

No. 672,411.

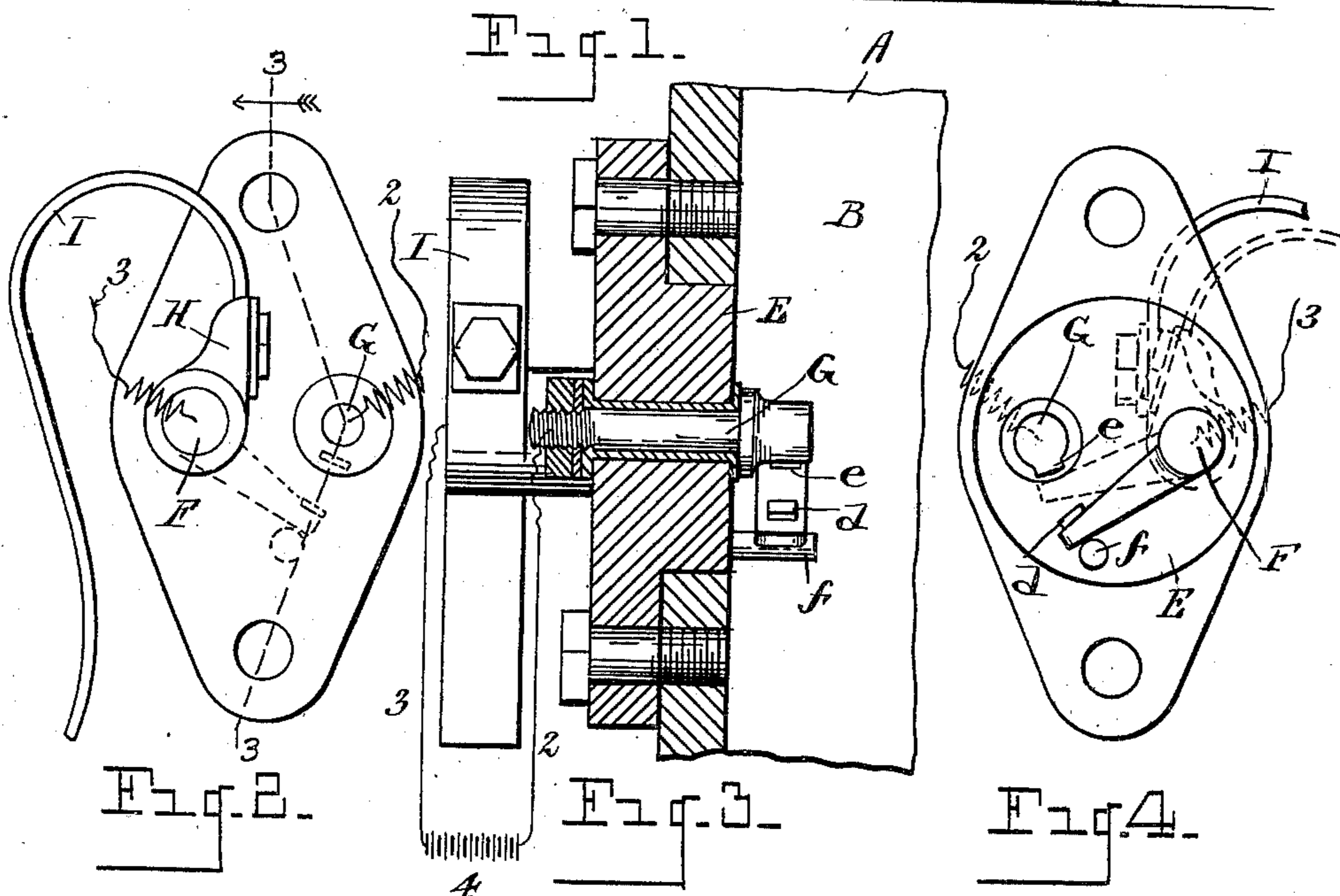
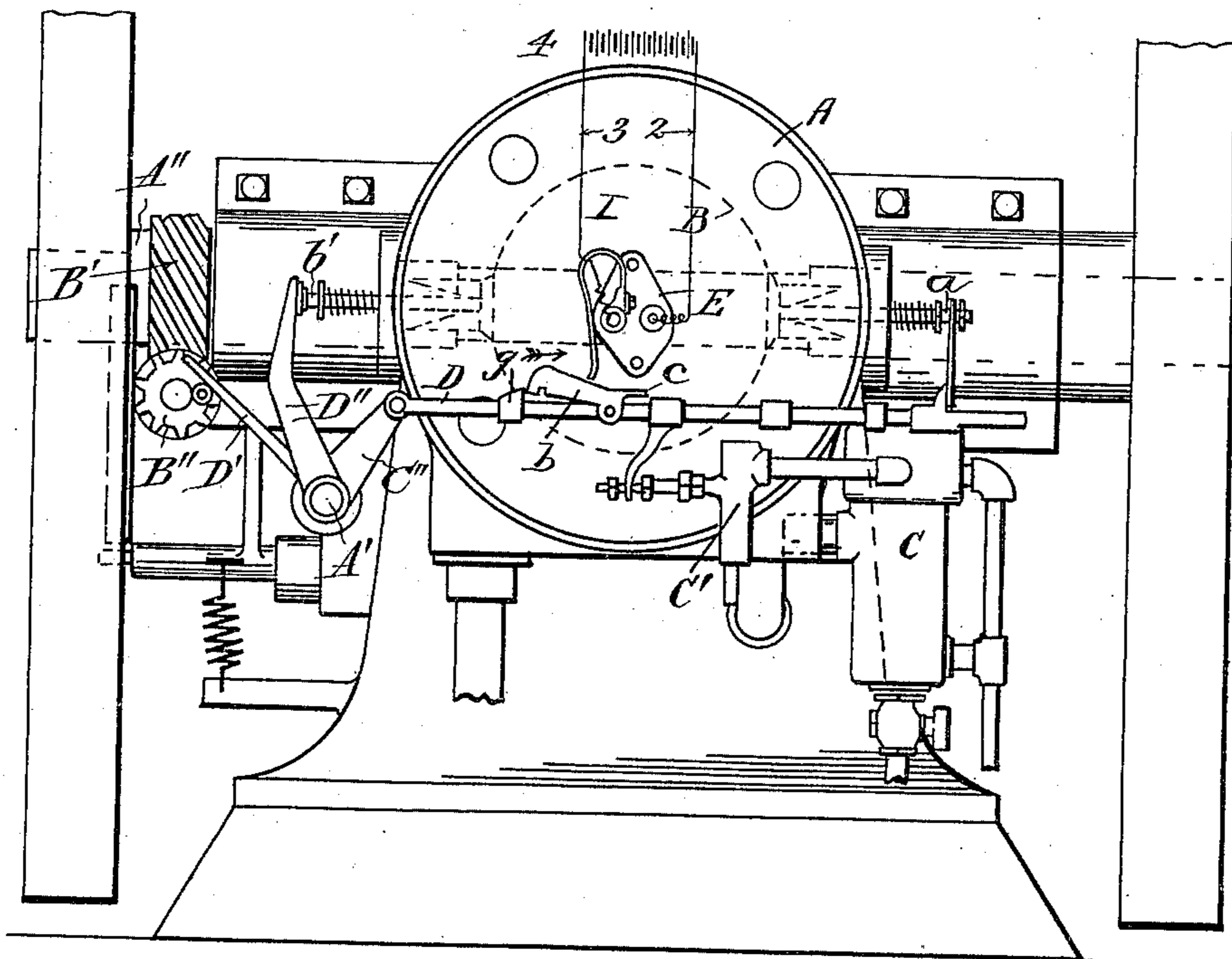
Patented Apr. 16, 1901.

