June 5, 1928. 1,672,201

A. CHAMPION

TERMINAL CONNECTER FOR ELECTRICAL SUPPLY CABLES

Filed May 18, 1921 2 Sheets-Sheet 1

Fig. 1.

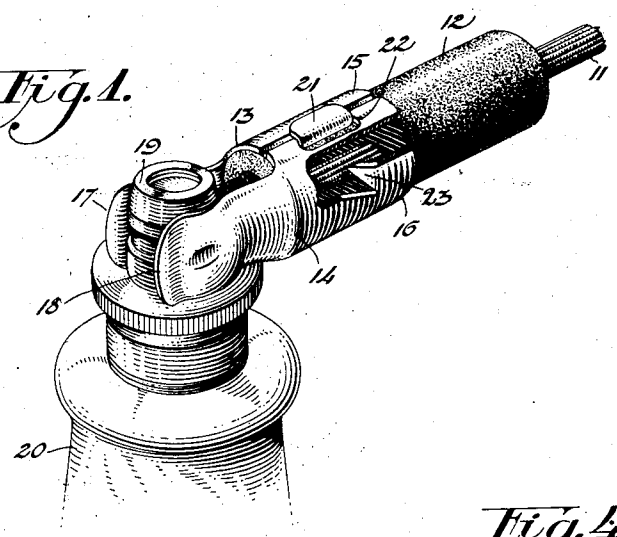


Fig. 2.

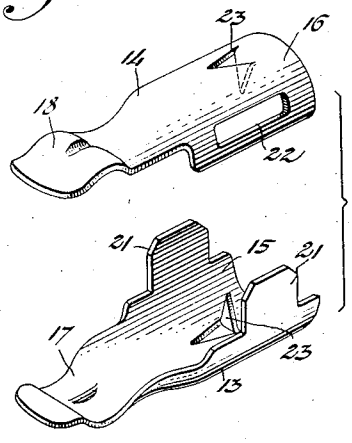
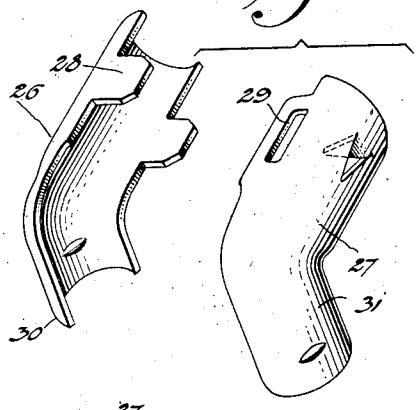


Fig. 4.



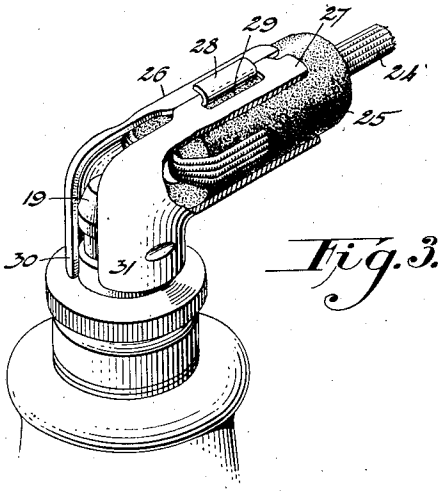


Fig. 3.

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A. CHAMPION

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Fig. 5.

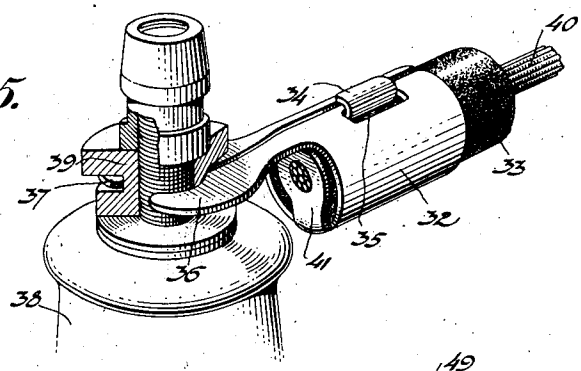


Fig. 6.

