

UNITED STATES PATENT OFFICE

2,490,646

SPARK PLUG FOR INTERNAL-COMBUSTION MOTORS

Eduardo Murphy, José Mulé, and Juan Caniglia,
Rosario, ArgentinaApplication January 21, 1947, Serial No. 723,280
In Argentina December 16, 1946

2 Claims. (Cl. 123-169)

1

This invention relates to improvements in spark plugs for internal combustion motors and more particularly to improvements related to the cleaning of these spark plugs.

Practice has shown that the opposite ends of the spark plugs electrodes are stained by particles of lubricant or by other factors, with the consequent unsatisfactory operation of the spark plugs resulting in inexact ignition. This problem has been solved in part by improving the qualities of the fuels and lubricants and also by improving the materials used in the construction of the motors, thus reducing to a minimum the extraneous particles which might stain the sensitive parts of the spark plugs.

However, if the failure mentioned hereinbefore does happen, it is necessary to disconnect the cable connected to the central electrode of spark plug, unscrew the spark plug, clean the same, place it again in its place and to connect anew its central electrode to the ignition circuit. The simple enumeration of the various operations required is a clear indication of the time required for correcting the fault. It should be mentioned that sometimes it is necessary to clean all, or at least several, of the spark plugs since not always it is possible to locate exactly the faulty one. Furthermore, the cleaning of spark plugs on the road is often very inconvenient, such as on rainy days.

A further field of application of the present invention are the motors used in boats in which a rapid cleaning of the spark plugs offers multiple advantages, since in the presence of a strong current and with the motor dead, the boat is drifting which sometimes might have very serious consequences.

The improvements according to the present invention have for their object to eliminate all of the above disadvantages and, above all, to provide an effective solution for the problem.

Briefly stated, the improvements introduced in the spark plugs for internal combustion motors, which constitute the present invention, consist of orifices formed in the body of the spark plug and communicating with the exterior, the chamber which is formed in the interior of said body between the internal surface thereof and the central extension of the central electrode support, said orifices being located in points which are not covered when the spark plug is mounted in the corresponding cylinder of a motor and being provided with means for governing the passage of fluids and other materials which might pass therethrough.

2

From the above, it will be evident that one of the main objects and advantages of the invention consists in providing the facility of rapidly cleaning the spark plugs without it being necessary to unscrew them from the motor.

A further object of the present invention is to provide, by means of the improvements introduced into the spark plugs and their accessories, an efficient device of simple construction, easy handling and reduced cost.

A still further object is to provide a spark plug which practically does not produce cleaning costs.

A further object of this invention is to provide a spark plug which may be operated with an ample margin of safety, notwithstanding the velocity and pressure required during the operation, due to the simplicity of the mechanism resulting from the above combination.

Further objects and advantages of this invention will become apparent in the course of the following description taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a side elevation, partly in section, of a spark plug including the improvements according to the present invention and designed for an internal combustion motors of the type used in vehicles.

Fig. 2 is a side elevation, partly in section, of a further embodiment of the invention.

Fig. 3 is a view, partly in section, of a further embodiment of the present invention, and finally

Fig. 4 is a side elevation, partly in section, of a spark plug mounted on the cylinder head of an internal combustion motor.

In the various figures, the same or similar parts or elements have been designated with the same reference numerals or characters.

As can be observed in the drawings, *a* is a spark plug formed of the insulating body for the central electrode 1 which forms the inner shoulder 2 of the spark plug body 3 (Fig. 1). The upper external part of said spark plug body 3 is provided with a hexagonal nut 4 by means of which the internal threaded portion 5 of body 3 is screwed into the corresponding cylinder of the motor. Between the cylindrical portion 6 and threaded portion 5 there exists a cylindrical part, the diameter of which is smaller than the internal diameter of thread 5, thus forming neck 7 with respect to thread 5 and rim 8 which is located immediately below cylindrical portion 6.

The reduced portion or neck 7 preferably is provided with three radial passages or orifices 9 located as near as possible with respect to rim or shoulder 8.

A bushing 10 having an internal diameter equal to that of shoulder 8 and whose height is also equal to that of shoulder 8 plus neck portion 7 and approximately two threads of the threaded portion 5, is mounted on the above mentioned parts, the external configuration of part 10' being similar to that of a nut which, with its upper face 3'', abuts against shoulder 3' of the spark plug body 3. Part 10'' of bushing 10, the external configuration of which is cylindrical, forms the lower portion of said bushing 10. In view of the fact that the height of bushing 10 is equal to the sum of the elements mentioned hereinbefore, there is formed, in that portion corresponding to neck 7, an annular chamber 11 between said neck portion 7 and the internal face of bushing 10.

Bushing 10 is provided with a radial aperture 12 closed by a cock or valve 13.

The operating principle on which the cleaning of the spark plug is based, is rather simple. Should the central electrode 14 or the other electrode 15 of the spark plug be stained or dirty, it is sufficient to open valve 13, either mechanically or manually, to obtain a communication between the interior of the cylinder and the exterior of the motor. On running the motor, either connected to a load or the pressure originated within the cylinder by the piston during the compression stroke is considerably higher than the atmospheric pressure, and since there exists a communication between the interior of the cylinder and the exterior of the motor, the internal pressure is relieved through said passage the stream of compressed gases or air sweeping along all particles which it encounters on its passage from the interior of cylinder toward the exterior of the motor. In other words, the trajectory described by the compressed gases has been indicated by the arrows illustrated in Fig. 1, i. e. the compressed gas or gases flows through the chamber 16 formed by the internal wall 17 of the spark plug body 3 and the central extension 18 of insulating body 1, enters annular chamber 11 through orifices 9 and passes, through valve 13, to the exterior of the motor.

