

March 19, 1935.

R. P. LANSING

1,994,614

ELECTRICAL APPARATUS

Filed Aug. 8, 1929

FIG. 1.

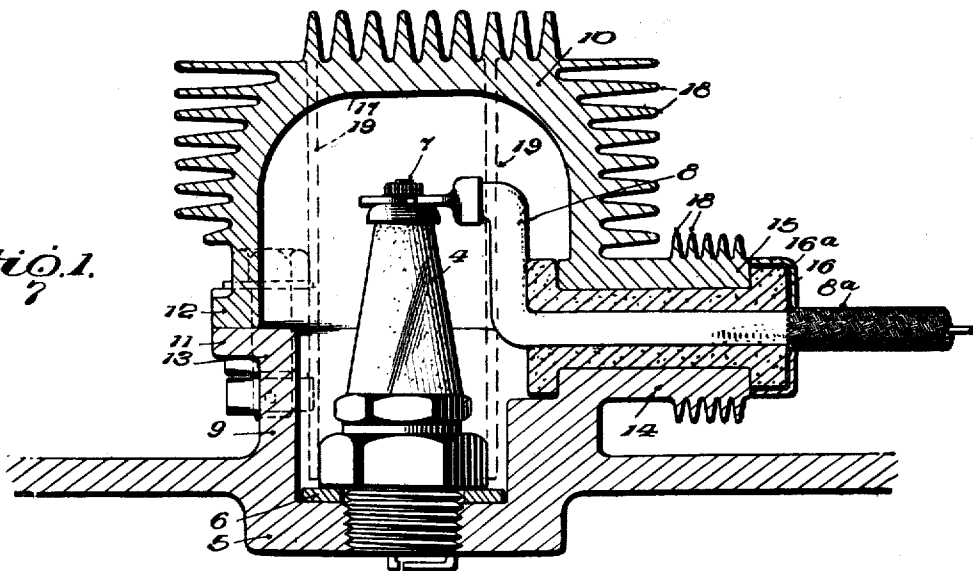


FIG. 2.

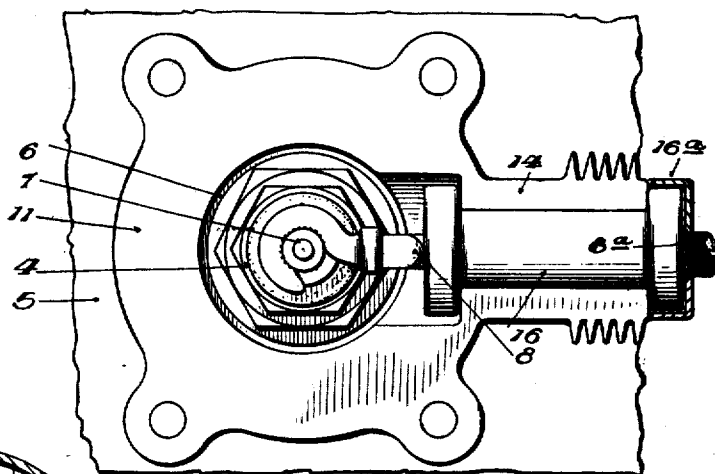
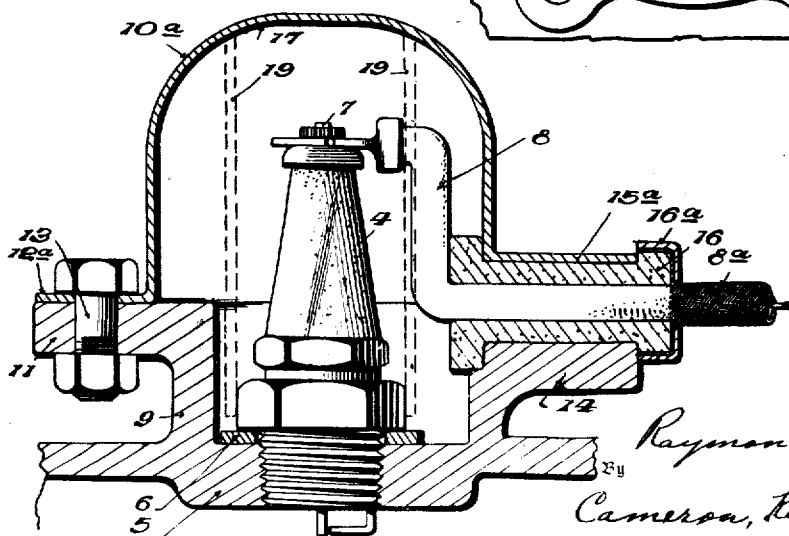


FIG. 3.



