

E. Q. WILLIAMS.
SPARK PLUG.
APPLICATION FILED APR. 16, 1914.

1,248,046.

Patented Nov. 27, 1917.

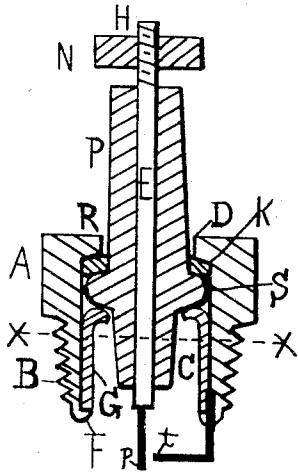


Fig. 1.

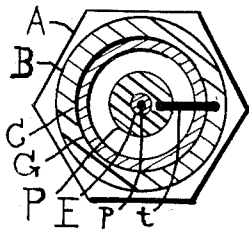


Fig. 2.

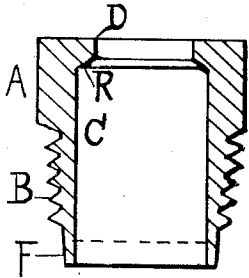


Fig. 3.

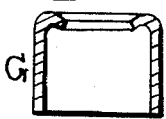


Fig. 4.

WITNESSES:
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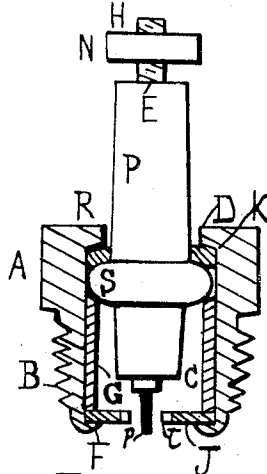


Fig. 5.

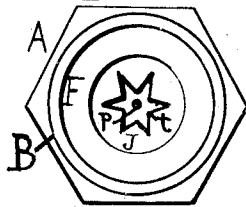


Fig. 11.

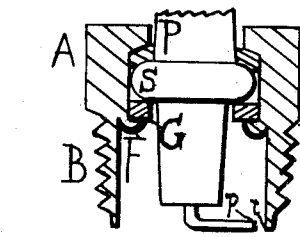


Fig. 7.

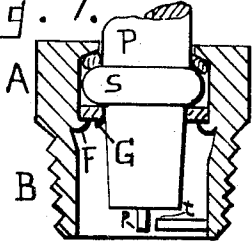


Fig. 9.

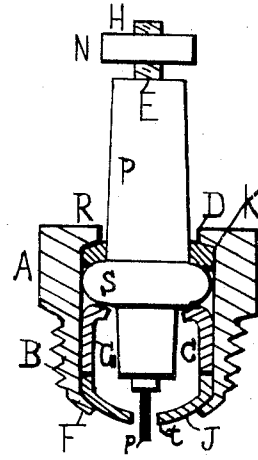


Fig. 6.

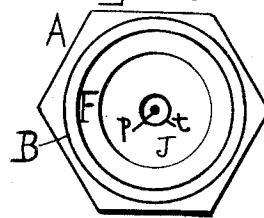


Fig. 12.

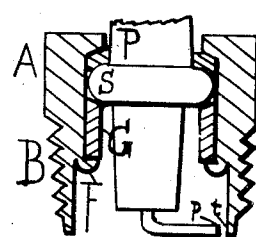


Fig. 8.

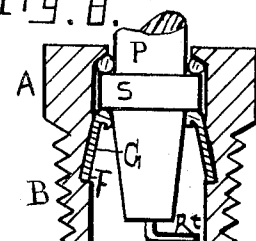


Fig. 10.

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UNITED STATES PATENT OFFICE.

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SPARK-PLUG.

1,248,046.

Specification of Letters Patent.

Patented Nov. 27, 1917.

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To all whom it may concern:

Be it known that I, EDWARD Q. WILLIAMS, of Syracuse, N. Y., have invented certain new and useful Improvements in Spark-Plugs, of which the following is a description.

My invention comprises mainly the form and method of construction and assembling, and of particulars set forth.

10 The object of my invention is to produce a spark plug which shall be simply and cheaply manufactured, yet an efficient, serviceable and reliable spark plug, practically equal to such as are now produced in more
15 expensive manner.

The principal feature of my invention is the manner by which the parts are held within the body, by a cylindrical bushing, or equivalent, which in turn is held by a
20 beading, or flange, or may be held in any manner.

In carrying out my object, I bore the body or shell with the enlarged cavity at the lower end thereof, which permits all tooling
25 operations upon said body to be performed from one end, and at a single setting in ordinary forming lathes; and I dispense with screw threads and other operations, except thread B, for attaching to the engine
30 in the usual manner.

In the accompanying drawings, Figure 1. is a longitudinal section of a completed plug, of the simplest form.

Fig. 2. is a cross section on the line *x x*,
35 Fig. 1.

Fig. 3, is a longitudinal section of the steel body or "shell", as first formed, before assembling the other parts, and illustrating the manner of producing the "shell" from
40 solid hexagonal steel bars.

