No. 679,243. Patented July 23, 1901.

S. A. RHODE & J. DUBORD.

SPARKING IGNITER FOR EXPLOSIVE ENGINES.

(No Model.) (Application filed Aug. 9, 1900.)

2 Sheets—Sheet 1.

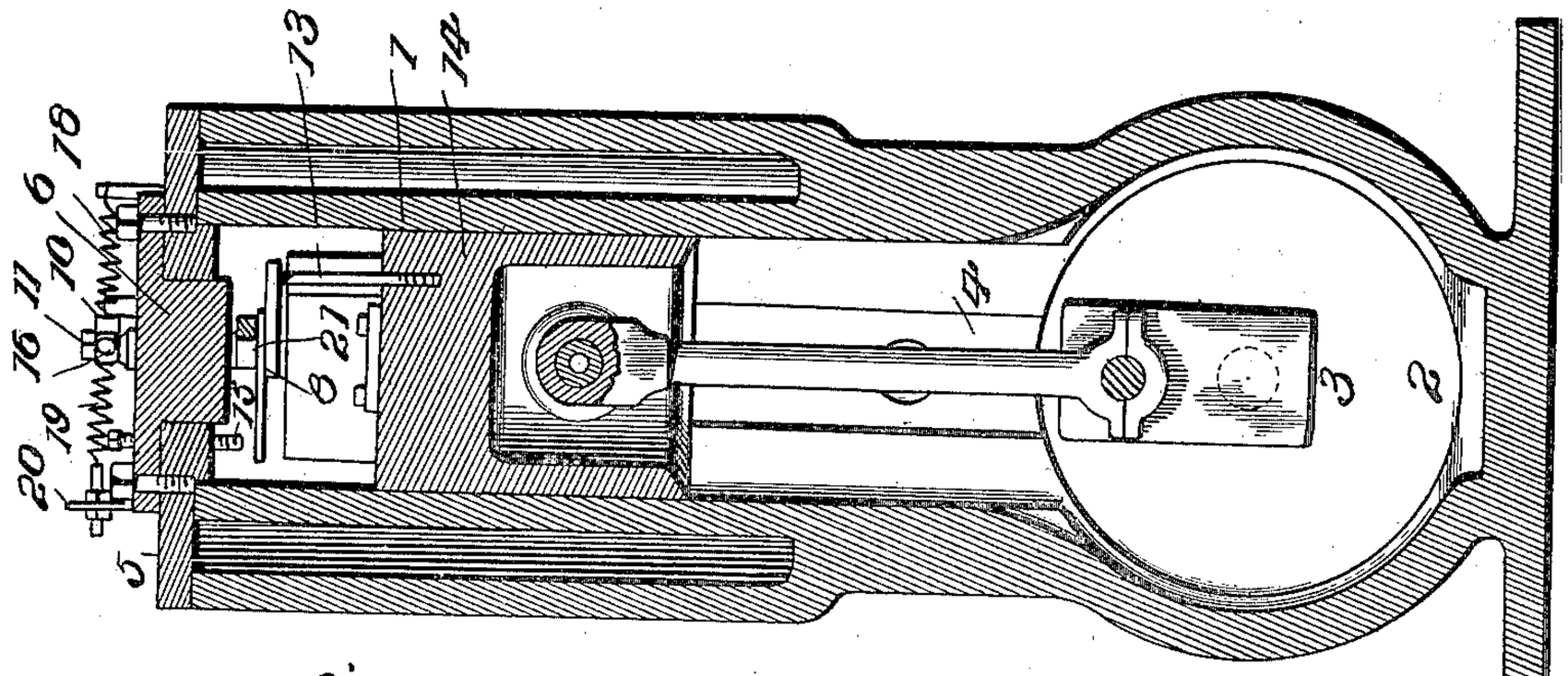

Fig. 2.

