July 8, 1924. 1,500,916

W. L. BARRON

SPARK PLUG

Filed April 27, 1923

Fig. 1.

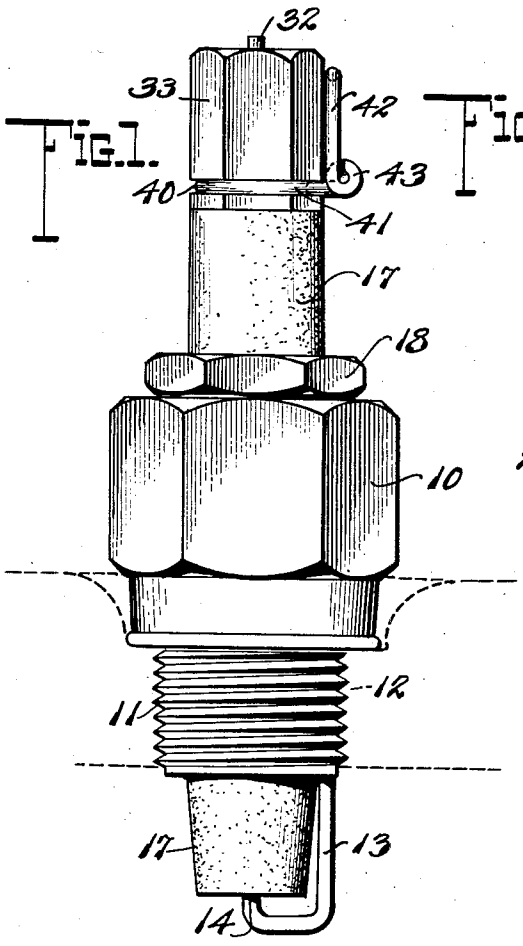


Fig. 2.

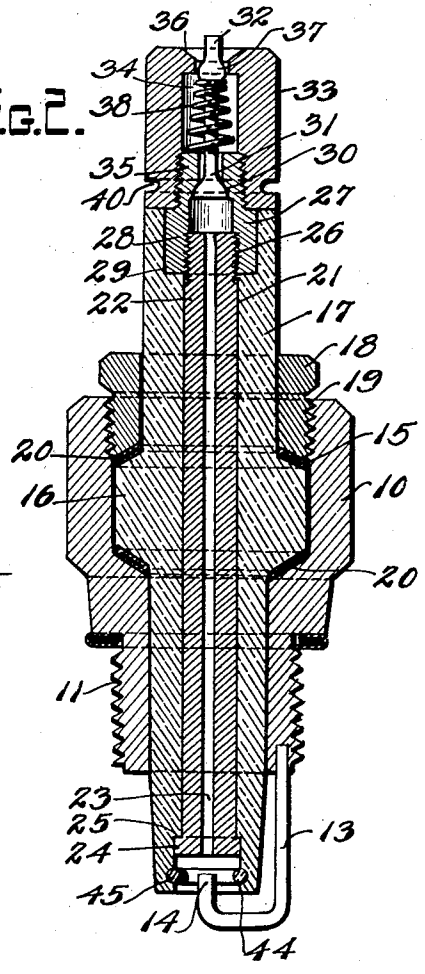


Fig. 3.

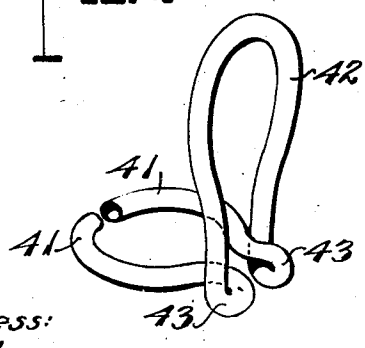
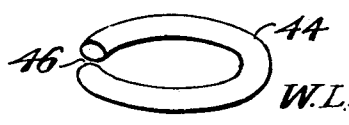


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM L. BARRON, OF OKLAHOMA CITY, OKLAHOMA.

SPARK PLUG.

Application filed April 27, 1923. Serial No. 635,082.

