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2,118,673

DEVICE FOR SHIELDING A SPARK PLUG AND FOR CONDUCTING CURRENT THERETO

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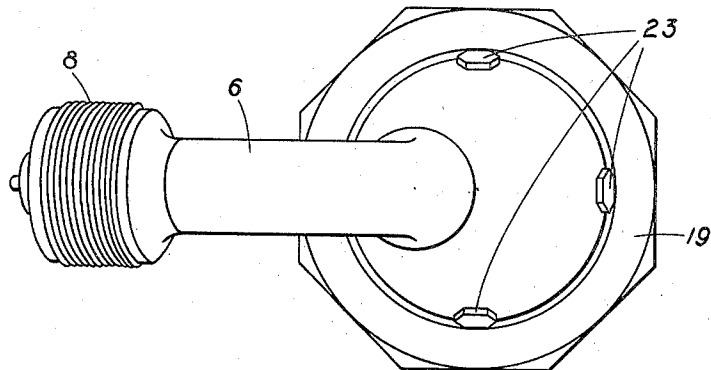


Fig. 2

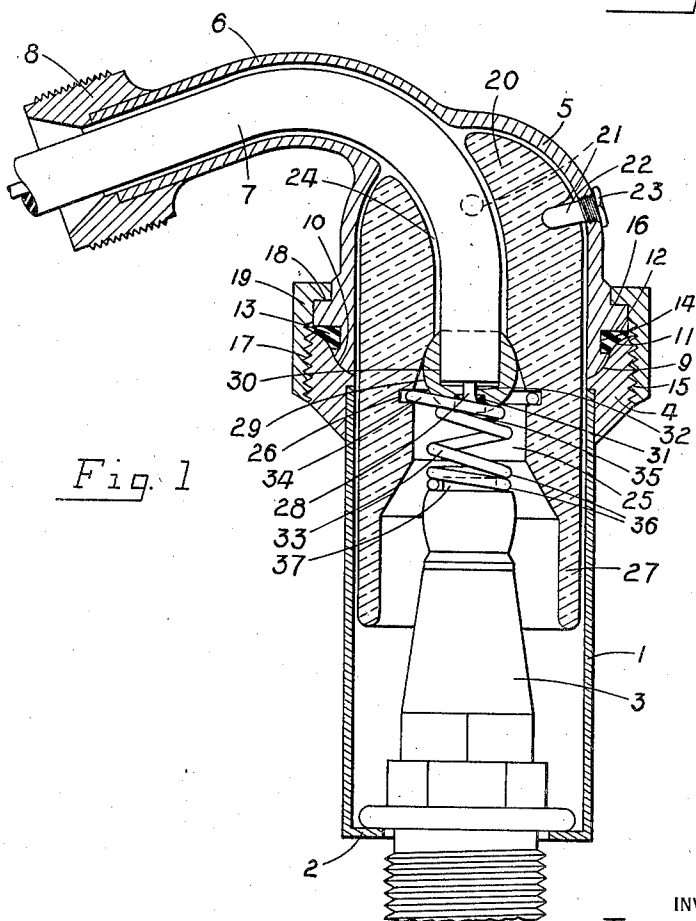


Fig. 1

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UNITED STATES PATENT OFFICE

2,118,673

DEVICE FOR SHIELDING A SPARK PLUG
AND FOR CONDUCTING CURRENT THERE-
TO

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Application September 14, 1936, Serial No. 100,690

19 Claims. (Cl. 123—169)

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

My invention relates to a device for electrically shielding a spark plug and for conducting current thereto. In order to effectively shield extraneous apparatus against electrical disturbances caused by ignition circuits of internal combustion engines it is essential that the circuit be completely encased by a metallic surface; that the enveloping metallic surface be grounded at its ends and at suitable intervals therebetween; and that the enveloping metallic surface be electrically continuous throughout its length. Failure of the enveloping metallic surface to properly and effectively shield against the deleterious disturbances generated by the ignition circuits is caused principally by lack of electrical continuity along the enveloping metallic surface or an increase in resistance of the enveloping metallic surface over that at which optimum shielding is obtained. This lack of electrical continuity or increase in resistance of the enveloping metallic surface frequently occurs in the device which electrically shields the spark plug and conducts current thereto.