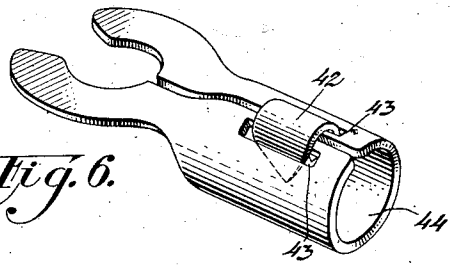


Fig. 7.

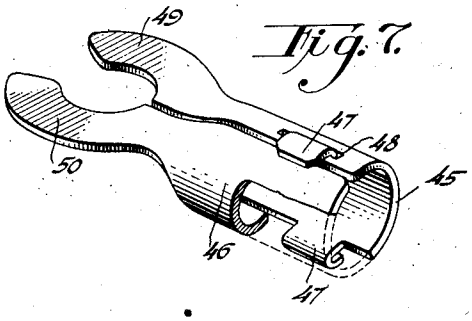


Fig. 8.

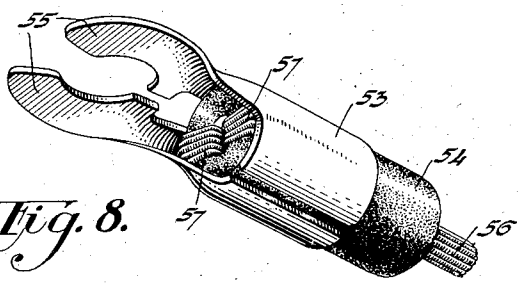
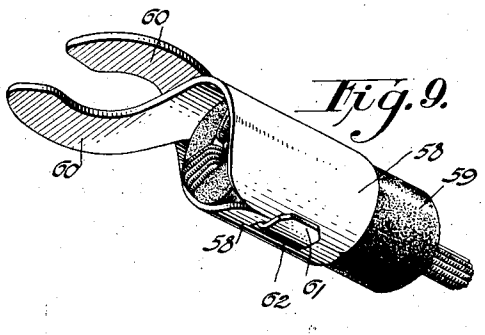


Fig. 9.



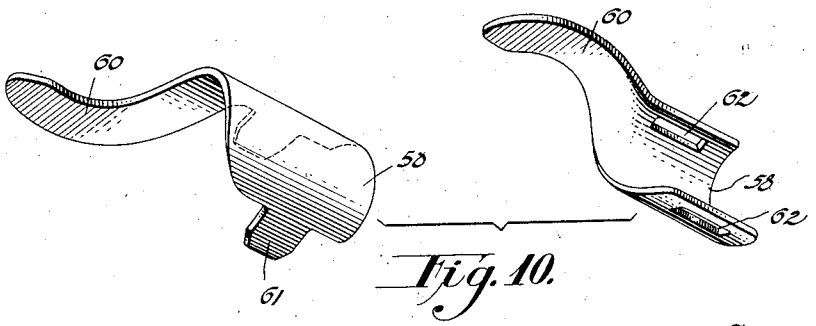


Fig. 10.

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Patented June 5, 1928. 1,672,201

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 ELECTRICAL SUPPLY CABLES.

Application filed May 18, 1921. Serial No. 470,576.

My invention relates to terminal connecters designed for attaching a conducting wire or cable to a terminal of a device to which electricity is to be supplied, and particularly to terminal connecters designed for use in connection with the ignition system of internal combustion engines to supply high tension current to the spark plugs whereby the combustible mixture supplied to the engine is ignited within the cylinder thereof.

The principal object of my invention is to provide an improved terminal connecter of the general type above referred to comprising a base portion secured to the end of the supply cable, and having jaws extending beyond the ends of the cable and adapted to grasp a terminal with which the cable is to be connected; the jaws being materially shorter than has heretofore commonly been the case and the same being substantially non-resilient, the yielding of the jaws as the connecter is connected with or disconnected from the terminal being due to the resiliency of the insulating covering of the cable. It therefore follows that the jaws themselves are not resilient to any material degree as has heretofore commonly been the case, and that the base portion of the connecter yields upon or relative to the insulating covering of the cable to thereby permit the slight movement apart of the jaws during the attachment of the cable to and its removal from the terminal of the device to which electricity is supplied.

