J. E. SEELEY.

SPARK PLUG FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED NOV. 26, 1909.

978,494. Patented Dec. 13, 1910.

Fig. 1.

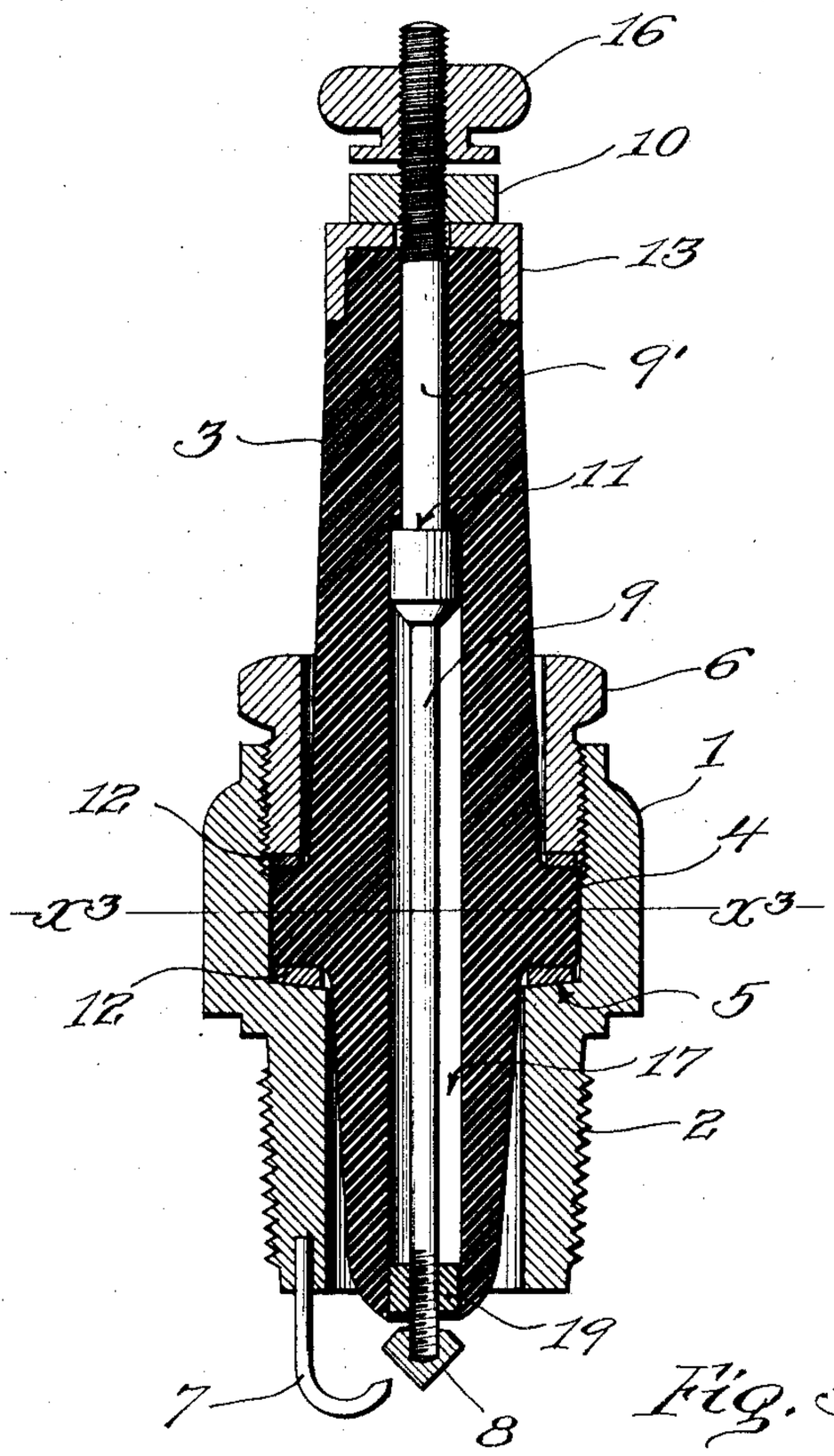


Fig. 2.

