

E. P. NICHOLSON.
SPARK PLUG.
APPLICATION FILED MAY 15, 1919.

1,363,904.

Patented Dec. 28, 1920.

Fig. 1.

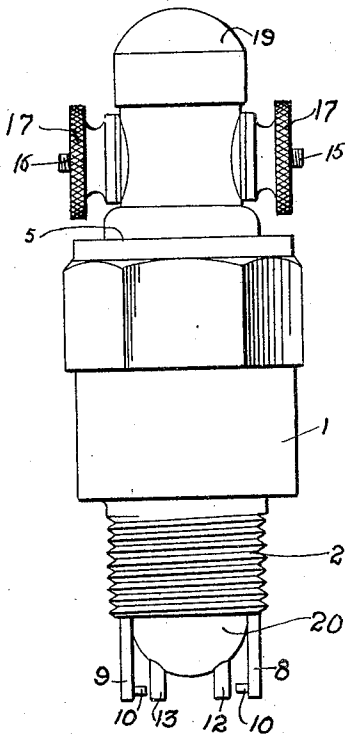


Fig. 2.

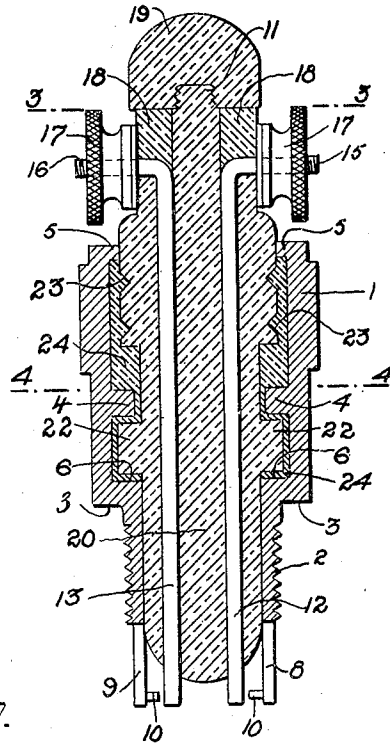


Fig. 3.

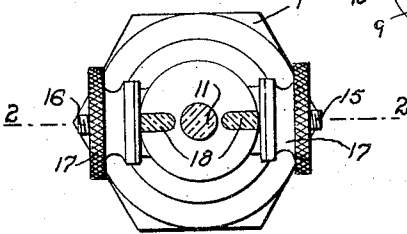


Fig. 7.

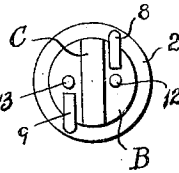


Fig. 4.

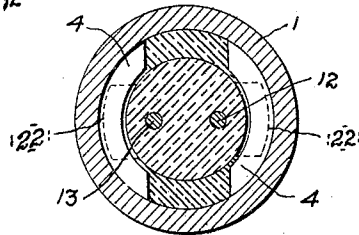


Fig. 5.

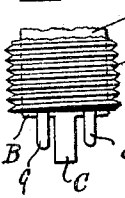
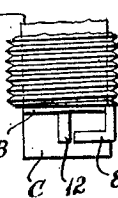


Fig. 6.



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SPARK-PLUG.

1,363,904.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EBERHARDT P. NICHOLSON, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented a new and Improved Spark-Plug, of which the following is a full, clear, and exact description.

This invention relates to spark plugs, and in particular to a new and improved form of double electrode spark plug.

A purpose of the invention is to provide a double electrode spark plug adapted to give off twin sparks, or a double spark within the combustion chamber of the cylinder head of the internal combustion motors.

A broad purpose of the invention is to provide a double electrode spark plug which will simultaneously produce twin sparks to facilitate combustion in the gas engine cylinder. It is also a purpose to provide the design of a double sparking ignition plug so as to make it unnecessary to employ two separate spark plugs in airplane engines, high speed automobile racing motors, and large stationary working engines.

With the above and other objects in view the invention has relation to a certain combination of spark plug elements, an example of which is described in the following specification, specifically pointed out in the appended claims, and illustrated in the accompanying drawings, wherein:

Figure 1 shows the double electrode spark plug in side elevation, and Fig. 2 shows a longitudinal sectional view taken through Fig. 1.

