May 29, 1934. A. E. HERRON ET AL 1,960,309

SPARK PLUG

Filed May 13, 1930

Fig. 1.

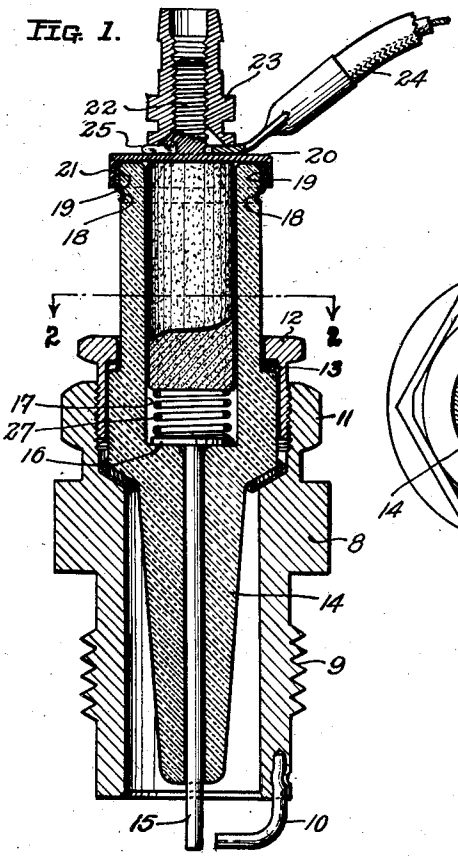


Fig. 3.

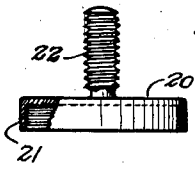


Fig. 4.

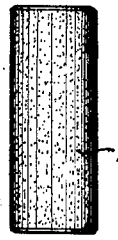


Fig. 5.

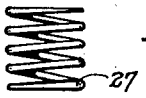


Fig. 2.

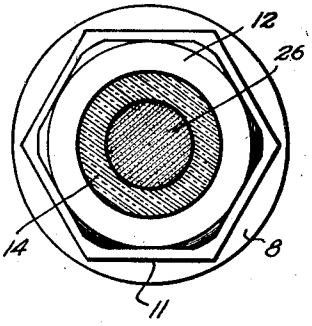


Fig. 6.

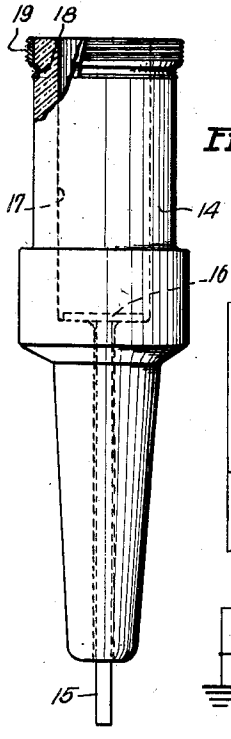
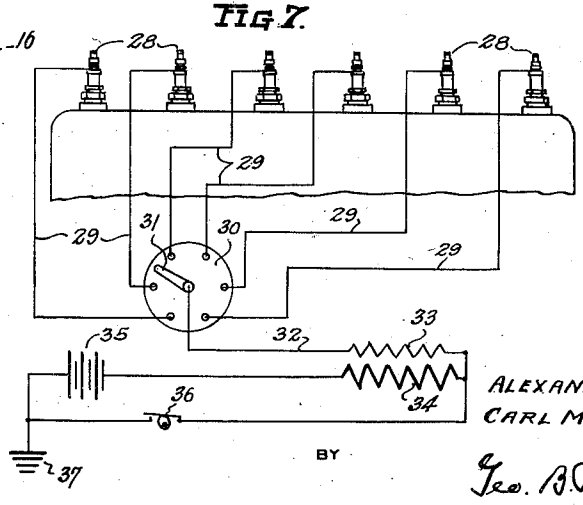


Fig. 7.



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Patented May 29, 1934

1,960,309

UNITED STATES PATENT OFFICE

1,960,309

SPARK PLUG

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Application May 13, 1930, Serial No. 452,051

5 Claims. (Cl. 123—169)

This invention relates to improvements in spark plugs as customarily used for the ignition of explosive internal combustion engines. It has been well recognized that the ordinary type of spark plugs permit the flow of electric current in such manner as to set up considerable electric wave disturbances. With the advent of radio signalling used in conjunction with internal combustion engines it is found that such disturbances of the ether are most undesirable, for example, in an airplane the electrical disturbances created by the ignition circuits of the internal combustion engine, act to interfere seriously with the operation of receivers for radio signals which necessarily must be located in close proximity to the internal combustion engine power plant.

It is also evident that the presence of the airplane may be disclosed at a considerable distance by detecting such electric wave disturbances as are developed from the ignition circuits of their internal combustion engines.

With the increasing popularity of receivers for radio signals as accessories in the equipment of motor vehicles there is likewise a growing realization that the electric wave disturbances caused by the high tension ignition circuits in the gas engine power plant of the vehicle are sources of objection unless some means is provided to shield the receivers from these waves or preferably to prevent the creation of such disturbances.

It is an object of our invention to provide means within the spark plug for preventing the creation of electric wave disturbances from the high tension circuits. It is also an object of our invention to house this improved means within the core of the spark plug as an integral part of the complete device.

Among the objects of our invention is the establishment of this means within the ordinary electrical path between the insulated electrode and the connector for the ignition cable so that the means will be protected from exposure, electrically inoperative conditions and from likelihood of developing loose electrical connections.

