Aug. 27, 1935. H. WALTERS 2,012,699

SPARK PLUG

Filed Feb. 12, 1934

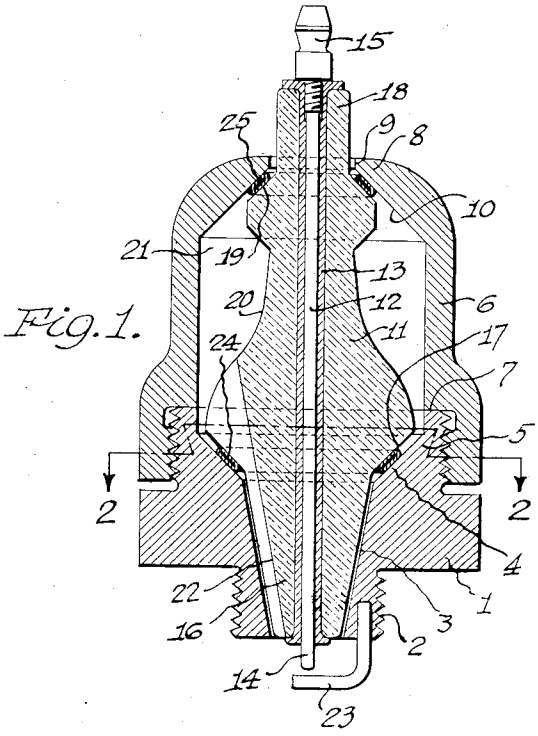


Fig. 1.

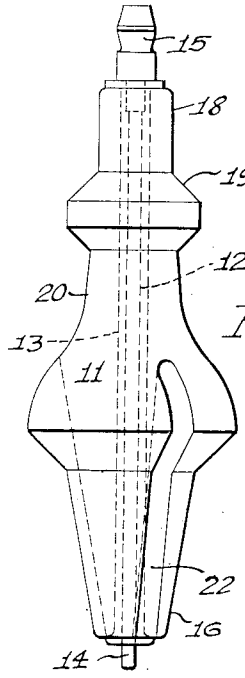


Fig. 3.

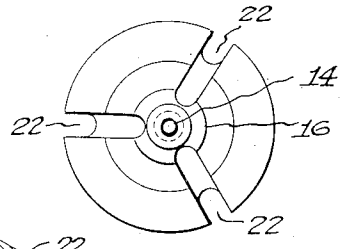


Fig. 4.

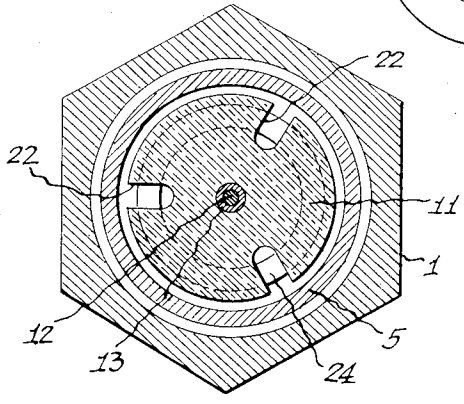


Fig. 2.

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SPARK PLUG

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7 Claims. (Cl. 123—169)

This invention relates to a spark plug particularly adapted for use in connection with internal combustion engines, and its object is to provide a self-cleaning plug the terminals of which will not become fouled and short circuited when the engine is pumping an excessive amount of oil. A further object is to provide an insulating core or porcelain the construction of which is such as to preclude its cracking in use and to provide a strong and rigid body so arranged as to guard against injury by unequal expansion, the major portion of said body being inclosed and firmly seated within an enclosing casing which forms a chamber around the porcelain having restricted communication with the interior of the engine cylinder at the inner end of the plug adjacent its terminals, whereby upon compression in the cylinder, this chamber is filled with explosive mixture which is exploded therein upon the down stroke of the engine piston and the products of this combustion shoot past the terminals cleaning the same.

A further object is to provide certain other new and useful features, all as hereinafter set forth, reference being had to the accompanying drawing in which

Figure 1 is a transverse longitudinal section through a complete structure illustrative of an embodiment of the present invention;

Fig. 2 is a transverse section substantially upon the line 2—2 of Fig. 1;

Fig. 3 is a side elevation of the porcelain core detached; and

Fig. 4 is a lower end view of Fig. 3.

The plug comprises a metal casing comprising a base 1 formed with a screwthreaded nipple 2 adapted to be received in a bore communicating with the combustion chamber of an explosion engine in the manner well known in the art. The base part 1 is further formed with a conical bore 3 which is countersunk at its upper end as indicated at 4. The base part has an upwardly extending screwthreaded portion 5 receiving an internally threaded hollow body or casing 6, the latter having an internal shoulder 7 adapted to oppose the portion 5 and an end wall 8 formed with a central opening 9 and an annular inclined shoulder 10.

