A. E. McDANIEL.

SPARK PLUG.

APPLICATION FILED OCT. 27, 1915.

1,246,966. Patented Nov. 20, 1917.

FIG. 1

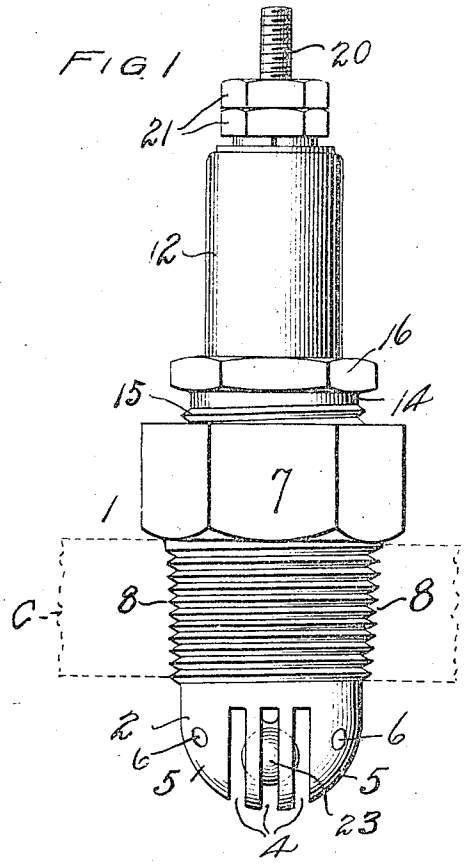


FIG. 2

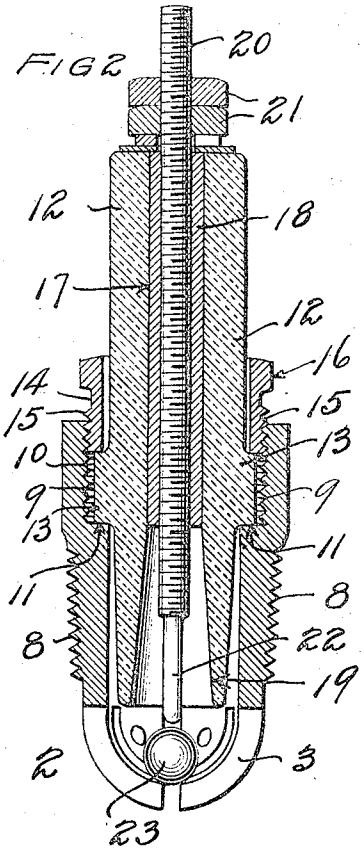


FIG. 3

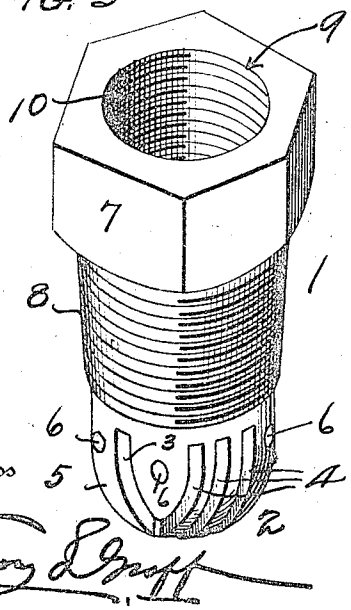
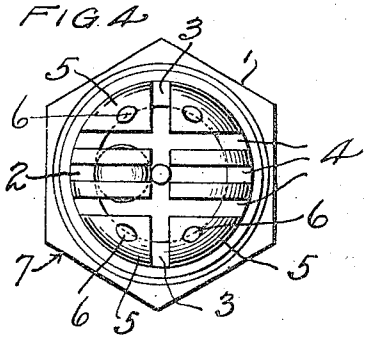


FIG. 4



Witness

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UNITED STATES PATENT OFFICE.

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SPARK-PLUG.

1,246,966. Specification of Letters Patent. Patented Nov. 20, 1917.

Application filed October 27, 1915. Serial No. 58,183.

To all whom it may concern:

Be it known that I, ALBERT E. McDANIEL, a citizen of the United States, residing at Cedar Rapids, in the county of Linn and State of Iowa, have invented certain new and useful Improvements in Spark-Plugs, of which the following is a specification.

This invention relates to the subject of igniters for internal combustion engines, and more particularly to an improvement in electrical spark plugs.

As a general object, the invention contemplates a novel and practical spark plug of the type having a movable terminal element adapted to automatically maintain a proper spark gap for all positions of the plug. That is to say, it has in view a plug having a movable terminal element that has a free movement within certain limits about a relatively stationary terminal of opposite polarity, to thus always provide a substantially uniform spark gap, while at the same time preventing the accumulation of dirt of carbon which would otherwise reduce the efficiency of the plug. Although this general type of spark plug is already known, the practical embodiments thereof are more or less open to structural objections, not only from a practical point of view but from a commercial standpoint.

Accordingly, the present invention has primarily in view, a simple, substantial, and reliable construction for self cleaning spark plugs which will greatly enhance the practical value, as well as the commercial. In this connection, the invention proposes a device having but few and simple parts which may be readily assembled in the process of manufacture, and also readily taken apart when replacements or repairs are necessary.

