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G. H. E. BERTHOLD

1,930,639

ELECTRICAL CONNECTER

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Fig. 1.

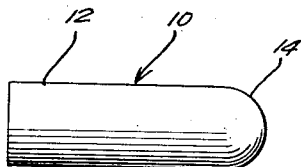


Fig. 2.

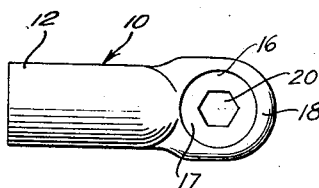


Fig. 3.

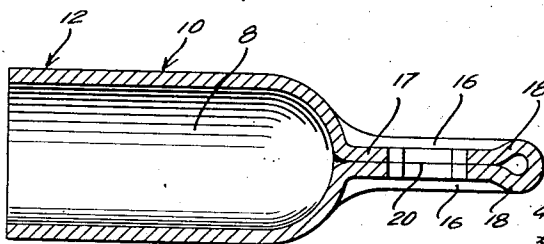


Fig. 4.

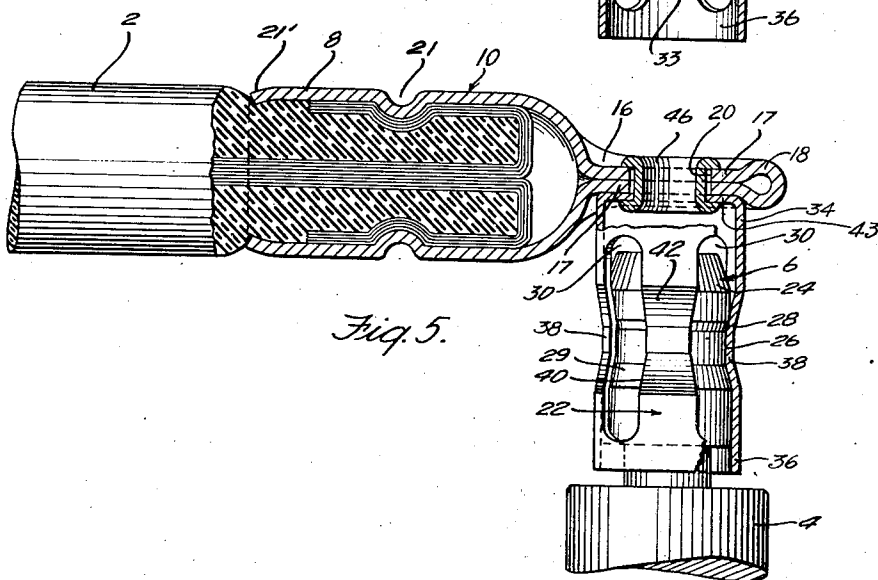
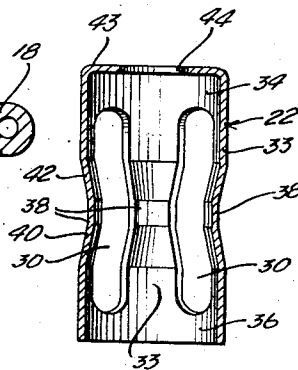


Fig. 5.

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ELECTRICAL CONNECTER

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3 Claims. (Cl. 173-269)

This invention relates to electrical connectors and more particularly to electrical connectors of the quickly attachable and detachable type such as is in common commercial use for connecting a high tension electrical conductor with a spark plug. It is to be understood however that the invention is not limited to use in connection with spark plugs but that the principal features thereof may be employed in connection with other electrical devices to connect electrical conductors with electrical terminals.

In one connector construction in common commercial use, a metallic shell is provided into which the end of the electrical conductor is introduced and with which the conductor wires are electrically connected and various devices are provided to connect the shell with a terminal. It is often desirable in devices of this character to connect an electrical conductor to a terminal so that the conductor extends at an angle to the axis of the terminal. Certain constructions heretofore produced for connecting a conductor to a terminal in this manner have been relatively complicated in construction and have been made up of a relatively large number of parts which it was necessary to assemble to form the complete connector, and such connectors have therefore been quite expensive to manufacture.

The principal objects of the present invention are to improve the construction and mode of operation of electrical connectors of the type referred to above and to produce a construction for connectors of this type in which an electrical conductor may be connected to a terminal with the axis of the conductor located at an angle to the axis of the terminal, and which is relatively simple in construction and may be manufactured at a relatively low cost.

With the above and other objects in view, the invention consists in an electrical connector embodying the novel and improved constructions hereinafter described and particularly pointed out in the claims, the advantages of which will be readily understood and appreciated by those skilled in the art.

The invention will be clearly understood from the accompanying drawing illustrating the invention in its preferred form, and the following detailed description of the constructions therein shown.

In the drawing—

Figure 1 is a view in side elevation illustrating one of the elements of applicant's connector in partially-formed condition;

Figure 2 is a view similar to Figure 1 illus-

trating the element in completely-formed condition;

Figure 3 is a sectional view of the element shown in Figure 2 taken in a plane containing the axis of said element;

Figure 4 is a sectional view illustrating another element of applicant's connector taken substantially in a plane containing the axis of the element; and

Figure 5 is a view partly in side elevation and partly in axial section illustrating the completely-formed connector.

