Dec. 8, 1931. G. H. E. BERTHOLD 1,835,000

ELECTRICAL CONNECTER

Filed July 9, 1929

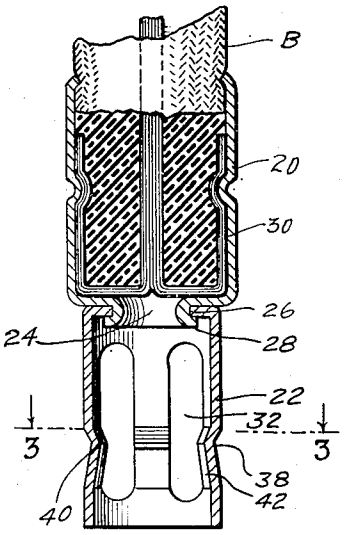


Fig. 2.

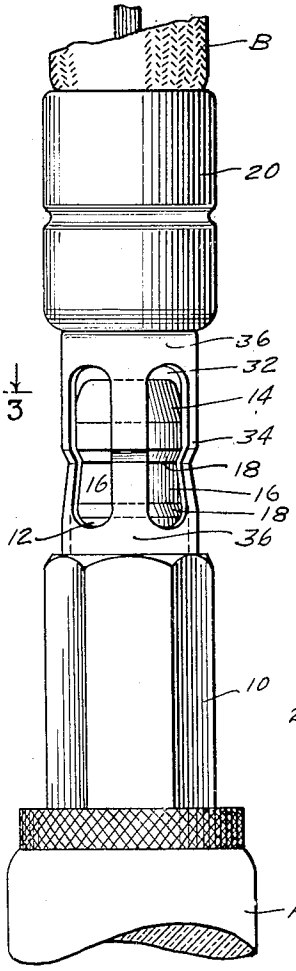


Fig. 1.

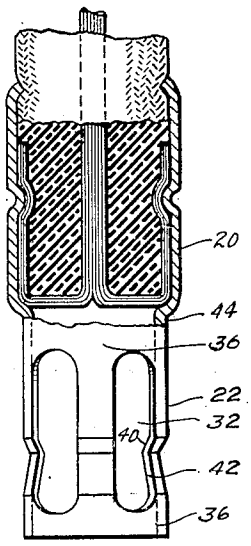


Fig. 4.

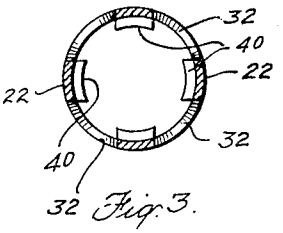


Fig. 3.

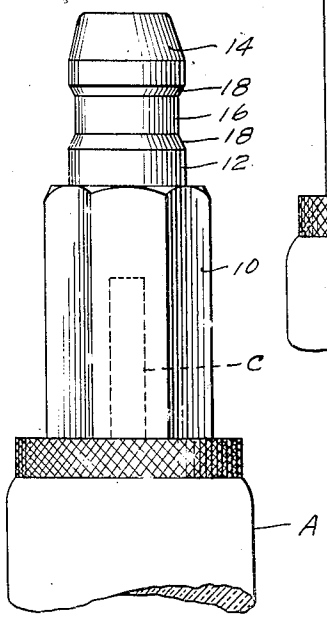


Fig. 5

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UNITED STATES PATENT OFFICE

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ELECTRICAL CONNECTER

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The present invention relates to connecters for electricity conductors such for instance as may be used to join two parts of a line to connect a line with a terminal or with other electrically conducting member.

It is highly desirable that devices of the above described character be quickly attachable and detachable, and yet engage with a grip firm enough to prevent accidental disconnection and also to provide a good electrical contact.

It is an object of the invention to provide a connecter which will meet the above-mentioned requirements and will also be economical to manufacture and efficient in use.

Other objects of the invention relate to certain novel and improved arrangements and combinations of parts 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.

One embodiment of my invention with particular reference to its use on spark plugs is illustrated by the accompanying drawings and will be described herein.

In the drawings—

Figure 1 is a view in elevation showing an electrical conductor connected to a spark plug by a device constructed in accordance with the present invention;

Figure 2 is a longitudinal sectional view showing the manner in which the connecter is attached to a conductor;

Figure 3 is a transverse sectional view taken on the line 3—3 of Figure 2;

Figure 4 is a view partly in elevation and partly in section of a slightly modified form of the invention; and

Figure 5 is a view in elevation showing the upper end of a spark plug and the manner of adapting the spark plug to use with a connecter constructed in accordance with the present invention.

Referring specifically to the drawings in which the same characters of reference designate corresponding parts A indicates a portion of a spark plug and B indicates an electrical cable. The spark plug A has an electrode C shown in dotted lines in Figure 5.

The spark plug terminal is preferably in the form of a nut 10 which has threaded engagement with the spark plug electrode C and is provided on its free end with a terminal stud 12. This terminal stud has a tapered free end portion 14 and intermediate of its ends it is provided with a reduced portion or groove 16. This construction forms a plurality of shoulders 18, the purpose of which will be hereinafter specifically described.

Secured to the free end of the electrical cable B is a ferrule member 20 and this ferrule is provided with a terminal-engaging member 22. As shown in Figures 1 and 2 of the drawings this terminal-engaging member 22 may be a separate element carried by the ferrule 20 and it may be secured thereto by providing the ferrule 20 with a portion 24 adapted to be received within an opening 26 at one end of the member 22 and upset as at 28 to firmly grip the border portion of the opening 26 in the member 22.

As shown in Figure 2 the insulation of the cable B is stripped and the conductor which is preferably of the multiple strand type is folded back upon the insulated portion of the cable, as designated at 30 so that as the cable is inserted in the ferrule member 20 an electrical contact between the conductor of the cable and said ferrule is had.