M. F. BATES.

ELECTRICAL IGNITER FOR EXPLOSIVE ENGINES.

(Application filed Dec. 1, 1899.)

(No Model.)



WITNESSES.

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MADISON F. BATES, OF LANSING, MICHIGAN.

ELECTRICAL IGNITER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 672,411, dated April 16, 1901.

Application filed December 1, 1899. Serial No. 738,794. (No model.)

To all whom it may concern:

Be it known that I, MADISON F. BATES, a citizen of the United States, residing at Lansing, in the county of Ingham, State of Michigan, have invented certain new and useful Improvements in Igniters for Explosive-Engines; and I do 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, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

15 This invention relates to electrical igniters for explosive-engines; and it consists in the construction and arrangement of parts hereinafter fully set forth, and pointed out particularly in the claims.

20 The object of the invention is to provide simple and efficient means for producing a strong spark in the combustion-chamber of a gas or other explosive engine, wherein the arrangement is such as to insure perfect contact between the electrodes and a sudden and positive separation of said electrodes to produce the spark desired. This object is attained by the mechanism illustrated in the accompanying drawings, in which—

30 Figure 1 is an end elevation of an engine embodying my improved igniter. Fig. 2 is an elevation of the plate mounted upon the cylinder-head and carrying the spark-producing mechanism. Fig. 3 is a section as on line 3 3 of Fig. 2. Fig. 4 is an elevation of the reverse side of the plate shown in Fig. 2.

