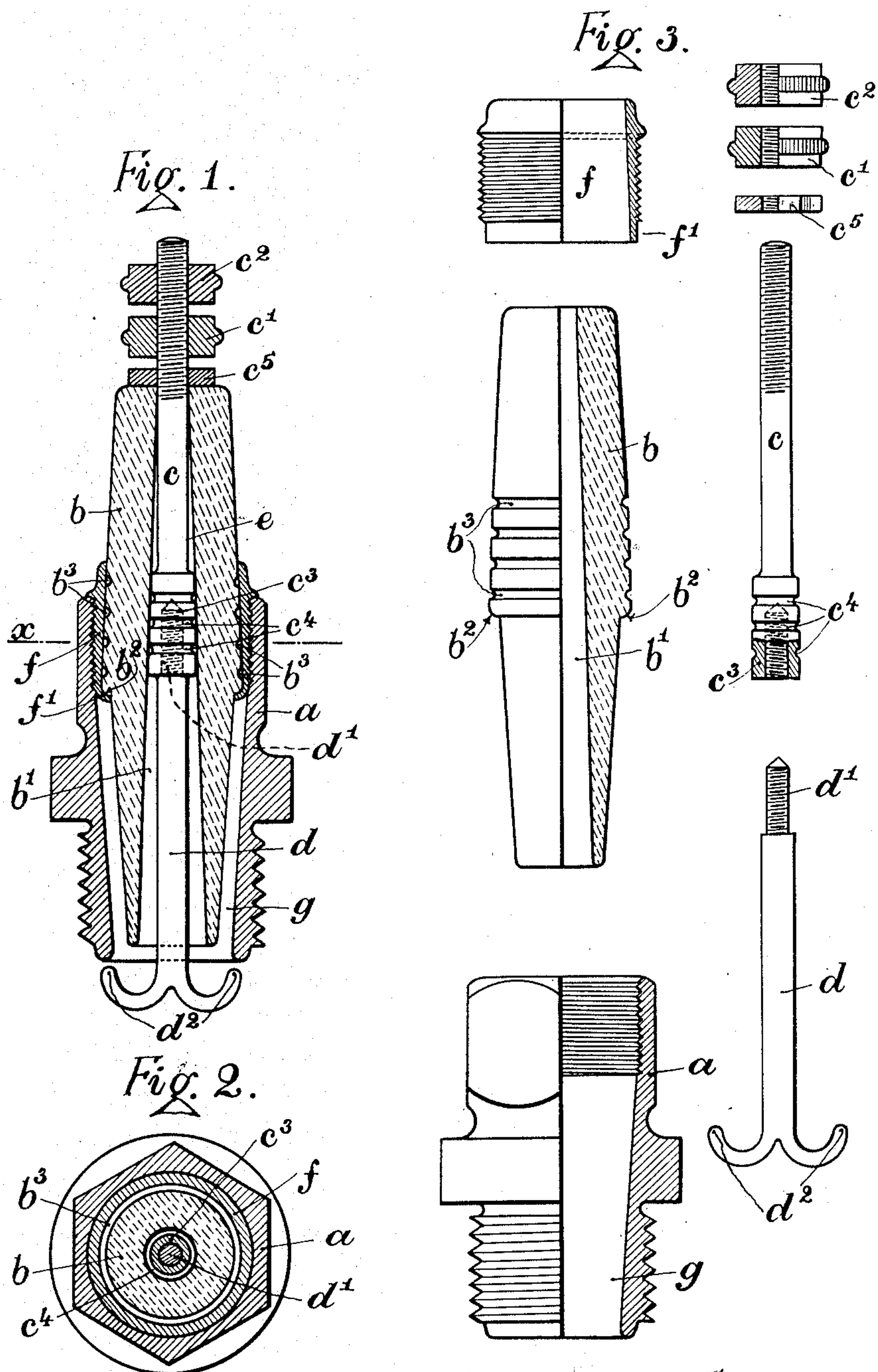


R. F. HALL.
SPARKING PLUG FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED OCT. 30, 1908.

976,797.

Patented Nov. 22, 1910.



WITNESSES

[Signature]
[Signature]

INVENTOR *Robert F. Hall*

By *James L. Norris*
[Signature]

UNITED STATES PATENT OFFICE.

ROBERT FREDERICK HALL, OF MOSELEY, BIRMINGHAM, ENGLAND.

SPARKING PLUG FOR INTERNAL-COMBUSTION ENGINES.

976,797.

Specification of Letters Patent.

Patented Nov. 22, 1910.

Application filed October 30, 1908. Serial No. 460,320.

To all whom it may concern:

Be it known that I, ROBERT FREDERICK HALL, a subject of the King of Great Britain, residing at Ferndale, Church Road, Moseley, Birmingham, England, have invented certain new and useful Improvements in Sparking Plugs for Internal-Combustion Engines, of which the following is a specification.

10 This invention relates to sparking plugs for use in connection with the electric ignition systems of internal combustion engines, and has for its objects to provide an improved construction of plug of which the
15 parts can be readily taken to pieces for cleaning or other purposes and readily replaced; which obviates all shoulders, ledges or annular grooves which, in ordinary plugs, form resting places and receptacles for carbon deposits; which obviates the use of
20 asbestos or other packing, which is liable to absorb oil laden with carbon and which also is porous; and which obviates danger of fracture when tightening up the parts.