The devices now in use for shielding spark plugs and conducting current thereto include upper and lower electrically conductive casing elements held in fluid impervious engagement by a snap-spring arrangement, an insulator interiorly secured to one of said casing elements and fabricated of a phenolic condensation product, and an insulated current carrying conductor extending into the enclosure formed by the casing elements and contact with which is made by an arrangement including a contact screw. These devices neither effectively shield nor conduct current to the spark plug. The surfaces of the casing elements relied upon to provide electrical continuity therebetween are positioned exteriorly of the sealing means which forms a fluid impervious seal between the upper and lower casing elements. In consequence thereof, these surfaces within a short time become covered with an accumulation of dirt, oil and gasoline which impairs or completely destroys the electrical continuity between the casing elements at their point of junction. This in turn renders the entire shielding conduit from the spark plug to the ring manifold inoperative to accomplish its electrical shielding function. An excessive amount of maintenance work is therefore necessary to keep these prior art devices reasonably effective for shielding purposes. The snap-spring arrangement which is relied upon to hold the upper and lower casing elements in engagement is either insufficiently strong or loses its tension

after a period of use so that a slight misalignment of the shielding conduit extending from the spark plug to the ring manifold will cause tilting of the upper casing element with respect to the lower one. When this occurs, oil, dirt, water and other extraneous matter can freely enter the device enveloping and electrically shielding the spark plug with detriment to the instrumentalities housed therein. Furthermore, the design of these prior art devices for electrically shielding a spark plug and for conducting current thereto is such that only a phenolic condensation product can be used for insulation in their construction thus preventing the use of insulating materials having better dielectric characteristics. Finally the contact screw arrangement in these prior art devices does not always make proper contact with the ignition wire. This results in arcing which eventually destroys the wire and causes an interruption in current conduction to the spark plug.

With the foregoing prior art deficiencies in view, it is an object of my invention to provide a device for electrically shielding a spark plug and for conducting current thereto wherein the electrical shielding properties are maintained unimpaired and wherein the means for conducting current to the spark plug is free from arcing.

It is another object of my invention to provide a durable and rugged device for electrically shielding a spark plug and for conducting current thereto which can be completely disassembled to enable the replacement of any damaged parts and to thus insure economical maintenance.

It is another object of my invention to provide a device for electrically shielding a spark plug and for conducting current thereto wherein the casing elements of the device are held in non-tilting engagement and wherein an insulating material other than a phenolic condensation product may be employed.

It is another and further object of my invention to provide a device for electrically shielding a spark plug wherein the juncture between the casing elements of said device is maintained by direct and intimate metallic contact, the said juncture being sealed against the device exterior whereby electrical continuity along and through the device is insured.

It is another and still further object of my invention to provide a device for conducting current to a spark plug which is free from arcing.

Other objects and many of the attendant advantages of this invention will be readily ap-

preciated as the same becomes better understood by reference to the following description when considered in connection with the accompanying drawing wherein:

5 Figure 1 is a view in cross sectional elevation of the assembled device of my invention operatively associated with a spark plug; and

Figure 2 is a plan view of the said device.

10 The device of my invention for electrically shielding a spark plug and for conducting current thereto is intended primarily for use with the shielding of spark plugs in aircraft. It is to be emphasized, however, that the device of my invention is not restricted to the aforementioned use but may be used wherever and whenever an efficient device is desired for electrically shielding a spark plug and for conducting current thereto.

15 Turning now to the drawing, there is shown at 1 a lower electrically conductive casing element having a flange 2 at one end thereof adapted to contact the lower portion of the spark plug 3 and an annular threaded junction member 4 at the upper end thereof and forming part of the casing element. An upper casing element 5 has one end thereof detachably associated with the annular member 4 of the lower casing element and has at the other end thereof a tubular projection 6 through which the ignition cable 7 passes. The outer end of the tubular projection 6 is adapted for connection to the shielding conduit which passes to the ring manifold. For joining the outer end of the tubular projection 6 to the shielding conduit I prefer to employ the electrically continuous connector disclosed in my application Serial No. 100,687, filed 14 September 1936 of which the female connector part 8 is here shown. The female connector part 8 and the annular member 4 may be assembled with their respective casing elements 5 and 1 by sweating the same thereto with solder, by brazing, silver soldering, or similar and equivalent processes. Instead, however, the female connector part 8 and the annular member 4 may be fabricated integral with their respective casing elements if desired. The electrically conductive casing elements 1 and 5 may advantageously be fashioned from brass, bronze, aluminum alloy or mild stainless steel or any other suitable metal or alloy.