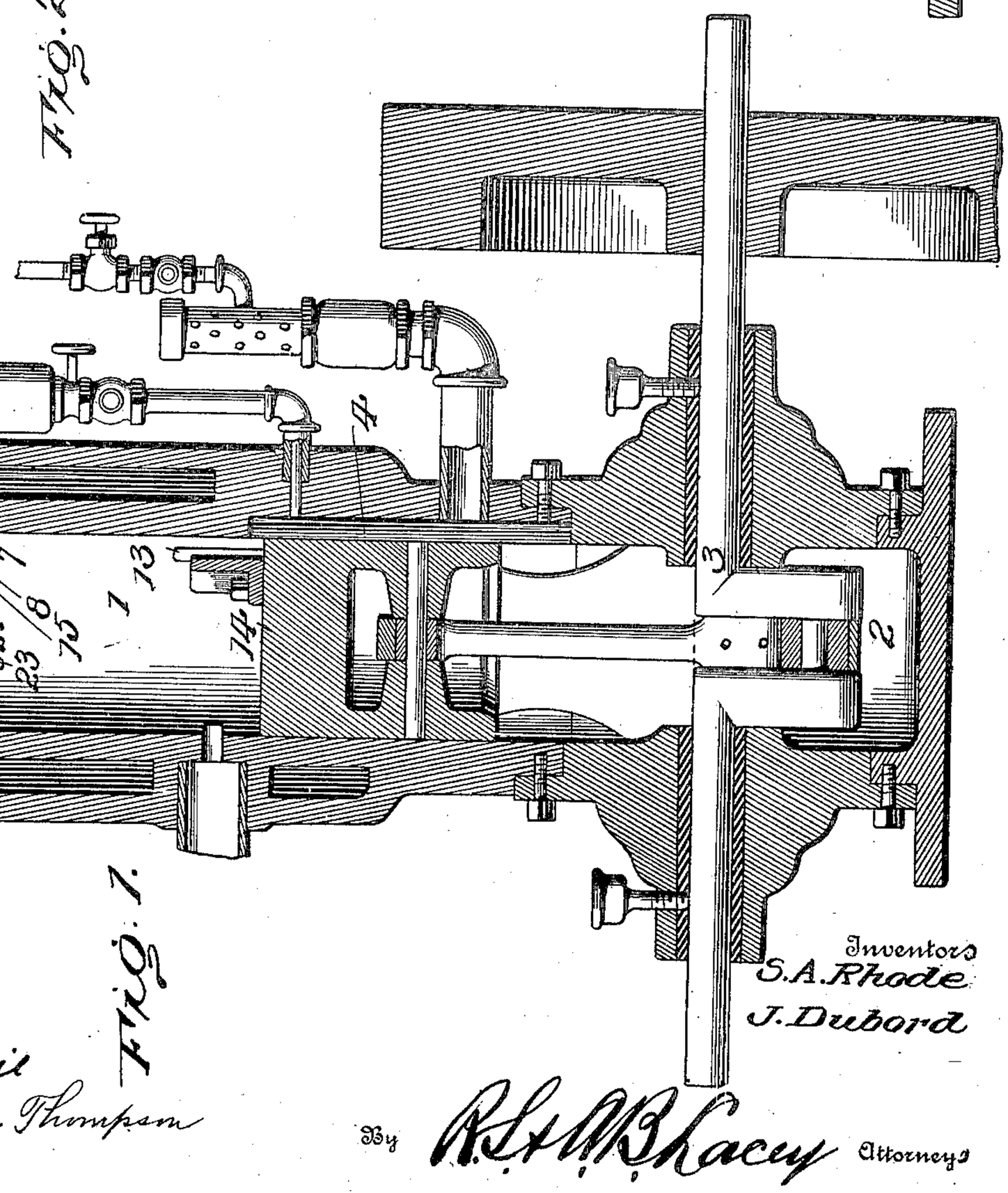

Fig. 1.

