

No. 849,769.

PATENTED APR. 9, 1907.

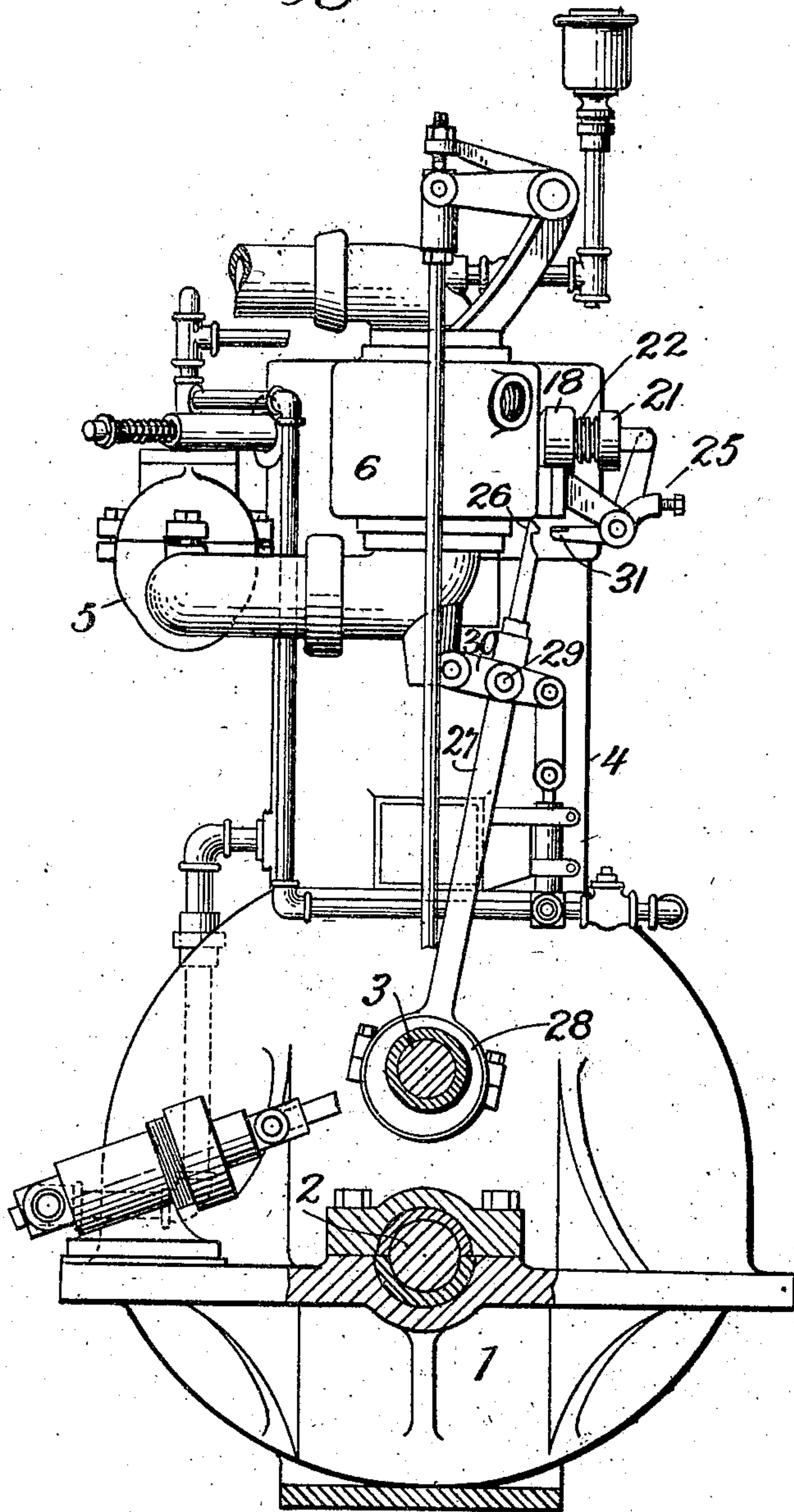
F. W. BRADY.

SPARKING DEVICE FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED AUG. 11, 1904.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
J. H. Thomas
William J. Firth.

Inventor:
Francis W. Brady
By his Attorney, Henry C. Cunniff

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2 SHEETS—SHEET 2.

