Nov. 2, 1965 F. TESTERINI 3,215,131

GLOW PLUGS AND INSTALLATION IN THE ENGINE HEAD

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FIG. 1

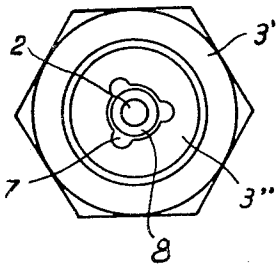


FIG. 2

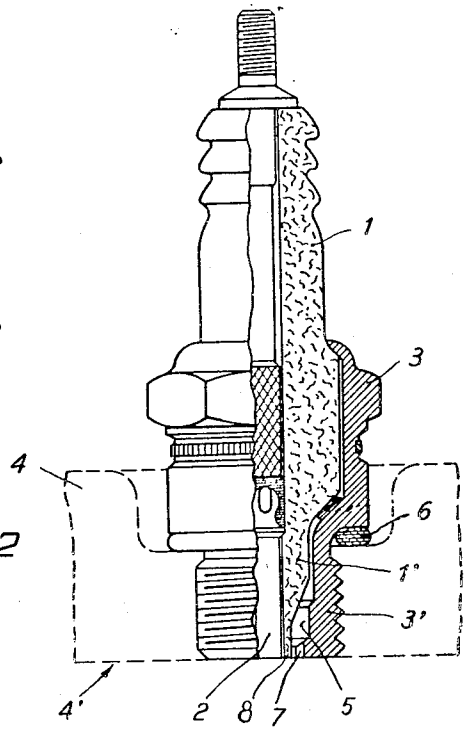
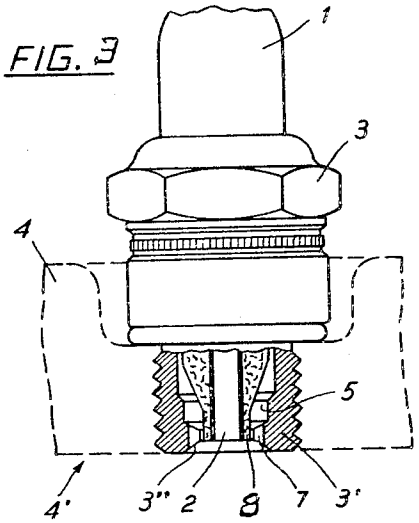


FIG. 3



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GLOW PLUGS AND INSTALLATION IN THE ENGINE HEAD

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Claims priority, application Italy, Dec. 23, 1960, 21,970/60

5 Claims. (Cl. 123—169)

This invention relates to ignition spark plugs for internal combustion engines of the glow plug type, also known as semi-superficial or surface-gap type, and more particularly it relates to spark plugs of the type wherein the spark grazes the surface of the insulator comprising a center electrode surrounded about its point by a thin insulating medium and substantially enclosed by a metal body electrode concentric with the surrounded central electrode and having radial grooves or openings communicating between the enclosed spark plug chamber and the combustion chamber of the engine. In this type of plug the spark grazes the insulator as it crosses the annular gap formed between the center electrode and the metal body electrode.

The invention relates, further, to the manner of installation or mounting of said spark plugs in the engine head. In conventional spark plugs, the body of the plug constitutes one grounded electrode which is screwed into the engine head to a limiting position where the center electrode with insulator projects substantially into the combustion chamber beyond the engine head. Because of this projection, when the spark plug becomes hot, the ignition acts as it would with a spark advance, thus changing the engine timing characteristics. Part of this disadvantage results from the fact that the limited projecting plug area must conduct heat to the point that the plug contacts the engine head where the conduction path is not so limited by a small heat transmission area.

Also, the spark gap spacing may not be held constant in prior art plugs, because of imperfect centering of the insulator in the plug body, where the centering is dependent upon a rim operation and locking by means of a threaded ring. When imperfectly centered, the sparking is localized with resulting pitting and reduced life of the plug.

Furthermore, difficulties are encountered in the milling and manufacture of ventilating slits to produce exact shape and conformation with the center electrode, thereby making the plugs expensive.

It is an object of the present invention to provide an improved installation of a glow plug in an engine, thereby resolving the above mentioned problems.

Spark plugs of the present invention comprise a central electrode assembly substantially enclosed by the body which comprises the outer grounded electrode, and which contains radially disposed ventilation slits for communication between the spark plug chamber and the combustion chamber. These radially extending slits are arranged symmetrically above the axis of the plug to allow a homogeneous interchange of the interior gases.

A threaded plug body is provided of such length that the plug cannot be inserted to project beyond the interior engine surface into the combustion chamber, but is mounted entirely within the engine block or head. Thus, the plug is installed with its point either recessed or preferably in the same plane with the internal surface of the engine with the ends of the center electrode, insulator and the body on the same level.