50 The lower and upper electrically conductive casing elements 1 and 5 are provided at their contiguous ends with surfaces 9 and 10, respectively, which are in intimate and direct metallic contact to thus insure electrical continuity between the casing elements. While these surfaces of contact are shown as surface portions of a sphere, I do not desire to be restricted thereto since other inclined contact surfaces may be employed within the purview of my invention and will readily suggest themselves to those skilled in the art, conical surfaces and pyramidal surfaces being illustrative but not restrictive of such other inclined surfaces. The lower and upper casing elements 1 and 5 are also provided with bearing faces 11 and 12, respectively, which extend from adjacent the outermost edge of contact between the contact surfaces 9 and 10 outwardly of the device. A fluid impervious gasket 13 is seated in a groove 14 in the end of the casing element 5 and is interposed between the bearing faces 11 and 12 to thus be engaged and compressed thereby. This gasket may be fabricated of asbestos, fibre, synthetic rubber, rubber, special gasket paper or any other suitable material so long as the material chosen is sub-

stantially fluid impervious, will withstand the weather and be reasonably resistant to fluids such as, for example, gasoline, oil and water.

10 In order to insure a direct and intimate metallic contact between the contacting surfaces 9 and 10 of the casing elements and a compression of the gasket 13, the casing elements 1 and 5 have been provided at their contiguous ends with external screw threads 15 and a flange 16 respectively which are adapted to engage internal screw threads 17 and a complementary flange 18 of a coupling sleeve or nut 19. The coupling nut 19 is octagonally or otherwise shaped to permit the use of a wrench for tightening purposes. In addition to holding the contact surfaces 9 and 10 of the casing elements in intimate and direct metallic contact the coupling sleeve or nut 19 serves also to cause a compression of the fluid impervious gasket 13 as well as to furnish some protection to the said gasket and to provide a secondary electrically conductive path between the casing elements 1 and 5. It is to be observed that the cross-sectional area of the sleeve or nut 19 and of the casing portions which form a juncture at their contacting surfaces 9 and 10 is greater than the cross-sectional area of the remaining casing parts. This construction of the nut and casing portions at the juncture therebetween serves to provide a heat dissipating extension which among other things prevents overheating of the portion of the ignition cable 7 housed within the tubular projection 6. Furthermore, the greater diameter and the three exposed sides of the coupling sleeve or nut 19 provide for greater heat dissipation in it than at the juncture enclosed thereby, thus producing a shrinking effect which further tightens the juncture and avoids the possibility of the nut loosening and backing off.

40 Removably and interiorly secured to the upper casing element 5 is the insulator 20 which may be fashioned of any suitable ceramic or phenolic insulating material. Isolantite and pyrex, however, are considered preferable to bakelite for this purpose. The insulator is provided at its upper end with a plurality of recesses 21 which are adapted to receive the cylindrical portions 22 of set screws 23 which, as shown, have threads at their upper ends which are adapted to engage the walls of threaded apertures in the upper casing element 5 to thus removably secure the insulator in place. The heads of these set screws 23 may be provided with holes through which safety wire can be passed to prevent the screws from backing out. Since, however, it is necessary to remove the screws only to replace the insulator 20 their heads may be soldered to the upper casing element 5 if desired instead of using the safety wire previously discussed. While I have shown three set screws for securing the insulator in place, only two need be employed which in this case would be diametrically positioned with respect to each other.

55 The insulator 20, as shown, is provided with a passageway 24 which extends from its upper end and terminates inwardly thereof in a recess 25 and annular groove 26. The distance in all directions over and through the insulator along which the ignition current would travel to reach either of the casing elements is considerably in excess of those distances over or through the insulation of the spark plug 3. This provides a liberal margin of safety against arcing across the insulator. The inner surface of the depending portion 27 of the insulator 20 may be fash-

ioned with annular serrations to increase the surface distance across it if this is deemed desirable. In addition, if desired, the upper portion of the insulator may be provided with cells or foramina to lighten the same. Because of the simplicity in design of my insulator 20, I am enabled to use ceramic insulating materials in fabricating the same and am not limited to the use of phenolic condensation products which have lower dielectric characteristics.