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ELECTRICAL APPARATUS

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9 Claims. (Cl. 123—169)

This invention relates to ignition apparatus for internal combustion engines, and more particularly to shielding means for spark plugs.

Electrical shielding means of the type heretofore provided for spark plugs have usually been built into the plug and have been so constituted as to be expensive to manufacture and somewhat difficult to service by the average mechanic. Moreover, such shielding means, in many instances, do not properly protect the plug against accidental blows, moisture, etc.

One of the objects of the present invention is to provide novel shielding means for the spark plugs of an internal combustion engine which means will efficiently and practically prevent interference with radio or other sensitive electrical apparatus by said spark plugs.

Another object is to provide novel shielding means for a spark plug which are rugged and dependable, and which do not impair the charge igniting efficiency of the plug.

A further object is to provide novel shielding means for a spark plug which are simple in structure, cheap of manufacture, and easily and quickly attached or detached.

A still further object is to provide novel shielding means for a spark plug which are attached to the engine cylinder wall and which render the spark plug readily accessible for inspection or repairs.

Another object is to provide in combination with the engine cylinder wall, novel shielding means for a spark plug which are moisture proof and self-cooling.

Two embodiments of the present invention have been illustrated in the accompanying drawing, but it is to be expressly understood that said drawing is for purposes of illustration only and is not to be construed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In said drawing:

Fig. 1 is an elevation, partly in section, of one embodiment of the invention;

Fig. 2 is a plan view of the embodiment shown in Fig. 1 with the shielding cap removed; and

Fig. 3 is an elevation, partly in section, of another embodiment of the invention.

Referring now to the drawing, wherein like reference numerals indicate like parts through the several views, Figs. 1 and 2 illustrate a spark plug for an internal combustion engine cylinder and novel means for electrically shielding and mechanically protecting said spark plug.

In the form shown, a spark plug 4 is threaded

into the cylinder wall 5 of an internal combustion engine in the usual manner, a soft metal gasket 6 being provided around the threaded portion of the spark plug to make the connection between the plug and cylinder gas-tight. Connected to electrode 7 of the plug in any suitable manner is an ignition cable 8 covered with a suitable flexible metal shield such as woven wire 8^a. Spark plug 4, gasket 6 and cable 8 may be of any suitable material or construction, the details of which form no part of the present invention.

In order to prevent such a spark plug, when operating, from interfering with radio or other sensitive electrical apparatus in the vicinity thereof, novel shielding means are provided which entirely surround the plug with metal. In the embodiment shown, engine cylinder wall 5 is provided with a boss 9 surrounding the lower portion of spark plug 4, while the upper part of the plug is enclosed within a metallic shielding cap 10, said cap coacting with boss 9 to form a complete metallic shield. If desired, a soft metal gasket (not shown) may be interposed between cap 10 and the cylinder wall to exclude moisture, or the contacting surfaces may be carefully ground.

Cap 10 is removably attached to boss 9 by suitable means such as flanges 11 and 12 and bolts 13. Flanges 11 and 12 are provided with complementary projecting portions 14 and 15 of semi-circular cross section which coact to form an entrance for the ignition cable 8. A porcelain insulating thimble 16 may be provided between portions 14 and 15 and cable 8 in order to thoroughly insulate the latter from the former, to exclude moisture, and prevent excessive heating of the cable insulation. If desired, a metal cap 16^a may be threaded on cable 8 and pressed over the end of thimble 16.

As shown in Fig. 1, the interior surface 17 of shielding cap 10 is generally hemispherical in shape while the outside of said cap may be provided with a plurality of fins 18 to facilitate cooling. The dimensions of cap 10 are preferably such that the minimum clearance between electrode 7 of plug 4 and the interior surface 17 of said cap is $\frac{3}{4}$ inch. This clearance is necessary in order to insure proper operation of the plug at high altitude; i. e., to prevent arcing between electrode 7 and metallic surface 17, when, due to the decrease in the density of the air at high altitudes, the di-electric strength thereof is lowered. If the connection between the cap 10 and boss 9 is made airtight, this clearance of $\frac{3}{4}$ inch may be decreased.

Proper clearance is also provided between the

inner surface of boss 9 and the outside of spark plug 4 so as to allow the use of a socket wrench (indicated by dotted lines 19) for inserting and removing said plug.

5 In Fig. 3 there is shown another embodiment of the invention differing from that shown in Figs. 1 and 2 only in the construction of the shielding cap. In this embodiment, cap 10^a comprises a substantially hemispherically shaped member made of relatively thin metal having good heat conducting properties, such as aluminum or copper. In this type of structure, the cooling fins shown in Figs. 1 and 2 may be omitted.

