

O. C. WINESTOCK.
SPARK PLUG.
APPLICATION FILED JULY 27, 1909.

993,214.

Patented May 23, 1911.

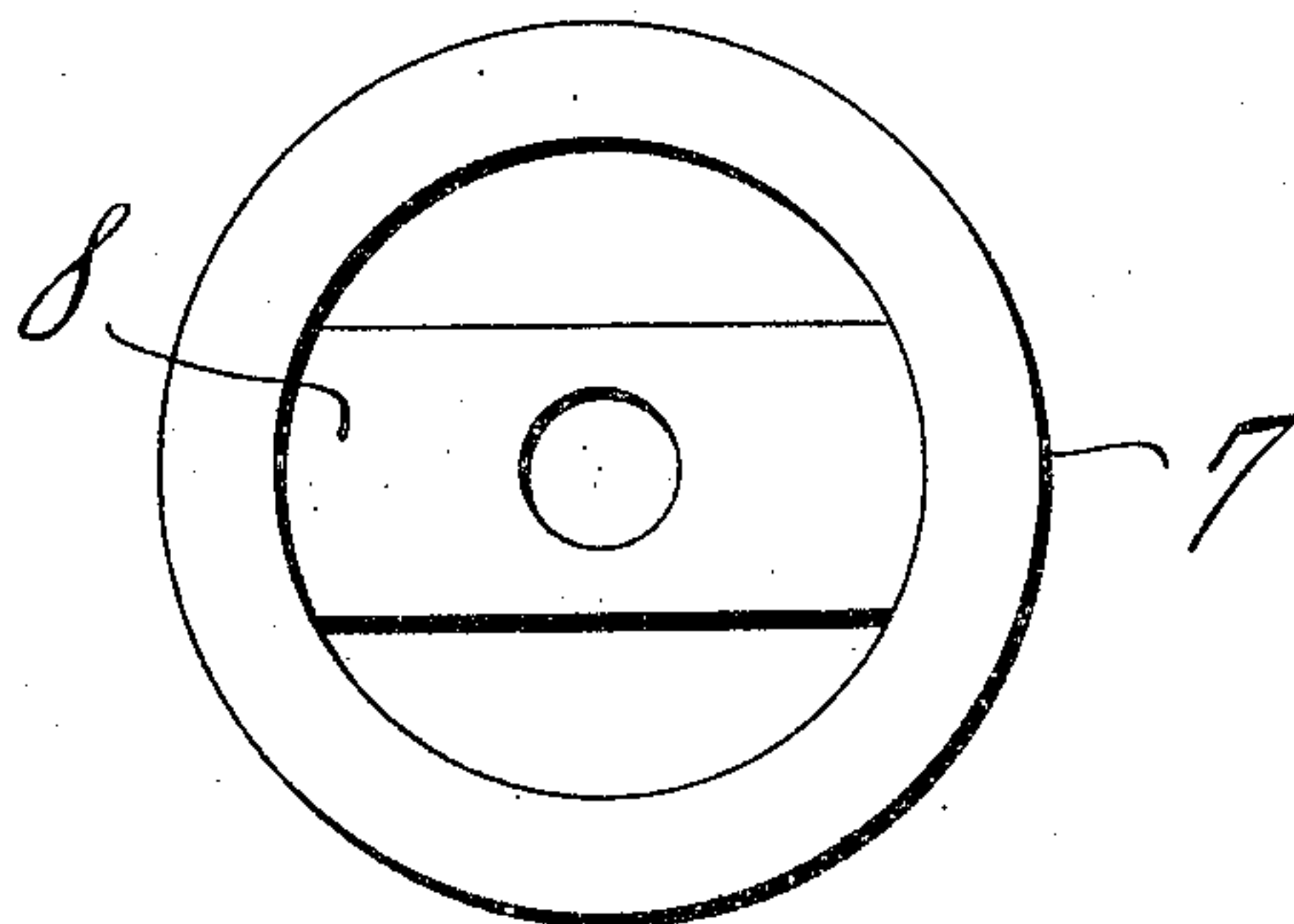
