

No. 685,978.

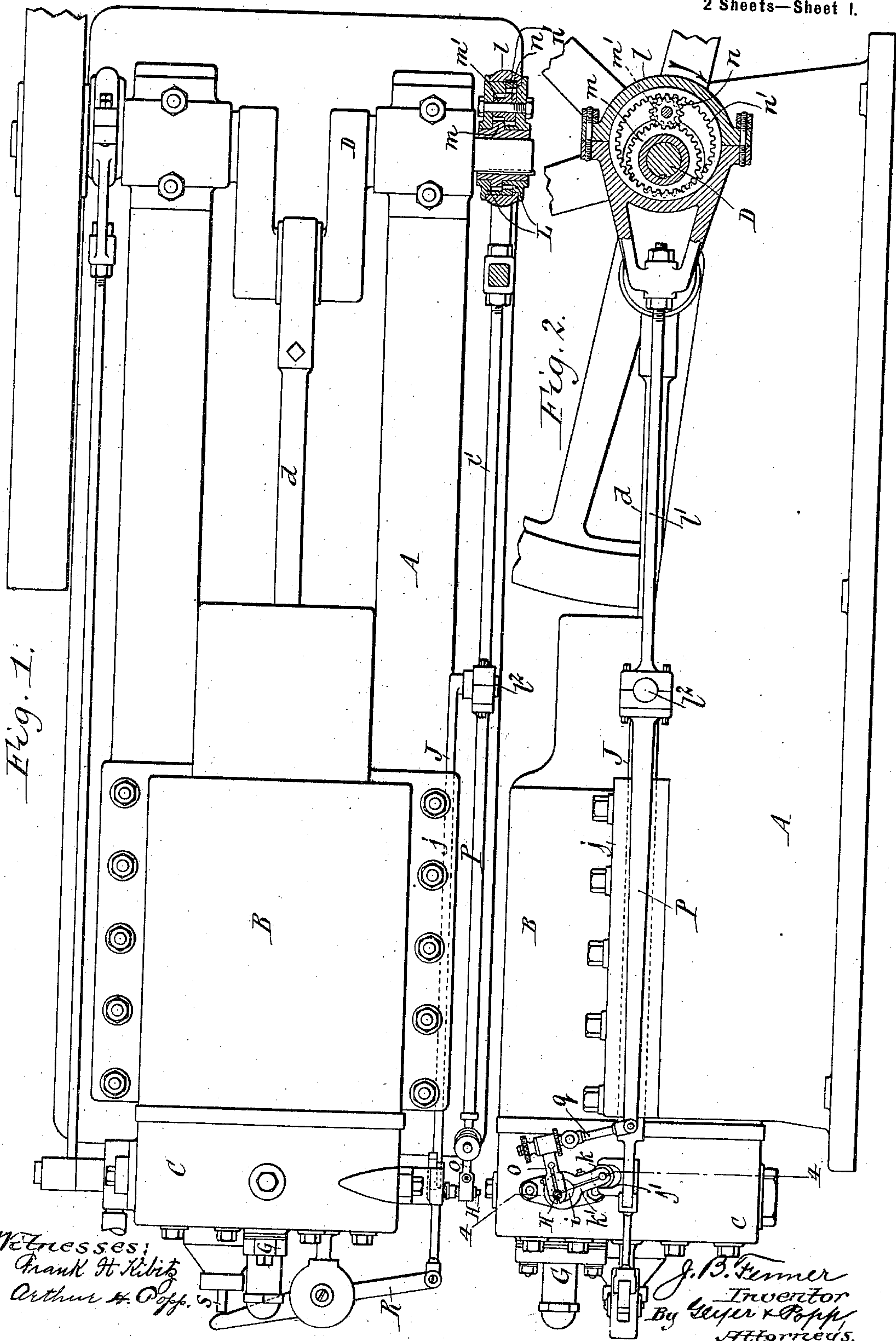
Patented Nov. 5, 1901.

J. B. FENNER.
ELECTRIC IGNITER FOR GAS ENGINES.

(Application filed Apr. 4, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
Frank H. Hilbig
Arthur H. Popp.

