(No Model.) 2 Sheets—Sheet 1.

J. B. CARSE.

GAS ENGINE.

No. 518,177. Patented Apr. 10, 1894.

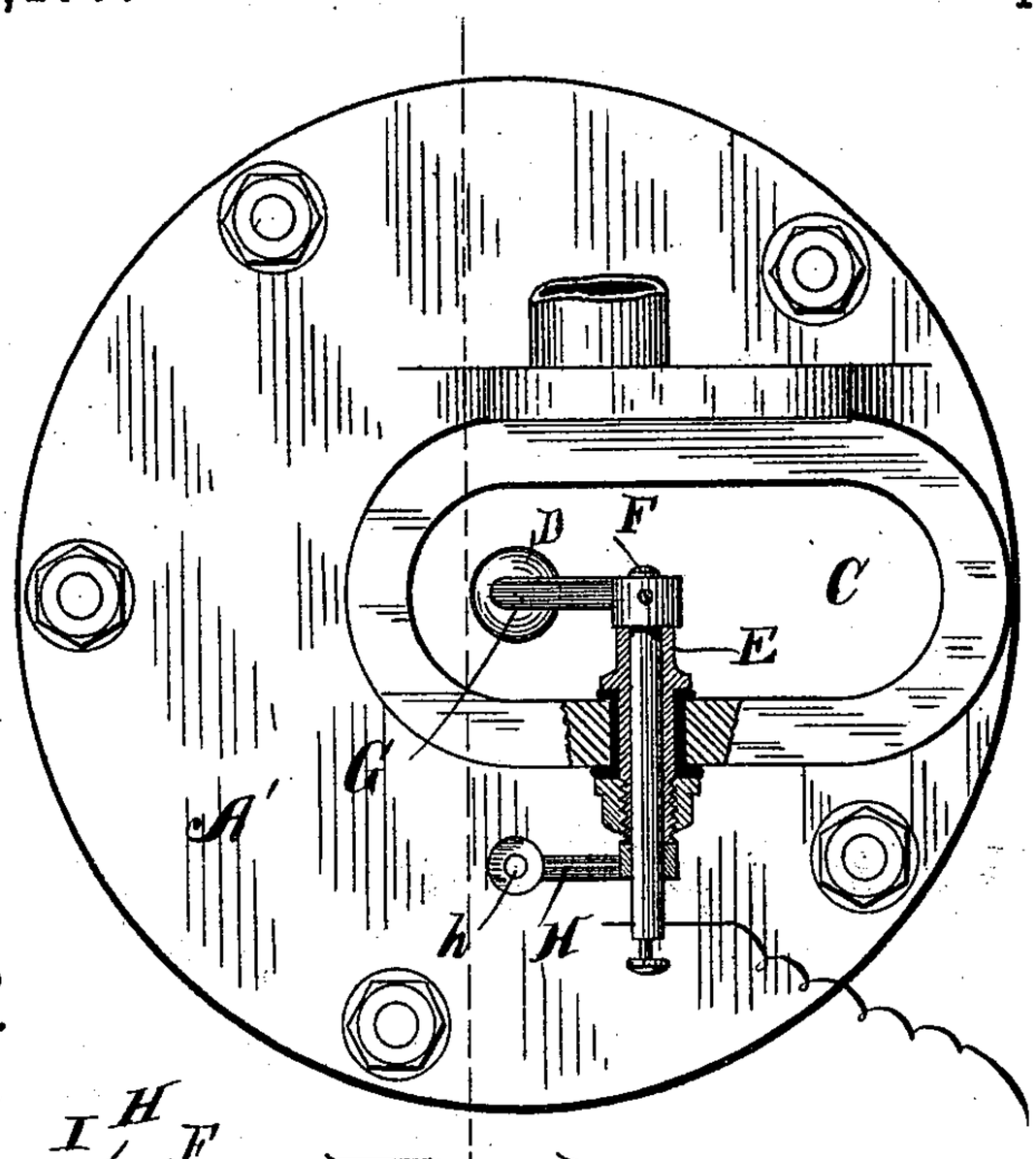
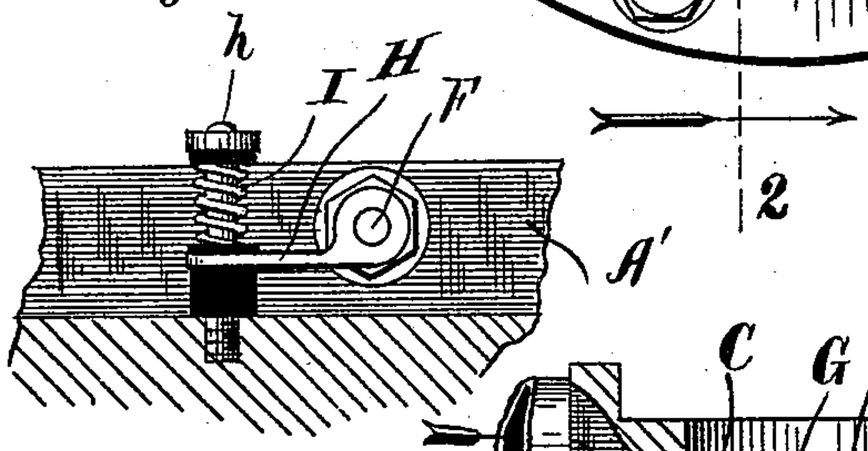


