C. H. SCHLUNDT.

SPARK PLUG.

APPLICATION FILED MAY 12, 1915.

1,218,215. Patented Mar. 6, 1917.

Fig. 1.

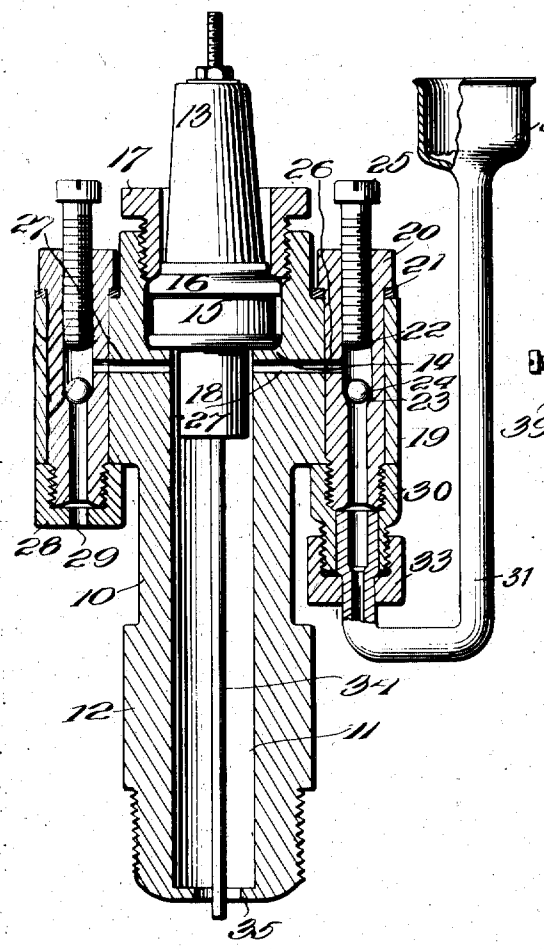


Fig. 2.

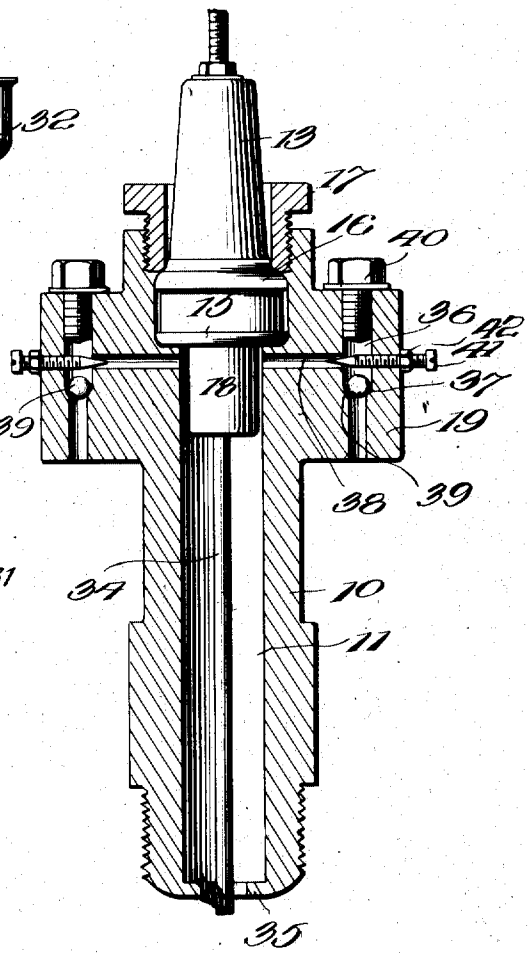
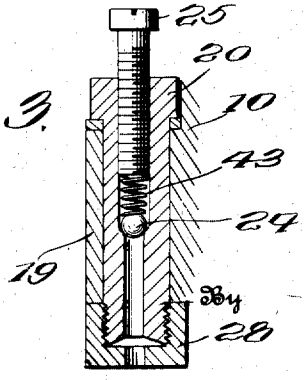


Fig. 3.



Inventor

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By

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UNITED STATES PATENT OFFICE.

CHRISTIAN H. SCHLUNDT, OF HUNTINGBURG, INDIANA, ASSIGNOR OF ONE-HALF TO RUFUS KIRK AND ONE-HALF TO HARRISON ALFORD, BOTH OF HUNTINGBURG, INDIANA.

SPARK-PLUG.

1,218,215. Specification of Letters Patent. Patented Mar. 6, 1917.