The ignition cable or insulated current carrying conductor 7 extends from within the tubular projection 6 into and through the passageway 24 of the insulator to within the insulator recess 25 and has its insulation terminating short of the end thereof leaving a portion 28 thereof uninsulated and exposed. An electrically conductive body 29 is provided with major and minor recesses 30 and 31, respectively, which are interconnected by a small passageway 32, the major recess 30 receiving the conductor with its insulation adjacent the end thereof and the other and minor recess receiving the uninsulated and exposed end portion 28 of the conductor which is threaded through the passageway 32. The uninsulated and exposed end portion 28 of the conductor extending into the minor recess 31 of the terminal 29 is pressed into an intimate, mechanically secure, electrical contact with the recess walls and is preferably, although not necessarily, soldered in place therein. Although the electrically conductive body or terminal 29 is shown substantially spherical in shape, it is evident that it may have any other shape which will make a good electrical contact with the coiled or convoluted member to be described hereinafter. Thus the terminal 29 serves both to carry the ignition current and to secure the end of the ignition wire while eliminating any possibility of arcing with attendant destruction of the wire and consequent interruption of current flow to the spark plug.

For completing the current path from the cable terminal 29 to the spark plug 3, I employ a convoluted or coiled, resilient electrically conductive member 33 having a plurality of convolutions 34 and 35 at one end thereof, the convolution 34 of larger diameter being seated in the annular groove 26 of the insulator and the convolution 35 of lesser diameter being in intimate and direct electrical contact with the terminal 29 to thus insure electrical continuity therebetween. The convolution 35 of lesser diameter also serves to hold the terminal 29 in place within the insulator recess 25. The lower and other end of the resilient, coiled member 33 is provided with a plurality of convolutions 36 which serve to make electrical contact with the spark plug and receive within their confines a portion 37 thereof. In operation the resilient member 33 is compressed to thus insure electrical continuity from the electrically conductive body or terminal 29 to the spark plug 3 and hence unimpaired current conduction thereto. It is to be observed that the outer curved surface of the terminal is of advantage in that the convolution 35 of lesser diameter conforms itself readily thereto with the result that intimate and efficient electrical contact therebetween is assured.

In use the coupling nut 19 is assembled with the upper casing element 5 adjacent the end thereof. The casing elements 5 and 1 are then brought into contact at their surfaces 9 and 10 and the parts secured together by tightening the nut 19. As the nut 19 is tightened the projec-

tion on the upper casing element 5 is wedged into the corresponding recess in the lower casing element 1, thus providing direct electrical continuity through and along the casing elements. Simultaneously with the tightening of the nut 19 the sides of the gasket 13 are compressed between the bearing faces 11 and 12, thus sealing within its confines the surfaces of contacts 9 and 10 of the casing elements against the exterior of the device and providing fluid tight integrity against the introduction of extraneous materials such as gasoline, oil and moisture. Furthermore, since the resilient, electrically conductive member 32 is compressed as incidental to the securing of the casing elements together, electrical continuity from the terminal 29 to the spark plug 3 is assured.

Thus it is seen that I have provided a durable and rugged device for electrically shielding a spark plug and for conducting current thereto, which is fluid impervious, electrically continuous, conducts current to the spark plug free from arcing and is capable of being completely disassembled to enable the replacement of damaged parts to thereby insure economical maintenance.

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

Having thus set forth and disclosed the nature of this invention, what is claimed is:

1. A device for electrically shielding a spark plug and for conducting current thereto comprising in combination an electrically conductive casing element having a flange at one end thereof adapted to contact the lower portion of a spark plug and a contact surface and bearing face at the other end thereof, a second electrically conductive casing element having a tubular projection at one end thereof for connection with a shielding conduit and a contact surface and bearing face at the other end thereof, the surfaces of contact of said casing elements being in intimate electrical engagement, deformable means interposed between the bearing faces of said casing elements and adapted to be engaged thereby for sealing the area of contact at the surfaces of said casing elements against the exterior of the device, one of said casing elements being provided with exterior threads and the remaining element with a flange, a sleeve having a complementary flange at one end operable to engage the flange on one of said casing elements and interior threads at the other end to cooperatively engage the exterior threads on the other of said casing elements, said sleeve functioning to hold said casing elements in engagement at their surfaces of contact and to cause the bearing faces to abut against and compress the deformable means interposed therebetween whereby to insure the formation of a fluid impervious enclosure by said casing elements as well as an electrically continuous and protected juncture therebetween, a ceramic insulator interiorly and