Fig. 4. is a bushing thereof.

Figs. 5. 6. 7. 8. 9. 10. are modifications, in somewhat different forms, as may be preferred for any reason.

45 Figs. 11. 12. are end views of Figs. 5. and 6. respectively.

The construction of my improved spark plug comprises a steel body or shell A. with screw threads B, upon the exterior of its
50 lower end, to screw into the engine in the usual manner.

This shell A, is bored hollow throughout, to admit and contain the insulating stem P. preferably of porcelain, or mica, or other
55 suitable material.

The stem P. is preferably formed with a

collar or shoulder S. at about midway, more or less, of its length.

The body or shell A. is bored for the greater part of its length with a sufficiently
60 large cavity C, to admit and contain the collar S. of the insulating stem P. and for the remainder upper portion D. only sufficiently to contain the upper part P. of said
65 stem, thus leaving a solid shoulder or inverted flange R. of the shell A. while the lower portion of said stem projects downward within the cavity C. of the shell A.

Throughout the center of the length of the stem P, there extends the usual electrode E. to carry the sparking current, and of which the portion *p*, extending below the
70 stem constitutes one of the spark or firing points, and is usually of special material, while the upper or top end thereof is completed by a screw thread H. and nut N.
75 thereon suitable for attaching the electric conduction wires from the coil, or it may be of any preferred type.

Within the cavity C. and above the stem
80 collar S. there may be placed a suitable packing K. to form a soft cushion between the shell and stem, and to form a gas tight joint at said point.

A cylindrical bushing or ring G. is placed
85 within the cavity C, the upper end of said bushing resting against the collar S. of the stem, holding the same firmly in position and pressing against the shoulder or flange R. while the lower end of said bushing is
90 held up by the lower edge of the shell being formed over F, by flanging, beading, spinning, compressing or otherwise, to hold the said bushing with an upward pressure, which compresses and holds all parts tight and
95 sufficiently firmly in their respective positions, as will be readily understood from the drawings, yet sufficiently permitting the necessary slight movement of parts by expansion and contraction, without destructive effect.

100 Another electrode *t*. may be set in the end of the shell to form the other firing point, *t*. or other construction, as herein shown.

The stem P. may be of any suitable form, as solid pointed end, or recessed, or other
105 forms, or mica or other material substituted.

A second form of my spark plug Fig. 6. is similar to the foregoing except the form of the lower end containing the firing point *t*.

In this form the bushing may be composed
110 of two parts, the lower part may be composed of a cap, or solid end, except for a

certain small aperture *t*, surrounding the firing point *p*, which aperture *t* may be round, or of other form, as shown in Figs. 6, 7., et cetera, and which comprises the other firing point *t*.

Another equivalent modification Fig. 5. instead of the last mentioned cap, is a flat circular end piece *T*. with aperture *t*.

The bushing *G*. may extend to the end of the shell as Fig. 1. or it may be of any length less as in Figs. 8. and 10. even to the form of a ring Fig. 7. or a washer Fig. 9. or by cutting into the side of the shell and turning the chip as a bead over the edge of the bushing as Fig. 9.

I am aware that spark plugs have been made with a bore tapering throughout, but such can only be used with a stem of elastic material, as mica, being unsuitable for porcelain; while my form is suitable for either porcelain or mica, or other material.

The firing points *p*. *t*. may be any of the forms shown, or others.

I claim:—

1. A spark plug comprising a shell threaded exteriorly at its inner end for engagement in an engine cylinder and provided at its outer end with an inturned flange, an insulator element which extends longitudinally through said shell and is provided with a laterally extending collar, said insulating element comprising a portion extending below said collar, an electrode carried by said insulating element and a compressive ring disposed inside of said shell inwardly of said collar bearing outwardly thereagainst, said shell having an integral flange turned over therefrom and said ring being compressively bound between said flange and said collar.
2. A spark plug comprising a shell thread-

ed exteriorly at its inner end for engagement in an engine cylinder and provided at its outer end with an integrally solid inturned flange, an insulator element which extends longitudinally through said shell and is provided with a laterally extending collar, said insulating element comprising a portion extending below said collar, an electrode carried by said insulating element and a compression ring disposed inside of said shell inwardly of said collar bearing outwardly thereagainst, said shell having an integral flange mechanically turned over at the inner end therefrom to compress said ring against said collar and said collar against said outer solid integral flange.

3. A spark plug comprising a shell threaded exteriorly at its inner end for engagement in an engine cylinder and provided at its outer end with an inturned flange, an insulating element which extends longitudinally through said shell and is provided with a laterally extending collar, said insulating element comprising a portion extending below said collar, an electrode carried by said insulating element, a compression ring disposed inside of said shell inwardly of said collar, said compression ring comprising a cylindrical portion having an over turned upper edge, the latter bearing against said laterally extending collar of the insulating element, and an integral inturned flange carried by the inner end of said shell which engages the inner portion of said ring, said ring being compressively bound between said flange and said collar.

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