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W. H. WALTER.

ELECTRICAL IGNITER FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED MAR. 24, 1902. RENEWED APR. 16, 1903.

Fig. 1.

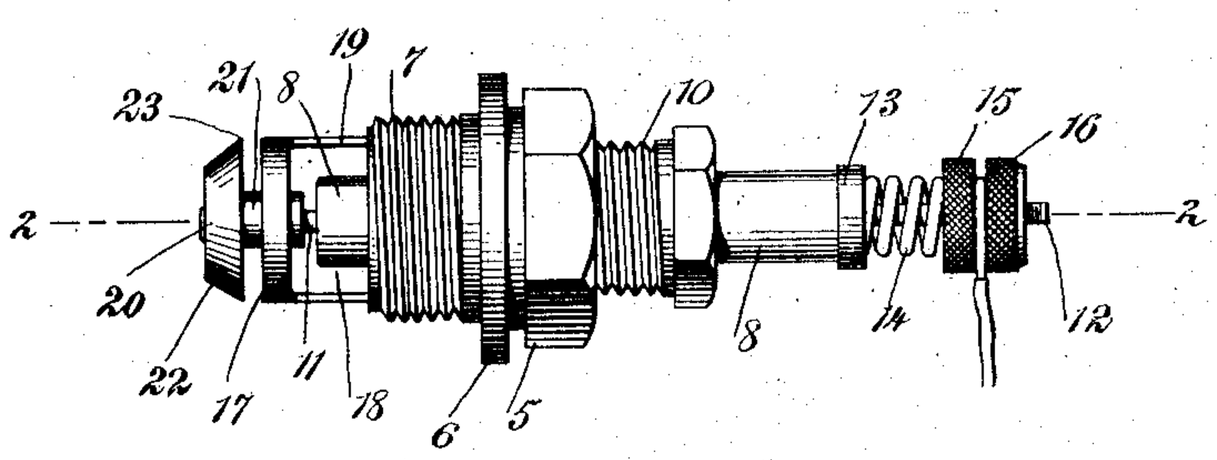


Fig. 2.

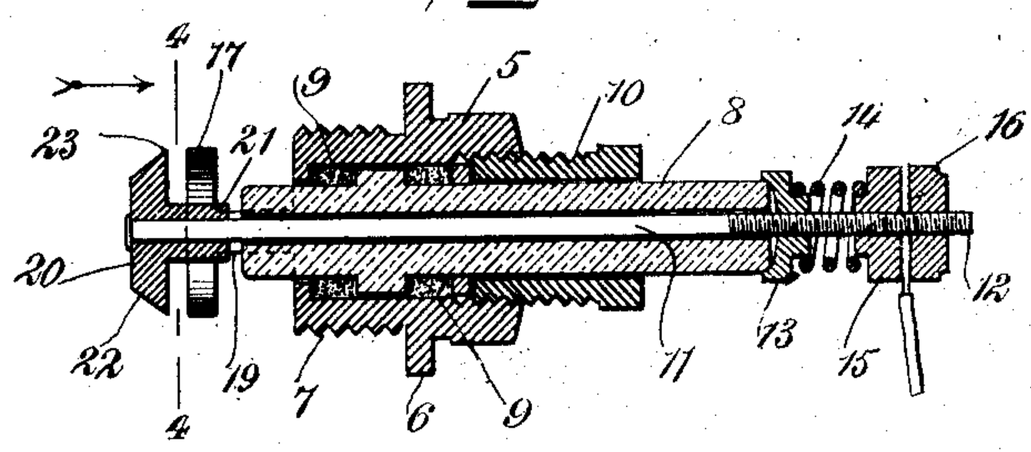


Fig. 3.

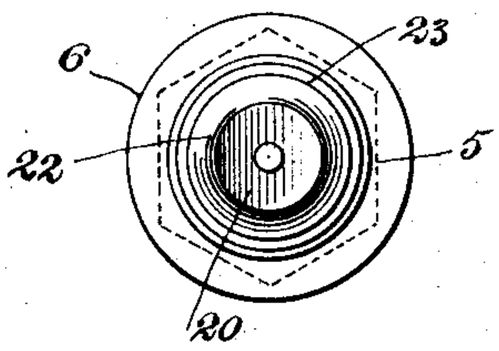
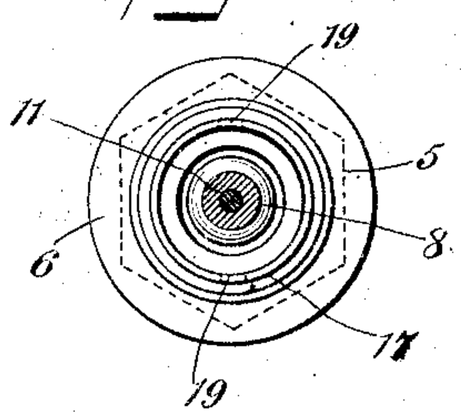


Fig. 4.