A further object of the invention is to provide a spark plug that may be easily and quickly attached to and removed from the cylinder head of an engine, and which also has all of its parts rigidly connected, so that the danger of any of the parts working loose or falling apart is reduced to a minimum or entirely eliminated, even under the most severe service conditions.

With the above and other objects in view which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

A preferred and practical embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of my improved spark plug.

Fig. 2 is a vertical sectional view thereof.

Fig. 3 is a detail perspective view of the attaching base thereof.

Fig. 4 is a bottom plan view.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

In carrying out the present invention, it is preferred to utilize a plug body which is formed entirely of one piece, thus not only facilitating attachment of the plug to the engine, but at the same time eliminating any separate or unnecessary parts that are likely to become loose. Accordingly, as will be observed from the drawings, the plug body of the invention is generally designated as 1, and has at one end an open sparking cage 2, which is preferably formed by making a single cross cut 3 in the rounded end of the plug and a plurality of cross cuts 4 at right angles to the single cross cut 3, thus providing a plurality of spaced ball supporting fingers F. To increase the communication between the inner part of the sparking cage and the interior of the combustion chamber of the engine, the walls 5 of the rounded sparking cage portion may be also provided with the openings 6.

The end of the attaching base opposite the sparking cage 2 is formed with a plurality of external angularly disposed faces 7 which constitute a wrench head whereby the plug may be conveniently fitted to the engine. The exterior portion of the body 1 intermediate the wrench head 7 and the rounded or semi-spherical sparking cage 2, is provided with a plurality of threads 8, which form a threaded holding shank for the plug that is adapted to enter the usual threaded opening provided therefor in the engine cylinder.

With further reference to the plug body 1, it will be observed more particularly from Figs. 2 and 3, that the upper end thereof, or the end thereof having the wrench head 7 is formed with an internal keeper socket 9 which is provided with suit-

able threads 10, and which has at its lower portion a rigid abutment shoulder 11. This construction permits of the plug body detachably receiving a suitable insulating post 12 which is preferably of porcelain, or other insulating material, and which has an annular locking shoulder 13, the lower edge of which is adapted to engage with the rigid abutment shoulder 11, and thus properly position the post in the plug body. In order to hold or secure this insulating post 12 in the socket, there is provided a clamping ring 14 which fits over the shank of the post, as shown in Fig. 2, and is provided with suitable threads 15 for engaging with the threads 10 of the keeper socket. Therefore, it will be clear that the lower edge of this clamping ring will bear against the upper edge of the annular shoulder 13 of the post to lock the latter in place. This clamping ring 14 may be provided with a wrench engaging portion 16 as shown in Fig. 1 to facilitate the fitting of the same into the keeper socket 9.

The insulating post 12 which is rigidly clamped in the body 1, is provided with a central bore 17 which is adapted to receive an internally threaded metallic sleeve 18. This bore 17 flares outwardly at its lower end as indicated at 19 to provide a flared terminal chamber which opens into the sparking cage 2. An adjustable conductor stem 20 is fitted in the internally threaded sleeve 18, and as will be observed from Fig. 2, the same carries at its upper end suitable wire terminal clamping nuts 21, while the lower end thereof which extends into the terminal chamber at the end of the post, is preferably reduced to provide a relatively stationary battery terminal point 22. Owing to the mounting of the stem 20 in the sleeve 18, it will be clear that the same may be adjusted vertically, that is so that the extremity of the terminal point 22 may be raised and lowered with respect to the bottom of the sparking cage 2.

The construction above described readily permits of the self-cleaning feature especially intended to be a characteristic of this spark plug. That is to say, the open sparking cage 2 receives a movable terminal element 23 which is preferably a smooth metallic ball which has a free and unobstructed movement throughout the cage, and which is at all times a relatively fixed distance from the extremity of the terminal point 22 to thus provide the desired spark gap. In the position of parts shown in Fig. 2 the spark will be readily made between the terminal end 22 and the ball 23. However, should the ball 23 for any reason be in contact with the terminal end 22, the spark will then be made from the ball 23 to the cage 2, whose open construction readily permits an ignition of the compressed charge in the cylinder.

From the foregoing, it is believed to be clearly apparent that the invention provides a spark plug of the self cleaning type which involves a rigid and practical structure, which although susceptible of being dismembered when desired, is absolutely rigid and unitary when in use. This feature together with the practical features of construction constitute a reliable and serviceable plug which effectively ignites the compressed charge in the cylinder while in any position, and at the same time prevents the accumulation of foreign matter on the sparking terminals. In this connection, it may be noted that the terminal end 22 supplies the current from the battery, while the movable terminal ball 23 which contacts with the metallic cage 2 is the ground terminal, whereby the current makes its way from the battery to the ground through the shank 8 of the base 1 which fits in the head of the cylinder C indicated by dotted lines in Fig. 1.

I claim:

A self cleaning spark plug comprising a one-piece plug body having at one end a skeleton ball cage having a spherical exterior, said cage being formed by a single cross cut, and a plurality of parallel other cuts at right-angles to said single cut, thereby providing a plurality of oppositely disposed ball supporting and oil draining fingers and wall portions, the latter being perforated, said plug body having an internally threaded keeper socket at its upper end and an externally threaded holding shank portion, a terminal ball loosely resting on said supporting fingers of the cage, an insulating post locked in said plug body, and an adjustable battery terminal stem carried by said post.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ALBERT ELLSWORTH McDANIEL.

Witnesses:

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