removably secured to said second mentioned casing element and provided with a passageway which terminates at its inner end in a recess and an annular groove, an insulated current carrying conductor having its insulation terminating short of the end thereof leaving a portion of the conductor uninsulated and exposed and extending from within the tubular projection of said second mentioned casing element into and through the passageway of the insulator to within the insulator recess, an electrically conductive body having a curved outer surface and a plurality of recesses one of which receives the conductor with its insulation adjacent the end thereof and the other of which receives the uninsulated and exposed end portion of the conductor with the recess walls in good electrical contact therewith, a convoluted, resilient, electrically conductive member having a plurality of convolutions at one end thereof one of which is positioned within the annular groove of the insulator and the other of which is in intimate contact with the curved outer surface of the electrically conductive body, and a plurality of convolutions at the other end of said convoluted member which are adapted to make electrical contact with the spark plug and receive within their confines a portion thereof, the said convoluted, resilient member when in use being compressed to thus insure electrical continuity from the conductive body to the spark plug and hence unimpaired current conduction thereto.

2. A device for electrically shielding a spark plug and for conducting current thereto comprising in combination a plurality of electrically conductive casing elements each having at one end thereof a contact surface and a bearing face the contact surfaces of which are in intimate electrical engagement, deformable means interposed between the bearing faces of said casing elements and adapted to be engaged thereby for sealing the area of contact at the surfaces of said casing elements against the exterior of the device, one of said casing elements being provided with exterior threads and the remaining element with a flange, a sleeve having a complemental flange at one end operable to engage the flange on one of said casing elements and interior threads at the other end to cooperatively engage the exterior threads on the other of said casing elements, said sleeve functioning to hold said casing elements in engagement at their surfaces of contact and to cause the bearing faces to abut against and compress the deformable means interposed therebetween whereby to insure the formation of a fluid impervious enclosure by said casing elements as well as an electrically continuous and protected juncture therebetween, a ceramic insulator interiorly and removably secured to one of said casing elements and provided with a passageway which terminates at its inner end in a recess and an annular groove, an insulated current carrying conductor having its insulation terminating short of the end thereof leaving a portion of the conductor uninsulated and exposed and extending into and through the passageway of the insulator to within the insulator recess, an electrically conductive body having a curved outer surface and a plurality of recesses one of which receives the conductor with its insulation adjacent the end thereof and the other of which receives the uninsulated and exposed end portion of the conductor which is soldered in place therein, a convoluted, resilient, electrically conductive mem-

ber having a plurality of convolutions at one end thereof one of which is positioned within the annular groove of the insulator and the other of which is in intimate contact with the curved outer surface of the electrically conductive body, and a plurality of convolutions at the other end of said convoluted member which are adapted to make electrical contact with the spark plug and receive within their confines a portion thereof, the said convoluted, resilient member when in use being compressed to thus insure electrical continuity from the conductive body to the spark plug and hence unimpaired current conduction thereto.

3. A device for electrically shielding a spark plug and for conducting current thereto comprising in combination an electrically conductive casing element having a flange at one end thereof adapted to contact the lower portion of a spark plug and a contact surface and bearing face at the other end thereof, a second electrically conductive casing element having a tubular projection at one end thereof for connection with a shielding conduit and a contact surface and bearing face at the other end thereof, the surfaces of contact of said casing elements being in intimate electrical engagement, deformable means interposed between the bearing faces of said casing elements and adapted to be engaged thereby for sealing the area of contact at the surfaces of said casing elements against the exterior of the device, one of said casing elements being provided with exterior threads and the remaining element with a flange, a sleeve having a complemental flange at one end operable to engage the flange on one of said casing elements and interior threads at the other end to cooperatively engage the exterior threads on the other of said casing elements, said sleeve functioning to hold said casing elements in engagement at their surfaces of contact and to cause the bearing faces to abut against and compress the deformable means interposed therebetween whereby to insure the formation of a fluid impervious enclosure by said casing elements as well as an electrically continuous and protected juncture therebetween, a ceramic insulator interiorly and removably secured to said second mentioned casing element and provided with a passageway which terminates at its inner end in a recess and an annular groove, an insulated current carrying conductor having its insulation terminating short of the end thereof leaving a portion of the conductor uninsulated and exposed and extending from within the tubular projection of said second mentioned casing element into and through the passageway of the insulator to within the insulator recess, an electrically conductive body having a curved outer surface and a plurality of recesses one of which receives the conductor with its insulation adjacent the end thereof and the other of which receives the uninsulated and exposed end portion of the conductor with the recess walls in good electrical contact therewith, a convoluted, resilient, electrically conductive member having a plurality of convolutions at one end thereof one of which is positioned within the annular groove of the insulator and the other of which is in intimate contact with the curved outer surface of the electrically conductive body, and a plurality of convolutions at the other end of said convoluted member which are adapted to make electrical contact with the spark plug and receive within their confines a portion thereof, the said convoluted, resilient

