Jan. 5, 1926. 1,568,655

A. CHAMPION

TERMINAL CONNECTER FOR SPARK PLUGS

Filed Oct. 28, 1921

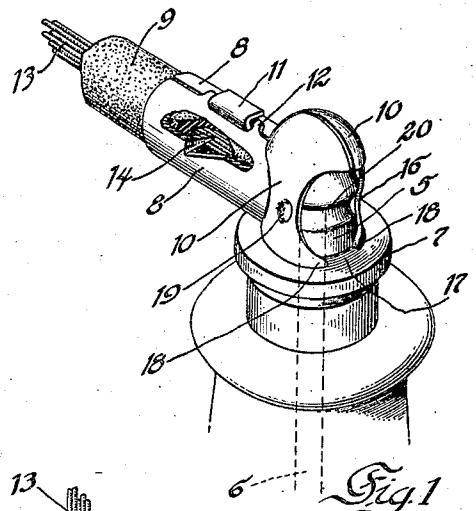


Fig. 1

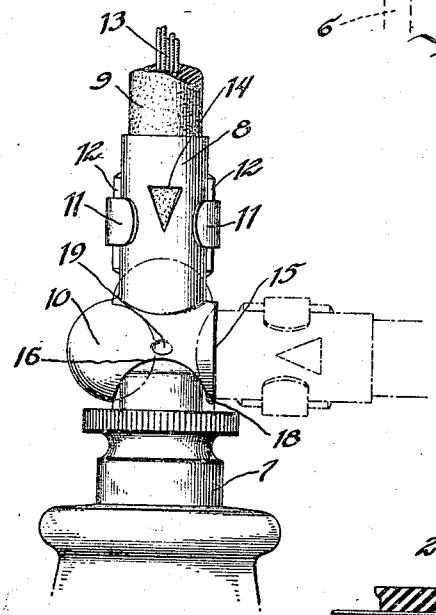


Fig. 2

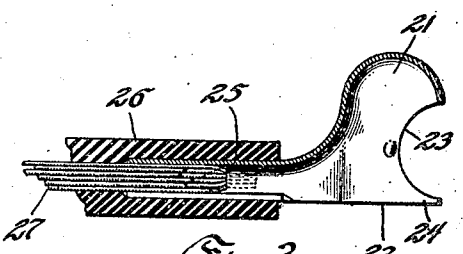


Fig. 3

Witness:-

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UNITED STATES PATENT OFFICE.

ALBERT CHAMPION, OF FLINT, MICHIGAN, ASSIGNOR TO A C SPARK PLUG COMPANY, OF FLINT, MICHIGAN, A CORPORATION OF MICHIGAN.

TERMINAL CONNECTER FOR SPARK PLUGS.

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To all whom it may concern:

Be it known that I, ALBERT CHAMPION, a citizen of the Republic of France, and a resident of Flint, county of Genesee, and State of Michigan, have invented certain new and useful Improvements in Terminal Connecters for Spark Plugs, of which the following is a full, clear, concise, and exact description, such as will enable others skilled in the art to which the invention relates to make and use the same, reference being made therein to the accompanying drawings, which form a part of this specification.

My invention relates to terminals or connecters adapted to connect an end of a cable or conductor with a device to which electricity is to be supplied through the conductor, and particularly to connecters designed for use in high tension igniting systems for internal combustion engines wherein electricity is supplied to the spark plugs of the system through conducting wires or cables the ends of which have to be readily attachable to and detachable from an electrode of the plug, commonly the inner insulated electrode which is carried and insulated by the porcelain or equivalent material insulating member of the plug.

The object of my invention is to provide an improved terminal or connecter for the purpose stated having features whereby the same will not be likely to be shaken loose from the plug, and the supply of current thus interrupted, by the vibration and jarring incident to its use in connection with a motor driven vehicle, but which may be readily disconnected from the plug if and when it becomes necessary to do so; the weight of the free end portions of the supply conductors acting to keep the terminals properly connected with the plugs and to maintain the circuits wherein said elements are included, while a natural upward tilting movement imparted to the supply conductors serves to disconnect the terminals at the extremities thereof from the plug electrodes.

