(No Model.) 2 Sheets—Sheet 1.

P. A. N. WINAND.

ELECTRICAL IGNITOR FOR GAS OR HYDROCARBON ENGINES.

No. 507,516. Patented Oct. 24, 1893.

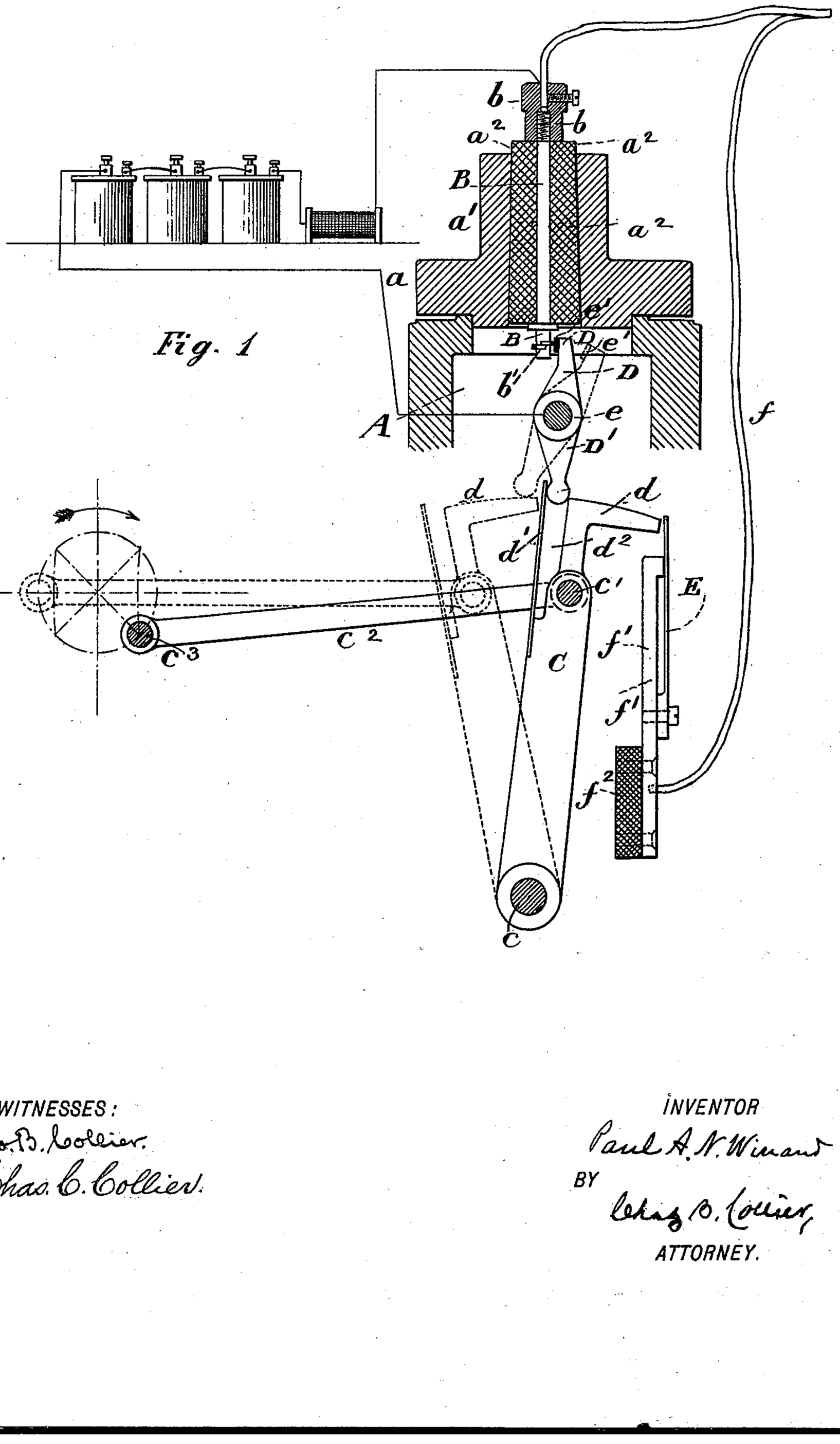

Fig. 1

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INVENTOR
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(No Model.) 2 Sheets—Sheet 2.

