Aug. 29, 1939. M. THOMEN 2,171,014

SPARK PLUG

Filed March 1, 1939

Fig. 1.

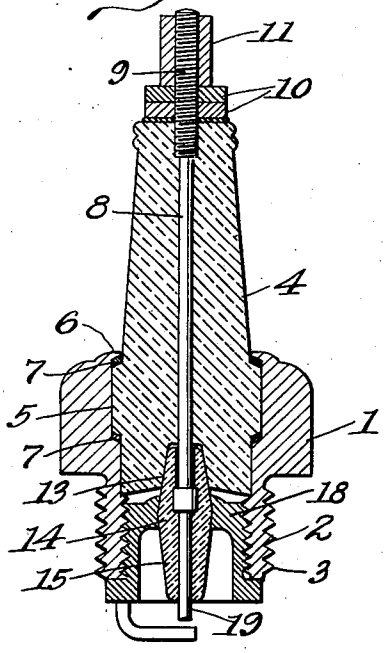


Fig. 2.

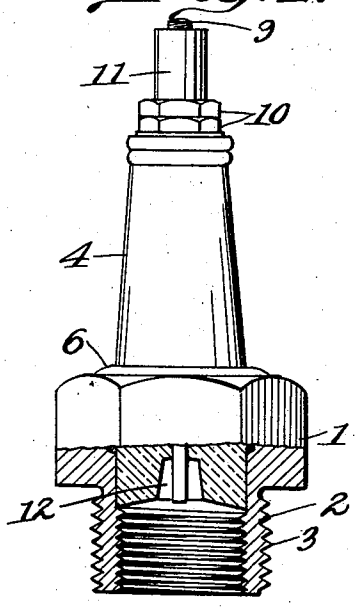


Fig. 3

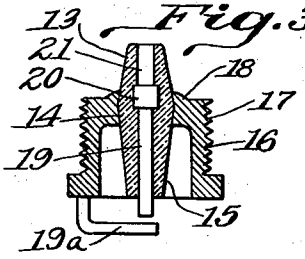


Fig. 5.

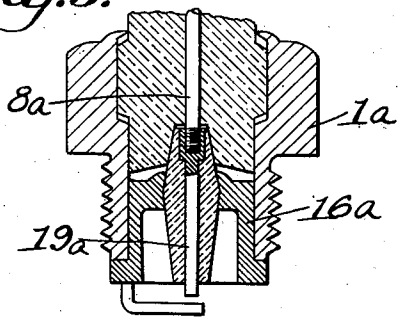


Fig. 4.

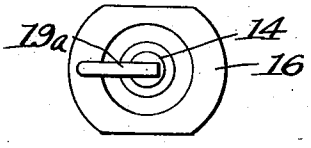
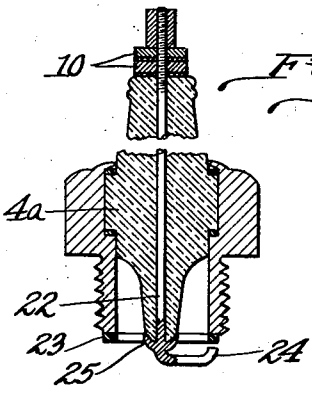


Fig. 6.



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SPARK PLUG

Marion Thomen, Baltimore, Ohio

Application March 1, 1939, Serial No. 259,207

6 Claims. (Cl. 123—169)

This invention relates generally to ignition devices and is particularly directed to spark plugs having separable sections, one of which is provided with electrodes which deteriorate from use. By constructing the spark plugs of separable sections, the cost of renewing the worn parts is greatly reduced and consequently the parts will be replaced oftener and better motor performance secured.

The primary object of the invention resides in providing a sectional spark plug which will be inexpensive to manufacture and convenient to use, there being but two major parts and one of these being removed and replaced entirely when the parts have deteriorated from use.

It is also an object to make the removable portion of the plug with a body, an insulator and a pair of electrodes, the parts being so connected that the unit will be self-contained and convenient to remove and replace.

It is a further object to provide a spark plug having a sleeve-like case in which is permanently secured a primary insulator having a current conducting stem. The case is also provided with an insert which is removable and has a pair of electrodes insulated from one another.

A still further object rests in so connecting the insert with the permanent part of the plug that the tendency for the current to arc or jump at places other than between the electrodes will be materially lessened.

Another object resides in providing a spark plug having but a single element to deteriorate and be replaced.

