April 7, 1964 S. E. ESTES 3,128,139

SPARK PLUG SHIELD

Filed June 27, 1960

FIG. 1.

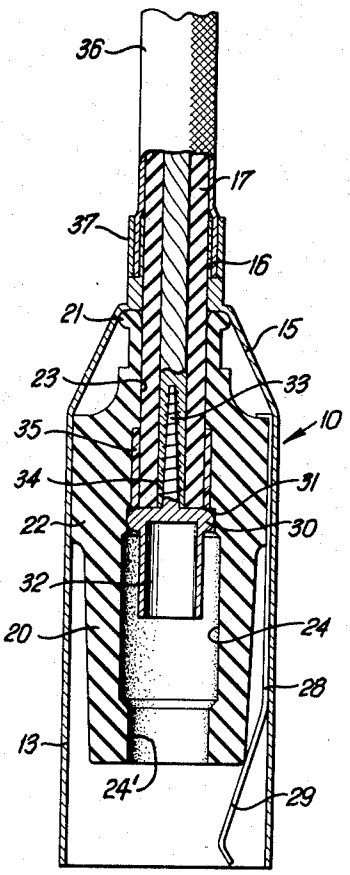


FIG. 2.

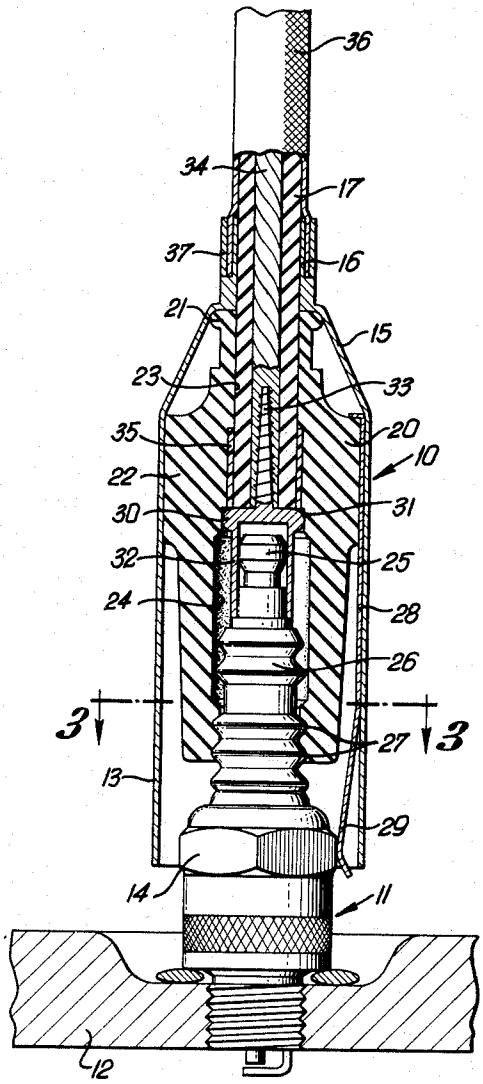
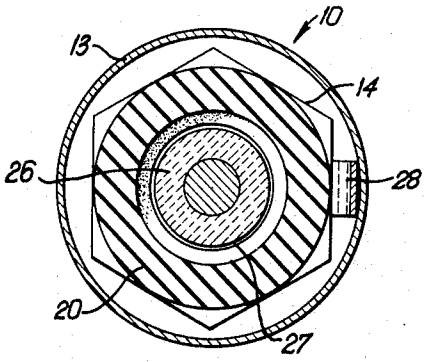


FIG. 3.



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SPARK PLUG SHIELD

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This invention relates to the art of shielding the ignition system of an internal combustion engine, and particularly to a new and improved form of shielding for the spark plug thereof.

Unshielded elements of an ignition system in proximity to radio receiving and transmitting apparatus cause interference with radio reception. The high tension currents of the system normally cause the greatest difficulty, and in the case of land vehicles, airplanes and motor boats, as well as in stationary installations embodying radio equipment where these installations are proximate internal combustion engines seriously diminishes the utility of the radio receiving and transmitting apparatus.

