Aug. 21, 1945. J. W. FITZ GERALD 2,382,984

SPARK PLUG SHIELD

Filed June 19, 1943

Fig. 1.

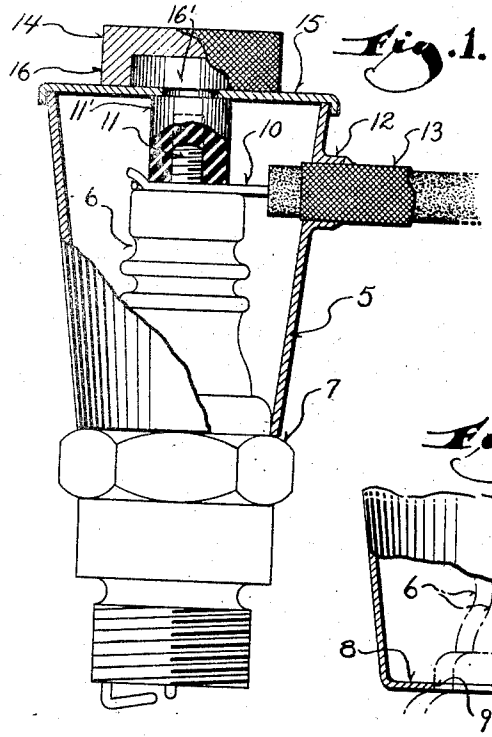


Fig. 2.

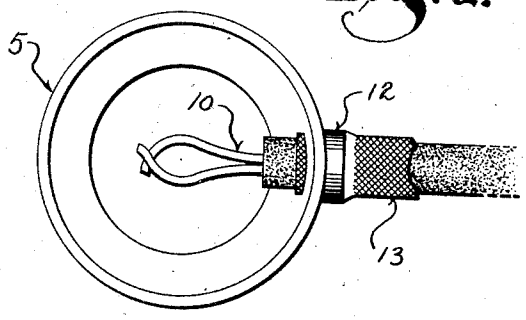


Fig. 4.

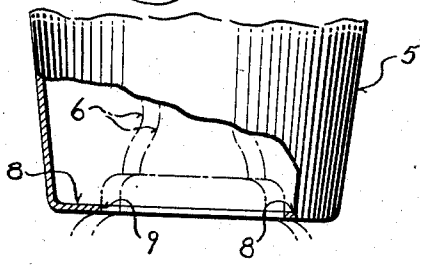


Fig. 3.

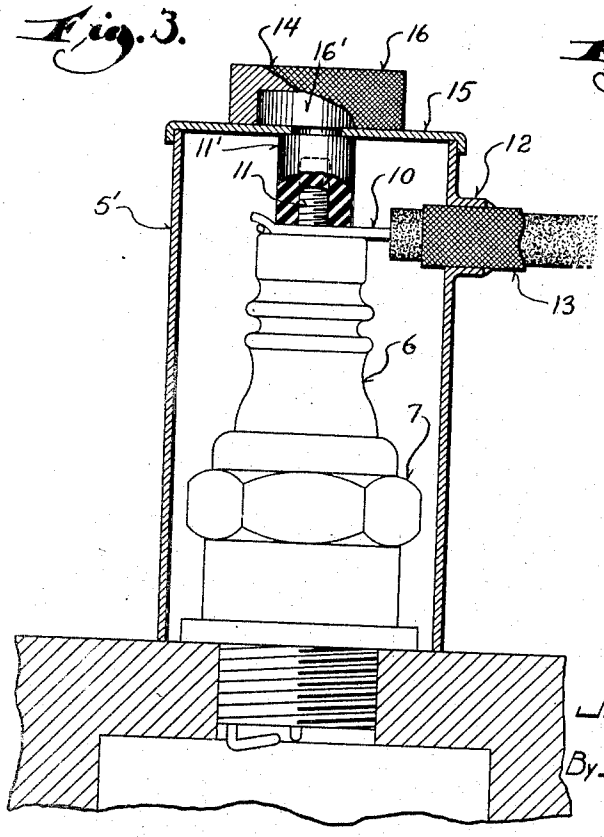
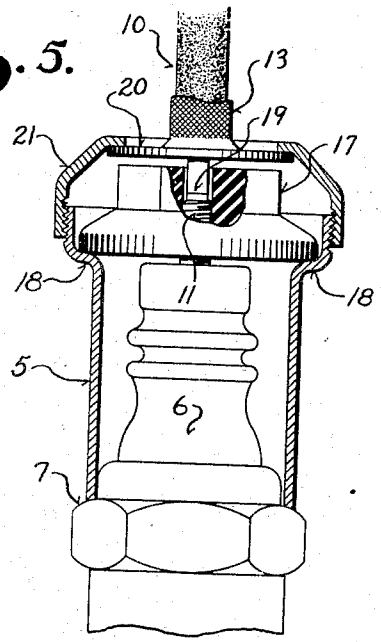


