H. B. SHERMAN.

MEANS FOR AND METHOD OF ATTACHING ELECTRICAL CONDUCTORS TO CONNECTORS, &c.

APPLICATION FILED APR. 11, 1919.

1,324,177. Patented Dec. 9, 1919.

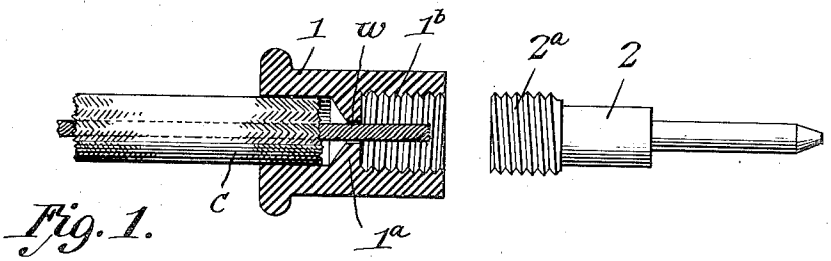


Fig. 1.

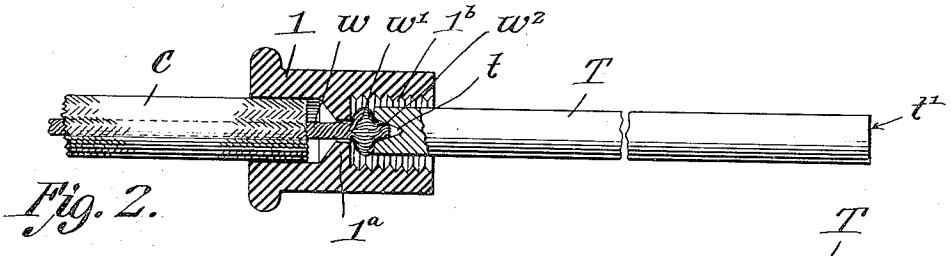


Fig. 2.

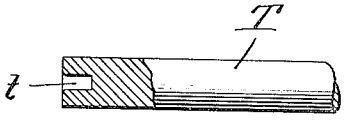


Fig. 6.

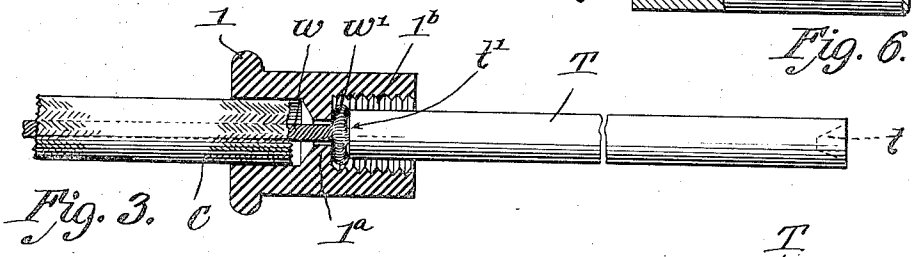


Fig. 3.

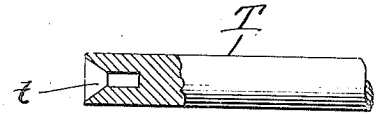


Fig. 7.

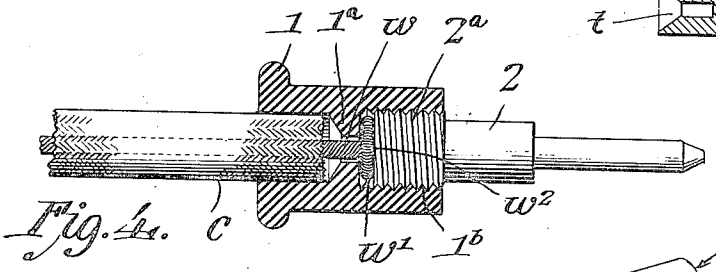


Fig. 4.

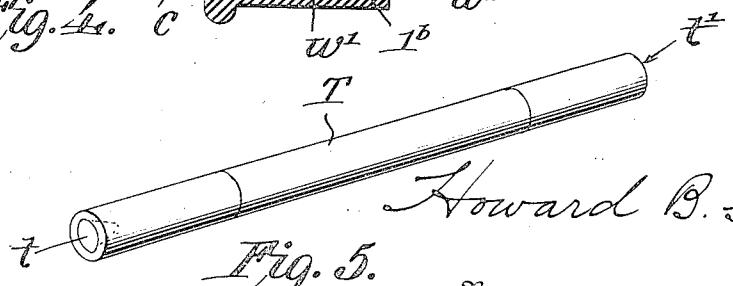


Fig. 5.

