No. 757,064. PATENTED APR. 12, 1904.

H. J. SMITH.

ELECTRIC IGNITER FOR GAS ENGINES.

APPLICATION FILED AUG. 3, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

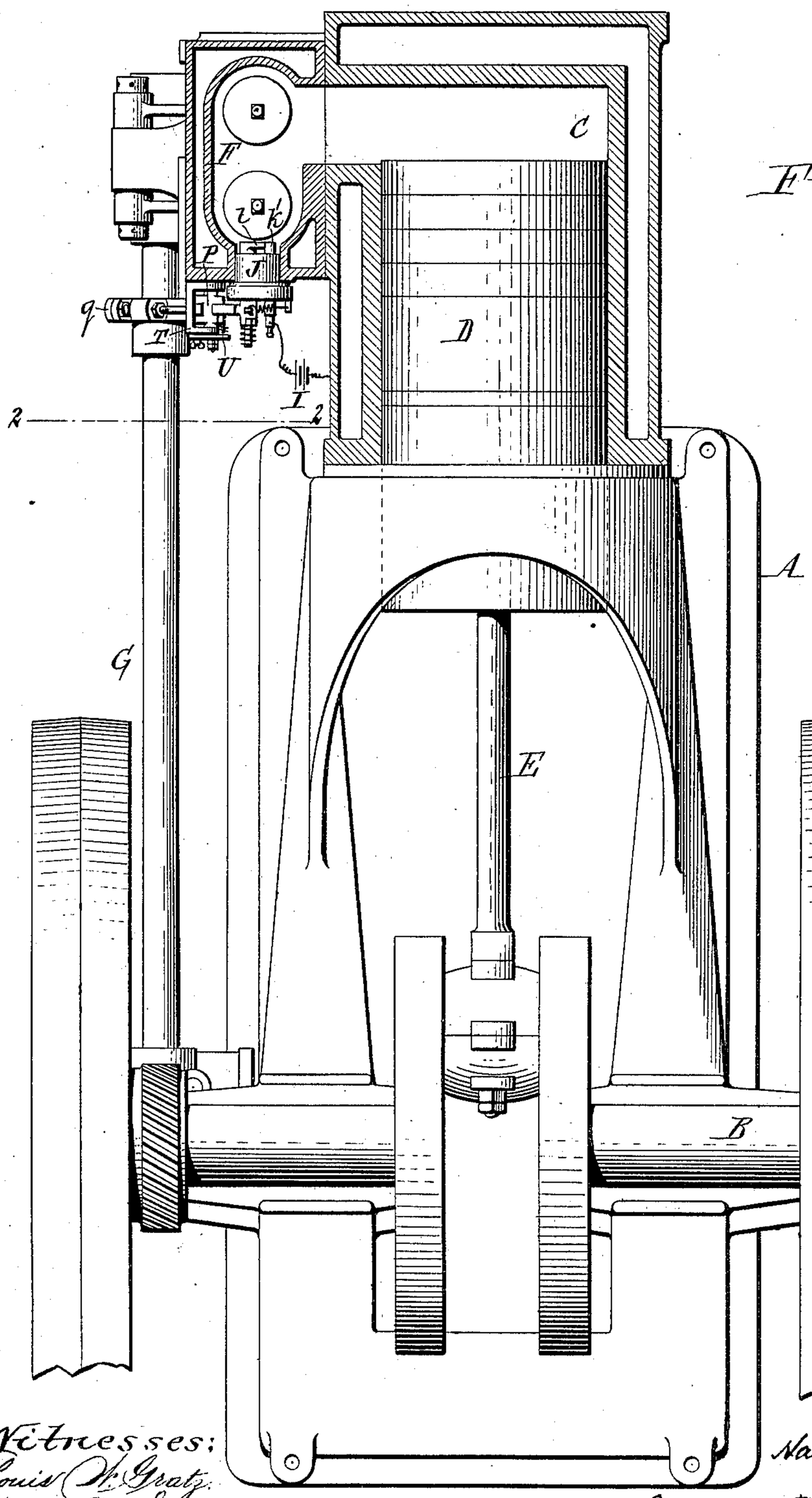

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

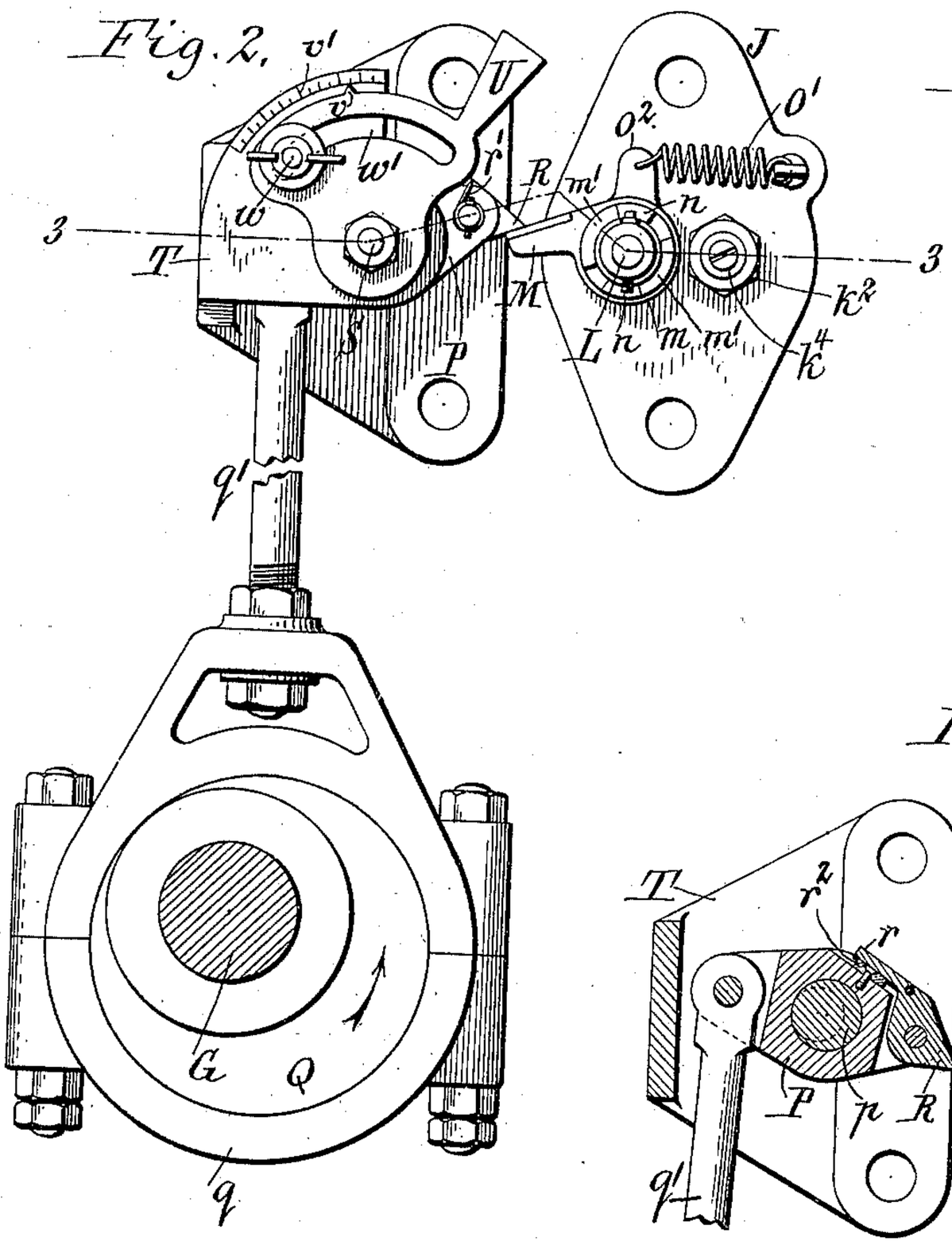


Fig. 5.