WITNESSES:

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ELECTRICAL IGNITER FOR INTERNAL-COMBUSTION ENGINES.

No. 812,622. Specification of Letters Patent. Patented Feb. 13, 1906.

Application filed March 24, 1902. Renewed April 16, 1903. Serial No. 152,982.

To all whom it may concern.

Be it known that I, WILLIAM H. WALTER, a citizen of the United States, residing in the city of New York, borough of Manhattan, in the county and State of New York, have invented certain new and useful Improvements in Electrical Igniters for Internal-Combustion Engines, of which the following is a full, clear, and exact description.

My invention relates to improvements in electrical igniters for internal-combustion engines; and it consists in the construction and arrangement of parts which will be hereinafter fully described and claimed.

In the present invention I aim to provide a simple and efficient construction of electrical igniters of that class which employ stationary terminals or electrodes and which may be advantageously used on internal-combustion engines in which oil is liable to be pumped up from the crank-pit past the packing-ring and into the combustion-chambers. The oil when deposited on one or both of the terminals or electrodes prevents an electric spark from jumping from one terminal to the other and when the terminal becomes heated and coated with oil the latter soon carbonizes into a thick deposit or coating which precludes the passage of the electric current and results in a consequent failure to produce the spark necessary to ignite the explosive gaseous mixture.

The object of this invention is to provide an improved igniter which insures the passage of an electric spark or sparks under any and all conditions of service and in which the deposit of carbonaceous matter on the terminals (one or both) is overcome.

In my igniter one of the terminals is made to retain a considerable amount of heat, so that any oil deposited thereon would immediately upon coming in contact with this heated terminal be vaporized and entirely consumed during the following combustion of the cylinder-charge, which in turn would give off more heat to the terminal and contribute toward keeping the terminal free from carbonaceous deposits and add to the successful operation of the igniter for an indefinite length of time. To secure such a condition in the service of the igniter, it has been found necessary to design the insulated terminal of unusually large proportions for a device of this kind. The form suggesting itself most readily is the sphere; but it has been found that the electric current will more readily pass points of comparatively thin sections, selecting wherever possible that point of a terminal which presents the keenest edge. I have found by experiment that a metallic body of a shape of a double convex lens is most suitable for the purpose in view, because it presents a continuous circular thin or knife edge as an exit for the electric current and at the same time it is capable of holding enough heat to cause any oil which may reach it or lodge thereon to become immediately vaporized and rendered innocuous as a possible means of coating the terminal with carbon. A plano-convex shape is more easily produced or else a purely conical form, and therefore either of the described forms may be employed, the latter being preferable owing to the decreased cost of production. It will be understood that a core or central body of any shape may be employed so long as it terminates at some point in a circular disk, said disk constituting the passage for the electric current or spark. The construction of one terminal is not alone sufficient to secure the best results, and I have found that its efficiency is highly increased by surrounding the disk-shaped terminal by another terminal, the latter assuming the shape of an annular opposing terminal, which is preferably continuous or unbroken and is arranged to present an edge of thin section in opposing concentric relation to an edge of thin section of the first-named terminal. With the two terminals arranged in opposing relation the chances for the formation of a spark are very greatly increased. When oil is deposited on either of the circular terminals, the electric current will infallibly select a point of exit where at that moment exists a clean metallic surface in one of the two terminals, producing a spark consequent upon the bridging of the terminals by the current.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of an electrical igniter embodying my improvements. Fig. 2 is a longitudinal sectional view through the same. Fig. 3 is an end elevation looking at the inner extremity of the igniter, and Fig. 4 is a transverse section taken in the plane of the dotted line 4 4 of Fig. 2 and looking toward the terminal formed by or as a part of the bushing.

In order that others skilled in the art may

understand the construction and application of my improvement, I have illustrated one embodiment thereof in the accompanying drawings; but it will be understood that I do not limit myself to the specific construction of the non-important parts of the igniter, and, furthermore, that I hold myself at liberty to embody the essential or generic features of the invention in other constructions of igniters well known in the art.

