No. 822,782.

PATENTED JUNE 5, 1906.

J. M. SMITH.

CURRENT DISTRIBUTER FOR SPARKING DEVICES.

APPLICATION FILED MAY 23 1904.

2 SHEETS—SHEET 1.

Fig. 1.

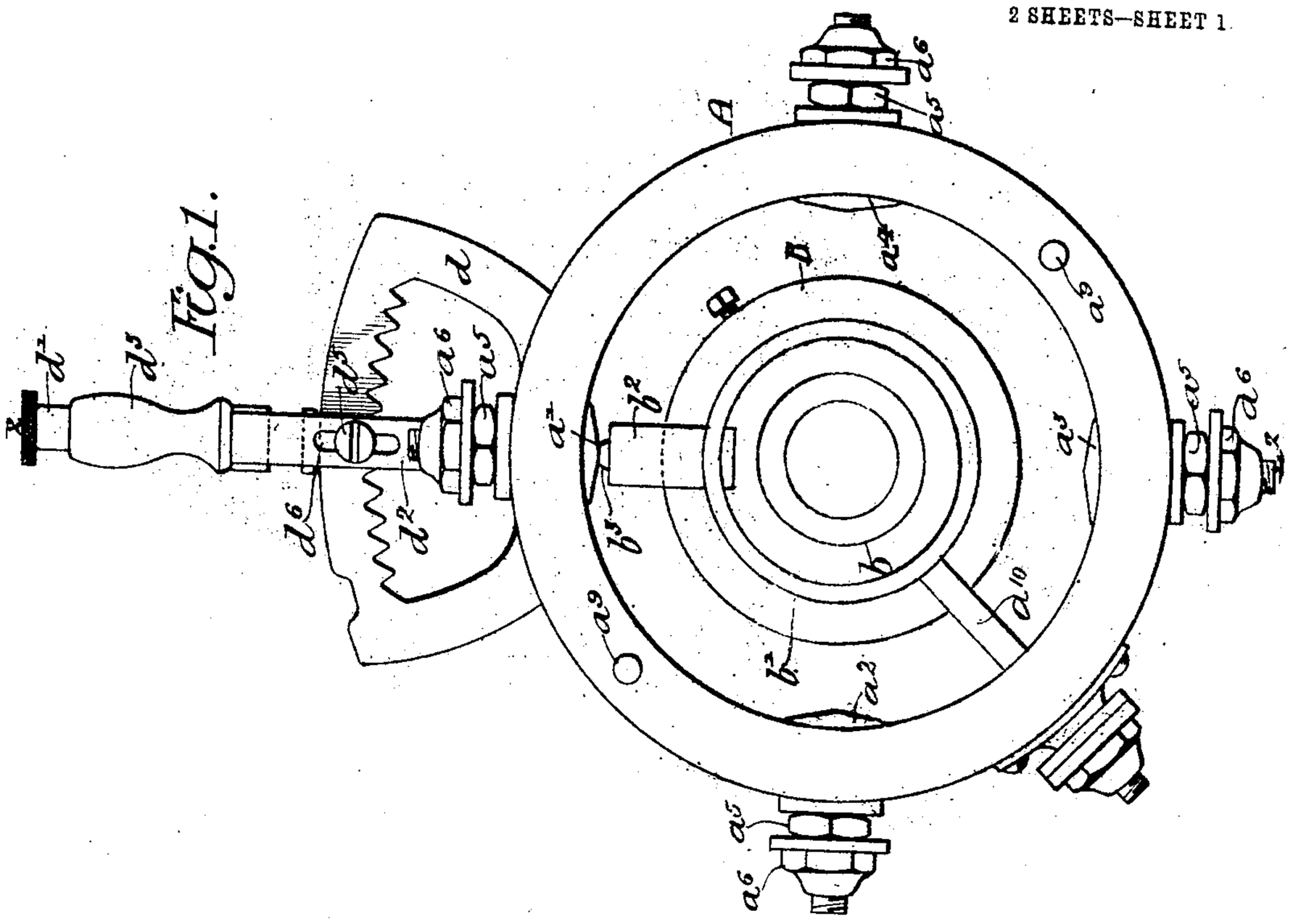
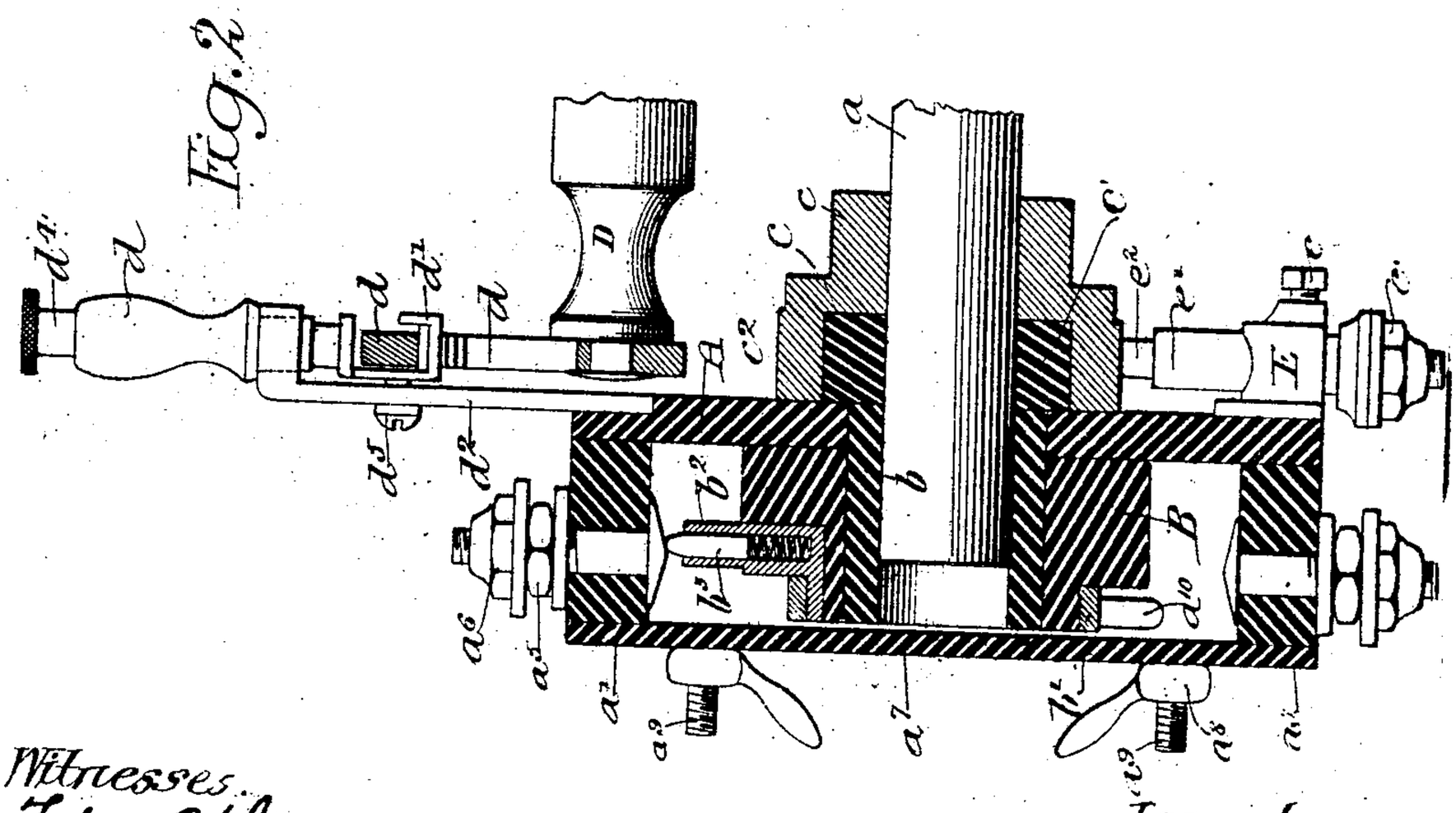