A porcelain insulating body 11 has an axial conductor rod 12 enclosed in a protective sheath or tube 13 molded in the body to secure it therein, the rod extending beyond the lower end of the porcelain to form an electrode 14 and is screwthreaded at its upper end to screw into said tube and to form a terminal post receiving a clamping nut 15 and also to provide for longitudinal adjustment of said rod in said tube. The porcelain body 11 has a substantially conical lower end portion 16 received in the conical bore 3, and an annular outwardly inclined shoulder 17 received in the countersunk part 4. The upper projecting end portion of the porcelain body 11 is formed cylindrical as at 18 and this portion extends through the central opening 9 in the end wall 8 of the casing 6, projecting a short distance therebeyond to insulate from the casing, a lead wire connected to said rod. On the porcelain body within the casing 6 adjacent the end wall thereof, there is formed an enlargement forming an inclined shoulder 19 to oppose said shoulder 10 of the casing and that portion of said body between the enlargement forming the angular shoulder 17 and this enlargement of the porcelain body is reduced in diameter as at 20 to provide a space between said body and casing wall and form a combustion chamber 21 in said casing surrounding said body. Furthermore the porcelain body is formed with a plurality of grooves 22 in the exterior of its conical end portion 16, cutting through the adjacent enlargement or shoulder 17 on the body and providing passages leading from the chamber 21 and opening through the lower end of the conical portion of the body adjacent the electrode 14 and an electrode 23 on the nipple 2, which electrode is bent to lie adjacent to but spaced from the electrode 14 in the usual manner to provide a spark gap.

In assembling the device a compressible ring gasket 24 is placed in the countersink 4 between the shoulder formed thereby and the shoulder 17 with the conical end 16 of the porcelain body 11 seated in the conical bore and a similar ring type compressible gasket 25 is then placed on the inclined shoulder 19 and the casing 6 is screwed onto the portion 5 of the base, securely clamping said insulating body 11 between the shoulders 10 and 4 on the casing 6 and base respectively. When the shoulder 7 approaches the portion 5 the gaskets 24 and 25 will have become compressed and provide an efficient sealing means so that gases cannot enter or escape from the chamber 21 except through the grooves 22, and the porcelain insulation is rigidly held in the casing with all except its end portions 16 and 18 spanning the chamber 21, so that a substantially even heat will be applied to the insulator throughout substantially its entire length by combustion in said chamber and unequal expansion of the procelain will be obviated, thus preventing cracking thereof.

When the present plug is mounted in a cylinder of an internal combustion engine and the compression stroke takes place a quantity of combustible gases will be forced into the chamber 21 through the passages 22 and when the charge in the cylinder is fired in the usual manner these gases in the chamber 21 will also be fired and expand rapidly to create a blast through the grooves 22 upon the power stroke of the engine piston, the blast thus created being directed against the electrodes 14 and 23 by said grooves or passages, setting up a flow of gases of sufficient velocity to efficiently clean the electrodes of deposits before such deposits have had sufficient time to become firmly adhered thereto and the burning of the points is also prevented thereby.

The gap between the points or electrodes 14 and 23 may be quickly and accurately adjusted without removing the plug from its mounting in the engine cylinder, by mounting the rod 12 slidably in the tube 13 and screwing this rod into or out of said tube, thus providing a very quick setting of the spark gap while the engine is running to secure the most effective adjustment.

Although a specific embodiment of the present invention has been illustrated and described it is to be understood that various changes may be made within the scope of the appended claims without departing from the spirit of the invention, and such changes are contemplated.

What I claim is:—

1. A spark plug including a metal casing forming a combustion chamber having restricted communication with the interior of an engine cylinder, an insulating body provided with an electrode projecting from the inner end of said body, said body extending across said chamber and confined adjacent its ends within said casing, whereby said body is secured adjacent its ends with the main portion thereof enclosed within said chamber and heated by combustion within said chamber to give substantially equal expansion substantially throughout the length of said body.

2. A spark plug including a metal casing forming a combustion chamber having restricted communication at its inner end with the interior of an engine cylinder to which the plug is applied in use, said casing being formed with seats at the inner and outer ends of said chamber, and an insulating body seated adjacent its ends upon said seats with the main portion of said body extending across said chamber and in spaced relation to the side walls thereof, said body being provided with an electrode at its inner end.

3. A spark plug including a metal casing having a screwthreaded nipple at its inner end formed with a tapered bore, said casing forming a combustion chamber having restricted communication through said nipple with the interior of an engine cylinder to which the plug is applied in use, and an insulating body having a tapered lower end portion to seat in said tapered bore and an upper end portion seated upon the upper end wall of said casing to confine said body in said casing with the main portion of said body extending across the chamber of the casing with said body spaced from the side walls of said chamber, said body having an electrode projecting from its lower tapered end.

4. A spark plug including a casing forming a combustion chamber and having an opening through the end thereof which end is applied to an engine cylinder in use, and an insulating body mounted in said chamber and extending across the same and seated in said opening with a passage opening into said chamber at one end and at its opposite end adjacent the end of said body forming the closure for said opening, said end of said body having an electrode adjacent the outlet end of said passage, whereby products of combustion from said chamber will be directed by said passage over said electrode projecting from said body.

5. A spark plug including a metal casing forming a combustion chamber and having an opening in each end thereof with an annular seat adjacent each opening, an insulating body provided with an electrode projecting from one end thereof, said body having shoulders adjacent its ends to seat in said seats and hold said body within said casing and extended across said chamber in spaced relation to the side walls thereof, the end of said body provided with said electrode and said casing forming a restricted passage open at one end into said chamber and at its opposite end adjacent said electrode.

6. A spark plug comprising a casing forming a combustion chamber and formed with a tapered bore in its inner end, and an electrode carrying body formed with a tapered lower end to seat in said bore, said tapered end being formed with external longitudinal grooves forming passages open at their upper ends into said chamber of said casing and at their lower ends adjacent said electrode.

7. A spark plug as characterized in claim 6, and wherein said casing is formed with an opening in the upper end wall of its chamber opposite said tapered bore in its lower end, and wherein said body has an upper end portion to engage in and close said opening in said end wall, said casing being formed with annular seats at the inner end of said bore and opening for the seating thereon of annular shoulders on said body, and said casing being formed in two parts to be drawn toward each other to clamp said body within said casing and seated upon said seats.

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