Application filed May 12, 1915. Serial No. 27,621.

To all whom it may concern:

Be it known that I, CHRISTIAN H. SCHLUNDT, a citizen of the United States, residing at Huntingburg, in the county of Dubois and State of Indiana, have invented certain new and useful Improvements in Spark-Plugs, of which the following is a specification.

This invention contemplates an improved spark plug and has as its primary object to provide a device of this character wherein the overheating and consequent cracking of the porcelain of the plug will be prevented and wherein the sooting of the plug to effect a short circuit therethrough will be obviated.

The invention has as a further object to provide a plug employing a priming cup in connection therewith and adapted to automatically feed gasolene introduced into the cup into the engine cylinder with which the plug is associated.

The invention has as a further object to provide a plug wherein currents of cool air will be permitted to flow into the plug upon each suction stroke of the engine with which it is associated, to the end that the inner terminal of the porcelain of the plug may be kept cool and wherein adjustable check valves will be provided for regulating such inflowing currents of air.

Other and incidental objects will appear as the description proceeds and in the drawings wherein I have illustrated the preferred embodiment of the invention and wherein similar reference characters designate corresponding parts throughout the several views:—

Figure 1 is a vertical sectional view of my improved spark plug,

Fig. 2 is a similar view showing a modified form of the invention, and

Fig. 3 is a detail perspective view of a further slight modification of the invention showing one of the check valve receiving sleeves of the plug removed.

In carrying out my invention, I employ a plug having a substantially cylindrical body portion 10 which axially thereof is formed with a longitudinally tapered bore 11 opening through opposite ends of the plug, the said bore adjacent the larger end thereof being internally screw threaded. Formed on the body portion 10 adjacent one extremity thereof is a polygonal wrench receiving enlargement 12 while the inner end of the plug is externally screw threaded in the usual manner for engagement with an engine cylinder.

Detachably fitted within the larger end of the bore 11 is a porcelain 13 which, intermediate its ends, is provided with an annular enlargement seating upon a suitable annular shoulder 14 formed in the wall of said bore. Detachably engaging one end of the enlargement of the porcelain is an annular washer 15 seating against the shoulder 14, while a similar washer 16 is arranged to surround the enlargement of the porcelain at its opposite end. Detachably engaging within the adjacent screw threaded extremity of the bore 11 is an externally screw threaded annular nut or sleeve 17 surrounding the porcelain and engaging the washer 16 for urging the porcelain to seat upon the shoulder 14. It will be noted that the inner end 18 of the porcelain is reduced and extends axially within the bore 11 in spaced relation to the wall thereof.

Formed upon opposite sides of the body portion 10 adjacent the upper extremity thereof, are oppositely disposed lateral annular extensions or lugs 19 which are axially bored to detachably receive cylindrical sleeves or pins 20. The sleeves 20 at the upper extremities thereof are provided with heads between which and the extensions 19 are preferably disposed washers 21. The sleeves 20 are provided with axial bores 22 opening through opposite ends of the sleeves and which are reduced intermediate their ends to provide annular valve seats 23.

Freely mounted within the upper extremities of the bores 22 of the sleeves 20 are ball valves 24 adapted to engage the seats 23 and which are limited in their movement away from the said seats by adjusting screws 25 screw threaded within the outer extremities of the bores 22. The sleeves 20 thus each provide a valve cage and are each provided upon one side with a radial opening 26 communicating with a passage 27 leading into the bore 11 immediately adjacent the inner extremity of the reduced inner end of the porcelain 13. The sleeves 20, at their lower extremities, are externally screw threaded and detachably connected to one of said sleeves is a terminal nut 28 having an opening 29 formed therein communicating with the bore 22 of the sleeve.

Detachably connected to the inner ex-

tremity of the other of said sleeves, is an internally screw threaded coupling sleeve 30 adapted to receive the inner end of the tubular extension 31 of a cup 32. Surrounding the inner extremity of the extension 31 is a coupling nut 33 which is screw threaded upon the outer end of the sleeve 30 for urging the extension into engagement with the adjacent terminal of the sleeve 20 supporting the cup. In this connection, it is to be observed that each of the sleeves 20 at the lower end thereof, is provided with frusto-conical seats adapted to receive the adjacent terminal of the extension 31 in the usual manner so that, if desired, the nut 28 may be removed and a cup 32 readily attached upon each side of the plug.