It should be noted that instead of a valve or cock, illustrated in Fig. 1, it is possible, should it be considered convenient, to increase the number of apertures 12 and consequently the number of valves 13 or of other adequate passage governing means.

A particular feature of the present invention is that orifices 9 should be located as near as possible to shoulder 8, so that the compressed gas or gases must follow a larger trajectory and hence offer a larger security in sweeping along all extraneous particles.

As regards Fig. 2, the same represents a further embodiment of the present invention.

In order to obtain a correct operation of the spark plug cleaning system, it is necessary that an annular space exists between the bushing and the spark plug. In the case of bushing 19, the latter is provided with an internal recess which, in combination with recess 20, forms annular chamber 21. Since annular chamber 21 is formed by bushing 19, it is not necessary to reduce the diameter of the cylindrical body 22. Valve 23, which controls the discharge of the dirt, might be, as illustrated in the present case, of the direct manual type and is governed by means of handle 24. The arrangement of the other parts or elements is exactly equal to that described in connection with Fig. 1 and for this reason, Fig. 2 shows only in detail those parts which have

been modified according to this embodiment of the invention.

For the sake of information, and without unduly limiting thereby the scope of the present invention, it can be mentioned that there exists a possibility of eliminating completely the bushing as well as the neck portion, by providing each orifice 9 with a corresponding individual valve or cock 25. The most practical embodiment of this idea consists in perforating two orifices 9 in the body 3 of the spark plug, and mounting in each of said orifices an individual valve 25 having a horizontal shaft 26. Said valves 25 might be governed by remote control, for instance from the instrument board of the car or from any other remote point. One of the embodiments of the remote control system consists in utilizing a worm wheel 27 mounted on the shaft 26 of valve 25 and a worm (not shown in Fig. 3) which, in turn is governed, for instance, by a flexible shaft coupling said worm to a knob mounted in the dash-board of the vehicle.

Finally, Fig. 4 shows part of a motor 5 provided with a depression 33 in which there is mounted a spark plug *a* incorporating the improvements according to the present invention. As can be clearly seen in the above mentioned figure, the lower cylindrical portion of bushing 10 must have a height equal to at least that of depression 33 of motor 5, in order that part 10' of bushing 10 remains above motor 5 so that valve 13 mounted in said bushing 10, is located above motor 5. In the present case, the figure shows a valve having a vertical shaft 28 on which there is mounted a worm wheel 29 meshing with a worm 29' mounted on brackets 34 welded or otherwise fixed to valve 13. In order to rotate said worm 29' the same has been coupled to a flexible shaft 30, the other extreme of which terminates in a knob 31 mounted on the dash-board of the respective vehicle.

The invention is not to be construed as limited to the particular embodiments that have been disclosed, since these are illustrative, but the scope of the invention is indicated in the claims.

We claim:

1. In an internal combustion engine having a plurality of cylinders, a reciprocating piston for each cylinder, and a spark plug for each cylinder, the improvement in each of the spark plugs which comprises a hollow body provided at one end portion with an inwardly projecting electrode, an inner part providing at its lower end an electrode cooperating with said first electrode, a groove on the exterior of said hollow body, a bushing surrounding said body and forming with said groove a chamber, passages within said body between the chamber and the interior of said body; in combination with independent means for cleaning each of said plugs independently of each other which means includes a pipe secured to said bushing and communicating with said chamber and the atmosphere, a stop valve in said pipe, an individually upwardly extending shaft for operating said valve, gearing on the upper portion of said shaft meshing with gearing on a second shaft and manually remote controlled means for rotating said second shaft.

2. In an internal combustion engine having a plurality of cylinders, a reciprocating piston for each cylinder and a spark plug for each cylinder, the improvement in each of the spark plugs which comprises a hollow body provided at one end portion with an inwardly projecting electrode, an inner part providing at its lower end

5

an electrode cooperating with said first electrode, a groove on the exterior of said hollow body, a bushing surrounding said body and forming with said groove a chamber, passages in said body between said chamber and the interior of said body; 5 in combination with independent means for cleaning each of said plugs independently of each other which means includes a pipe secured to said bushing and communicating with said chamber and the atmosphere, a stop valve in said pipe, 10 an individually upwardly extending shaft for operating said valve, gearing on the upper portion of said shaft meshing with gearing on a second shaft and manually remote controlled means for rotating said second shaft, bearings for supporting said second shaft carried by upwardly ex-

6

tending brackets supported by said pipe and means including a flexible shaft for rotating said second shaft.

EDUARDO MURPHY.
JOSÉ MULÉ.
JUAN CANIGLIA.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,395,923	McCoy -----	Nov. 1, 1921
1,492,007	Wayte -----	Apr. 29, 1924
1,543,646	Shamblin -----	June 23, 1925