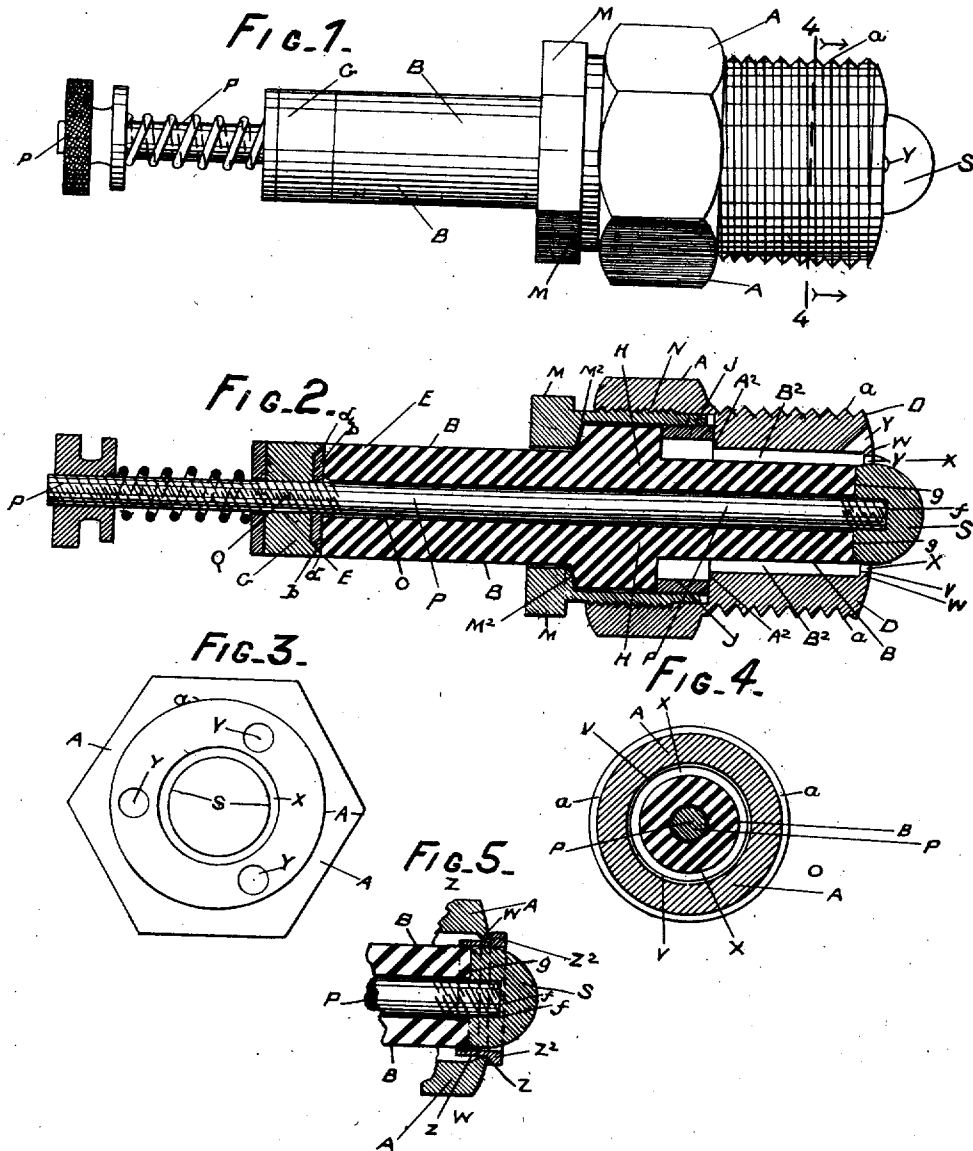


G. S. WALKER.
SPARKING PLUG.
APPLICATION FILED DEC. 13, 1910.

1,018,383.

Patented Feb. 20, 1912.



WITNESSES.
Marion E. Brown
Sarah E. Barnard.

INVENTOR.
GEORGE S. WALKER
BY
Albert W. Brown
ATTORNEY.

UNITED STATES PATENT OFFICE.

GEORGE S. WALKER, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO
EDWARD J. CHADBOURNE, OF WAKEFIELD, MASSACHUSETTS.

SPARKING PLUG.

1,018,383.

Specification of Letters Patent.

Patented Feb. 20, 1912.

Application filed December 13, 1910. Serial No. 597,158.