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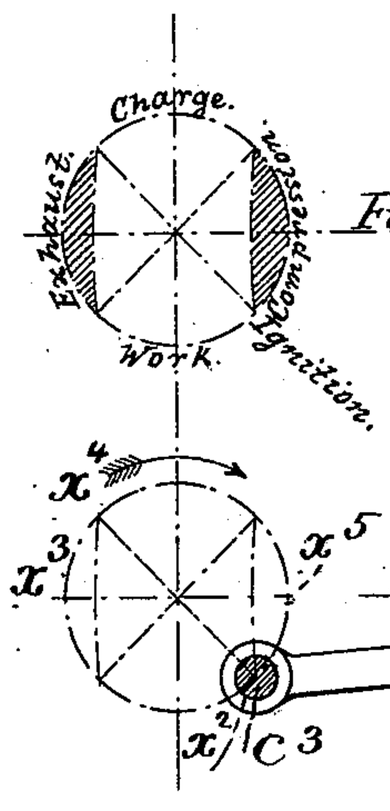

Fig. 3.

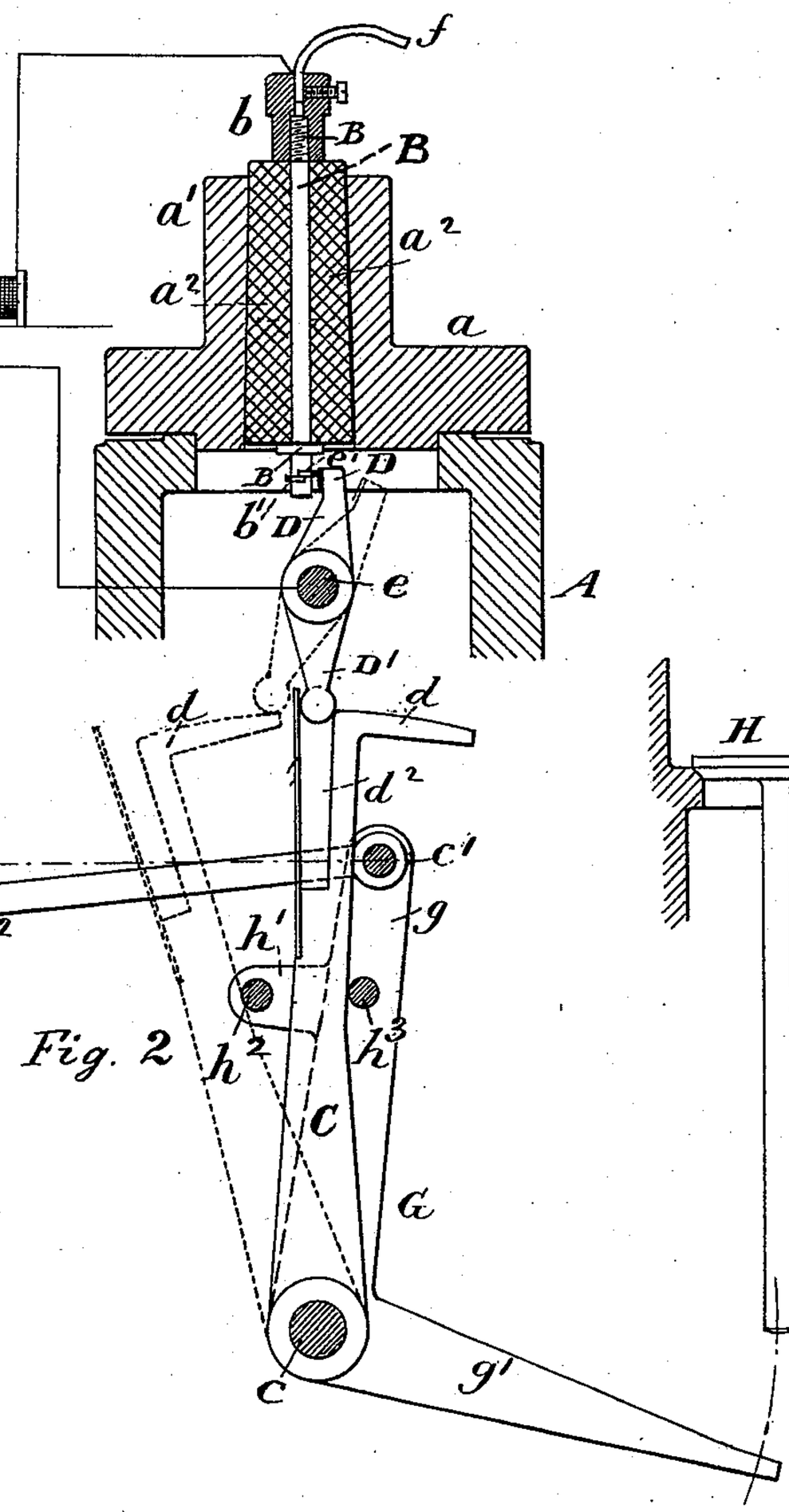

Fig. 2

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UNITED STATES PATENT OFFICE.

