J. H. BECKER AND W. S. BELLOWS.

SPARK PLUG.

APPLICATION FILED AUG. 13, 1917.

1,334,212. Patented Mar. 16, 1920.

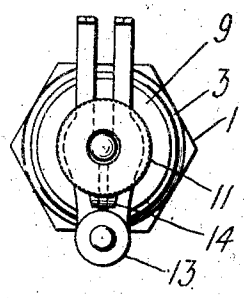


FIG. 4

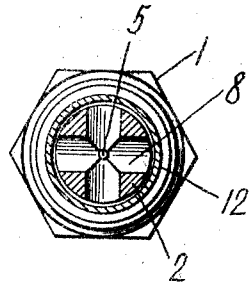


FIG. 3

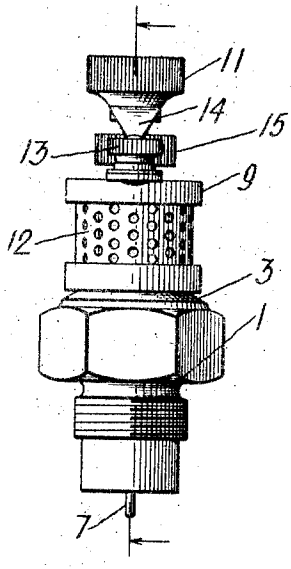


FIG. 1

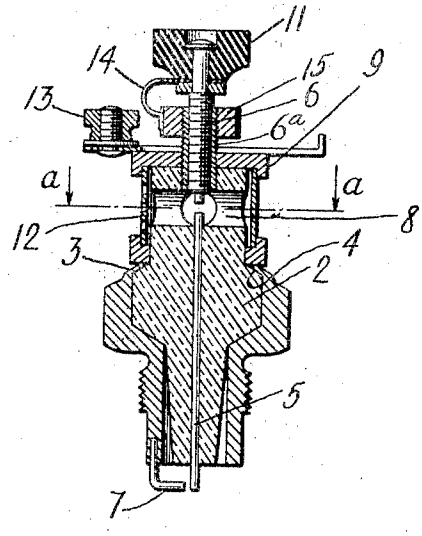


FIG. 2

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SPARK-PLUG.

1,334,212. Specification of Letters Patent. Patented Mar. 16, 1920.

Application filed August 13, 1917. Serial No. 185,852.

To all whom it may concern:

Be it known that we, JOHN H. BECKER, a citizen of the United States, residing in the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, and WARREN S. BELLOWS, a citizen of the United States, residing in the city of Worcester, county of Worcester, and State of Massachusetts, have invented certain new and useful Improvements in Spark-Plugs, of which the following is a specification.

Our invention relates to that type of spark plug which is provided with an interrupted electrode forming an auxiliary spark gap located in an apertured core, by means of which observation may be made and knowledge had of the sparking condition of the plug.

One of the objects of our invention is to improve structurally this type of plug by the addition of certain features which greatly enhance the usefulness and efficiency of the plug generally.

In carrying out our invention, we arrange the auxiliary gap and associated structural parts in such a way as to produce in effect the action of an electrical condenser, which increases the voltage and decreases the amperage, one terminal of the gap being adjustably mounted so as to vary the character of the spark produced thereat.

This adjustment, which forms one of the principal features of our invention, we have so arranged that it may be made while the spark plug is in active use. In practice this has been found to be of particular advantage in as much as by observing the character of the spark at the auxiliary gap one may know and determine the character of the spark at the effective igniting points of the plug. For instance, experience has shown that sparks may be observed at the auxiliary gap when as a matter of fact no sparking is present at the active igniting points of the plug due to the plug becoming fouled, either by the accumulation of carbon, oil or a short circuit. It has been observed that the current passing an improperly adjusted auxiliary gap is purple in color and that in such instances no spark is being produced at the ignition points of the plug. By properly adjusting the gap distance, the character of this spark may be changed to such an extent that it will overcome the fouling at the igniting points and cause an efficient firing spark. When so properly adjusted, the color of the spark at the auxiliary spark gap electrode points becomes a bluish white. Therefore, it is manifest that by providing means for conveniently adjusting the auxiliary gap while the engine is running, the efficiency and serviceability of the plug is greatly enhanced.

In the accompanying drawings we have illustrated by way of example a spark plug embodying the features of our invention, in which—

Figure 1 is a perspective view thereof.