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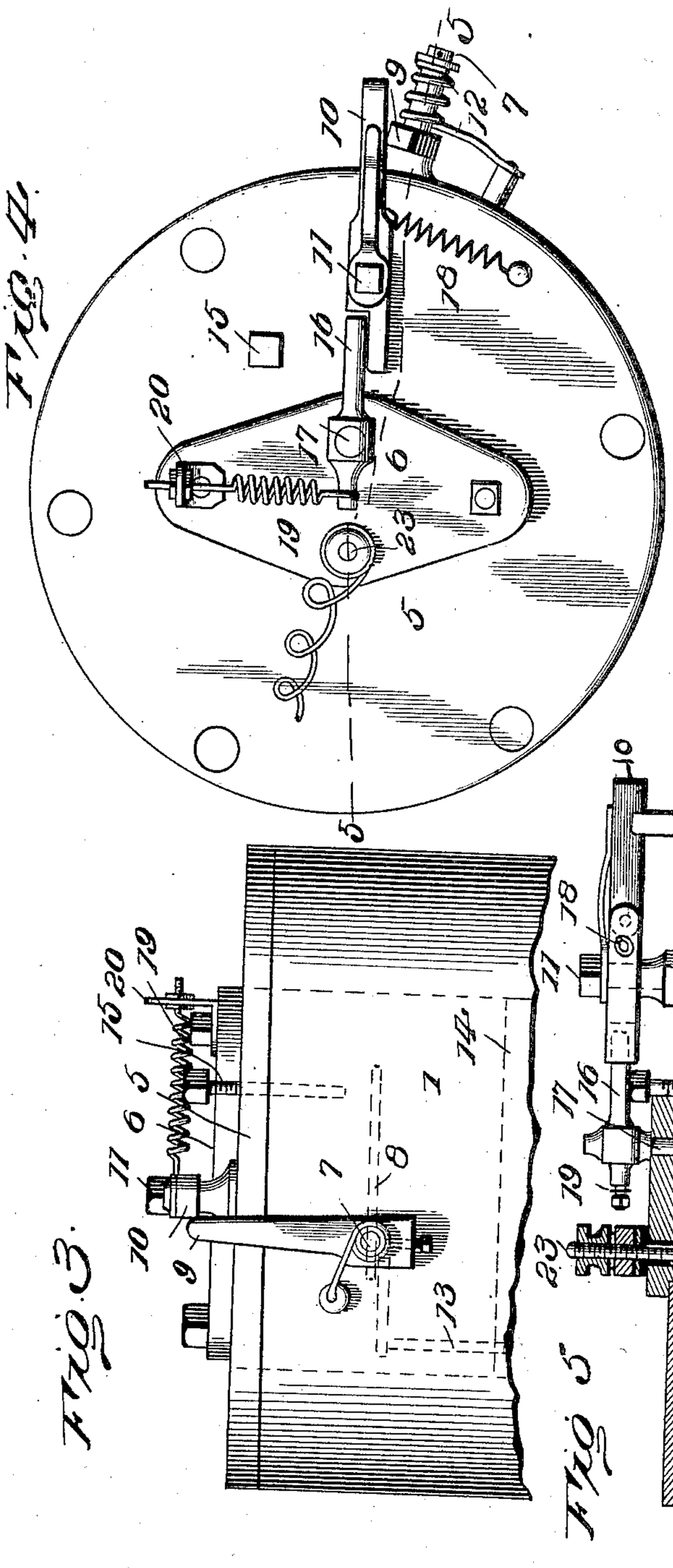