J. B. Fenner
Inventor
By Meyer & Popp
Attorneys.

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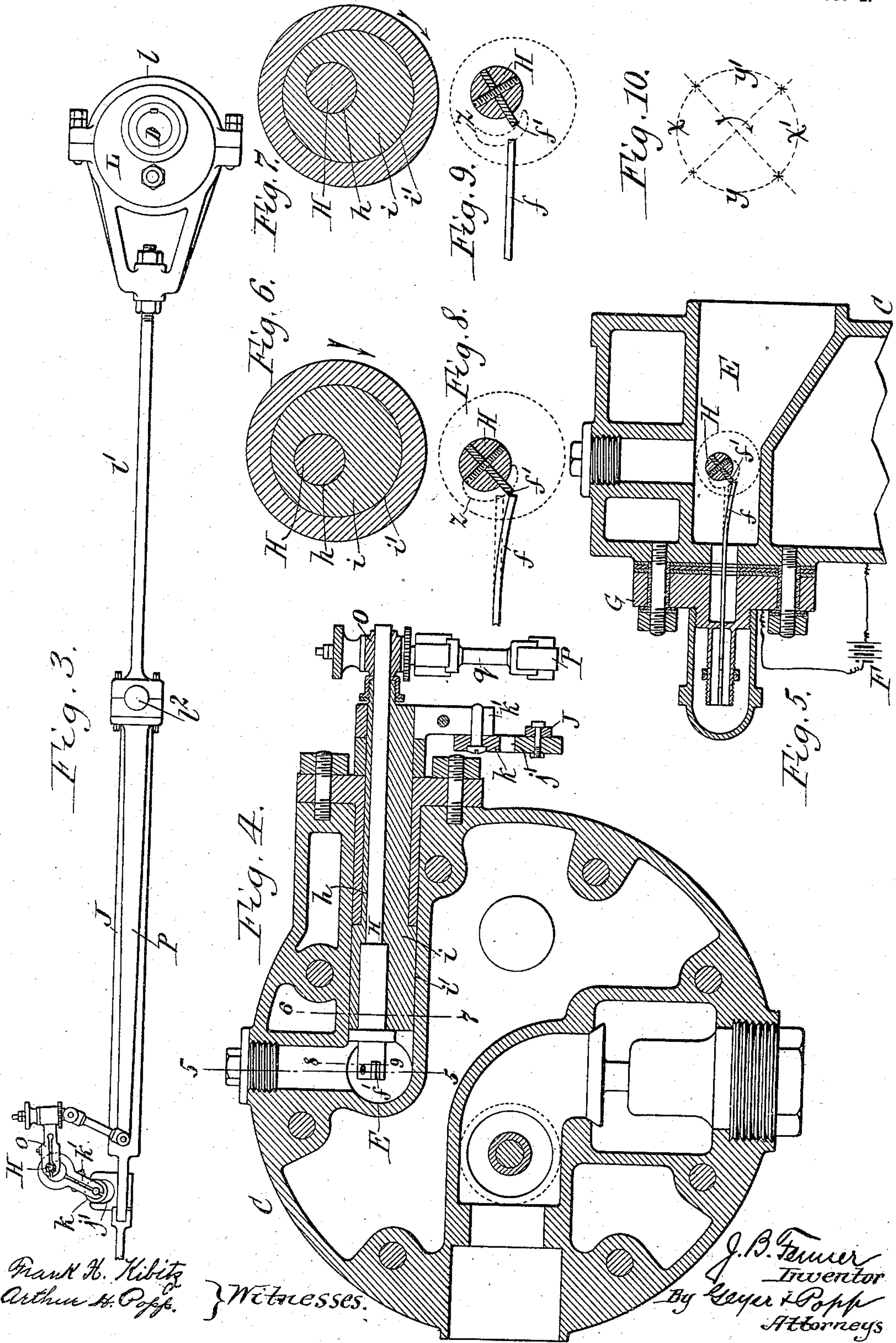
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UNITED STATES PATENT OFFICE.