A further object of my invention is to provide an improved terminal connecter of the type referred to which may be readily and cheaply manufactured from sheet metal by approved cutting and shaping processes, and in which the base portion of the connecter when assembled in place upon the end of the leading in conductor or cable embraces and grasps the resilient covering thereof; and wherein the parts of the connecter will be yieldably held in proper co-operative relationship with one another by the resilient action of the insulating covering of the cable.

A further object of my invention is to provide a terminal connecter of the general type above referred to in which the jaws which are comparatively rigid, and are integral with the base portion of the connecter, are flat and of considerable area and are arranged edgewise relative to the terminal which they grasp when the connecter is in use.

With the above and other objects of invention in view my invention consists in an improved terminal connecter illustrated in its preferred form in the accompanying drawings, 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 drawings which form a part of this specification:

Figure 1 is a perspective view showing an electric supply conductor or cable connected with the central electrode or terminal of a spark plug by means of my improved terminal connecter.

Figure 2 is a perspective view showing the two parts which together form my improved terminal connecter separate from one another.

Figure 3 is a perspective view similar to Figure 1, but in which the form of the grasping jaws of the connecter differs from the form shown in Figures 1 and 2.

Figure 4 is a perspective view showing the two parts which form the terminal connecter shown in Figure 3 apart from the cable, and separated from one another as in Figure 2.

Figure 5 is a perspective view showing another form of my improved connecting device.

Figure 6 is a view showing still another form thereof in perspective, the cable being omitted.

Figure 7 is a view similar to Figure 6 but showing another form of my invention.

Figure 8 is a perspective view showing another form of my improved connecting device in which all the parts thereof are integral, the same as in Figure 5.

Figure 9 is a view showing another form of my improved connecter in perspective, the grasping jaws being so arranged as to overlie and cross one another.

Figure 10 is a perspective view showing the two parts which make up the connecting member shown in Figure 9 by themselves, and apart from the conducting cable.

Referring first to Figures 1 and 2, an electrical supply cable having a metallic conducting core 11 and an insulating covering

12 is shown; the insulating covering being ordinarily of considerable thickness, and made from a yieldable material such as from a rubber composition, as is usual in the high tension cables through which electricity is supplied to the spark-plugs of internal combustion engines.

Secured in place upon the end of the leading in cable is a terminal connecter comprising two similar metallic members 13, 14 made from suitable sheet metal blanks of proper form, and so shaped as to provide semi-circular base portions 15, 16 which embrace the free end of the supply cable and grasp the insulation thereof when the terminal is secured in place thereupon; the insulating covering being ordinarily held in a more or less compressed condition by the base formed by the portions 15, 16 in order that the resilience of the same may be imparted to the connecter and act to yieldably hold the jaws thereof in proper position relative to one another. The members 13, 14 are provided with jaw portions 17, 18 which, when the terminal is secured in place upon the end of the cable, extend beyond the end of the cable as clearly shown in the drawings; and which jaws are substantially rigid with the base portion of the terminal connecter made up by the semi-circular portions 15, 16 above referred to; so that as the jaws move apart in attaching the terminal to or detaching the same from the terminal 19 of a spark plug 20 the movement of the jaws toward and from one another will be communicated to the base portion of the connecter and will be resiliently opposed by the resilience of the insulating covering of the cable.

The members 13, 14 in Figures 1 and 2 are shown as fastened together by means of lugs or tongues 21 of one member which extend through slots 22 of the other member, the lugs and slots being located adjacent the meeting side edges of the base portion of said members. The base portion of the connecter may, however, comprise a single piece of suitable metal, as shown in Figures 5, 6 and 8; and the stiffness of the metal from which the connecter is made may be relied upon to hold the same in place upon the end of the cable as in the form of my invention illustrated in Figure 8, in which case no separate fastening means is necessary for fastening the free edges of the base portion of the connecter together.

