Aug. 26, 1952 J. E. HUDSON 2,608,186

SPARK PLUG

Filed Jan. 24, 1949 2 SHEETS—SHEET 1

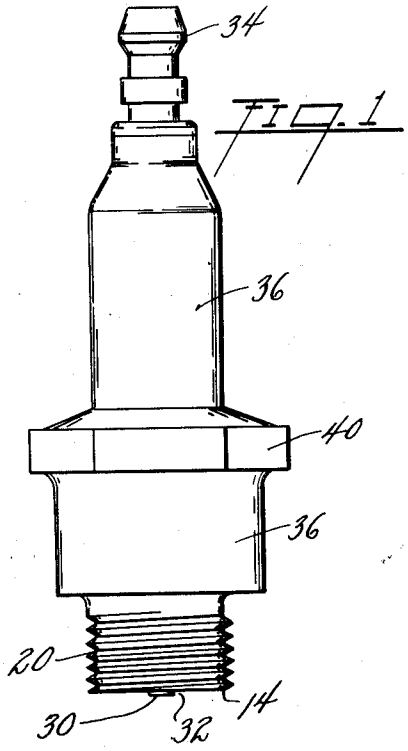


FIG. 1

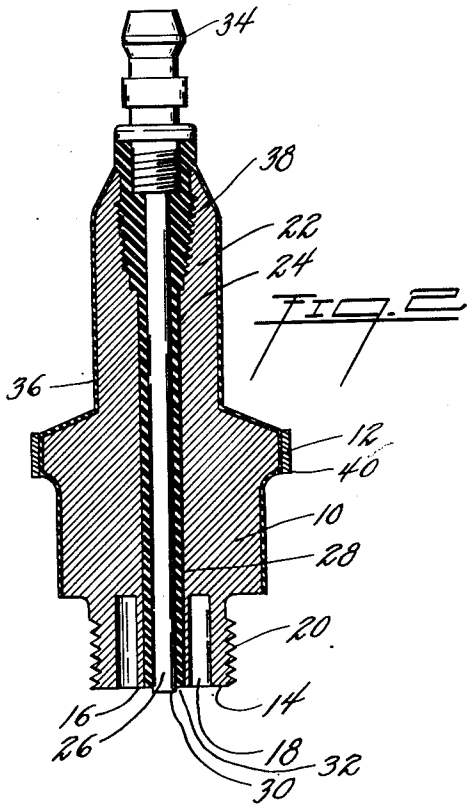


FIG. 2

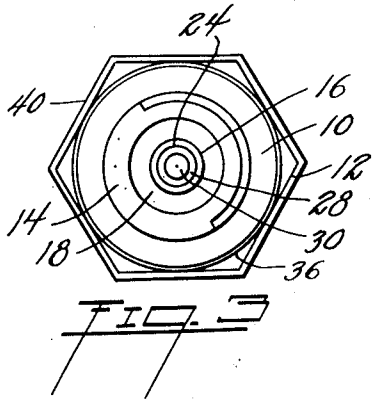


FIG. 3

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FIG. 4

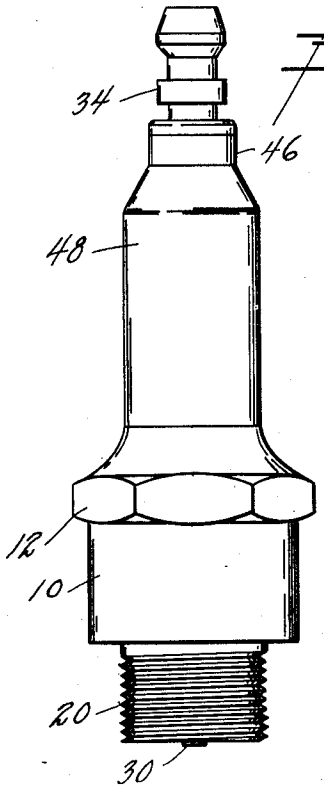
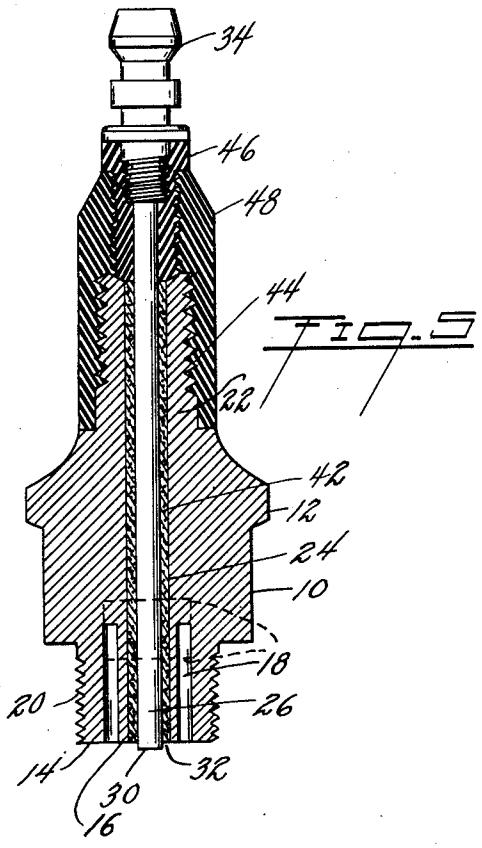


FIG. 5



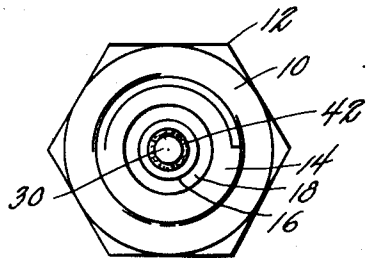


FIG. 6

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SPARK PLUG

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7 Claims. (Cl. 123—169)

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This invention relates to spark plugs.