JESS B. FENNER, OF BUFFALO, NEW YORK, ASSIGNOR TO THE J. W. RUGER MANUFACTURING COMPANY, OF BUFFALO, NEW YORK.

ELECTRIC IGNITER FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 685,978, dated November 5, 1901.

Application filed April 4, 1901. Serial No. 54,340. (No model.)

To all whom it may concern:

Be it known that I, JESS B. FENNER, 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.

This invention relates to an electric igniter for gas-engines, and has for its object to produce an igniter of this type which is simple and durable in construction and reliable in operation and in which the wear of the contacts and of the electric generator is reduced to a minimum.

In the accompanying drawings, consisting of two sheets, Figure 1 is a top plan view, partly in section, of a gas-engine provided with my improved igniter. Fig. 2 is a side elevation of the same, partly in section. Fig. 3 is a side elevation of the igniter-operating mechanism, showing the same in a different position from that shown in Fig. 2. Fig. 4 is a vertical transverse section, on an enlarged scale, in line 4 4, Fig. 2. Fig. 5 is a fragmentary longitudinal section in line 5 5, Fig. 4. Figs. 6 and 7 are vertical sections taken in line 6 7, Fig. 4, showing different positions of the eccentric bearing-sleeve of the igniter-spindle. Figs. 8 and 9 are fragmentary vertical sections taken in line 8 9, Fig. 4, showing different positions of the igniter-contacts corresponding to Figs. 6 and 7, respectively. Fig. 10 is a diagram showing the different quarters of the circular movement of the eccentric whereby the igniter is operated.

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

A represents the base of a gas-engine, B the cylinder, arranged on the front part of the base, C the valve-chest, arranged on the front end of the cylinder, D the crank-shaft, journaled on the rear part of the base, and *d* the pitman, which connects the crank-shaft with the piston in the cylinder, all of which parts may be of any suitable and usual construction.

E represents an igniting-chamber formed in the valve-chest and opening into the front end of the main or working cylinder B.

f f' are the contacts, which are arranged in

the igniting-chamber and which form the terminals of an electric generator or battery F. The fixed terminal *f* consists of a flexible plate or bar which is arranged lengthwise in the igniting-chamber and supported at its outer end on a head G, which latter is secured to the front side of the valve-chest, but insulated therefrom. The rocking or movable contact *f'* is arranged at its front end adjacent to the free end of the fixed contact *f*, while its rear end is secured to a transverse rock-shaft H, which extends horizontally through the valve-chest and projects at its inner end into the igniting-chamber, as represented in Fig. 4. The rock-shaft H is journaled in a bearing *h*, which is formed eccentrically in the upper part of a rocking sleeve or bushing *i*. The latter is journaled in a bearing *i'*, formed in the adjacent part of the valve-chest. The rock-shaft H and the rocking sleeve *i* are operated in such manner that when the rocking contact *f'* is moved forward or transversely with reference to the fixed contact *f* it engages with the latter and closes the electric circuit; but during the backward or return movement of the rocking contact in a direction transversely to the fixed contact it clears the latter, thereby avoiding closing of the circuit during this movement of the rocking contact.

The mechanism shown in the drawings for imparting a rocking movement to the sleeve *i* is constructed as follows: J represents a longitudinally-movable slide, which is guided in a way *j*, arranged on the outer side of the base below the rocking sleeve *i*. On the front end of this slide is mounted an upwardly-opening fork *j'*, which receives a roller *k*, arranged on the lower end of a rock-arm *k'*, which latter depends from the outer end of the rocking sleeve, as shown in Figs. 2, 3, and 4. Upon reciprocating the slide J the sleeve *i* is oscillated through the medium of the fork *j'*, roller *k*, and arm *k'*, connecting the slide with the sleeve. The reciprocating slide receives its motion from a rotating eccentric L, which is driven from the crank-shaft and which has its surrounding strap *l* connected by a bar or pitman *l'* with a pivot pin or wrist *l''*, arranged on the rear end of the slide