Fig. 1.

Fig. 3.



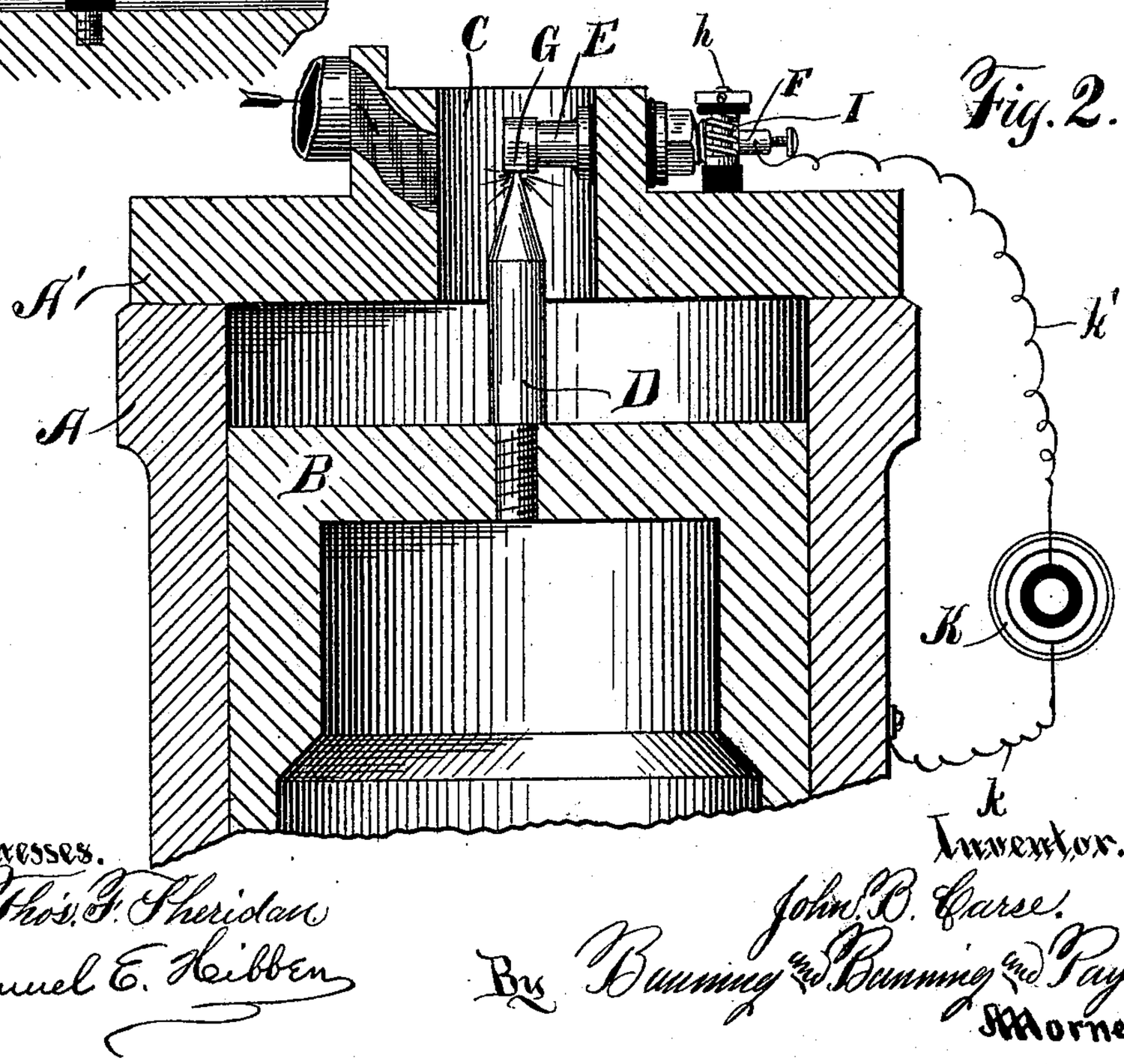


Fig. 2.