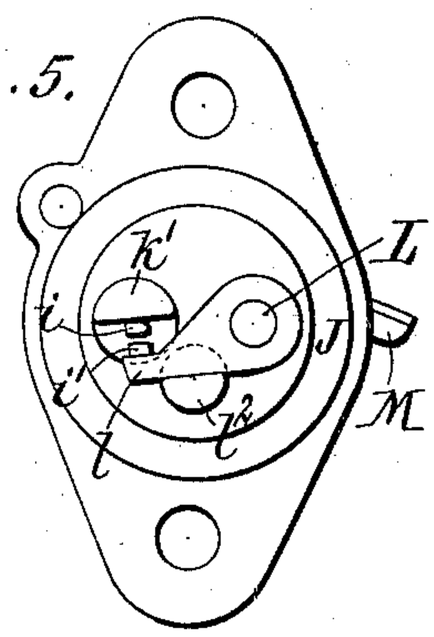


Fig. 4.

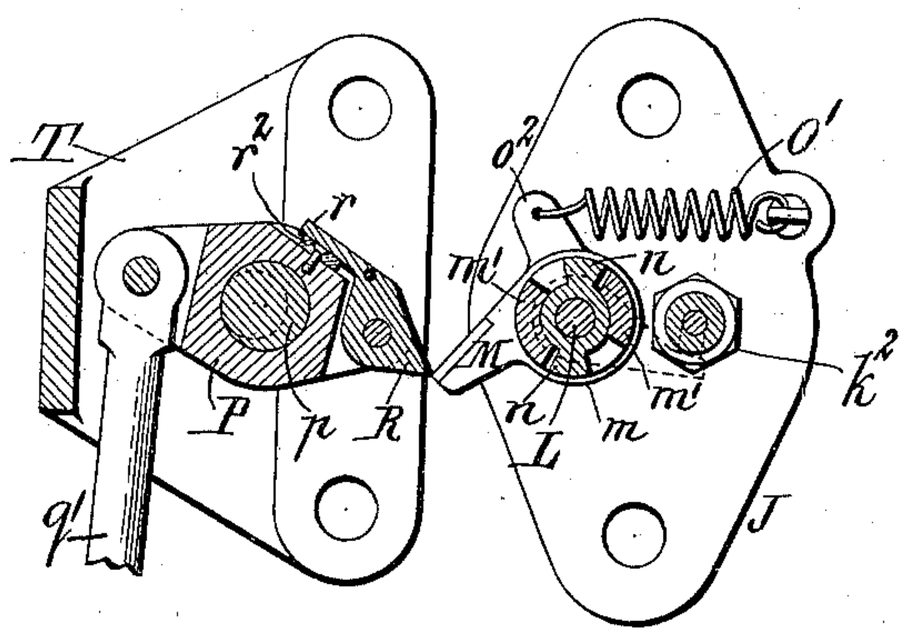


Fig. 3.