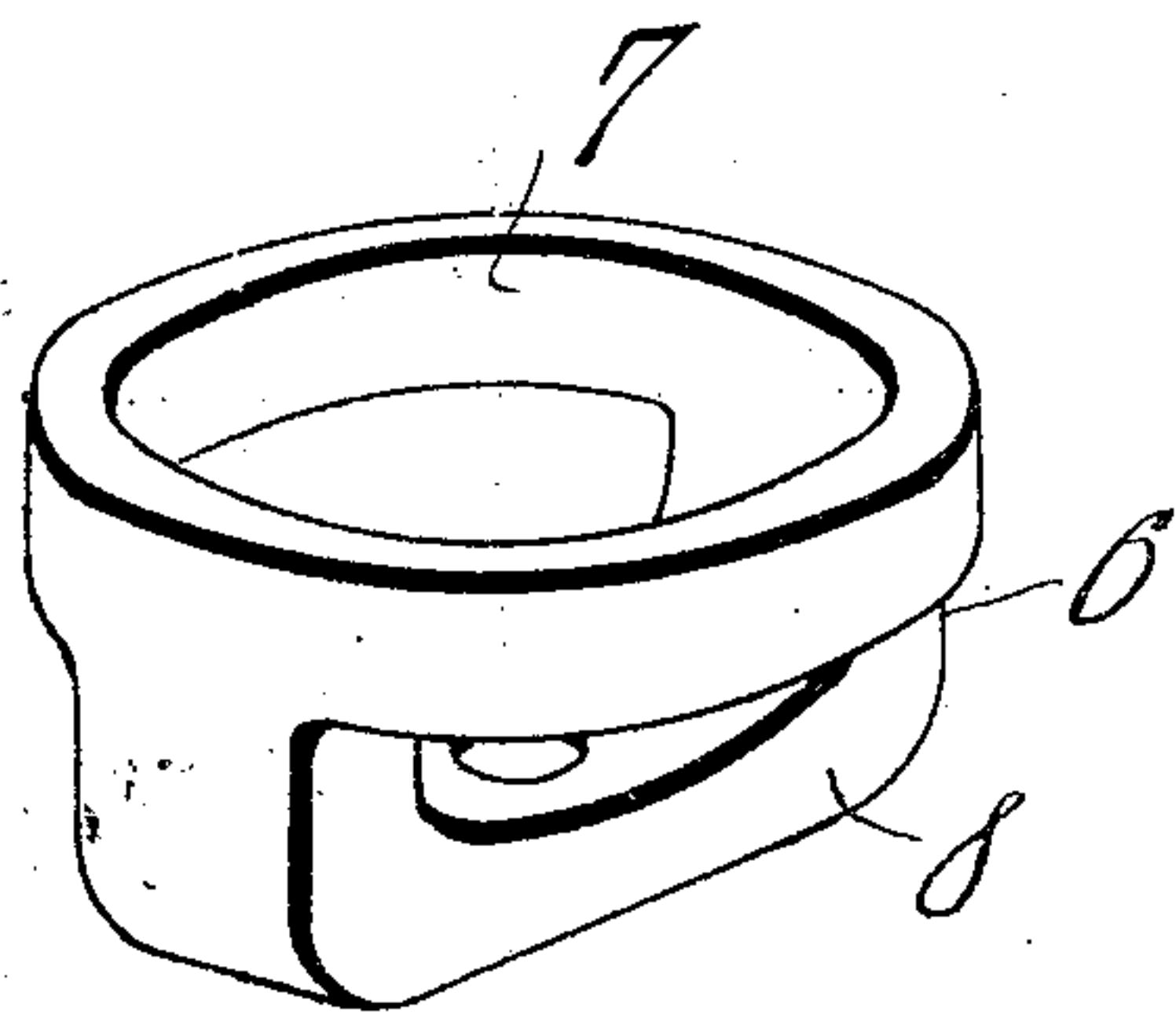
