Dec. 9, 1924. 1,518,248

A. B. BROLUSKA ET AL

SPARK PLUG

Filed Aug. 19, 1920

Fig. 1

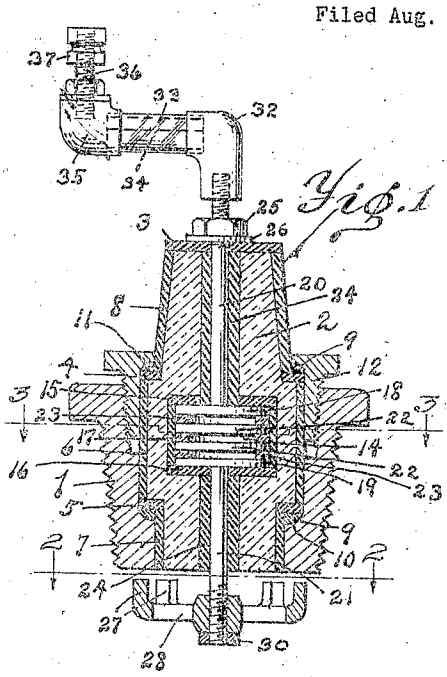


Fig. 2

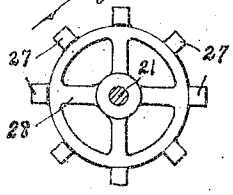


Fig. 3

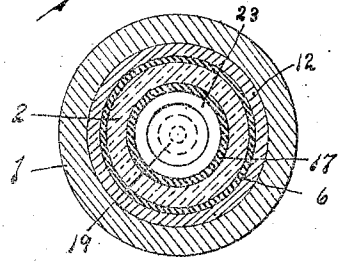


Fig. 4

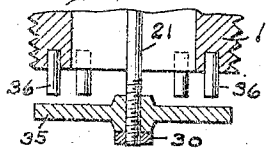


Fig. 5

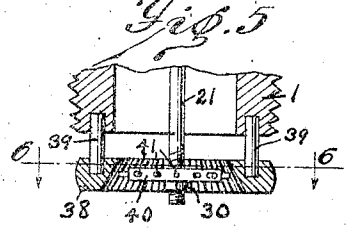


Fig. 6

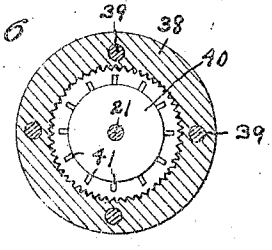
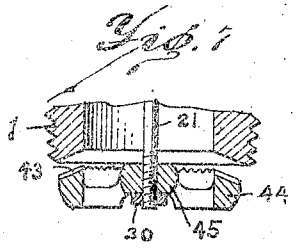


Fig. 7



WITNESS:

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UNITED STATES PATENT OFFICE.

AMEL B. BROLUSKA AND HARRY A. BROLUSKA, OF DETROIT, MICHIGAN, ASSIGNORS OF ONE-THIRD TO CYRIL CAILLIAU, OF DETROIT, MICHIGAN.

SPARK PLUG.

Application filed August 19, 1920. Serial No. 404,596.

To all whom it may concern:

Be it known that we, AMEL B. BROLUSKA and HARRY A. BROLUSKA, citizens of the United States, and residing at Detroit, county of Wayne, and State of Michigan, have invented a new and Improved Spark Plug, of which the following is a specification.

This invention relates to the construction of spark plugs designed for use with internal combustion engines, and its object is to provide a device of this character with a plurality of spark gaps, one at the inner end of the spark plug, that is, at that portion which extends into the combustion chamber of the engine, and the other spark gap within the spark plug itself and entirely surrounded by insulating material.

This invention consists in a spark plug having a porcelain core, a central electrode within the core and a metal bushing in which the core is mounted, together with shells of mica enclosing the electrode and the core and preventing the metal of the bushing and of the electrode from contacting with the core, the mica acting as a special and auxiliary insulation.

It further consists in a core having an interior chamber and an electrode of two alined parts having disks of metal at their adjacent ends spaced apart, and bridging members to conduct electric sparks between said disks.

It also consists in a terminal for the central electrode adjacent the lower end of the spark plug and having a series of points so that a number of sparks will simultaneously bridge the spaces between these points and the metal bushing in which the core of the plug is mounted.

It also consists in the details of construction illustrated in the accompanying drawing and particularly pointed out in the claims.

In the drawing, Fig. 1 is a central section of a spark plug embodying our invention. Figs. 2 and 3 are sections on the lines 2—2 and 3—3 of Fig. 1 respectively. Figs. 4 and 5 are vertical sections of the lower ends of spark plugs showing modified forms of terminals. Fig. 6 is a section on the line 6—6 of Fig. 5. Fig. 7 is another section of the lower end of a spark plug showing another modified form of terminal.

Similar reference characters refer to like parts throughout the several views.