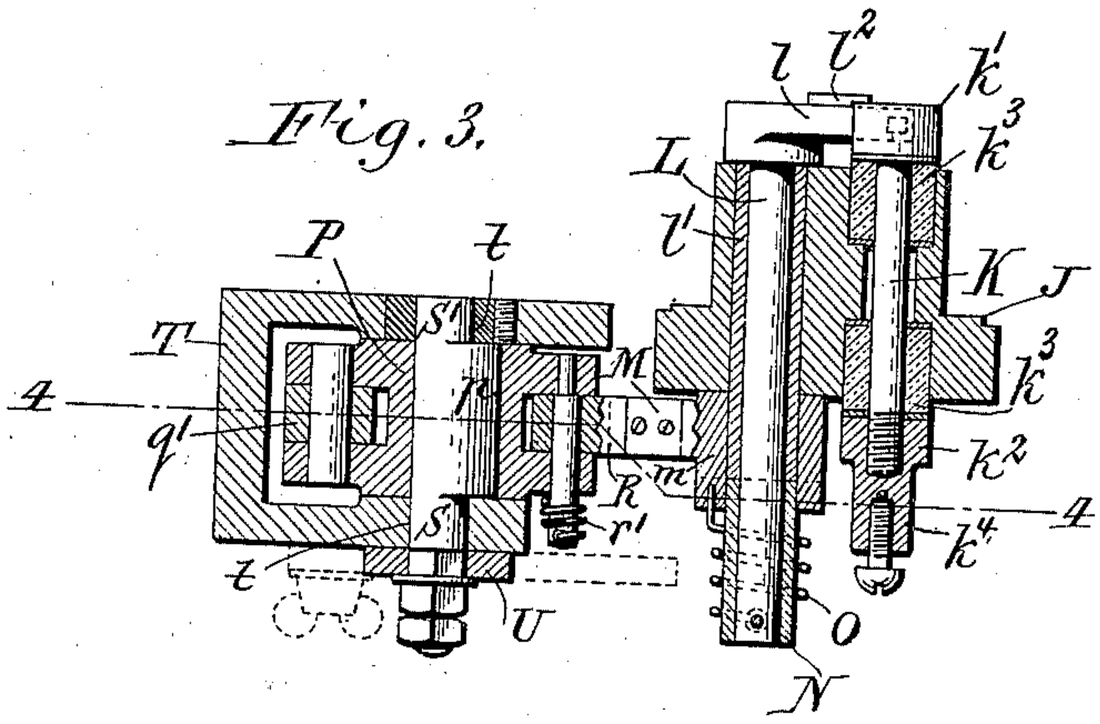
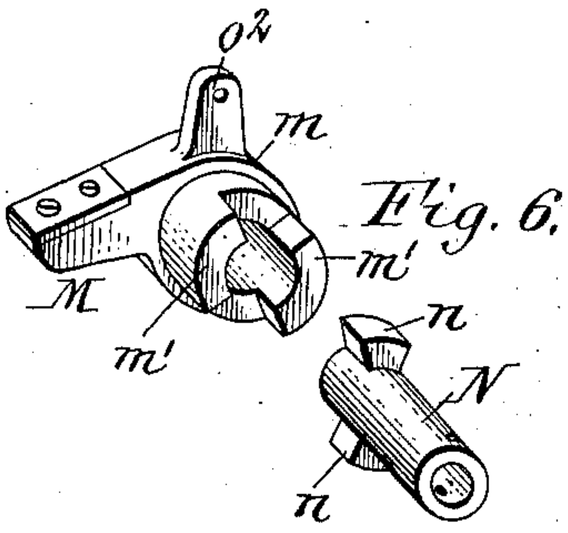


Fig. 6.



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UNITED STATES PATENT OFFICE.

HARRY J. SMITH, OF BUFFALO, NEW YORK, ASSIGNOR TO THE ALBERGER COMPANY, OF BUFFALO, NEW YORK.

ELECTRIC IGNITER FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 757,064, dated April 12, 1904.

Application filed August 3, 1901. Serial No. 70,749. (No model.)

To all whom it may concern:

Be it known that I, HARRY J. SMITH, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Electric Igniters for Gas-Engines, of which the following is a specification.

The object of this invention is the production of an electric igniter for gas and similar engines which is comparatively simple and durable in construction and reliable in operation, which can be readily adjusted while the engine is running for varying the time of producing the spark, and in which the rock-shaft supporting the movable contact is relieved from undue wear.

In the accompanying drawings, consisting of two sheets, Figure 1 is a fragmentary top plan view, partly in section, of a gas-engine provided with my improved igniter. Fig. 2 is a detached cross-section of the igniter, on an enlarged scale, in line 2 2, Fig. 1. Fig. 3 is a horizontal section in line 3 3, Fig. 2. Fig. 4 is a fragmentary vertical section in line 4 4, Fig. 3. Fig. 5 is an inside view of the plug which carries the contacts. Fig. 6 is a perspective view of the latch and coupling forming part of the mechanism whereby the movable contact is operated.

Like letters of reference refer to like parts in the several views.

A represents the frame or base of the engine; B, the main or crank shaft, journaled transversely on the front end of the base; C, the cylinder, mounted on the rear end of the base; D, the piston, arranged in the cylinder; E, the pitman, connecting the piston with the crank of the main shaft, and F the valve-chest, which communicates with the firing end of the cylinder.

