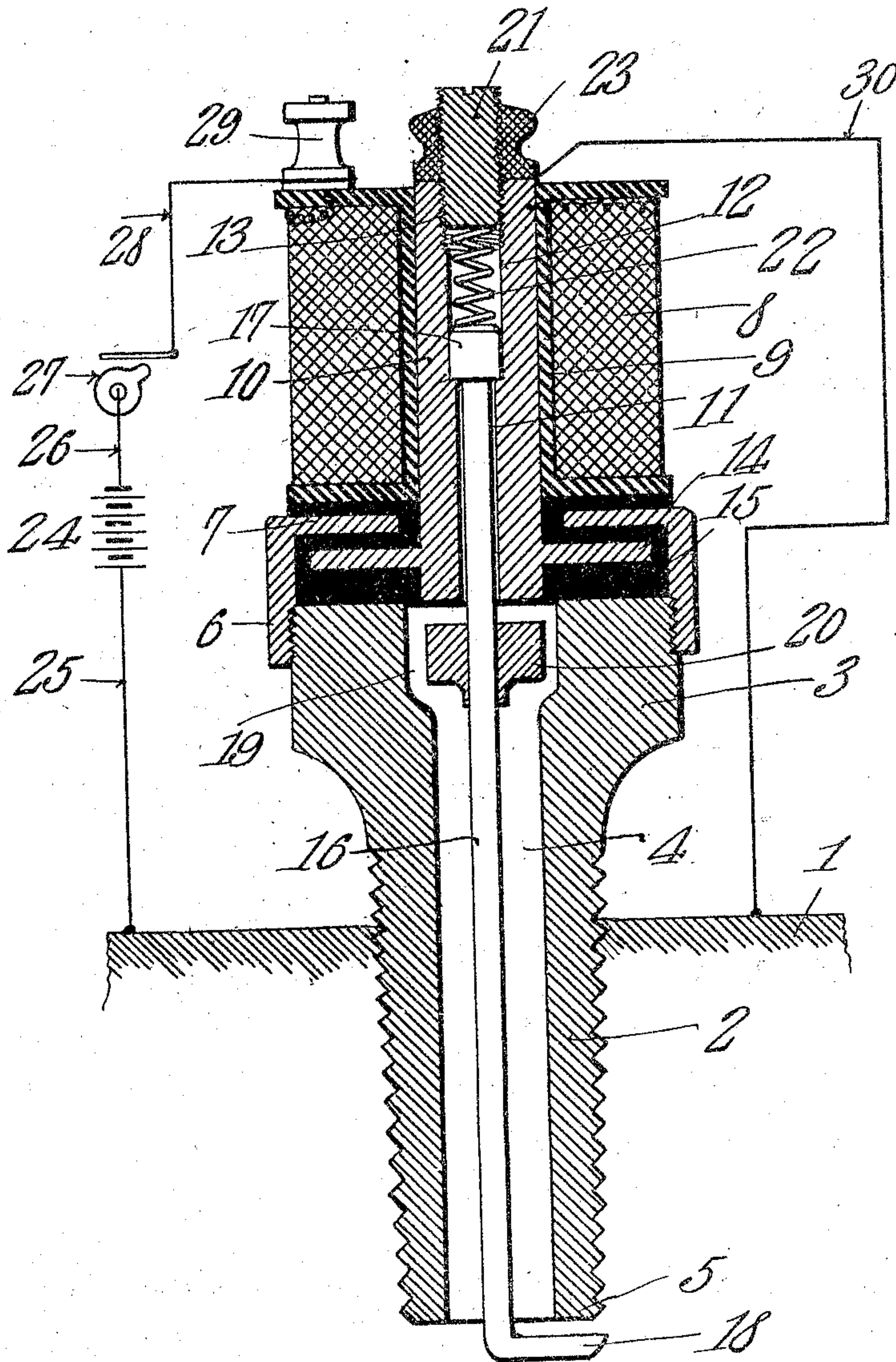


E. C. RAUCH,
SPARK PLUG.
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974,824.

Patented Nov. 8, 1910.



