United States Patent

[11] 3,591,736

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[33] **Great Britain**
[31] **13181/69**

[54] **INTERNAL COMBUSTION ENGINE IGNITION DISTRIBUTOR CAP WITH IMPROVED CEMENT TERMINAL CONNECTOR MEANS**
4 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **200/19, 200/166**
[51] **Int. Cl.** **H01h 19/00**
[50] **Field of Search** ..... 200/19, 23, 28, 166 CT

[56] **References Cited**

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ABSTRACT: An internal combustion engine distributor cap has an H.T. input terminal in the top of the cap, and a central contact member, which projects within the cap is electrically connected to the inner end of the input terminal, and secured in the cap, by a mass of conductive cement formed from a mixture of epoxy resin and iron powder.

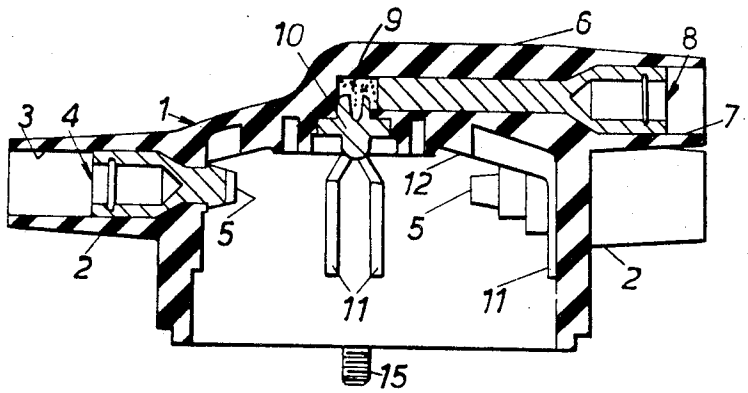

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FIG.1.

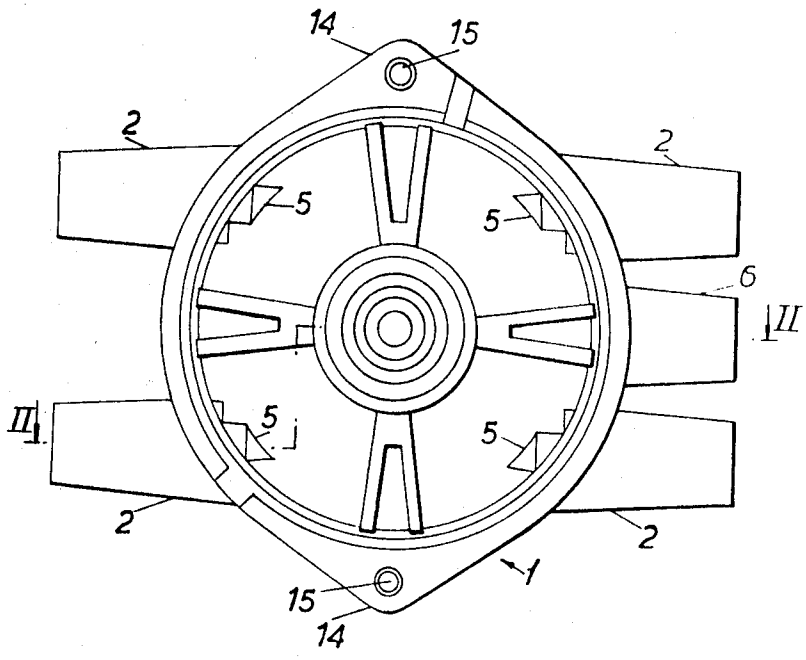
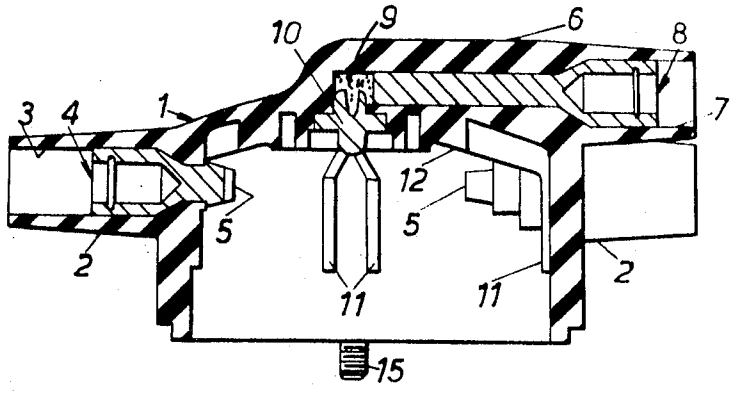


