

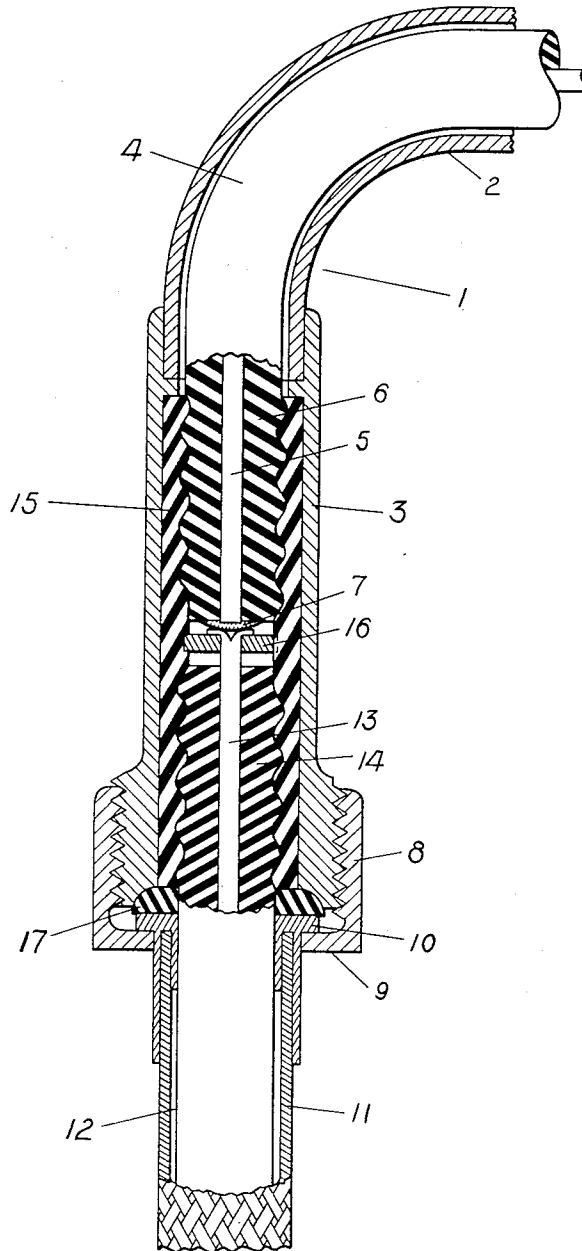
Dec. 5, 1939.

A. ADKINSON

2,181,860

SHIELDING AND CURRENT CONDUCTING ASSEMBLY

Filed July 16, 1937



INVENTOR  
ALLEN ADKINSON  
BY *Robert A. Foxworth*  
ATTORNEY

# UNITED STATES PATENT OFFICE

2,181,860

## SHIELDING AND CURRENT CONDUCTING ASSEMBLY

Allen Adkinson, United States Marine Corps

Application July 16, 1937, Serial No. 153,939

6 Claims. (Cl. 174—35)

(Granted under the act of March 3, 1883, as  
amended April 30, 1928; 370 O. G. 757)

My invention relates to a shielding and current conducting assembly and more particularly to such an assembly which is adapted for use as part of the shielded ignition circuit associated with an internal combustion engine.

In order to effectively shield extraneous apparatus against electromagnetic and electrostatic disturbances caused by ignition circuits of internal combustion engines it is essential that the insulated electrical conductors which carry the ignition current be completely encased by a metallic surface. The shielding casings enclosing the aforesaid conductors are sectionalized and detachably connected in an electrically continuous manner so as to facilitate their installation and allow ready disassembly when it becomes necessary to inspect, repair or replace the housed conductors. It frequently happens that the end portion of an insulated conductor connected to a spark plug becomes seriously impaired due principally to the high temperature to which it is subjected at this point. In order to replace this damaged conductor portion it has often been necessary in the past to remove considerable lengths of conductor from within the shielding casings with attendant high labor and material costs.

With a view to reducing these maintenance costs I have positioned within the shielding casing associated with the spark plug a short replaceable, insulated, electrical conductor which in the event of damage can be readily renewed with inconsequential cost. This conductor extends from the terminal fitting at the spark plug to a point within the shielding casing where a connector detachably joins it to an insulated conductor extending from the magneto. This latter conductor is likewise housed within a casing which is removably connected to the shielding casing associated with the spark plug. The connector is fabricated from any suitable insulating material and is screw-threaded to engage the insulating material of the replaceable and magneto-conductors without damage thereto while at the same time insuring an intimate electrical juncture between the aforesaid conductors. Furthermore, the connector as constructed is one of great simplicity and alone is considered novel, it being evident that it has many uses and applications in fields other than here described. In the event of damage to the short replaceable conductor within the spark plug shielding casing it is only necessary to detach this casing from the magneto-conductor casing, remove and replace the short conductor and reconnect the casings, all of

which involves a labor and material cost far below that entailed by the prior art arrangement.

