

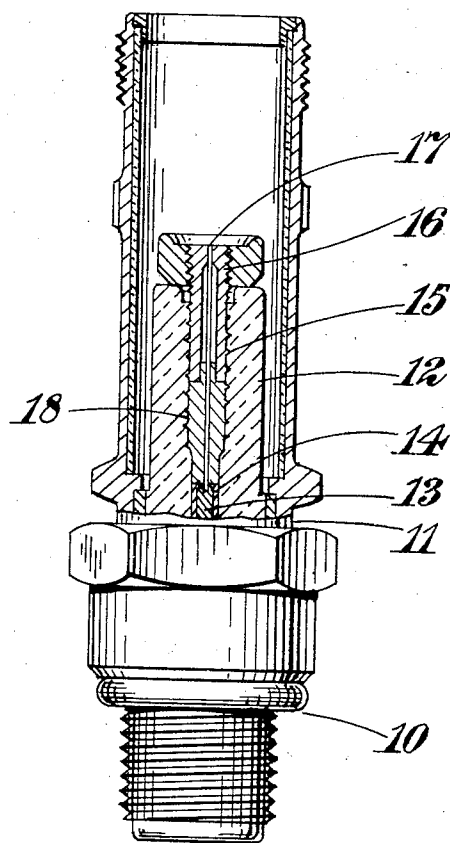
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SPARKING PLUG

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SPARKING PLUG

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5 Claims. (Cl. 123-169)

This invention relates to sparking plugs, for internal-combustion engines, of the type comprising an insulator of ceramic material, such as fused alumina, through which a central conductor passes to a firing point. The object of the invention is to provide a gas-tight seal between the central conductor and the insulator.

The invention, therefore, comprises, in one aspect, a method of sealing the terminal end of a central conductor in a bore of a ceramic insulator of a sparking plug, which method includes the steps of inserting a mixture of glass and a powdered or granulated material which is infusible at the fusion temperature of glass, into the bore so as to surround the central electrode and then heating the assembly to a temperature at which the glass fuses.

In another aspect, the invention comprises a sealing material for use in the method described in the next preceding paragraph, which sealing material comprises a mixture of powdered glass and powdered or granulated material the same as that of which the insulator is made.

According to a feature of the invention, the glass and powdered or granulated material are chosen to have substantially equal coefficients of thermal expansion.

In yet another aspect, the invention comprises the combination with a ceramic insulator and a sealing mixture as set forth above, of a conductor to be surrounded by the sealing mixture which conductor is selected to have substantially the same co-efficient of thermal expansion as the sealing material.

Where the insulator is made of fused alumina, containing a flux or binding material, such as that known under the registered trade-mark "Corundite," the sealing mixture conveniently comprises a boro-silicate glass and powdered or granulated "Corundite" material, and the metal of the conductor which is to be surrounded by the sealing mixture is conveniently of molybdenum. Tungsten may also be used for the conductor.

One embodiment of sparking plug according to the invention will be described by way of example, reference being had to the accompanying drawing which is an elevation of the sparking plug partly in longitudinal section.

The sparking plug comprises a two-part plug body 10, 11 in which is held an insulator 12 formed of ceramic material, such as that sold under the registered trade-mark "Corundite," through which passes a central conductor. The central conductor comprises a core 13 of steel

surrounded by a sheath of copper 14, the core 13 and sheath 14 both terminating well below the top or terminal end of the bore through the insulator 12, and a molybdenum wire 17 engaged in the top end of the core 13 and extending upwardly through a hole drilled in a terminal stud 16 with which the molybdenum wire has a good electrical contact. The core of the insulator above the end of the core 13 is widened and provided with a coarse thread 15 which is engaged by an external thread on the stud terminal 16. Between the lower end of the stud 16 and the top of the core 13 around the molybdenum wire 17 there is a gas-seal 18 formed of a sealing material comprising a mixture of glass, for example boro-silicate glass, and powdered or granulated fused alumina, such as that sold under the registered trade-mark "Corundite."

In the manufacture of the combined insulator and the central conductor, the core 13 is drilled at one end to receive the end of the molybdenum wire 17, and the core together with the molybdenum wire then positioned in the bore of the insulator. The sealing material is next packed in the bore of the insulator around the molybdenum wire 17, the sealing material being tamped into position from the terminal end of the bore and the stud 16 screwed in thereby compressing the sealing material tightly in the space between the stud 16 and core 13. The top end of the wire 17 passes into the hole drilled in the stud 16 and is secured in good electrical contact with it.

The assembly is next passed into a furnace and heated to a temperature sufficient to cause the glass to fuse, but not to fuse the "Corundite" material. Consequently the glass, when cooled, forms a hard vitreous matrix in intimate contact with the insulator 12 on the one hand and with the molybdenum wire 17 on the other hand, having the "Corundite" particles forming a disperse phase therein.

It is found that the particles of the infusible material have the effect of preventing the formation of large bubbles which would otherwise result from gassing in the glass; on the contrary, the granules produce a very large number of small bubbles evenly distributed throughout the seal.

Moreover, since the glass, the "Corundite" particles and the molybdenum have approximately the same coefficient of thermal expansion as the insulator 12, there is no tendency for the seal to

fail owing to changes of temperature which occur during the working of the plug.

I claim:

1. The method of sealing the terminal end of an electrode in a bore, which is larger in diameter than said terminal end, in a ceramic insulator, comprising the steps of inserting the electrode into the bore, filling the space within the bore between the electrode and the insulator with a mixture of powdered glass and a powdered or granulated material having a melting point higher than glass, and heating the assembly to a temperature above the melting point of glass but below that of the powdered or granulated material.

2. For sealing an electrode into a bore in an insulator made of a ceramic material, a cement comprising a mixture of powdered glass and the ceramic material in a powdered or granulated form.

3. An electrode-insulator assembly for a sparking plug, comprising a ceramic insulator having a central bore, an electrode received in said bore and having a terminal portion which is smaller in cross-section than the part of the bore in which it is situated to provide a space and a seal filling said space and comprising fused glass having dispersed therein powdered material having a melting point higher than the glass.

4. An electrode-insulator assembly for a sparking plug, comprising a ceramic insulator having a central bore of which one end is tapped to receive a terminal, an electrode received in the bore and having its part within the tapped part of the bore of smaller diameter than the bore, a terminal screwed into the bore and in electrical contact with the electrode and a seal filling the space between the electrode and the bore that is not filled by the terminal, said seal comprising fused glass having dispersed therein powdered ceramic material of which the insulator is made.

5. An electrode-insulator assembly for a sparking plug, comprising an insulator made of a ceramic material and formed with a bore, an electrode received in the bore and having a terminal portion which is of less diameter than the part of the bore in which it lies to provide a space within the bore and a seal filling the said space and consisting of fused glass in intimate contact with the electrode and walls of the bore in the insulator and having dispersed in it particles of the ceramic material, which cause the gas within the seal to be dispersed therein in the form of a large number of small bubbles.

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