Referring to the letters of reference, A designates a cylinder, of any suitable construction, having at one end a combustion-chamber B.

40 In Fig. 1 are shown the operative parts of the gas-engine, including a carbureter C, a fuel-oil pump C', a rock-shaft A', connected with the main shaft A'' of the engine through the worm-gear B' thereon, the pinion B'', and a lever D' on the rock-shaft engaging a pin on said pinion, whereby movement is imparted to said rock-shaft for actuating the engine-valves, the exhaust-valve b' being operated through an arm D'' on said rock-shaft, all of which is immaterial in this case. Crossing the end of the cylinder is a reciprocatory

rod D, connected with the inlet-valve stem a and carrying thereon a pivoted dog b, having a projecting end c, said rod being connected 55 to the rock-shaft by a crank C'', whereby said rod is made to reciprocate.

Mounted in the end of the cylinder is a plate E, which supports the igniting mechanism. The body of said plate extends through 60 an opening in the head of said cylinder and its flanges are bolted thereto, as clearly shown in Fig. 3. Passing through said plate E is a rock-arm F, having upon the inner end thereof an electrode d, which is suitably included 65 with said rock-arm in an electric circuit comprising the conductors 2 and 3 and the battery 4. G designates an insulated rod, also passing through said plate E and carrying upon its inner end an electrode e, located in 70 the path of the electrode d of the rock-arm F, said electrode e being also included in said electric circuit.

Mounted upon the outer end of the rock-arm F is a coupling H, (see Fig. 2,) to which 75 is securely attached one end of a flat curved spring I, whose lower end extends downwardly into the path of the dog b, pivoted to the rod D.

The operation of the several parts is so 80 timed that at the time the piston compresses a charge in the combustion-chamber the reciprocatory rod D, actuated by the means connected with the shaft of the engine, will carry the projecting end c of the dog b against 85 the free end of the spring I and swing the rock-arm F, so as to bring the electrodes d and e together within the combustion-chamber. A further movement of said rod in the same direction will place a tension upon said 90 spring through the engagement of said dog therewith and force the electrodes directly together, so as to insure a contact. The tension placed upon said spring also serves when the movement of said rod carries said dog 95 beyond the end thereof to cause said spring to recoil with force, thereby swinging the rock-arm F upon its journal and quickly separating the electrodes, thereby producing a strong spark within the combustion-chamber, which ignites the charge compressed 100 therein and gives an impulse to the engine. The electrodes after this operation remain separated until the engine requires another

impulse, when, through the operation of the connected parts, the dog upon the reciprocatory rod D again engages the spring I and produces another spark between the electrodes in the combustion-chamber, as before described. After passing the spring the rear or heavy end of said pivoted dog drops down, so that the projecting end *c* thereof is again raised into the path of said spring for a succeeding operation.

Located in the body of the plate E is a pin *f*, which arrests the rock-arm F upon the recoil of the spring I and holds said parts in proper relation.

The novelty in this igniter resides largely in the means for bringing the electrodes forcibly together and separating them with a sudden force, whereby a perfect contact between the electrodes is insured and a strong spark made certain by their sudden separation due to the recoil of the spring I.

When it is desired to lower the end *c* of the dog, so as to hold it out of the path of the spring H, a sliding collar *g* is provided on the rod D, which when forced under the rear end of said dog will depress the forward end thereof out of alinement with the depending end of said spring.

Having thus fully set forth this invention, what is claimed is—

1. In a vapor or gas engine, the combination of a horizontally-reciprocatory rod, a combustion-chamber, a rock-arm extending into said chamber carrying an electrode, a second electrode in said chamber in the path

of the electrode on said rock-arm, a curved spring mounted directly upon said rock-arm and having a depending free end, a pivoted dog on said reciprocatory rod adapted to engage the free end of said spring when moving in one direction and to slip past said spring when moving in the opposite direction, whereby, by the movement of said rod the electrodes are brought together through the engagement of the dog with said spring and suddenly separated by the disengagement of said spring from said dog.

2. In a vapor or gas engine, the combination of the combustion-chamber, a rock-arm extending into said chamber carrying an electrode, a second electrode in said chamber in the path of the electrode on said rock-arm, a curved spring rigidly attached at one end directly to said rock-arm, said spring curving outwardly from said arm and downwardly below the center of said arm and having an unattached free end, a reciprocatory rod working transversely of said rock-arm and a dog pivoted on said rod standing in alinement with the free end of said spring, whereby said dog is caused to engage the end of said spring when moving in one direction and to slip past the spring when returning to its former position.

In testimony whereof I sign this specification in the presence of two witnesses.

MADISON F. BATES.

Witnesses:

ROSWELL MOTT,
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