June 21, 1927. E. N. DE ALCOCER ET AL 1,633,435

SPARK PLUG

Filed Dec. 28. 1923

Fig. 1,

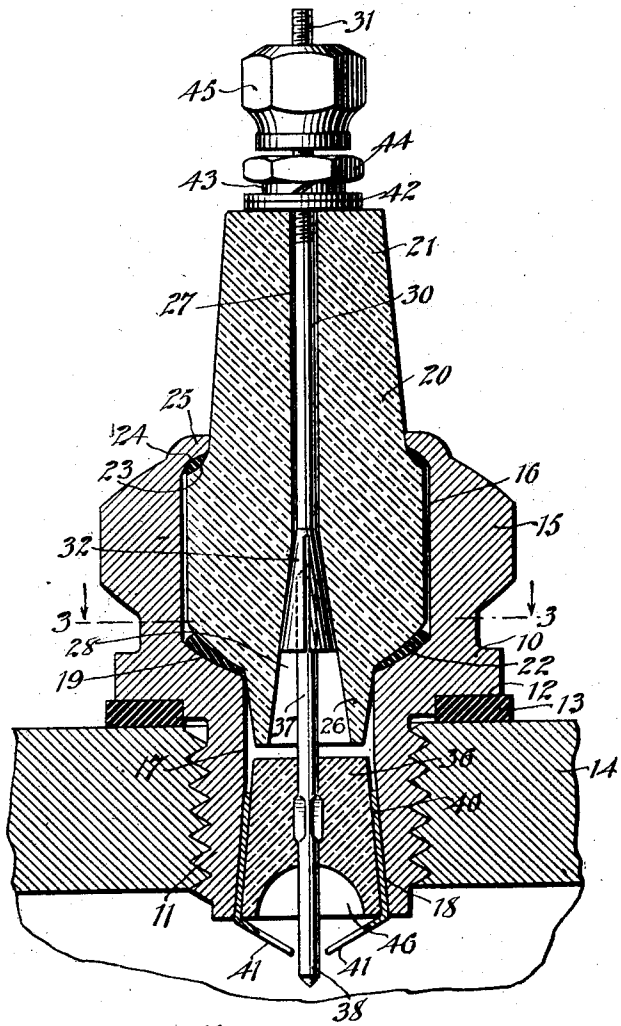


Fig. 2,

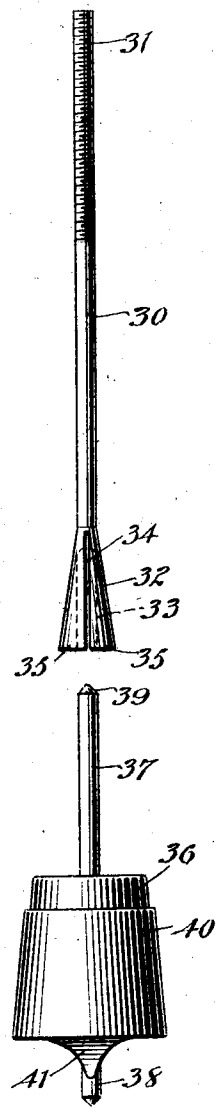
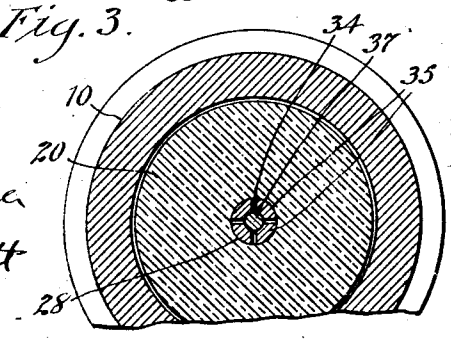


Fig. 3.



WITNESSES

Edw. Thorpe.

Hugh H. Plett

INVENTOR

Eugenio N. de Alcocer

Francisco O. de Alcocer

BY Munn & Co

ATTORNEYS

Patented June 21, 1927. 1,633,435

UNITED STATES PATENT OFFICE.

EUGENIO N. DE ALCOCER AND FRANCISCO O. DE ALCOCER, OF MEXICO, MEXICO.

SPARK PLUG.

Application filed December 28, 1923. Serial No. 683,228.

This invention has relation to ignition devices for internal combustion engines and has particular reference to an improvement in spark plugs.

