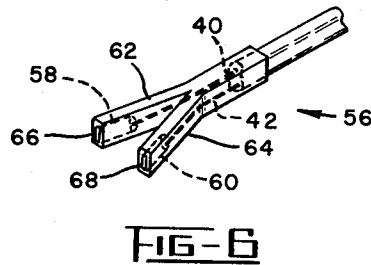
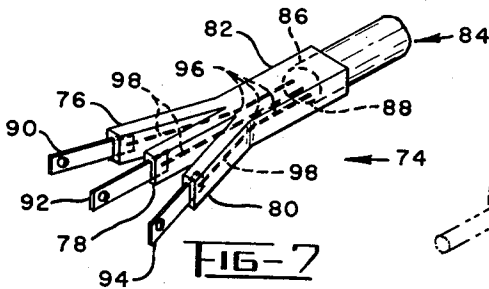
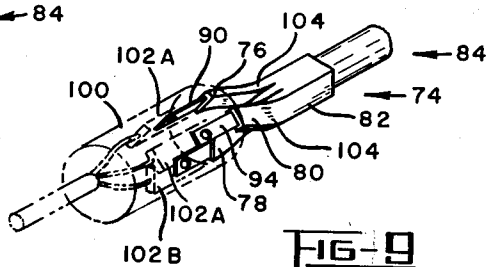
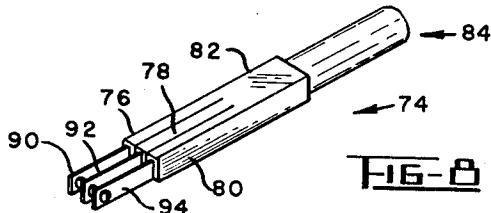


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ELECTRIC PLUG

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ELECTRIC PLUG

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2 Claims. (Cl. 339-61)

The present invention relates to an electric connector and particularly to an electric connector which can be conveniently collapsed when not in use.

Heretofore it has been the practice to form electric plugs or receptacles, such as those used for line cords, extension cords and other types of electric cables, from rather large and bulky insulating members provided with two or more male or female electric contacts, as required by the application of the electric connector. Such prior formations of electric connectors of the character described have been cumbersome to store in the equipment with which the connector is used as, for example, a portable radio, wherein a minimum of space is available.

In the case of extension cords, the bulkiness and weight of the conventional plug and receptacle connectors utilized render the extension cords not only inconvenient to store but also difficult to untangle in the event the cord has become inadvertently snarled. Moreover, conventional plugs, having the contacts thereof in permanently spaced positions relative to the insulating member frequently became loosened in the receptacles intended therefor, inasmuch as no means were provided for easily and adequately imparting a biasing force tending to increase the frictional engagement of the connector contacts with those of a mating electrical connector.

In the case of line cords for electric appliances within a casing the size and rigidity of previous electrical plug connectors utilized therefor necessitated the removal of the connector in order to withdraw the plug through the aperture usually provided in the casing or else unsoldering or otherwise detaching the line cord from associated electric circuitry of the appliance within the casing.

Accordingly an object of the present invention is to enhance the efficiency and storability of electric plugs and receptacles.

More specifically, it is an object of the invention to furnish a connector having a spatially adjustable electric portion, which is collapsed in storage and expanded when in an operative position.

Another object of the invention is to incorporate, in an electric connector, means for maintaining the connector in a collapsed position or alternatively in an expanded or operable position.

A further object of the invention is to improve the frictional engagement of an electric connector with a suitable receptacle.

Still another object of the invention is to minimize the size of an electric connector so that it is not disproportionately larger in cross-section than that of the electric cable to which it is attached.

Other objects, advantages, and features of the invention will be made apparent during the ensuing description of illustrative forms of the invention, said description being taken in conjunction with the accompanying drawings wherein:

Fig. 1 is a perspective view of a plug or male connector constructed in accordance with the principles of this invention.

Fig. 2 is a side elevational view of Fig. 1.

Fig. 3 is a perspective view of a connector made in accordance with the invention, with parts shown in collapsed position.

Fig. 4 is a top plan view of another form of an electric connector, constructed according to the invention.

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Fig. 5 is a top plan view of still another form of the invention.

Fig. 6 is a perspective view of a receptacle or female type connector constructed in accordance with the teachings of this invention.

Fig. 7 is a perspective view of another form of the invention adapted for use with a three-wire cord or cable.

Fig. 8 is a perspective view of the connector of Fig. 7 shown here in the collapsed position.