G represents an intermediate shaft, whereby the valves and igniter are driven from the main shaft and which is journaled lengthwise on one side of the base and geared at its front end with the main shaft in any suitable manner.

i i', Fig. 5, represent the two contacts which form the terminals of an electric generator or battery I and which may be located in any suitable space which is in communication with the firing end of the cylinder, but, as shown in the drawings, are preferably arranged in the valve-chest. These contacts are mounted on a plug J, which is removably secured in an opening in the front side of the valve-chest to permit of removing the contacts for inspection, cleaning, and repairing. The stationary or fixed contact i is arranged on a bolt K, which extends through an opening in the plug J and which is secured to said plug, but insulated therefrom, by engaging its head and nut k' k^2 with insulating-sleeves k^3 on the inner and outer ends of the plug. The nut k^2 is provided with a suitable binding-post k^4 for receiving the wire leading to one pole of the electric generator I. The other pole of the electric generator is connected with any suitable metallic part of the engine which is in electrical communication with the movable contact i'. The movable contact i' is arranged on a rock-arm l, which is secured to the inner end of a rock-shaft L. This shaft is journaled in a stationary sleeve or bushing l', extending through the contact-plug J, parallel with the fastening-bolt K. The movement of the contact-arm l away from the stationary contact is limited by a stop l^2 on the plug J, as shown in Figs. 3 and 5.

M represents a latch whereby the movable contact is operated and which is journaled, with its hub m, on the outer end of the bushing l'. By mounting the latch on the bushing l' the latch is prevented from wearing or straining the contact-shaft, which otherwise would interfere with the movement of the movable contact relative to the stationary contact. By supporting the latch on a bushing which is separate from the plug the bushing can be made of hardened steel or similar material, while the plug is made of cast-iron, thereby producing a very durable construction at small cost. The hub m is provided on its outer side or face with two diametrically opposite shoulders or lugs m' m', the spaces or recesses between which receive two diametrically opposite shoulders or lugs n n, arranged on the inner end of a coupling-sleeve N. The latter is rigidly secured to the outer

end of the rock-shaft L. The spaces between the lugs m' of the latch-hub are wider circumferentially than the circumferential width of the lugs n, whereby a slack connection is produced between the latch and the contact rock-shaft, which permits these parts to move independently of each other to a limited extent. The latch is yieldingly held in its rearmost or retracted position with reference to the contact-shaft by a spring O, which surrounds the sleeve N and is connected at one end to said sleeve and contact-shaft and at its opposite end to the hub of the latch. This spring normally holds the back side of the lugs m' in engagement with the front side of the lugs n.

o' represents a spring which is secured at its ends to the plug J and to an ear o^2 on the latch and which serves to rotate the latch backwardly, and the latter in turn rotates the rock-shaft backwardly until the rock-arm l strikes the stop l^2, thereby separating the contacts to the fullest extent.

P represents a trip-lever whereby the latch is operated for producing a spark between the contacts. This lever is pivoted on an eccentric or wrist p, which is arranged parallel with the contact rock-shaft, and one of its arms is adapted to be coupled with the latch, while its opposite arm is connected with an actuating mechanism, whereby the lever is rocked. The actuating mechanism for this purpose (shown in the drawings) consists of an eccentric Q, mounted on the intermediate shaft G, and a strap q, surrounding the eccentric and connected by a rod q' with the trip-lever. During the forward movement of the trip-lever the same is coupled with the latch, so that the latter is compelled to move with the trip-lever; but during the return movement of the trip-lever the same is free to move backward independently of the latch. This is preferably effected by a trip-pawl or dog R, which is pivoted on the inner or operative end of the trip-lever and which is free to recede or swing forward with reference to the lever; but its backward movement thereon is limited by a tail or stop r, formed on the back of the dog and engaging with a shoulder formed on the adjacent part of the trip-lever. The dog is normally held in its operative or projecting position, so that its tail engages the trip-lever by a spring r', connected at one end with the dog and at its other end with the pivot of the dog, which is fixed on the trip-lever. A cushion r^2, of felt or similar soft material, is preferably interposed between the tail of the dog and the trip-lever in order to avoid clicking noise when these parts come together.