By enclosing the various elements of the ignition system within a metallic electrically conductive housing which is grounded, the electrical radiations from the system will be dissipated in the ground and the interference eliminated. In the case of spark plugs themselves they have been shielded by building a metallic housing into the plug itself which is expensive and not otherwise fully satisfactory. I am also aware of a separate spark plug housing, but this type renders the spark plug difficult of access as well as other faults which I have eliminated by my present invention.

A broad object of my invention is to provide a compact electrical shielding for a spark plug which will substantially prevent transmission of electrical radiation.

A further object of my invention is to provide an improved shielding for a spark plug which serves the additional function of physical protection against weather.

Still another object of my invention is to provide a spark plug shield of light weight, simple construction, and which can be readily assembled or disassembled and which nevertheless serves the function of shielding with maximum efficiency.

Still another object of my invention is to provide a new and improved shield for a spark plug which incorporates a simplified mounting on the spark plug permitting it to be installed on the plug and removed without the use of special tools.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained as hereafter more fully set forth, pointed out in the claims, and illustrated in the accompanying drawings, in which:

FIGURE 1 is a side elevational cross section view of my spark plug shield;

FIGURE 2 is a view similar to FIGURE 1 wherein the shield is mounted on a spark plug;

FIGURE 3 is a cross section taken on line 3—3 of FIGURE 2.

My spark plug shield is indicated by the reference numeral **10** which is adapted to fit on a spark plug **11** which is installed in a cylinder head **12** of an internal combustion engine.

The spark plug shield comprises an enlarged tubular electrically conductive housing **13** of sufficient diameter to accommodate the hexagonal shoulder **14** of the spark plug **11**. The upper portion of the tubular housing **13** is tapered forming a conical neck portion **15** and a cylindrical end portion **16** having an inside diameter sufficient to receive an electrical cable **17**.

An insulating member **20** is formed with an annular

shoulder **21** at its upper end resting against the upper end of conical neck portion **15** of the tubular housing **13**. The insulating member **20** extends downward from the annular shoulder **21** to a position in the tubular housing **13** shown in FIGURES 1 and 2. The insulating member **20** at a point at least midway between the respective ends has an annular shoulder portion **22** with a diameter substantially the same as the inside diameter of the tubular housing **13** so that when the insulating member **20** is inserted in the tubular housing **13** the shoulder **22** will engage the interior of the housing **13** and frictionally hold it in position as illustrated in FIGURES 1 and 2. It should be noted that to insure permanency the shoulder **22** may be cemented to the interior of the housing **13**. The insulating member **20** is further formed with an opening **23** extending through the insulator. The central portion of the insulator opening **23** is enlarged at **24** to receive the electrode terminal **25** and porcelain insulator **26** of the spark plug. The elongated enlarged portion **24** is substantially the same diameter throughout but at its lower end is reduced in diameter forming an annual gripping portion **24'** which will accommodate and frictionally engage ribs **27** of the spark plug **11**, or in the case of spark plugs having smooth surfaced insulators, the smooth surface will be engaged by gripping portion **24'**. It should be noted that the diameter of the central portion **24** is wider than the insulator portion **26** when inserted and there is formed an annular air space around the insulator portion **26**. This air space creates an air thermal insulation between the spark plug insulator and the spark plug shield, thus maintaining a relatively low temperature on the exterior of the shield. An elongated electrical grounding spring clip **28** is positioned between the annular shoulder **22** of the insulator and the inside surface of the tubular housing **13**. This clip **28** extends downward parallel to and engaging the housing **13** to a point where it is bent inward forming a portion **29** which engages the hexagonal shoulder **14** of the spark plug **11** as best shown in FIGURE 2. With the use of this grounding spring clip **28** any electrical radiation which may be traveling along the tubular housing **13** will pass to the clip, then to the metal shell of the spark plug and thence to the cylinder head **12**.

At the upper end of the enlarged opening **24** of the insulator an outwardly extending annular shoulder **30** of a terminal conductive connector **32** engages a shoulder **31** of the insulator. An upper threaded screw portion **33** of connector **32** is threaded into the wire end portion **34** of cable **17**. A nonconductive collar **35** is fitted around the cable **17** in the opening **23** to further hold the cable in position on the connector **32**.

The cable **17** extends upward from the connector **32** snugly through the opening **23** in the insulator and out the elongate cylindrical end portion **16** to an electrical distributor cap not shown.

