April 28, 1942. G. PARKIN 2,281,511

SPARK PLUG

Filed July 1, 1940

Fig. 1.

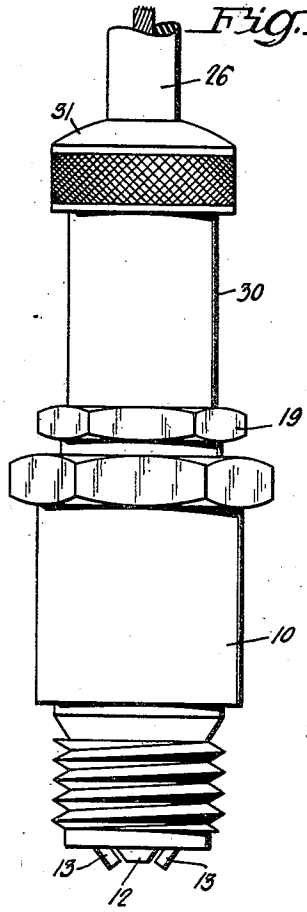


Fig. 2.

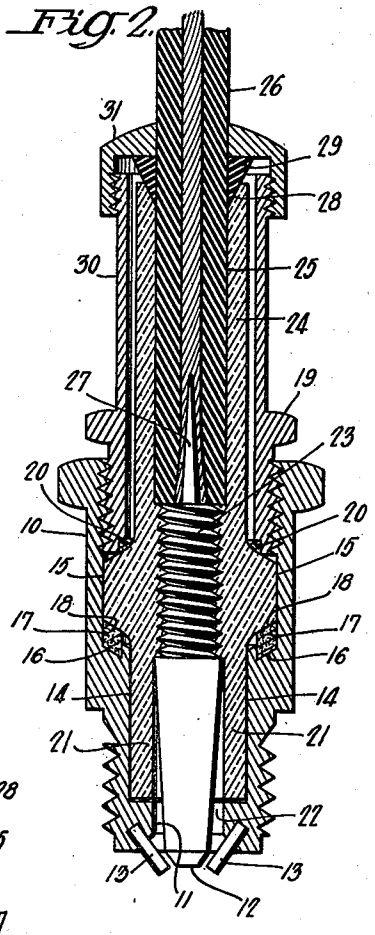
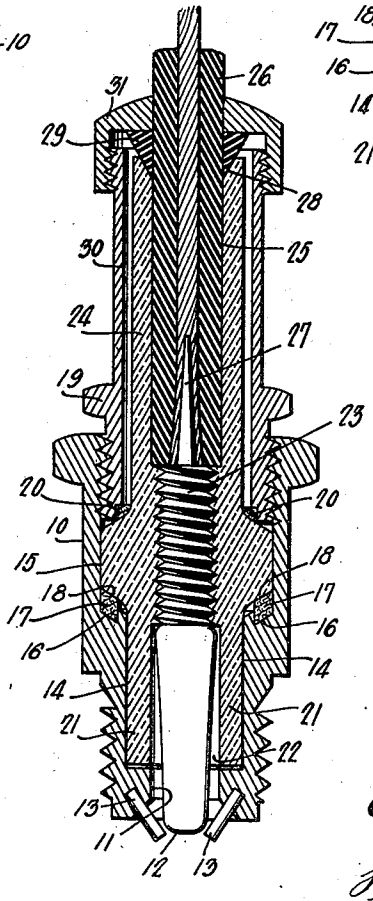


Fig. 3.



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Patented Apr. 28, 1942

2,281,511

UNITED STATES PATENT OFFICE

2,281,511

SPARK PLUG

George Parkin, Philadelphia, Pa.

Application July 1, 1940, Serial No. 343,488

4 Claims. (Cl. 123—169)

This invention relates to spark plugs and has for an important object thereof the provision of a spark plug which may be readily adapted for use under highly variable conditions.

The use in the same type of engine of varying types of fuels, and the wide variation in the characteristics of different engines renders it ordinarily necessary to provide an extensive line of different types of plugs in order that varying temperature conditions may be taken care of. If a plug is operating at too low a temperature, that is to say, it fails to heat to a certain degree during operation of the engine, the plug will foul or soot and eventually short circuit, causing faulty operation. If, on the other hand, the temperature of the plug becomes too high, the value of the porcelain as an insulation is destroyed with resultant pre-ignition "blow-by" and burning of the electrodes.

In an attempt to control the temperature at which the plug operates, it has heretofore been the practice to vary the amount of the porcelain of the plug which is subjected to combustion temperatures in the cylinder, as many as eight or nine different types of porcelains being employed in the same size plug. Obviously, this must result in a considerable increase in the cost of individual plugs since a large and varied stock of plugs must be maintained at all times, and the porcelain of the ordinary plug is, obviously, one of the more expensive elements therein.

An important object of the present invention is the provision of a plug construction such that for use in a given size a single porcelain may be made to answer under all conditions, and in which control of the temperature at which the plug is operating is obtained not from variation of the area of the porcelain which is subjected to engine temperatures, but by varying the size of a primary electrode to thereby control the extent of the combustion chamber within which the porcelain is disposed.

Another object of the invention is the provision in a spark plug of an arrangement permitting ready radio shielding of the plug and which at the same time provides for insulation of the plug against moisture.

These and other objects I attain by the construction shown in the accompanying drawing wherein, for the purpose of illustration, I have shown a preferred embodiment of my invention and wherein:

Fig. 1 is a side elevation of a spark plug constructed in accordance with my invention; and

Figs. 2 and 3 are vertical sectional views illustrating the internal construction and the method of controlling the plug temperature.

