No. 735,923. PATENTED AUG. 11, 1903.

J. M. WILSON.

SPARKING DEVICE FOR GAS ENGINES.

APPLICATION FILED JAN. 29, 1902.

NO MODEL.

Fig. 2.

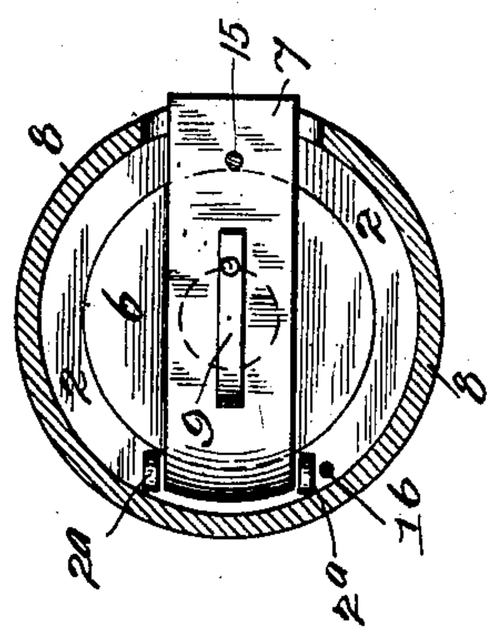
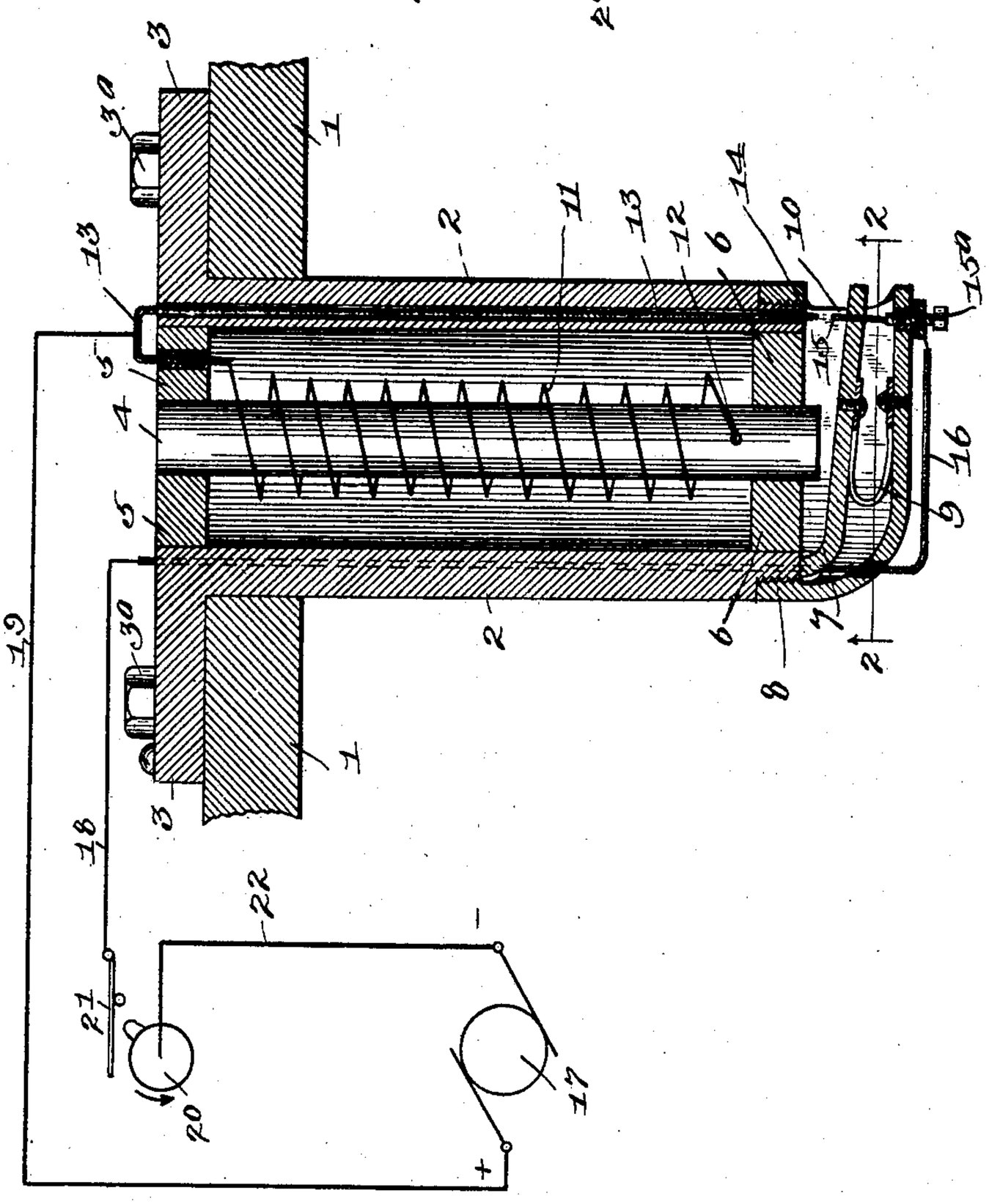