For its principal object the invention contemplates a spark plug which consists of separable elements whereby to afford means for readily disassociating the parts for the purpose of cleaning or renewing worn and broken parts to obviate the necessity of purchasing an entirely new plug when one of the minor parts are broken or rendered otherwise unfit for use.

As a further object the invention contemplates a spark plug which will increase the efficiency of the engine to which it is applied by means of its construction which reduces to a minimum the formation and collection of carbon and which prevents leakage through the plug and consequent loss of compression.

As a still further object the invention aims to provide a spark plug which is comparatively simple in its construction, inexpensive to manufacture and produce and which is thoroughly reliable and highly efficient in its purpose.

With the above recited and other objects in view, the invention resides in the novel construction set forth in the following specification, particularly pointed out in the appended claims and illustrated in the accompanying drawings, it being understood that the right is reserved to embodiments other than those actually illustrated herein to the full extent indicated by the general meaning of the terms in which the claims are expressed.

In the drawings—

Figure 1 is a vertical sectional view through the spark plug constructed in accordance with the invention.

Fig. 2 is a side view of the removable member or element with the sections thereof in separated relation.

Fig. 3 is a horizontal sectional plan view taken approximately on the line indicated at 3—3 in Fig. 1.

Referring to the drawings by characters of reference, 10 designates a substantially cylindrical shell or casing constituting a part of the body of the plug, the said shell or casing being provided with a reduced externally threaded boss 11 at its lower end providing at its juncture with the casing an external enlarged shoulder 12 which is designed to seat against a packing ring 13 which is clamped against the cylinder head 14 around the threaded opening which receives the plug boss. The shell or casing 10 is provided with an external multifaced portion 15 which constitutes a means with which a wrench or other tool is engaged for screwing the plug into place on the cylinder head. The plug, shell or casing is provided with an upper enlarged bore 16 which communicates with a reduced lower bore 17 extending through the hollow boss. The lower end of the bore 17 is flared outwardly as at 18 for a purpose to be hereafter set forth. At their juncture the bores 16 and 17 provide an internal annular shoulder 19 upon which an insulator member 20 mounted in the bore 16 is adapted to seat at its lower end. The insulator member is preferably constructed of porcelain and is provided with a reduced upper end 21 which protrudes from the upper end of the casing or shell 10. An annular gasket or packing ring 22 is interposed between the lower end of the insulator member 20 and the shoulder or seat 19. The upper reduced end 21 at its juncture with the major body portion of the insulator member 20 produces an external shoulder 23 upon which an annular gasket or packing ring 24 is arranged, after which a flange 25 is spun inwardly over the shoulder 23 and gasket 24 to rigidly retain the insulator member in juxtaposition. The insulator member is provided at its lower end with an extension or boss 26 which extends through the gasket or packing ring and into the upper portion of the bore 17. The insulator member is provided with an axially extending bore 27 from the upper to the lower end. Adjacent the lower end the bore flares outwardly to provide a conical seat 28. The parts thus described constitute the body or carrier member of the plug which serve as a means for attaching and supporting the electrodes to be hereinafter described in proper position on the cylinder head.

The carried member or removable elements of the plug include a stem 30 having a threaded upper end 31 and a flared or conical head 32 at its lower end, which head 32 is provided with an axial bore 33 extending upwardly from its lower end to a point spaced below the upper end of the head. Crossed slits 34 are provided in the head which extend axially thereof and divide the

head into a plurality of clamping jaws 35. The carried member further includes a frusto-conical insulating and filler member 36 which is provided with an axially extending conductor stem 37 secured therein in any suitable manner against movement and with its opposite ends projecting therefrom, the lower terminal 38 constituting an electrode. The upper terminal is pointed as at 39 to facilitate its insertion within the bore 33 of the head 32 which head in effect constitutes a gripping chuck for coupling the upper end of the stem 37 to the stem 30 which is also of a conducting material. The lower end of the insulating member 36 is encased in a shell 40 which is also of a frusto-conical formation and is provided with angular diametrically disposed downwardly inclined extensions 41 which are designed to constitute ground electrodes, the free ends of which are properly spaced from the central electrode 38 to constitute spark gaps.