In Fig. 1 we have shown a metal holder in the form of a bushing 1 provided with a bore to receive the porcelain core 2 and the mica shell consisting of the washers 3, 4 and 5, the cylindrical portions 6 and 7 and the frusto-conical jacket 8. The objects of the mica shell are to provide a packing between the porcelain and the bushing 1 and also to act as emergency insulation in the event the core becomes cracked or becomes so heated that it loses its insulating qualities. If desired, small rings 9 of asbestos may be placed against the circular shoulder 10 of the bushing and the circular shoulder 11 of the follower 12, as additional precautions against leakage and also to obtain even pressure surfaces between the shoulders 10 and 11 and the core.

The core is formed with an interior chamber 14 which is preferably lined with the washers 15 and 16 and a cylinder 17 of mica, and within this chamber are the disks 18 and 19 on the two parts 20 and 21 of the central electrode of this spark plug. These disks are separated by the metal rings 22 and the ring 23 of insulating material, mica or porcelain preferred. Tubes 24 of mica are slipped onto the two parts 19 and 20 of the electrode before the plastic porcelain is moulded and baked around these mica and metal parts. A nut 25 and washer 26 on the upper end of the electrode hold the washer 3 and the jacket 8 of mica in position after the core has been baked.

Attached to the lower end of the central electrode is a terminal consisting of a number of spark points 27 connected to a central member, a spider 28 being shown in Figs. 1 and 2, a jamb nut 30 being provided to hold this terminal in correct position. On the upper end of the central electrode is secured a metal member 32 in the form of an elbow into which extends a short tube 33 containing mercury 34, and the opposite end of the tube is mounted in the metal member 35 which carries a binding post 36 having a nut 37. These metal members 32 and 35 are of any desired size and of a metal which does not readily amalgamate with mercury. The tube may be secured in place in any desired manner and may be of any desired size and length.

When a proper circuit to the spark plug is closed, the spaces between the metal disks 18 and 19 on the two part electrode and the rings 22 at first prevent the passage of the current to the terminal points 27, but when a sufficient amount has accumulated or condensed in the conductor in the various connections and in the mercury 34 in the tube 33 in a manner we cannot explain, the spark jumps across from the disk 18 to the disk 19, using the metal rings 22 as steps in its path. The result is a strong clear spark between one or more of the spark points 27 and the lower end of the bushing 1. In practice, sparks pass from a number of these spark points 27 simultaneously when the distance between them and the bushing is the same.

We prefer to use the disks 18 and 19 and the rings 22 to the use of a pair of spark points as the latter are liable to burn away in time and adjustment is substantially impossible, while the disks and rings last indefinitely.

In Figs. 4 to 7, we have shown a series of other electrode terminals which embody the same idea of a series of spark points. In Fig. 4 is shown a plain disk 35, screwed onto the lower end of the part 21 of the central electrode. The points 36 are mounted in the lower end of the bushing 1 and the purpose and effect of this construction is the same as above described.

In Figs. 5 and 6 we have shown a terminal ring 38 connected to the lower end of the bushing 1 by means of pins 39, which may be of any desired length to carry the spark gap into the combustion chamber. The terminal disk 40, screwed onto the electrode 21, has radial points 41 while the inner surface of the ring 38 is frusto-conical and fluted.

In Fig. 7 the lower end of the bushing 1 is beveled inwardly so as to be substantially parallel to the ends of the teeth 43 on the ring 44 of the terminal which also embodies a spider 45 which screws onto the electrode 21 and is locked thereon by the jamb nut 30.

We claim:—

1. In a spark plug, the combination of a metal holder, a core of insulating material mounted therein and having an inner chamber, a two-part electrode mounted centrally within the core and having disks within said chamber constituting the adjacent ends of its two parts, and metal rings serving to partially bridge the space between said disks, said metal rings being separated by rings of insulating material so as to form circular spark gaps.

2. In a spark plug, an insulator having an opening, co-acting electrodes projecting into said opening to provide a spark gap, and a third electrode constituting a bridge between said first mentioned electrodes.

3. In a spark plug, the combination of a metal holder, a core of insulating material mounted therein and having an inner chamber, a two-part electrode mounted centrally within the core and having disks within said chamber constituting the adjacent ends of its two parts, metal members serving to partially bridge the space between said disks, a lining of mica for the chamber in said core, and insulating means between the metal members within said chamber.

4. In a spark plug, a metal holder, a core of insulating material partly within the holder, and formed with a chamber between its ends and in that portion which is enclosed by the holder, a two part electrode in said core and having disks constituting its adjacent ends within said chamber and means constituting a bridge between the ends of said two parts of the electrode to enable the spark to pass more freely.

5. A spark plug including a shell, an insulator carried thereby and provided with an opening, coacting electrodes upon the insulator projecting into said opening to provide an auxiliary spark gap, and a third electrode upon the insulator intersecting said opening to extend between said first mentioned electrodes.

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