Referring now more particularly to the drawing, the numeral 10 generally designates the bushing of the plug, the threaded lower end of which has at its inner end a bore 11 for the passage of the tip of a primary electrode 12, and is equipped with the usual secondary electrodes indicated at 13. Immediately above the lower end of the plug, the bore 11 is enlarged, as at 14, the bore at this point being preferably cylindrical, and at a considerable distance above the initial enlargement at 14 is again enlarged as at 15 to provide the usual seat 16 for the reception of gaskets 17 upon which the lower portion 18 of the porcelain shoulder seats. The periphery of the shouldered portion is disposed in sufficiently close relation to the wall of the bushing or shell to be in good heat exchange relation therewith. The porcelain is held in position through a ring nut 19 which, in turn, engages the upper shoulder of the porcelain through gaskets 20. Gaskets 17 and 20 are preferably of the type illustrated in Patent No. 1,987,024 to J. W. Parkin, Sr., granted January 8, 1935, for Spark plug.

The porcelain is provided with a depending, relatively thin skirt 21. This skirt has an internal diameter substantially the same as that of the bore 11 and an external diameter which will bring its face into the closest practical engagement with the walls of bore 14 so that any heat generated in the combustion chamber 22 and transmitted to this procelain will be conducted away through the bushing to the relatively cool head of the engine. As will be noted, the primary electrode is of large size and will be so under all conditions although the size of this electrode is varied to control the temperature of the plug, and to this end the electrode, instead of being embedded in the porcelain, is threaded therein at its upper end, as indicated at 23. The size of the combustion chamber and the extent of the body of this electrode will control temperatures in the combustion chamber and the adjacent portions of the porcelain and thus variation in size thereof will enable the plug to be adapted to any given condition. For convenience in assembly the body 12 of the electrode is made of greater length than the skirt 21.

The upper end of the porcelain is preferably provided with an elongated tubular extension 24 having a bore 25 to closely receive the insulated lead 26 to the primary electrode, and the upper end of the primary electrode is preferably provided with a spur 27 to engage in the conductor

of the lead. The upper portion of the bore of extension 24 is flared as at 28 to receive the lower end of a conical rubber washer 29. The upper end of ring nut 19 is likewise provided with a tubular extension 30 surrounding the extension 24 and threaded at its upper end for the reception of a cap 31. Cap 31 will serve to compress washer 29, and this compression will serve to lock the lead 26 in position in the plug and will also serve through the frictional engagement to lock the cap 31 in position.

Since the construction illustrated is capable of considerable modification without departing from the spirit of my invention, I do not wish to be understood as limiting myself thereto except as hereinafter claimed.

I claim:

1. In a spark plug, a shell having a cylindrical bore, a unitary porcelain comprising a heavy body portion having a thin skirt closely fitting in the bore and in good heat exchange relation to the shell, the bore being reduced at its lower end to provide a flange having the same interior diameter as and shielding the lower end of the skirt from direct contact by the products of combustion in an engine, and a large primary electrode detachably engaged in the body portion of said porcelain and filling a substantial portion of the cavity formed by said skirt and flange to determine the combustion space in the plug and thereby control the heating of the skirt of said porcelain.

2. In a spark plug, a shell having a cylindrical bore, a unitary porcelain comprising a heavy body portion having a thin depending skirt closely fitting in the bore and in good heat exchange relation to the shell, the bore being reduced at its lower end to provide a flange having the same interior diameter as and shielding the lower end of the skirt from direct contact by the products of combustion in an engine, and a large primary electrode engaged only in the body portion of said porcelain and filling a substantial portion of the cavity formed by said skirt and flange to determine the combustion space in the plug, said body portion having a shouldered portion whereby it may be clamped in position in the shell, the periphery of said body portion being in good heat exchange relation with the shell.

3. In a spark plug, a shell having a cylindrical bore, a unitary porcelain comprising a heavy body portion having a thin depending skirt closely fitting in the bore and in good heat exchange relation to the shell, the bore being reduced at its lower end to provide a flange having the same interior diameter as and shielding the lower end of the skirt from direct contact by the products of combustion in an engine, a large primary electrode engaged only in the body portion of said porcelain and filling a substantial portion of the cavity formed by said skirt and flange to determine the combustion space in the plug, said body portion having a shouldered portion whereby it may be clamped in position in the shell, the periphery of said body portion being in good heat exchange relation with the shell, a ring nut clamping the porcelain in the shell, the upper end of the body of the porcelain having a sleeve-like extension forming a housing for a lead wire to said electrode, said ring nut having a sleeve-like extension loosely surrounding the extension of the porcelain, a cap having threaded engagement with the upper end of the extension of the ring nut and having an opening for the passage of the lead wire, and a compressible sealing washer surrounding the opening between the cap and the upper end of the extension of the porcelain.

4. In a spark plug, a shell having a cylindrical bore, a unitary porcelain comprising a heavy body portion having a thin depending skirt closely fitting in the bore and in good heat exchange relation to the shell, the bore being reduced at its lower end to provide a flange having the same interior diameter as and shielding the lower end of the skirt from direct contact by the products of combustion in an engine, a large primary electrode engaged only in the body portion of said porcelain and filling a substantial portion of the cavity formed by said skirt and flange to determine the combustion space in the plug, said body portion having a shouldered portion whereby it may be clamped in position in the shell, the periphery of said body portion being in good heat exchange relation with the shell, a ring nut clamping the porcelain in the shell, the upper end of the body of the porcelain having a sleeve-like extension forming a housing for a lead wire to said electrode, said ring nut having a sleeve-like extension loosely surrounding the extension of the porcelain, a cap having threaded engagement with the upper end of the extension of the ring nut and having an opening for the passage of the lead wire, the mouth of the extension of the porcelain being flared, and a conical rubber washer seated in said mouth and engaged by said cap.

GEORGE PARKIN.