In practice the stem 30 is inserted from the lower end of the plug whereby it extends upwardly through the bore 27 of the insulator member 20 with the threaded end protruding above the same and with the conical head 32 defining the gripping fingers 35 arranged within the downwardly and outwardly flared portion 28 of the bore 27. Preferably washers 42 surround the stem and rest upon the upper end 21 of the insulator member 20 after which a split washer 43 is arranged over the stem resting upon the upper end 21 of the insulator member 20 after which a split washer 43 is arranged over the stem resting upon the washers 42. A retaining nut 44 is then threaded on the end 31 and serves to effect axial movements of the stem 31 and corresponding movements of the head 32 whereby upon upward movement of the stem the gripping fingers 35 are radially contracted, and upon downward movement radial expansion of the same is effected. A binding nut 45 is threaded on the upper end of the stem 31 which serves as a binding post for attaching the conduit wire of the ignition system to the plug. Prior to the contraction of the gripping fingers 35 by upward movement of the stem 30 the insulator member 36 and its component parts are inserted in the flared lower end 18 of the bore 17 and the pointed terminal 39 of the stem 37 is inserted in the bore 33 of the head 32. By turning the securing nut 44 to effect upward movement of the stem 30 the gripping fingers 35 will radially contract about the upper end of the stem 37 and couple the same with the stem 30 whereby the shell 40 is effectually seated in the flared portion 18 of the bore 17. The lower end of the insulating member 36 is provided with a semi-spherical recess 46 which constitutes a gas chamber communicating with the combustion chamber of the cylinder and which functions when the expansion takes place to dislodge from the upper faces of the downwardly inclined electrodes 41 foreign matter or carbon deposits which may form thereon. It should be further noted that the complementary frusto-conical seat 18 and shell 40 and insulating member 36 will positively prevent the escape of pressure or loss of compression due to the fact that the force exerted against the same will tend to more firmly seat the members 36 and 40 in place within the boss 11. In event of breakage or any other cause which requires the replacement of the electrodes of the porcelain member 36, said section of the carried member may be readily replaced at a nominal cost.

We claim:

1. In a spark plug, the combination with the shell and insulator member, of a removable plug member fitted within and closing the lower end of the shell and carrying spaced central and grounded electrodes, and a stem extending through the insulator member and detachably connected with the central electrode, said stem and insulator member having interengageable portions for effecting the frictional coupling of the stem with the central electrode upon axial movement of the stem.

2. In a spark plug, a carrier member including a shell adapted to extend into the combustion chamber of an engine cylinder and an insulator element arranged in the shell, said shell and insulator elements having bores each of which are provided with a flared portion, and a carried member adapted for detachable association with the carrier member and comprising a pair of stem sections having a means of connection coacting with the flared portion of the bore of the insulator element for rendering the connection active, an insulator head carried by the free end of one of the stem sections and provided with spaced electrodes, said head coacting with the flared portion of the bore of the shell to close the same and to clamp the spaced electrodes in grounded relation to the shell and cylinder.

3. In a spark plug, the combination with a shell and an insulator member, of a removable closure plug member fitted within the lower end of the shell and carrying spaced central and grounded electrodes, a stem extending through the insulator member having a radially contractable clamping portion for receiving the central electrode and interengageable portions on the stem and insulator member for setting up a clamping action of the stem about the portion of the central electrode which is received by the clamping portion, upon axial movement of the stem with respect to the insulator member.

4. In a spark plug, the combination with a shell and insulator member, of a removable closure plug member fitting closely within the lower end of the shell and carrying spaced central and grounded electrodes, the central electrode extending inwardly from the closure plug, a conductor stem extending through the insulator member having clamping means engageable with the inwardly extending portion of the central electrode, the said insulator member and clamping means of the conductor stem having coacting faces adapted upon axial movement in one direction to effect clamping engagement of the stem and central electrode and the retention of the closure plug in engagement within the shell.

5. In a spark plug, a shell having an outwardly flaring lower end, an insulator member mounted in the shell having an axial bore provided with a frusto-conical flaring lower end, a substantially frusto-conical closure plug member of insulating material snugly fitting within the lower end of the shell and having spaced central and grounded electrodes, the central electrode extending upwardly from the closure plug into the enlarged lower end of the bore of the insulator member, a conductor stem positioned in the bore of the insulator member having an axially split frusto-conical lower end arranged in the lower end of the bore of the insulator member and provided with a bore receiving the upper end of the central electrode, and means threadedly engaging the upper end of the stem for drawing the same upwardly whereby to cause the lower frusto-conical end of the stem to clamp the upper end of the central electrode and move the same upwardly therewith to snugly sit and retain the closure plug in the lower end of the shell.

EUGENIO N. DE ALCOCER.
FRANCISCO O. DE ALCOCER.