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APPARATUS FOR ASSEMBLING LOW-TENSION SPARKING PLUGS FOR ENGINES

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Fig. 1

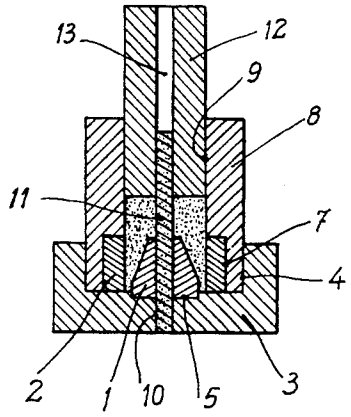
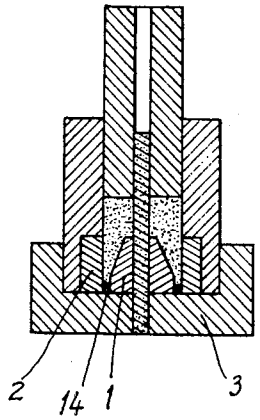


Fig. 2



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APPARATUS FOR ASSEMBLING LOW-TENSION SPARKING PLUGS FOR ENGINES

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4 Claims. (Cl. 49—1)

This invention relates to spark plugs generally and more particularly to low-tension spark plugs.

Many forms of low-tension spark plug electrodes have already been proposed, wherein the spark occurs between two electrodes by the discharge of a condenser in the iginition system of an internal combustion engine. The fitting of a body of insulating material in the space between the electrodes, which space is relatively narrow (i.e., of the order of from about 0.004" to about 0.012"), constitutes a difficult problem and restricts considerably the range of insulating materials suitable for this purpose, inasmuch as the insulating material must be such as to enable the spark to glance off its surface while presenting a convenient mechanical and thermal resistance thereto.

This invention relates more particularly to manufacturing spark-forming elements of low-tension ignition spark plugs, wherein the insulating material is glass, notably borosilicate glass.

According to the present invention, the insulating material in powder form is set in the aforesaid space under the combined action of pressure and heat. To this end, the invention provides means adapted to hold the electrodes in the proper relationship and to guide a piston by which the insulating material is simultaneously compressed to fill up this material.

Other features and advantages of the apparatus and method according to the present invention will be better understood as described in the following specification and claims in conjunction with the following drawings in which:

Fig. 1 is a sectional elevation view of the apparatus according to the invention and illustrates the method of assembling spark plugs according to the invention, and

Fig. 2 is a sectional elevation view of another embodiment of the apparatus shown in Fig. 1 and illustrates the use of a spacer in assembling the electrodes of a spark plug according to the invention.

The method of manufacture will now be described with reference to Fig. 1 of the accompanying drawings illustrating diagrammatically by way of example a typical embodiment of the means employed for carrying out same in the practice. It being understood that like parts of the apparatus shown in the drawings bear similar reference numerals and the apparatus of Fig. 2 is similar to that of Fig. 1 except as later herein described. In Fig. 1, the sparking element proper consists of two concentric electrodes 1, 2 between which the insulating material is to be disposed. For this purpose, the central electrode is held in position by being clamped in a heat-resistant base member 3 formed with a cylindrical cavity 4 formed in turn in its bottom with a central recessed portion 5 of the same diameter as the central electrode 1 so that the latter will have its lower face at a level slightly below the bottom of the cylindrical cavity 4. The peripheral or outer electrode 2 is positioned in the larger portion 7 of a double-bore cylindrical cavity formed in a cylindrical heat-resistant body 8 of which

the smaller bore 9 is of the same diameter as the bore of the peripheral electrode 2.

The outer diameter of the cylindrical body 8 is such that the latter has a free sliding fit in the cylindrical cavity 4. An axial cylindrical hole 10 is drilled through the electrode 1 and base member 3 and adapted to receive a graphite rod 11 to be used as a core; furthermore, the hole 10 is adapted to form a passage for the lead-in conductor.

In this invention, after having assembled the parts 8 and 4, the inner space of cylinder 8 is filled with glass powder and the assembly heated to a suitable temperature, for example 1,470° F., whereupon the piston 12 (which has a slide fit in the bore 9) is lowered by adequate means (not shown) to compress the glass powder. This movement is facilitated by forming an axial bore 13 in the piston 12 which is engaged by the upper end of the graphite rod 11 acting as a guide.

If desired the apparatus may be constructed as shown in Fig. 2 without recess 5 in which case a washer 14 of a different insulating material such as mica may be disposed in the bottom of the gap separating the electrodes. This washer may act as a distance-piece or spacer between the electrodes, whereby the bottom recess 5 may be dispensed with.

This method may be employed with nearly all usual electrode shapes and is particularly suitable when the insulating material consists of glass in powder form, notably powdered borosilicate glass.

I claim:

1. Apparatus for assembling low-tension surface discharge spark plugs having an inner and outer concentrically disposed electrode and an insulator fixed between the electrodes comprising heat-resistant means including a hollow cylinder for releasably holding the two electrodes disposed concentrically during assembly, and radially spaced in fixed relative position so that they define a space radially of the inner electrode, the cylinder being disposed peripherally of the outer electrode and having inner wall surfaces defining an axial bore and extending axially as a continuation of the inner surfaces of the outer electrode forming a receptacle for receiving a composition of insulating material to be molded under heat and pressure into an insulator between the electrodes, a piston reciprocable in said cylinder for applying axially directed pressure to the insulating material while the composition is in a heated and plastic state, and core means movable after assembly of the electrodes and setting of the insulating material disposed extending axially of the inner electrode and axially in the bore of the cylinder for cooperating with the piston to assist in guiding the piston axially during its reciprocable movement and for maintaining the inner electrode disposed exactly concentrically of the outer electrode during the travel of the piston in a pressure applying direction, whereby the inner and outer electrodes are assembled in fixed relation ship with an exact radial distance between them.

2. Apparatus according to claim 1, in which said heat-resistant means comprises a base disposed at one end of the cylinder and is provided with a recess to receive the end of the cylinder and releasably hold the cylinder in a fixed position extending substantially normal to the base, said base being provided with a hole disposed centrally in the recess, spacer means comprising a mica washer disposed circumferentially of the inner electrode for holding the inner electrode in a fixed position relative the outer electrode, and in which the inner electrode is provided with an axial bore, said core means comprising a rod-like member disposed in said central hole and extending axially through the bore of the inner electrode and through the composition the piston being provided

with an axial bore for slidably receiving the rod-like member and cooperating therewith during its travel.

3. Apparatus according to claim 1, in which said heat-resistant means comprises a base disposed at one end of the cylinder and is provided with a first recess to receive the end of the cylinder and releasably hold the cylinder in a fixed position extending substantially normal to the base, and having a second recess within the first recess for releasably holding the inner electrode axially of the cylinder.

4. Apparatus according to claim 3, in which the base is provided with a hole centrally disposed in the second recess and corresponding with the longitudinal axis of the cylinder, and in which the inner electrode is provided with an axial bore, said core means comprising a rod-like member disposed in said central hole and extending axially through the bore of the inner electrode and through the composition, the piston being provided with

an axial bore for slidably receiving the rod-like member and cooperating therewith during its travel.

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