The members 13, 14 which form the terminal connecter in Figures 1 and 2 are shown as provided with spurs 23 struck up from the metal of the base, and forced inwardly through the insulating covering so as to cause the free extremity of said spurs to engage the conducting core 11 of the cable; thus providing an electrical or conducting connection between the core and the metallic base so that electricity may flow from the core to the connecter, and from thence to the terminal of the plug. These triangular spurs are cut free in such a way that they are disposed transverse to the axis of the core when bent inward and into their final position, which is a construction in which the point of the spur is less likely to miss the core than would be the case if it was disposed parallel therewith, as has heretofore commonly been the case.

While the covering 12 is referred to as resilient, the same does not have to be perfectly resilient as a covering which will yield to permit a slight movement of the base, due to movement of the jaws toward and from one another, is regarded as coming within the scope of my invention; as the base portion of the connecter acts by itself to yieldably hold the jaws in proper relation to one another especially in the single piece forms of my invention altho a better holding action is secured if the insulating covering is resilient to a pronounced degree, and is placed under a condition of considerable initial tension during the assembling of the connecter upon and the securing of the same to the end of the cable, which operation may be accomplished by the use of a press or other suitable device.

In another form of my invention shown in Figure 3 the end of the leading in cable made up of a core 24 and an insulating covering 25 is grasped by the base of a terminal connecter comprising base portions 26, 27 held together by interengaging tongues and grooves 28, in substantially the same way as in the form illustrated in Figures 1 and 2. In this form of my invention, however, the rigid jaws 30, 31 of the connecter are bent to one side of the cable, and are so shaped as to form a sort of a socket or cap which fits over the end 19 of the plug electrode or terminal; thereby enclosing the upper end of the same as distinguished from grasping the sides of an extending portion of the terminal as is the case in the form of my invention first herein described.

In the form of my invention illustrated in Figure 5 the terminal connecter is made from a single piece blank bent into proper form, and having a base portion 32 which surrounds and is clamped in place during the assembling of the terminal upon the insulating covering 33 of the leading in cable; the meeting side edges of the base being provided with a tongue 34 which extends through a slot 35 to thereby hold the base firmly clasped about and in permanent engagement with the insulating covering of the cable. The jaws 36, 37 extend beyond the end of the cable and are rigid with the base, so as to communicate such movement as is due to their slight separation as the terminal is connected with or disconnected from

the central electrode of the spark plug 38 to the base and insulating covering of the cable.

In this form of my invention, however, the jaws 36, 37 are arranged edgewise with relation to a grooved nut 39 upon the plug terminal, and within the groove of which the said jaws lie when a connection is made; the plane of the jaws being thus at right angles to the axis of the plug electrode or terminal with which the device is connected. This arrangement of the jaws provides a stiffer connecter, and one in which the movement of the jaws is more certainly communicated to the base thereof, than is the case where the jaws are arranged so that their width is parallel with the plug terminal or substantially so as in the form illustrated in Figure 1; in which form the bending is resisted by a thin flat wall as distinguished from by a portion arranged edgewise to the bending force, as is the case in the form of my invention shown in Figures 5 to 9, inclusive. In Figure 5 the electrical connection between the metallic conducting core 40 and the connecter is established by a lug 41 having a hole through which the end of the core extends, the core and the lug being soldered together if deemed necessary or desirable.

In the form of my invention shown in Figure 6 the terminal connecter is also made from a single sheet metal blank bent into proper form. In this form, however, the free edges of the base are held together, and the terminal as a whole held in position upon the end of the supply cable, by means of a double pointed staple 42 extending through slots 43 formed adjacent the meeting edges of the base 44 of the connecter; and the points or prongs of which staple extend through the insulating covering of the cable and establish contact with the conducting core thereof; so that the staple performs the double function of holding the meeting edges of the base together and the connecter as a whole in place upon the supply cable, and also establishing an electrical connection between the conducting core of the cable and the connecter.