A further object of my invention is to provide an improved terminal connecter of the class described which may be readily manufactured from suitably formed sheet metal blanks bent and properly shaped by suitable dies, or otherwise, thus reducing their cost to a minimum; which will be simple in form and easily manipulated, and which in general will be effective for the purpose for which said connecter is designed.

With the above and other objects of invention in view, my invention consists in the improved terminal connecter illustrated in the accompanying drawing and hereinafter described and claimed; and in such variations and modifications thereof, within the scope of the concluding claims, as will be obvious to those skilled in the art to which my invention relates.

Referring now to the drawing wherein what I now regard as the best form of my invention is illustrated:

Figure 1 is a view showing my improved connecting terminal in perspective, and in the position it assumes while it remains connected with the insulated electrode of a spark plug also shown.

Figure 2 is a view illustrating the manner in which the terminal is disconnected from the spark plug electrode.

Figure 3 is a sectional view upon a longitudinal central plane showing my invention slightly modified as regards some of the features thereof.

In the drawing, the reference numeral 5 designates an enlarged head at the upper end of the central insulated electrode 6 of a spark plug, the shape of which head is immaterial as my improved terminal may as a matter of course be so formed as to fit and to be connected with the various forms, shapes and sizes of head commonly present in spark plugs, and in which the outer exposed end of the insulated central electrode of the plug commonly terminates. As shown a nut 7 is screwed onto the threaded upper end of the plug electrode and the head 5 screwed onto the electrode above and against the nut; although these and such other features associated with the central electrode as find expression merely in the size, shape, and outline thereof are unessential details, and details which vary in the case of different manufacturers and in fact often in the output of one and the same maker.

My improved terminal connecter is made up of two substantially like members each formed from a suitable sheet metal blank properly bent and shaped to provide cooperating portions 8, 8 which together form a tubular base portion, which receives the

insulating covering 9 of the supply cable to which the terminal is fastened; while other portions 10, 10 of said members co-operate to form a socket which fits over the head 5 of the plug electrode with which the terminal is to be used. As a matter of course the size and shape of the socket thus provided will be determined by like features of the head, although it is unnecessary to provide for a tight fit between the socket and the head. As a matter of fact the socket will commonly be larger than the head to a degree such that the socket will be quite loose upon the head, as mere contact is sufficient in the case of the high tension current which is dealt with; and looseness facilitates the manipulation of the parts and permits comparatively wide variations in size so that the terminal may be made from stampings bent and assembled by suitable dies and presses, in which process or method of manufacture variations in size commonly extend through a considerable range.

The two members above referred to may be fastened together in various ways other than by the tongues 11 of one member extending through loops 12 upon the other, and bent back onto the base of the connecter, shown as provided for that end. Likewise, while the necessary electrical connection between the core 13 and the terminal is shown as provided by spurs 14 cut free from the members which form the terminal and forced through the insulating covering and into engagement, at their extremities, with said core, the core may be otherwise placed in electrical connection with the terminal, as the invention herein is in no way concerned with this particular matter.

The hollow socket portion formed by the parts 10, 10 has a bottom opening at 15 of such size as to allow the terminal to be forced straight down over the head 5 while kept in a substantially horizontal position to connect the cable with the plug as shown in Figure 1, and with a side opening at 16 which communicates with said bottom opening through a third opening or passage at 17; and which side opening is of sufficient size to permit the terminal to be moved straight upward and off from the head 5 after the terminal has been swung from a substantially horizontal into a substantially vertical position. Obviously the passage 17 is of sufficient width to permit the head to pass from the bottom into the side opening as the terminal is swung upward and into a substantially vertical position as a step incident to its disconnection from the said head and from the plug terminal.

The parts or walls 10, 10 which provide the socket portion of the terminal extend at 18, 18 toward one another and determine the width of the passage or opening 17; and the oppositely disposed projections or spurs thus provided engage the head 5 as shown in Figure 1 and prevent sidewise movement of the terminal away from the head, upward movement of the connecter such as might be produced by vibration or jarring of the vehicle being shown as prevented by projections forced inward from the walls of the socket portions at 19 which snap under a ledge 20 on the head as the connection is established. The socket and terminal as a whole is sufficiently resilient to permit the action of the holding members 19 just referred to, as well also as to permit the extremities of the projections 18 to separate as they slide over the periphery of the head 5 as the cable and terminal are swung from the horizontal position shown in Figure 1 into the vertical position shown in Figure 2, as will be appreciated. It will be understood, however, that the socket fits loosely upon the head; the projections 18 and the depressions at 19 acting rather to prevent the jarring of the terminal from the head than to hold the same in place upon the head with any definite degree of force such as would be present in an actual clamping of the terminal upon the head.