The terminal-engaging member 22 is preferably of sleeve-like construction and is provided with a plurality of cut-out portions or slots 32 extending longitudinally but terminating short of the ends thereof. This construction provides a plurality of spaced resilient members 34, the ends of which are connected as at 36 by reason of the fact that the cut-out portions 32 do not extend throughout the length of the member 22.

The resilient members 34 are bent inwardly as designated at 38 which construction provides shoulders 40 for engagement with the upper shoulder 18 of the groove in the terminal and leading from each of said shoulders 40 there is an inclined portion 42 for engagement with the tapered free end 14 of the terminal.

By forming the resilient members 34 in the manner heretofore described, that is, by not

extending the cutout portions 32 to the end of the member 22, a firm grip and a good electrical contact is obtained between the member 22 and the terminal 12 when the latter is inserted therein. This is due to the fact that the ends of the resilient members 34 are connected and therefore these members are less readily deformed than would be the case if the cut-out portions were extended through the end of the member 22. It is to be understood, however, that the members 34 have sufficient resiliency to permit of ready removal of the member 22 from the spark plug terminal stud 12.

In attaching the cable B to the terminal 12, the member 22 is inserted over the terminal 12 and the tapered free end portion thereof engages the inclined faces 42 of the member 22. The tapered portion 14 of the terminal upon engagement with the inclined faces 42 causes the resilient members 34 to expand until such time as the shoulders 40 of the member 22 pass beyond the outer shoulder 18, at which position the shoulders 40 of the members 22 are free to snap into engagement with the outer shoulder 18 of the terminal, thereby securing not only a good electrical contact, but also a firm mechanical connection between the female connecter 22 and the male terminal 12.

In that form of the invention shown in Figure 4 the member 22 is similar in construction to that in the form just described except that instead of being a separate element with respect to the ferrule 20 it is an integral extension thereof which may be of the same diameter or slightly enlarged or slightly reduced in diameter as designated by the reference numeral 44 and according to the requirements of the particular cable and terminal or other apparatus with which it is used.

From the foregoing it is apparent that the present invention provides a new form of connecter for electrically connecting electricity conductors and in which the connection is of such nature as provides a good electrical connection and one which is relatively safe against accidental disconnection.

Although I have illustrated my invention by its application in the connection of high tension cables to spark plugs of internal combustion engines, my invention is nevertheless applicable to numerous other cases and in short wherever a tight, but readily attachable and detachable, electrical contact is required. It is evident that the stud top type of terminal here shown as attached to a spark plug may be attached to any other type of electrical apparatus including a flexible conductor similar to that on which the female connecter is shown in the drawings. Also, in some cases, it may be desirable to attach the female connecter to the stationary apparatus and use the male terminal on a flexible cable. All of these variations I claim as within the scope of my invention.

The number, shape and size of the slots 32 is not limited to what is illustrated in the drawings, but may be substantially varied according to the weight and kind of material used and according to the current which is to be carried or the force against which it is desired to maintain the contact. However, I have found the form illustrated to be an advantageous one. In general I have found it advantageous to manufacture the connecter from resilient brass, but any resilient electrically conducting material may be used.

It will also be apparent to those skilled in the art that the female connecter element of my invention may be secured to the electricity conductor in many other ways than those illustrated in the drawings and although I have found it advantageous to use the method illustrated in the drawings my invention as claimed herein is not to be limited thereto.

While the invention has been herein shown in a preferred form it is obvious that it may be practiced in other forms without departing from the spirit of the invention and it is to be understood that the invention is not to be limited to the specific forms in which it is herein shown or described.

What is claimed as new is:

1. A device of the character described comprising a sleeve-like member slotted so as to form a plurality of elongated resilient members rigidly connected at their ends, said resilient members being bent so as to form inwardly projecting V-shaped portions adapted to be forced outwardly by the male terminal when the connection is being joined or broken and to engage in a transverse groove on said male terminal when the connection is made.

2. A device as defined in claim 1, in which the sleeve-like member is substantially circular in cross-section.

3. A device as defined in claim 1, in which the sleeve-like member is substantially cylindrical.

4. A device of the character described comprising a sleeve-like member slotted so as to form a plurality of resilient members connected at their ends, and cam surfaces on said resilient members spaced from the ends thereof positioned so as to be forced outwardly by the male terminal when the connection is being made or broken and to engage in a transverse groove on said male terminal when the connection is made.

5. A device of the character described comprising a sleeve-like member slotted so as to form a plurality of resilient members connected at their ends, and inwardly extending terminal engaging means carried by each of said resilient members spaced from each end thereof.

6. An electrical connecter comprising a male terminal having a sloped end and an annular groove, the outer edge of which is sloped, and a female terminal comprising a sleeve-like member of a diameter to fit substantially over the outside of male terminal, being slotted longitudinally so as to form a plurality of resilient members integrally connected at their ends, and having near their centers and spaced from the ends of the members formed by said slots inwardly projecting terminal engaging means adapted to spring said resilient members outward when pushed over the end of the male terminal and to be held by said members in said slot of the male terminal when in operative relation thereto.

7. An electrical connecter comprising a male terminal having an annular groove, and a female terminal comprising a sleeve-like member of a diameter to fit substantially over the outside of male terminal, being slotted longitudinally so as to form a plurality of resilient members integrally connected at their ends, and having near their centers and spaced from the ends of the members formed by said slots inwardly projecting terminal engaging means, the inner surfaces of which are adapted to act as cams against the end of the male terminal to spring said resilient members outward when pushed over the end of the male terminal and to be held by said members in said slot of the male terminal when in operative relation thereto.

Signed at Bloomfield, Essex County, N. J., this 8th day of July, 1929.

GEORGE H. E. BERTHOLD.