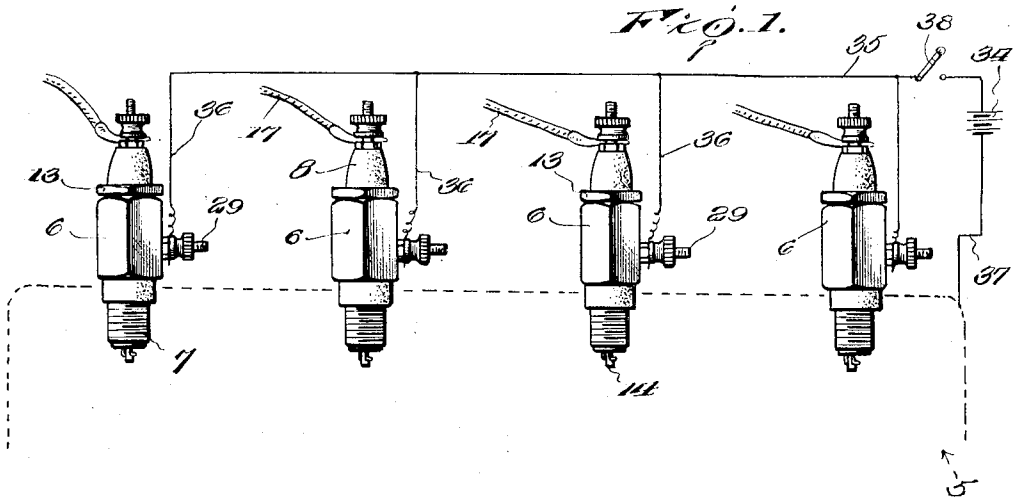
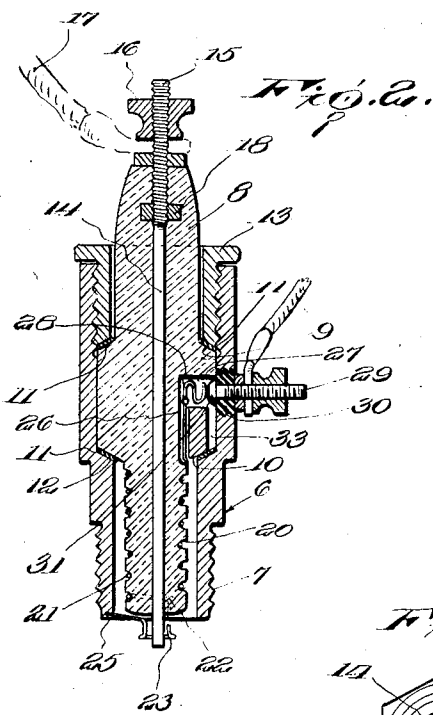
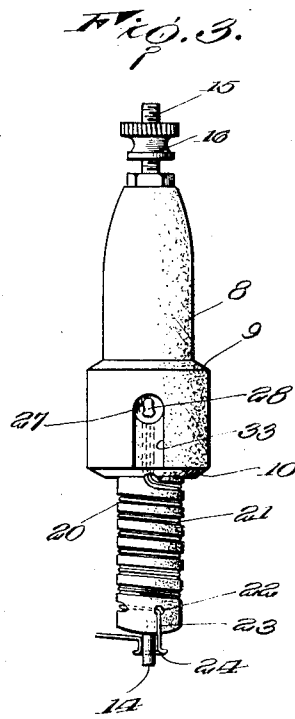
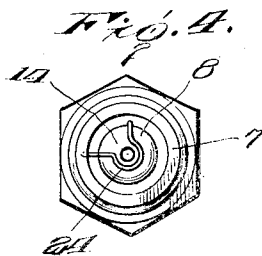


A. J. FABER,
SPARK PLUG,
APPLICATION FILED JAN. 30, 1920.

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Inventor
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By

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SPARK-PLUG.

1,364,262.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALVIN J. FABER, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Spark-Plugs, of which the following is a specification.

This invention relates to improvements in spark plugs especially adapted for use on internal combustion engines.

An important object of this invention is to provide a spark plug having a heating coil surrounding the insulator of the same and adapted for vaporizing the fuel upon entering the explosion cylinder in the event that the motor is not sufficiently hot to bring about the vaporization of the fuel prior to the igniting of the same.

A further object of the invention is to provide a spark plug having novel means for mounting the heating coil within the same whereby one terminal of the coil may be utilized as one of the electrodes of the spark plug, thereby dispensing with the necessity of providing the usual stationary electrode carried by the shell of the spark plug.