An object of this invention is to provide a one-piece shell for a spark plug which not only provides the engine block engaging extension, but also an annular side electrode, a body with a metallic mass so distributed as to predetermine its heat transferring ability and serve as a shield against radio interference.

Another object of this invention is to incorporate all the above named advantages into a one-piece shell which advantages may be corrected to meet various operating conditions by simple dimensional alterations.

Still another object of this invention is to permit the use of a center electrode of wire having a constant diameter throughout its length and which is so completely insulation protected from the shell and its mounting, shorts are prevented under the most adverse conditions even should the plug be submerged.

Complete insulation, temperature control, fouling prevention and a permanently fixed spark gap are all advantages resulting from the extreme simplicity and the number of parts employed in the spark plug of this invention and in its modified forms.

Other objects and advantages of this invention relating to the arrangement, operation and function of the related elements of the structure, to various details of construction, to combinations of parts and to economies of manufacture, will be apparent to those skilled in the art upon consideration of the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

Referring to the drawings:

Fig. 1 is a side elevation of a spark plug embodying features of the invention:

Fig. 2 is a longitudinal section through the spark plug of Fig. 1;

Fig. 3 is a bottom plan view of the spark plug of Fig. 1;

Fig. 4 is a side elevation of a modified form of the spark plug shown in Fig. 1;

Fig. 5 is a longitudinal section through the spark plug of Fig. 4; and

Fig. 6 is a bottom plan view of the spark plug of Fig. 4.

A desirable form of spark plug as illustrated in Figs. 1, 2 and 3 embodies a metallic body or shell having a central or base portion 10 provided with a tool receiving polygonal shoulder 12 useful in mounting the spark plug in operative position on an internal combustion engine block.

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Outwardly extending in one direction from the portion 10 is a pair of concentric annular skirts 14, 16, providing a chamber or clearway 18 in the form of a groove therebetween. The outer skirt is provided with exterior threading 20 to engage the threading on an engine block. The inner skirt 16 forms the side electrode of the spark plug.

The clearway or chamber 18 is cut inwardly to a predetermined depth from the spark plug terminus for fixing the operating temperature which is desired. For example if a "cool plug" is specified, the groove 18 would be shallow and the resultant larger mass of the shell would tend to rapidly conduct the heat away from the firing region. For a "hot plug" the groove 18 would be comparatively deep and a "normal plug" would be cut to a depth somewhere inbetween.

The body 10 is provided with a neck or tubular extension 22 oppositely from the skirts 14, 16. This extension 22 not only adds to the metallic mass of the shell for heat control but provides a shielded construction. There is thus provided an economical element supplying the mounting means, side electrode, heat transferring mass and radio shield.

The element has axial passageway 24 therethrough in which center electrode 26 is axially positioned and the space between the center electrode and shell is filled with an electrical insulation 28.

The firing end 30 of the center electrode is positioned adjacent the outer terminus of the inner skirt 16 and determines the length of the spark gap 32 therebetween. This center electrode terminus may be flush with the skirt terminus, or slightly spaced inwardly or outwardly (as shown) therefrom as predesigned in fixing the spark plug's characteristics.

Adjustment of the spark gap is eliminated throughout the useful life of the spark plug.

The opposite end of the center electrode mounts a fitting 34 serving as a terminal for the reception of a conductor.

The electrical insulation 28 seals the passageway 24 about the center electrode and may be a suitable plastic, thermo-set following assembly and having the necessary temperature resistance and dielectric properties.

The insulation 28 not only substantially fills and seals the passageway 24 but continues to the fitting 34 and downwardly over and about the shell exterior as a jacket or coating 36 therefor. This coating may cover the extension 22

only or continue to envelope the exterior of the base portion. This exterior insulation defeats possible shorting between the terminal 34 and the engine block even under the most adverse conditions. In fact such a spark plug will satisfactorily fire even when submerged.

For insuring an insulation lock and assembly, a portion 38 of the inner surface of the passageway 24, adjacent the outer terminus of the extension 22, may be broken such as by threading.

When the entire outer surface of the shell is coated, it is desirable to mount a metallic ring 40 about the shoulder 12, so that engagement thereof by a mounting tool will not chip nor break the insulation.

The construction of the spark plug is susceptible to variations while retaining the advantages (Figs. 4, 5 and 6). The passageway 24 may be unbroken throughout the shell extent with the insulation between the center electrode and shell in the form of a powder pack 42.

