

H. R. PEARSALL.
SPARK PLUG.
APPLICATION FILED OCT. 13, 1917.

1,276,105.

Patented Aug. 20, 1918.

Fig. 1

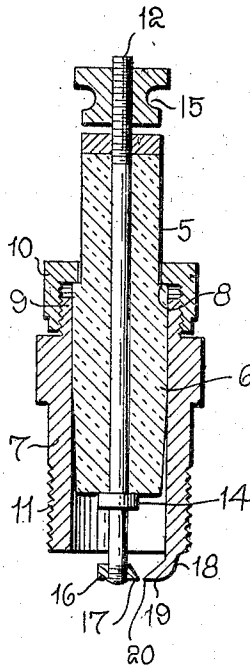
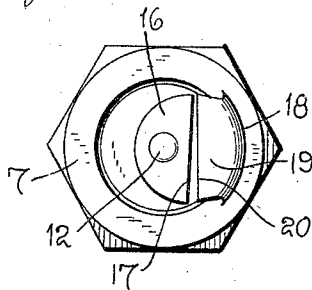


Fig. 2



Inventor

HARRY R. PEARSALL

By *Watson E. Coleman*

Attorney

UNITED STATES PATENT OFFICE.

HARRY R. PEARSALL, OF BINGHAMTON, NEW YORK.

SPARK-PLUG.

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To all whom it may concern:

Be it known that I, HARRY R. PEARSALL, a citizen of the United States, residing at Binghamton, in the county of Broome and State of New York, have invented certain new and useful Improvements in Spark-Plugs, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to spark plugs for internal combustion engines and has for its primary object to provide an improved arrangement of the electrode so that a very hot spark will be obtained even when the engine is running at a very low speed to thereby insure the ignition of a maximum amount of gas which has been compressed in the cylinder.

It is a more particular object of my invention to provide a spark plug having an elongated gap varying in width from one end to the other thereof whereby, when the electric current varies in intensity, the spark will jump at different points along the length of the gap.

It is also another important object of my invention to provide an improved construction of the spark plug electrodes so as to obviate failure of the spark by reason of the accumulation of oil or other deposits on the electrodes, as for instance, when there is leakage around the piston rings.

And it is a further general object of the invention to provide a spark plug as above characterized of very simple and inexpensive construction, reliable and efficient in practical use and which will effectively overcome the numerous deficiencies of spark plugs heretofore in use.

With the above and other objects in view the invention consists in the improved construction and arrangement of the several elements which will be hereinafter more particularly described, and subsequently pointed out in the appended claim.

In the accompanying drawings wherein similar reference characters designate corresponding parts throughout the several views:

Figure 1 is a longitudinal sectional view through a spark plug illustrating the preferred embodiment of my invention, and

Fig. 2 is an enlarged end view of the plug.

Referring in detail to the drawing 5 designates the body or core of the spark plug which is constructed of mica or other suit-

able insulating material. This plug may be of any desired cross-sectional form, but is preferably provided with an intermediate polygonal shaped body portion 6 which fits snugly within the metallic shell or casing 7. At one end of the intermediate portion 6 of the core 5 the shoulder indicated at 8 is formed and the contiguous end of the shell 7 is reduced in thickness to form a projecting flange 9 which is exteriorly threaded to receive the interiorly threaded flange of a clamping nut 10 which is adapted to seat upon the shoulder 8 and force the insulating core tightly into the shell. The other end of the shell 7 is threaded as at 11 for detachable engagement in a cylinder wall. The usual current conducting rod 12 is adapted to be inserted through the axial opening 13 which extends entirely through the insulating core 5. The flange 14 is fixed upon this rod in spaced relation to one of its ends for abutting contact with one end face of the core 5 to limit the movement of the conducting rod in one direction through the bore 13. A binding nut 15 has threaded engagement upon the other end of the rod 12 and is adapted to clamp the ignition circuit wire in connection with said rod against the opposite end of the core.