J. The eccentric L may be rotated once during every two rotations of the crank-shaft when the igniter is to be used in a four-cycle engine or the eccentric may be rotated once for every rotation of the crank-shaft when the igniter is to be used in a two-cycle engine. In the mechanism which is shown in the drawings for operating the eccentric L the latter is mounted loosely on the crank-shaft and is turned once during every two rotations of the shaft by a train of gearing, consisting of a gear-wheel *m*, secured to the crank-shaft and meshing with a pinion *m'*, pivotally mounted on the eccentric L, and a gear-wheel *n*, connected with the pinion *m*, so as to turn therewith, and meshing with an internal gear-rim *n'*, secured to the eccentric-strap *l*. This gearing is the same as that shown and described in Letters Patent No. 634,207, granted to me October 3, 1899.

The mechanism shown in the drawings for oscillating the rock-shaft of the movable contact *f'* is constructed as follows:

o represents a rock-arm projecting rearwardly from the outer end of the contact-shaft H.

P represents a rock-arm connected with the pitman *l'* and projecting forwardly from the pivot *l''* thereof. The front end of the rock-arm *P* is arranged below the rock-arm *o*, and the adjacent ends of these arms are connected by an upright link *q*.

While the eccentric L is moving with its salient part through the upper and lower quarters *x x'* of its circular movement, (see Fig. 10,) it is most effective in a horizontal direction, and during this movement of the eccentric the slide J receives the greater part of its backward and forward movement through the medium of the pitman *l'*, which at this time acts principally as a link between these parts. While the salient part of the eccentric L is moving through the front and rear quarters *y y'* of the circular movement, (see Fig. 10,) it crosses the dead-center, and the longitudinal movement imparted to the slide J at this time is comparatively small. While the pitman is being moved horizontally forward and backward, the same is also raised and lowered by the action of the eccentric and the eccentric-strap connected with the pitman. This vertical movement of the pitman is greatest at the time that the eccentric is moving through the front and rear quarters of its rotation and is least at the time the eccentric is moving through the upper and lower quarters of its rotation. The vertical movement derived from the eccentric L is transmitted to the contact rock-shaft H and connecting parts by the pitman *l'* and the rock-arm *P*, which together at this time form a rock-lever having its fulcrum or pivot on the wrist-pin *l''*. At the end of the backward or compression stroke of the piston the eccentric L is moving downwardly past the dead-center in the rear quarter *y'* of its rotation, in which position the slide J is in its rearmost position and practically at a

standstill and the rocking sleeve *i* has been turned so that the contact-shaft H, journaled in its upper part, is moved bodily into its foremost position, as shown in Figs. 2 and 6. While the contact-shaft is in this forward position, the rock-lever *l' P* receives the greater part of its vertical movement in a direction which causes the rocking contact *f'* to be moved downwardly or laterally with reference to the fixed contact *f*. During this movement of the rocking contact it first bears against the flexible contact *f* and deflects the same, as shown in Fig. 8, and then slips off from the flexible contact, whereby the latter when released separates quickly from the rocking contact and a long spark is produced upon breaking the electric circuit, which thoroughly ignites the compressed charge of fuel in the cylinder. During the last part of the downward movement of the rocking contact after the same clears the flexible contact the eccentric L moves forwardly through the lower quarter *x'* of its rotation, during which time its effect upon the slide J is greater for moving the same forward, while its effect upon the lever *l' P* for rocking the same is smaller, whereby the rocking sleeve *i* is turned in the direction for moving the contact-shaft backward bodily into the position shown in Figs. 7 and 9. While the contact-shaft is in this position, the rocking sleeve practically remains standing still for a time and the contact-shaft is turned in a direction for raising or moving the contact *f'* transversely with reference to the fixed contact *f* by reason of the eccentric L moving through the front quarter *y* of its rotation, as shown in Figs. 3, 8, and 10, during which movement of the eccentric it is more effective in a vertical direction for rocking the lever *l' P* and less effective in a horizontal direction, so that the slide is not moved lengthwise to any extent. While the rocking contact *f'* is being thus raised, it is arranged out of reach of the flexible contact *f* and clears the same, whereby the circuit is not closed during this part of the movement of the rocking contact and unnecessary waste of the battery-current is thereby avoided. During the last part of the upward movement of the rocking contact *f'* the eccentric L moves rearwardly through the upper quarter *x* of its rotation, during which time the rock-lever *l' P* turns but slightly; but the slide J is moved rearwardly to a considerable extent, whereby the contact-shaft H is moved forwardly into position preparatory to again engaging its contact *f'* with the contact *f* during the next following downward movement of the former.