Fig. 3 shows a sectional view taken upon the line 3—3 of Fig. 2, and Fig. 4 shows a sectional view taken upon the line 4—4 of Fig. 2.

Figs. 5, 6 and 7 show modified forms of the spark plug, and are fragmentary views of the spark head. A description of the modified form will be given in the specification.

Referring now more in particular to the drawings, wherein the same parts throughout are designated by the same reference characters, the numeral 1 points out a metal shell internally bored and adapted to receive the elements comprising the spark plug. This shell is reduced in diametral size and provided with screw threads 2 and shoulder 3. The spark plug is screw-threaded into

the motor cylinder and seated against gaskets or the cylinder face by engaging the shoulder 3 therewith. The shell is provided with internal lugs 4 diametrically opposite one another and formed on the inner wall of the bore at right angles with the axis of said bore. The lug extremities will be terminated so as to leave an adequate circumferential distance between the ends of each lug so as to admit a co-acting lug as later seen. The shell is provided with an internal flange 5 formed on the metal shell at the time it is centrally bored. The shell is provided with an inner shoulder 6 which is a formation incident to the shoulder 3 and which provides a bore sufficiently large to receive a lug which co-acts with the lug 4 as later seen. The screw-threaded shank 2 is fitted with spark terminal posts 8 and 9 diametrically disposed thereon. These terminal posts are provided with spark heads 10. The shell is finished on the outside and upper portion thereof with a hexagonal wrench head for receiving the grip of a wrench in order that the spark plug may be tightly screw-threaded into the tapped bore of the cylinder.

An insert core or plug 20 made of any suitable heat resisting and electric current resisting material is fitted within the shell. The upper portion of this core is provided with a screw-threaded stud 11. The core is provided with longitudinal parallel bores, and into the bores are tightly fitted circuit spark rods 12 and 13. These rods project through the lower portion of the heat resisting and insulated insert core or plug, and terminate adjacent the spark heads of the terminal posts. The spark heads and circuit spark rods will be spaced apart sufficiently to cause proper arcing between the respective circuit spark rods and spark terminal posts. The upper ends of the spark rods are outwardly bent, and project through the cylindrical surface of the insert core or plug as designated at 15 and 16. The screw-threaded extremities 15 and 16 are provided with suitable terminal washers and knurled retaining nuts 17. The upper end of the insert core is slotted as shown in Fig. 3 so that the spark rods may be introduced into the longitudinal bores. After the rods are pushed into position the slots are filled with insulating compound 18 which becomes an integral and structurally composite part of

the insert core. This firmly anchors the spark rods in position. A finishing head 19 is screw-threaded upon the screw-threaded stud and thus locks the material 18 in place, and also provides a smoothly finished and well appearing spark plug.

The insert core or plug will preferably have a diametral size slightly less than the inner diametral size of the bore of the shell member 1. The insert core will very tightly fit the internal flange 5, and further will very closely fit the internal bore of the screw-threaded portion 2. This lines up the insert core within the shell causing the two members to tightly engage one with the other. The insert core is provided with integrally projecting lugs 22 diametrically formed upon the circumference of the core and having a circumferential length approximately equal the distance between the lugs 4 of the shell. The insert core is pushed downwardly in the shell so that the lugs 22 register with the opening between the lugs 4. When the insert core is in its downwardly limited position it is given a one-fourth turn which causes the lugs 22 to move into position behind the lugs 4. This adequately locks the shell and insert core together. The core is grooved as shown at 23.

A heavy plastic form of heat resisting cement is used when assembling the shell and insert core. Cement is packed around the core so that it will be tightly compressed within the annular space left between the inner wall of the shell and the outer wall of the core. This heat resisting cement material is designated by the numeral 24 and tightly fits into the grooves 23 and also engages the co-acting lugs. The cement is forced down in between the lugs 22 and shoulder 6. After the cementing material is dried the insert core forms a very tight fitting immovable plug within the shell. The cement becomes wedged into the grooves and between the surface of the lugs 4 and 22 so as to form a solid and composite structure.

