Sept. 22, 1925. 1,554,271

C. H. FYE

SPARK PLUG STRUCTURE

Filed April 26, 1921

Fig. 1.

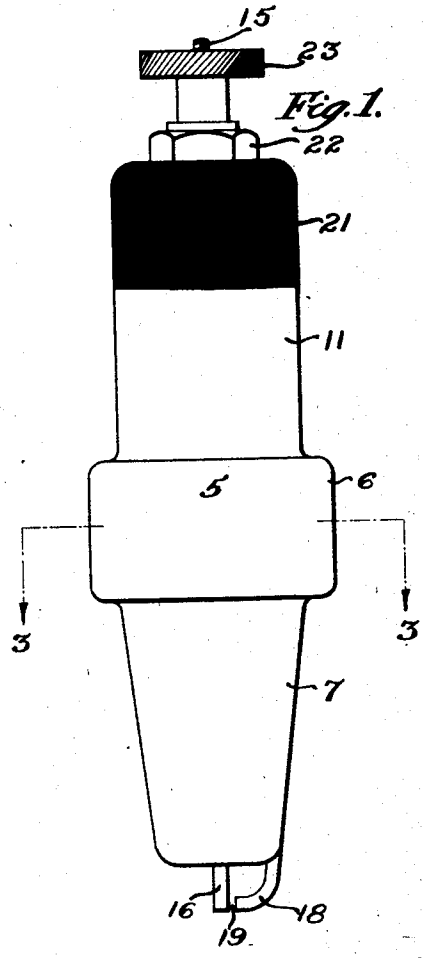



Fig. 2.

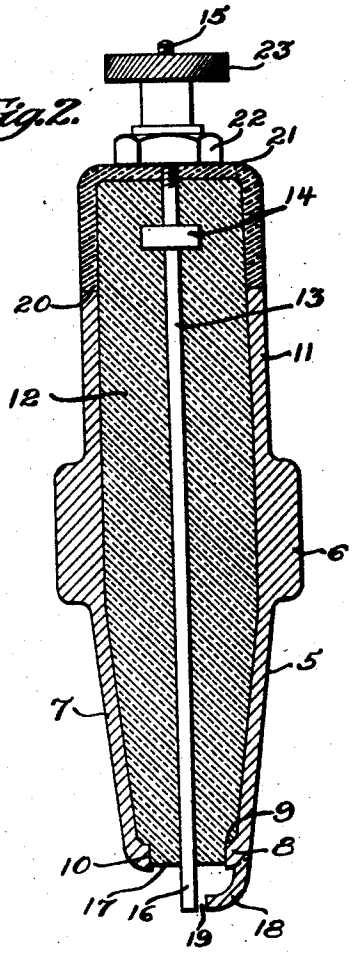



Fig. 3.

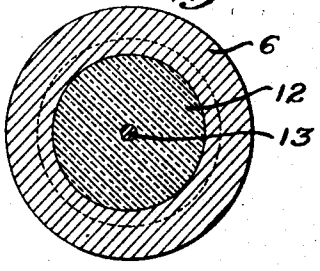
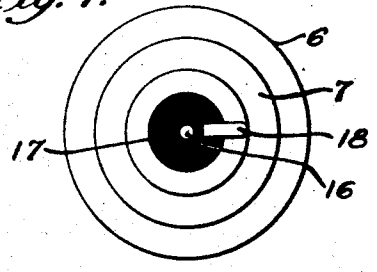



Fig. 4.




Witnesses,
Spencer W. Megonegal,
Augustus B. Coppes

Inventor,
Clayton H. Fye,
by Joshua R. H. Potts
his Attorney.

Patented Sept. 22, 1925. 1,554,271

# UNITED STATES PATENT OFFICE.

CLAYTON H. FYE, OF HOWARD, PENNSYLVANIA.

## SPARK-PLUG STRUCTURE.

Application filed April 26, 1921. Serial No. 464,572.

*To all whom it may concern:*

Be it known that I, CLAYTON H. FYE, a citizen of the United States, residing at Howard, in the county of Center and State of Pennsylvania, have invented certain new and useful Improvements in Spark-Plug Structures, of which the following is a specification.

One object of my invention is to provide an improved insulated electrode structure for use in the metallic body portions of spark plugs; the construction being such that the insulating material for the central electrode will be protected by an armor at its portions which are usually subjected to injury and contamination by the pressure of combustion in the engine.

Another object of my invention is to provide, in a single unit which can be inserted within or removed from a spark plug body, both electrodes in set sparking relation.

These objects, and other advantageous ends which will be described hereinafter, I attain in the following manner, reference being had to the accompanying drawings in which

Figure 1 is an enlarged elevation of a spark plug electrode structure made in accordance with my invention,

Figure 2 is a vertical section of said structure,

Figure 3 is a transverse section taken on the line 3—3 of Figure 1, and

Figure 4 is an inverted plan view of Figure 1.