Figure 7 shows a form of my invention in which a connecter is made up of two like members having base portions 45, 46 which grasp the insulating covering of a supply cable, and which members are held together by tongues 47, one upon each member, extending through slots 48 adjacent the edges of the other member much as in the form of my invention shown in Figures 1 and 2 so far as regards the securing of the connecter to the cable. The jaws 49, 50 are arranged edgewise relative to the terminal with which they are connected as in Figures 5 and 6, instead of flatwise and parallel with the axis of the connecter as in the form of my invention shown in Figures 1 and 2.

Figure 8 is a view showing a form of my invention in which the connecter is made from a metal blank having sufficient inherent stiffness to retain the condition into which it is forced during the assembling of the connecter upon the end of the supply cable, and with the insulation thereof under compression, and in which as a consequence no independent fastening means is provided for securing the meeting edges of the base portion 53 of the connecter in proper grasping and holding engagement with the insulating covering 54 of the supply cable. The jaws 55 are rigid with the base as in forms of my inventions hereinbefore described so that the base itself acts to oppose movement of the jaws away from one another during the attaching of the terminal to and its detachment from a terminal. In this form a different scheme is provided for establishing an electrical connection between the conducting core 56 of the cable and the base of the connecter; the insulation being removed from the core and the wires thereof being folded backward over the surface of the insulation before the connecter is put in place, so that the interior surface of the base contacts with the turned back wires of the core to thereby establish electrical connection between the parts, the bent back ends of the core wires being shown at 57. This same method of establishing an electrical connection between the cable core and the connecter is also employed in the forms of my invention shown in Figures 3 and 9.

Figure 9 shows a form of my invention in which a terminal connecter is made up from two members of the form shown in Figure 10 the base portions 58 of which grasp and hold the free end of the insulating covering 59 between them in a state of compression, so that the body of insulating material beneath and grasped by the base acts resiliently to resist movement of the jaws 60, 60 apart. The base members are fastened together by tongues 61 extending through slots 62 as hereinbefore explained, and the jaws are rigid with the members which together form the base so as to communicate motion to the base as the jaws move apart, the same as hereinbefore explained. In this form of my invention, however, the blanks used in forming the separate members are of such form that the jaws overlie and extend past one another in the completed connecter, as clearly shown, which is a form in which movement of the jaws is somewhat more effectively communicated to the base members than in forms illustrated in Figures 5 to 8 inclusive wherein the jaws extend alongside one another, but do not cross.

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

1. In a terminal connecter and in combination with a supply cable having a metallic core, and a resilient insulating covering surrounding said core; a connecting device comprising a metallic base portion made up of two parts embracing said insulating covering and capable of slight movement relatively to one another; two substantially rigid metallic jaws formed integrally with said base and adapted to yield because of the resiliency of said insulating covering, and which jaws extend one from each of the parts of said base portion and beyond the end of said cable and are so shaped as to grasp a terminal; means whereby said base portion is electrically connected with said conducting core; and members formed integrally with the parts aforesaid of said base portion and adapted to engage and interlock with one another, to thereby hold said base portion in place upon said insulating covering.

2. In a terminal connecter and in combination with a supply cable having a metallic core, and a resilient insulating covering surrounding said core; a connecting device comprising a metallic bace portion made up of two parts embracing said insulating covering and capable of slight movement relative to one another; two substantially rigid metallic jaws formed integrally with said base and adapted to yield because of the resiliency of said insulating covering, and which jaws extend one from each of the parts of said base portion beyond the end of said cable, and are so shaped as to grasp a terminal, and are flat, and arranged edgewise relative to the terminal to be grasped; means whereby said base portion is electrically connected with said conducting core; and members formed integrally with the parts aforesaid of said base and arranged at the sides of said parts, and adjacent pairs of which members are adapted to engage and interlock with one another to thereby hold said parts in place upon said insulating covering.

3. In a terminal connecter and in combination with a supply cable having a metallic core, and an insulating covering surrounding said core; a connecting device comprising a metallic base portion made up of two parts which clasp the insulating covering at the end of said cable, and are capable of slight movement relative to one another, and members formed integrally with the parts aforesaid of said base and arranged at the sides of said parts, and adjacent pairs of which members are adapted to engage and interlock with one another to thereby hold said parts in place upon said insulating covering.

In testimony whereof I affix my signature.

ALBERT CHAMPION.