To the end of the rod 12 which projects into the engine cylinder, the electrode member 16 is suitably secured. This member as herein shown is in the form of a flat metal plate substantially semi-circular in plan. The straight edge of this plate is beveled or sharpened to a knife edge, as shown at 17.

Upon the end of the spark plug shell 7 the secondary electrode is integrally formed and includes a shank 18 extending a short distance longitudinally from the shell wall and an angular lug 19 formed on the end of the shank. This lug is flattened and also provided with a beveled or sharpened straight edge 20.

It will be noted from reference to Fig. 2 of the drawing that the sharpened edges 17 and 20 of the opposed electrodes are co-extensive in length and gradually diverge from each other from one end to the other end of the electrodes. Thus there is provided a spark gap which varies in width throughout its length. This gradual increase in the width of the elongated gap from one end to the other thereof, is substantially about eight one thousandths of an inch which I have found to give excellent

results in practice. It is apparent however that this divergence of the opposed knife edges of the electrodes may be more or less varied as the peculiar conditions of each individual case may require. The adjustment of the spark gap in this respect may be readily obtained by turning the conducting rod 12 in the insulating core before clamping said rod in position by means of the nut 15.

In the use of a spark plug constructed as above described, the knife edges of the electrodes result in greater electrical attraction so that the plug will fire quicker and easier and with less current than would be the case if electrodes without the knife edges were used. By the use of this form of the electrodes, from 6 to 20 separate sparks may be obtained along the length of the gap, according to the amount or intensity of the current delivered by the magneto or battery.

Thus, when the engine is running at low speed, the spark will occur at the narrow end of the gap but as the speed gradually increases, the spark works along the gap to the wider end thereof. This movement of the spark from one end to the other of the gap serves to keep the knife edges of the electrodes free from carbon or soot. Also, by the provision of the gap varying in width, all of the current delivered to the plug will be passed through the electrodes, thus affording a hotter and more intense spark resulting in better ignition and obviating the possibility of wearing out the magneto or breaking the contact points when the engine is running at a high speed. If the piston rings become worn considerable oil may leak into the cylinder, but by providing the knife edges 17 and 20, this oil cannot accumulate on the electrodes and thereby possibly prevent the jumping of the spark.

While I have illustrated the electrodes disposed in a plane at right angles to the core of the plug, it will, of course, be manifest that these electrodes might be arranged at any desired angle, and the knife edges thereof instead of extending in a straight line may also be curved in the arc of a circle. Such mechanical variations however are clearly of an obvious character, the essen-

tial feature residing in the provision of the knife edge electrodes forming a long spark gap of varying width whereby a great number of fine sparks will be obtained to insure the ignition of a maximum quantity of compressed gas in the engine cylinder and thus develop a maximum of power therefrom.

From the foregoing description taken in connection with the accompanying drawings, the construction, manner of operation, and several advantages of my invention will be fully and clearly understood. The improved spark plug while exceedingly simple in its construction, has been found to give highly satisfactory results in service. The few parts employed in the construction of the improved plug, are of such form that they can be manufactured at substantially the same cost as the common form of spark plug now in general use. The form, construction and relative arrangement of the elements as above referred to, is to be considered as merely illustrative of one practical embodiment of my invention. It is accordingly to be understood that I reserve the privilege of adopting all such legitimate modifications of which the device may be fairly susceptible within the spirit of the invention as claimed.

I claim:

In a spark plug, a shell having an inwardly projecting lug formed upon its wall at one end and constituting the secondary electrode, said lug having a sharpened edge and extending in a single horizontal plane throughout its length and at right angles to the axis of the shell, and a central primary electrode having a flat metal plate fixed to one of its ends and also disposed in a horizontal plane, said plate having a sharpened edge disposed in opposed relation to the sharpened edge of the lug on said shell and gradually diverging therefrom from one end to the other of said lug to provide a spark gap varying in width throughout its length.

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

HARRY R. PEARSALL.

Witnesses:

VERNON H. QUICK,
JAMES E. MCINERNEY.