Witnesses

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ELMER C. RAUCH, OF COEUR D'ALENE, IDAHO.

SPARK-PLUG.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ELMER C. RAUCH, a citizen of the United States, residing at Coeur d'Alene, in the county of Kootenai and State of Idaho, have invented a new and useful Spark-Plug, of which the following is a specification.

This invention has reference to improvements in spark plugs for producing a spark by the passage of an electric current between separated terminals located within an explosion chamber to cause the ignition of an explosive charge therein.

The object of the present invention is to include in a spark plug the means for causing the generation of a current producing a spark between the circuit terminals lodged within the explosion chamber.

It is customary in the make and break type of spark plugs to complete an electric circuit by bringing the electrodes within the explosion chamber in electrical contact and then by the sudden separation of the terminals to rupture the circuit so that the self-induction of the circuit due to the presence of a self-induction coil included in the circuit shall cause the generation of a high potential current of sufficient quantity to bridge the spark gap caused by the separation of the circuit terminals within the explosion chamber in the form of a fat, hot spark which will ignite the explosive charge in the usual manner.

In accordance with the present invention there is a magnet forming a part of the spark plug and arranged to bring circuit terminals in the explosion chamber together and then the circuit exterior to the spark plug is ruptured causing the deenergization of the magnet and the separation of the spark plug terminals, thus producing the spark.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings forming a part of this specification in which drawing there is shown a central longitudinal section of a spark plug embodying the invention, the showing being on an enlarged scale, and there also being shown a diagrammatic representation of the electric circuit.

Referring to the drawings, there is indicated at 1 a portion of the walls of an explosion chamber through which wall there

is passed the threaded end 2 of the body portion 3 of a spark plug. This body portion has a central longitudinal passage 4 and the end of the threaded portion 2 extending into the explosion chamber constitutes one of the active terminals of the spark plug as will hereinafter appear. This active terminal is indicated at 5.

The outer end of the body 2 is enlarged and provided with screw threads for the reception of a cap nut 6 having one end reduced in diameter as indicated at 7 and provided with a central perforation. There is provided a coil 8 in the form of a solenoid wound upon an insulating spool 9, within which is a core 10 of magnetic material through which is a central passage 11 enlarged at one end as shown at 12 and provided at the enlarged end with internal screw threads as indicated at 13. The core 10 extends at one end beyond the corresponding end of the coil 8 and there is provided with a circumferential flange 14 of greater diameter than the central passage through the reduced end 7 of the cap nut 6, but of less diameter than the internal diameter of said cap nut. The core 10 with the flange 14 is insulated from the body 3 of the spark plug and also from the cap nut 6 by suitable insulating material indicated at 15 the cap nut serving to hold the insulating material in place.

Extending through the central passage 11 of the core 10 from the end thereof coincident with the passage 4 through the body 3 of the spark plug to the enlarged portion 12 of the said passage through the core 10, is a rod 16 formed at the end entering the extension 12 of the passage 11 into a head 17. This rod extends entirely through the passage 4 and beyond the terminal or electrode 5 and there is bent at an angle as shown at 18 to form another electrode or terminal capable of moving into contact with the terminal 5. The end of the passage 4 remote from the terminal 5 is enlarged circumferentially as indicated at 19 and this end is closed by the corresponding end of the core 4. Fast on the rod 16 in operative relation to the corresponding end of the core 10 and lodged in the enlargement 19 is an armature block 20, the purpose of which will presently appear. Applied to the threaded outer end of the core 10 is a screw plug 21 between which and the head 17 there

is lodged a spring 22 housed within the portion 12 of the internal bore of the core 10. The plug 21 extends beyond the outer end of the core and there receives a thumb nut 23
5 designed to clamp a conductor to the core 10.