Inventor
Howard B. Sherman

By
Alexander Powell
Attorneys

UNITED STATES PATENT OFFICE.

HOWARD B. SHERMAN, OF BATTLE CREEK, MICHIGAN.

MEANS FOR AND METHOD OF ATTACHING ELECTRICAL CONDUCTORS TO CONNECTORS, &c.

1,324,177. Specification of Letters Patent. Patented Dec. 9, 1919.

Application filed April 11, 1919. Serial No. 289,392.

To all whom it may concern:

Be it known that I, HOWARD B. SHERMAN, a citizen of the United States, residing at Battle Creek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Means for and Methods of Attaching Electrical Conductors to Connectors, &c.; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a novel method of and means for attaching electrical conductors to so-called "connectors" by which the conductors are rendered readily attachable to or detachable from the poles or binding posts of spark plugs and other electro-receptive, or generating, devices.

The invention particularly relates to attaching electrical conductors formed of a plurality of small wires (and usually incased in a non-conducting outer-jacket of non-conducting material such as rubber or gutta-percha and the like) to such "connectors."

I will explain the invention as used in and for attaching such conductors to connectors such as shown in my application filed January 22, 1919, Serial No. 272,487; but when the invention is understood those familiar with the art will readily see its adaptability for various other related uses and objects, and therefore I do not consider the invention restricted to the specific utilization thereof illustrated in the drawings and described herein.

In said drawings:

Figure 1 is a sectional view showing an electrical conductor inserted in the insulating sleeve of the connector preparatory to the engagement of the shank of the terminal of the connector therewith, the terminal being shown juxtoposed thereto.

Fig. 2 is a similar view showing how the ends of the conductor wires are bulged to form a bulb by and in accordance with my invention preparatory to the shank of the terminal being engaged with the sleeve.

Fig. 3 is a similar view showing how the bulb may be flattened before the terminal shank is engaged with the socket.

Fig. 4 is a similar view illustrating the complete connection made between the conductor and the connector in accordance with this invention.

Fig. 5 is a perspective view of a simple form of tool which can be used in bulging the conductor wires.

Figs. 6 and 7 indicate a few of the possible modifications of such tool.

In utilizing my invention, in order to attach the end of a conductor, such as described, to a connector, one end of the conductor is stripped or bared for a short distance by removing the non-conducting covering C so as to expose the multiple wire core *w* thereof. The stripped end of the conductor is then inserted into one end of the insulating sleeve 1 of the connector. The bore of said sleeve is divided by an internal partition 1^a into two sockets, one for the reception of the end of conductor C and the other 1^b for the reception of the shank 2^a of the terminal 2, which may be of any suitable or desired kind. The partition 1^a has a central perforation for the passage of the stripped end *w* of the conductor core; said stripped end then projecting into the internally threaded socket portion 1^b of the sleeve, as in Fig. 1.

Heretofore this end *w* has been bent over against the partition and then the externally threaded shank 2^a of the terminal 2 screwed into the socket 1^b to clamp the bent-over end of the wires *w* against the partition, the clamping effect and electrical contact between the conductor and terminal depending upon how forcibly the terminal shank is screwed into the sleeve.

It has also been attempted to separate the ends of the wires of the cable *w* and bend the ends of the individual wires over against the partition. This is a troublesome procedure and depends for clamping the cable in the sleeve, and for electrical contact, entirely upon the force with which the terminal is screwed into the sleeve. With such a connection moreover the sleeve is apt to pull away from the conductor, or the conductor end to pull out of the sleeve. These kinds of connections have proven objectionable in practice, as when it is attempted to separate the terminal from the binding post by pulling on the conductor—(as is frequently done when it is desired to make the disconnection very rapidly)—the conductor wires pull away from the

sleeve, leaving the terminal engaged with the binding post and fast to the sleeve, and causing great delay and annoyance in repairing the connection; especially when such devices are used for connecting the batteries or generators with the spark plugs of explosive engines. Further the ends of the cable wire when merely bent outwardly are apt to project into the threads 1^b in the socket and interfere with the screwing home of the shank of the terminal, resulting in inefficient and defective electrical contact between the conductor and terminal.