Fig. 2. B

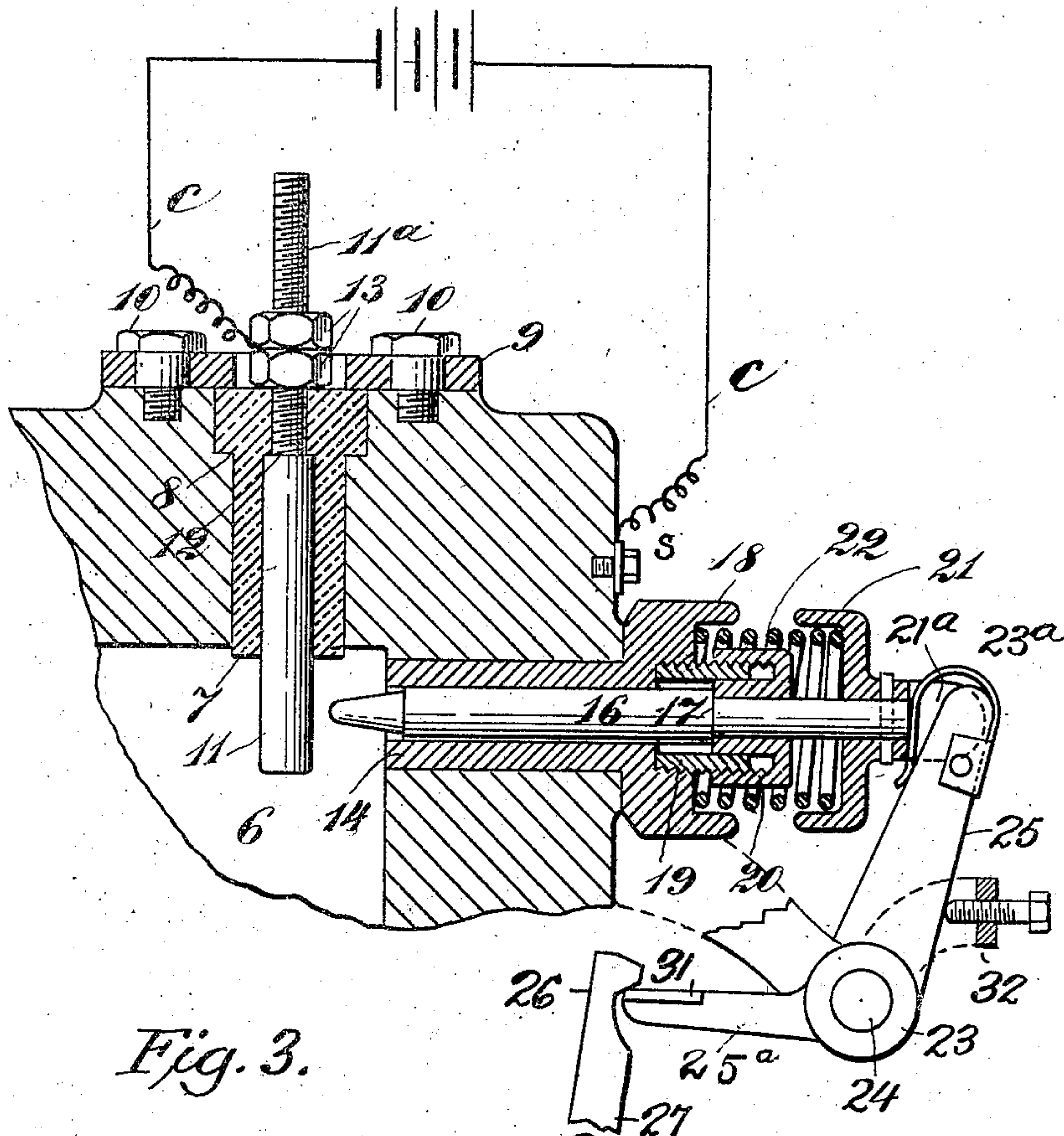


Fig. 3.