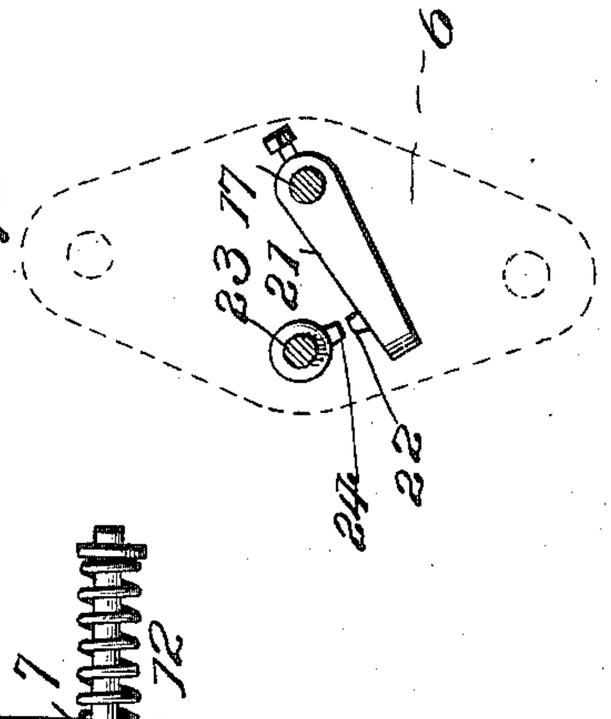

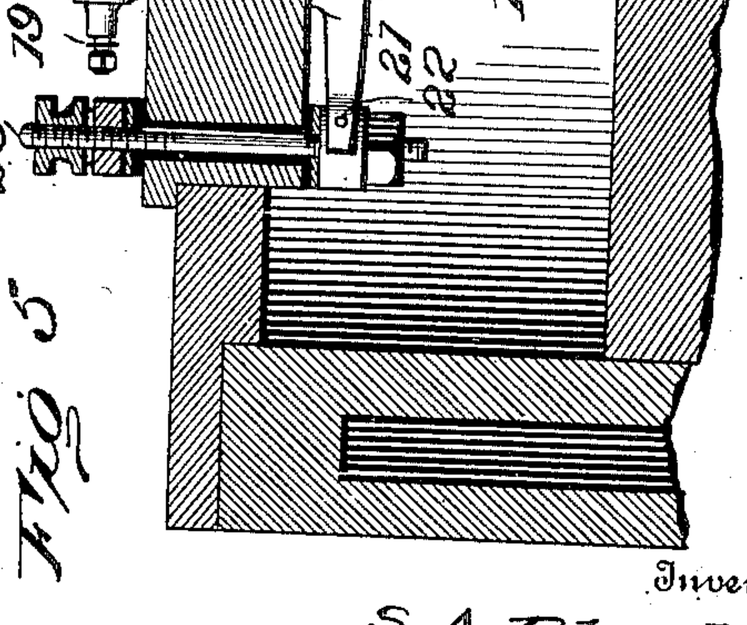

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UNITED STATES PATENT OFFICE.

SCHILLER A. RHODE AND JACOB DUBORD, OF MANITOWOC, WISCONSIN.

SPARKING-IGNITER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 679,243, dated July 23, 1901.

Application filed August 9, 1900. Serial No. 26,431. (No model.)

To all whom it may concern:

Be it known that we, SCHILLER A. RHODE and JACOB DUBORD, citizens of the United States, residing at Manitowoc, in the county of Manitowoc and State of Wisconsin, have invented certain new and useful Improvements in Electric Igniters for Explosive-Engines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain novel features in engines of the explosive type whereby their efficiency is greatly enhanced and the explosion of the gaseous mixture rendered more certain and at the completion of each forward stroke of the piston.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the appended description and drawings hereto attached.

While the essential and characteristic features of the invention are necessarily susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical cross-section of an explosive-engine embodying the invention. Fig. 2 is a view similar to Fig. 1, taken on a line at a right angle thereto. Fig. 3 is a side elevation of the igniting mechanism. Fig. 4 is a top plan view of the same. Fig. 5 is a section on the line 5 5 of Fig. 4. Fig. 6 is a detail top plan view of the electric contacts and their mountings.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The engine may be of any make and, as illustrated, is of the upright type, the cylinder 1 being in line with the pit 2, formed in the base or stand and in which the crank of the shaft 3 operates. A passage 4 is cored or otherwise formed in the inner side of the cylinder and establishes communication between the said cylinder and the crank-pit 2. By providing the passage 4 in this manner a direct communication is had between the cylinder and crank-pit, which has been found to be of material advantage. The head 5 of the cylinder is formed centrally with an opening, in which is secured a plug or cap 6, to which the elements of the electric igniter are fixed in the manner presently to be described. A rock-shaft 7 is journaled in a side of the cylinder near its upper end and projects beyond the inner and outer walls thereof. A bar 8, constituting a rocker, is secured to the inner end of the rock-shaft 7 and projects therefrom in diametrically opposite directions. An arm 9 is secured to the outer end of the rock-shaft 7 and normally extends in the path of a lever 10, fulcrumed upon a pin or stud 11, applied to the head 5. A spring 12, of the coil type, is mounted upon the outer end of the rock-shaft 7 and has one end secured thereto and its opposite end attached to the cylinder, and the purpose of this spring is to hold the arm 9 and shaft 7 in a predetermined position and to return said parts to a normal position after being actuated and released from the operating means. A pin 13 has adjustable connection with the piston 14 and is positioned so as to engage with one end of the rocker-bar 8 and actuate the rock-shaft when the piston reaches the limit of its inner or forward stroke. A pin 15 has adjustable connection with the head 5 and is positioned so as to engage with the opposite end of the rocker-bar 8 and hold it and the arm 9 in a given position against the tension of the spring 12. The pin 15 subserves the purpose of a stop, and the amplitude of movement of the rocker-bar 8 can be varied by adjusting the parts 13 and 15, as will be readily comprehended. The lever 10 is disposed about at a right angle to the arm 9 and its outer end projects across the path of the free end of the said arm, so as to be engaged thereby. The inner end of the lever 10 is cut away and overlaps the adjacent end of a lever 16, secured between its ends to a post 17, journaled in the plug 6. A spring 18 maintains the lever 10 in a normal position. A spring 19 is adjustably interposed between the inner end of the lever 16 and a bracket 20, secured to a flange of the plug 6, and acts to hold the outer end of the lever 16 in engagement with the inner end of the lever 10. The spring 18 exerts a greater force than the spring 19, which latter is normally held re-