The shell member 1 and insert plug 20 may also be screw-threaded together in case it is undesirable to employ the lug retaining means above described.

In the manufacture of this spark plug it may be found preferable to use a plastic material for molding the insert plug within the shell member. This may be accomplished by packing the plastic material within the shell, and at the same time inserting the spark rods 12 and 13. A suitable die will be employed for joining up with the shell member and for finishing off the lower end of the insert plug. This may be accomplished by screw-threading the shell member into a lower die, said die to have a semi-cylindrical convex form which will cause the plastic material to mold itself within the die and impart a rounded off head to the

projecting end of the molded insert plug. A finishing die will also be employed on the upper portion of the shell member to finish off the top extended portion of the insert plug. This die will be properly fitted to the shell member and after the plastic material has been compressed into the spark plug shell and allowed to set and dry sufficiently, the said dies will be removed therefrom and a well shaped insert plug with top and bottom finished off according to the interior shape of the dies. This form of construction will render unnecessary the use of the finishing head 19 and will otherwise form a very substantial and composite structure. This method of manufacture will provide a spark plug approximately solid and indestructible in nature.

The terminals 15 and 16 will be connected in the motor ignition system on separate and independent high tension lines so that a separate and independent spark can be transmitted through the two sets of spark heads 10. In case one of the arcing sets 8—12 becomes inoperative and fails to spark, the other arcing set will function. This form of double electrode spark plug will adequately take the place of two spark plugs carried within a single cylinder and render unnecessary the use of double plugs.

The last three figures of the drawings illustrate modified forms of this spark plug and in particular relate to the lower form of the insert plug. In these views the insert plugs are designated by the character B. The insert plug is either molded within the shell or separately built and pressed thereinto, a disclosure of each method being hereinbefore described.

The insert plug B is provided on the lower end thereof with an extended ear C which projects beyond the end of the sparking sets. This extended ear is placed between the sparking sets which adequately separates each set from the other and provides positive security against possible short circuits between the sparking sets.

The spark terminal posts 8 and 9 are integrally made with, or fitted to the outer rim of the screw-threaded member 2, and the circuit spark rods 12 and 13 are contained within the insert plug. Each set of sparking members 8 and 12, and 9 and 13, is separated by the extended ear C. And each circuit spark rod is diametrically located, likewise the spark terminal posts are diametrically located as shown in Fig. 7.

This forms a symmetrically constructed spark plug head. The extended ear C projects below the sparking sets for the purpose of protecting them against possible damage or contact when the plug is removed from the engine to be cleaned. The extended ear C will also facilitate the breaking up of possible carbon collections, and

will further function to prevent any affinity of relation between the two separately disposed sparking sets.

5 Either form of the invention as presented may be manufactured under the present specifications and claims without departing from the theory, scope, and breadth of the invention.

10 This double arcing plug, giving off twin combustion arc within an engine, will more readily ignite the compressed gas in an engine than a single arcing plug will act.

15 This disclosure presents a spark plug which will fill a long-felt want for a motor ignition plug capable of running the engine under abnormally hard conditions, and which will insure the automobilist or aviator of at least one combustion arc at all times, by supplying his engine with a double sparking means.

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

25 1. A spark plug, comprising in combination; an internally bored shell member, an internal flange formed on one end thereof,

an internally bored shank formed on the other end thereof with the internal periphery of the flange and bore of the shank approximately equal, an insert plug pressed 30 into the shell member and tightly engaging the flange and internal bore of the shank, a pair of spark terminal posts fitted on the shell member, a pair of circuit spark rods fixed in the insert plug, and a cementing material interposed between the shell member 35 and the insert plug to securely retain the shell and plug together.

2. A spark plug, including a shell formed with a bore, a core positioned within said 40 bore, a rod extending within said core, said core being formed with a screw threaded stud forming the upper part of said core, spark terminals secured to said sleeve and being adapted to cooperate with said rods, 45 a head formed with a screw threaded opening adapted to be attached to said stud, and a layer of insulating material interposed between said head and the upper end of said core.

EBERHARDT P. NICHOLSON.