Fig. 5.



Inventor

John W. FitzGerald Deceased

By Mary C. FitzGerald Executrix

By

Attorney

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2,382,984

SPARK PLUG SHIELD

John W. Fitz Gerald, deceased, late of Milwaukee, Wis., by Mary C. Fitz Gerald, executrix, Milwaukee, Wis., assignor to Briggs & Stratton Corporation, Milwaukee, Wis., a corporation of Delaware

Application June 19, 1943, Serial No. 491,511

14 Claims. (Cl. 123—169)

This invention relates to spark plug shields used to prevent radio interference arising from the firing of the plugs; and as an object, to provide a simple, inexpensive shield which can be readily applied to a spark plug without necessitating removal of the plug.

Heretofore it has been customary to die cast spark plug shields and provide them with an apertured bottom wall which was clamped between the nut on the base of the plug and the adjacent surface of the cylinder or cylinder head wall into which the plug is screwed.

Aside from the inconvenience of requiring removal of the plug for the attachment of these past types of shields, it was found, especially in the smaller sizes, that the die cast shield was not strong enough and as a consequence, the bottom wall by which the shield was held in place would break. To overcome this difficulty, reinforced steel sleeves were used in the bottom of the shields, but this introduces another element and additional expense and inconvenience.

Another disadvantage of the die cast shield of the past was the expense of providing different sized molds necessitated by the need for shields of at least two different sizes.

It is therefore the purpose of this invention to provide a spark plug shield which not only can be applied without necessitating removal of the plug but which is so designed and constructed that different sized plugs can be readily accommodated.

Another object of this invention is to provide a spark plug shield of the character described wherein the component metal parts are in the form of easily made stampings or sections of standard tubular stock and wherein all parts of the shield are adequately strong notwithstanding the possible small size of the shield.

The accompanying drawing illustrates one complete example of the physical embodiment of the invention constructed in accordance with the best modes so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a view partially in side elevation and partially in longitudinal section illustrating a spark plug shield embodying this invention mounted in position on a plug;

Figure 2 is a top plan view of the shield shown in Figure 1 with the cover thereof removed;

Figure 3 is a view similar to Figure 1 but illustrating a modified embodiment of the invention;

Figure 4 is a fragmentary detail view illustrating the manner in which the housing of the shield shown in Figure 1 may be formed to more readily accommodate plugs of different diameters; and

Figure 5 is a view similar to Figure 1 illustrating another modified embodiment of the invention.

Referring now more particularly to the accompanying drawing, in which like numerals indicate like parts, the numeral 5 designates the housing of the shield, which in the embodiments shown in Figures 1 and 4, is slightly tapered to have a large upper end, and a smaller lower end. Both ends of the housing are open and the housing is of a size to telescope or fit over the upper ungrounded part of a spark plug 6 with the lower open end of the housing resting on the metal base 7 of the plug.

If desired, the lower end of the housing may be provided with an inwardly directed annular flange 8 so that the housing is substantially cup-shaped as shown in Figure 4. In this case, the size of the opening 9 in the bottom wall of the housing formed by the flange 8 adapts the shield to plugs of different diameters.