PAUL A. N. WINAND, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRICAL IGNITOR FOR GAS OR HYDROCARBON ENGINES.

SPECIFICATION forming part of Letters Patent No. 507,516, dated October 24, 1893.

Application filed March 14, 1892. Serial No. 424,923. (No model.)

To all whom it may concern:

Be it known that I, PAUL A. N. WINAND, a subject of the King of Belgium, but now residing in the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electrical Ignitors for Gas or Hydrocarbon Engines, of which the following is a specification, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The invention relates to that class of gas or hydro-carbon engines in which the movement of the piston is effected by the explosion of charges of mixed air and gas ignited by electric sparks, the current of electricity being produced by a suitable generator; and more especially to means whereby the spark is produced by interrupting the current within the cylinder between a fixed and a movable contact piece. If iron or other oxidizable metal is used for the contact points the contact resistance soon becomes so great by the interposition of oxide that, in order to force the current through the contacts, a high electromotive force is required, not conveniently attained by the use of batteries. If an unalterable metal, as platinum, or carbon contact points are used, while the resistance is not unduly increased and batteries may be successfully employed, the softness of such metals, and the brittleness of carbon, are such that the use of special devices is necessary to prevent mechanical injury to the contact pieces.

My invention consists in means hereinafter described for making contact between the points; and further whereby platinum or other soft metal, or carbon may be used for the contact points without danger, as with platinum, of their becoming battered or hammered out of shape by the sudden making of the contact; or, as with carbon, the cracking or destruction of that substance by the shock; the contact being broken swiftly but made slowly, so as to prevent the sudden meeting of the contact points.

In the drawings, Figure 1, is an elevation of a portion of an engine chiefly in section, and in part illustrative of my invention. Fig. 2, is a view similar to Fig. 1, but with additions hereinafter described. Fig. 3, is a diagram illustrative of the consecutive operations of the engine, they being indicated on a circle described by the crank pin.

Similar letters of reference indicate similar parts in the respective figures.

A is the motive cylinder of the engine, or combustion chamber connected to said cylinder, and which may be supported by any suitable frame or bed. Only one end of the cylinder is shown, that at which the fixed contact piece is placed. The head a is provided with a neck a' within which is an insulating material a^2. Supported within the tubular insulating material a^2 is the fixed contact piece B, its inner end extending within the cylinder or combustion chamber A and its outer end being screwed into the insulating connecting stub b. The inner end of the fixed contact piece B carries as a contact point a block of platinum b' soldered or otherwise secured thereto.

Referring now more particularly to Fig. 1, C is a lever adapted to oscillate in a plane outside of the cylinder or combustion chamber upon a shaft c, suitably mounted, the lever being joined by means of its pin c', the connecting rod c^2, and crank pin c^3, to the crank or other revolving part of the engine. The lever C has at its outer end a foot or shoe d whose exterior or operative surface presents a curved line struck from the center of the shaft c, and also with a blade-spring d', the latter being secured upon that edge of the lever next to the crank, eccentric or other part of the engine intended to vibrate the lever. The blade-spring d' extends, as shown, beyond the outer curved surface of the foot or shoe d, and a space d^2 is provided between the confronting faces of said foot or shoe and the spring.

D is the movable contact piece which is adapted to oscillate within the cylinder or combustion chamber A upon a shaft e mounted or supported in or by the walls of the cylinder. An arm D′ secured to the shaft e, oscillates in a plane outside the combustion chamber. The movable contact piece B is provided with a block of platinum e' designed to make and break contact with the block b' of like substance supported by the fixed contact piece B. The end of the arm D′ presents, as seen in Fig. 1, a curvature of

the greater part of a true circle, while the faces in contact with the foot d and blade spring d', respectively, are straight.

One terminal of the battery x is connected through the coil y and insulating stub b with the fixed contact piece B, while the other terminal is connected to some metallic part of the engine (as shown in the drawings, to the shaft e) the current finding its way through the intermediate metal to the movable contact piece D.

The operation is as follows: In the position shown in full lines, the lever C is moving to the left and the heel of the shoe d is just striking the arm D' thus causing the movable contact piece D to rock and break the contact existing between the contact points b' and e'. The continued movement of the lever C will move the end of the arm D' out of the path of the shoe d and permit the latter to pass under the former until the position indicated in dotted lines is reached. In its return movement the shoe d will pass under the arm D' but the end of the blade spring d' will engage it and cause the movable contact D to rock and again bring the points b' and e' into contact. The pressure exerted by the blade spring d' will be gradual and the points b' and e' will, therefore, not be brought together violently; at the same time the pressure of the blade spring d' on the arm D' at the extreme forward movement of the lever C will be such as to insure close and perfect contact between the said points.

