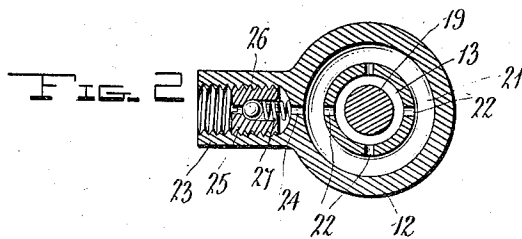
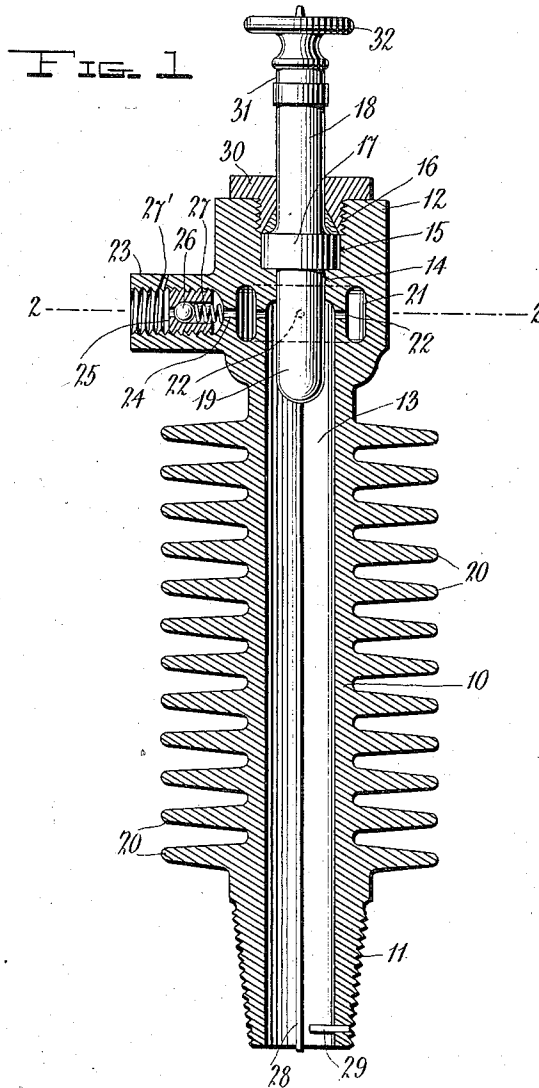


F. E. HARPST.
SPARK PLUG.
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Witnesses

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SPARK-PLUG.

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To all whom it may concern:

Be it known that I, FRED E. HARPST, a citizen of the United States, residing at Houston, in the county of Harris, State of Texas, have invented certain new and useful Improvements in Spark-Plugs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to spark plugs and has special reference to a spark plug for use with internal combustion motors.

It is a well known fact that much trouble is experienced through the cracking of the porcelain insulator commonly used in spark plugs, this cracking being brought about by the intense heat conditions of the plug when the engine is running.

The principal object of the present invention is to provide a device of this character wherein the porcelain will at all times be kept cool.

The second object of the invention is to provide means for keeping the terminals clean this being accomplished by causing a current of air or gas from carbureter to pass through check valve then around insulator and down through spark gap.

With the above and other objects in view, as will be hereinafter apparent the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings, and specifically set forth in the claims.

In the accompanying drawings, like characters of reference indicate like parts in the several views, and Figure 1 is a vertical section of a spark plug constructed in accordance with this invention, Fig. 2 is a section on the line 2—2 of Fig. 1.

The spark plug comprises a shell 10 which is threaded at one end as at 11 to permit its being screwed into the combustion chamber of the engine. The other end of the plug is provided with the usual polygonal nut 12 to enable the plug to be grasped with a wrench. The plug has a bore extending from one end to the other end, and this bore consists of a lower or inner portion 13 having a contracted portion 14 immediately thereabove. Just above the contracted portion the bore is again widened out, as shown at 15, and terminates at its upper end in a