To all whom it may concern:

Be it known that I, GEORGE S. WALKER, a citizen of the United States, residing at the city of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Sparking Plugs, of which the following is a specification.

This invention in sparking-plugs relates to such class of said plugs as contain in their parts and construction, two electrodes, one more or less spherical in shape, and the other a circular running edge surrounding and spaced from said spherical electrode.

The invention consists in a combination of these two electrodes in the plug; all as hereinafter fully described.

In the accompanying drawings, forming a part of this specification, a sparking-plug of this invention is shown on an enlarged scale.

Figure 1 is a side view of the sparking-plug. Fig. 2 is a central longitudinal section. Fig. 3 is a face view at the sparking-end of the plug. Fig. 4 is a cross-section on dotted line 4-4, Fig. 1. Fig. 5 is an illustrative sectional view, in detail, as hereinafter appears.

In the drawings, A is a metal tubular casing or shell, open at both ends, and exteriorly adapted, by a screw-thread *a* to be screwed into and out of a suitable female screw-threaded opening in the wall of the explosion chamber or cylinder of an internal combustion engine. The shell A, intermediate of its length, has a radial circular running shoulder *A*² extending around its inner wall.

B is a tubular plug of any suitable insulating material, such as porcelain, glass or mica. This plug extends concentrically lengthwise of and within the shell A and at one end-portion C it terminates within and near to the smaller open and sparking-end D of the shell A. The plug B, at its other end-portion E, projects beyond the shell A and at this end-portion E is a metal screw-head or nut G. This nut G has a depression *b* in its end-face toward the plug, and in this depression *b* is a layer of asbestos or other suitable packing, preferably soft packing. This packing *b* and the raised edge *d* surrounding the screw-nut G, with the screw-nut G in place, as hereinafter ap-

pears, lie against and pack the outer end-face of the plug B, Fig. 2. The plug B, within the smaller tubular end-portion of the shell *a*, is of less external diameter than the internal diameter of the shell, which leaves an annular open space *B*² between the plug and shell. This chamber *B*² extends inwardly from the sparking end D of the shell A and ends within the larger tubular end-portion of the shell A at the radial face toward it of a projecting circular collar or flange H, that surrounds and is intermediate of the length of and integral with the plug B.

M is an external screw-threaded gland, screwing into the larger and screw-threaded open end of the shell A. This gland M, at its outer open end, has an internal circular running shoulder *M*² that surrounds and fits the plug B, and the gland, at its inner open end, has a sleeve or ring J which preferably closely fits and wedges within and, by one end-portion, projects from said inner open end of the gland and by that end-portion it bears against the shoulder *A*² of the shell.

In screwing the gland M into the larger open end of the shell, its inner radial shoulder *M*² coming against the outer radial face of the collar H of the plug B forces said plug forward, that is, toward the sparking-end B of the shell, and into a bearing by the inner face of its collar H against the inner end of the sleeve J, and the projecting end of the sleeve into its bearing on the shoulder *A*², there securing the plug to and within the shell, and at the same time tightly closing the inner end of the annular space *B*² about the plug and within the shell. The plug B has an axial bore O, and this bore extends through the whole length of the plug, and P is a round metallic rod or stem, extending loosely through said bore O, and projecting from each end thereof. This rod or stem P, at each of its projecting end-portions, is screw-threaded, and its end-portion Q has the screw-nut G screwed on it and its then projecting end-portion beyond said nut and also the shell A are each in suitable electric connection as common and well known. The opposite projecting end-portion R of the stem P screws into a corresponding screw-threaded socket *f*, at the center of the flat side *g* of a metal head S, of spherical or ball shape

at its remaining portion. This head S lies within and projects through the open smaller end D of the shell and its spherical portion is one of the electrodes of the sparking-plug of this invention as hereinafter fully appears.

The stem P is attached to the electrode head S by screwing it into the screw-threaded socket *f* of the head, and with the screw-nut G then screwed to a firm bearing against the plug B, the electrode S is brought, by its flat side *g*, to a bearing or seat on the end-portion E of the plug and thus the electrode S and stem P and plug B are firmly bound and secured together.

V is the electrode opposed to the electrode S. This electrode V is the inner circular running edge of a flange-projection W around the opening of the end D of the shell A, and between this flange-edge or electrode V and the spherical-head or electrode S is an annular open space X which constitutes the sparking-gap, see Figs. 2, 3 and 4.

