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SPARK PLUG

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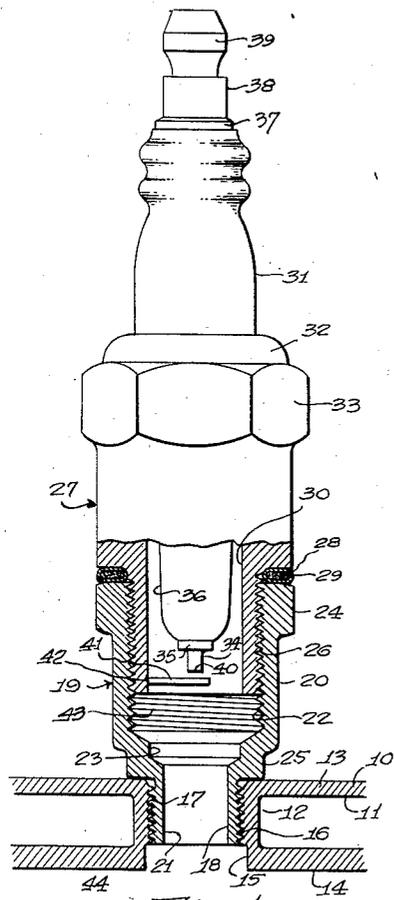


Fig. 1.

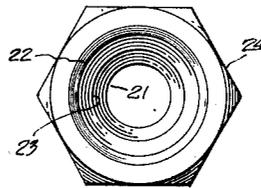


Fig. 3.

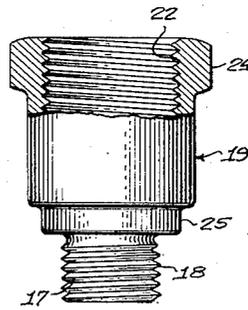


Fig. 2.

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SPARK PLUG

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2 Claims. (Cl. 123—169)

This invention relates to spark plugs for internal combustion engines.

One object of this invention is to provide a spark plug which is adapted to be used in modern high compression internal combustion engines, with a reduced tendency toward fouling and burning out of electrodes.

Another object is to provide a spark plug particularly suited for insertion in small-diameter threaded spark plug bores in the cylinder heads of modern internal combustion engines of high compression.

Another object is to provide a spark plug having a sparking chamber with a restricted entrance opening into the explosion chamber of the engine, the electrodes being spaced away from this entrance so as to reduce the fouling and burning out of electrodes.

Another object is to provide a shell for receiving a spark plug of a relatively large diameter base and insertable in a cylinder head bore of smaller diameter so as to form a sparking chamber with a restricted entrance with electrodes located a considerable distance from the entrance to the explosion chamber of the engine.

In the drawing:

Figure 1 is a front elevation (partly broken away) in central vertical section, of a spark plug according to a preferred embodiment of this invention.

Figure 2 is a side elevation, partly in section, of the lower shell of the spark plug shown in Figure 1.

Figure 3 is a top plan view of the lower spark plug shell shown in Figure 2.

In general, the spark plug of this invention consists of a lower shell threaded into a relatively small bore in the engine cylinder head and expanding into a larger diameter sparking chamber containing the two electrodes of the spark plug, the outer electrode being attached to the upper shell which is threaded into the lower shell and the central electrode being carried by and extending through the center of the usual insulator or "porcelain." In this manner the electrodes of the spark plug are located at a considerable distance from the explosion chamber and hence are less subject to the entrance heat and carbon-forming materials, with the result that the plug fouling is greatly reduced and the burning out of electrodes diminished to a large extent.

Referring to the drawing in detail, Figure 1 shows a cylinder head 10 of an internal combustion engine having a water jacket space 11 for

the circulation of cooling fluid and having an annular wall 12 interconnecting the outer and inner walls 13 and 14 of the cylinder head 10. The annular wall 12 is provided with a bore 15 which is internally threaded as at 16 and serves to receive the corresponding threads 17 upon the small diameter end 18 of the lower spark plug shell generally designated 19. The diameter of the bore 15 is relatively small compared with the diameter of the main body 20 of the lower shell 19 and is provided with a bore 21 of restricted diameter opening into a threaded bore 22 of considerably larger diameter within the main body 20 and separated therefrom by a flaring wall 23. The upper end of the lower shell 19 is provided with a hexagonal head 24 to which a wrench may be attached. The main body 20 and lower end portion 18 are separated from one another by an annular stepped portion 25.

Threaded into the relatively large threaded bore 22 is the threaded lower end 26 of the upper spark plug shell 27, leakage being prevented by a hollow gasket 28 containing asbestos or other sealing material 29. The upper shell 27 is provided with a central bore 30 expanded at its upper end (not shown) to receive the spark plug insulator 31 or "porcelain."