Mounted within the porcelain 13 is an electrode 34 arranged to extend axially within the bore 11 and adapted to coöperate, at the inner terminal thereof, with an annular shoulder 35 extending radially within the bore 11 at its inner end, the shoulder 35 providing a sparking terminal.

In use, the plug is attached to an engine in the usual manner and it will now be seen that upon each suction stroke of the engine, fresh air will be drawn in through the sleeves 20 and will then enter through the opening 26 of the said sleeves and the passages 27 to be directed against the inner reduced extremity 18 of the porcelain 13. Thus, the possibility of the overheating of the porcelain and its consequent cracking will be reduced to a minimum.

Explosion within the combustion chamber of the engine will, as will be readily seen, cause the valves 24 to engage the seats 23 and consequently close the passages to prevent the escape of the gases within the engine.

Particular attention is now directed to the fact that the screws 25 may be adjusted within the sleeves 20 to either partially or entirely close the openings 26 formed therein and consequently regulate the currents of fresh air flowing into the plug. However, it will be observed that the ball valves 24 are adapted to move across the openings 26 so that the screws 25 may be adjusted to cause the said ball valves to coöperate therewith in regulating the inflowing currents of air, it being merely necessary to accomplish this end, that the said screws be so positioned that the ball valves will be held when at the limit of their movement away from the seats 23 and in engagement with the pins 25, in a position partially or entirely closing the openings 26.

It will be noted that the inner end of the porcelain 13 is spaced a considerable distance from the inner extremity of the bore 11 so that, in use, the flame of the explosion of the engine will be prevented from backing up within the bore and sooting the porcelain. In this way, the troubles ordinarily experienced through this cause will be greatly obviated and the possibility of the short circuiting of the plug will be reduced to a minimum.

As will be readily seen, gasolene may be introduced within the cup 32 in the practical use of the plug when, upon the suction stroke of the engine, such gasolene will be drawn in through the passages of the plug into the engine cylinder, the plug automatically operating to accomplish this operation. Thus, the engine may be easily primed while the presence of the cup upon the plug will not in the least hamper the inflowing currents of air passing through the plug upon each suction stroke of the engine.

In Fig. 2 of the drawings, I have disclosed a modified form of the invention wherein the extensions 19 are provided with axial bores 36 which are reduced intermediate their ends to provide valve seats 37. Communicating with the bores 36 are radial passages 38 opening into the bore 11 of the body portion of the plug in a manner similar to the passages 27 of the preferred form of the invention. Freely mounted within the upper extremities of the bores 36 are ball valves 39 adapted to engage the seats 37 while the bores 36 are internally screw threaded adjacent the upper extremities thereof to detachably receive closure plugs or screws 40.

Screw threaded into the outer walls of the extension 19 are radially disposed needle valves 41, the inner conical extremities of which are adapted to fit within the adjacent ends of the passages 38 to close the said passages. Preferably, the valves 41 are provided with lock nuts 42. It will be seen that in this form of the invention, the valves 41 may be adjusted to regulate the incoming flow of fresh air currents entering the bores 36 while the ball valves 39 are adapted to engage the seats 27 under the influence of combustion within the engine. Otherwise, the construction of this modification is identical with that found in the preferred form of the invention and a further description thereof will, therefore, not be given. As will be readily understood, the plug of this modification may be provided with only one extension 19 if desired and thus equipped with only one check valve, the duplication of the valves being entirely a matter of choice.

In Fig. 3 of the drawings, I have disclosed a further slight modification of the invention wherein springs 43 are disposed within the sleeves 20 of the preferred form of the invention and arranged to bear between the ball valves 24 and the set screws 25, the said springs normally urging the said valves to engage the seats 23 of the said sleeves and consequently close the passages therethrough. Thus, when this modified structure is em-

ployed, the ball valves 24 will be automatically returned to normal position by the springs after having been actuated against the tension thereof.

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

1. A spark plug including a hollow body portion provided with a sparking terminal, an electrode fitted within the body portion and adapted to coact with the said terminal, a hollow sleeve detachably connected to the body portion and formed with a valve seat, there being a passage communicating interiorly of the said sleeve and opening into the body of the plug, a valve freely mounted within the sleeve and adapted to engage said seat, and adjustable means carried by the sleeve for limiting the movement of the valve away from the seat.

2. A spark plug including a hollow body portion provided with a sparking terminal, an electrode fitted within the body portion and adapted to coöperate with the said terminal, an intake sleeve carried by the body portion, there being a passage leading from the said sleeve and opening into the body portion, a valve freely mounted within the sleeve and adapted for movement across one end of said passage, and means for adjustably limiting the valve in such movement.