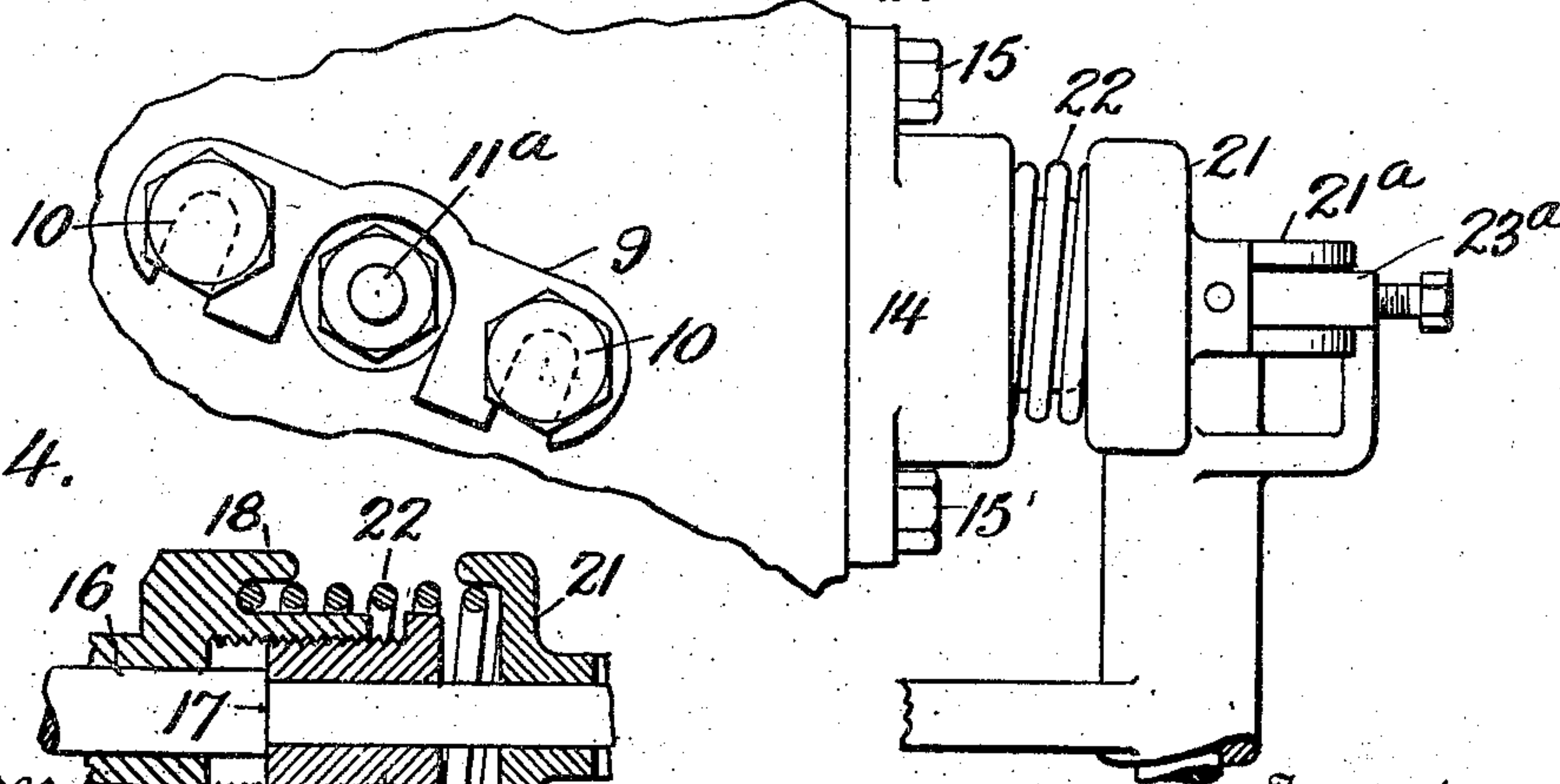