The cable **17** between the distributor cap and the end portion **16** of the housing is shielded with tinned copper braid **36** which affords substantial metallic conductive coverage of the cable. The braid or mesh **36** does not enter the end portion **16** but is spread so that it will fit over the end portion **16** as shown in FIGURES 1 and 2. An outer collar **37** is fitted and crimped over the mesh to hold it to the neck portion **16**. Thus by the contact of the mesh with the portion **16** of tubular housing **13** the grounding of any electrical radiation will be complete from the braid to the tubular housing to the spark plug to the motor.

While the invention has been shown and described herein in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention which is therefore not to be limited to the details disclosed here-

in but is to be accorded the full scope of the claims and so as to embrace any and all equivalent apparatus.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Electrical shielding means for use with a spark plug of an internal combustion engine which spark plug comprises a conductive shell including a wrench shoulder formed thereon, a porcelain insulator mounted on said shell and an electrode terminal projecting from said insulator, said electrical shielding means comprising an electrically conductive tubular housing including a first open ended section of relatively large diameter adapted to receive the spark plug, a second open ended section of relatively small diameter, and an intermediate section conductively connected with the first and second sections, an insulator member mounted within said housing including an annular enlarged portion engaging said tubular housing and reduced portions projecting from said enlarged portion into said intermediate section and said first open ended section respectively, said reduced portions radially spaced from said intermediate section and said first open ended section respectively of said housing, said insulator member formed with a bore extending entirely therethrough, said bore including an annular end portion which is adapted to frictionally engage a section of the porcelain insulator spaced from said wrench shoulder, whereby said housing is adapted to be retained in spaced relation from said spark plug, an electrode terminal conductive cap mounted in said insulator bore adapted to frictionally engage said electrode terminal and stabilize said tubular housing about said spark plug, an insulated conductive cable extending through said second open ended section and said insulator bore and conductively connected with said electrode terminal cap, said cable being provided with external conductive sheathing terminating on the second open ended section and conductively connected thereto and providing electrical grounding therewith, and a second ground connection extending from the housing adapted to engage the conductive shell of said spark plug.

2. Electrical shielding means as defined in claim 1 wherein said second ground connection is a conductive spring clip engageable with the wrench shoulder of said spark plug.

3. Electrical shielding means as defined in claim 1 wherein the axis of each of said first open ended section, said second open ended section and said intermediate section lie on the same line.

4. Electrical shielding means as defined in claim 3 wherein said intermediate section is tapered from said second open ended section to said first open ended section.

5. The combination of: a spark plug for an internal combustion engine comprising an electrically conductive shell including a wrench shoulder formed thereon, a porcelain insulator mounted on said shell and an electrode terminal projecting from said insulator, an electrically conductive tubular housing including a first open ended section of relatively large diameter receiving the spark plug, a second open ended section of relatively small diameter, and an intermediate section conductively connected with the first and second sections, an insulator member mounted within said housing including an annular enlarged portion engaging said tubular housing and reduced portions projecting from said enlarged portion into said intermediate section and said first open ended section respectively, said reduced portions radially spaced from said intermediate section and said first open ended section respectively of said housing, said insulator member formed with a bore extending entirely therethrough, said bore including an annular end portion which frictionally engages a section of the porcelain insulator spaced from said wrench shoulder, whereby said housing is retained in spaced relation from said spark plug, an electrode terminal conductive cap mounted in said insulator bore to frictionally engage said electrode terminal and stabilize said tubular housing about said spark plug, an insulated conductive cable extending through said second open ended section and said insulator bore and conductively connected with said electrode terminal cap, said cable being provided with external conductive sheathing terminating on the second open ended section and conductively connected thereto and providing electrical grounding therewith, and a second ground connection extending from the housing engaging the conductive shell of said spark plug.

6. The combination as defined in claim 5 wherein said second ground connection is a conductive spring clip engageable with the wrench shoulder of said spark plug.

7. The combination as defined in claim 5 wherein the axis of each of said first open ended section, said second open ended section, and said intermediate section lie on the same line.

8. The combination as defined in claim 5 wherein said intermediate section is tapered from said second open ended section to said first open ended section.

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