Fig. 1.



Witnesses.
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No. 735,923. Patented August 11, 1903.

UNITED STATES PATENT OFFICE.

JAMES M. WILSON, OF BATTLECREEK, MICHIGAN, ASSIGNOR TO THE ELECTRIC SPARKING & ILLUMINATING COMPANY, OF BATTLECREEK, MICHIGAN.

SPARKING DEVICE FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 735,923, dated August 11, 1903.

Application filed January 29, 1902. Serial No. 91,675. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. WILSON, of Battlecreek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Sparking Devices for Gas-Engines; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in sparking devices for gas-engines.

The object of my invention is to provide a device which will continue to automatically produce electric sparks within the cylinder of a gas-engine during the time when an electric circuit, including the said device, is closed.

Another object of my invention is to provide a device which will automatically cut out the resistance, consisting of the windings of the electromagnet-coil, and thereby strengthen the current, for the purpose of elongating and increasing the volume of the spark and to utilize the discharge of the operating-coil when the short circuit is broken and it is again cut into circuit for the purpose of utilizing the spark of the discharge thus made.

With these and other objects, which may hereinafter appear, my invention consists in the construction and arrangement of parts and the combinations as hereinafter described.

In the drawings, Figure 1 is an elevation of the device in section, with the circuits shown diagrammatically. Fig. 2 is a transverse section of the device, taken on lines 2 2 of Fig. 1.

The same reference-numerals indicate similar parts in both views.

1 is a fragment of the cylinder-head of a gas-engine.

2 is an iron cylinder adapted to enter a perforation in the cylinder-head 1 and to be held to the cylinder-head by means of the bolts 3^a 3^a, which pass through the flange 3 into the cylinder-head. The magnetic core 4 is located and fixed in the center of the cylinder 2 by means of the magnetic yoke 5, which fits tightly in the end of the said cylinder and in which the said core is tightly held, providing both legs of the magnet.

6 is an annular diamagnetic support which holds the lower end of the core 4 in position and which closes the cylinder 2.

7 is an armature, one end of which rests upon and is normally held in contact with the free end of the magnetic cylinder 2 and which is guided by means of the lugs 2^a 2^a.

8 is a brass cap adapted to be screwed on the free end of the cylinder 2 and to partly inclose the armature 7. The cap is provided with an opening 10, through which the armature 7 projects. The armature is held in place by means of the elliptical spring 9, which is fastened to the armature and to the cap 8 and which holds the armature normally in the position shown in Fig. 1.

11 is the diagrammatic representation of the magnet-windings, which are adapted to surround the core 4, and which is to be energized by any convenient source of current.

12 is the point where the inner end of the windings is connected to the core 4.

13 is a wire insulated in the walls of the cylinder 2 and terminating at its lower end in a contact-point 14. The upper end of the wire is connected to the remaining terminal of the windings 11 and also to one terminal of a source of current, such as a dynamo or battery, by means of the wire 19.

15 is a contact-point on the end of the armature 7, adapted to make contact with the stationary contact 15^a and the stationary contact 14.

16 is an insulated wire passing through the walls of the cylinder 2 in a manner similar to that of wire 13, one terminal being connected to the insulated screw 15^a, the other terminal connected to a timing device which is located between the automatic sparking device and the source of current.

17 is a source of current, such as a battery or dynamo. In this illustration it is shown to be a dynamo which is connected to the timing device by means of wire 22.

