No. 774,432 PATENTED NOV. 8, 1904.

E. B. JACOBSON.

SPARK PLUG.

APPLICATION FILED SEPT. 4, 1901.

NO MODEL.

Fig-1-

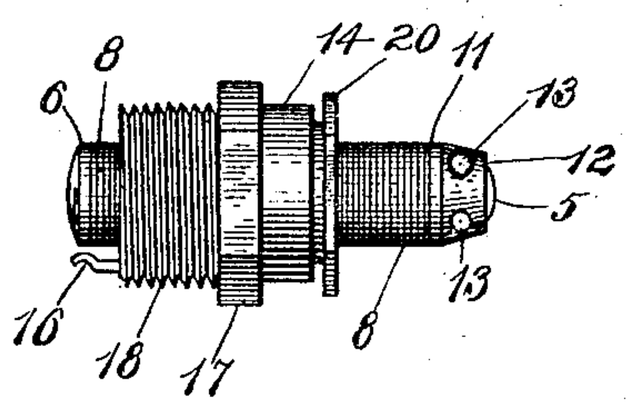



Fig-3-

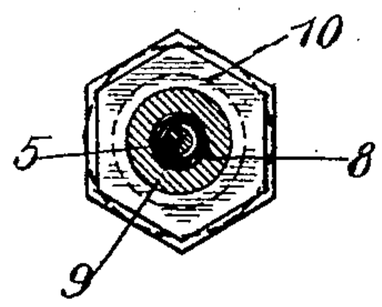



Fig-4-

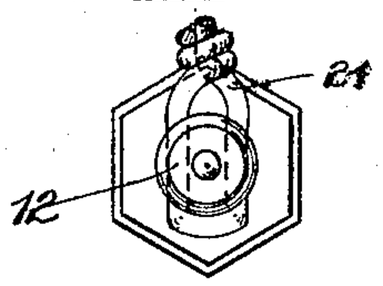
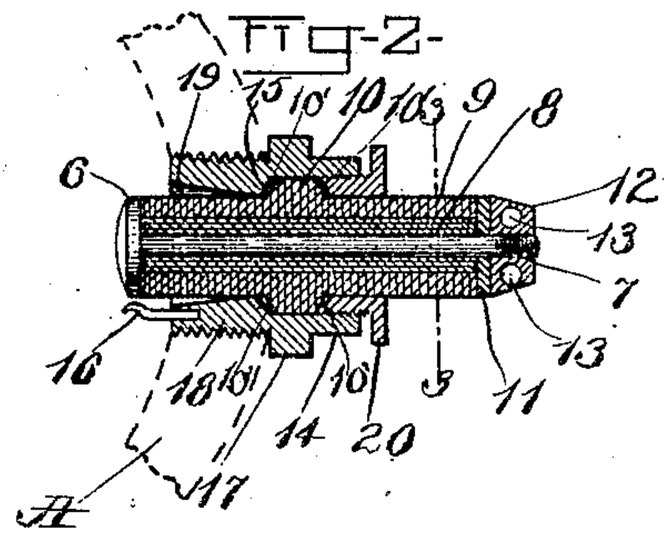



Fig-2-




Witnesses:-

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atty.

No. 774,432. Patented November 8, 1904.

# UNITED STATES PATENT OFFICE.

EDWARD B. JACOBSON, OF WEST SOMERVILLE, MASSACHUSETTS, ASSIGNOR TO PITTSFIELD SPARK COIL COMPANY, OF PITTSFIELD, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

## SPARK-PLUG.

SPECIFICATION forming part of Letters Patent No. 774,432, dated November 8, 1904.

Application filed September 4, 1901. Serial No. 74,293. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD B. JACOBSON, a citizen of the United States, residing at West Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Spark-Plugs, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has reference to sparking devices or spark-plugs used for igniting gaseous charges in explosion-motors, the object being to generally improve the construction and operation of such devices to overcome the many difficulties experienced with similar devices heretofore used. More particularly, my objects are to improve the insulation between the terminal supports to prevent short-circuiting or leakage between said supports and to thereby obtain at the desired intervals disruption of the full force of the current in the space which separates the points of the terminals, to provide an insulation capable of withstanding the destructive and deteriorative tendencies of the repeated disruptions of the electric current and explosions of the gaseous charges, to utilize the gaseous compound of the explosion-chamber as an additional insulation between the terminal supports, and to provide terminals or terminal points so disposed and constructed that their relative arrangement will not be disturbed by the shocks and pressure due to the repeated explosions. These and other objects are believed to be attained by the embodiment of the invention illustrated in the accompanying drawings, wherein—

Figure 1 is an elevation of a spark-plug. Fig. 2 is a longitudinal section, a portion of the wall of the explosion-chamber being shown in dotted lines. Fig. 3 is a transverse section on line 3 3, Fig. 2; and Fig. 4 is an end view showing a wire secured in the binder-nut.

5 is a rod or core having a screw-thread 7 at one end and at its other end a large head 6 with a flattened inner face. About the core 5 is wrapped or coiled a sheet of mica 8, which may, if desired, be secured in place by means of shellac or other cementitious material. On the coiled sheet 8 is strung a series of perforated disks 9 9, of mica, corresponding in diameter for the main length of the core 5 to the diameter of the head 6, the disks about intermediate the length of the core being, however, of larger diameter than those marked 9 to form the annular compression-shoulder 10, furnished with the copper protecting-washers 10′ 10′.

After the perforated disks 9 9, of mica, have been strung on the wrapped or coiled sheet 8 the washer 11 is placed on the threaded end 7 of the core, and the binder-nut 12, having the perforations 13 13, is screwed in place to compress the disks 9 9 against the flat face of the head 6, the end of the part 7 being then upset to prevent the removal of the nut. As shown, the head 6 is of the same diameter as the disk 9. This is important, as the mica disks are thereby tightly compacted and held together throughout their diameters, preventing warping, fraying, and other distortion or deterioration to which the peripheral edges of the disks would be susceptible if their diameter were larger than that of head 6.