In my method I make a bulb or enlargement of the bared ends of the conductor wires within the threaded socket of the sleeve, of such size that the conductor will be practically fastened thereby to the sleeve, and so that the extremities of the wire can not spread out in such manner as to engage or fill up the threads in the socket portion of the sleeve and prevent or hinder screwing the shank of the terminal into this threaded socket.

In carrying out my invention after the stripped end of the wire w is inserted in the sleeve as shown in Fig. 1, the conductor C is held in one hand, while the end of a suitable tool, indicated at T, having a recess t in it is inserted in the outer end of the sleeve. The recessed end of said tool engages the end of the cable w and keeps the ends of the cable wires therein together, but as the tool is forced inward toward the partition the intermediate portions of the wires w, between the tool and partition 1^a, are bowed or bulged, as indicated at w', in Fig. 2, forming a kind of globular enlargement, which I term a bulb w', in the bared end of the conductor cable at the side of the partition opposite the sheathed portion of such wire; and this bulb in the cable being much larger in diameter than the opening in the partition 1^a prevents the conductor being easily pulled away or disengaged from the sleeve 2 even before the terminal is connected therewith.

The recess in the operative end of the tool is preferably made as shown in Figs. 6 and 7, but may be of various forms, examples of which are shown in Figs. 2 and 5.

By thus treating the exposed end w of the cable the extremities w^2 of the wires thereof will be kept approximately at the center of the socket and will not separate or spread apart, and cannot engage or catch in the internal threads 1^b in the sleeve and interfere with the proper engagement of the threaded shank of the terminal with said sleeve.

After this bulb is formed the flat end t' of the tool may be inserted in the sleeve and the knot flattened as much as possible, as indicated in Fig. 3. Then the shank 2^a of the terminal may be screwed into the sleeve, as indicated in Fig. 4, completing the connection and insuring a fine electrical contact between the conductor w and the shank of the terminal.

It is not necessary to use the flat end t' of the tool after bowing or bulging the wires with end t, if shank 2^a is forcibly screwed into sleeve 1 with a pair of pliers, as the inner face of the shank then performs the same office as the end t' of the tool. The bulged parts w^2 of the wires will then either be crushed flat, or nearly flat as in Fig. 4, and if not crushed flat, the bowing of the wires tends to render them sufficiently resilient or springy to automatically maintain a spring-like contact with the inner end of shank 2^a.

The bulb w^2 effectively prevents the sleeve being pulled away from the conductor or the conductor being pulled out of the sleeve. The peculiar bulb w' renders the ends of the wires spring-like so that the extremities w^2 of the wires tend to always bear against the inner end of the shank 2^a of the terminal when the latter is screwed into the threaded portion 1^b of the sleeve.

The object of treating the wire by the tool as described is to so bulge the ends of the wires that they will not draw out from the sleeve when the shank is detached, and when the shank is secured it cannot be pulled from the sleeve even if the conductor is vigorously or violently jerked or pulled to disconnect it from the spark plug, binding post, etc.

If the ends of the conductor wires were simply bent over at right angles and then a plug or threaded shank screwed down against them as is now customary they could not be secured nearly as tightly as when the wires are bowed or bulged into a bulb as in my invention. When formed into a bulb, as in my process, the wires will be held against reasonable pulling, even when the shank is detached, and the principal function of the shank is making electrical contact with the wires.

What I claim is:

1. The method of attaching cables to members, consisting in inserting the bared end of the conductor cable through an opening in such member, then compressing the cable longitudinally so as to bulge or bend the wires therein to form a bulb larger than the opening in the member, and then compressing the bulb and screwing a terminal into the member to form electrical contact with the end of the wire.

2. The method of connecting a conductor cable to a connector comprising a sleeve having an internal partition provided with an opening and a terminal having a shank adapted to enter the sleeve; consisting in inserting the bared end of the cable into one end of the sleeve and through the open-

ing in the partition therein into the socket; then bulging the wires in the bared end of the cable to form a bulb larger than the opening in the partition; and finally inserting a terminal shank into the sleeve to contact with the bulb.

3. The method of connecting a conductor cable to a connector comprising a sleeve having an internal partition with an opening, and a terminal having a shank adapted to screw into the sleeve; consisting in inserting the bared end of the cable into the sleeve and through the opening in the partition therein; then applying longitudinal pressure to the bared end of the cable to cause the wires thereof to bulge outwardly and form a bulb of larger diameter than the opening in the partition; and finally screwing the terminal shank into the sleeve to contact with the bulb.

In testimony that I claim the foregoing as my own, I affix my signature.

HOWARD B. SHERMAN.