The invention will now be described by way of example, with reference to the preferred embodiments of the accompanying drawing, wherein:

FIGURE 1 is a plan view of the electrode structure of a plug constructed in accordance with the invention,

FIGURE 2 is a side view, partly in section of a plug installed in an engine in accordance with the principles of the invention, and

FIGURE 3 is a fragmentary view, partly in section of a further plug embodiment of the invention.

The spark plug comprises an insulator **1** surrounding center electrode **2** within body **3**, which is inserted in the engine head **4** by means of screw threads on the threaded end portion **3'** of the body as limited by the outer sealing gasket **6**.

An annular plug chamber **5** is formed within the end portion **3'** by the space between tapered end of insulator **1**, having a thin insulating covering **8** extending out to the end of the center electrode **2**, and the inner surface of the body member **3'**.

In order to secure sufficient ventilation of the chamber **5** enclosed by the inwardly flared portion **3''** of the body, radially extended grooves **7** are formed therein by a broach in a symmetrical pattern about the axis of the plug or the center electrode **2**. The inwardly flared portion **3''** of the body has a central aperture positioned concentrically about the thin insulating covering **8** of the center electrode **2**, from which the grooves **7** extend. Thus, gas movement is facilitated to produce a homogeneous change of gases within the chamber **5** to provide cooling for the insulator portion **8** which is heated until it glows when grazed by sparks passing between the two electrodes.

To permit good centering of the thin insulator portion **8** within the inwardly flared portion **3''** of the body, a centering tool (not shown) is inserted in all the grooves **7** during assembly to lock the position of the insulator **1** into position. This assures uniform distribution of the spark, which, with the better cooling provided by conduction of heat through the head **4** in contact with the entire threaded end portion **3'**, assures a long wearing life of the spark plug. The inwardly flared portion **3''** is preferably integral with the body **3** to provide better thermal conduction to the engine head **4**.

As shown in FIGURES 2 and 3, the end of the spark plug is mounted flush with the interior surface **4'** of the engine. Thus, the end of the center electrode **2**, the thin insulation covering **8**, and the inwardly flared portion **3''** of the body are all at the same level in the plane of the inner surface **4'** of the engine as shown in FIGURE 2. This causes the spark between the two electrodes to graze the end portion **8** of the insulator, whereby the plug operates on the glow-plug principle.

In FIGURE 3, the electrode **2**, inwardly flared section **3''** and insulator covering **8** are recessed within the plug, while the threaded end portion **3'** is preferably in the same plane as the internal surface **4'** of the engine. It is important that no part of the plug protrudes inside the combustion chamber after installation. Thus, the length of the threaded portion **3'** of the plug body is limited.

Thus, improved performance is afforded by the novel construction features of the present glow-type spark plug with the manner of installation within the engine head, as defined in the following claims:

1. An ignition spark plug with a spark path partly grazing the surface of its insulator comprising a center electrode surrounded to its tip by a thin insulator, an outer electrode comprising a metal body portion concentrically surrounding the insulator and terminating in a plane confined within the end of the plug and common with the end of the center electrode and the end of its surrounding insulator to cause, thereby, the spark between the electrodes to graze the insulator, an annular chamber between said body and said insulator, and radially extending sym-

metrical passages in the metal body about said center electrode communicating with the chamber thereby to provide homogeneous interchange of gases within said chamber wherein the outer electrode is an integral portion of a plug body member provided with mounting threads for insertion into an engine head which has the end of the body flared inwardly.

2. A plug, as defined in claim 1, wherein the metal body is provided with mounting threads having a limiting position such that the plug may be inserted within a standard engine mount without projecting into the combustion chamber.

3. A radial discharge ignition spark plug in an engine comprising a center electrode surrounded by a thin insulator and a metal body spaced from the insulator in the region of the end of said insulator, said plug having an annular chamber between said body and said insulator and passages communicating with said chamber and the combustion chamber of the engine, characterized in that said passages extend at least through the portion of the body of the spark plug inside said engine head and in that the center electrode is recessed with respect to the end of the body.

4. An ignition spark plug according to claim 3, characterized in that the end of the body is flared inwardly.

5. For installation in an engine head, a plug with a sparking path defined to graze the surface of an insulator interposed between two electrodes and having a body for insertion in said head with its terminal end at a limiting position flush with the inner wall of a combustion chamber in said engine head, a center electrode concentrically surrounded by an insulation layer, within said body and an outer electrode concentrically surrounding said insulation layer, wherein the electrode, body and insulator terminate at a single plane perpendicular to the center electrode and the outer electrode constitutes an end portion of the plug body which is flared inwardly and recessed from the end of the plug.

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