The tubular casing or casing member 14 has a socket extending to the shoulder 15, threaded for a portion of its length. From the shoulder 15 the bore of the casing gradually increases in diameter to the end of the casing, from which a terminal 16 extends to a point opposite the peripheral edge of the head 6, which latter constitutes the other terminal of the sparking circuit. By this arrangement I am enabled to employ a practically straight and short terminal 16, preferably made of a short piece of wire and capable of withstanding the force of frequent explosions without disturbing the relative disposition of the terminals. Long projecting terminals, particularly those bent to bring them to proper position, are frequently distorted by the force of the explosions and are a source of constant trouble.

In assembling the parts the core 5, with its double insulations 8 and 9 9, secured in place thereon, is inserted through the casing 14

until the shoulder 10 abuts against shoulder 15, thus bringing the head 6 opposite terminal 16. The annular follower 20 is next screwed into the outer end of the casing and tightly clamps shoulder 10 against shoulder 15, thereby rigidly holding the core and its insulation rigidly in the casing. An annular space or compartment 19, formed between the insulation and the interior surface of the inner end of the casing, is adapted to be filled with gas from the explosion-chamber, which gas constitutes a further insulation between the terminal supports at a point where leakage or short-circuiting is most likely to occur. The threaded portion 18 of the plug-casing being screwed through a perforation in a chamber, as A, adapted to contain at times explosive gaseous compounds, which chamber is connected with one arm of an electric circuit, the wire or conductor 21, representing the other arm of the electric circuit, is then passed through the perforations 13 13 in the binder-nut 12 and the ends of the wire are twisted together, as is shown in Fig. 4.

Upon the compression of a charge of the gaseous compound within the chamber, as A, a portion of such charge enters the compartment 19 and tends from its greater volume than that of the compound contained between the terminal 16 and the head 6 to resist the passage of electricity from the casing toward the insulated core, while the wrapped or coiled mica sheet 8 and the disk insulation 9 9 cannot be disrupted by the rapid changes in the intensity of the current. For packing the joint between the shoulder 15 and the rib or shoulder 10 I place on each side of shoulder 10 a protecting and packing washer 10′, which under the compression of the follower 20 protects the shoulder 10 from the grinding action of the follower and forms a gas-tight joint when compressed against the shoulder 15 by said follower. It is of course understood that other metal than copper may be used for these washers; but the metal used is preferably ductile to yield to the compression somewhat and may be quite thin, if desired.

What is claimed is—

1. The combination with a hollow plug, of a bar-electrode extending through said plug, and an insulating-sleeve formed of a sheet of mica wound around the bar-electrode.

2. The combination with a hollow plug, of a bar-electrode extending therethrough, a rolled sheet of mica forming an insulator between the bar and plug, and washers of insulating material surrounding and protecting the end portions of the mica sleeve.

3. The combination with the hollow plug, of a bar-electrode extending therethrough, a roll of mica wound around the bar-electrode and forming an insulating-sleeve, and mica washers disposed on either end of the mica sleeve and serving to protect the same.

4. The combination with the hollow plug, of a bar-electrode extending therethrough, an insulating-sleeve between the bar-electrode and the plug, and washers of insulating material arranged between the inner end of the plug and the electrode and forming an extensive surface of non-conducting material.

5. The combination with a hollow plug, of a bar-electrode extending therethrough and provided near its inner end with an enlarged head, and at its outer end with screw-threads, a sleeve of insulating material surrounding the bar, mica washers surrounding the inner and outer portions of the bar-electrode, and a nut disposed on the threaded end of the bar and serving as a compressing means for the insulating material.

6. A spark-plug comprising a core, a tubular insulation closely embracing the core, and an insulation built of perforated disks of refractory material embracing the tubular insulation, said tubular insulation being formed of a sheet of mica wrapped upon itself.

7. A spark-plug comprising two spark-electrodes, a tubular casing carrying one electrode, and a core extending through said casing and carrying the other electrode, and insulation between said core and casing consisting of a tube of rolled sheet-mica fitting tightly about the core, and mica disks strung upon said mica tube and tightly compressed together.

8. A spark-plug comprising a tubular casing, a core extending through said casing, an enlarged head on the inner end of said core constituting one spark-electrode, a second spark-electrode consisting of a short wire projecting from the inner end of the casing and terminating opposite a point on the periphery of said head, and insulation interposed between said casing and core.

9. A spark-plug comprising a tubular casing, a core extending through said casing, an enlarged head on the inner end of said core constituting one spark-electrode, a second spark-electrode consisting of a short wire projecting from the inner end of the casing and terminating opposite a point on the periphery of said head, and insulation between said core and casing consisting of a tube of rolled sheet-mica fitting tightly about the core, and mica disks strung upon said mica tube and tightly compressed together and against the head on the core, the mica disks adjacent to said head having the same diameter as the head.

10. A spark-plug comprising a tubular casing, a core extending through said casing, an enlarged head on the inner end of said core constituting one spark-electrode, a second spark-electrode consisting of a short wire projecting from the inner end of the casing and terminating opposite a point on the periphery of said head, insulation between said core and casing consisting of a tube of rolled sheet-mica fitting tightly about the core, and

mica disks strung upon said mica tube and tightly compressed together and against the head on the core, the mica disks adjacent to said head having the same diameter as the head, and an annular gas-space between the wall of the casing and the periphery of the mica disks at the inner end of the casing.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD B. JACOBSON.

Witnesses:
W. STANLEY CAMPBELL,
H. J. MILLER.