

R. S. THWAITE.
SPARK PLUG FOR INTERNAL COMBUSTION ENGINES.
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Patented Feb. 14, 1911.

984,454.

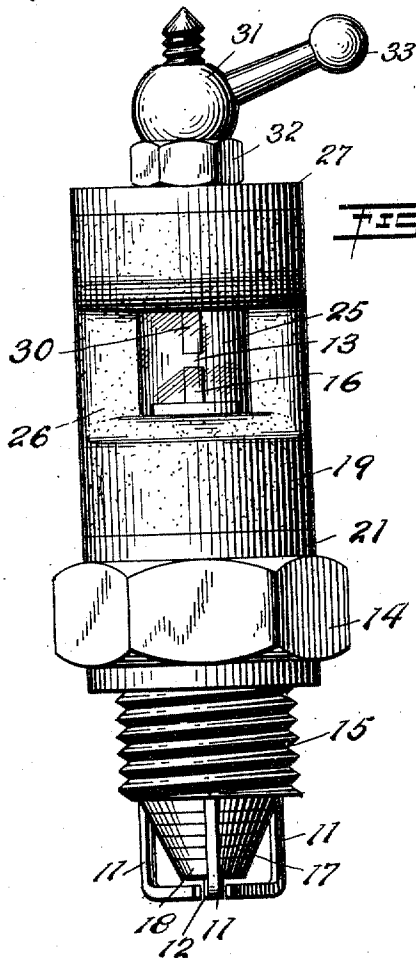


FIG. I.

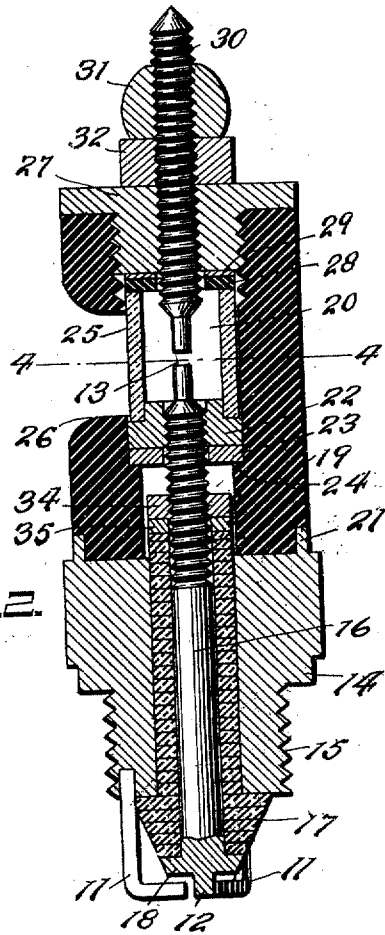


FIG. 2.

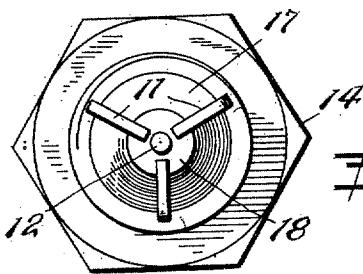


FIG. 3.

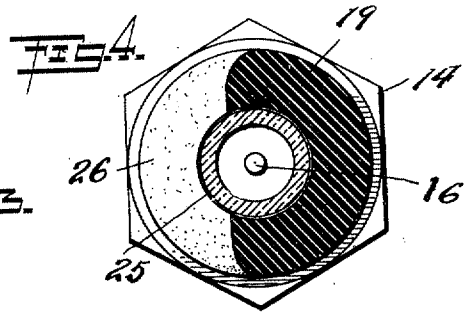


FIG. 4.

WITNESSES:
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SPARK-PLUG FOR INTERNAL-COMBUSTION ENGINES.

984,454.

Specification of Letters Patent.

Patented Feb. 14, 1911.

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To all whom it may concern:

Be it known that I, ROBERT S. THWAITE, a citizen of the United States, residing in the city of New York, State of New York, have invented new and useful Improvements in a Spark-Plug for Internal-Combustion Engines, of which the following is a specification.

This invention relates to an improved spark plug for internal combustion engines.

The object of one part of the invention is to provide in the spark plug an auxiliary, intensifying gap, and further to enable this auxiliary gap to be adjusted, so that the nature of the ignition spark may be varied to suit particular conditions.

A further object is to render this auxiliary gap visible, so that it forms an index as to the functioning of the ignition spark.

Another object of the invention is to expose the sparking electrodes completely, so as to prevent the accumulation of carbon about the same.

With these and other objects in view, the invention consists in the parts, arrangements and combinations hereinafter described and particularly pointed out in the claims.

In the accompanying drawings is shown the preferred embodiment of the invention, which may, however, be considerably varied as to the various features of construction, without departing from the invention in the broader phases thereof.