To all whom it may concern:

Be it known that I, WILLIAM L. BARRON, a citizen of the United States, residing at Oklahoma City, in the county of Oklahoma and State of Oklahoma, have invented certain new and useful Improvements in Spark Plugs, of which the following is a specification.

This invention relates to a spark plug, and particularly to a construction embodying an air intake through said plug.

In the practical application of plugs of this character, the means for introducing air therein have not been disposed so as to effectually cool the insulating member and also cool and cleanse the firing points, particularly when such points are arranged for an intensified spark. Such earlier constructions have involved more or less complicated constructions which are avoided in the type of plug herein presented wherein the number of parts is materially reduced and assembled for ready disconnection and cleansing or repair.

The present invention seeks to provide an improved construction by which an insulating sleeve is mounted within the usual supporting shell which carries one electrode, while within the sleeve an opposite tubular electrode is mounted and provided with an air intake valve, the discharge from said tubular electrode being so disposed as to directly impinge upon the firing points in order to introduce oxygen to effect a hot spark and also cool the insulating support and firing electrode in its downward passage directly over the latter which also effects a cleansing action by removing any particles of adhering carbon before the same can become caked or baked upon the firing point of the electrode.

A further object of the invention is to provide an improved form of firing electrodes in which the discharge from the inner or tubular electrode is directly toward a firing ring supported by an insulating surface, and a secondary discharge or spark passes from this ring to the firing point of the electrode connected to the grounded plug.

Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the drawing:

Figure 1 is a perspective of the invention applied to an engine;

Figure 2 is a central vertical section thereof;

Figure 3 is a detail perspective of the connecting clip for the terminal wire; and

Figure 4 is a similar view of the firing ring.

Like numerals refer to like parts in the several figures of the drawing.

The numeral 10 designates the plug shell which may be of any desired configuration and is provided with the usual threaded portion 11 for engagement with a cooperating aperture in the engine head 12, as usual. Depending from this threaded portion is an electrode 13 which has an upturned or reentrantly bent firing point 14. The body of the shell 10 is formed with a chamber 15 adapted to receive a centrally disposed enlarged body 16 of the insulating sleeve 17. This body portion is clamped in position by a nut 18 threaded at 19 into the chamber 15. Packings of any desired character may be disposed between the faces of the body portion 16 and those of the shell and nut, as indicated at 20. The insulating member 17 may be formed of any preferred material, such as porcelain or other vitreous substance, and is formed with a central aperture 21 within which a tubular electrode 22 is disposed, the passage 23 therethrough being in direct alignment with the firing point 14 of the electrode 13. The lower end of this tubular electrode is formed with a head 24 which rests against a shoulder 25 of the insulating sleeve, while the upper end of the electrode is threaded as at 26 to receive a connecting valve chamber 27 which is interiorly threaded at 28 and bears against the base of a chamber 29 in the insulating member.

It will be seen that an adjustment of this valve chamber draws the tubular electrode into position and firmly secures the same while also permitting its convenient removal when desired. The upper portion of the valve chamber 27 is provided with a valve seat 30 cooperating with a valve 31 the stem 32 of which is extended upward. This stem is enclosed by a cap 33 having a receiving chamber 34 and threaded at 35 upon the upper portion of the valve cham-

ber. This cap is also formed at its upper end with a relatively restricted opening 36 having a tapering intake thereto, and which opening cooperates with an enlargement or guide 37 upon the valve stem. The valve is normally held in closed or seated position by a coiled tension spring 38 bearing against this guide 37 and also the upper end of the valve chamber. The guiding action of the cap insures a direct and positive seating of the valve and prevents any lateral play of the stem which is extended beyond the cap in order that the valve may be manually depressed when desired. This is of particular importance when the chamber in the cap is filled with a priming fluid and the valve depressed to admit this priming charge into the engine cylinder prior to the starting of the engine. The valve is normally operated by the suction incident to the engine stroke and if this priming chamber be filled under such conditions the fluid will be drawn into the cylinder for the preliminary priming action, and subsequently a feed of air passes through the same valve and passage.