The insulator 31 is secured within the upper shell 27 by the knurled or spun portion 32 and is provided adjacent the latter with a hexagonal head 33 for receiving a wrench. The insulator 31 is provided with a central bore (not shown) through which passes the central electrode 34, the lower end of which carries a flange 35 serving as an abutment against the lower end 36 of the insulator 31 and the upper end carrying the usual threaded disk 37, cap 38 and threaded nut 39.

Arranged adjacent the lower end 40 of the central electrode 34 is the outer electrode 41 which is secured in the lower end 42 of the upper shell 27. The outer electrode 41 may be secured with a radial hole in the lower end 42 of the upper shell 27 or in any other suitable manner. Thus the electrodes 41 and 34 are located in a relatively large diameter sparking chamber 43 formed by the threaded bore 22 and the flaring wall 23 and with a restricted entrance formed by the bore 21 of the lower end 18 of the lower shell 19.

In operation, the spark coil or other source of high tension electricity has one of its leads grounded to the frame or engine in such a manner that it is in circuit with the engine cylinder head 10, whereas the other lead is connected to the central electrode 34 by means of the nut 39.

The usual suitable timing and distributing device is, of course, employed in connection with distributing the electricity and timing the various sparks. When the circuit leading to the electrodes 34 and 41 is closed, a spark leaps across the gap between the lower end 40 of the central electrode 34 and the outer electrode 42. This spark takes place within the large diameter chamber 43 which is already filled with explosive gas entering this chamber by means of the restricted port or bore 21 leading through the small diameter portion 18. The spark ignites the explosive gas within the chamber 43 and the flame thereof shoots through the bore 21 into the explosion chamber of the engine, igniting the entire charge.

As the ignition takes place within the sparking chamber 43 at a distance from the main explosive chamber 44 beneath the cylinder head 10, the electrodes 34 and 41 are protected from the heat of the main explosion and are also protected from fouling by the products of combustion within the main chamber. It has been found by actual running tests with the spark plugs constructed according to the present invention that the plugs continue to perform satisfactorily long after the ordinary spark plugs have been rendered inefficient by fouling or burning out of the electrodes. The ordinary plug, it will be understood, has its central electrode projecting down into the space adjacent the lower end of the portion 18, whereas the outer electrode extends inwardly from a point adjacent the bottom thereof. In such positions, the electrodes of the prior art plug are exposed to the full force of the flame of the main explosion and also to the products of combustion, burning oil, and other gases or materials tending either to burn out the electrodes or foul them.

In the preferred form of the invention, the spark plug has been disclosed as made up of upper and lower shells 27 and 19 respectively threaded together, this form of construction being used merely because of convenience in manufacture and for ease in inserting and locating the electrodes 42 and 34. It will be understood, however, that the upper and lower shells 27 and 19 may be combined in one single shell, the electrodes 41 and 34, however, being located at the same relative positions as in the two-part construction shown in Figure 1.

While a specific embodiment of the invention has been described and illustrated, it will be understood that various modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

What I claim is:

1. A spark plug of the character described comprising a hollow shell having an external threaded end portion of reduced size capable of being received in a miniature spark plug receiving bore of an engine, said reduced portion having a bore of restricted diameter and said shell having an upper internally threaded chamber of enlarged diameter adapted to receive a threaded electrode shell of increased size, an insulator extending into said upper chamber, a first electrode extending through said insulator and terminating a distance short of the open end of the threaded electrode shell, and a second electrode extending from said electrode shell within the confines of the open threaded end thereof and projecting beneath said first electrode, said electrode being located and spaced remote from the entrance to said restricted diameter end portion and said electrode shell having an outer diameter contiguous with the outer diameter of the hollow shell.

2. A spark plug of the character described comprising a hollow shell having an end portion of reduced diameter adapted to be received in a miniature spark plug opening of an engine, said shell at the reduced end portion being provided with a bore of restricted diameter and an upper chamber of enlarged diameter, said upper chamber having an internally screw threaded bore extending inwardly from its open end to the bore of restricted diameter and said reduced end being externally screw threaded with screw threads of reduced size, an electrode supporting shell having an externally threaded reduced portion adapted to be received in the internally threaded portion of the upper chamber of enlarged diameter, an insulator carried by the electrode supporting shell extending into said upper chamber of enlarged diameter, a first electrode carried on the lower end of said electrode supporting shell, a second electrode carried by the electrode supporting shell and extending through said insulator into the upper chamber and terminating a distance short of the end of said electrode supporting shell directly above said first electrode, said hollow shell comprising a tubular member having a polygonal shaped upper end portion contiguous with the outer diameter of the electrode supporting shell and said electrode supporting shell having a polygonal shaped upper end portion to facilitate the insertion and removal of said electrode supporting shell with respect to said hollow shell.

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