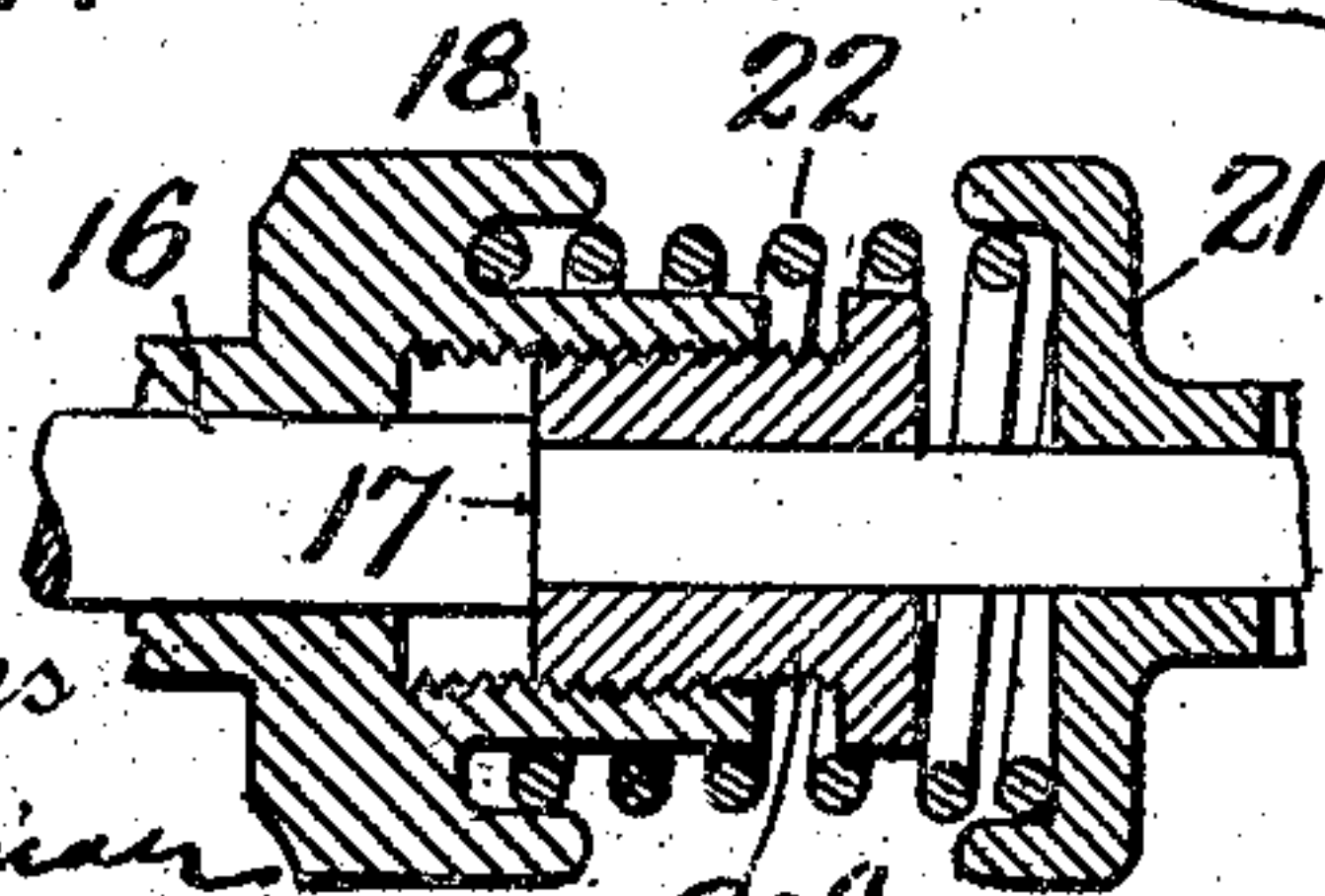


