P. C. DEPEW.
SPARK PLUG.
APPLICATION FILED MAY 9, 1919.

1,377,407. Patented May 10, 1921.

Fig. 1

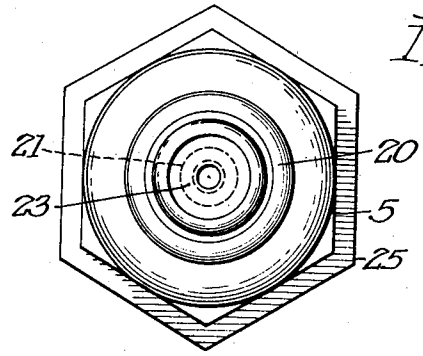


Fig. 2

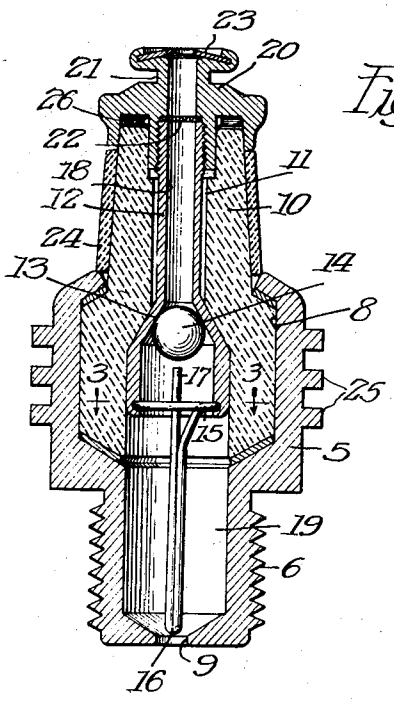
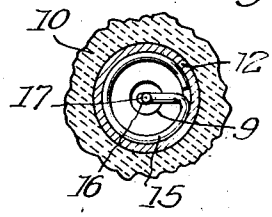


Fig. 3



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UNITED STATES PATENT OFFICE.

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SPARK-PLUG.

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Application filed May 9, 1919. Serial No. 295,832.

To all whom it may concern:

Be it known that I, PAUL C. DEPEW, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Spark-Plugs, of which the following is a specification.

This invention relates to spark plugs to be used with internal combustion engines, and one of the objects of my invention is to provide a spark plug constructed and operated so that the spark terminals at all times will be maintained clean, means being provided for preventing carbon deposits thereon. A further object of my invention is to provide a spark plug comprising means for automatically passing air into the engine cylinder during the suction stroke of the piston. A further object is to provide a simple spark plug comprising means for priming the cylinder in case of need. Other objects of my invention will be apparent from a consideration of the following description thereof.

In the accompanying drawings Figure 1 is a plan view of a spark plug which embodies features of my invention; Fig. 2 is a central longitudinal section thereof; and Fig. 3 is a fragmental transverse section along the line 3—3 of Fig. 2.

The spark plug which I illustrate in this instance as my preferred form comprises a casing 5, the casing having ordinary external threads 6, at one end for the purpose of screwing the plug into the casing of the cylinder, and a central longitudinal passageway 8 extending the entire length of the casing. The passageway 8 is materially restricted at the lower end of the casing so as to form an aperture 9, the walls of which form the grounded terminal of the spark plug. Within the casing 5 is inserted the lower end of an insulation member 10 having also a central longitudinal passageway 11 extending its entire length. Within the passageway 11 is a metallic tube 12 enlarged at its lower end and having a valve seat 13 adapted to receive a ball valve 14. Fixed to the lower end of the tube 12 in any suitable manner is one end of a wire 15 which extends downwardly from the lower end of the tube 12 and forms the other terminal 16 of the spark gap. From this point the wire extends upwardly, the upper end 17 being adapted to prevent the valve 14 from passing downwardly below a predetermined desired limit.