The outwardly tapered formation of the housing affords increased clearance at the upper end of the plug where the lead 10 is attached to the terminal 11, but if desired, the housing may be formed of a length of ordinary conventional tubing as at 5' in Figure 3.

In the latter case, the housing is large enough to fit over the entire plug so that its lower open end rests not on the metal base of the plug, but on the adjacent cylinder or cylinder head wall into which the plug is screwed. Obviously, however, it is of no great consequence whether the housing rests on the base of the plug or on the wall onto which it is screwed, for in either case, the desired purpose is achieved, namely, grounding of the housing and application of the housing over the plug without necessitating its removal.

The lead 10 enters the interior of the housing through a port 12 in its side wall and preferably the edge of this opening is slightly flanged and soldered to the shielding covering 13 of the lead. This securement of the lead to the housing makes the housing an attached part of the lead and locates the end of the lead in position to properly engage the terminal of the plug when the housing is applied.

The housing is held down in position over or around the plug and the end of the lead is held in electrical contact with the terminal of the plug by a nut member indicated generally by the numeral 14 which bears down on the housing through a cover 15 over the open end of the housing. The nut member is threaded onto the terminal of the plug and bears down on top of the cover 15 which

in turn engages the top of the housing and thus secures the housing in place.

The nut member, in addition to securing the housing in place, also clamps the end of the conductor to the plug terminal as shown, the parts being so dimensioned that pressure is exerted on the cover 15 slightly before the nut member actively engages the conductor which, of course, is permitted by the resiliency of the cover. The necessary insulation is obtained by having at least that part of the nut member which threads onto the terminal formed of suitable insulating material. The entire nut may be of insulating material if desired, but preferably a sheath of metal 16 surrounds its upper end portion 16' to protect the same from breakage occasioned by repeated application of pliers and other tools thereto. This metal sheath is pressed and cemented to the nut. Besides providing a protecting handle portion for the nut the metal sheath also provids a metal cap for the hole in the cover thus completing the metal enclosure.

The nut member may be connected to the cover 15 in any one of a number of different ways. One feasible manner of effecting the juncture consists of having the lower part 11' of the nut member provided with a threaded extension screwed into the upper part 16', the neck of reduced diameter preferably being a stepped portion of the lower part 11'. Another way of effecting the connection is to mold the nut member onto the cover with a suitable facing material applied to the cover to enable relative rotation between the parts after assembly.

In applying the shield to a spark plug, the housing 5 with the shielded conductor secured thereto by having its braided covering soldered to the flanged port 12, is fitted over the plug. The conductor wires of the lead 10 are then applied to the plug terminal. Next, the assembled nut and cover 15 is secured in place.

In the embodiment of the invention thus far described, the lead enters the housing through the side wall. It may, however, be desirable to have the lead enter the housing from the top, and for this purpose the modified embodiment illustrated in Figure 5 is provided.

In this case the housing 5 as before, has its open lower end arranged to bear down on the metal base of the plug or the adjacent wall into which the plug is screwed; but in this case, the housing is directly held down by a nut member 17 threaded onto the terminal of the plug. Any suitable interconnection between the nut member 17 and the metal housing may be employed, and in the present instance, the housing is shown provided with an internal shoulder 18 against which the nut member bears.

It is to be noted that the threaded bore of the nut extends above the top of the terminal, thus providing a well into which the end 19 of the lead projects.

The projecting end of the lead has its shielding covering stripped therefrom and soldered to a cover disc 20 which is held in place by a nut member 21 threaded onto the housing to draw the cover disc down. In this manner, the exposed end 19 of the lead is centered over the terminal and forced down against the top of the terminal.

It will be obvious however, that as in the previous embodiments of the invention, it is the attachment of the nut member to the terminal of the plug which holds the housing in place and likewise provides the anchorage for holding the end of the conductor lead in electrical contact with the spark plug terminal.