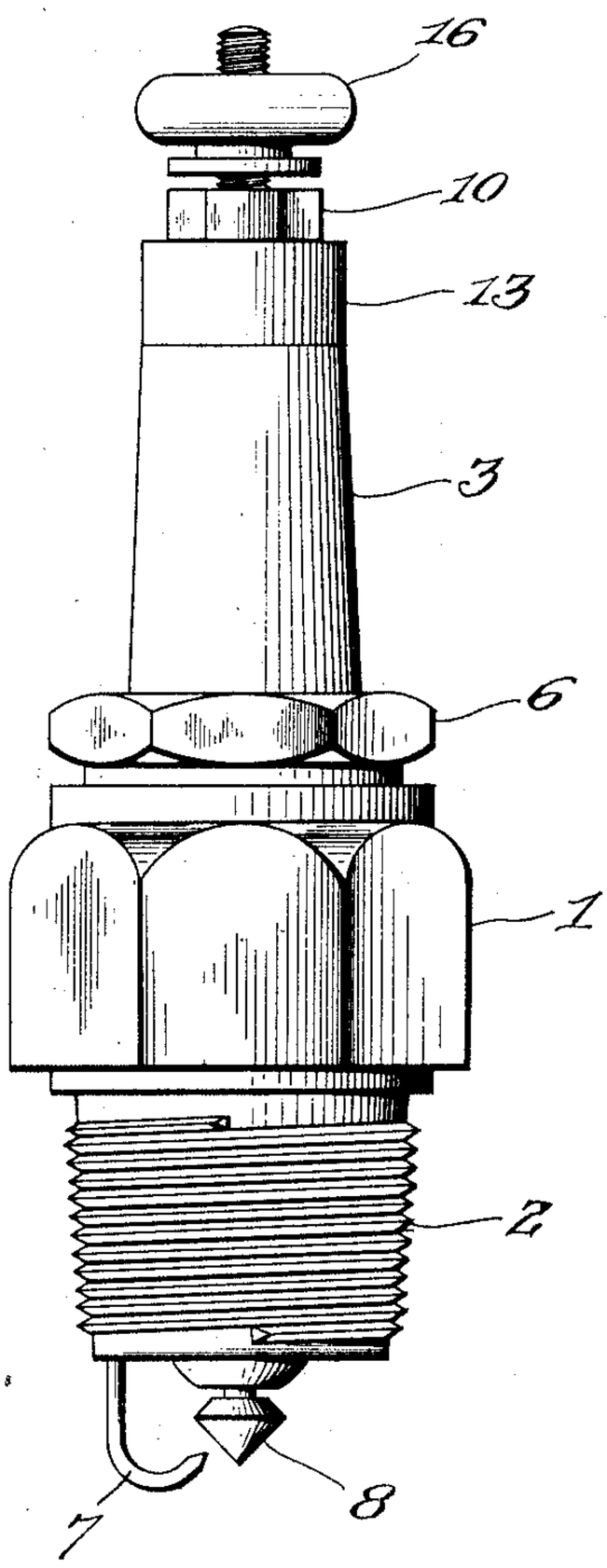
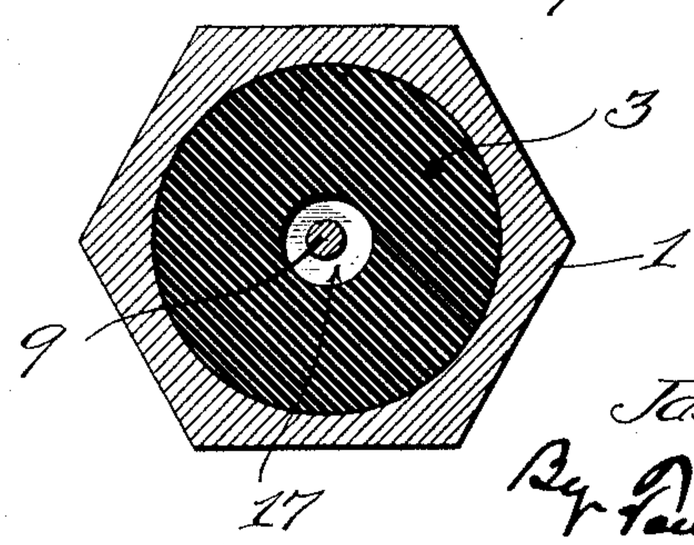


Fig. 3.



Witnesses.
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His Attys.

UNITED STATES PATENT OFFICE.

JAMES E. SEELEY, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO HIGH FREQUENCY IGNITION COIL COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

SPARK-PLUG FOR INTERNAL-COMBUSTION ENGINES.

978,494. Specification of Letters Patent. **Patented Dec. 13, 1910.**

Application filed November 26, 1909. Serial No. 530,011.

To all whom it may concern:

Be it known that I, JAMES E. SEELEY, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Spark-Plug for Internal-Combustion Engines, of which the following is a specification.

This invention relates to a spark plug for igniting the explosive charge in internal combustion engines and the main object of the invention is to minimize the loss in the spark plug due to electro-static induction therein.

In spark plugs as usually constructed the inner and outer conducting members of the spark plug are, in general, insulated from one another by solid materials presenting a relatively high coefficient of electro-static induction, or of specific inductive capacity. According to the present invention there is interposed or provided in the insulation between such inducting parts a space containing material of low specific inductive capacity, namely, an air space.

A further object of the invention is to provide improved electrode means for the spark plug.

