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G. WINCHESTER ET AL

SPARK PLUG

Filed May 16, 1921

Fig. 1.

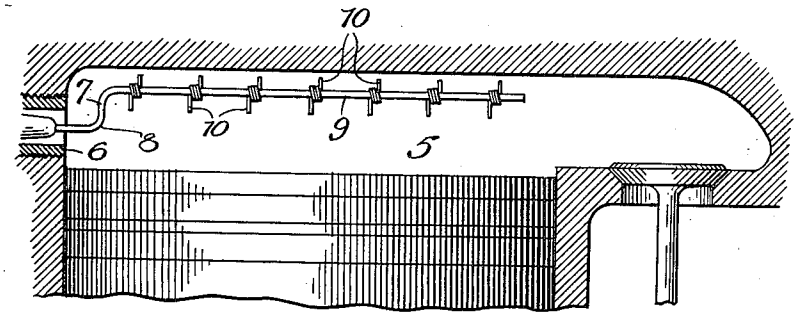
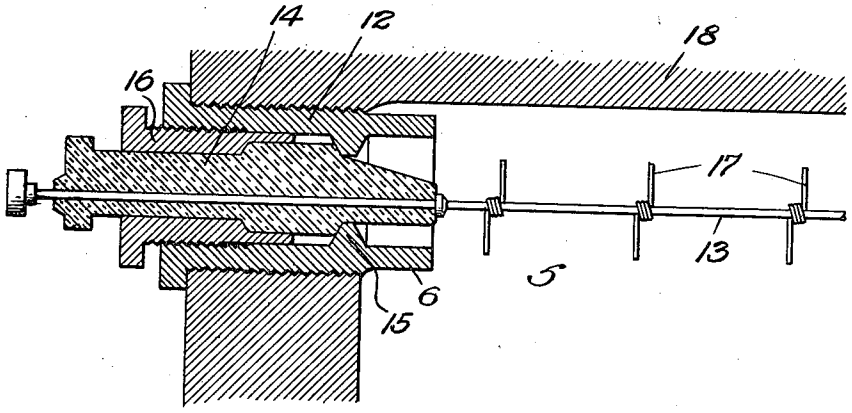


Fig. 2.



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UNITED STATES PATENT OFFICE.

GEORGE WINCHESTER, OF ROSELLE, AND FRANK A. HOWARD, OF ELIZABETH, NEW JERSEY, ASSIGNORS TO STANDARD DEVELOPMENT COMPANY, A CORPORATION OF DELAWARE.

SPARK PLUG.

Application filed May 16, 1921. Serial No. 469,957.

To all whom it may concern:

Be it known that we, GEORGE WINCHESTER and FRANK A. HOWARD, citizens of the United States, residing at 312 E. Maryland Avenue, Roselle, and 183 Stiles Street, Elizabeth, respectively, in the county of Union and State of New Jersey, have invented a new and useful Improvement in Spark Plugs, of which the following is a specification.

The present invention relates to ignition devices for internal combustion engines and will be fully understood from the following description thereof, illustrated by the accompanying drawing in which:

Fig. 1 is an elevation partly in section of a device constructed in accordance with the present invention, with the diagrammatic showing of parts of an internal combustion engine to illustrate its operative position relative thereto, and

Fig. 2 is an elevation partially in section of a modified form of construction in accordance with the invention.

In accordance with the present invention an ignition device is provided in an internal combustion engine capable of simultaneously producing a plurality of sparks at various points in the combustion chamber, thereby causing the fuel mixture in the engine to be ignited simultaneously at a number of separated points whereby more rapid and uniform combustion and propagation of flame is produced than under ordinary circumstances in which one or more igniting sparks are produced at a single point or in a very small area. This may be effected, for example, by a device as shown in Fig. 1 of the drawings in which the numeral 5 indicates the combustion chamber of the internal combustion engine and the numeral 6 the body of the spark plug from which projects an electrode 7. This electrode may suitably be bent upwards near the spark plug, as indicated at 8, and then bent substantially parallel to the head of the engine, the parallel portion being indicated by the numeral 9. At spaced intervals along the portion 9 of the rod 7 the points or barbs 10 are secured for example, by tightly wrapping them about the rod. They may likewise be secured by welding, tying or the like. These points project upwardly toward the head of the cylinder. In practice it is preferred to place three or more such points at approximately equal intervals along the portion 9 of the rod 7. The ends of the points 10 may suitably be a $\frac{1}{16}$ to $\frac{1}{4}$ inch from the head of the cylinder, this distance being bridged by the spark gap when suitably high voltage current is applied. The rod 7 with the attached points 10 forms one electrode and the head of the internal combustion engine 5, which is in conductive contact with the body of the spark plug 6 forms the other electrode. On applying current to the spark plug at the proper point in the cycle of the engine a plurality of sparks are produced between one or more of the points 10 and the head of the engine, each of these sparks forming a center for flame propagation. The mixture, being ignited at several points, is rapidly and uniformly burnt, substantially without detonation.

The electrode 7 may be formed of any suitable conductive metal such as copper, iron, tungsten, platinum, nichrome, or the like. The points 10 may suitable be formed of conductive material such as tungsten, platinum or the like. The use of a rod of tungsten or nichrome with points of platinum has been found satisfactory in practice. In operation there appears to be very slight vibration of the electrode.

In the modified form of construction shown in Fig. 2 the spark plug 12 is provided with a central projecting electrode 13 which is mounted as shown in a body of insulating material 14 such as porcelain. The insulating body is suitably supported in the spark plug between a fixed ring 15 formed in the metal body of the plug and a threaded ring 16 screwed thereinto. By loosening the latter the insulating body 14 may be rotated to adjust the distance of the points 17 on the rod 13 with respect to the head of the combustion chamber, indicated by 18. The points 17, which may suitably be of platinum, may be secured to rod 13 by wrapping.

It is readily apparent that the electrode may be so disposed in the combustion chamber as to bring the points to substantially equal distances from any wall thereof, the term wall being employed in its broader significance to include the head also.

Although the present invention has been

described in connection with the details of specific means for carrying it into effect, it is not intended that these details shall be regarded as limitations upon the scope of the invention, except in so far as included in the accompanying claims.

We claim:

1. In combination, an internal combustion engine, a spark plug secured thereto, an electrode forming part of said spark plug and projecting into the combustion chamber of the engine substantially through the clearance volume thereof and a plurality of spaced spark points secured to said electrode, said points approaching to a short distance from a wall of the combustion chamber to form spark gaps acting in parallel between the said points and the wall.

2. A spark plug comprising in combination a projecting central electrode of substantial length, said electrode adapted to be disposed in substantial parallelism with a wall of the combustion chamber of an engine, a plurality of spaced points upon said electrode adapted to extend to substantially equal distances from said wall, said points adjustable as to distance from said wall.

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