From the foregoing description taken in connection with the accompanying drawing, it will be readily apparent to those skilled in the art that this invention provides an exceedingly simple and inexpensive spark plug shield which may be readily applied to plugs already in position and which has none of the objectionable characteristics of the die cast shields heretofore in use.

What is claimed as the invention is:

1. A spark plug radio interference shield comprising: a metal housing of a size to fit over a spark plug, the lower end of said housing being open and adapted to contact the metal base of the plug or the cylinder wall into which the plug is screwed all around so that the housing is electrically grounded; a shielded lead entering the interior of the housing with its shielding covering grounded to the housing and the end of the lead in position to engage the terminal of the spark plug; means secured to the spark plug terminal for holding the housing with its lower edge in grounded position and for holding the lead in electrical contact with the spark plug terminal including an electrical insulator; and a metal cap surrounding said electrical insulator and contacting the housing all around the said electrical insulator.

2. A spark plug radio interference shield comprising: a metal housing of a size to fit over a spark plug, the lower end of the housing being open and adapted to contact the metal base of the plug or the cylinder wall into which the plug is screwed, all around the edge of the housing so that the housing is grounded and fully closed by metal at its bottom; a shielded lead entering the interior of the housing with its shielding covering grounded to the housing and the end of the lead in position to engage the terminal of the spark plug; an insulated nut screwed onto the terminal of the spark plug for securing the end of the lead in electrical contact with the spark plug terminal; means engaged by the nut through which its attachment to the terminal acts to hold the housing in position over the plug; and a metal cap over the insulated nut and contacting the metal housing all around the edge of the cap.

3. A spark plug radio interference shield comprising: a metal housing of a size to fit over the plug, the lower end of said housing being open and adapted to contact the metal base of the plug or the cylinder wall into which the plug is screwed with the lower edge of the housing engaging the metal base of the plug all around; means attached to the terminal of the spark plug for holding the housing in position over the plug, said last named means including a nut member of insulation adapted to be threaded onto the terminal of the spark plug; and a metal cap over the nut member and engaging the housing to complete the grounded metallic enclosure of the spark plug.

4. A spark plug radio interference shield comprising: a metal housing of a size to fit over the plug, the lower end of said housing being open and adapted to contact the metal base of the plug or the cylinder wall into which the plug is screwed with the lower edge of the housing engaging the metal base of the plug all around so that the metal base closes the bottom of the housing; means attached to the terminal of the spark plug for holding the housing in position over the plug, said last named means including a nut

member of insulation adapted to be threaded onto the terminal of the spark plug; and means accessible on the exterior of the housing for turning said insulated nut member; and a metal cap over the nut member and engaging the housing to complete the grounded metallic enclosure of the spark plug.

5. A spark plug radio interference shield comprising: a metal housing having an open lower end and adapted to fit over the plug with its lower open end resting on the metal base of the plug or the cylinder wall into which the plug is screwed so that the housing is grounded and closed at its bottom; an insulated nut member adapted to thread onto the terminal of the spark plug and bearing against a portion of the housing to clamp the same against the metal base of the plug or the cylinder wall into which the plug is screwed; and a metal cap over the insulated nut member and engaging the housing to complete the grounded metallic enclosure of the spark plug.

6. In combination with a spark plug having a threaded terminal at its upper end: an open ended metal housing fitted over the spark plug with its open lower end grounded to the metal base of the plug; a shielded lead entering the housing with the end of its conductor exposed for connection to the spark plug terminal; a metal cover for the open top of the housing; an electrically non-conducting nut member passing through the cover and threaded onto the spark plug terminal to secure the end of the conductor thereto, said nut member having a shoulder engaging the cover to hold the cover down onto the shell; and a metallic cap covering the nut member and making contact with the metal cover.

7. A spark plug radio interference shield comprising: a metal housing of a size to embrace at least the upper ungrounded portion of a spark plug while the lower end of the housing rests on the base of the plug to be grounded thereto, said housing having a hole in its side through which the lead for the spark plug enters the interior of the housing; a cover for the top of the housing; a nut member passing through the cover and threaded onto the spark plug terminal to hold its lead in position thereon, said nut member having a shoulder engaging the cover to also hold the cover on the housing and the housing on the plug, and including an insulating portion to insulate the spark plug terminal from the cover; and a metallic cap completely surrounding the opening for the nut member in the cover.