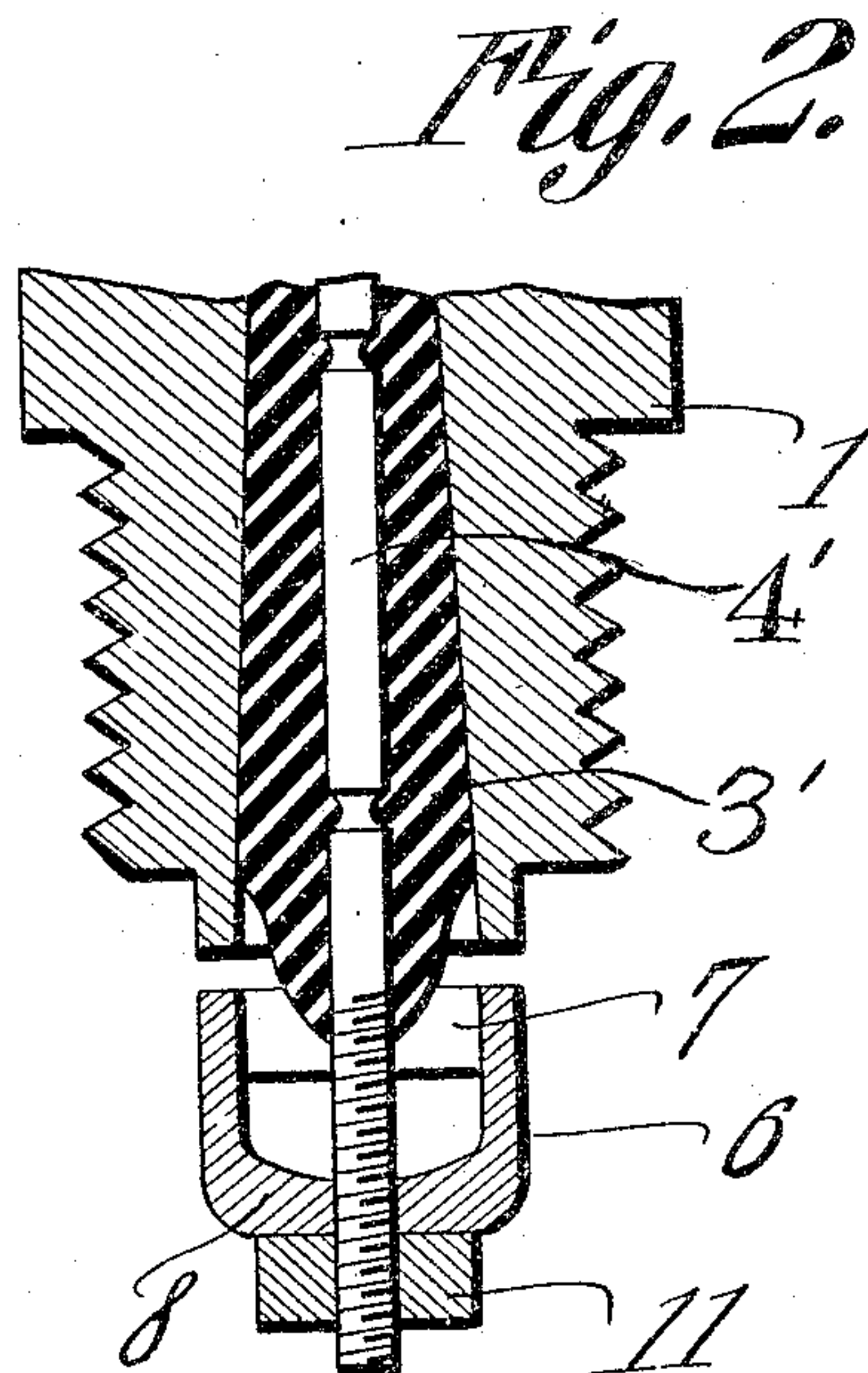
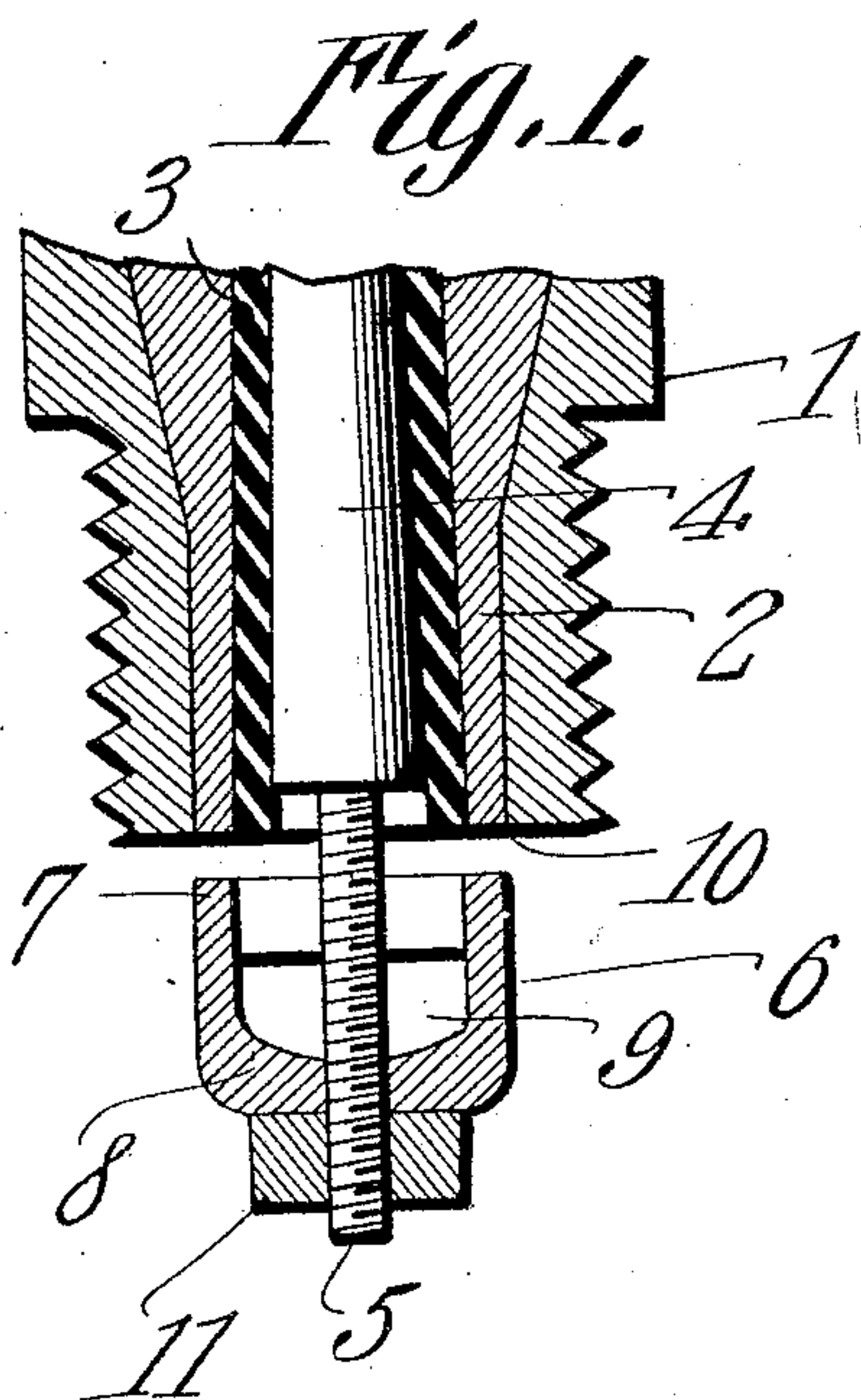