25 Figure 1 of the accompanying drawings represents a section through a sparking plug constructed in accordance with this invention. Fig. 2 is a transverse section on line *x* Fig. 1. Fig. 3 shows the component parts
30 of the plug disassembled from one another.

The same letters of reference indicate corresponding parts in each of the figures of the drawing.

The insulator body part of the plug, which
35 surrounds the central electrode or conductor rod, and serves to insulate same from the metallic body or shell *a*, consists of a long one-piece sleeve *b* made of steatite, porcelain or other suitable insulating material. The
40 central hole or bore *b*¹ of this sleeve, and through which the conductor rod passes, is tapered throughout its length, the wider end being situated at the inner end of the plug and extending to near the sparking points.
45 The conductor rod itself is made in two parts *c*, *d*. The part *c* extends through the outer end of the sleeve *b* where it is adapted to be connected by the terminal nuts *c*¹, *c*², with the high tension cable of the ignition
50 system. The inner end of the said part *c* is formed with an enlarged head *c*³ whose outer sides are tapered to correspond to the internal taper of the insulator *b*, while also a number of annular gas-check grooves or
55 rings *c*⁴ are formed which serve to prevent the passage of gas between the conductor rod

and said insulator. The said taper head *c*³ is arranged to make an interlocking and wedging connection with the taper interior of the sleeve *b*, and is retained in position
60 by the lock nut *c*⁵ taking its bearing upon the end of said sleeve *b*. The tendency of the explosions in the engine cylinder is to tighten the joint between the conductor rod and insulator by forcing the part *c* farther
65 outward and thus the taper head *c*³ into closer wedging engagement with said insulator. Between the rod *c* and the inside taper walls of the insulator sleeve *b* an annular clearance *e* is formed.
70

The lower half *d* of the conductor rod consists preferably of a pure nickel rod whose inner end *d*¹ is screwed into the head *c*³ of the part *c*, while the outer end is bifurcated, and formed into the two sparking
75 points *d*². The outer half of the sleeve *b* is also tapered externally, and is adapted to make a locking wedge connection with a metallic sleeve *f* having a correspondingly tapered interior, and screwed into the outer
80 end of the metal body *a*. The inner end *f*¹ of this sleeve *f* is, after the insulator *b* has been inserted therein, turned over a shoulder *b*² formed at the inner end of the external tapered portion of said insulator, while said
85 sleeve *f* is also preferably closed over the end of the body *a* so as to form a gas-tight joint. Or the joint may be soldered over. In order to render the joint between the sleeve *f* and insulator *b* gas tight, a series
90 of gas-check annular grooves or rings *b*³ may be provided around the latter.

The interior of the body *a* is tapered as shown, and the inner half of the insulator *b* is tapered correspondingly and is separated
95 from said body by an annular space *g*. The said inner end of the insulator thus serves as a shield for assisting in preventing short-circuiting due to carbonaceous deposits, being separated from both central and outer
100 electrodes by annular spaces. By removing the lock nut *c*⁵ the central electrode may be taken out of the insulator and cleaned and replaced. The long taper hole of said insulator admits of being readily cleaned when
105 required. As can be seen, the taper part on the central rod comes directly in line with that part of the external portion of the insulator which is engaged and gripped by the sleeve *f*, so that there is no danger of said
110 insulator bursting or fracturing when the electrode is tightened up.

Having fully described my invention, what I desire to claim and secure by Letters Patent is:—

1. A spark plug for explosive engines
5 comprising an insulator body tapered externally so as to diminish in diameter toward the outer end of the plug and also having a tapered bore which diminishes in diameter toward the outer end of the plug, a metal
10 attaching shell adapted to serve as one of the electrodes of the plug, a metallic sleeve having an internal taper corresponding to and coöperative with the external taper upon the insulator body, said sleeve having a rigid
15 gas-tight connection with said shell, and a conductor extending through the bore of the insulator body and having a tapered part which corresponds to and coöperates with the wall of the tapered bore of the insulator
20 body, the tapers upon the exterior of the insulator body and the coöperating sleeve, and also the taper of the bore of such insulator body and tapered portion of the conductor being such that the pressure of the
25 gas acting upon the inner end of the plug will tend to tighten such parts.

2. A sparking plug for internal combustion engines, having an insulator body part
30 provided with a hole which tapers uniformly from end to end of the insulator body part,

and a central conductor rod provided with an enlarged taper-sided collar adapted to make a locking wedge connection directly with the wall of the internal hole in the body, said taper-sided part of the rod being
35 provided with annular gas-check rings or grooves.

3. A spark plug for explosive engines comprising a metal attaching shell capable of serving as an electrode, an insulator body
40 fitted therein and provided with a bore which tapers from end to end thereof, the wider portion of the bore being arranged at the inner end of the plug, and a conductor rod having a short tapered collar directly
45 engaging and forming a gas-tight joint within said tapered bore, and an electrode extending inwardly from said collar, the inner end of the insulator body being arranged
50 between the metallic shell and the inclosed portion of the electrode and being separated from said shell and electrode by annular spaces.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.
55

ROBERT FREDERICK HALL.

Witnesses:

HENRY SKERRETT,

HENRY NORTON SKERRETT.