20 is a conventional timing device.

21 is the brush with which the timing device is designed to close the electric circuit.

The use and operation of the device may be described as follows: The small cylinder 2 is inserted within the gas-engine cylinder

through a perforation made in the cylinder-head 1 and is fastened in position by means of the screws 3^a 3^a, which pass through the flange 3. It will therefore be noticed that the entire device is inclosed within the cylinder of the gas-engine. When the circuit is closed by the timing device 20—that is to say, when the cam makes contact with the brush 21—the magnetic cylinder 2 and the core 4 are energized by the current passing through the coil 11, when the armature 7 will be attracted toward the core 4 and the cylinder 2, at which time the armature will break metallic contact between contact-points 15 and 15^a. At this time the circuit is completed from the dynamo 17 through the wire 22, cam 20, the brush 21, the wire 18, to the wire 16, the contact-screw 15^a, the contact 15, through the arc or spark to the armature 7, to the point 12, through the coil 11 to the wire 13, to the wire 19, back to the dynamo. When the armature 7 is thus attracted toward the cylinder 2 and the core 4, the contacts 15 and 15^a are broken and an arc or spark will bridge the contacts. When connection is made between contacts 15 and 14, the coil 11 will be "short-circuited" thereby, and the resistance of the core will be thus removed from the circuit and the arc existing between the contacts 15 and 15^a will be strengthened or increased in volume by virtue of the reduced resistance effected by short-circuiting of the coil 11; but the armature will no longer be forcibly attracted by the cylinder 2 and the core 4, and the spring 9 will return the armature toward the contact 15^a. At this time the connection between the contacts 14 and 15 will be broken, and the coil 11 will discharge itself and spring an arc between the contacts 14 and 15, and thus the discharge of the coil 11 is utilized for the purpose of making a spark. The armature 7 will be thus vibrated between the contact 15^a and the contact 14, and a spark will be made at each point in its vibration—that is to say, between contacts 15, 15^a, and 14, respectively—and thus it will be seen that while the magnetic coil which automatically vibrates the armature to produce the spark will absorb more or less energy at one time during its action the energy which it absorbs is utilized by virtue of the discharge of the said coil, and a spark that results from the discharge is utilized for the purpose for which the device is intended.

The hood 8 is placed over the armature for the purpose of preventing the shock due to the explosion of the charge of the engine from injuring the armature or any of the working parts.

While I have shown the magnetic armature oval in form, it may be made circular or disk-like, when the guides 2^a 2^a will not be required, and while I have shown a considerable portion of the device projecting into the cylinder it is not essential that more than the armature and contact-points be within the combustion-chamber of the cylinder.

Having described my invention, what I claim as new and useful, and desire to secure by Letters Patent of the United States, is—

1. In an automatic sparking device for gas-engines, an electromagnet, an armature responsive thereto within the cylinder of the said engine, a contact within said cylinder controlled by said armature, a circuit containing said magnet adapted to be interrupted by said armature, and a means for subsequently short-circuiting said magnet by the operation of said armature.

2. In an automatic sparking device for gas-engines, an electric circuit including an electromagnet, an armature responsive to said magnet arranged within the cylinder of the engine, and a contact within the cylinder controlled by the armature and adapted to interrupt the circuit and short-circuit the magnet when said armature is moved in response thereto.

3. In an automatic sparking device for gas-engines, an electromagnet, an armature responsive thereto, an electric circuit adapted to be interrupted by said armature, contacts included in said circuit, said armature and said contacts within said cylinder, and a source of current for energizing said magnet.

4. In an automatic sparking device for gas-engines, a cylinder of magnetic material 2, a core 4 within said cylinder, windings 11 surrounding said core, armature 7 responsive thereto within said cylinder, contact 14 for short-circuiting said magnet, and contact 15^a for closing said circuit, an engine-cylinder within which the moving parts of the device are contained, and a source of current for energizing said device.

5. In an automatic sparking device for gas-engines, a cylinder of magnetic material, a core of similar material within said cylinder, an armature arranged with one end in constant electrical contact with the free end of said magnetic cylinder, and a contact-point on the free end of said armature.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JAMES M. WILSON.

In presence of—
A. W. LANE,
EDITH GIBBS.