member when in use being compressed to thus insure electrical continuity from the conductive body to the spark plug and hence unimpaired current conduction thereto, and the said casing elements at their juncture as well as the sleeve for maintaining the juncture having a cross-sectional area which is greater than that of the remaining portions of said casing elements to thus provide a heat dissipating extension for preventing overheating of that portion of the insulated current carrying conductor within the tubular projection of said second mentioned casing element.

4. A device for electrically shielding a spark plug and for conducting current thereto comprising in combination an electrically conductive casing element in intimate electrical contact with a second electrically conductive casing element, deformable means interposed between said first and second mentioned casing elements adjacent the outermost edge of contact therebetween for sealing the area of contact between said elements against the exterior of said device, means for holding said casing elements in engagement and for causing a compression of the deformable means interposed therebetween to thereby insure the formation of a fluid impervious enclosure by said casing elements as well as an electrically continuous and protected juncture therebetween, a ceramic insulator interiorly and removably secured to one of said casing elements and provided with a passageway which terminates at its inner end in a recess, an insulated current carrying conductor having a portion at the end thereof uninsulated and exposed and extending into and through the passageway of the insulator to within the insulator recess, an electrically conductive body having a recess and a curved outer surface, the said recess receiving the uninsulated and exposed end portion of the conductor which is soldered in place therein, a convoluted, resilient, electrically conductive member having a plurality of convolutions at one end thereof, one of which is in engagement with the insulator and the other of which is in intimate contact with the curved outer surface of the electrically conductive body, and the other end of said convoluted member being shaped to provide a mechanically secure and electrically efficient contact with the spark plug, the said convoluted, resilient member when in use being compressed to thus insure electrical continuity from the conductive body to the spark plug and hence unimpaired current conduction thereto.

5. A device for electrically shielding a spark plug and for conducting current thereto comprising in combination an electrically conductive casing element in intimate electrical contact with a second electrically conductive casing element, deformable means interposed between said first and second mentioned casing elements for sealing the area of contact between said elements against the exterior of said device, means for holding said casing elements in engagement and for causing a compression of the deformable means interposed therebetween to thereby insure the formation of a fluid impervious enclosure by said casing elements as well as an electrically continuous and protected juncture therebetween, a ceramic insulator interiorly and removably secured to one of said casing elements and provided with a passageway which terminates at its inner end in a recess, an insulated current carrying conductor having a portion at the end thereof uninsulated and exposed and extending into and through the

passageway of the insulator to within the insulator recess, an electrically conductive body having a recess and a curved outer surface, the said recess receiving the uninsulated and exposed end portion of the conductor which is soldered in place therein, a convoluted, resilient, electrically conductive member in engagement with the insulator and having a convolution at one end thereof in intimate contact with the curved outer surface of the electrically conductive body and the other end thereof shaped to provide a mechanically secure and electrically efficient contact with the spark plug, the said convoluted, resilient member when in use being compressed to thus insure electrical continuity from the conductive body to the spark plug and hence unimpaired current conduction thereto.

