March 31, 1925. 1,531,943

L. G. HOWARD

SPARK PLUG

Filed Nov. 23, 1922

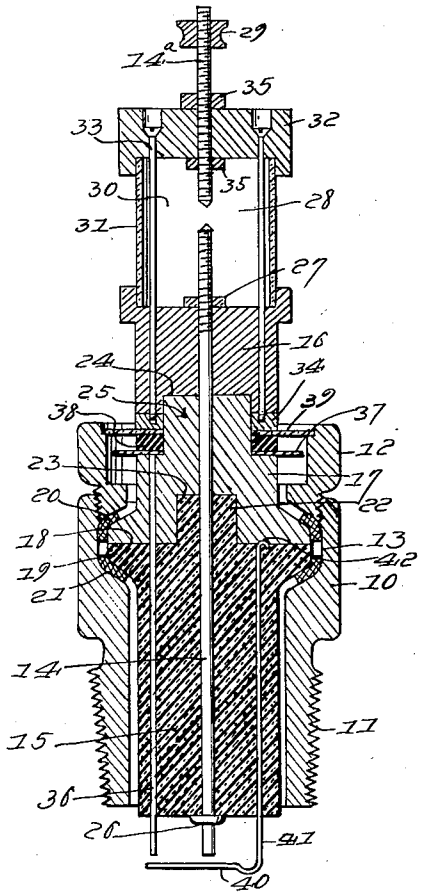
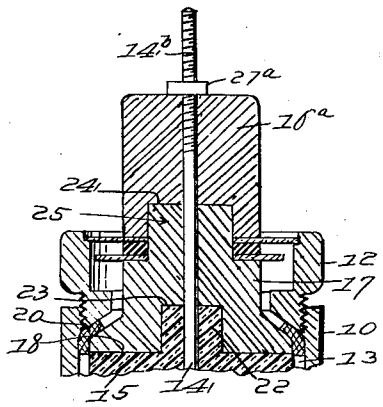


Fig. 1.

Fig. 3.



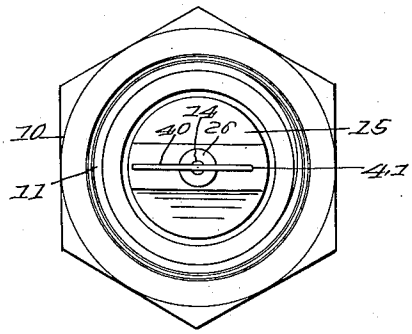


Fig. 2.

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UNITED STATES PATENT OFFICE.

LORENZO G. HOWARD, OF PROVIDENCE, RHODE ISLAND.

SPARK PLUG.

Application filed November 23, 1922. Serial No. 602,794.

To all whom it may concern:

Be it known that I, LORENZO G. HOWARD, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented new and useful Improvements in Spark Plugs, of which the following is a specification.

The object of the invention is to provide a spark plug suitable for general purposes in connection with motors of the explosive type, wherein provision is made for indicating the proper functions of the battery or magneto circuit and for intensifying the spark, wherein provision is made furthermore for indicating the proper functioning of the device at the spark terminals without removing the plug from the cylinder, and with these objects in view, the invention consists in a construction, combination and relation of parts of which a preferred embodiment is illustrated in the accompanying drawings, wherein:

Figure 1 is a longitudinal sectional view.

Figure 2 is an inner end view of the improved spark plug.

Figure 3 is a detail sectional view of a slight modification wherein the intensifier feature is omitted.

The structure embodies essentially a shell 10 threaded as usual and as indicated at 11 for engagement with the opening in the cylinder head and fitted at its outer end with a shell nut 12 to form an annular seat 13 for the reception of an annular enlargement at an intermediate portion of the length of the insulating core which extends through the shell and carries the main electrode 14, said core being of sectional construction and consisting in its illustrated form of a lower main or body section 15, an upper or outer section 16 and an intermediate section 17. The separation between the main and intermediate sections of the core is indicated at 18. Cushioning rings 20 and 21 are interposed between the surface of the enlargement and the wall of the shell. The inner end of the shell nut serves upon the tightening of the nut to bind the core in its place in the shell and hold the sections of the core in their proper relative positions. Preferably an interlocking relation is established between said core sections by providing one of them with a tongue 22 to engage a socket 23 in the other. This feature serves to break the joint between the sections and insure a relative centering thereof. Likewise the upper and outer section 16 of the core and intermediate section are interlocked, by providing the latter with a socket 24 for the reception of a tongue 25 on the core section 17, and the main electrode which consists of a rod extension axially through said core sections and through the interlocking elements of those sections, with a collar 26 in contact with the lower end of the section 15 and a binding nut 27 engaged with a threaded portion of the rod and bearing upon the outer end of the upper or outer section 16 so as to lock the parts against relative longitudinal displacement.