Referring to the drawings, 5 represents a metallic armor shell which within its length is provided with an annular boss 6 providing a laterally extending flange adapted to seat within a metallic body portion of a spark plug in any desired manner. This shell 5 has a portion 7 depending from the boss 6 and preferably tapering downward and at its lower end is provided with an inturned flange 8 which provides an upper shoulder 9 and a hole 10 of smaller cross sectional diameter than the cross sectional internal diameter of the shell immediately above the shoulder 9 as clearly shown in Figure 2.

The metallic armor shell 5 has a portion 11 projecting upwardly from the boss 6. A core 12 of insulating material which is a non-conductor of electricity such for example as porcelain, glass or other suitable material is positioned within the armor shell 5 and if desired can be molded therein so as to include a central electrode wire 13. If desired this electrode wire can be anchored in the core 12 by having an enlargement 14 embedded in the material of the core 12; said electrode wire having a part 15 projecting above the top surface of the core 12 and at its lower end 16 projecting below the bottom of the core. The lower portion of the core 12 abuts the shoulder 9 and the core has a part 17 which fills the hole 10 of the armor shell 5; said lower part of the portion 7 of the shell 5 has a metallic tongue 18 projecting downwardly therefrom and curved inwardly toward the lower end 16 of the central electrode 13; there being a space 19 which is permanently set between the tongue 18 and the end 16 of the central electrode 13. The tongue 18 can either be drawn from the metal of the shell 5 or if desired it can be electro-welded or otherwise secured thereto so as to be in metallic connection with the shell 5.

The core 12 at its top projects above the top edge 20 of the shell 5 and a fiber insulating cap 21 fits over the top of the core 12 and at its lower edge abuts the top edge of the shell 5 as shown in Figure 2. The upper end of the electrode 15 is preferably screw threaded and provided with a nut 22 which abuts the cap 21 so as to firmly hold the cap in engagement with the top edge of the jacket and also in engagement with the upper portion of the core 12. Any suitable means for the connection of the usual electric conduit wire can be secured to the top of the electrode 13 and in the present instance I have shown a binding nut 23 for this purpose.

The inner surface of the portion 11 of the shell 5 can be made slightly tapered as can also the upper portion of the core 12 so as to guard against relative upward movement of the core within the shell and it will be noted that when the device is placed within the body portion of a spark plug in the usual manner that the upper edge of the boss 6 can be used for abutment with a gland nut as is the customary way of securing electrode devices within the body portions of spark plugs.

An electrode structure made in accordance with my invention as described and illustrated will protect the lower portion of the insulating core of the central electrode from injury by the pressure of combustion

since the lower parts of the insulating members of spark plugs are usually subjected laterally to the pressures of the gases upon combustion and very often become injured and rendered unsuitable for further use. With my construction the lower part of the insulating core is protected by the armor shell and the latter takes off compression or pressure from the combustion of the gases. Furthermore by providing the tongue 18, which forms the outer electrode, directly on the bottom of the shell and close to the lower end thereof, a short conductor for electricity is provided and short-circuiting of the plug is to a great extent eliminated for the reason that even though carbon deposit is formed on the lowermost surface 17 of the core 12, the tongue 18 and end 16 are so close to this part of the structure that the current will take the course between the electrodes at the spark gap 19 and not by way of the carbon deposit since there is practically no resistance owing to the shortness of the electrode portions.

While I have described my invention as taking a particular form, it will be understood that the various parts of my invention may be changed without departing from the spirit thereof, and hence I do not limit myself to the precise construction set forth, but consider that I am at liberty to make such changes and alterations as fairly come within the scope of the appended claims.

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

1. In a unit structure of the character described, an insulating core comprising an integral structure; an electrode embedded in said core and projecting from one end thereof; a metallic shell surrounding the lower portion of the core, the core being oppositely tapered and the bore of the shell being correspondingly tapered to fit the core, said shell having an integral curved tongue forming an electrode in sparking relation to said first electrode, and an annular boss projecting therefrom providing means of attachment to the metallic body portion of a spark plug.

2. In a structure mountable in the metallic body of a spark plug, a metallic shell having a tapered lower portion directed inwardly at the lower end thereof and having an integral tongue forming an electrode; a substantially solid core of insulating material snugly fitting in the shell and in direct contact therewith and having its lower end extending into the inwardly extending portion of the shell, and an electrode extending through the core and projecting from the lower end thereof in sparking relation to the first named electrode.

3. A structure arranged to be mounted in the metallic body of a spark plug, said structure comprising a metallic shell having an intermediate annular boss and a lower portion tapering downwardly therefrom and which is provided with an inturned flange and with an integral tongue curved inward beneath said flange to form an electrode, a core of insulating material snugly fitting in said shell being in direct contact therewith and having its lower end reduced and extending in said inturned flange of the shell, an electrode anchored in said core and extending through said core and having its lower end at sparking relation to said first electrode.

In testimony whereof I have signed my name to this specification.

CLAYTON H. FYE.