Y, Y are a series of apertures or orifices at and through the shell A at its end D, and they and the sparking-gap X open to the annular chamber or space B² which is about the plug B and within the shell A.

It is preferable, and for the best and most satisfactory working of the sparking-plug, that the annular sparking-gap X shall be of uniform width throughout, and that the diametrical plane of the electrode S and the plane of the electrode V, or in other words, the circular running edge of the shell A shall be coincident. The first, that is the securing of a sparking-gap X of uniform width throughout, is insured by inserting a cylindrical tubular templet Z, with its flange Z² at one end, all of suitable size, between said two electrodes, see Fig. 5, having previously loosened screw-nut G and then tightening up the screw-nut and removing the templet Z. And the second, that is, fixing the plug B in the shell A so that the diametrical plane of the spherical electrode S and that of the edge-electrode V are coincident is insured, by the use of a sleeve J, within the gland M, of proper length, for the reason, that the length of the sleeve J, when the plug B is secured within the shell A, as has been explained, necessarily regulates and determines the position of the diametrical plane of the electrode S within and as to the electrode V.

The sparking of the plug described is at the sparking-gap X and as the opposed electrodes S, V are circular, obviously many sparking points are presented and the sparking is more or less a continuous circle, an important advantage as is obvious.

It is plain, that, as the electrode S is secured to the plug B, the removal of the plug, from the shell A in no way interferes with

the described central adjustment of the electrode S on the plug. Again, that as the positioning of the plug B within the shell A is regulated and determined by the sleeve J, as has been explained, the gland M and plug B can be removed and replaced at pleasure without interfering with the relative position explained of the two electrodes S and V.

In the operation of the plug the explosive gases can freely enter the chamber B² of the shell by passing through the apertures Y and as freely pass out of said chamber. Again the contact or bearing between the shoulder M² of the gland M and the collar H of the plug B is preferably packed with asbestos or other suitable packing.

Having thus describe my invention what I claim and desire to secure by Letters Patent is,

1. A sparking-plug comprising, in combination, an electrical connected metal tubular shell, exteriorly screw-threaded and at its opposite end-portions open and of different internal diameters joined by a circular running shoulder, and at its larger open end internally screw-threaded and at its smaller open end having a circular radial flange projecting inwardly, constituting an electrode, a gland exteriorly screw-threaded and screwing into said screw-threaded end of said shell, and at one end having an internal circular running flange or shoulder and at its opposite and open end having a removable sleeve closely fitting and terminating therewithin and projecting therefrom, an insulated cylindrical and tubular plug having an external running collar lying between said internal flange of, and the end of said sleeve within said gland, and at one end-portion extending into and along and spaced from the smaller tubular end-portion of said shell and said sleeve of the gland and at its opposite end-portion projecting from said gland, a cylindrical metal stem electrically connected and extending lengthwise through and projecting from the opposite ends of said plug, a screw-threaded nut on one of the projecting ends, and a spherical shaped head, constituting an electrode, on the other opposite projecting end of said stem, and said head lying within and spaced from said electrode of said shell, all substantially as described, and for the several purposes specified.

2. A sparking-plug comprising, in combination, an electrical connected metal tubular shell, exteriorly screw-threaded and at its opposite end-portions open and of different internal diameters joined by a circular running shoulder, and at its larger open end internally screw-threaded and at its smaller open end having a circular radial flange projecting inwardly, constituting an electrode, and also having apertures about said

flange leading to its interior chamber, a gland exteriorly screw-threaded and screwing into said screw-threaded end of said shell, and at one end having an internal circular running flange or shoulder and at its opposite and open end having a removable sleeve closely fitting and terminating there-within and projecting therefrom, an insulated cylindrical and tubular plug having an external running collar lying between said internal flange of and the end of said sleeve within said gland, and at one end-portion extending into and along and spaced from the smaller tubular end-portion of said shell and said sleeve of the gland and at its opposite end-portion projecting from said gland, a cylindrical metal stem electrically

connected and extending lengthwise through and projecting from the opposite ends of said plug, a screw-threaded nut on one of the projecting ends, and a spherical shaped head, constituting an electrode, on the other and opposite projecting end of said stem, and said head lying within and spaced from said electrode of said shell, all substantially as described and for the several purposes specified. 20 25

In witness whereof, I have hereunto set my hand in the presence of two subscribing witnesses.

GEORGE S. WALKER.

Witnesses:

ALBERT W. BROWN,
MARION E. BROWN.