

July 28, 1925.

1,547,918

L. G. HOWARD

SPARK PLUG

Filed Nov. 23, 1922

Fig. 1.

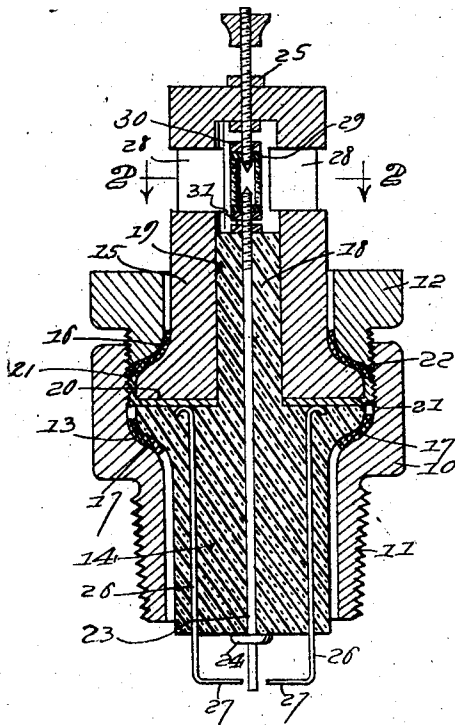


Fig. 2.

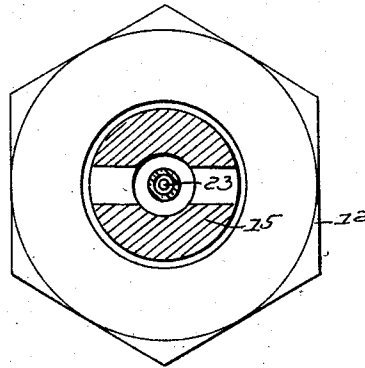
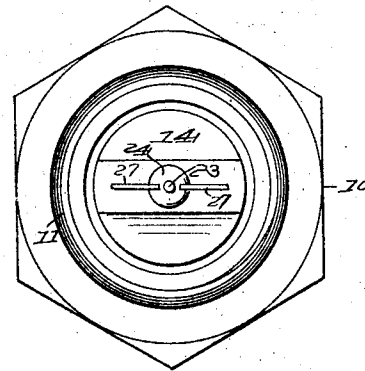


Fig. 3.

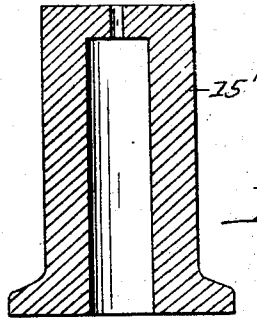


Fig. 4.

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SPARK PLUG.

Application filed November 23, 1922. Serial No. 602,795.

To all whom it may concern:

Be it known that I, LORENZO G. HOWARD, a citizen of the United States of America, 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 simple and efficient construction of spark plug wherein the risk of fracturing the insulating core either by heat or vibration is minimized and wherein the disadvantages ordinarily resulting from the fracture of a core are neutralized by the provision of means for preventing detached portions of the core from dropping into the motor cylinders.

A further object of the invention is to provide a plurality of selectively or interchangeably operative grounding electrodes or elements which perform the additional function of reinforcing the insulating core and particularly that portion of said core which is directly exposed to the heat of the explosion chamber, and to so dispose these selectively or interchangeably operative grounding electrodes with relation to the main or positive electrode as to the retainers to prevent possibly detached portions of the core from finding their way into the motor cylinders.

A further object of the invention is to provide a simple, efficient and well protected arrangement of indicating and intensifying spark gap which, while literally available for inspection by the operator, is not subject to injury in the ordinary use and comparatively rough handling of commercial spark plugs.

With these and related objects in view, the invention consists in a construction and combination of parts of which a preferred embodiment is shown in the accompanying drawings, wherein:

Figure 1 is a longitudinal sectional view of the spark plug.

Figure 2 is a transverse view on the plane indicated by the line 2—2 of Figure 1.

Figure 3 is an inner end view of the plug.

Figure 4 is a sectional view of the inner member of the core when constructed without reference to the accommodation of an intensifying spark gap.

The device consists of a shell 10, threaded

as in the usual practice at 11 for engagement with the opening in the cylinder head and fitted at its outer end with an inserted shell nut 12 having threaded engagement therewith. The shell is provided with an interior bearing shoulder 13 between which and the inner end of the shell nut is arranged an annular enlargement for the insulating core which consists of separate inner and outer members 14 and 15, with which are associated the cushioning gaskets 16 and 17.