Fig. 2.




Witnesses.
Titus H. Sprous.
Louis F. Buck.

Inventor:
James M. Smith,
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Fig. 4.

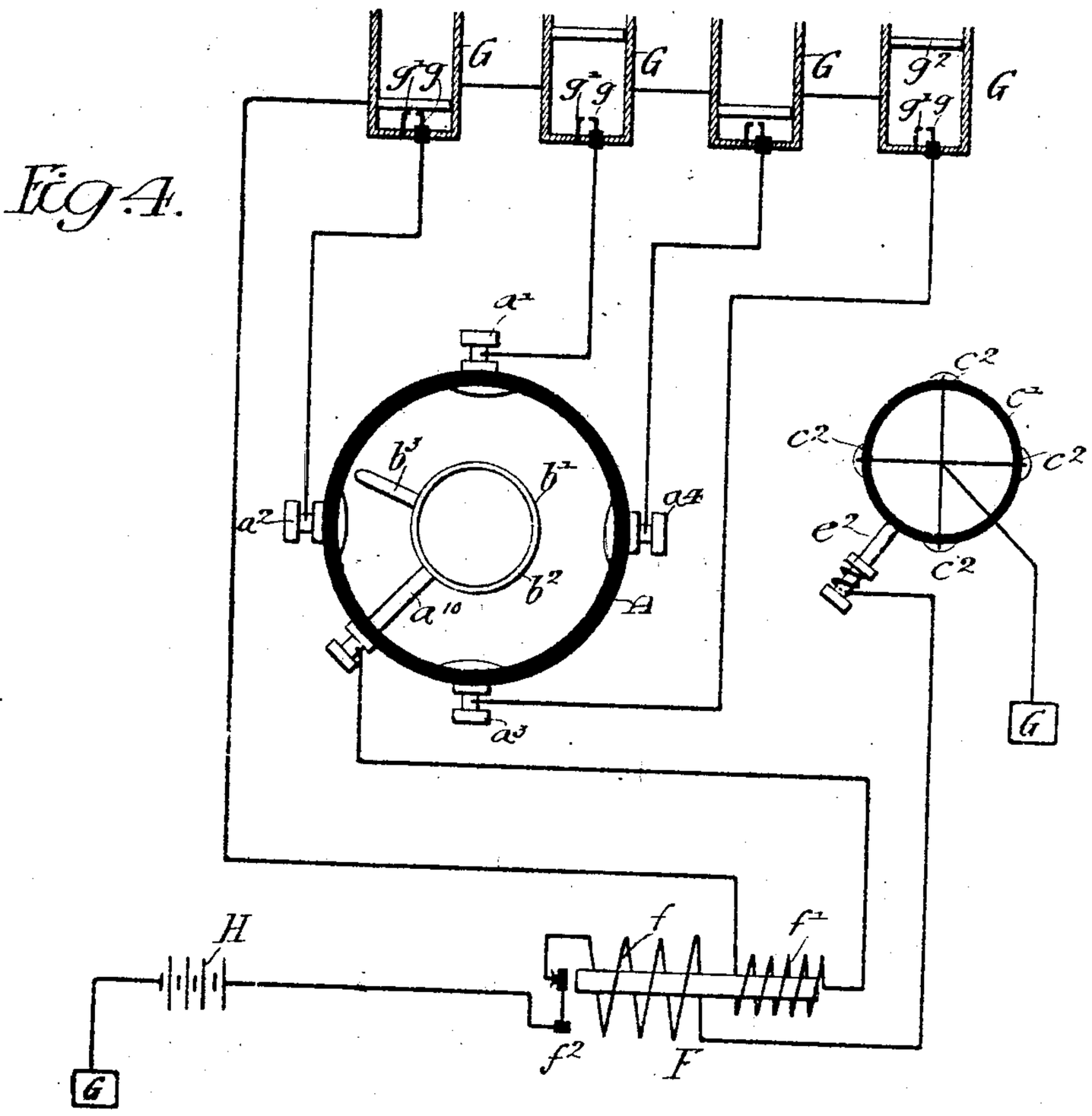
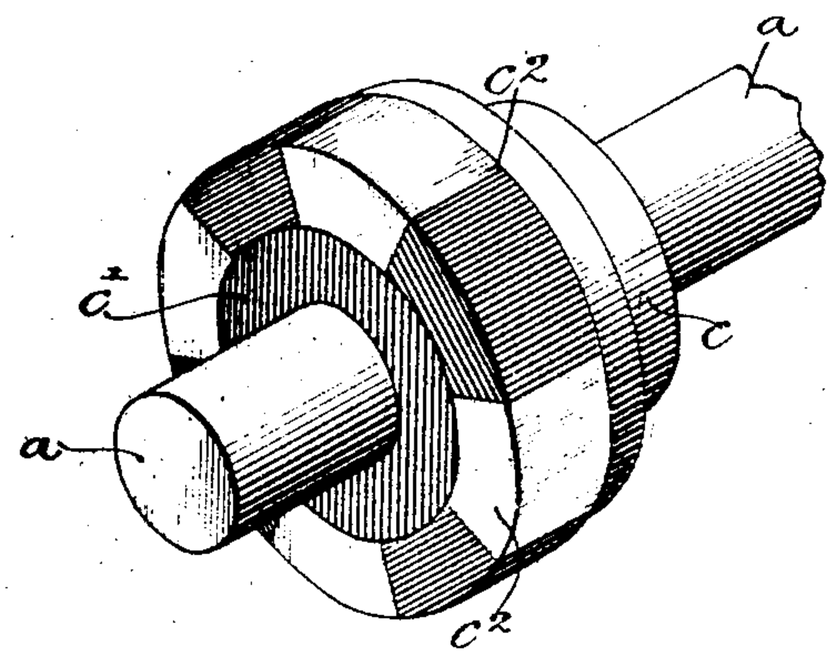



Fig. 5.




