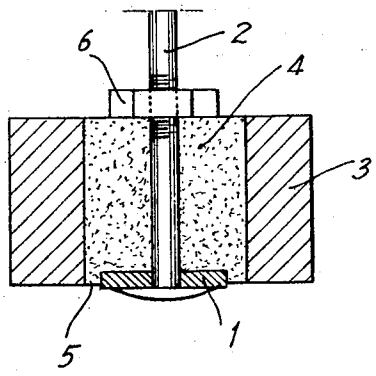
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LOW-TENSION SPARKING PLUG FOR INTERNAL COMBUSTION ENGINES

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# LOW-TENSION SPARKING PLUG FOR INTERNAL COMBUSTION ENGINES

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1 Claim. (Cl. 313—131)

In sparking plugs of the type ensuring through the discharge of a condenser the ignition of internal combustion engines, it is already known to produce the ignition sparks across two electrodes separated by a relatively reduced gap of the order of from 0.004" to 0.012", which is filled with an insulating material adapted to "guide" the spark. The assembly comprising the electrodes and the insulator is generally called "insert."

This invention relates to an improved insert of this character which is designed in view of its manufacture on a commercial scale at a relatively low cost; the inserts according to this invention are extremely reliable and operate without failure nor misfiring.

According to this invention, one of the electrodes consists of a rigid hollow cylinder of refractory metal, for example tungsten, of a thickness sufficient to permit its machining and assembling without any risk of fracture for undue fragility, for example 1 mm. (0.04") with an outer diameter of 11 mm. (7/16"), and the other electrode consists of a thin disc of refractory metal, for example tungsten, which is sealed mechanically, by welding or through any other adequate method, to a central rod through which the current is to be fed to the device; according to an advantageous feature of this invention, the thickness of the thin disc is such that the wear will affect the disc throughout the thickness thereof; if tungsten is used, this thickness may be less than 0.024".

The insulator fills the cylindrical space within the hollow electrode without leaving any gap between the insulator and the electrode, and is so disposed that the thin disc will be positioned at the bottom thereof.

According to a preferred embodiment of the low-tension sparking plug insert manufactured in accordance with the teachings of the present invention and illustrated in axial section in the accompanying drawing by way of example, the electrode **1** consists of a thin disc of tungsten, for example of a thickness ranging from 0.004" to 0.024"; this disc **1** is connected to the distributor through the medium of a central rod **2** of conducting material. The other electrode **3** is cylindrical and grounded through the plug body (not shown) in which it is force fitted. The insulator **4** fills completely the inner space of the electrode **3**. The diameter of the thin disc **1** is such that the disc lies at least partly within the electrode **3**, the zone in which the spark occurs being the lower face of the insert at right angles to the axis of the cylindrical insert, in the annular, free zone of the insulator. This arrangement is advantageous in that it prevents the production of sparks in the inter-electrodes space, thereby avoiding the frequent inconvenient of low-tension sparking plugs whereby the spark takes place in a recessed position.

The sparks are formed in the space or gap **5** between the electrodes and glance off the insulator surface; due to



the moderate thickness of the electrode **1**, the latter will wear out throughout its thickness and the spark will not tend to take place in a recessed position, i.e. in a region where the change of igniting the air-fuel or other combustion mixture would be seriously impaired.

To comply with this requirement, the thin electrode **1** should not be recessed in the insert beyond 0.016" from the lower face of the peripheral electrode **3**.

The insulating filling **4** is advantageous in that it ensures a particularly long useful life to the insert; as a matter of fact, its position between the electrodes in such that it is efficiently protected against the strong destructive effect of the electric sparks which occurs in inserts having a relatively thin insulating element.

The insulator may advantageously consist of molten borosilicated glass. The insulator being preferably incorporated in the insert through the method employing the combined action of heat and pressure.

Alternately, the cylindrical insulator may be moulded separately by using for example the glass-and-mica sintered products marketed under the trade name of "Micaver" which are advantageous in that they can be machined to their final shape without difficulty.

After its final assembly, the insert may be definitely clamped or secured by means of a nut **6**, as shown in the drawing.

I claim:

In an insert for a surface discharge spark plug for operation with a discharged condenser in low-tension ignition installations comprising, in combination, an inner thin, circular, tungsten disc electrode having a thickness in the order of 0.6 millimeters and opposite faces one of which forms a flat sparking surface, a tubular outer electrode disposed circumferentially of the inner electrode and radially spaced therefrom forming a gap between it and the disc electrode and having a substantially flat annular sparking surface at one end thereof, an insulator core disposed internally of the outer electrode and substantially filling it and said gap and having a substantially flat surface substantially coplanar with the outer electrode sparking surface, the inner electrode being imbedded in said core about 0.4 millimeters and disposed at substantially an end of the outer electrode corresponding to the sparking surface thereof and having its flat sparking surface disposed in a plane corresponding to a plane lying axially outwardly of the outer electrode and substantially parallel with the outer electrode sparking surface and the face of the inner electrode opposite to the sparking surface being disposed in a direction axially inwardly of the outer electrode and away from a plane corresponding to the outer electrode sparking surface, and an electrically conductive rod connected to the disc electrode and extending axially through said core in a direction axially of the outer electrode and externally thereof.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 950,847 | Fowler | Mar. 1, 1910 |
| 1,537,903 | Von Lepel | May 12, 1925 |
| 2,176,858 | Koehler et al. | Oct. 17, 1939 |
| 2,391,455 | Hensel | Dec. 25, 1945 |
| 2,689,556 | Smits | Sept. 21, 1954 |
| 2,760,099 | Suter | Aug. 21, 1956 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 22,517 | Great Britain | Sept. 28, 1910 |