At some convenient point there is located a battery 24 or other source of electric current and on one side this battery is connected by a conductor 25 to the walls of the explosion chamber 1 in the particular showing
10 of the drawings and on the other side the battery is connected by a conductor 26 to a circuit controller 27 of the make and break type, the other side of which is connected by
15 a conductor 28 to the coil 8 by means of a binding post 29. The other side of the coil 8 is directly connected to the core 10, while the core 10 is connected by a conductor 30 to the walls of the explosion chamber 1.

20 Since spark plugs are customarily employed in connection with explosion engines it may be assumed that the circuit controlling device 27 is driven by a rotating part of the engine in proper timed relation. Every
25 time the circuit controller 27 causes a closure of the circuit there is established a circuit which may be traced as follows: Proceeding from the battery 24, the current will pass by way of the conductor 26 to the circuit
30 controller 27 thence by conductor 28 to the coil 8 and from the latter to the core 10 and then returning to the battery through the conductor 30, walls of the explosion chamber 1 and conductor 25. This will cause the
35 energization of the coil 8 and the magnetization of the core 10 which latter will then attract the armature 20 and so move the rod 16 against the action of the spring 22 until the terminal 18 is in contact with the terminal 5. When the circuit is broken at the
40 controller 27 the magnet 8 is deenergized and the spring 22 will force the armature 20 away from the core 10 and the terminal 18 away from the terminal, 5, thus producing
45 a spark between the said terminals, and causing the firing of a charge within the explosion chamber in the usual manner.

While the spark plug has been described as provided with a single coil 8, this does
50 not preclude the use of a double coil for the same purpose, but, for manufacturing reasons the single coil is preferable since the firing pin works through the center of it and it is easier to protect and cheaper to
55 manufacture and has been found efficient in practice. The rod or pin 16 is made of suitable non-magnetic material while the armature 20 will of course be made of magnetic material. The screw 21 provides a means
60 not only for closing the outer end of the spark plug against escape of the gases of combustion, but also provides a means for adjusting the tension of the spring 22.

What is claimed is:—

1. A spark plug of the make and break 65 type, comprising a body portion adapted to enter an ignition chamber and there constituting one terminal of the plug, said body portion having a longitudinal passage there-through enlarged at the end remote from 70 the ignition chamber, and an electromagnet mounted on the body portion of the plug, a core for the magnet provided with a longitudinal passage enlarged at the outer end and there screw threaded, a firing pin ex- 75 tending through the body portion of the plug into the hollow core and there formed with an enlarged end housed in the enlarged portion of the passage through the core, said firing pin carrying within the enlarged por- 80 tion of the passage through the body of the plug an armature in operative relation to the core and at the end remote from the end within the core extending beyond the ignition chamber end of the body portion of 85 the plug and there bent at an angle to constitute a terminal of the plug in operative relation to the terminal at the ignition chamber end of the body portion of the plug, a closure for the enlarged end of the core 90 provided with screw threads adapted to the threaded end of the passage through the core, and a spring housed in the core and compressed between the closure and the enlarged end of the firing pin, said spring 95 tending to maintain the firing pin in open circuit position.

2. A spark plug comprising a body portion provided with an axial passage enlarged at one end, a magnet mounted on the 100 body portion, a core for the magnet projecting beyond one end thereof and there provided with a circumferential flange, a cap-nut on the end of the body portion of the plug and interposed between the same 105 and the adjacent end of the magnet, said cap nut inclosing said flange, insulating material between the body portion of the plug and the flange on the core and also between the said flange and the cap nut, a rod extend- 110 ing through the passage in the body of the plug and into and movably along the core and formed at one end into a circuit terminal in operative relation to the explosion chamber end of the body portion of the plug, and an 115 armature carried by the rod within the enlarged portion of the passage through the body of the plug in operative relation to the corresponding end of the core.

In testimony that I claim the foregoing 120 as my own, I have hereto affixed my signature in the presence of two witnesses.

ELMER C. RAUCH.

Witnesses:

T. V. CASE,
A. L. RAUCH.