Witnesses:
Titus H. Irons.
Louis H. Buck.

Inventor:
James M. Smith
by his Attorneys,
Hinson & Hinson

# UNITED STATES PATENT OFFICE.

JAMES M. SMITH, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF TWO-THIRDS TO CLARENCE L. ALTEMUS AND HERBERT B. BOWLES, OF PHILADELPHIA, PENNSYLVANIA.

## CURRENT-DISTRIBUTER FOR SPARKING DEVICES.

No. 822,782. Specification of Letters Patent. Patented June 5, 1906.

Application filed May 23, 1904. Serial No. 209,330.

*To all whom it may concern:*

Be it known that I, JAMES M. SMITH, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Current-Distributers for Sparking Devices, of which the following is a specification.

One object of my invention is to reduce the amount of apparatus and the number of electrical connections required for the sparking mechanism of a multicylinder internal-combustion engine, and to this end I provide a relatively simple and reliable device for use in connection with a single induction-coil by which it is possible to produce charge-igniting sparks in any desired number of engine-cylinders.

It is further the object of my invention to provide a switch of novel construction which shall be capable of successively connecting the sparking terminals or devices of a number of engine-cylinders with the secondary winding of an induction-coil, which switch shall also cause the primary winding of said coil to be energized during some part of the time in which its secondary circuit is so completed. I also desire to provide means for use in connection with a switch having the characteristics above noted by which it shall be possible to vary the times of the formation of the sparks in the various cylinders.

These objects I attain as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of my improved current-distributer. Fig. 2 is a sectional elevation on the line 2 2, Fig. 1. Fig. 3 is a perspective view of that portion of the current-distributer employed to control the flow of current in the primary circuit of the induction-coil, and Fig. 4 is a diagrammatic view illustrating the various electrical connections of my current-distributer and the parts with which it is connected.

In order to do away with much of the complex apparatus heretofore considered necessary in devices of the class to which my invention belongs as well as to reduce the number of parts requiring attention, I have provided a current-distributer or switch having one portion connected in circuit with the secondary winding of a single induction-coil and designed to successively connect the sparking terminals of the various cylinders in circuit with said secondary winding. A second portion of the current-distributer or switch is in circuit with the primary winding of the same coil and is designed to periodically close the circuit of said winding, so as to energize the secondary winding of the coil during the times in which this latter is in circuit with the various sparking terminals of the cylinders.

In the above drawings, A represents an inclosing casing, of fiber or other suitable insulating material, supported in any desired manner so as to be free to rotate to a limited extent and having a movable cover-plate $a^7$, held in position by handled nuts $a^8$, which engage screws $a^9$, projecting from the side of said casing. A shaft $a$, forming part of or driven from the main shaft of an engine with which the device is to be used, enters said casing and carries at its ends a metallic bushing $b$, upon which is a fiber bushing B, having fixed to it a metallic ring $b'$.

Projecting radially and in contact with said metallic ring is a tubular piece of metal $b^2$, having within it a contact-brush $b^3$, yieldingly supported upon a spring $b^4$ and designed to periodically engage the heads of a series of bolts $a'$, $a^2$, $a^3$, and $a^4$, set in the periphery of the casing and threaded at their outer ends for the reception of nuts $a^5$ and $a^6$, whereby they are held in position and electrically connected to wires leading to the various engine-cylinders. There is in addition a contact-brush $a^{10}$ projecting into the casing and permanently engaging the contact-ring $b'$, the outer end of this brush being threaded for the reception of a nut for the attachment of a wire leading from one end of the secondary winding of the induction-coil. Also fixed to the shaft $a$ is a ring or collar $c$, which confines between itself and the side of the casing a ring $c'$, of insulating material, in which are set ninety degrees apart four metallic segments $c^2$, in electrical connection with said collar $c$, and consequently with the shaft $a$.