During the first part of the forward movement of the trip-lever the same moves idly until the dog engages the latch, as shown in Fig. 2. As the trip-lever continues its forward movement its dog turns the latch forward until the parts reach the position shown in Fig. 4. While the latch is effecting the initial portion of its forward movement with the dog the spring o' is strained and the contact-shaft is caused to move in the same direction with the latch, owing to the tension of the spring O, connecting these parts, whereby the movable contact is carried against the stationary contact and the electric circuit is closed. After the contacts have been thus engaged and the forward movement of the movable contact has been arrested the latch continues to move forward independently of the contact-shaft, whereby the lugs m' of the latch are moved, with their rear sides, out of engagement with the front sides of the lugs n on the contact-shaft, as shown in Fig. 4, and the spring o' is further strained, thereby increasing the pressure of the movable contact against the stationary contact and insuring a perfect closing of the electric circuit. This movement of the latch independent of the contact-shaft takes place before the parts reach the position shown in Fig. 4. Upon continuing the forward movement of the trip-lever when the parts reach the position shown in Fig. 4 the dog of the trip-lever clears the latch and completes its forward movement independent of the latch. The instant the latch is released from the dog the recoil of the springs O o' moves the latch quickly backward, causing the lugs m' of the latter to deliver a sharp backward blow against the lugs n of the contact-shaft, whereby the movable contact is separated quickly from the stationary contact and a long spark is produced, which effectually ignites the charge of gas in the cylinder. If desired, the spring o' may be omitted, in which case the backward movement of the latch and contact-shaft is effected solely by the recoil of the spring O; but it is preferable to employ the spring o' in order to reliably hold the movable contact when free out of engagement from the stationary contact.

During the subsequent backward movement of the trip-lever the dog is deflected upon engaging the latch and is then again projected into its operative position by the spring r', so as to overhang the latch preparatory to engaging the operative face of the same during the next following forward movement of the dog.

For the purpose of enabling the time of producing the spark to be varied the pivot of the trip-lever is made adjustable relatively to the latch. The adjusting device for this purpose shown in the drawings is constructed as follows: SS′ represent two trunnions arranged eccentrically at opposite ends of the wrist p, on which the trip-lever is fulcrumed. These trunnions are arranged axially in line and journaled in bearings t, formed in the inner and outer parts of a bifurcated bracket T, which is secured to the front side of the valve-chest. U represents a shifting arm or handle which is secured to the outer trunnion S

of the wrist and whereby the fulcrum of the trip-lever is adjusted relatively to the latch.

To permit of adjusting the fulcrum of the trip-lever to a predetermined position, the handle is provided with a pointer v, which traverses a segmental scale v' on the front side of the bracket. The handle and the parts connected therewith are held in their adjusted position by a clamping-bolt w, arranged on the bracket and passing through a segmental slot w' in the handle.

In the position of the parts shown in Fig. 4 the axes of the latch, the trip-lever, and the trunnions are in line, in which position of the parts it will be assumed the dog clears the latch at the proper time for producing a spark when the piston reaches the end of its compression-stroke.

Upon turning the handle in the direction for raising the wrist, the trip-lever will effect the greater part of its forward movement before tripping the latch, thereby producing a spark late or after the piston has passed the point of greatest compression of the fuel, thereby reducing the force of the explosion and enabling the engine to be started slowly or run under reduced pressure when the load is light.

When it is desired to run the engine under high pressure for heavy loads, the handle is turned in the opposite direction, so as to lower the wrist, which causes the trip-lever to engage the latch earlier in its forward movement and produce a spark while the piston is leading or approaching the point of highest compression, thereby obtaining the maximum output of the engine. This adjustment of the time of sparking can be effected while the engine is running, thus rendering it possible to regulate the working of the engine readily and conveniently when starting or when running under varying loads.

I claim as my invention—

An electric igniter for gas-engines comprising stationary and movable contacts, a latch yieldingly connected with the movable contact, a rocking trip-lever, a pawl arranged on one end of the lever and adapted to engage with said latch, an actuating mechanism connected with the opposite end of said lever for oscillating the same, an eccentric upon which said lever is journaled and which is provided at opposite ends with trunnions, a bifurcated supporting-bracket provided with bearings on its members in which said trunnions are journaled, an adjusting-handle connected with one of said trunnions and provided with a segmental slot, and a clamping-bolt arranged in said slot, substantially as set forth.

Witness my hand this 30th day of July, 1901.

HARRY J. SMITH.

Witnesses:

THEO. L. POPP,

EMMA M. GRAHAM.