8. A spark plug radio interference shield comprising: a metal housing open at both ends and of a size to embrace at least the upper ungrounded portion of a spark plug, the bottom of the housing being adapted to fit against the adjacent metal parts so as to ground the housing thereto; a cover for the open top of the housing; and means receiving anchorage from the spark plug terminal for holding the cover on the housing and for holding the housing in position on the plug, said last named means including an electrical insulator between the spark plug terminal and the cover.

9. A spark plug radio interference shield comprising: a substantially cup-shaped metal shell having a hole in its bottom wall to enable telescoping the shell over the upper portion of a spark plug with the edge of the hole resting on the metal base of the plug; a cover for the open top of the shell; and means receiving support from the spark plug terminal for holding the cover onto the shell and retaining the shell in position on the plug, said last named means including an electrical insulator between the spark plug terminal and the cover.

10. A spark plug radio interference shield comprising: a substantially cup-shaped metal shell having a hole in its bottom wall to enable telescoping the shell over the upper portion of a spark plug with the edge of the hole resting on the metal base of the plug; a cover for the open top of the shell; and means receiving support from the spark plug terminal for holding the cover onto the shell and retaining the shell in position on the plug, said last named means including an electrical insulator between the spark plug terminal and the cover, the bottom wall of the shell being large enough to enable adaptation of the shield to plugs of larger diameter by increasing the size of the hole in the bottom wall.

11. A spark plug radio interference shield comprising: a metal shell open at both ends and of a size to embrace the unshielded top portion of a spark plug while the bottom of the shell engages a grounded metal part so that the shell is likewise grounded, the opening in the bottom of the shell being large enough to enable the shell to be applied to a spark plug in position without necessitating removal of the plug; a cover for the top of the shell; and means threaded onto the terminal of the spark plug for holding the cover down onto the shell and for retaining the shell in position on the plug, said last named means including an electrical insulator between the spark plug terminal and the cover.

12. In combination with a spark plug mounted in position of use: a metal shielding housing enclosing the insulated top portion of the plug to prevent the plug from radiating radio interference, said housing having an open bottom resting on and grounded to a metal part at the grounded base of the plug, the open bottom enabling application of the housing over the plug without necessitating removal of the plug; and a nut member threaded on the terminal of the plug and bearing down on the housing to hold the housing in position over the plug, said nut member including an insulator between the spark plug terminal and the housing.

13. In combination with a spark plug mounted in position of use: a metal shielding housing enclosing the insulated top portion of the plug to prevent the plug from radiating radio interference, said housing having an open bottom resting on and grounded to a metal part at the grounded base of the plug, the open bottom enabling application of the housing over the plug without necessitating removal of the plug; a lead entering the interior of the housing with the end of its conductor exposed for connection to the terminal of the spark plug; and a nut member threaded onto the terminal of the plug to connect the conductor end to the terminal and bearing down on the housing to hold the housing in position over the plug, said nut member including an insulator between the spark plug terminal and the housing.

14. In combination with a spark plug mounted in position of use: a metal shielding housing enclosing the insulated top portion of the plug to prevent the plug from radiating radio interference, said housing having an open bottom resting on and grounded to a metal part at the grounded base of the plug, the open bottom en-

abling application of the housing over the plug without necessitating removal of the plug; a nut including an insulating member threaded on the terminal of the plug and bearing down on the housing to hold the housing in position over the plug; a removable cover for the top of the housing; a shielded lead passing through the cover with its shielding covering connected to the cover and the end of its conductor exposed for connection to the spark plug terminal; and means for drawing the cover down toward the housing to hold the conductor end in contact with the spark plug terminal.

MARY C. FITZ GERALD,
Executrix of the Estate of John W. Fitz Gerald, Deceased.