The main electrode, in the construction shown in Figure 1, is divided to form a spark gap 28 serving as a spark intensifier and also as a means of indicating the proper functioning of the ignition circuit for the connection of which said electrode is provided with the usual binding nut 29, and this gap is arranged in a gap chamber 30 bounded by a wall 31 of glass or other light penetrable material fitted at its lower end on the terminal core section 16 and at its upper end in a cap block 32 which is secured to said terminal core section by bolts 33 which preferably pass through said terminal core section and engage a retaining ring 34 located in the upper end of the hollow shell nut. The outer terminal portion 14^a of the electrode is adjustably mounted in the cap block 32 to provide for varying the extent of the spark gap and is movable and secured at its desired adjustments by nuts 35—35.

In the modified construction indicated in Figure 3 the spark gap feature just described is omitted and the terminal section 16^a of the insulating core constitutes the outer end of the spark plug and is held in place as previously described by the main electrode 14^b which is fitted with a binding nut 27^a.

For cooperation with the main or positive electrode there is provided the grounding or negative electrode 36 bodily embedded in the core and extending longitudinally thereof from the lower or inner end of the main or body section thereof through the joint 18 and the intermediate core section 17 where it is terminally attached to a grounding disk 37 arranged in the upper end of the hollow shell nut peripherally spaced from the inner surface of the nut

sufficiently to form a small spark gap visible through the upper end of the shell nut and serving as a telltale or indicator of the proper functioning of the spark terminals at the inner end of the plug. The grounding disk which is seated upon a shoulder of the intermediate core section 17 is held in place by an insulating gasket 38 upon which bears a transparent annular panel 39 of mica, or its equivalent, in turn secured by the retaining collar 34 upon which bears the inner end of the terminal core section 16.

Instead of having the ignition spark gap formed directly between the terminals of the main and grounding electrodes it is preferred to employ a bridging terminal 40 disposed transversely of the spark plug axis in spaced relation with the extremities of the bore of said terminals and supported at one end by a tie rod 41 which is imbedded in and extends longitudinally of the main or body section of the core and is offset or provided with a hook 42 and at its outer end engaged with the outer end of the main or body section of the core and held in place against movement permitting rotation of the rod by the contact therewith of the adjacent end of the intermediate core section, to the end that the bridging terminal may be permanently held in proper relation with the extremities of the electrodes.

The construction and arrangement of the bridging terminal facilitates the cleansing thereof or the removal therefrom of any accumulations of carbon and at the same time minimizes the tendency of carbon to deposit thereon due to a vibratory characteristic thereof incidental to the support of said terminal at one end only, and in addition said terminal by reason of its transverse arrangement below the inner end of the block, and the anchoring of the tie rod in the core at an intermediate portion of the length of the latter, serve to prevent any shattered or fractured portions of the core which may become detached by heat from dropping into the cylinder. The core is thus reinforced by both the main and grounding electrodes and the means employed to support the bridging terminal with the collar 26 of the main electrode and the transversely disposed terminal 40 serving as a means for preventing the dropping of portions of the core from the inner end of the plug. At the same time the carrying of the grounding electrode outwardly through the core to a plane near the open end of the shell nut affords an opportunity for enabling the operator to determine without removing the plug from the cylinder whether the sparking terminals are properly functioning.

Having described the invention, what is claimed as new and useful is:

A spark plug comprising a shell, a nut engaging the shell, a core housed in the shell and nut, a gap chamber mounted upon the core, an electrode traversing the length of the core and having one end disposed in said gap chamber, a terminal passing through the wall of the gap chamber and having an end located in the gap chamber and spaced from the terminal, the said nut having a gap chamber, a second terminal located in the last mentioned gap chamber and supported upon the core and spaced from the surface of the nut, an electrode connected with the second mentioned terminal and passing through the core, both of said terminals having end portions extending beyond the end of the core and spaced from each other, and a bridging electrode carried by the core and having an end portion disposed transversely of the ends of both of the first mentioned electrodes and spaced therefrom.

In testimony whereof he affixes his signature.

LORENZO G. HOWARD.