With the foregoing preliminary discussion in view it is among the several objects of my invention to provide a shielding and current conducting assembly having a low maintenance cost; to provide a current conducting assembly wherein an efficient electrical juncture is maintained between two insulated current carrying conductors; and to provide a connector of great simplicity for electrically joining a plurality of insulated current carrying conductors.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying sheet of drawings wherein there is depicted one embodiment of the instant invention.

Referring now to the drawing the reference character 1 denotes in general the electrically conductive shielding casing associated with a spark plug. This casing includes an elbow 2 extending from the spark plug to which there is secured in any suitable manner known to the prior art an extension 3. The elbow 2 is of somewhat greater length than that employed in the prior art structure so that the extension 3 connected thereto will be placed out of the zone of highest heat concentration. A short replaceable cable 4 is housed within the shielding casing 1 and extends from the terminal fitting at the spark plug (not shown) to a convenient point within the extension 3. This cable is preferably cut to a greater length than actually necessary for a reason which will be pointed out hereinafter and includes a suitable current carrying conductor 5 embedded in any convenient insulating material 6 known to the prior art. The conductor 5 as shown is provided at its extremity with a drop of solder 7 so as to insure good electrical contact with the adjacent conductor. The end of the extension 3 is screw-threaded to receive a nut 8 having complementary threads and provided with a flange 9. The flange 9 of this nut serves to engage a flange 10 of a terminal piece secured to a second electrically conductive shielding casing 11 which houses the magneto cable 12 and thus, among other things, insures electrical continuity between the several casings. The magneto cable 12 like the replaceable cable 4 includes a current carrying conductor 13 of any suitable design embedded in any proper insulating material 14.

For electrically joining the cables 4 and 12 there is provided a connector 15 housed in the extension 3 in the manner shown. This connector is tubular in shape and is fabricated from any suitable insulating material known to the prior art, it being threaded in any convenient manner from both ends so as to detachably engage the insulating materials 6 and 14 of the cables 4 and 12. The depth, pitch, face and inside diameter of the threads are such that the connector will hold the cables firmly in place while preventing any damage to the insulating materials thereof. To further obviate any possibility of damage to the cables the threads of the connector are provided with rounded faces.

For facilitating electrical contact between adjacent ends of the conductors 5 and 13 of the cables 4 and 12 respectively the connector 15 is provided intermediate its ends with an apertured disc or washer 16 through which the wires of the conductor 13 are threaded and bent over in the manner shown. The disc 16 is here shown for illustrative purposes as fashioned from any suitable metal or alloy and is provided with a serrated edge so that it may readily be pressed into place in the center of the tube prior to the threading operation. It is to be understood, of course, that the disc 16 may alternatively be molded in place were this desired or might be fabricated of the same material as is the tubular portion of the connector if the insulating material chosen has the requisite strength. It is evident that the connector 15 when securely screwed onto the cables 4 and 12 will cause an intimate, positive, non-arcing juncture between the ends of the cable conductors 5 and 13. Furthermore, since the tubular portion of the connector 15 is fabricated from a high grade insulating material the electrical juncture between the conductors 5 and 13 will be efficiently insulated from the electrically conductive shielding casing 1.

A resilient, fluid impervious washer 17 is interposed between adjacent ends of the casings 1 and 11. This washer may be fashioned from any convenient material known to the prior art which has the recited characteristics and of which rubber or any of its many compounds is illustrative. The washer 17 disposed in the manner shown performs a three-fold function. Since it is compressed by tensioning of the nut 8 during the assembly operation, the washer serves to seal the ends of the extension 3 and connector 15 thus preventing the entry of any foreign matter which would seriously damage the insulation of the connector 15 and the cables 4 and 12 or impair the electrical contact between the abutting conductors 5 and 13. The washer furthermore operates by reason of its compression to lock the cable 12 firmly in place and to hold the connector 15 securely within the extension 3 and thus prevent it from vibrating. With the various parts of my arrangement assembled as shown in the drawing it is evident that the short replaceable cable 4 will be compressed since as pointed out hereinbefore it was cut to a length somewhat in excess of that actually necessary. By reason of its compression, since one end thereof abuts against the terminal fitting at the spark plug, a positive, non-arcing electrical juncture between the ends of the cable conductors 5 and 13 is further insured.