FIG.2



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INTERNAL COMBUSTION ENGINE IGNITION DISTRIBUTOR CAP WITH IMPROVED CEMENT TERMINAL CONNECTOR MEANS

This invention relates to internal combustion engine distributors and in particular to the connections in the cap of a distributor between the terminal in the top of the cap into one end of which an H.T. lead is inserted and to the other end of which is connected a central contact which projects within the top of the cap and is engageable by the distributor rotor.

In an internal combustion engine ignition distributor cap according to the invention an H.T. input terminal in the top of the cap is connected at its inner end to a central contact member, which projects within the cap, by a mass of conductive cement compressed between the inner end of the terminal and said contact member.

The conductive cement is injected into a bore, which may be an angled bore formed in the material of the top of the cap so that upon the insertion of the H.T. input terminal into one end of the bore and the central contact member into the other end thereof the conductive cement is compressed between the terminal and contact member to form a good conductive connection therebetween and to secure the contact member and terminal in said bore.

Preferably the conductive cement is a mixture of synthetic resin, such as epoxy resin, and iron powder. The ratio of resin to iron powder may be from 1:5 to 1:10.

The scope of the invention is defined by the appended claims; and the invention and the method by which it is to be performed are hereinafter particularly described with reference to the accompanying drawings, in which:

FIG. 1 is an inverted plan of an ignition distributor cap according to the invention; and

FIG. 2 is a section on the line II–II of FIG. 1.

The drawings show an ignition distributor cap **1** which may be made of thermosetting plastics material, such as phenolic or alkyd resin, but is preferably made of a thermoplastic material, which may be reinforced, for example glass-filled nylon.

The cap **1** has four terminal housings **2** which extend laterally therefrom and are moulded integrally therewith, each housing **2** having therein an opening **3** which extends into the interior of the cap for the reception of terminals **4** (of which one only is shown in FIG. **2**), to receive the spark plug leads. In order to secure the terminals **4** in the housing **2** it is preferred to make the openings **3** slightly undersize and to press the terminals **4** into the housing openings **3** this conveniently being done immediately following a hot moulding operation by which the cap **1** is formed. If the terminals are inserted subsequent to the moulding of the cap, the cap material should be hot when the inserts are fitted, if the material used is a thermosetting plastics material.

The inner ends **5** of the terminals project within the cap in known manner to conduct electrical energy from a rotor (not shown) which is carried in the body of the distributor to which the cap **1** is fixed and which rotates past the ends **5** of the terminals **4**.

The terminals **4** are shaped so as to prevent rotation or withdrawal from the housings **2** after assembly and during machining operations on the cap **1**.

The cap **1** has also formed integral therewith in the top thereof a housing **6** for the H.T. input terminal, the housing **6** extending laterally of the cap and having therein an angled bore **7** the inner end of which is arranged coaxially of the cap and the circle on which lie the ends of the terminals **5**. An H.T. input terminal **8** is pressed into the bore **7** and at its inner end the terminal **8** connected by a mass of conductive cement **9** to a central contact **10** which maybe of graphite and is located in the inner end of the bore **7** and projects downwardly coaxially of the cap **1**. The conductive cement **9** secures the central contact **10** within the inner end of the bore **7** and also connects it electrically to the inner end of the terminal **8**.

The conductive cement **9** is injected into the bore **7** so that, upon the insertion of the H.T. input terminal **8** into the outer end of the bore **7** and the central contact member **10** into the inner end of the bore the conductive cement **9** is compressed between the terminal **8** and contact member **10** to form a good conductive connection therebetween and to secure the contact member **10** and terminal **8** in the bore **7**.