strained thereby and comes into play only when the lever 10 is operated to disengage its inner end from the lever 16. An arm 21 is attached to the inner end of the post 17 and carries an electric contact 22, which constitutes one terminal of an electric circuit by means of which the spark is produced under certain conditions to effect an explosion of the gaseous mixture in the active operation of the engine. A post 23 is attached to the plug 6, is electrically insulated therefrom, and is connected with the opposite pole of the battery or generator from which the circuit derives its energy. An electric contact 24 is applied to the inner end of the post 23 and constitutes the other terminal of the aforesaid circuit. The electric contacts 22 and 24 normally stand apart, thereby interrupting the circuit, and when said contacts are brought together the circuit is completed and the spark produced. When the parts comprising the electric igniting mechanism are properly assembled, the terminals 22 and 24 of the circuit are separated, and the opposing ends of the levers 10 and 16 are in engagement and the spring 18 overcomes the force of the spring 19 to hold the said contacts 22 and 24 spaced apart. When the piston is actuated by rotating the shaft 3, the pin 13 will be brought in contact with the rocker-bar 8 and effect a movement thereof, which is transmitted to the arm 9 by means of the rock-shaft 7, and said arm coming in contact with the outer end of the lever 10 moves it against the tension of the spring 18, so as to release the lever 16, which in turn being actuated by the spring 19 causes the contacts 22 and 24 to come together and complete the circuit. As soon as the rocker-bar 8 is released the arm 9 is returned to a normal position by the spring 12, and the lever 10 being released is returned to an initial position by the spring 18, and the lever 16 is engaged by the inner end of the lever 10 to place the spring 19 under restraint and effect a separation of the contacts 22 and 24, whereby the circuit previously closed is again broken and the spark produced to effect an explosion of the gaseous mixture. The construction results in a saving of electric energy, since the circuit is normally open and is closed only at such times as the explosions occur. By having the electric elements attached to the plug 6 they are readily accessible without requiring the removal of the head of the cylinder to effect repairs or cleaning.

Having thus described the invention, what is claimed as new is—

1. In an explosive-engine, electric contacts, one fixed and the other movable, a post journaled in the cylinder and carrying the movable electric contact, a rock-shaft journaled in a side of the cylinder, a rocker-bar attached to the inner end of the rock-shaft, a pin adjustably connected with the piston and adapted to strike the rocker-bar, a stop having adjustable connection with the cylinder and serving to hold the rock-shaft in a given position, and exterior connections between the outer end of the said rock-shaft and the movable electric contact, substantially as set forth.

2. In an explosive-engine, normally separated electric contacts, a spring-actuated lever connected with one of the said contacts and normally tending to close the circuit, a spring-actuated restraining-lever normally overcoming the force of the first-mentioned spring-actuated lever, a rock-shaft, means for actuating the rock-shaft from the piston, and an arm attached to the rock-shaft and adapted to be brought into engagement with the restraining-lever and release the contacts under the influence thereof to permit the completion of the circuit, substantially as specified.

3. In an explosive-engine, a fixed contact, a rotatably-mounted post provided at its inner end with a contact normally held separated from the fixed contact, a lever attached to the outer end of said post, a spring connected to said lever to effect a closing of the circuit, a restraining-lever having an end portion extended in the path of the first-mentioned lever, a spring exerting a force upon the restraining-lever to overcome the action of the spring applied to the first-mentioned lever, whereby the contacts are held separated, a rock-shaft, a rocker-bar at the inner end of the rock-shaft and adapted to be actuated by the piston, and an arm secured to the outer end of the rock-shaft and adapted to come in contact with the restraining-lever and release the first-mentioned lever from its influence, substantially as specified.

In testimony whereof we affix our signatures in presence of two witnesses.

SCHILLER A. RHODE. [L. S.]
JACOB DUBORD. [L. S.]

Witnesses:
HUGO J. BOEEHR,
ARTHUR BEDFORD.