Other objects of our invention will be apparent from the following description of the preferred form of our invention as illustrated in the accompanying drawing in which:

Fig. 1 is a longitudinal cross section of our invention;

Fig. 2 is a horizontal cross section on the line 2—2 of Fig. 1;

Fig. 3 is a side elevation partly in section of the terminal cap;

Fig. 4 is a side elevation of the resistance element;

Fig. 5 is a side elevation of the co-operating spring;

Fig. 6 is a side elevation of the core partly in section and;

Fig. 7 is a diagrammatic representation of the high tension electric ignition circuits.

By way of example we have shown in the accompanying drawing a spark plug jacket 8 of the usual size and form in which 9 is a reduced screw threaded sleeve at the free end of which there is provided a grounded electrode 10.

The opposite end of the jacket 8 has the usual hexagonal configuration 11 by which the plug is applied to the cylinder wall of the internal combustion engine.

A locking ring 12 also having a hexagonal shape is screw threaded within the hexagonal part 11 and serves to compress the core against the gasket 13 in the usual manner to establish an air tight fit.

The core 14 is made of a molded and fired plastic material such as porcelain or the like of satisfactory heat resistance and non-expansive character. It is of course understood that the purpose of the core is to provide adequate insulation from the jacket under all conditions for the insulated electrode 15 which extends through the axis of the lower conical part. The electrode 15 has a wide head 16 at its upper end. This head 16 rests on the bottom of a hollow cylindrical chamber 17 which extends axially through the upper portion of the core.

The top of the core is grooved as indicated at 18 to receive in locking arrangement a screw threaded collar 19.

A terminal cap 20 has a depending flange 21 also screw threaded to fit the collar 19. Centrally of the cap 20 there is a vertical extension or binding post 22. The latter carries a connector nut 23 of the usual and conventional type.

While the nut 23 may serve to hold the clip terminal or other device on the ignition cable, I have shown the ignition cable 24 as ending in a metallic eyelet 25 which is slipped over the post 22 and by means of the nut 23 brought into good electrical contact with the terminal cap 20.

A resistor or resistance element 26 is provided in the form of a cylinder or high resistance material such as carbon, graphite or the like which has been shaped to fit within the chamber 17. The resistor has approximately 30,000 ohms of resistance. The end surfaces of the resistor are flat and form extended surfaces which contact

with the cap 20 or the conductor at the opposite end.

A helical spring 27 of conducting material as shown particularly in Fig. 5 is located between the lower end of the resistance element 26 and the corresponding flat head 16 of the core electrode. This spring is maintained under compression between the elements 16 and 26 when the cap 20 is applied to the core. Thus, the resistance element 26 is maintained in direct conducting relation with the other parts of the electrical circuit.

In Fig 7 an electric ignition circuit is indicated as applied to six spark plugs 28 similar to that above described in detail. The conductors 29 of the high tension current lead from the distributor 30 to each of the spark plugs. The rotating contact 31 is connected by lead 32 to the secondary winding 33 of the transformer coil. The primary winding 34 is connected to battery 35 or to an equivalent generator of current. The opposite sides of both coils are connected through the circuit interrupter 36 to ground 37.

The resistance elements 26 while fitting the chambers 17 are held therein by the caps 20 against the tension of the springs 27. This serves to maintain good conducting paths for the high tension current. The current flowing through the resistance and the core electrode breaks down the air gap between the latter and the grounded electrode 10 permitting the development of an ingiting spark. At the same time the presence of the resistance element 26 so controls the surges of electrical energy that the creation of electric wave disturbance is reduced to to a minimum.

The location of the resistance element within the core of the spark plug prevents damage or deterioration. It is also apparent that the electrical characteristics will remain uniform over a long period of time and are not subject to accidental interruption.

When it is desired to inspect or replace the resistance the cap 20 is unscrewed and the spring 27 forces the resistance element 26 above the top of the core so that the element may be readily removed. In this way changes may be made in the sizes of the resistance element or it may be replaced when deteriorated.

While we have shown and described the preferred form or our invention it may be embodied in other modifications with various changes in arrangement of sizes and proportions within the scope of the following claims.

What we claim is:

1. A spark plug comprising a shell, an electrode thereon, an insulating core carried by said shell, the upper portion of said core being hollowed out to provide a chamber open at its upper end and the lower portion thereof being formed with a central bore communicating with said chamber, an electrode extending through said bore and having a head at its upper end arranged to engage the bottom of said chamber, a member removably mounted in said chamber and having sufficiently high resistance to dampen high frequency oscillations otherwise affecting the radio receiving circuit, a conductor member removably mounted in said chamber, said members having contact with each other in end to end relation and one of said members being in contact with said head, and a cap having a binding post and detachably connected to the upper end of said core in contact with the other of said members for closing said chamber and serving as a means for removably holding said members in said chamber, said conducting member comprising a helical compression spring normally maintaining said cap, members and head under pressure in electrical contact.

2. A spark plug having a grounding shell and an insulator core within the shell, a sparking terminal wire at one end of the core, a connector terminal at the opposite end of the core, an electric current oscillation damping element enclosed by the core and engaged with one of said terminals, and an expansion spring interposed between said element and the other of said terminals.

3. A spark plug having a grounding shell and an insulator core within the shell, a sparking terminal wire at one end of the core, a connector terminal at the opposite end of the core, an electric current oscillation damping element positioned within the core without connection thereto, and an elastic device for maintaining electrical connection between the element and terminals.

4. A spark plug having a grounding shell and an insulator core within the shell, a sectional electrode carried by the core and including a sparking terminal section fixedly held by the core, a connector terminal section also fixedly held by the core and an oscillation damping section free of direct connection to the core, and elastic means to maintain said sections in electrical connection.

5. A spark plug having a grounded shell and an insulator core, a pair of axially spaced metallic electrode sections carried by the core, an oscillation damping element located in the space between said sections and free of attachment with the core, and spring means maintaining electrical connection between said sections through the oscillation damping element.

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