In operation, at the time of the suction stroke of the piston, the valve 14 will rest on the end 17 of the wire, and more or less air will pass through the bore 18 of the tube 12 into the cylinder of the engine, the amount entering depending upon the position of the wire end 17, the area of the valve opening, and further adjustments hereinafter specified. The air passes downwardly through the chamber 19 and is forced at a high speed against the spark gap terminals 9 and 16, blowing therefrom any particles of carbon that may have adhered thereto at the time of the last explosion. When the compression stroke occurs the gas in the cylinder is forced upwardly through the chamber 19, forcing the valve 14 to its closed position, and at the same time forcing the gas against the spark gap terminals and tending further to clean the surfaces thereof. This process is continued, so that there is a continual vibration of air or gas at high speed back and forth through the aperture 9, tending to clean the surface of the spark gap terminals. At the same time the stroke of the valve 14 on the end 17 of the wire tends to jar any adhering particles of carbon from the terminals 16.

At the upper end of the tube 12 and the insulation member 10 is fixed in any suitable manner a cap 20, having also a central port coaxial with the port of the tube 12, and at its upper end an annular groove 21, by means of which an electric wire may be connected to the cap, in an ordinary manner. The cap 20 is composed of any suitable metal, and being fixed to the metal tube 12 the electricity is free to flow from the cap to the terminal 16. In order to prevent particles of any nature from passing downwardly through the central passageway of the plug I provide between the cap 20 and the tube 12 a suitable screen 22. The screen also provides means for adjusting the amount of air that can pass into the cylinder with each stroke, as a screen of any suitable mesh or area of opening may be used.

In order to prevent any whistling tendency of the spark plug when in operation, due to the rapid passage of air inwardly or outwardly, I provide at the upper end of the

cap 20 an annular soft yielding member 23, the central opening of which is somewhat smaller than the opening of the upper end of the central passageway. By the use of this member a soft yielding edge is provided for the upper end of the passageway, and the whistling tendency of the gas is thereby eliminated.

In order to protect the insulation member 10 from injury, due to cold drafts or blows from tools, or the like, I provide the covering 24 encircling the exposed portion of the insulation member, this covering to be composed of any suitable material, such as bakelite, which is not easily fractured by changes in temperature, or by blows. Also I provide radiation flanges 25 which tend to reduce the temperature of the insulation.

Also I provide a spring lock washer 26 which yieldingly holds the cap 20 snugly in place with the insulation piece 10, by means of the tube 12, and the washer also prevents inadvertent unscrewing of the cap from the tube.

I claim as my invention:

1. A spark plug having a passageway therethrough, a gas pressure actuated valve in said passageway, and yielding means mounted on said plug, said yielding means having an opening therethrough registering with said passageway, said opening being somewhat smaller than the adjacent portions of the passageway, said yielding means being adapted to deaden the sound of the air as it passes through said passageway.

2. A spark plug having a passageway therethrough, and yielding means mounted on said plug, said yielding means having an opening therethrough registering with said passageway, said opening being somewhat smaller than the adjacent portions of the passageway, said yielding means being adapted to deaden the sound of the air as it passes through said passageway.

3. A spark plug having a central longitudinal passageway therethrough; a metallic tube mounted in said passageway and coaxial therewith, a wire fixed to the lower end of said tube and extending downwardly to a point adjacent the wall of the lower end of said passageway, said wire then passing upwardly to a point near the central portion, longitudinally, of said passageway, and a valve normally resting on the upper end of said wire.

4. A spark plug having a central longitudinal passageway therethrough; a metallic tube mounted in said passageway and coaxial therewith, a wire fixed to the lower end of said tube and extending downwardly to a point adjacent the wall of the lower end of said passageway, said wire then passing upwardly to a point near the central portion, longitudinally, of said passageway, and a valve normally resting on the upper end of said wire, and means for connecting a wire to said tube.

5. A spark plug having a central longitudinal passageway therethrough; a metallic tube mounted in said passageway and coaxial therewith, a wire fixed to the lower end of said tube and extending downwardly to a point adjacent the wall of the lower end of said passageway, said wire then passing upwardly to a point near the central portion, longitudinally, of said passageway, and a valve normally resting on the upper end of said wire, said valve being arranged to close said passageway when the gas pressure below the valve exceeds materially the gas pressure above.

In testimony whereof, I hereunto set my hand.

PAUL C. DEPEW.