Fig. 9 is a perspective view of the connector illustrated in Fig. 7 shown here in an operative position of engagement with a conventional three-wire receptacle connector.

Referring now more particularly to Figs. 1 to 3 of the drawings, the exemplary form of the invention illustrated therein comprises a bifurcate insulating member 20 having a line cord receiving portion 22 and terminating in legs 24 and 26. The portion 22 of the insulating member 20 is provided with a channel 28 into which a line cord 30, or other type electric cable, is inserted. The outer insulation 32 of the line cord 30 is preferably terminated at a shoulder 34 formed in the channel 28. Adjoining the channel 28 are passages 36 and 38 which extend through the legs 24 and 26, respectively. The passages 36 and 38 are arranged to accommodate individual conductors 40 and 42, respectively, of the line cord 30. Adjacent the ends of the conductors 40 and 42 are affixed, in this form of the invention, conventional male electrical contacts 44 and 46. The ends of the conductors 40 and 42 are secured to the contacts in any convenient manner, after which inward portions 48 of the contacts 44 and 46 may be pulled a short distance into the prongs 24 and 26 in order to lend the support thereof to the contacts 44 and 46.

The insulating member 20, in this example of the invention may be molded or otherwise formed from hard rubber or other resilient insulating material, forming at least a portion thereof, which will maintain itself in an expanded condition such as that shown in Figs. 1 and 2. In order to collapse the connector for storage or to insert the same through an aperture provided for the line cord 30 it is only necessary to apply sufficient pressure to the outside of the legs 24 and 26 of the insulating member 20 to spatially adjust the legs to the position illustrated in Fig. 3. In this instance of the invention, the legs 24 and 26 are each formed with a cross-sectional area equal to approximately half that of the line cord receiving portion 22, so that in the collapsed position of legs 24 and 26, as shown in Fig. 3, the insulating member 20 is of approximately the same over-all thickness or girth throughout its length.

Alternatively, the insulating member 20 may be formed or molded initially in the collapsed position exemplified in Fig. 3. In this latter arrangement the ends of legs 24 and 26, when the electrical connector is to be used, are spread for insertion into a suitable receptacle. The elasticity or the resiliency of the material utilized to mold the insulator prongs in the collapsed position thereof, urges the contacts 44 and 46 toward each other so that, when the insulating member 20 of this form of the invention is spatially adjusted or expanded to an operational position, and in engagement with a conventional receptacle, the contacts 44 and 46 engage the receptacle more securely.

It is further contemplated that the form of the invention illustrated in Figs. 1 and 2 may be provided with an insulating member 20 wherein the ends of legs 24 and 26 normally are spaced a greater distance than that required for the insertion of the contacts 44 and 46 into a conventional receptacle. Therefore, when the contacts 44 and 46 are moved toward each other in order to spatially adjust the contacts for insertion into the receptacle, the

resiliency of the material from which the insulator 20 is fabricated tends to spread the contacts 44 and 46 and to thereby cause them to more securely engage the contacts of the receptacle.

In accordance with another form of the invention the insulating member 20 is provided with resilient material in the form of a wishbone-shaped, or furcate spring or biasing member 50 secured to inner surfaces 52 and 54, respectively, of the legs 24 and 26. As illustrated in Fig. 4, the spring or biasing member 50 includes tines 51 and 53 normally extending in an expanded position of the member 50. Alternatively, as illustrated in Fig. 5, the tines 51 and 53 of a spring member 55 may be biased to the collapsed position and secured to insulating member 21. Thus for the purposes enumerated in connection with Figs. 1 to 3, the insulating member 20 and spring means 50 (Fig. 4) may be collapsed to the position shown in Fig. 5 or vice versa, the insulating member 21 and the spring means 55 (Fig. 5) may be expanded to the position shown in Fig. 4. In the forms of the invention illustrated in Figs. 4 and 5 the cross-sectional area of the legs 24 and 26 is preferably reduced to accommodate the spring 50 or 55 secured thereto, in order that upon collapse of the insulating member 20 or 21 and the associated spring 50 or 55 the insulating member will have substantially the same overall thickness along its length. The springs 50 or 55 may be fabricated from thin spring steel or from a stiff resilient plastic material, depending upon the desired biasing force to be imparted to the legs 24 and 26. Obviously the spring member can be molded into the leg members 24 and 26 so to lie preferably adjacent the inside surfaces 52 and 54 of the legs.