Fig. 4.



Witnesses
J. H. W. W. W.
William J. Firth,

Inventor:
Francis W. Brady
By his Attorney, Henry C. C.

UNITED STATES PATENT OFFICE.

FRANCIS W. BRADY, OF ENGLEWOOD, NEW JERSEY.

SPARKING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

No. 849,769.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed August 11, 1904. Serial No. 220,380.

To all whom it may concern:

Be it known that I, FRANCIS W. BRADY, of Englewood, in the county of Bergen and State of New Jersey, a citizen of the United States, have invented certain new and useful Improvements in Sparking Devices for Internal-Combustion Engines, of which the following is a specification.

This invention relates to electrical igniting devices for engines of the internal-combustion type, and the object is to provide a simple, reliable, and durable device for the purpose, as will be hereinafter described.

In the accompanying drawings, which illustrate an embodiment of the invention, Figure 1 is a side elevation of an internal-combustion engine provided with the igniter, the lower portion of the engine being in section. This view, which is on a small scale, is mainly designed to illustrate the relation and application of the ignition device to the engine. Fig. 2 is a vertical sectional detail view on a much larger scale, showing the parts clearly. Fig. 3 is a plan view of the parts seen in Fig. 2. Fig. 4 illustrates a slight modification, which will be hereinafter described.

Referring to Fig. 1, 1 is the bed-plate or base of the engine. 2 is the main shaft. 3 is the cam-shaft. 4 is the cylinder. 5 is the vaporizer, and 6 is the combustion-chamber. These features relate to the present invention only so far as to illustrate the application of the latter to an engine.

Referring now to Fig. 2, 7 designates a bushing set and fitting snugly in a bore in the wall of the combustion-chamber 6. This bushing will be of porcelain or other refractory insulating material and be provided with an external shoulder 8 to engage the metal. It is held in place by a plate 9 and screws 10. In this tubular bushing 7 is fitted a metal electrode 11, having a shoulder at 12, fitting up to an internal shoulder on the bushing, and a reduced screw-threaded portion 11^a, which protrudes exteriorly from the bushing, and has nuts 13 to draw the electrode tightly up into the bushing.

Set in the wall of the combustion-chamber at a right angle to the axis of the bushing 7 by preference is a metal bushing 14, secured by screws 15, Fig. 3, and in this bushing is slidably mounted a metal electrode 16, having a shoulder at 17 and a reduced exte-

rior portion. The exterior part or head of the tubular bushing 14 is enlarged to form a housing-cup 18, and the bore in the bushing is also enlarged at its outer end to receive an externally-screw-threaded tubular nipple 19, on which is screwed a nut 20, bored to form a guide for the reduced portion of the electrode 16 and also to serve as an adjustable stop to engage the shoulder 17 on the electrode and limit its movement outward. On the outer end of the electrode 16 is secured a housing-cup 21, and between this cup and the cup 18 is disposed a coiled retracting-spring 22, which is normally under some compression and holds the electrode 16 drawn back.

The electrode 16 is so alined axially with respect to the electrode 11 that when pressed in its tip will contact with said electrode 11, and the tips of said electrodes, or, indeed, the whole of that portion of each electrode exposed within the combustion-chamber, may be made of or covered with some non-oxidizable refractory conducting metal, such as platinum.

In Fig. 2, B designates diagrammatically any source of electricity—as a battery, for example—and *c c* conductors leading from the respective poles thereof to the electrodes 11 and 16. As the electrode 11 is insulated, one of the conductors leads directly to said electrode at the nuts 13; but as the electrode 16 is not insulated the other conductor is electrically connected with the metal wall of the combustion-chamber through a metal screw *s*. Obviously when the metal electrode 16 is pressed in until its tip is in contact with the electrode 11 a current of electricity will flow through the closed circuit thus established, and if the pressure on the electrode 16 be removed the spring 22 will retract said electrode and break the circuit, and a spark will be produced in the combustion-chamber 6 between the two electrodes at the break.

It will be noted that the movable electrode is metallically mounted—that is, insulating material is not interposed between it and the walls of the combustion-chamber. The two electrodes are insulated from each other by insulating the stationary electrode. None of the insulating materials in common use are adapted to afford a bearing-surface for the moving electrode, and in

insulating it, as is now the practice, it is necessary to provide the insulating-bushing with a metallic lining, which is expensive, and even then the insulation is liable to become broken 5 and the bearing become loose. Moreover, according to the present invention contact with the movable electrode can be made through the bearing by securing one terminal of the electrical source to a wall of the combustion-chamber, and thus the necessity 10 of securing an electrical connection to the moving electrode and consequent wear of the connection and hampering of the movement of the electrode are avoided.