Other objects will be apparent from the following description and the accompanying drawing in which the invention has been illustrated in several of its preferred forms.

In the drawing:

Fig. 1 is a vertical longitudinal sectional view taken through a spark plug formed in accordance with the present invention;

Fig. 2 is a side elevational view, partly in vertical section, of the permanent part of the plug;

Fig. 3 is a longitudinal sectional view through the removable portion of the plug;

Fig. 4 is a bottom plan view of the removable portion of the plug shown in Fig. 3;

Fig. 5 is a detail vertical sectional view of the lower end of a modified form of plug;

Fig. 6 is a vertical longitudinal sectional view of a still further modified form of plug.

Referring more particularly to the drawing, the numeral 1 designates the sleeve-like casing of the plug. This casing is formed from steel or other suitable metal and is provided at its upper end with flat side surfaces for the reception of a wrench used in securing the plug to an engine. The lower end of the casing is reduced as at 2 and provided with screw threads 3 for connecting the casing with the engine cylinder. The upper end of the casing is formed with an enlarged bore for the reception of the lower end of the primary insulating member 4. This member is formed of porcelain and has an enlargement 5 providing a shoulder for engagement with a similar shoulder formed internally of the casing.

The insulator is permanently secured with the casing by forming the casing with an annular flange 6 to be rolled or otherwise turned down over the enlargement 5 when the insulator is assembled with the casing. The enlargement on the insulator is protected from injury by disposing soft metal gaskets 7 between the shoulders on the insulator and those in the casing. Extending axially through the insulator is a current conducting stem 8 having a threaded upper end 9 to which lock nuts 10 are applied. A sleeve 11 is also threaded on the upper end of the stem to receive a connecting element, not shown, on the end of the ignition wire of the engine. The lower end of the stem projects from the insulator into an inverted cone-shaped socket 12 formed in the lower end of the insulator. This socket is provided for the reception of the upper end 13 of a secondary insulator 14.

The lower end 15 of the secondary insulator is tapered in the opposite direction to that of the upper end. This insulator is supported with the casing by a thimble-like body 16 which, in the preferred form, is externally threaded as at 17 for reception by the similarly threaded lower end of the casing 1. The upper end of the body is closed by a wall 18 having a central opening through which the secondary insulator extends. The edge of the wall around the opening is rolled into engagement with the insulator after the latter has been positioned in the opening. When the opening is formed, it is tapered to conform to the taper on the lower portion 15 of the insulator. After the edge of the opening has been rolled over, the insulator 14 and the body 16 are permanently united and may be removed or replaced in the casing as a single unit.

To facilitate the insertion of the insert 16 within the casing 1, the insert is provided at its lower end with an annular flange having flattened side surfaces to receive a wrench used in threading the member 16 into the casing. The central electrode 19 extends axially of the secondary insulator and terminates slightly beyond its lower end 15. The upper end of the electrode is enlarged as at 20 and is slightly spaced from the upper end of the insulator to provide a socket 21 for the reception of the lower end of the stem 8. A ground electrode 19a is secured at one end to the flange at the lower end of the body 16, the other end of this electrode terminating adjacent to but spaced slightly from the center electrode to provide a spark gap. When the member 15 is

positioned in the casing, the lower end of the stem will be placed in the socket 21 and engage the enlarged end of the center electrode. The current will pass through the stem and into the electrode and produce a spark between the lower end of the center electrode and the inner end of the ground electrode.

As illustrated in Fig. 1, the socket 12 receives the tapered upper end of the secondary insulator. Due to this formation, the distance over which it will be necessary for the current to pass in order to short circuit the plug will be so great that the tendency to do so will be eliminated.

In the form of the invention shown in Fig. 5, the outer side surface of the body 16*a* is left smooth as is the inner surface of the casing 1*a*. The insert is connected with the permanent part of the plug by providing the enlarged upper end of the center electrode 19*a* with internal screw threads to receive screw threads formed on the lower end of the current conducting stem 8*a*. The advantage of this construction is the remote location of the screw threads from the combustion zone which will prevent the accumulation of carbon thereon and inconvenience in detaching the insert from the plug.

