Sept. 25, 1923. 1,468,970

C. E. LEONARD

SPARK PLUG

Filed April 19, 1920

Fig. 1.

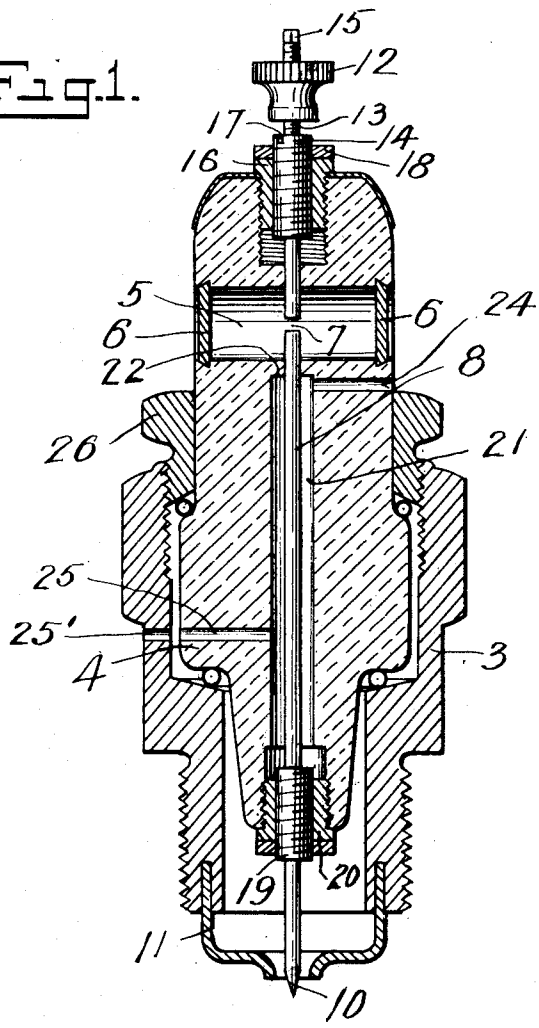
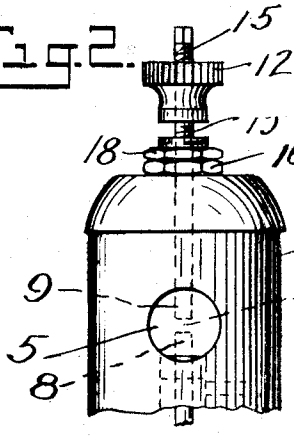


Fig. 2.



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By his Attorney
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Patented Sept. 25, 1923. 1,468,970

UNITED STATES PATENT OFFICE.

CALEB E. LEONARD, OF BOONTON, NEW JERSEY.

SPARK PLUG.

Application filed April 19, 1920. Serial No. 374,796.

To all whom it may concern:

Be it known that I, CALEB E. LEONARD, a citizen of the United States, residing at Boonton, in the county of Morris and State of New Jersey, have invented certain new and useful Improvements in Spark Plugs, of which the following is a specification.

My invention relates to the class of devices known as spark plugs and has for its main objects to intensify the spark and to provide a visual indication of the operation of the plug.

A further object is to provide within the insulating core ventilation passages for the purpose of keeping the core and attached parts in a desirably cool condition.

Other objects are to accomplish the above without adding to the bulk or weight of the plug and without materially increasing the cost thereof.

One of the principal features of the invention is the construction of the insulating core of the plug with a transverse opening or passage located near the exposed or outer end of the plug and the provision of a special "spark intensifying" gap within said passage.

Another feature of the invention is the formation of the insulating core with an enlarged central passage through which the conductor or electrode passes, and transverse passages at opposite ends of the core leading from the central passage to the outside of the core, for the purpose of ventilating the plug as hereinafter described.

These and other novel features of the invention will be disclosed more fully as the specification proceeds.

In the drawing accompanying and forming a part hereof I have illustrated my invention as embodied in a practical, commercial form, but wish it understood that the invention is not restricted to this paticular form, as will be clear from the scope of the appended claims.

Figure 1 of said drawing is a vertical or longitudinal sectional view of one of my improved spark plugs; Figure 2 is a broken side elevation thereof.

The body of the plug consists, as usual, in such devices, of a metallic sleeve 3, forming a protective and supporting base for the core which carries the insulated sparking terminal.

This insulating core, which is designated 4, is, as above indicated, of novel construction, in that it is provided near its outer end with a transverse passage or opening 5 shown as extending entirely therethrough and forming a chamber, closed at its opposite ends by windows 6, of transparent or semi-transparent, suitable heat-resisting material, such as mica.

Within this closed chamber is located the spark-intensifying gap, indicated at 7 and provided between the opposed ends of the two electrodes or electrode sections 8 and 9. These electrodes are entered through the opposite ends of the core, the end of the first electrode 8 being left exposed at the inner end of the plug to form a sparking terminal 10, cooperating with a terminal or terminals 11, carried by the base, and the outer end of the other electrode being exposed at the outer end of the plug and provided with a suitable terminal device, such as the binding nut 12, illustrated.