Fig. 3.

Fig. 4.

Witnesses

E. J. Hunt
H. J. Chapman.

Otto C. Winestock.

By

C. A. Snow & Co.

Attorneys

UNITED STATES PATENT OFFICE.

OTTO C. WINESTOCK, OF PERKINSVILLE, VERMONT.

SPARK-PLUG.

993,214.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, OTTO C. WINESTOCK, a citizen of the United States, residing at Perkinsville, in the county of Windsor and State of Vermont, have invented a new and useful Spark-Plug, (Case A,) of which the following is a specification.

This invention has reference to improvements in spark plugs, and its object is to provide a means for preventing an accumulation of soot at the active end of the plug in a manner to cause a short circuiting of the sparking terminals.

In accordance with the present invention there is provided a chamber in the spark plug structure on the side of the sparking zone remote from the body of the spark plug through which chamber the gases within the explosion chamber may freely circulate, and under certain circumstances pass with speed through the said chamber, thus thoroughly cleansing the sparking terminals from any soot or other deleterious material that may have found lodgment upon said sparking terminals and which either at once or from further accumulation may short circuit said terminals.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings forming a part of this specification, in which drawings,

Figure 1 is a longitudinal axial section, with parts in elevation, of the active end of a spark plug with the invention applied thereto, the showing of the drawing being on an enlarged scale. Fig. 2 is a similar view showing a somewhat different arrangement of parts. Fig. 3 is a perspective view on an enlarged scale of an adjustable terminal used in connection with the present invention. Fig. 4 is a plan view of the structure shown in Fig. 3.

Referring to the drawings there is shown in Figs. 1 and 2 a threaded member 1 designed to be introduced into a correspondingly threaded hole leading to the explosion chamber, usually the explosion chamber of an explosion engine, though of course the spark plug may be used for any explosion chamber of any character where it is desired to fire an explosive mixture by means of a spark produced by the passage of an electric current between two separated electrodes.

In Fig. 2 the threaded member 1 is designed to remain in the walls of the explo-

sion chamber while the two terminals of the spark plug are carried by another member, insertible in and removable from the threaded member in a manner similar to the structure shown in my application for Letters Patent, Number 459,644, filed October 26, 1908.

In the structure shown in Fig. 1, the removable portion of the spark plug comprises a sleeve 2, the exterior of which may be brought into gas tight relation to the interior of the threaded member 1, the parts having their meeting surfaces ground to fit so that there is no escape of the gases of combustion under the pressures generated in the explosion chamber. The interior of the sleeve 2 is formed with a tapering bore into which there is fitted a tapering sleeve 3 of insulating material, either mica or some other suitable refractory material. This sleeve 3 may be carried to the edge of the wide end of the sleeve 2, as shown in the drawings, or may terminate back of such edge, as shown in the aforesaid application. Fitting the interior of the sleeve 3 is a taper stem 4 which, in the showing of Fig. 1, terminates back of the wider end of the sleeve 3 so that there is a space between the wide end of the stem 4 and the wide end of the sleeve 3. Extending axially from the wide end of the stem 4 is a threaded rod or stem 5, either made in one piece of the stem 4 or separately therefrom and secured thereto.

The threaded rod or stem 5 carries a cup 6 comprising an annulus 7 joined at diametrically opposite points to the legs of a yoke 8, the junction member of which extends diametrically with relation to the annulus 7 at one side thereof and in spaced relation thereto. This structure may be formed from a cylindrical block bored in the direction of its axis to a suitable depth, one end being open and the other closed, and then milling away at the opposite sides of the cylindrical walls until there are formed two like passages 9 through the block at one side of the annulus.

Through the yoke 8 at the axial point of the cup 6 there is a threaded passage so that the cup may be secured upon the threaded rod or stem 5 with the edge of the annulus 7 remote from the yoke 8, in parallel relation to the corresponding end of the sleeve 2, this end being indicated by the reference numeral 10. A lock nut 11 is applied to the rod or stem 5 beyond the cup

6 to secure the same in any desired adjusted position with relation to the end 10 of the stem 2.

The spark plug is so connected up in a suitable circuit that the end 10 of the sleeve 2 constitutes one of the sparking terminals of the plug and the corresponding edge of the annulus 7, that is the edge remote from the yoke 8 constitutes the other sparking terminal.

The annular sparking terminal 7 is brought into proper relation to the annular sparking terminal 10 and locked by the nut 11 and then when the current is passed, there is produced a ring shaped spark or series of sparks which is found to be highly efficient and certain in action. It is found in practice to be necessary to provide for the adjustment of one terminal toward or from the other to allow for variations in the parts making up the spark plug so that the sparking terminals may be brought into the most efficient relation, and if found necessary after the spark plug has been put in use, this relation may be changed to allow for varying conditions which may arise.