For the purpose of connecting the terminal to the plug the cap 33 is provided with a groove 40 extending circumferentially thereof and adapted to receive the spring arms 41 of a connector, as shown in Figure 3. This connector is preferably formed from a single piece of wire or like material and the portion 42 thereof is extended at an angle to the spring arms 41 by means of the bent portions 43 connecting these members. The usual conducting wire is connected to the portion 42 of the spring clip in any desired manner.

In order to provide the most efficient form of intensifying action at the spark gap, an improved construction of these parts has been provided and this embodies a firing ring 44 seated in a recess 45 within the insulating sleeve which is extended below the plug body and is exposed to the action of the charge within the cylinder. This extended portion is normally cooled by the passage of air through the inner electrode and the head 24 of this electrode is spaced from the firing ring 44 to form a preliminary spark gap at that point, while the firing point 14 of the electrode 13 is disposed within sparking distance of the firing ring 44 so as to secure the secondary or intensified spark between the ring and this point. The term "ring" as herein used is not necessarily confined to a circular structure, as it may be of any desired form to effect the proposed action, but is herein shown as being formed of spring material with a gap 46 by which it may be compressed and expanded into the seat 45 where it is firmly held by its expansive tension.

In the operation of the invention the suction stroke of the engine piston draws a charge of air through the tubular electrode, the aperture of which discharges in direct alignment with the firing point which is thus cooled and cleansed from carbon, while the effect of such impact is to diffuse the air toward the walls of the porcelain insulator which carries the firing ring and these parts are also maintained in cool condition. This body of air also supplies oxygen at the firing point which is particularly effective in securing the intensified spark contemplated by this invention as the air is applied directly to the first spark gap between the tubular electrode and firing ring. This intensified action is also materially facilitated by the arrangement herein presented by which the preliminary and secondary spark gaps are each confined within the extended porcelain insulating portion from the plug. The construction of the air intake also provides a positive simple form of valve which is guided in its action by the cap member and this member is formed to effect a priming function of the engine when desired, while the extended stem of the valve permits its manual operation if necessary. The construction and assemblage of parts of this plug permits ready access to the interior members thereof and also to the valve by simple removal of the cap for the valve and clamping screw for the insulation, so that the members may be readily cleaned and replaced without the liability to breakage or damage.

While the construction of this spark plug has been specifically shown and described, the invention is not confined thereto, as changes and alterations may be made without departing from the spirit of the invention as defined by the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a spark plug, a supporting shell provided with an electrode, an insulating sleeve arranged within said shell and projected beyond the lower end thereof, a tubular electrode within said sleeve, a valve casing mounted upon said electrode at its upper end, a tensioned valve in said casing controlling an air intake to said tubular electrode and having an extended operating stem, and a cap carried by said valve casing to partially enclose and guide the extended end of the valve stem.

2. In a spark plug, a supporting shell provided with an electrode, an insulating sleeve carried by said shell and having a chamber at its upper portion, a tubular electrode within said sleeve, a valve casing disposed within the chamber of said sleeve and connected to said tubular electrode, a valve within said chamber having a vertically disposed stem formed with an enlarged

portion and an operating extension therefrom, a closing spring for said valve disposed between said portion and said valve casing, and a cap member mounted upon the valve casing and having a guide opening cooperating with said enlarged portion and exposing said extension.

3. In a spark plug, a supporting shell provided with a depending electrode having a re-entrant firing point, an insulating sleeve supported by said shell and extended below the lower end thereof to enclose said point, an electrode disposed within said sleeve, and a firing ring carried by the sleeve spaced from the inner electrode and concentric to said point.

4. In a spark plug, a supporting shell provided with an electrode having a re-entrant firing point, an insulating sleeve disposed in said shell and extended beyond the same, a tubular electrode provided with an air inlet, and a firing ring mounted in said sleeve below the tubular electrode and concentric to said firing point.

In testimony whereof I affix my signature.

WILLIAM L. BARRON.