The most natural way to disconnect the supply cable from spark plug is just to grasp it and pull it loose therefrom, which is the way the terminal in which my invention consists is designed to be disconnected from the plug electrode. The position of the operator relative to the engine is commonly such that the most natural movement imparted to the supply cable at such times will be an upward swinging movement about the head 5 of the plug electrode as a center, which movement brings the lower or inner end of the cable and the terminal thereupon into the substantially vertical position shown in Figure 2; whereupon and upon further pulling the terminal leaves the electrode, the head passing out of the socket through the side opening 16.

Likewise when a connection is to be reestablished the operator must of necessity grasp the terminal in the hand; whereupon the most natural act is to press the terminal straight down onto the head while holding the terminal in a substantially horizontal position; the head passing into the socket through the bottom opening at 15 to make a connection, and out therefrom through the side opening at 16 when the connection is to be broken, as will be appreciated.

In the embodiment of my invention illustrated the projections 18 act as levers against the nut 7 which forms a fulcrum as the cable is swung from a horizontal position upward, thus in a way prying the socket upward and forcing the projections 19 over the ridge 20 of the head 5 and themselves separating, because of the resilience of the

socket, as their extremities slide over the periphery of the head where they engage the same. This prying action, however, is incidental to the particular head and nut construction illustrated and described, rather than an essential feature of operation in my invention; and in plugs in which the nut or similar abutment is not present the terminal may nevertheless be readily disconnected by swinging it into an upright position and then pulling upward and in the direction of the length thereof substantially as hereinbefore explained.

Figure 3 shows a form of my improved terminal connecter made from a single sheet metal blank of proper outline and which is bent and shaped into proper form by suitable dies in accordance with well known manufacturing processes; the finished connecter having a socket portion 21 provided with a bottom opening at 22, a side opening at 23 communicating with said bottom opening, and projections 24 between said openings, all substantially as hereinbefore explained. In this form of my invention an alternative form of body portion 25 is illustrated; the same being of small diameter and fitting within the insulating covering 26 of the supply cable, and receiving the stranded core 27 thereof, all as will be understood from the drawing.

Having thus described and explained my invention, I claim and desire to secure by Letters Patent:

1. In combination with a terminal to which electricity is to be supplied, a connecter having a body portion whereby it may be secured to an electrical supply conductor, and a hollow socket portion adapted to receive the terminal with which the connecter is to be connected; said socket portion having a bottom opening of a size sufficient to permit the terminal to pass thereinto, a side opening communicating with said bottom opening and of a size such that the terminal may pass therethrough as the connecter is disconnected from the terminal, and two oppositely disposed projections between said openings and extending toward one another, and the extremities of which determine the width of the passage whereby said two openings are placed in communication with one another.

2. In combination with a terminal to which electricity is to be supplied, a connecter comprising means whereby it may be secured to an electric supply conductor, and a hollow socket adapted to receive the terminal; said socket having a bottom opening of a size sufficient to permit the terminal to pass thereinto, a side opening communicating with said bottom opening and of a size such that the terminal may pass therethrough and out from the socket, and two oppositely disposed abutments extending toward one another between said openings, and between which abutments the terminal may pass from one of the openings aforesaid into the other.

3. In combination with a terminal to which electricity is to be supplied, a connecter comprising means whereby it may be secured to an electric supply conductor, and a hollow socket adapted to receive the terminal; said socket having a bottom opening of a size sufficient to permit the terminal to pass thereinto and a side opening communicating with said bottom opening; the arrangement of said openings being such that the terminal to which the connecter is connected may pass from said bottom into said side opening as the connecter is swung from a horizontal into a vertical position.

In testimony whereof I affix my signature.

ALBERT CHAMPION.