In assembling the various parts of my structure the washer 17 is first placed about the magnet cable 12 and the connector 15 threaded into

engagement with its cable end. The wires 13 of the conductor are then threaded through the aperture of the disc 16 and bent over in the manner shown. Thereupon the short replaceable cable 4 is screwed into the remaining end of the connector 15 until the terminal 7 of the conductor 5 makes a positive and efficient electrical contact with the bent over portions of the conductor 13. The conductor 15 with the electrically joined cables 4 and 12 is then pushed into place within the extension 3 of the shielding casing 1 and the nut 8 securely threaded into engagement with the threads of the extension 3. By reason of the engagement of the flanges 9 and 10 of the nut 8 and terminal piece of the casing 11 respectively, the washer 17 is compressed thus effectively performing its several functions previously alluded to. In the event of damage to the short replaceable cable 4 within the spark plug shielding casing 1 it is only necessary to detach the casings 1 and 11, remove and replace the cable 4 and reconnect the casings, all of which it is clear will involve but a low labor and material cost.

According to the provisions of the patent statutes I have set forth the principle and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically illustrated and described.

The invention herein described and claimed may be used and/or manufactured by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. A shielding and current conducting assembly comprising in combination an electrically conductive casing, a current carrying conductor provided with a covering of insulating material and disposed within said casing, a second electrically conductive casing arranged in end to end relationship with said first-mentioned casing, a current carrying conductor likewise provided with a covering of insulating material and disposed at least in part within this latter casing, an insulating member interiorly threaded at its ends and removably disposed within said first-mentioned casing for detachably connecting said conductors and engaging the insulating material thereof, resilient fluid impervious means interposed between adjacent casing ends, and means for connecting said casings to insure an electrically continuous path therebetween and to cause a compression of said first-mentioned means, thereby sealing an end of said insulating member and the end of the casing in which said member is disposed.

2. A shielding and current conducting assembly comprising in combination an electrically conductive casing, a current carrying conductor provided with a covering of insulating material and disposed within said casing, a second electrically conductive casing arranged in end to end relationship with said first-mentioned casing, a current carrying conductor likewise provided with a covering of insulating material and disposed at least in part within this latter casing, an insulating member interiorly threaded at its ends and removably disposed within said first-mentioned casing for detachably connecting said conductors and engaging the insulating material

thereof, resilient means interposed between adjacent casing ends, and means for connecting said casings to insure an electrically continuous path therebetween and to cause a compression of said first-mentioned means, thereby holding said insulating member securely within its casing.

3. A shielding and current conducting assembly comprising in combination an electrically conductive casing, a current carrying conductor provided with a covering of insulating material and disposed within said casing, a second electrically conductive casing arranged in end to end relationship with said first-mentioned casing, a current carrying conductor likewise provided with a covering of insulating material and disposed at least in part within this latter casing, an insulating member interiorly threaded at its ends and removably disposed within said first-mentioned casing for detachably connecting said conductors and engaging the insulating material thereof, resilient means associated with adjacent casing ends, and means for connecting said casings to insure an electrically continuous path therebetween and to cause a compression of said first-mentioned means, whereby the resilient means becomes effective to perform a sealing function and to hold the insulating member securely in place within its casing.

4. A shielding and current conducting assembly comprising in combination an electrically conductive casing, a current carrying conductor provided with a covering of insulating material and disposed within said casing, a second electrically conductive casing arranged in end to end relationship with said first-mentioned casing, a current carrying conductor likewise provided with a covering of insulating material and disposed at least in part within this latter casing, an insulating member interiorly threaded at its ends and removably disposed within said first-mentioned casing for detachably connecting said conductors and engaging the insulating material thereof, resilient means associated with adjacent casing ends and abutting against one end of said insulating member, and means for connecting said casings to insure an electrically continuous path

therebetween and to cause a compression of said first-mentioned means.

5. A shielding and current conducting assembly comprising in combination an electrically conductive casing, a current carrying conductor provided with a covering of insulating material and disposed within said casing, a second electrically conductive casing arranged in end to end relationship with said first-mentioned casing, a current carrying conductor likewise provided with a covering of insulating material and disposed at least in part within this latter casing, an insulating member interiorly threaded at its ends and removably disposed within said first-mentioned casing for detachably connecting said conductors and engaging the insulating material thereof, means disposed intermediate the ends of said member for facilitating electrical contact between the joined conductors, resilient means interposed between adjacent casing ends, and means for connecting said casings to insure an electrically continuous path therebetween and to cause a compression of said resilient means.

6. A shielding and current conducting assembly comprising in combination an electrically conductive casing, a current carrying conductor provided with a covering of insulating material disposed within said casing and capable of being readily removed therefrom when it becomes necessary to replace the same, a second electrically conductive casing arranged in end to end relationship with said first-mentioned casing, a current carrying conductor likewise provided with a covering of insulating material and disposed at least in part within this latter casing, an insulating member interiorly threaded at its ends and removably disposed within said first-mentioned casing for detachably connecting said conductors and engaging the insulating material thereof, an apertured partition intermediate the ends of said member and through which one conductor is passed into intimate electrical contact with the other conductor, a resilient washer interposed between adjacent casing ends and means for connecting said casings to insure an electrically continuous path therebetween and to cause a compression of said resilient washer.

ALLEN ADKINSON.