15 The means employed for closing the circuit through the electrodes by pressing in the pin 16 will now be described.

A rocker 23 has an upright arm 25 so disposed as to take between cheeks 21^a on the 20 cap 21 and bear on the electrode 16 indirectly through a cushion-spring 23^a on said arm. This rocker turns about a fulcrum or pivot 24 and has an operating-arm 25^a, which is engaged by a trip 26 on the end of an eccentric-rod 27. This rod (see Fig. 1) has at its 25 lower end a strap which embraces an eccentric 28 on the cam-shaft 3 of the engine, and said rod is pivoted at 29 to a vibratable link 30. The cam-shaft 3 is driven from the main 30 shaft of the engine by gearing in a well-known way, not necessary to be herein described. As the eccentric 28 rotates it imparts motion to the trip 26 in an endless path of somewhat modified circular form, causing the hook-like 35 trip 26 to rise, move over, engage the arm 25 of the rocker, draw it down, and operate the rocker so as to cause the upright arm of the latter to press the electrode 16 into contact with the electrode 11, and then in its further 40 movement wipe off from said arm, thus allowing the spring 22 to retract the electrode 16, so as to produce the spark, the rocker being also returned to its first position by said spring.

45 The trip will be hardened, and the arm 25^a of the rocker, which the trip engages, is provided with a hardened plate 31 to take the wear.

The operation is as follows: When the 50 charge is compressed in the combustion-chamber of the engine and the piston of the engine is near the end of its stroke, the trip 26 engages the arm of the rocker 23 and through the latter presses the electrode 16 55 into contact with the electrode 11. As the crank passes the center and the piston is ready to return the trip frees itself from the rocker and the spring 22 retracts the electrode 16, thus breaking the circuit and producing the 60 igniting-spark in the combustion-chamber.

The cushion-spring 23^a is to cushion the contact between the electrodes 11 and 16. As the operation of the rocker is positive, it 65 would be difficult to effect just the desired pressure of one electrode on the other to al-

ways insure a contact and yet avoid injury to the parts, and therefore a cushion is interposed between the rocker-arm and the electrode 16.

Fig 4 shows a construction of the head of 70 the electrode 16, wherein the nut 20^a, forming the limiting-stop for the electrodes, screws directly into said head, the nipple 19 being omitted.

There is a suitable limiting-stop 32 back of 75 the rocker-arm, Fig. 2, to arrest the backward movement of the rocker-arm when the electrode 16 is retracted. Any form of stop device may be employed for this purpose.

The electrodes 11 and 16 are terminals of 80 the electric circuit, one being fixed and the other movable to make and break the circuit of which they form a part. The movement, which need not be very considerable in extent, is preferably produced by a longitudinal 85 sliding movement of the electrode 16, but this movement may be attained in any way.

Having thus described my invention, I claim—

1. An internal-combustion engine, having 90 an electrical igniting device comprising an electric circuit including a generator, a fixed electrode of the circuit, which extends into the combustion-chamber of the engine, and a movable electrode of the circuit which also 95 extends into the said chamber and may be moved into and out of contact with the fixed electrode, a spring which breaks the contact between the electrodes, a stop which limits the outward movement of the movable electrode, and means for moving the said electrode 100 into contact for closing the circuit, said means consisting of the cam-shaft 3, the eccentric 28 thereon, the eccentric-rod 27 and its yoke, the link 30, to which said rod is pivoted, the trip 26 on said rod, the rocker 23, 105 having an operating-arm in position to be engaged by said trip, an arm 25, and a cushion-spring 23^a mounted in said arm and so disposed as to impinge on the said movable electrode. 110

2. In an internal-combustion engine having a combustion-chamber, the combination 115 with an electrode extending within said chamber, a bushing in a wall of said chamber, a nut at the outer end of said bushing, a second electrode passing through said bushing and nut, said second electrode having a shoulder located between said nut and the combustion-chamber and adapted to bear 120 against said nut, and means for intermittently bringing the said electrodes into contact.

3. In an internal-combustion engine having a combustion-chamber, the combination 125 with an electrode extending within said chamber, a bushing in a wall of said chamber having a housing-cup at its outer end, a nut also at the outer end of said bushing, a second electrode passing through said bush- 130

ing and nut, said second electrode having a
shoulder adapted to bear against the inside of
said nut, a second housing-cup secured to the
outer end of said second electrode, a spring
5 interposed between said housing-cups and
means for intermittently moving said second
electrode inwardly.

In witness whereof I have hereunto signed
my name, this 10th day of August, 1904, in
the presence of two subscribing witnesses.

FRANCIS W. BRADY.

Witnesses:

HENRY CONNETT,
BENJAMIN H. HOLT.