The conductive cement is a mixture of synthetic resin, such as epoxy resin, and iron powder. A cement mixture which is suitable for the purposes of the invention has the following compositions:

Epoxy resin— parts by weight
Hardener—part by weight

One part by weight of the above resin and hardener mixture is then added to 7 parts by weight of electrolytic iron powder.

The conductive cement formed in this way is cured for 30 minutes at 100° C. but may be cured in 10 minutes at 160° C.

The ratio of adhesive to filler, in parts by weight, may vary from 1:5 to 1:10.

When jointing two absorbent electrodes, for example, of graphite, with the conductive cement the joint resistance is less than 1 ohm, but for metal-to-metal joints, it is of the order of thousands of ohms. However, if the latter joint is flashed with 15, the resistance drops to less than 1 ohm. It is believed that this is because at the metal-adhesive interfaces, a resin-rich insulating area exists that is broken by the H.T. This migration can be seen in cast blocks of the compound.

The cap **1** has reinforcing ribs **11**, **12** moulded respectively in the sidewall and top thereof and is formed with a diametrically opposed lugs **14** with bores therein to receive screws **15** by which the cap **1** can be secured to the body portion (not shown) of a distributor.

The invention simplifies and reduces the cost of assembly of a distributor cap and avoids the use of known conductive cements which, because they are filled with silver powder are considerably more expensive. Although the iron powder-epoxy resin mixture described above has a lower conductivity than a silver filled cement, such reduced conductivity does not have any noticeable effect on the efficiency of the distributor by reason of the very high voltages which pass between the H.T. input terminal and said central contact.

The construction of the distributor cap may be further modified by replacing a portion of the H.T. input terminal **8** by a body of resistive material which provides the desired suppression of high frequency oscillations which if not suppressed would give rise to radio interference during operation of the distributor.

A distributor with four metal-to-metal joints, and the center metal-to-graphite joint was run on a static life test rig for 2722 hours at revolutions equivalent to 30 m.p.h. simulating a 81,660 miles road test and functioned perfectly. No carbonizing of the joints was seen on disassembly. The 15 kv flashover for the break down of resistance necessary when the cement is used in conjunction with a nonabsorbent electrode can be accomplished by the initial discharge from the H.T. or ignition coil on the engine installation.

We claim:

1. An internal combustion engine ignition distributor cap, having secured therein and spaced around the axis of the cap a plurality of output terminals to receive spark plug leads; a high tension input terminal secured in the top of the cap to receive an external high tension input lead; a contact member mounted coaxially of, and projecting within, said cap; and a mass of conductive cement which conductively connects said input terminal and contact member and secures them in said cap, said conductive cement comprising a mixture of synthetic resin and iron powder.

2. An internal combustion engine ignition distributor cap, comprising a cap moulding of plastics material; a plurality of high tension output terminal housings and a single high tension input terminal housing moulded integral with said cap, said housings being formed with bores for the reception of terminals therein; high tension output terminals respectively

secured in said output terminal housing bores, said output terminals having outer end portions adapted to receive spark plug leads and inner end portions which extend within said housing and lie on a circle coaxial with said cap; a high tension input terminal secured in the inner end of said input terminal housing bore and having an outer end portion adapted to receive a high tension input lead; a contact member mounted in the inner end of said input terminal housing bore and projecting coaxially within said cap; and a mass of conductive cement interposed between and conductively connecting the said input terminal and said contact member and securing said input terminal and contact member in said cap, said conductive cement comprising a mixture of epoxy resin and iron powder.

3. An internal combustion engine ignition distributor cap according to claim 2 in which the cement in said conductive cement is a mixture of 10 parts by weight of epoxy resin and 1 part by weight of hardener, 1 part of the resin and hardener mixture being admixed with 5 to 10 parts by weight of electrolytic iron powder.

4. An internal combustion engine ignition distributor cap according to claim 3 in which 1 part by weight of the resin and hardener mixture is admixed with 7 parts by weight of electrolytic iron powder.

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(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,591,736 Dated July 6, 1971

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It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 12, insert -- 10 -- before "parts"; line 13, insert -- 1 -- before "part"; line 25, after "15" insert -- KV --.

Signed and sealed this 23rd day of November 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Acting Commissioner of Patents