In the said drawings: Figure 1 is a side elevation of the spark plug; Fig. 2 is a longitudinal section therethrough; Fig. 3 is a bottom plan view; and Fig. 4 is a horizontal section on the line 4-4 of Fig. 2.

In these views, the ignition electrodes are indicated by the numerals 11 and 12. In accordance with one part of the invention these electrodes are completely exposed, projecting below the lower end of the supporting parts of the spark plug.

At 13 is indicated the auxiliary, adjustable gap in the ignition circuit, provided in accordance with the invention.

In the particular embodiment of the invention illustrated are the following arrangements: A metal attaching plug 14 is adapted to support the spark plug in the wall of an engine; and to this end it is provided with external screw threads 15 in the usual manner. The electrodes 11 are in the nature of rods, suitably three in number,

having their upper ends inserted in the lower end of the plug 14 and their lower ends bent inward. A metal rod or conductor 16 extends through a longitudinal bore formed in the attaching plug 14, and projects below the lower end of the same, constituting the electrode 12. Insulation 17, of mica or other suitable material, is placed in the bore of the attaching plug 14, between this plug and the rod 16. The rod 16 is suitably provided with a collar or enlargement 18 for retaining the mica insulation, and a nut 34 and washer 35 are provided on the upper part of the rod for the same purpose. An insulating block 19, of fiber or other suitable material, is attached to and extends above the attaching plug 14. In this block 19 is formed a chamber or recess 20, extending downward from the upper end of the block. The rod 16 extends up through the block 19 into this chamber 20, where its upper end constitutes an electrode. The insulating block is shown as secured in place in a suitable manner, its lower end being received within an annular flange 21, and a nut 22 and washer 23, on the upper part of the rod 16, bearing against a shoulder 24 in the insulating block. A transparent guard 25 is provided for this chamber 20, and, together with a lateral opening 26, permits the gap 13 to be viewed readily, it being understood that the block 19 is exposed to view outside the engine. In the preferred construction, the guard 25 is in the nature of a glass tube, which is inserted downward into the chamber 20, where it is retained by a metal cap 27. This cap 27 is shown as being screwed into the open upper end of the recess 20. Rubber and metal washers 28 and 29 may be interposed between the cap 27 and the upper end of the glass tube 25. A threaded rod 30 passes through a threaded opening in the cap 27, and projects at its lower end within the glass tube 25, being opposed to and spaced from the upper end of the rod 16, the two constituting electrodes between which is the auxiliary gap 13. Two nuts 31 and 32 on the upper end of the rod 30, the former provided with a handle 33, afford means for turning the rod to adjust the same longitudinally. It will be understood that one of the wires from the battery will be connected to the rod 30.

In operation, the auxiliary spark gap serves to intensify the ignition spark. By

adjusting the auxiliary gap, the spark plug becomes suitable for various types of engine. It may be made fast or slow, and a very fat spark may be obtained, so that plenty of cylinder oil may be used without bad effect on the ignition. The auxiliary gap is plainly visible, so that a glance at it will show whether the spark plug is operating. Owing to the fact that the ignition electrodes are completely exposed, there is little tendency of the plug to become fouled and inoperative.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. A spark plug comprising an attaching plug, an electrode extending from the lower end of said attaching plug, said attaching plug being provided with a central bore, a rod extending through said bore and projecting below the lower end of the same to form the second electrode, said rod being provided with a shoulder on its lower end, insulating material surrounding the rod, said insulating material being also formed with a shoulder which contacts with the lower end of the attaching plug, an insulating block mounted on the upper end of the attaching plug, a nut on the rod engaging the insulating block to secure the parts together, a second rod mounted in the insulating block in line with the first rod, with the ends of said rods slightly separated whereby a spark gap is formed, said insulating block being cut away on one side to expose the spark gap, and a transparent guard surrounding the spark gap.

2. A spark plug comprising an attaching plug, an electrode extending from the lower end of said attaching plug, said attaching plug being provided with a central bore, a rod extending through said bore and projecting below the lower end of the same to form the second electrode, said rod being provided with a shoulder on its lower end, insulating material surrounding the rod, said insulating material being also formed with a shoulder which contacts with the lower end of the attaching plug, an insulating block mounted on the upper end of the attaching plug, said insulating block being centrally bored, said bore being provided with a shoulder, a nut on the rod engaging the shoulder of the insulating block to secure the parts together, said insulating block being cut away on one side to expose the bar, a second rod mounted in the bore of the insulating block in line with the first rod with the ends of said rods slightly separated, whereby a spark gap is formed, a transparent circular guard mounted at one end on the nut of the first mentioned rod, and a cap threaded into the upper end of the bore of the insulating block into which said second mentioned rod is threaded, the lower end of said cap engaging the upper end of the transparent guard.

In witness whereof, I have hereunto set my hand and seal.

ROBERT S. THWAITE. [L. S.]

In the presence of—
WALTER S. DOERNBERG;
MILTON M. EISENBERG.