In the modified form shown in Fig. 6, the insert has been eliminated and the center electrode 22 is the only part removable from the plug. The lower end of the casing has a ring electrode 23 welded or otherwise secured thereto. When the electrodes become worn, the center electrode may be unscrewed from the lock nuts 10 and withdrawn from the insulator 4*a*. When a new center electrode is installed, the up-turned end 24 will be disposed adjacent to the ring 23 at a different location than the previous position so that the burned part of the ring will not be used. To protect the lower end of the insulator 4*a*, the member 22 has a cap 25 formed therewith. This cap serves as a shoulder to engage the lower end of the insulator and forms a stop to resist upward movement of the member 22 in response to the locking movement of the nuts 10.

From the foregoing, it is apparent that there has been provided a number of spark plugs with renewable electrodes and while various other forms may be suggested, the rights to use such other forms as may be said to wall within the scope of the appended claims is reserved.

I claim:

1. In a spark plug, a sleeve-like shell having a reduced threaded extension formed for reception by the spark plug opening of an engine cylinder, a primary insulator rigidly secured to said shell and projecting from one end thereof, a current-conducting stem having threaded ends extending axially through said insulator, a removable insert carried by the shell, said insert having a thimble-like body with a closed inner end, a secondary insulator extending through the end wall of said body, a center electrode extending axially through said secondary insulator, the inner end of said electrode being internally threaded to receive the threaded end of said stem, and a ground electrode extending from said body and terminating adjacent to the center electrode.

2. In a spark plug, a sleeve-like shell having a reduced threaded extension formed for reception by the spark plug opening of an engine cylinder, a primary insulator rigidly secured to said shell and projecting from one end thereof, the inner end of said insulator having a socket formed therein, a current-conducting stem extending axially through said insulator, the inner end of said stem projecting into said socket, a removable insert carried by said shell, said insert having a thimble-like body with a closed inner end, a secondary insulator supported by said body, the inner end of said secondary insulator projecting into the socket in said primary insulator, a center electrode extending axially through said secondary insulator, an enlargement provided on said center electrode within the confines of said secondary insulator, the inner end of said stem extending into said secondary insulator and engaging the enlargement on said center electrode, and a ground electrode carried by said body and terminating adjacent the outer end of said center electrode.

3. In a spark plug, a sleeve-like shell having a reduced threaded extension formed for reception by the spark plug opening of an engine cylinder, a primary insulator rigidly secured to said shell and projecting from one end thereof, the inner end of said insulator having a socket formed therein, a current-conducting stem extending axially through said insulator, the inner end of said stem projecting into said socket, a removable insert carried by said shell, said insert having a thimble-like body with a closed inner end, a secondary insulator supported by said body, the inner end of said secondary insulator projecting into the socket in said primary insulator, a center electrode extending axially through said secondary insulator, an enlargement provided on the inner end of said center electrode within the confines of said secondary insulator and spaced from the inner end thereof, the inner end of said stem projecting into said secondary insulator and engaging the enlargement on said center electrode, and a ground electrode carried by said body and terminating adjacent said center electrode.

4. In a spark plug, an insert comprising a thimble-like body formed for attachment to the shell of a spark plug and having a closed end, a dielectric member rigidly carried by said body and projecting outwardly beyond the closed end thereof, a center electrode carried by said dielectric member, an enlargement provided on said electrode within the confines of said member, and a ground electrode carried by said body and terminating adjacent said center electrode.

5. In a spark plug, an insert comprising a thimble-like body formed for attachment to the shell of a spark plug and having a closed end, a dielectric member rigidly carried by said body and projecting outwardly beyond the closed end thereof, a center electrode carried by said dielectric member, an enlargement provided on said electrode within the confines of said member, said enlargement having a threaded socket opening toward one end of said dielectric member, and a ground electrode carried by said body and terminating adjacent said center electrode.

6. In a spark plug, an insert comprising a thimble-like body formed for attachment to the shell of a spark plug and having a closed end, a dielectric member rigidly carried by said body and projecting outwardly beyond the closed end thereof, the outwardly projecting end of said member being formed with a socket, a center electrode carried by said dielectric member, an enlargement provided on said electrode at the inner end of the socket in said member, and a ground electrode carried by said body and terminating adjacent said center electrode.

MARION THOMEN.

CERTIFICATE OF CORRECTION.

Patent No. 2,171,014. August 29, 1939.

MARION THOMEN.

It is hereby certified that error appears in the above numbered patent requiring correction as follows: In the grant, line 3, residence of inventor, for "Baltimore, Maryland, read Baltimore, Ohio; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3rd day of October, A. D. 1939.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)