In Fig. 2, the lever C is loosely journaled upon the shaft c. The general construction and operation of the lever C and the fixed and movable contact pieces B and D are the same as in the preceding figure.

G is a bell-crank lever, keyed to the shaft c, and having the arm g joined by the pin c' to the connecting rod c^2, and by it to the crank pin c^3. The other arm g' of the bell-crank lever G extends under, so as to operate upon the stem h of the exhaust valve H of the gas engine. The arm g is provided with a laterally projecting pin h^3 and a lug h' having a similar pin h^2. The lever C rests and is caused to vibrate between the pins h^3 and h^2. In the movement of the arm g the lever C is pushed backward and forward by the said pins, which are spaced to allow the arm, after reaching each end of its movement, to move a certain distance before acting upon the lever. Sufficient mechanical friction is provided for keeping the lever C in position while not being pushed by either of the pins.

In the position shown in full lines, in Fig. 2, the lever C is being pushed to the left by the pin h^3. The dotted line position is reached at the end of the movement of the arm g, that is when the crank pin is in the position x^3. The mechanical friction will then keep the lever C in this extreme position until, by the return movement of the arm g, the pin h^2 strikes it, at which time the crank pin will be in the position x^4. Contact within the cylinder or combustion chamber is thus seen to be made and broken. With this arrangement, the contact is made when the crank pin is very near x^5, and consequently the contact points are brought together slowly and gently, and may be made of a soft metal like platinum without getting battered. When the crank pin reaches x^2 and the contact is interrupted, the parts acquire a much greater speed, and the contact is broken with sufficient quickness.

It is obvious that any other reciprocating motion on the engine may be utilized, and that the connection with the engine may be made in a manner mechanically different from, yet in substance the same as that herein described. The important feature is that the reciprocating part of the engine, actuated by a crank or eccentric, shall act on the movable contact piece by means of an intermediate lever carried to and fro by the reciprocating arm, there being a certain amount of play or lost motion between the two, while the intermediate lever shall be adapted to remain at the extreme position of its movement by any suitable frictional or spring device used in such cases by those skilled in mechanical matters.

The arm g' of the bell-crank lever G will operate the exhaust valve in a manner adapted to the special circumstances and with due regard to the charges admitted to the motive cylinder or combustion chamber.

When a separate cam motion is used for the special purpose of actuating the movable contact piece, this cam may be made steep on the front side and sloping down gradually on the back side, thus imparting directly the slow motion for making and the quick motion for breaking the contact.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an electrical ignitor for a gas or hydro-carbon engine, a motive cylinder, a fixed and a movable contact piece both within the cylinder, the movable contact piece having an arm extending outside the cylinder, combined with a lever having a foot or shoe adapted to strike said arm to break the contact and then to pass beneath the arm, a spring blade attached to said lever to engage the said arm on the return movement of the lever and bring the contact pieces into engagement, and means whereby said lever is oscillated from the engine, substantially as set forth.

2. In an electrical ignitor for a gas or hydro-carbon engine a motive cylinder, a fixed and a movable contact piece, the latter being adapted to rock within the cylinder and make and break contact with the fixed contact piece, a generator of electricity and electrical connections, combined with an arm outside the cylinder for rocking the movable contact piece, a lever loosely mounted upon a shaft for engaging said vibrating arm, a crank-arm

rigidly mounted upon said shaft and provided with pins spaced to receive said lever between them and move it backward or forward as it is engaged by one or other of the pins, and means for oscillating said crank arm from the engine, substantially as set forth.

3. In an electrical ignitor for a gas or hydro-carbon engine, a motive cylinder, a fixed and a movable contact piece, the latter being adapted to rock within the cylinder and make and break contact with the fixed contact piece, a generator of electricity, electrical connections and an exhaust valve, combined with an arm outside the cylinder for rocking the movable contact piece, a lever loosely mounted upon a shaft for engaging said vibrating arm, a crank-arm rigidly mounted upon said shaft, one member of said crank-arm extending under the stem of the exhaust valve and the other member being provided with pins spaced to receive said lever and move it backward or forward as it is engaged by one or other of the pins, and means for oscillating said crank-arm from the engine, substantially as set forth.

In testimony whereof I have hereunto set my hand on this 24th day of February, A. D. 1892.

PAUL A. N. WINAND.

Witnesses:
GEO. W. REED,
CHAS. C. COLLIER.