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

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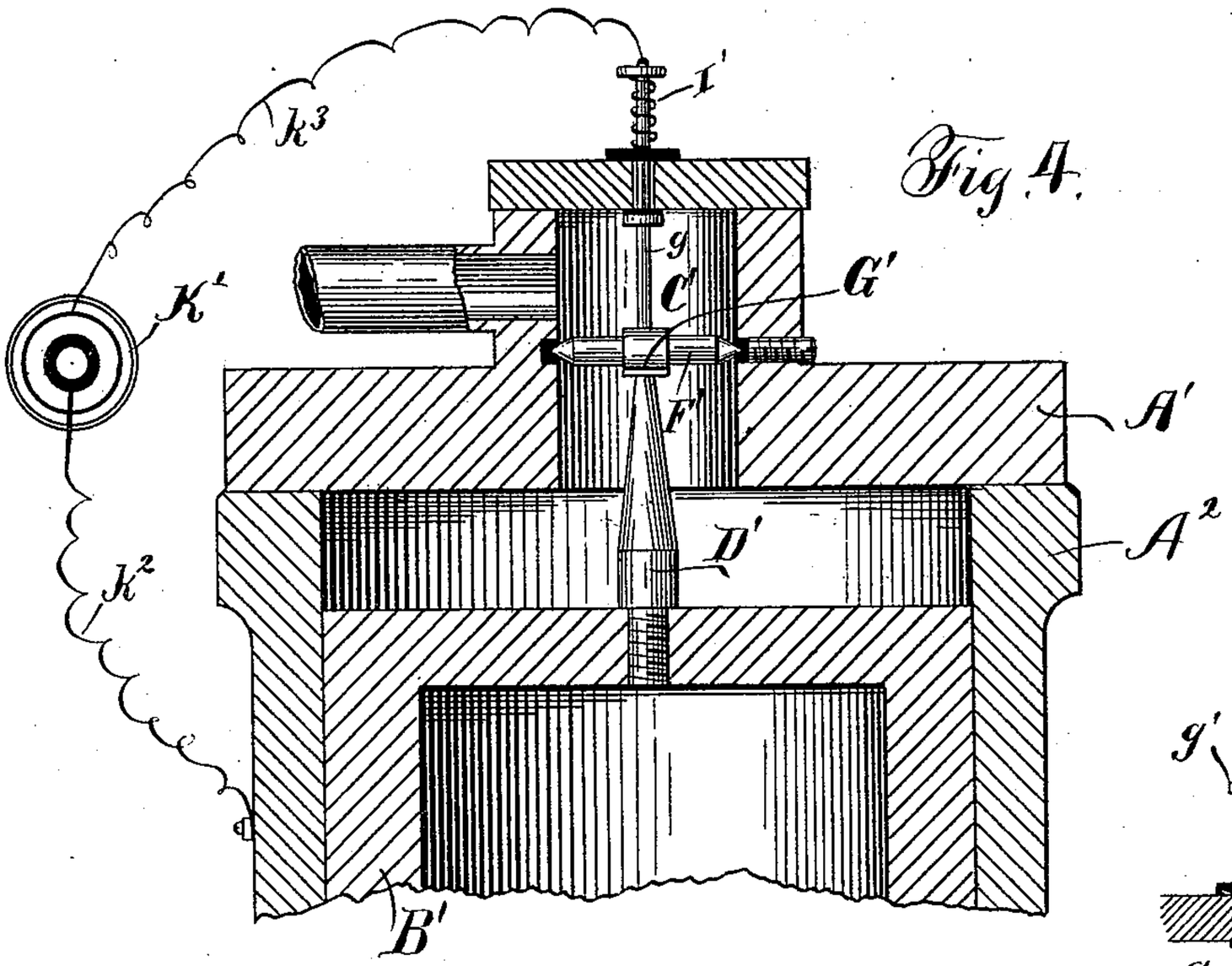

Fig. 4.