The exterior surface of the extension 22 adjacent its outer terminus may be provided with threading 44. An economical assembly embodies a first molded insulation plug 46 about the center electrode between the powder pack 42 and fitting 34 with a second molded insulation piece about the plug 46 and extending to engage the threading 44 in providing a jacket 48 for the extension 22. The threaded engagements between the parts may have a cement applied to their coacting surfaces prior to assembly.

It is to be understood that the above detailed description of the present invention is intended to disclose an embodiment thereof to those skilled in the art, but that the invention is not to be construed as limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of being practiced and carried out in various ways without departing from the spirit of the invention. The language used in the specification relating to the operation and function of the elements of the invention is employed for purposes of description and not of limitation, and it is not intended to limit the scope of the following claims beyond the requirements of the prior art.

What is claimed and is desired to secure by United States Letters Patent:

1. A park plug having a shell including a circumferential tool receiving shoulder and a pair of spaced depending annular skirts providing a clearway therebetween, said outer skirt having means to engage an engine block for mounting said spark plug in operative position thereon, said inner skirt forming the side electrode of said spark plug, said shell including an extension oppositely from said skirts, said body, inner skirt and extension having an axial passageway therethrough, a center electrode axially disposed along said passageway, electric insulation substantially filling said passageway between said shell and center electrode, a continuation of said insulation about said shell and shoulder, and a tool receiving band on said insulation about said shoulder.

2. A spark plug embodying a metallic body having a pair of spaced annular skirts extending therefrom providing a chamber therebetween, said outer skirt having means for coacting with an engine block to mount said spark plug in operative position thereon, said inner skirt providing the side electrode of said spark plug, an extension of said body in the opposite direction from said skirts, said body, inner skirt and extension having a passageway therethrough which passageway is provided with an undulated surface adjacent the outer terminus of the extension, a center electrode axially extending through said passageway, and electric insulation sealing said passageway between said center electrode and the body, locked therein by engagement with said undulated surface and extending beyond said passageway about the extension to form a jacket therefor.

3. In a spark plug, a shell including a metallic body having a pair of coaxial annular skirts depending therefrom and terminating in a common plane, the outer skirt threaded to engage an engine block for mounting the spark plug in operative position thereon, the inner skirt providing the side electrode and parallelly spaced from said outer skirt to provide a clearway therebetween, said metallic body including a tubular extension projecting from said body in the opposite direction from said skirts, said body, inner skirt and extension having a continuous axial passageway therethrough, a center electrode axially disposed along said passageway from adjacent the outer terminus of said inner skirt to beyond said extension to provide a terminal, and electrical insulation in said passageway between said center electrode and said body, said electrical insulation continuing beyond said tubular extension and thereabout to provide a coating therefor.

4. In a spark plug, a shell including a metallic body having a pair of coaxial annular skirts depending therefrom and terminating in a common plane, the outer skirt threaded to engage an engine block for mounting the spark plug in operative position thereon, the inner skirt providing the side electrode and parallelly spaced from said outer skirt to provide a clearway therebetween, said metallic body including a tubular extension projecting from said body in the opposite direction from said skirts, said body, inner skirt and extension having a continuous axial passageway therethrough, a center electrode axially disposed along said passageway from adjacent the outer terminus of said inner skirt to beyond said extension to provide a terminal, and electrical insulation in said passageway between said center electrode and said body, said electrical insulation continuing beyond said tubular extension to coat said extension and the outer surface of said body.

5. In a spark plug, a shell including a metallic body having an annular skirt depending therefrom, said skirt providing the side electrode, said body including a tubular metallic extension projecting from said body in the opposite direction from said skirt, said body and extension having a continuous axial passageway therethrough, a center electrode axially disposed along said passageway from adjacent the outer terminus of said skirt to beyond said extension to provide a terminal, and electrical insulation in said passageway between said center electrode and said body, said insulation continuing beyond the tubular extension and thereabout to provide a coating therefor.

6. In a spark plug, a shell including a metallic body having an annular skirt depending therefrom, said skirt providing the side electrode, said body including a tubular metallic extension projecting from said body in the opposite direction from said skirt, said body and extension having a continuous axial passageway therethrough, a center electrode axially disposed along said passageway from adjacent the outer terminus of said skirt to beyond said extension to provide a termi-

nal, and electrical insulation in said passageway between said center electrode and said body, said electrical insulation continuing beyond said tubular extension to coat said extension and the outer surface of said body.

7. A spark plug having a metallic shell including a pair of spaced substantially co-planar terminating annular skirts extending in one direction therefrom and a tubular continuation extending in the opposite direction therefrom, an axial passageway through said shell and extension, a center electrode axially extending through said passageway terminating at one end to provide a spark gap between said center electrode and the inner one of said skirts and terminating at its opposite end beyond said extension to provide a terminal, and electric insulation thermoset in said passageway between said center electrode and said shell, said insulation providing a plastic seal between said center electrode and said shell and continuing therefrom to provide a coating for said tubular continuation.

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