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H. MAILLARD.

SPARKING DEVICE.

APPLICATION FILED OCT. 24, 1906.

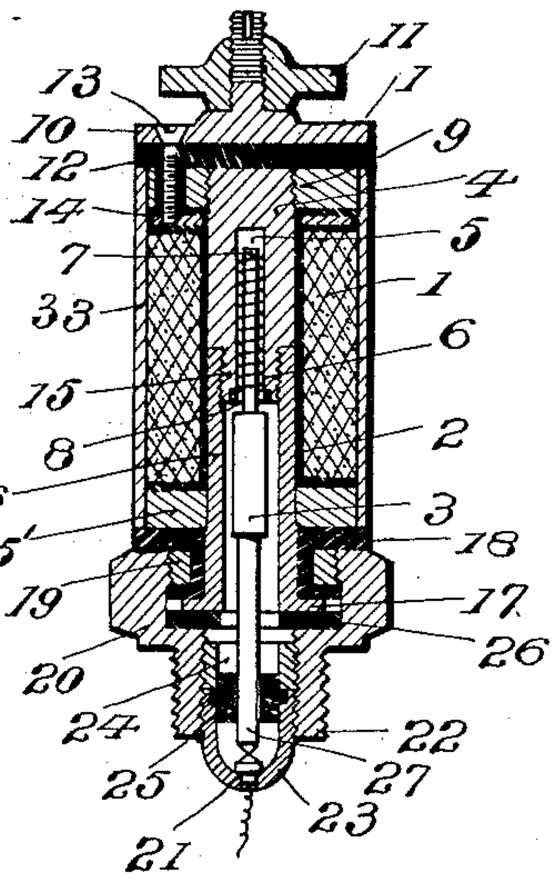

Fig. 1.

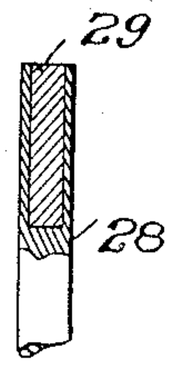

Fig. 2.

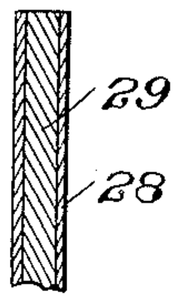

Fig. 3.

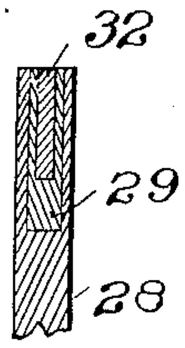

Fig. 4.

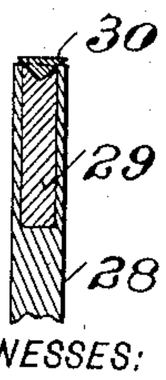

Fig. 5.

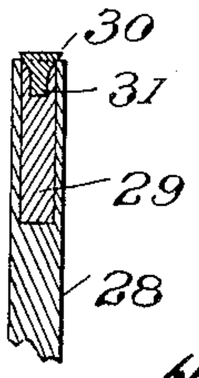

Fig. 6.

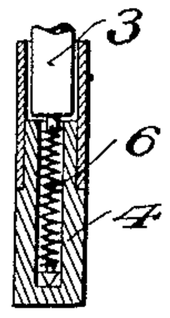

Fig. 7.

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HENRI MAILLARD, OF PARIS, FRANCE.

SPARKING DEVICE.

No. 883,554. Specification of Letters Patent. Patented March 31, 1908.

Original application filed January 30, 1905, Serial No. 243,371. Divided and this application filed October 24, 1906. Serial No. 340,422.

To all whom it may concern:

Be it known that I, HENRI MAILLARD, a resident of 155 Avenue Malakoff, Paris, France, have invented a new and useful Improvement in Sparking Devices, which invention is fully set forth in the following specification.

This application which is a division of my co-pending application Sr. No. 243,371, filed January 30th, 1905, is directed to improvements in sparking devices therein disclosed and relates more particularly to electro-magnetic sparking devices in which the igniting spark is produced between two metallic sparking terminals, one being stationary in relation to the other, and both insulated from the parts of the engine. The movable member is actuated by the passage of a current through a coil in circuit with the two sparking terminals.

The device may be used with primary or storage batteries, as in the case of ordinary sparking plugs operated by an induction coil, or with a magneto or dynamo with continuous or alternating current. I prefer, however, to use the device with a magneto having a voltage of from thirty (30) to five hundred (500) according to the speed of the engine in connection with my improved means for placing the armature of the magneto in short circuit before the moment at which the magneto gives its maximum voltage and interrupting the short circuit at a point near the maximum voltage, as described in my application Sr. No. 243,371, above referred to.

The invention has among its principal objects to more effectually insulate, in a sparking device of the kind mentioned, the metal sparking terminals between which the spark is produced, while giving free movement to one of the teminals; to provide a movable terminal which will resist the softening and bending effect of high temperatures while resisting the corroding effects of such conditions; to secure perfect contact between the sparking terminals; to protect the parts of the device from the destructive action of heat and also from shocks, particularly at the contacting parts of the terminals; and to generally improve the sparking device.

In order that the invention may more readily be understood, reference is had to the accompanying drawings, which are intended merely as illustrations to aid in the description of the invention and not as defining the limits thereof, reference being had to the claims for this purpose.

Figure 1 is a view in longitudinal section of the igniting device; Figs. 2 and 3 are sectional views showing different constructions of the movable sparking terminal; Figs. 4, 5 and 6 illustrate in sectional view different forms of the sparking-tip; and Fig. 7 is a view in longitudinal section illustrating another arrangement of spring and terminal.