A further object of this invention is to provide a spark plug of the class described which by reason of its ability to vaporize the fuel upon entering the explosion cylinders, will increase the reliability and efficiency of internal combustion engines.

A further object of the invention is to provide means whereby a spark plug may be readily provided with the improved heating coil.

A further object of the invention is to provide a spark plug of the class described which is simple, desirable in use and cheap to manufacture.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawing forming a part of this application and in which like numerals are employed to designate like parts throughout the same:

Figure 1 is a fragmentary elevation of an internal combustion engine having a plurality of the improved spark plugs applied,

Fig. 2 is a central vertical sectional view through the improved spark plug,

Fig. 3 is a side elevation of the insulator of the spark plug, and

Fig. 4 is a bottom plan view of the improved spark plug.

In the drawing wherein for the purpose of illustration is shown a preferred embodiment of the invention, the numeral 5 generally designates an internal combustion engine provided as usual with a plurality of explosion cylinders having openings for receiving spark plugs. The invention herewith illustrated aims to overcome the difficulty of starting of the motor caused by cold weather. As is well known the heat generated by the motor is utilized to vaporize the fuel and bring the same up to a highly volatile state prior to igniting the same. However, in starting the motor the same generates no heat and therefore the fuel is permitted to remain practically unvaporized with the result that it is very difficult to ignite the same. To overcome this difficulty the improved spark plug herein illustrated is provided with a heating coil in the vicinity of the spark plug electrodes and which serves to bring the fuel up to a highly volatile state only while starting and for a short period afterward for the reason that the heat generated by the motor while running acts to vaporize the fuel whereby the same is rendered more highly combustible.

With particular reference to Fig. 2, it will be noted that the invention includes a shell 6 having the usual exteriorly screw-threaded attaching portion 7 adapted to be secured within the spark plug opening of an internal combustion engine cylinder. An insulator 8 is extended through the shell 6 and is provided with upper and lower annular shoulders 9 and 10 about which are arranged gaskets 11 for providing a gas-tight connection between the insulator and the shell. The lower gasket 11 is mounted upon an annular shoulder 12 formed within the shell and inclined to correspond to the inclination of the annular shoulder 10. The upper gasket 11 is held in rigid engagement with the annular shoulder 9 by an exteriorly screw-threaded sleeve nut 13 secured within the upper portion of the shell. As usual in the construction of spark plugs the insulator 8 is provided with a centrally arranged longitudinally extending conductor or electrode 14 having its upper portion exteriorly screw-threaded, as indicated at 15, for connection with a binding nut 16. An ignition wire 17

is connected at one end with a source of current and at its other end with the upper portion of the electrode 14 and is held in position by the binding nut 16. A nut 18 is embedded within the insulator at a point adjacent the upper end and has threaded engagement with the adjacent portion of the conductor 14. The conductor or electrode 14 which is of a high tension wire is extended beyond the lower end of the insulator 8 and in the customary manner forms one side of a spark gap over which the spark periodically jumps for igniting the fuel within the combustion chamber.

With particular reference to Figs. 2 and 3, it will be noted that the lower portion of the insulator is provided with a spirally arranged exterior groove or channel 20 within which is arranged a heating coil 21 adapted to be electrically energized for vaporizing the fuel within the explosion chamber. The lower portion of the spiral groove or channel terminates above the lower portion of the insulator and is in communication with an interiorly arranged passage or opening 22 which extends out through one side of the insulator and receives a portion of the coil 21. After being extended through the passage 22 the wire of the heating element is extended downwardly, as indicated at 23, so as to provide a means whereby the coil is locked to the insulator and is prevented to a high degree from spreading outwardly. In other words, the downwardly extending portion 23 coöperates with the interior passage 22 in forming a locking means for the heating element.

As particularly illustrated in Fig. 4, the lower portion of the wire from which the heating coil is formed is curved about the exposed lower portion of the conductor 14, and is then extended radially from said electrode 14 and anchored to one side of the shell 6, as indicated at 25. The electrode 24 thus formed is of course retained in a heated condition and therefore serves to prevent the accumulation of carbon thereon.