15 There is thus provided a novel shield for spark plugs which is both electrically and mechanically efficient for the prevention of ignition interference with radio or other sensitive electrical apparatus. The shield herein disclosed is simple in structure and cheap of manufacture, two factors which are of importance where a large number of spark plugs must be shielded as in an aeroplane engine. Due to its connection to the engine cylinder wall instead of to the spark plug itself, the shield structure is rugged and dependable, and does not affect the ignition efficiency of the spark plug it shields. It is also easily and quickly attached or detached, and thus renders the spark plug readily accessible for inspection or repairs by the average mechanic. The shield is moisture proof and self-cooling, and so constructed as to protect the ignition cable from possible short circuits or burns from the shielding structure.

35 While only two embodiments of the invention have been illustrated and described, it will be apparent that various changes may be made in the details of construction and the arrangement of parts, as will now readily occur to those skilled in the art, without departing from the spirit of the invention. It is to be understood that although certain clearances and materials have been specifically mentioned herein, they are illustrative only and are not to be construed as limiting the invention thereto. Reference is therefore to be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

50 1. In combination with a cylinder of an internal combustion engine, a spark plug therefor, a two-part electrical shield surrounding said plug and having an opening at the adjacent edges of said two parts for the reception of an ignition cable disposed with its longitudinal axis substantially perpendicular to the longitudinal axis of the plug, one of said parts being arranged for receiving the sparking end of the plug so that said end extends into said cylinder, and means for securing the two parts together.

60 2. In combination with a spark plug including a metal shell, and a shielded conductor therefor a device for preventing radiation of electrical energy therefrom comprising a casing formed of complementary sections, and means adapted to hold said sections in contact with each other along a plane passing through said conductor, and with one of the sections in contact with the shell.

70 3. In combination with a spark plug including a metal shell, and a shielded conductor therefor, a device for preventing radiation of electrical energy therefrom comprising a casing formed of complementary sections one of which is integral

with the outer wall of the associated combustion chamber, and means adapted to hold said sections in contact with each other, with one of the sections in contact with the shell.

4. In combination with a spark plug including a metal shell, and a shielded conductor therefor, a device for preventing radiation of electrical energy therefrom comprising a casing formed of complementary sections, one of which is integral with the outer wall of the associated combustion chamber, and in contact with the shell, and means adapted to hold said sections in contact with each other along a plane passing through said conductor.

5. In combination with a spark plug including a metal shell, and a shielded conductor therefor disposed with its longitudinal axis at an angle to the longitudinal axis of the plug, a device, for preventing radiation of electrical energy therefrom comprising a casing formed of complementary sections one of which is integral with the outer wall of the associated combustion chamber and in contact with the shell, and means adapted to hold said sections in contact with each other.

6. In combination with a shielded conductor and a spark plug including a metal shell having a wrench receiving portion and a threaded base below said wrench receiving portion, a device for preventing radiation of electrical energy therefrom comprising a casing formed of complementary sections, one of which has a threaded portion for engagement with said base and a portion of wider bore surrounding but spaced from said wrench receiving portion, and means adapted to hold said sections in contact with each other.

7. In combination with a shielded conductor and a spark plug including a metal shell having a wrench receiving portion and a threaded base below said wrench receiving portion, a device for preventing radiation of electrical energy therefrom comprising a casing formed of complementary sections, one of which has a threaded portion for engagement with said base and a portion of wider bore surrounding but spaced from said wrench receiving portion, and means adapted to hold said sections in contact with each other along a plane passing through said shielded conductor.

8. In combination with a shielded conductor and a spark plug including a metal shell having a wrench receiving portion and a threaded base below said wrench receiving portion, a device for preventing radiation of electrical energy therefrom comprising a casing formed of complementary sections, one of which has a threaded portion for engagement with said base and a portion of wider bore surrounding but spaced from said wrench receiving portion, and means adapted to hold said sections in contact with each other adjacent said conductor.

9. In combination with a spark plug including a metal shell, and a shielded conductor therefor disposed with its longitudinal axis at an angle to the longitudinal axis of the plug, a device for preventing radiation of electrical energy therefrom comprising a casing formed of complementary sections, one of which has a threaded portion for engagement with said shell at the innermost edge thereof.

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DISCLAIMER

1,994,614.—*Raymond P. Lansing*, Montclair, N. J. ELECTRICAL APPARATUS. Patent dated March 19, 1935. Disclaimer filed August 26, 1938, by the assignee, *Eclipse Machine Company*.

Hereby enters this disclaimer to claim 1 of said Letters Patent.
[*Official Gazette September 20, 1938.*]