In the accompanying drawings illustrating the invention: Figure 1 is a vertical section of the spark plug. Fig. 2 is a side elevation thereof. Fig. 3 is a horizontal section on the line x^3—x^3 in Fig. 1.

1 designates a plug body screw-threaded at 2 to screw into the usual tapped opening in the cylinder of an internal combustion engine. The body 1 is bored centrally to receive the insulating body or member 3, said member 3 having an annular projection or flange 4 which is clamped between a shoulder 5 in the bore of the plug body 1 and a shoulder formed by the inner end of the screw plug or bushing 6 screwing into the upper end of the bore in the body 1, suitable washers 12 being interposed between the said shoulders and the flange 4 to give an even clamping action on said flange.

The outer electrode 7 is attached to the lower end of the plug body 1 and the inner electrode 8 is attached to an electrode bar or rod 9 supported by the insulating member 3, the upper portion or shank 9′ of this rod being clamped to the member 3 by a nut 10 screwing on said shank and drawing a shoulder 11 of said shank against a shoulder formed in the axial perforation or bore 17 of the member 3. A ferrule 13 may be provided encircling the upper end of the insulating member 3. Electrode shank 9′ may be provided with the usual connecting means or binding nut 16.

Insulating member 3 is tapered at each end so as to leave an air space between the outside of said insulating member and the inside of the tubular metallic members 1 and 6, said insulating member being therefore surrounded by an air gap except at the flanged portion 4 thereof where it is in contact with the outer metallic members for the purpose of securing it in such members. Member 3 is preferably of porcelain or similar insulating material. Such material is of relatively high specific inductive capacity as compared with air and in order to minimize the loss due to electro-static induction through the insulating body, the said member 3 is recessed or formed with a central space or chamber as shown at 17, said chamber, for example, being central or axial and directly around the bar 9, said bar passing axially within said recess; said recess is preferably tubular and coaxial with the member 3 and is preferably of such length that it extends between the inner electrode conductor 8 and the surrounding metal parts, namely, body 1 and bushing 6, so that electro-static induction taking place between these conducting parts is exerted through this intervening air space and on account of the relatively low di-electric constant or specific inductive capacity of the air as compared with the insulating body 3 the loss due to electro-static induction is minimized. This loss, in cases where a solid porcelain or similar insulator is used, represents a considerable portion of the total energy supplied, especially where discharge currents of extremely high tension are employed. The air gap or space 17 within the insulating member 3 extends longitudinally in said member from a point farther out than said flange 4 to a point farther in than said flange so as to present an air gap within said flange and thereby protect against loss by static induction at that part of the length of the plug where the external or surrounding air gap above referred to is not present on account of the presence of the flange for supporting the insulating member in place. In order to prevent accumulation of solid ma-te-

rial within the tubular recess 17 the latter is preferably closed at its lower end by a plug or bushing 19, said plug or bushing being preferably below the inductive sphere of influence of the outer conducting member. The insulating supporting member 3 preferably tapers from the flange 4 upwardly and downwardly, so that on account of the air spaces thus provided around said end portions the electro-static induction is mainly concentrated in the vicinity of the flange 4, and it is at this portion of the plug that the effect of the air space 17 in reducing the electro-static induction is especially effective.

The inner electrode 8 is preferably formed as an inverted cone screwing into the lower end of bar 9, and the outer electrode 7 is preferably bent inwardly and upwardly so as to extend in proximity to the conical surface of electrode 8. This construction enables a new or different portion of the inner electrode to be presented for sparking, when necessary, by simply rotating the electrode in its support.

What I claim is:

1. A spark plug comprising an outer supporting and conducting member provided with an electrode, an inner conducting member provided with an electrode, and an intermediate insulating member having a flange portion in contact with and secured to said outer conducting and supporting member and having a portion at each end which is out of contact with said outer conducting member so as to form an air gap surrounding the insulating member at each end portion thereof and said insulating member supporting said inner conducting member at the outer end thereof and provided with an interior chamber surrounding said inner conducting member and forming an air gap between said inner conducting member and the aforesaid flange portion so as to present an air gap at that portion of the length of the spark plug at which there is no external air gap surrounding the insulating member.

2. A spark plug comprising an outer supporting and conducting member provided with an electrode, an inner conducting member provided with an electrode and an intermediate insulating member having a flange portion in contact with and secured to said outer conducting and supporting member and having a portion at each end which is tapered so as to be out of contact with said outer conducting member so as to form an air gap surrounding the insulating member at each end portion thereof and said insulating member supporting said inner conducting member at the outer end thereof and provided with an interior chamber surrounding said inner conducting member and forming an air gap between said inner conducting member and the aforesaid flange portion so as to present an air gap at that portion of the length of the spark plug at which there is no external air gap surrounding the insulating member.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 11th day of August 1909.

JAMES E. SEELEY.

In presence of—
ARTHUR P. KNIGHT,
FRANK L. A. GRAHAM.