The shoulders 9 and 10 enlarge the central or intermediate portion of the insulator so that the same may be provided with a longitudinal interior passage 26. The longitudinal or vertical passage 26 communicates with a radially extending socket or recess 27 extending out through one side of the insulator and receiving an S-shaped spring contact 28. The contact 28 is connected at one end to the upper end of the wire from which the coil is formed, said upper portion of the wire being also extended through the vertical passage 26. Electric energy is supplied to the spring contact 28 through a binding post 29 extending out through one side of the shell and insulated from the shell by an annular member 30 which may be of

pressed mica, bakelite or other suitable material. The inner end of the binding post 29 is provided with an enlarged head 31 which is adapted to engage the adjacent portion of the member 28 so as to provide an electrical contact between the binding post 29 and the heating coil. When the insulator is arranged within the shell the enlarged head 31 of the binding post is passed through a longitudinally extending groove 33 which is in communication with the socket 27 within which said head 31 is received when the insulator is finally in position.

As illustrated in Fig. 1, when all of the cylinders of a motor are provided with the improved spark plug, the same are connected to a source of electric energy 34 by wires 35 and 36. A suitable type of switch 38 is connected in the wire 35 so that the coils may be energized as desired. In this particular case one pole of the source of electric energy is grounded to the motor so that the flow of current from the source of electric energy is through the wire 35, branch wire 36, binding post 29, spring contact 28, coil 21, shell 6 and finally grounded by the motor 25.

The current for the spark plug is of course supplied through the ignition wire 17 to the electrode 14 from where it jumps across the gap formed by the lower portion of the coil and the adjacent portion of the electrode 14. The current is conveyed to the shell of the spark plug after having made the gap and is grounded to the motor in the usual manner. By this construction the heating coil serves a dual function which is, first, to vaporize the fuel upon entering the combustion chamber, and secondly, to form one side of the gap over which the current must jump upon being supplied to the electrode 14. As above stated, the lower portion of the coil is heated to a high degree when energized for preventing the accumulation of carbon.

In the practice of the invention the coil is preferably energized just prior to and immediately after starting the motor though no great harm would result in accidentally allowing the coil of each spark plug to remain energized.

It is to be understood that the form of the invention herein shown and described is to be taken as a preferred example of the same and that such minor changes in construction and arrangement of parts may be made as will remain within the spirit of the invention and the scope of what is claimed.

Having thus described the invention, what is claimed as new is:

1. A spark plug including a shell, an insulator arranged within the shell, an electrode extending through the insulator, and a heating coil carried by the insulator and

having its lower portion curved about and arranged in spaced relation to the adjacent portion of said electrode for coöperating with the same in forming a spark gap, the

5 lower portion of said insulator being provided with an internal passage receiving the adjacent portion of said heating coil whereby the coil is securely locked to the insulator.

10 2. A spark plug including a shell, an insulator extending through the shell, an electrode extending through the insulator and terminating beyond the lower end of the same, the lower portion of said insulator being

15 provided with an exteriorly arranged spiral groove, and a heating coil arranged within said spiral groove, the lower portion of said insulator being provided with an interiorly arranged passage communicating

20 with said spiral groove and receiving a portion of said coil, said coil being extended downwardly below said interior passage for securely connecting said heating coil to said insulator and extended about the lower portion

25 of said electrode for coöperating with the same in forming a spark gap, the lower terminal of said coil being anchored to the shell.

30 3. A spark plug including a shell, an insulator arranged within the shell and provided with a centrally arranged enlarged portion having a longitudinally extending interiorly arranged passage, said centrally arranged enlarged portion being provided

35 with a radial recess extending out through its side and communicating with said longitudinal passage, a spring contact arranged within said recess, a binding post carried by said shell and engaged with said contact,

40 and a heating coil carried by said insulator and having its upper portion extended

through said longitudinal passage and connected to said contact.

4. A spark plug including a shell, an insulator arranged within the same and having a 45 centrally arranged enlarged portion provided with a longitudinally extending interior passage, said centrally arranged enlarged portion of the insulator being provided with a radial recess extending out 50 through one side and communicating with said interior passage, an S-shaped spring contact arranged in said radial recess, a binding post extending through said shell and having an enlarged head engaged with said 55 S-shaped spring contact, an annular insulating element surrounding said binding post for spacing the same from said shell, and a heating coil having its upper portion extended through said interior passage and 60 connected to said S-shaped spring contact, the lower portion of said heating coil being extended about the electrode for forming a spark gap, said centrally enlarged portion being provided with a groove receiving the 65 enlarged head of said binding post and communicating with said radial recess.

5. A spark plug including a shell, an insulator arranged within the same, an electrode extending through the insulator and terminating beyond the same, said insulator being 70 provided with a spiral groove and an internal passage at the lower end of the groove, and a heating coil arranged in said spiral groove and passing through said internal 75 passage, the portion of said coil beyond said passage being extended downwardly and about said electrode for forming a spark gap.

In testimony whereof I affix my signature. 80

ALVIN J. FABER. [L. s.]