6. A device for electrically shielding a spark plug and for conducting current thereto comprising in combination an electrically conductive casing element in intimate electrical contact with a second electrically conductive casing element, means for sealing the area of contact between said casing elements against the exterior of said device, and means for holding said casing elements in engagement to thereby insure the formation of a fluid impervious enclosure by said casing elements as well as an electrically continuous and protected juncture therebetween, a ceramic insulator interiorly secured to one of said casing elements and provided with a recess, an insulated current carrying conductor having one end thereof extending into the insulator recess and having the said end provided with an electrically conductive terminal having a curved outer surface and electrically continuous with the conductor, a convoluted, resilient, electrically conductive member in engagement with the insulator and having a convolution at one end thereof in intimate contact with the curved outer surface of the electrically conductive terminal and the other end thereof shaped to provide a mechanically secure and electrically efficient contact with the spark plug.

7. A device for electrically shielding a spark plug and for conducting current thereto comprising in combination an electrically conductive casing element in intimate and direct, electrical contact with a second electrically conductive casing element, means for holding said casing elements in engagement and for sealing the area of contact therebetween against the exterior of said device to thereby insure the formation of a fluid impervious enclosure by said casing elements as well as an electrically continuous and protected juncture therebetween, insulating means interiorly secured to one of said casing elements and provided with a recess, an insulated current carrying conductor having one end thereof electrically continuous with an electrically conductive terminal having a curved outer surface and extending into the recess of said insulating means, and a resilient, electrically conductive member having a convolution at one end thereof in intimate contact with the curved outer surface of the electrically conductive terminal and the other end thereof shaped to provide a mechanically secure and electrically efficient contact with the spark plug.

8. A device for electrically shielding a spark plug and for conducting current thereto comprising in combination an electrically conductive casing element in intimate and direct, electrical contact with a second electrically conductive

casing element, means for holding said casing elements in engagement and for sealing the area of contact therebetween against the exterior of said device to thereby insure the formation of a fluid impervious enclosure by said casing elements as well as an electrically continuous and protected juncture therebetween, insulating means interiorly secured to one of said casing elements and provided with a recess, an insulated current carrying conductor having one end thereof soldered to an electrically conductive terminal having a curved outer surface and extending into the recess of said insulating means, and a resilient, electrically conductive means having one end thereof in intimate contact with the curved outer surface of the electrically conductive terminal and the other end thereof operable to electrically contact the spark plug.

9. A device for electrically shielding a spark plug and for conducting current thereto comprising in combination an electrically conductive casing element in intimate and direct, electrical contact with a second electrically conductive casing element, means for holding said casing elements in engagement and for sealing the area of contact therebetween against the exterior of said device to thereby insure the formation of a fluid impervious enclosure by said casing elements as well as an electrically continuous and protected juncture therebetween, and means for conducting current to the spark plug, said last mentioned means including an electrically conductive terminal electrically continuous with an insulated current carrying conductor and in intimate electrical contact with a resilient electrically conductive member.

10. A device for electrically shielding a spark plug comprising in combination an electrically conductive casing element in intimate and direct, electrical contact with a second electrically conductive casing element, and means for holding said casing elements in engagement and for sealing the area of contact therebetween against the exterior of said device to thereby insure the formation of a fluid impervious enclosure by said casing elements as well as an electrically continuous and protected juncture therebetween.

11. A device for electrically shielding a spark plug comprising in combination an electrically conductive casing element in intimate and direct, electrical contact with a second electrically conductive casing element, means for sealing the area of contact between said casing elements against the exterior of said device and means for holding said casing elements in engagement to thereby insure the formation of a fluid impervious enclosure by said casing elements as well as an electrically continuous and protected juncture therebetween, said last mentioned means as well as said casing elements at their juncture having a cross-sectional area which is greater than that of the remaining portions of said casing elements to thus provide a heat dissipating extension.

12. A device for electrically shielding a spark plug comprising in combination an electrically conductive casing element in intimate and direct, electrical contact with a second electrically conductive casing element, deformable means interposed between said first and second mentioned casing elements for sealing the area of contact between said elements against the exterior of said device, and means for holding said casing elements in engagement to thereby insure the formation of a fluid impervious enclosure by said

casing elements as well as an electrically continuous and protected juncture therebetween.

13. A device for electrically shielding a spark plug comprising in combination an electrically conductive casing element having a contact surface and a bearing face at one end thereof, a second electrically conductive casing element having a contact surface and a bearing face at one end thereof, the surfaces of contact of said casing elements being in intimate and direct electrical engagement, deformable means interposed between the bearing faces of said casing elements and adapted to be engaged thereby for sealing the area of contact at the surfaces of said casing elements against the exterior of the device, and means for holding said casing elements in engagement and for causing the bearing faces to abut against and compress the deformable means interposed therebetween whereby to insure the formation of a fluid impervious enclosure by said casing elements as well as an electrically continuous and protected juncture therebetween.

