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1,993,388

SPARK PLUG

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Fig. 1.

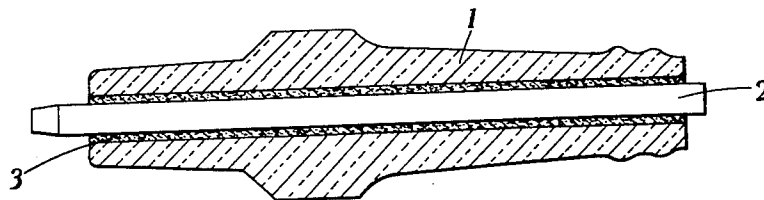


Fig. 2.

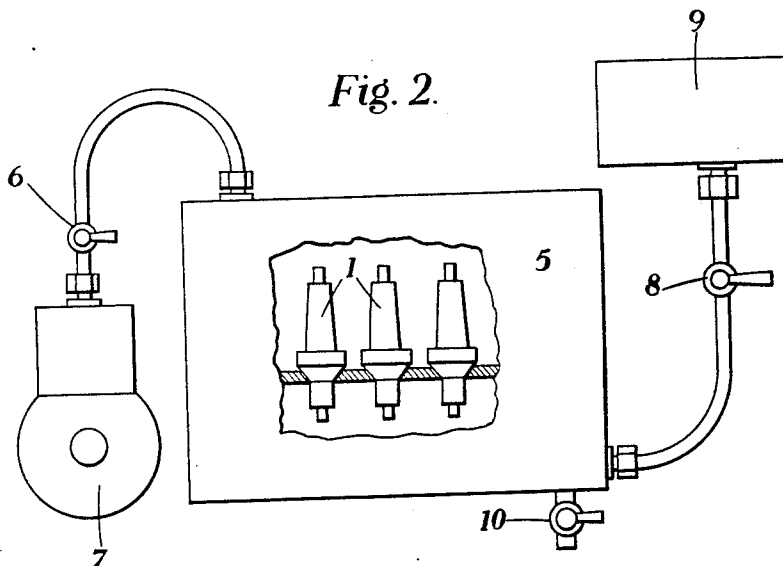
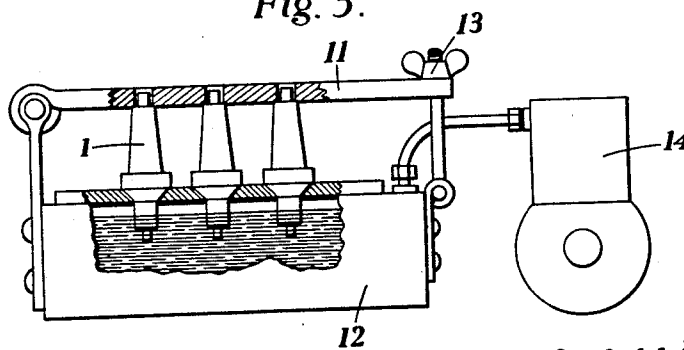


Fig. 3.



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SPARK PLUG

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3 Claims. (Cl. 123—169)

This invention relates to sparking plugs for internal combustion engines.

In one type of sparking plug, a central wire rod electrode is cemented in the bore of an insulating sleeve which is usually of a porcelainic nature. The quality of the cement employed is usually reasonably satisfactory in preventing undue gas leakage therethrough, and along the bore of the insulating sleeve, and between it and the central electrode. When, however, the central electrode is not adhesively secured by the cement along the full length of the bore of the insulating sleeve, it may happen that undue gas leakage may occur. Undue gas leakage may also occur owing to cement of an unsuitable character being employed or to slight irregularities in its final structure.

The object of the present invention is to render gas tight the cement securing a central rod electrode in the bore of the insulating sleeve of a sparking plug. According to the invention the set cement is impregnated with an interstice-sealing liquid which forms a sealing precipitate with the material of the cement.

The preferred method is to force a liquid into the interstices within the bore of the insulator and subsequently apply heat thereto. Such a liquid is one which is capable of permanently setting and occupying, or of providing a deposit permanently occupying the pores and interstices in the cement, as well as any spaces between the wall of the bore of the insulating sleeve and the central wire rod electrode, which may not be completely filled with cement.

Further features of the invention will be apparent from the following description taken in conjunction with the accompanying drawing, in which:—

Fig. 1 is a longitudinal section of part of a spark plug to which the invention is applicable;

Fig. 2 is a diagram of one form of apparatus for carrying out the invention; and

Fig. 3 is a diagram of another form of apparatus.

In Fig. 1 is shown the insulator sleeve 1 of a spark plug, which is usually porcelainic in character, and within the bore of which is the central electrode 2. The electrode is cemented in the bore in the usual manner by a cement 3, which may be of the sodium silicate type.

In order that the bore of the insulator with the electrode 2 and cement 3 within it shall be gas tight, the cement is impregnated with a liquid which has the effect of sealing up or fully occupying the spaces, pores and interstices within

the bore, whether they be between either the cement and the electrode or the cement and the insulator, or whether they be within the cement itself. If necessary, as above indicated, heat or other treatment may be applied, after the impregnation, in order to effect the sealing by the liquid.

A satisfactory liquid is a solution of ferric chloride. It is thought that this, during subsequent heat treatment, reacts with the traces of sodium silicate in the cement, to form a complex precipitate which seals the pores and interstices.

Solutions of water-soluble salts of iron or aluminum, may be used. In order to bring about the required chemical changes the heat treatment with this type of impregnating liquid involves a temperature of about 100° C.

The impregnation can be effected either hot or cold according to the fluidity or other nature or requirements of the liquid being used. One method is illustrated in Fig. 2 of the drawing. The insulators, with the central electrode cemented in, are mounted in a chamber 5 which can be placed in communication by means of a tap 6 with a vacuum pump 7. By means of a further tap 8, the chamber can be put into communication with a supply tank 9 containing the impregnating fluid. The chamber is first exhausted by the pump, and then subsequent to closure of the tap 6, the tap 8 is opened, whereupon liquid rushes into the chamber 5. Due to the previous exhaustion of air, the liquid can easily enter the pores and interstices in the insulators and thus a satisfactory impregnation is effected. A drain tap 10 allows the chamber 5 to be drained.

In Fig. 3 of the drawing an alternative method is illustrated. The insulators are clamped, by means of a clamp 11, in apertures in the top of a chamber 12 such that an air-tight connection is obtained between the insulators and the aperture walls. The ends of the insulators dip into the impregnating fluid as shown. When the clamp is tightened by means of the wing nut 13, a pressure pump 14 is started up or connected to the chamber 12, so that pressure forces the fluid through the pores and interstices within the central bore of the insulator.

After removal from the impregnating chamber the insulators are left to dry, and if the fluid is such that further treatment is necessary to cause a sealing of the pores and interstices, the insulators are then subjected to such treatment. For heat treatment they may be placed in a heated chamber or passed through a tunnel oven.

We claim:—

1. In the combination an insulator, an electrode in the insulator, cement connecting the electrode to the insulator, said cement being impregnated with material filling its pores and forming a sealing precipitate with the material of the cement.

2. A spark plug as defined in claim 1 in which

the cement is alkaline and the impregnating material is a metallic salt precipitated by contact with the alkali.

3. A spark plug as defined in claim 1 in which the cement is sodium silicate and the impregnating material is ferric chloride.

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