An interlocking connection is established by the members of the core by providing one of them as in the construction illustrated the inner member with an axial tongue 18 fitted in an axial bore 19 of the other member and engaged by the adjacent enlarged extremities of the core members and held in a clamping relation thereby is a grounding plate or disk 20 having an annular flange 21 which is in contact with the inner surface of the wall of the shell and preferably has a threaded engagement therewith as indicated at 22, so that the relation of the outer core member by the removal of the shell nut will not permit of the displacement of the inner core member which will be held seated subject to the removal of the grounding disk.

Extending axially through the plug is a main or positive electrode 23 serving to hold the core members in their proper relative positions by reason of a collar 24 bearing against the inner end of the inner core member and a nut 25 bearing against the outer end of the outer core member, and carried by the inner-core member in a spaced relation with the main electrode are the grounding electrodes 26 which extend longitudinally through and in reinforcing relation to the inner core member with their exposed inner terminals turned as indicated at 27 to provide suitable spark gaps for ignition purposes. These grounding electrodes are in connection electrically at their outer ends with the grounding disk 20 and in the construction illustrated are provided with terminal hooks or similar projections which engage the outer end of the inner core member in position to receive the pressure of the grounding disk which in turn is held in place by the outer core member, clamped by the action on the shell nut. This arrangement provides against the

accidental turning of the grounding electrodes to displace their terminals 27 with relation to the main electrode.

When, as indicated in Figures 1 and 2, it is desired to employ an intensifying spark gap to serve also as a telltale or indicator for the information of the operator as to the proper functioning of the battery or generator, the outer core member, instead of being closed throughout as shown in Figure 4, is provided with a transverse opening 28 to expose the separated terminals of sections of the main electrode which, however, are connected by a cage 29 of suitable insulating material held in place by nuts 30 and 31.

The interposition of the spark gap which is thus visible through the slot 28 thus does not destroy the efficiency of the main electrode as a tie rod for connecting the inner and outer members of the core and yet the extent of the gap between the terminals at the spark gap may be adjusted to produce the desired effect.

The collar 24 of the main electrode and the inwardly directed terminals of the grounding electrodes which are suitably anchored in and serve as reinforcing elements for the members of the core, serve to prevent any detached fragments of the core from dropping away from the spark plug and thus falling into the cylinder of the motor, while the spaced arrangement of the core throughout its length with reference to the inner surface of the shell and nut provides for differences in rates of expansion of the core and shell without placing an objectionable strain upon the former, while the cushioning of the core in the shell minimizes the tendency to fracture by vibration.

While the main electrode 23 is hereinabove referred to as serving to hold the core members in their proper relative positions, and while as a matter of fact there is a reinforcing function performed by such electrode with reference to the core by reason of the fact that said electrode notwithstanding the interposition of the spark gap constitutes a continuous tensionable element extending from one end of the sectional core to the other and having elements bearing upon the remote extremities thereof, it will

be obvious from the foregoing description that the features of the construction which are relied upon mainly to hold the several members of the core in their proper positions with relation to the shell and each other are the grounding disk 20 which locks the inner core member in place in the shell, and the shell nut 12 which locks the outer core member in its place in the shell, subject to certain and fully explained cushioning means which are interposed between the parts to prevent injurious jarring of the core members.

It will further be understood that the outer core member which is specifically illustrated in Figure 4 and which is not provided with an intensifying spark gap window opening or means of permitting inspection of the interior thereof may be substituted for the outer core member which is illustrated in Figures 1 and 2 when, for example, the inspection of the spark gap is not deemed necessary, and when such modified form of outer core member is thus employed, due to the construction thereof as clearly shown in Figure 4, the spark gap feature of the main electrode may or may not be used at the option of the manufacturer.

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

A spark plug comprising a shell, a nut screwed therein, a core composed of sections housed within the shell and nut, one section having a central opening and the other having a centrally located tongue which fits snugly in said opening; a grounding disk interposed between said core sections and having an opening which receives the tongue and having its peripheral portion in contact with the shell, an electrode passing centrally through the core and grounding electrodes passing through the inner core section and having contact with the grounding disk, the inner end portions of the said electrodes extending beyond the inner end of the core and being spaced from each other.

In testimony whereof he affixes his signature.

LORENZO G. HOWARD.