Carried by lug E, projecting from the side of the casing A, is a brush-holder $e'$, clamped to said lug by a set-screw $e$. A spring-pressed brush $e^2$ is supported by said holder in engagement with the ring $c'$, there being on the outer end of the holder a threaded por-

tion, on which is a nut $e^3$ for the connection of a wire from one end of the primary winding $f$ of the induction-coil F. The second end of this winding is in connection with one terminal of any desired form of current-interrupter, such as that indicated at $f^2$, whose second terminal is connected to a battery grounded on the metallic frame of the engine.

Carried upon a stud D, supported in any desired manner, is a toothed segment $d$, and there is a movable tooth or pawl $d'$, carried by an arm $d^2$, fixed to and projecting from the casing A, which tooth is placed to engage the teeth of said segment. The upper end of the arm $d^2$ carries a handle $d^3$, through which extends a headed spindle $d^4$, to whose inner end is attached the tooth $d'$, there being in the present instance a screw $d^5$ projecting from said tooth $d'$ and guided in a slot $d^6$ on the arm $d^2$.

Referring to Fig. 4, it will be seen that one end of the secondary winding $f'$ of the induction-coil F is connected to the contact-brush $a^{10}$ in engagement with the ring $b'$, while the second end of said winding is grounded on the frame of the machine. Each of the terminal bolts $a'$, $a^2$, $a^3$, and $a^4$ is respectively connected to one of the sets of sparking contacts of an engine-cylinder, of which in the present instance there are four, while the second sparking contact of each cylinder is grounded or in direct connection with the metal of said cylinder.

Under operative conditions the shaft $a$ is rotated, and with it the ring $c'$, as well as the ring $b'$ and the contact-brush $b^3$. Said brush is so placed that it will engage the head of the bolt $a^2$, for example, just before it is desired that a spark shall be formed in the cylinder to whose sparking terminal said bolt is connected, while the ring $c'$ is so placed upon the shaft $a$ that one of its metallic segments $c^2$ will engage with the brush $e^2$ during the time said brush $b^3$ so engages said bolt-head. It will therefore be seen that the circuit of the primary winding of the induction-coil is completed after the completion of the circuit of the secondary winding of said coil, so that a spark is caused to pass between the terminals in the desired cylinder at any predetermined time. If it be desired to have said sparking occur relatively earlier or later in the stroke of the engine, movement of the casing A by means of the handle $d^3$ will accomplish this end, the sparks in all of the cylinders being formed earlier or later.

It will be seen that by the above combination of apparatus I am enabled to operate in the case illustrated four cylinders with but a single sparking coil, and it will be readily understood by those skilled in the art that the number of cylinders so operated may be conveniently increased without in any way departing from the principles of my invention, the one requisite being that the number of bolts $a'$ $a^2$, &c., shall be changed so that there shall be one for each cylinder, while the number of segments $c^2$ shall also be correspondingly changed.

I claim as my invention—

1. A current-distributer for a sparking system including a relatively fixed and closed casing, terminals thereon having contacts extending within the casing, a shaft entering the casing substantially concentric with said contacts, a ring carried by but insulated from the shaft having a brush placed to engage the contacts when the shaft is rotated, a second brush carried within the casing so as to be maintained in engagement with the ring, a series of contacts carried by the shaft outside of the casing, and a third brush engaging said contacts, substantially as described.

2. The combination of a rotatable shaft, a brush, and a series of electrically-connected contacts carried by said shaft, a relatively fixed brush placed to engage said contacts and a second series of contacts placed to be engaged by said rotatably-supported brush, with means for varying the positions of the second series of contacts and the fixed brush relatively to the rotatably-supported parts of the device, said means including a casing inclosing the second series of contacts, an arm attached thereto, a notched quadrant, and a longitudinally-movable piece carried by said arm having a portion constructed to engage said quadrant, substantially as described.

3. The combination of a shaft carrying a piece of insulating material, a ring on said piece, a contact-brush connected to said ring, an inclosing structure having a series of terminals placed to be engaged by said brush as the shaft revolves, a second contact-brush carried within said inclosing structure in engagement with said ring on the insulating material, with a contact on the shaft outside the inclosing structure, and a brush placed on said structure to engage said contact, substantially as described.

4. The combination of a shaft having on it a piece of insulating material, a ring of metal on said piece, a tubular guide and a spring-pressed plunger therein forming a brush, also carried on said insulating-piece and in electrical connection with said ring, an inclosed structure having a terminal or series of terminals placed to be engaged by said plunger and a contact-brush carried by and projecting into the inclosed structure, said brush contacting with said ring, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES M. SMITH

Witnesses:
WILLIAM E. BRADLEY,
JOS. H. KLEIN.