It will be seen that by the use of a single eccentric the rocking contact *f'* receives a downward and upward movement or transversely relatively to the fixed contact and also a forward and backward movement relatively to the fixed contact, so that the same in its downward movement engages the fixed contact, but the same clears the fixed contact during its upward movement. By this means

the free end of the rocking contact moves in a crescent-shaped path, as shown by dotted lines *z* in Figs. 8 and 9.

In the construction shown in the drawings the movement of the slide *J* is utilized to operate a rock-lever *R*, which engages with the stem or spindle *s* of the exhaust-valve for opening the same; but this in no way affects the operation of the igniter.

10 I claim as my invention--

1. In an electric igniter for gas-engines, the combination with the cooperating fixed and movable contacts, of a shifting device for moving the movable contact forward and backward in a direction lengthwise of the fixed contact, and a shifting device which moves the movable contact forward transversely of the fixed contact and into engagement with the same while the movable contact is in the front part of its longitudinal movement and which moves the movable contact backward transversely of the fixed contact while the movable contact is in the rear part of its longitudinal movement and out of reach of the fixed contact, substantially as set forth.

2. In an electric igniter for gas-engines, the combination with the cooperating fixed and movable contacts, of a rock-shaft carrying the movable contact, a rocking sleeve or support provided eccentrically with a bearing in which the rock-shaft is journaled, an actuating device whereby the rock-shaft is oscillated for carrying the movable contact forward and backward transversely of the fixed contact, and an actuating device whereby the rocking sleeve is oscillated for carrying the rock-shaft and movable contact forward and backward lengthwise of the fixed contact, said transverse forward movement of the movable contact being effected while the rocking sleeve is in the front part of its movement and the transverse rearward movement of the movable contact being effected while the rocking sleeve is in the rear part of its movement, substantially as set forth.

3. In an electric igniter for gas-engines, the combination with two cooperating contacts, of a rock-shaft carrying one of said contacts, a rocking sleeve provided eccentrically with a bearing in which said shaft is journaled, a reciprocating slide which engages with an arm on said sleeve for rocking the same, a rock-lever pivoted on said slide and connected with an arm on said shaft, and an actuating device whereby said lever and slide are reciprocated and the lever is oscillated on the slide, substantially as set forth.

4. In an electric igniter for gas-engines, the combination with two cooperating contacts, of a rock-shaft carrying one of said contacts, a rocking sleeve provided eccentrically with a bearing in which said shaft is journaled, a reciprocating slide which engages with an arm on said sleeve for rocking the same, a rock-lever pivoted on said slide and connected with an arm on said shaft, and a rotating eccentric having its strap connected with said rock-lever, substantially as set forth.

5. In an electric igniter for gas-engines, the combination with a flexible contact which is secured to a fixed support, and a rigid contact adapted to cooperate with the flexible contact, of a rock-shaft carrying said rigid contact, a rocking sleeve journaled in a bearing and provided eccentrically with a bearing in which said rock-shaft is journaled, an arm depending from said rocking sleeve and provided with a roller, a reciprocating slide provided with a fork which receives said roller, a rock-lever pivoted on said slide and having one of its arms connected by a link with an arm on said rock-shaft, and a rotating eccentric having its surrounding strap connected with the other arm of the rock-lever, substantially as set forth.

Witness my hand this 29th day of March, 1901.

JESS B. FENNER.

Witnesses:

THEO. L. POPP,
CARL F. GEYER.