Provision is made for relatively adjusting the electrodes for the purpose of increasing or decreasing the gap, the outer or terminal electrode being shown as having a screw-threaded portion 13 engaged in a bushing 14 and provided with an angular or otherwise shaped end portion 15 by which the same may be readily turned.

In the illustration, the bushing 14 itself is adjustable, it being shown as having a screw-threaded engagement in the support 16 and as being notched at 17 for the engagement of a screw-driver or other adjusting implement. When properly adjusted, this bushing 14 may be secured as by means of a lock nut 18.

The inner or sparking electrode also preferably is longitudinally adjustable in the core, as by having a screw-threaded portion 19 engaged in a bushing 20 provided therefor in the inner end of the core.

The construction just described and whereby both the electrodes are adjustable, enables the relative adjustment of the same to vary the width of the spark gap and also such adjustment as may be necessary to center the spark gap within the chamber 5. The adjustability of the outer electrode enables the adjustment of the spark gap when the spark plug is mounted and in fact, even when the spark plug is operating, provided, of course, precautions are taken to prevent "shock." Great accuracy of adjustment is possible because of the fact that the gap is visible through the windows in the core and these windows enable at all times the operation of

the plug to be observed and if necessary "corrected."

The ventilating feature of the plug comprises an enlarged central longitudinal bore indicated at 21, sufficiently large to provide a considerable space around the electrode 8 that passes through it. At its upper end this bore is shouldered as indicated at 22, providing a restricted passage just large enough to receive the electrode 8. At the lower end of the core the electrode is positioned by the bushing 20. At the upper end of the core there is a transverse passage 24, which leads from the outside of the core to the upper end of the enlarged bore 21, and at the lower end of the core there is a similar passage 25. The passage 24 in the construction shown leads directly to the outer air, because it is formed in that part of the core which projects above the securing nut 26; but inasmuch as the lower part of the core is surrounded by the sleeve 3, it is necessary to provide a passage 25′ in the sleeve in line with the passage 25. With this arrangement it is obvious that as the lower end of the plug is heated in use, there will be a constant current of air passing into the central bore 21 at its lower end, and out at its upper end. The result is the ventilation and cooling of the core, and furthermore, since the electrode 8 is for the most part spaced away from the porcelain or other insulating core, the liability of cracking the insulation upon expansion of the electrode is diminished. Furthermore, since the sleeve 3 is in all cases spaced appreciably away from the outer surface of the core, and since this space is by my arrangement open to the outer air, ventilation of at least a considerable part of the outer surface of the core is accomplished.

The invention, it will be seen, provides a practical and efficient spark intensifying device which does not add in any way to the bulk of the plug and which in effect forms a unitary part of the plug. And it further provides a means for ventilating a plug and keeping it cool, whether the plug be of the particular construction hereinabove described, or of any of the usual constructions now in general use.

I claim:

1. A spark plug having an insulating core provided with a transverse passage therethrough, transparent windows closing the opposite ends of said passage, said core further provided with a central longitudinal bore internally threaded at its upper and lower ends, a bushing threadedly engaged in each end of the longitudinal bore, a sparking electrode adjustably supported in one of the bushings and having its outer end disposed within the transverse passage, and a terminal electrode adjustably supported in the other of said bushings and having its inner end disposed within the passage opposite the end of the sparking electrode.

2. A spark plug having an insulating core provided with a transverse passage therethrough, transparent windows closing the opposite ends of said passage, a bushing adjustably mounted in the lower end of the core, a sparking electrode supported in said bushing and having its outer end disposed within the passage, a second bushing adjustably mounted in the upper end of the core, and a terminal electrode supported in the said second bushing and having its inner end disposed within the passage opposite the end of the sparking electrode.

3. A spark plug having an insulating core provided with a transverse passage therethrough, transparent windows closing the opposite ends of said passage, a sparking electrode supported in the core and having its outer end disposed within the passage, a terminal electrode supported in the outer end of the core and having its inner end disposed within the passage opposite the end of the first electrode, and adjustable supports at the opposite ends of the core for adjusting the two electrodes toward and away from each other.

4. An insulating core for the purpose described having a central longitudinal bore leading in from the lower end thereof and a restricted passage leading through the upper end of the core and communicating with the longitudinal bore, an electrode within the bore spaced away from the walls thereof and projecting through the restricted passage in the upper end of the core, means within the longitudinal bore to maintain the electrode in its properly spaced relation to the walls of the bore, said means constituting a seal for the lower end of the longitudinal bore, and vent passages through the core communicating with the longitudinal bore.

In testimony whereof I affix my signature.

CALEB E. LEONARD.