It is also contemplated by the invention that the electrical connector of the invention can be utilized for a plug receptacle or female connector. As better shown in Fig. 6 a bifurcate member 56, having substantially the same configuration as that described heretofore in connection with Figs. 1 to 5, is provided additionally with recesses 58 and 60 adjacent the ends of the legs 62 and 64. Inserted into each of the recesses 58 and 60 is a female type electric jack or contact 66 or 68. The latter are attached individually to conductors 70 and 72 extending through the legs 62 and 64, as described fully in connection with Figures 1 to 3. The insulating member 56 is constructed from a resilient material adapted to maintain the insulating member in either a collapsed or expanded condition, as desired, and may be provided with additional biasing means through the use of the spring member 50 or 55, illustrated in Figs. 4 and 5, respectively.

An adaptation of the invention for use with a three-wire cable or cord is illustrated in Figs. 7 to 9. A trifurcate insulating member 74 comprises legs 76, 78 and 80 which are secured to a cable engaging portion 82. As pointed out in connection with Figs. 1 to 3, the insulating member 74 may be molded in a normally expanded position as shown in Fig. 7 or in a normally collapsed position as shown in Fig. 8. The combined thicknesses of the prongs 76, 78, and 80 in the collapsed position thereof is substantially equal to the thickness of the cable engaging portion 82, in order that the insulating member 74 will have substantially the same cross-sectional area throughout its length when in the collapsed position thereof. The thicknesses of the cable engaging portion 82 and the legs 76, 78 and 80 are selected such that the overall thickness of the insulating member 74 when in its collapsed position will not be substantially greater than that of an electric cable or cord 84.

The cable receiving portion 82 of the insulator 74 is provided with a channel 86 adapted to receive and be secured to a portion of exterior insulation 88 of the cable 84. Into each of the legs 76, 78 and 80 is inserted an electrical contact 90, 92, or 94, respectively, which individually are secured to conductors 96 of the electric cord or cable 84. The conductors 96 are inserted through

suitable conductor accommodating passages 98 provided in each of the legs 76, 78 and 80. The insulating member 74 can be provided with suitable spring members such as the stiffeners 50 or 55 described heretofore in connection with Figs. 4 and 5, in order to further bias the leg portions of the insulating member 74 to either the expanded position of Fig. 7 or the collapsed position illustrated in Fig. 8. It is contemplated that the spring member 50 or 55, if utilized, be secured between adjacent leg portions.

The electric connector illustrated in Figs. 7 and 8 may be inserted into a conventional plug receptacle 100 having the customary spaced array of electrical contacts 102 disposed therein. When inserting the electric connector of Fig. 7 or 8 into the receptacle 100, the outermost legs 76 and 80 and the associated contacts 90 and 94 are moved against the resiliency of the insulator 74, if the latter be molded in the collapsed position, in order that the male contacts 90 and 94 can be inserted into the upper female contacts 102A of the receptacle 100. The central leg 78 is displaced downwardly against the resiliency of the insulator material when used with this type of receptacle in order that the associated contact 92 be inserted into the lower female contact 102B of the receptacle 100. In those three-wire receptacles having one or more of the female contacts, for an example, contacts 102A, disposed at an angle to the remaining contacts, for an example contact 102B, one or more of the legs 76, 78, or 80 will be twisted, against the resiliency of the insulating member 74 in order that the male contacts 90 and 94 can be properly inserted into the female contacts 102A. The twist so imparted to the legs 76 and 80 is indicated generally by the reference character 104. The movement of the leg portions toward or away from each other, as the case may be, or the twisting thereof, or both, as required, to insert the same into the conventional receptacle in the manner described, additionally serves the function of increasing the frictional engagement of the contacts 90, 92 and 94 with the receptacle contacts 102, respectively.

In other applications of the invention, it is contemplated that the electric connector exemplified in Figs. 7 and 8 be utilized with a receptacle similar to that described in connection with Fig. 6 with the exception that the insulator 56 is provided in trifurcate form (not shown).

Numerous modifications of the foregoing description and exemplification of the invention will occur to those skilled in the art, without departing from the spirit and scope of the invention as defined in the appended claims. Moreover, it is to be understood that certain features of the invention can be utilized without a corresponding use of other features.

Accordingly, what is claimed as new is:

1. In a connector for an electric line cord, a rectilinear elongated resilient body of uniform rectangular cross section, said body having a line cord receiving end with a channel therein having a cross section slightly less than that of the body, the other end of the body being divided into a plurality of legs with opposed flat surfaces, said legs each being provided with longitudinal passages and with the passages communicating with the channel in the line cord receiving end of the body.
2. A connector as claimed in claim 1 in which the resilient body is square in cross section.

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