threaded portion 16. There is thus provided an annular shoulder between the portions 15 and 14 and against this annular shoulder bears the central portion 17 of a porcelain insulator having reduced portions 18 and 19 on each side of said central portion, the portion 19 fits the reduced portion 14 of the bore and extends within the portion 13 of both but terminates at a point greatly removed from the threaded end of the shell. Between the end of the insulator 19 and the threaded end 11 of the spark plug the shell is surrounded by radiator fins 20. Surrounding the upper end of the portion 13 of the bore is an annular chamber 21 which communicates with the bore by series of small openings or perforations 22. Projecting from one side of the shell is a lug 23 which is hollow and threaded internally. The hollow of this lug communicates with the annular chamber 21 by means of a passage 24. Within this hollow portion is screwed a valve cage 25 containing a ball valve 26 and spring 27 so arranged as to permit the passage of air and gas inward but to prevent the exploded charge from passing outward. The valve cage is held at the inner end of the hollow, and the remaining threads are utilized to connect the spark plug by means of a pipe not deemed necessary to be shown to the intake manifold or carbureter at such a point as to be below the throttle in same. Through the side wall of this portion 23 there is provided a small pin hole 27' for the purpose of admitting air during the suction stroke of the engine so that the mixture which passes through the ball valve will have an excess of air.

Extending through the insulator is a long terminal 28 which is arranged axially of the bore and extending radially from the side wall of the bore is a terminal 29 the two being so arranged that a gap is formed between the side of the terminal 28 and the end of the terminal 29. The plug is provided with the usual packing or backing nut 30 and terminal adjusting nut 31 as well as with the ordinary thumb nut 32 between which and the nut 31 the end of the conductor wire is clamped.

It is to be particularly noted that the location of the inner end of the insulator is such that with each suction stroke of the engine a charge of carbureted air in which there is an excess of air is drawn in and that this charge passing in through the ball valve

follows around the annular chamber and passes through the opening 22 so that the entire inner end of the insulator is surrounded by a sheath of cool air or gas. It is further to be observed that this incoming air or gas is kept cool by reason of the fact that the heat from the inner end of the spark plug is radiated away from the upper end by means of the fins 20. This incoming charge sweeping through the gap of the terminals effectually blows off any deposit of carbon or soot and keeps the terminals in proper conditions for sparking at all times. Finally the remote position of the end of the insulator from the inner end of the spark plug prevents the flame of the explosion from backing up into the bore 13 and depositing soot on the cold porcelain with the consequence that the passage surrounding the same becomes choked.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

What is claimed is:—

- 25 1. In a sparking plug, a shell provided with a bore extending therethrough and having an annular chamber at one end spaced from and surrounding said bore, an insulator extending into said bore and having its inner end in spaced relation to the bore and terminating adjacent said chamber whereby air entering the chamber will impinge upon the insulator, a projection on one side of said shell opposite said annular chamber, said projection having a hollow body communicating with said chamber, a check valve held in said projection, and sparking terminals supported by said insulator and the inner end of the shell.
- 40 2. In a spark plug, a shell provided with a bore extending therethrough and having an annular chamber at one end spaced from and surrounding said bore, said shell being provided with a series of openings between

the chamber and the bore, an insulator extending into said bore and having its inner end in spaced relation to the bore and terminating adjacent said openings whereby air entering the openings will impinge upon the insulator, a projection on one side of said shell opposite said annular chamber, said projection having a hollow body communicating with said chamber, a check valve held in said projection, said projection being threaded for connection to a pipe and having a radial opening communicating from the exterior to the hollow portion, and sparking terminals carried by said insulator and the inner end of said shell.

3. In a spark plug, a shell provided with a bore extending therethrough and having an annular chamber at one end spaced from and surrounding said bore, said shell being provided with a series of openings between the chamber and the bore, an insulator extending into said bore and having its inner end in spaced relation to the bore and terminating adjacent said openings whereby air entering the openings will impinge upon the insulator, a projection on one side of the shell opposite said annular chamber, said projection having a hollow body communicating with said chamber, a check valve held in said projection, said projection being threaded for connection to a pipe and having a radial opening communicating from the exterior to the hollow portion, sparking terminals carried by said insulator and the inner end of said shell, and radiator fins surrounding said shell between the insulator and the inner end of the shell.

In testimony whereof, I affix my signature, in presence of two witnesses.

FRED E. HARPST.

Witnesses:

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R. V. SOLOMON.