3. A spark plug including a hollow body portion provided with a sparking terminal, an electrode fitted within the body portion and adapted to coöperate with the said terminal, a sleeve carried by the body portion and formed to receive a valve, there being a passage communicating interiorly of the sleeve and entering into the body of the plug, a valve freely mounted in said sleeve and adapted for movement across one end of said passage, and a set screw adjustable upon the sleeve for limiting the valve in such movement.

4. A spark plug including a hollow body portion provided with a sparking terminal, an electrode fitted within the body portion and adapted to coöperate with said terminal, a valve cage carried by the body portion and formed with a passage opening exteriorly of the body portion, there being a passage leading from within the cage and opening into the body portion, a valve freely mounted within the cage, the said valve being adapted to close said first mentioned passage and being adapted for movement across one end of said last mentioned passage, and means for limiting the valve in such movement.

5. A spark plug including a hollow body portion provided with a sparking terminal, an electrode fitted within the body portion and adapted to coöperate with said terminal, the body portion being formed with a passage leading from its interior to its exterior, a check valve mounted in said passage and adapted for movement to permit an inflowing current of air to pass therethrough, and means arranged to coöperate with the valve for regulating the volume of such inflowing current of air.

6. The combination with a spark plug having an air passage leading from its interior to its exterior and provided with a check valve arranged in said passage for controlling a flow of air into the plug and normally gravitating to close said passage, of a priming cup supported by a stem above the valve and associated therewith for automatically feeding a liquid within the cup into the plug upon movement of the valve to a position for admitting air into the plug.

7. A spark plug including a hollow body portion provided with a sparking terminal, an electrode fitted within the body portion and adapted to coöperate with the said terminal, the body portion being provided with a passage opening exteriorly thereof and formed with a valve seat, there being a passage leading from said first mentioned passage and opening interiorly of the plug, a valve freely mounted in said first mentioned passage and adapted for engagement with the said seat to close the passage, and a valve adjustable upon the body portion to coöperate with said second mentioned passage for regulating a flow of air therethrough.

8. A spark plug including a hollow body portion provided with a sparking terminal, an electrode fitted within the body portion and adapted to coöperate with the said terminal, the body portion having an extension formed thereon bored to receive a sleeve, there being a passage opening into the body portion and communicating with said bore, a hollow sleeve detachably fitted in said bore and provided with an opening communicating with said passage, a valve freely mounted within the sleeve and adapted to close the passage therethrough, and a set screw adjustable within the sleeve to project across said opening for regulating a flow of air through the sleeve.

9. A spark plug including a hollow body portion provided with a sparking terminal, an electrode fitted within the body portion and adapted to coöperate with the said terminal, the body portion being provided with a passage communicating exteriorly thereof and with a second passage opening into said first mentioned passage and communicating interiorly of the body portion, a check valve arranged in said first mentioned passage and adapted to close the said passage, and means adjustable to coöperate with said second mentioned passage for regulating the volume of a current of air therethrough and for simultaneously limiting the movement of the valve to open said first mentioned passage.

10. A spark plug including a hollow body portion provided with a passage opening exteriorly of the plug, a sleeve arranged in said passage, a valve mounted in said sleeve and normally gravitating to close the passage, a priming cup carried by the sleeve, and means connecting the cup with the sleeve and coöperating with the body of the plug for holding the sleeve against displacement.

11. A spark plug including a hollow body portion provided with a passage opening exteriorly thereof, the passage having angularly disposed portions, a valve for controlling a flow of air through one of said portions, and means for controlling a flow of air through the other of said portions and adapted to limit the movement of the valve.

12. A spark plug including a hollow body portion provided with a passage communicating exteriorly thereof, the passage being formed with angularly disposed portions, automatic means for controlling the flow of air through one of said portions, and means adjustable for controlling the flow of air through the other of said portions and for limiting said first mentioned means in its movement.

13. A spark plug including a hollow body portion provided with a passage, the passage being formed with angularly disposed portions, and a valve mounted in one of said portions of the passage and adapted for movement to a position in front of the adjacent end of the other of said portions to coöperate therewith for controlling a flow of air therethrough.

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

CHRISTIAN H. SCHLUNDT. [L. S.]

Witnesses:
JOHN F. HEMMER,
LOUIS J. BRETZ.