In the construction shown in the drawing, the electrical connector is constructed and arranged to connect an insulated flexible electrical conductor indicated at 2 with the terminal of a spark plug indicated at 4. The spark plug is provided with a terminal indicated at 6 with which a part of the electrical connector makes electrical contact. In the form of the invention illustrated in the drawing the connector comprises a sleeve or ferrule 8, within which one end of the conductor is inserted. This ferrule is formed from a cylindrical shell 10 preferably stamped out of sheet metal and having the shape shown in Fig. 1. As shown in this figure the shell is provided with a cylindrical wall 12 and with an end wall 14 having substantially a hemispherical shape. In forming the ferrule from the shell 10, one end of the ferrule is flattened preferably by a stamping operation. In this operation the ferrule is provided with circular recesses 16 on opposite sides thereof, having flattened walls 17 surrounded by ridges or ribs 18, as clearly shown in Figs. 3 and 5. During the stamping operation a hole 20 is punched in the shell for the reception of a connecting element of the connector.

The conductor 2 is inserted in the ferrule 8 as shown in Fig. 5. In order to make electrical contact between the ferrule and the current-conducting wires within the conductor 2, the insulation is stripped back from the wires for some distance from the ends thereof and the end portions of the wires projecting from the insulation are separated into two parts and folded outwardly to the periphery of the insulation and then backwardly over the insulation, as shown in said figure. The shell is then applied over the conductor and preferably is formed with an annular depression 21 extending about the same, and the inner margin of the shell also may be bent inwardly as indicated at 21' to hold the shell securely in position on the conductor.

In the present construction, contact means is

provided for connecting electrically the shell 8 and the terminal 6 of the spark plug. This contact means is constructed and arranged to connect the shell to the spark plug terminal so that the axis of the shell and the conductor 2 lie at an angle to the axis of the spark plug terminal. In the form of the invention shown in the drawing of this case, the parts are constructed and arranged so that the axis of the conductor, when connected to the terminal, is located substantially perpendicular to the axis of the terminal. As shown in the drawing the means for connecting the shell with the spark plug terminal comprises a substantially cylindrical contact sleeve 22, also preferably stamped out of sheet metal and formed to slip over the terminal of the spark plug. The said terminal is provided with a tapered surface 24 at the outer end thereof, and with a peripheral recess 26 having beveled or inclined surfaces 28 and 29. The contact or connector sleeve 22 is provided with a number of cutout portions or slots 30 extending longitudinally of the sleeve but terminating at some distance from each end of the sleeve. The slotting of the sleeve in this manner provides a plurality of spaced resilient strips 33, the ends of which are connected respectively by the end portions 34 and 36 of the sleeve. Each of the strips 33 preferably is bent into the form shown clearly in cross section in Figs. 4 and 5. As shown in these figures, each of the strips is bent inwardly as indicated at 38 forming inclined portions 40 and 42. The inclined portions 40 on the strips are arranged to engage the inclined surface 24 on the terminal of the spark plug when the sleeve is being applied to said terminal to expand the strips, and are preferably inclined to correspond with the inclination of said surface. The inclined portions 42 of the strips are arranged to engage the inclined surface 28 of the terminal, when the sleeve has been applied to the terminal, to retain the sleeve yieldingly on the terminal. The sleeve is provided with an end wall 43 having an opening 44 to enable the same to be secured to the ferrule 8.

The sleeve 22 is applied to the ferrule or shell 8 with the upper end portion of the sleeve (Fig. 4) engaging in one of the recesses 16 in the flattened portion of the shell, with the end wall 43 of the sleeve contacting with one of the walls 17 of the shell and with the openings 20 and 44 in registration. The sleeve is secured to the shell by means of an eyelet 46 passed through the respective openings in the sleeve and shell, and having its ends expanded so as to overlie respectively the end wall of the sleeve and one of the flattened walls 17 of the shell. This will securely hold the sleeve in position with relation to the shell.

It will be noted from the drawing that the respective openings 20 and 44 in the shell and sleeve each has the form of a polygon. With this construction when the eyelet 46 is expanded in said openings and bent down over the walls

in which said openings are formed, the contact sleeve will be held from rotation with relation to the shell.

It will be noted that the connector illustrated and described is relatively simple in construction and is made up of relatively few parts. The parts of the connector, which are preferably all made of sheet metal, may be manufactured at relatively small expense by simple, easy stamping operations and may be quickly and easily assembled and secured together in operative positions.

It is to be understood that the invention is not limited to the particular construction and arrangement of parts of the illustrated embodiment of the invention, but that the invention may be embodied in other forms within the scope of the claims.

Having explained the nature and object of the invention, and having specifically described a construction embodying the invention in its preferred form, what is claimed is:

1. An electrical connector comprising a shell constructed to receive an electrical conductor and to be electrically connected thereto and having its outer end transversely flattened and provided with a recess, a sleeve arranged to receive another conductor and constructed to be slipped on and off the same to make and break the electrical connection therewith, and having one end engaging in said recess, and the axis of said sleeve extending at an angle to the axis of the shell, and means for permanently securing the sleeve directly to the shell.

2. An electrical connector comprising a shell constructed to receive an electrical conductor and to be electrically connected thereto and having its outer end transversely flattened and formed with a recess, a sleeve arranged to receive another conductor and constructed to be slipped on and off the same to make and break the electrical connection therewith, and having one end thereof engaging in said recess, and the axis of the sleeve extending at an angle to the axis of the shell, and means passing through openings in the end wall of the sleeve and in the flattened portion of the shell to secure permanently the sleeve to the shell in said position.

3. An electrical connector comprising a shell constructed to receive an electrical conductor and to be electrically connected therewith and having its outer end transversely flattened to form walls extending substantially parallel with the central plane of the shell containing the axis thereof, a cylindrical sleeve arranged to receive another electrical conductor and to be slipped on and off the same to make and break connection therewith, and having its axis extending substantially perpendicular to the axis of the shell, and an eyelet passing through openings in one of said walls of the shell and in the end wall of the sleeve to secure permanently the same together.

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