5 designites the bushing, which is provided with a collar 6 and with a threaded portion 7, the latter forming a convenient means for the secure attachment of the entire igniting device to the working cylinder of an internal-combustion engine. The bushing accommodates an insulated sleeve 8, which may be of any suitable material and constructed in any approved way. Said sleeve 8 extends through the bushing, and the joint between the bushing and the sleeve is made gas-tight by the employment of a non-combustible packing 9, which is compressed tightly around the sleeve by the employment of the gland 10, the latter being screwed into the outer portion of the bushing 5. The insulator-sleeve 8 has a central bore or passage through which extends the metallic stem 11, forming a part of an electrical conductor. The outer end of said stem is externally threaded, as at 12, and arranged to project beyond the sleeve 8. Loosely fitted on this projecting end of the metallic stem is a disk 13, against which is seated a spring 14, that is adapted to be compressed by the adjustment of a nut 15, the latter being screwed on the threaded part of the stem and serving to engage with the spring. Another nut 16 is screwed on the threaded part of the stem and is adapted to coöperate with the nut 15 for the purpose of holding an end portion of an electrical conductor forming a part of a sparking circuit in metallic engagement with the metallic conductor-stem 11. The two nuts 15 16 provide means for the convenient attachment of an electrical conductor to the stem, and the nut 15 may be adjusted on the stem to compress the spring 14 more or less.

According to my invention one terminal of the electric circuit for the sparking or igniting device is of an annular or ring-like form, and this terminal is formed by a part of the bushing 5 or is attached to said bushing so as to be supported or carried thereby. This circuit terminal may be formed by the edge of a reduced inner portion of the bushing, and this edge may be continuous, as shown by the drawings, or it may be interrupted or broken. As shown in the specific embodiment of the invention represented by the drawings, this annular or ring-like terminal 17 is an integral part of the bushing 5 and is formed with the slots 18, said slots being separated by the bridge-bars 19. The inner terminal portion of the bushing is thus skeletonized by removing some of the metal, so as to allow the hot gases or the exploded charge to circulate freely around and through the bushing, thus minimizing the area of the bushing for the lodging of oil or the deposit of carbonaceous substances. The other terminal for the sparking circuit constitutes one of the important features of my improvement, and it is embodied in the form of a disk 20, the same being supported or carried by the inner extremity of the metallic stem 11. This disk 20 is shown as having a hub 21, adapted to receive the extremity of the stem for the more perfect attachment of the terminal to the stem. The disk-like terminal has a beveled portion 22 on its inactive or neutral sides, and this beveled portion of the disk forms an extremely thin or knife edge 23, the latter being disposed in opposing and concentric relation to the annular terminal 17.

From the foregoing description it will be seen that the disk-like terminal, having the thin or knife edge, is supported by the stem, which is insulated by the sleeve 8 from metallic contact with the bushing, and the two parts 17 20 are disposed in concentric relation and spaced laterally, so as to form the intermediate sparking gap, across which the current is adapted to bridge or leap in order to form the spark at proper intervals.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an electrical igniter, the combination of a hollow plug provided near its inner end with openings or slots and with a ring-like terminal, said openings or slots lying inside of the ring-terminal and the latter presenting a continuous active edge of thin section, and a beveled disk-like terminal having an active edge of thin section disposed in parallel and opposing relation to the corresponding edge of the ring-like terminal and forming therewith an intermediate sparking gap of uniform width, said ring-like terminal being presented edgewise to the disk-like terminal.

2. An electrical igniter, comprising a bushing having an annular terminal of thin cross-section joined thereto by intervening ligaments, and a solid circular terminal having an edge of thin section, said annular terminal and the thin edge of the solid terminal being separated by an intervening sparking gap.

3. An electrical igniter having a solid disk-like terminal provided with a beveled periphery forming an edge of thin section, and an annular terminal having a thin active edge, both terminals presenting edges of thin sections in opposing and parallel relation, the thin edge of each terminal being continuous and lying in one plane.

4. A non-clogging electrical igniter, comprising a bushing provided with spaced webs or ligaments, and with an annular terminal having an edge of thin section, said terminal

being separated from the bushing by slots or spaces formed by and between the webs or ligaments, and a solid terminal having a beveled periphery forming an edge of thin section, which is presented in a concentric and opposing relation to the corresponding edge of the annular terminal.

5. An ignition device of the jump-spark class including a relatively stationary body portion, an annular terminal spaced apart therefrom but connected thereto leaving air-passages between said terminal and said body portion, a second terminal situated adjacent to the annular terminal and being spaced away from the same at all times.

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

WILLIAM H. WALTER.

Witnesses:

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