Fig. 2 is a view in vertical cross section.

Fig. 3 is a longitudinal section taken on line *a*—*a* of Fig. 2.

Fig. 4 is a top plan view.

Referring to the drawings in detail, the plug comprises the usual screw threaded bushing 1, and a centrally located porcelain core 2, which may be suitably fastened in place by swedging over the metal of the bushing as at 3 into contact with the shoulder 4 formed upon the core. The central electrode is of two-part construction, the lower part indicated at 5 being stationary while the upper part 6 is adjustably mounted. The other electrode of the plug is indicated at 7 and is of conventional form. The porcelain core, near the point where the central electrode is located is provided with a series of radially associated apertures 8 serving as windows through which the sparking characteristics of the plug may be observed. The upper adjustable part of the central electrode is in screw-threaded engagement with a metal sleeve 6^a embedded partly in the porcelain core 2, and partly in the cap 9 of insulating material. Mounted upon the upper extremity of this part of the central electrode is a knob 11 by means of which convenient manipulation may be had without danger of shock.

Between the metal cap 9 and the bushing 1 and entirely surrounding the upper portion of the core is a sheet metal perforated screen 12. In order to maintain the adjustable part of the central electrode as securely as possible in adjusted position we provide a spring locking means comprising an upwardly extending member of springy material 14, the upper extremity of which is

fast to the knob 11 while the lower extremity engages the grooved member 15.

It will be obvious that by rotating the knob 11 the finger 14, owing to its springy nature will trip from groove to groove and when the proper adjustment is had between the auxiliary spark gap electrodes, such adjustment will be properly maintained. Detachably arranged with respect to the metal sleeve 6^a surrounding the central electrode is a binding post 13 to accommodate the lead or wire which supplies the ignition current.

The metal screen 12 protects against the igniting of any gases or excess of oil which may accumulate under the hood of the engine and also serves to protect the porcelain of the plug in such a way as to prevent accidental breakage. It also ventilates the plug and permits observation of the sparking condition of the auxiliary gap.

As heretofore alluded to, the adjustment can be accomplished without fear of shock and the adjustment when made will be maintained.

By the use of our invention the circuit is broken at the auxiliary spark gap. The current is condensed in such a manner as to decrease the amperage and increase the voltage which produces a powerful, intense igniting spark capable of firing spark plugs after they become carbonized and oil soaked and which could not be fired in ordinary manner without the auxiliary gap. Furthermore plugs of our invention produce a better and more continuous and even spark than plugs hitherto known, which means more even engine torque, greater flexibility, less vibration, less bushing trouble and less wear and tear.

While we have illustrated and described certain structural details, we do not wish to be understood as limiting ourselves precisely thereto as changes may be resorted to without departing from the spirit and scope of our invention as defined by the appended claims by which we intend to cover the principles of our invention in whatever form they may be embodied.

Having thus described our invention what we claim is:

1. A spark plug comprising a two-part electrode, one part being rotatably and axially adjustable relatively to the other part to obtain variable spark gaps, a surmounted insulating member operably associated with and extending above the outer end of the adjustable part and rotatable therewith, whereby adjustment of the auxiliary gap may be accomplished while the plug is electrically active without fear of shock to the operator and means whereby an ignition wire can be electrically associated with the adjustable part below the insulating member.

2. A spark plug comprising a two-part electrode, one of which parts is rotatably and axially adjustable relatively to the other of said parts, so as to form an auxiliary spark gap, an insulating member mounted upon the upper extremity of the adjustable part and rotatable therewith, means whereby an ignition instrumentality may be connected to the adjustable part below the insulating member, and a perforated screen carried by the plug and surrounding the auxiliary gap to protect against ignition of gases or oil and at the same time to permit observation of the auxiliary spark during adjustment while the plug is electrically active.

3. A spark plug comprising a central electrode formed in two parts, one of said parts being rotatable and axially adjustable relatively to the other part to provide an auxiliary spark gap, an insulating knob fixedly applied to the upper extremity of the adjustable part, means associated with the adjustable part, and a stationary part of the plug for accomplishing a step-by-step adjustment of the adjustable part of the electrode and holding it in adjusted position, and means electrically associated with the adjustable electrode part beneath the insulating knob for connecting an ignition wire to the plug.

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