Referring to Fig. 1, a magnet coil 1 of wire, having an insulation of heat-resisting material, such as asbestos, is supported on a spool 2 of non-conducting material, within the center of which is a two-membered iron core, consisting of a movable member 3 and a stationary member 4. The latter member has at its inner end a recess or chamber 5 for receiving a spring 6, which normally forces the movable member 3 outward and may be arranged to act on the latter by tension, as shown in Fig. 1, or by pressure, as shown in Fig. 7. In the former case, the movable core member 3 is provided with a reduced extension 7 for receiving one end of the spring, the other end of the spring being secured in a socket 8 on the core. The outer end of the stationary core member 4 extends beyond the face of the coil and is provided with a screw-thread for engaging a retaining-washer 9. One end of the plug is provided with a metal plate 10 having a binding-post and nut 11, and is insulated from the core member 4 by a plate 12 of mica or the like, both of which are made fast to the plug by means of screws 13, only one of which is shown, and which enters a metal disk 14 resting against the end face of the spool 2. Between this disk and washer 9, and between the screw 13 and the washer is placed an incombustible insulating material such as asbestos or mica. One of the free ends of the coil 1 is in metallic contact with the disk 14 and with the binding-post through screw 13. The inner end of the core member 4 has a reduced portion or hub 15 which is screw-threaded and engages

the end of an interiorly screw-threaded tube 16 of non-magnetic metal such as brass or copper. The opposite end of this tube is provided with a retaining shoulder 17, against which rests a double flanged ring 18 of insulating material, between the flanges of which is a threaded metal collar 19 for receiving the interiorly screw-threaded supporting nut 20. This nut 20 has an exterior threaded hub 22 for securing the plug in the walls of the engine cylinder. The interior of this head is also threaded to receive a bridge-member 23 in which the fixed terminal 21 is supported, and to also receive an annular retaining-ring 24 which, in connection with said bridge-member, retains a guide 25 of heat-resisting and insulating material, such as steatite, porcelain, or mica. 26 is a plate of insulating material separating the end of tube 16 from the nut 20. A metal washer 5′ in metallic contact with the tube 16 and with the other end of the wire coil 1, and rests on the insulating flanged ring 18.

Secured to the movable iron core member 3 is a terminal rod 27, the construction of which is one of the principal features of this invention. It is essential that this rod should resist corroding action of heated gases, especially that of air or oxygen, and should possess rigidity when heated to such temperatures as are attained in a combustion engine. For this purpose I construct the rod of an outer shell or casing of a metal not readily corroded under working conditions, such as nickel, silver or the like, and with an inner stiffening core of steel or nickel-steel, which will not readily warp or bend by action of heat under the conditions named. In Fig. 2 I have shown a solid rod 28 of nickel or silver having an interior socket for receiving a steel or nickel-steel rod 29. The rod may, however, be a solid piece of nickel-steel. In Fig. 3 the entire core is of steel incased in a non-corroding metal.

I provide the end of the terminal rod 27 with a tip, preferably of platinum, which will resist the corroding action of sparking. This sparking-tip may assume various forms and be made of various non-corroding metals such as platinum, gold, or the like, but the form preferred is shown in Figs. 5 and 6, where the tip 30 is of conical form and may or may not be provided with a stem 31 for assisting in its retention in the end of the steel core 29. This form of tip is peculiarly useful in this class of igniters or spark-plugs, where the terminals are brought together in repeated blows for the reason that the tip cannot be driven into its socket nor expelled therefrom. I may, however, employ a rod 32 of platinum or like metal centrally disposed in the steel case, as shown in Fig. 4. In order that the rod 27 may be guided into contacting position with terminal 21, guide 25 is provided, which is heat resisting and a non-conductor of electricity.

To always insure a yielding contact between the terminals and to maintain a uniform pressure, I incase the spring in a cavity of the stationary core where the spring will be protected from heat, which might weaken, warp or distort the coil, and prevent its proper action. The magnetic coil is preferably protected by a casing 23, and may be of metal.

From the above description the assembling of the device will be readily understood, and requires no further explanation, except to state that it may be readily put together and taken apart, and when assembled the parts will not shake loose.

In operation the current may be assumed to enter at terminal 21, and pass to terminal-rod 3, which is normally spring-pressed against terminal 21, thence through the metal parts to plate 5′, which is in metallic contact with one end of the magnet coil, through the coil which it energizes, and out at post 11. As a result of energizing the coil 1 the movable core 3 overcomes the resilience of the spring 6 and the current is interrupted and a spark is produced between the sparking-tips. The spring then restores the parts to their original position. By reason of the construction of the rod 27 it is enabled to resist corroding action at high temperatures without becoming deformed by the softening action of the heat. The fact that the rod is of non-corrodible metal permits the use of a guide for the rod without danger of becoming fast therein by products of surface oxidation. The spring for normally forcing the contacts together is protected from heat by reason of its position within the iron core, thereby preserving its elasticity and form.

What is claimed is:—

1. In an electromagnetic sparking device, a two-part iron core one of said parts being in yielding engagement with the other, said movable part supporting a rod of non-oxidizable metal centrally reinforced with a rod of heat-refractory metal, said second rod having a tip of non-oxidizable metal, a second terminal, and a support for the same out of metallic contact with said core.

2. In an electromagnetic sparking plug, a two-membered iron core one member being stationary and the other having a yielding connection with the first, a rod having an outer surface of non-oxidizable metal and a core of rigid heat-resisting metal carried by said movable member, and a cone-shaped tip of platinum terminating said rod.

3. In an electromagnetic sparking device, a nut having an externally threaded tubular

projecting member for securing the same in a combustion engine, a spark-terminal supporting bridge member removably secured in the end of said projecting member, a spark-terminal guide of insulating material, and a retaining ring for securing said guide in place in said tubular member.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HENRI MAILLARD.

Witnesses:
EMILE LEDRET,
H. C. COXE.