Within the explosion chamber there occurs a movement of the gases of combustion at each explosion and there is a rush of gases on the inflow of the fresh charge. There are therefore within the explosion chamber violent and frequent movements of the gases, whatever be their character, and any tendency of the gases to deposit soot upon the active portion of the spark plug or any tendency of accumulations forming thereon is prevented by the swirl of gases through the space between the sparking terminals 7 and 10 and through the chamber on the side of the sparking terminals remote from the body of the plug because of the passages 9. Furthermore, any soot or other matters which may find lodgment upon the sparking terminals or interior thereto is blown off by the violent movements of either the gases of combustion or the incoming cool gases constituting the charge.

It is found in practice that commercial types of jump spark plugs usually become so fouled by soot after a comparatively short period of use that they become inoperative and must be removed from the explosion chamber or engine and cleansed, and even spark plugs of commercial types especially designed to avoid the deposition of soot thereon become fouled in use.

A spark plug of substantially the construction shown in Fig. 1 has been used for a period of time and under conditions which would cause many commercial forms of spark plugs to become inoperative from the deposition of soot while those forms of the so-called anti-soot type become markedly fouled by the deposition of soot, but no evi-

dence of the deposition of soot whatsoever was found upon the said spark plug constructed in substantial accordance with the showing of Fig. 1. This freedom of soot deposition is believed to be due to the free access of the gases at high speed through the space between the sparking terminals and through the interior of the adjustable terminal by way of the openings 9, thereby thoroughly cleansing all parts from any deposits which may take place and all particles which may find lodgment upon those parts of the spark plug exposed to the action of the gases of combustion. It may furthermore be stated that after the use referred to, the sparking terminals were found to be bright and the only discoloration in evidence was found to be due to the action of heat upon the exposed metallic surfaces. The insulation, where exposed, was also found to be clean.

In Fig. 2 the anti-soot features of the structure of Fig. 1 are retained, but the arrangement of the central electrode and the manner of insulating the same is somewhat different from that of Fig. 1. In this structure the central electrode is in the form of a rod 4', and about this rod there is molded a block 3' of refractory insulating material, while the threaded member 1 is formed with a taper bore into which the block 3' fits gas tight. Of course the block 3' and stem 4' may replace the insulating sleeve 3 and stem 4 of Fig. 1 and be seated in the sleeve 2 in the threaded member 1. In the structure shown in Fig. 2 the explosion chamber end of the block 3' is prolonged along the stem 4' so that it extends for a distance into the interior of the cup 6, it being desirable that this prolongation shall be sufficient to span the distance between the sparking terminals, but it should not be great enough to interfere with the action of the chamber within the cup 6 or to prevent the flow of gases through the annular spark gap.

What is claimed is:

1. A spark plug having sparking terminals one of which is in the form of an annulus with a carrying yoke offset from and having its legs joined to the annulus at diametrically opposite points of the latter, said annulus and yoke constituting a cup with oppositely disposed passages therethrough on the explosion chamber side of the annulus.

2. A spark plug having an annular spark terminal, a central conducting stem with a threaded extension at the explosion chamber end, and an annular spark terminal matching the first named spark terminal and provided with a yoke spaced from one side thereof and having a passage for the threaded end of the central stem, said yoke having its legs joined to the annulus at diametrically opposite points of the latter.

3. A spark plug having an annular spark terminal a central conducting stem with a threaded extension at the explosion chamber end, an annular spark terminal matching the first named spark terminal and provided with a yoke spaced from one side thereof and having a threaded passage for the threaded end of the central stem, said yoke having its legs joined to the annulus at diametrically opposite points of the latter, and a lock nut on said stem for locking the second named annular spark terminal in adjusted positions.

4. In a spark plug, two annular opposed spark terminals, one being more remote from the body of the plug than and adjustable to-

ward and from the other, the adjustable terminal being formed with an interior chamber and having passages through its walls at opposite sides on the explosion chamber side of the spark gap to permit the flow of gases through the chamber in the adjustable terminal transverse to the longitudinal axis of the plug.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

OTTO C. WINESTOCK.

Witnesses:

E. HUME TALBERT,
E. C. SCHLADT.