14. A device for conducting current to a spark plug comprising in combination a plurality of detachably connected casing elements, an insulator interiorly and removably secured to one of said casing elements and provided with a passageway which terminates at its inner end in a recess and an annular groove, an insulated current carrying conductor having its insulation terminating short of the end thereof leaving a portion of the conductor uninsulated and exposed and extending into and through the passageway of the insulator to within the insulator recess, an electrically conductive body having a curved outer surface and a plurality of recesses one of which receives the conductor with its insulation adjacent the end thereof and the other of which receives the uninsulated and exposed end portion of the conductor with the recess walls in good electrical contact therewith, a convoluted resilient, electrically conductive member having a plurality of convolutions at one end thereof one of which is positioned within the annular groove of the insulator and the other of which is in intimate contact with the curved outer surface of the electrically conductive body, and a plurality of convolutions at the other end of said convoluted member which are adapted to make electrical contact with the spark plug and receive within their confines a portion thereof, the said convoluted, resilient member when in use being compressed to thus insure electrical continuity from the conductive body to the spark plug and hence unimpaired current conduction thereto.

15. A device for conducting current to a spark plug comprising in combination a plurality of detachably connected casing elements, an insulator interiorly secured to one of said casing elements and provided with a passageway which terminates at its inner end in a recess, an insulated current carrying conductor having a portion at the end thereof uninsulated and exposed and extending into and through the passageway of the insulator to within the insulator recess, an electrically conductive body having a recess and a curved outer surface, the said recess receiving the uninsulated and exposed end portion of the conductor which is soldered in place therein, a convoluted, resilient, electrically conductive member having a plurality of convolutions at one end thereof one of which is in engagement with the insulator and the other of which is in intimate contact with the curved outer surface

of the electrically conductive body, and the other end of said convoluted member being shaped to provide a mechanically secure and electrically efficient contact with the spark plug, the said convoluted, resilient member when in use being compressed to thus insure electrical continuity from the conductive body to the spark plug and hence unimpaired current conduction thereto.

16. A device for conducting current to a spark plug comprising in combination a plurality of detachably connected casing elements, an insulator interiorly secured to one of said casing elements and provided with a recess, an insulated current carrying conductor having one end thereof extending into the insulator recess and having the said end provided with an electrically conductive terminal having a curved outer surface and electrically continuous with the conductor, a convoluted, resilient, electrically conductive member in engagement with the insulator and having a convolution at one end thereof in intimate contact with the curved outer surface of the electrically conductive terminal and the other end thereof shaped to provide a mechanically secure and electrically efficient contact with the spark plug.

17. A device for conducting current to a spark plug comprising in combination a plurality of detachably connected casing elements, an insulated current carrying conductor having one end thereof extending into the enclosure formed by said casing elements, the said end being provided with an electrically conductive terminal having a curved outer surface and electrically continuous with the conductor, and a resilient, electrically conductive means having one end thereof

in intimate contact with the curved outer surface of the electrically conductive terminal and the other end thereof operable to electrically contact the spark plug.

18. A device for conducting current to a spark plug comprising in combination a plurality of detachably connected casing elements, an insulated current carrying conductor having one end thereof extending into the enclosure formed by said casing elements, the said end being provided with an electrically conductive terminal permanently secured thereto having a curved outer surface and electrically continuous with the conductor, and a resilient electrically conductive member having a convolution at one end thereof in intimate contact with the curved outer surface of the electrically conductive terminal and the other end thereof shaped to provide a mechanically secure and electrically efficient contact with the spark plug.

19. A device for conducting current to a spark plug comprising in combination means defining an enclosure, insulating means disposed within said enclosure and provided with a recess, an insulated current carrying conductor having one end thereof extending into the aforesaid recess, the said end being provided with an electrically conductive terminal having a curved outer surface and electrically continuous with the conductor, and electrically conductive means engaging said insulating means and having a portion thereof in intimate contact with the curved outer surface of the electrically conductive terminal and another portion thereof operable to electrically contact the spark plug.

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