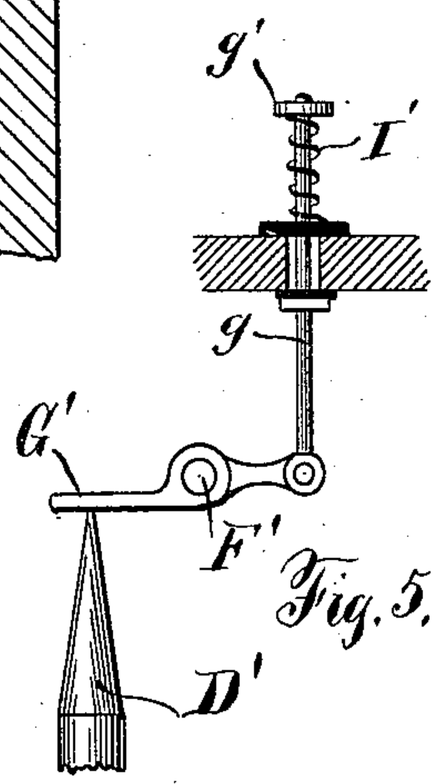

Fig. 5.

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UNITED STATES PATENT OFFICE.

JOHN B. CARSE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THOMAS KANE, OF SAME PLACE.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 518,177, dated April 10, 1894.

Application filed April 26, 1893. Serial No. 471,938. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. CARSE, residing at Chicago, Illinois, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification.

My invention relates to that class of engines in which a mixture of gas and air under compression is ignited by an electric spark, to operate the piston; and it consists in the features and details of construction hereinafter described and claimed.

In the drawings, Figure 1 is an end elevation of my improved gas engine, with the head of the combustion chamber removed; Fig. 2 a longitudinal section of a portion of the engine, taken on line 2 of Fig. 1; Fig. 3 a side view of the tension device used in Fig. 1; Fig. 4 a longitudinal section of a portion of the engine showing a modification of my improved gas engine; and Fig. 5 a side elevation of the operative parts shown in Fig. 4.

The object of my invention is to provide a simple, inexpensive and efficient mechanism for producing an electric spark to effect the ignition of the charge of compressed gas. To this end, I provide the reciprocating piston of an engine with an electrode arranged to be projected, by the movement of the piston, beyond the cylinder into the communicating combustion chamber. I mount in the combustion chamber a second electrode, which is rigid or inflexible, but pivoted and sustained in its normal position by yielding connections, in such a manner that it will act with yielding pressure upon the first named electrode, as the latter is carried against it by the movements of the piston. I prefer to mount the yielding electrode on one end of a rock shaft, which is projected through the wall of the combustion chamber, and connected on the outer end with an operating spring; but the essence of the invention resides in the employment of the inflexible electrodes in connection with yielding devices, and it will be manifest to a skilled mechanic that the details of construction may be variously modified within the limits of my invention, without materially changing the mode of action.

As illustrated in the drawings, in Figs. 1, 2 and 3, I prefer to construct my improved gas engine by using a cylinder A, which may be of the desired size, and which is provided with a cylinder head A′, in the usual way. I arrange a piston, B, in the cylinder, adapted to be moved back and forth therein, and which is intended to be connected with the crank of the engine to impart the desired rotation to the same in its movements. I provide a combustion chamber, C, arranged on the cylinder head and extending through the same into the interior of the cylinder. The combustion chamber is of course provided with a head or cap, so as to securely inclose it and confine the explosive material. I arrange an electrode, D, in the piston head, so that it will be carried back and forth with its movements. I pass through the wall of the combustion chamber a sleeve, E, which is intended to be insulated from the wall, and in which is intended to be arranged a metallic rock shaft, F, for which the sleeve affords the requisite bearing. On the inner end of the rock shaft is mounted a rigid metallic arm, G, arranged in position to be contacted by the point of the electrode as the piston reaches its extreme advanced position. This arm is preferably arranged at an angle to the axis of the electrode, so that as the point of the electrode approaches, it will contact against the arm at an angle, and slide or scrape along until it reaches its final advanced position. This rubbing or scraping action is preferred for the reason that by employing it the arm will be kept clean, so that a perfect contact will always be secured between the electrode and the arm. As the electrode contacts with the arm, it pushes or moves it back, and, in so doing, turns or rotates the rock shaft on which it is mounted to the extent that it moves the arm back. On the outer end of the rock shaft is arranged a rigid arm, H, which is moved or carried by the rock shaft as it turns or rotates. The free end of this arm is provided with a hole which surrounds the pin or bolt, *h*, which is insulated from the arm. A coiled spring, I, also preferably insulated both from the arm and pin or bolt, is arranged around the pin or bolt, so that as the rock shaft is turned and the outer arm lifted, it will lift against the tension of the spring, and as the piston in the cylinder moves back and carries the elec-

trode away from the inner rigid arm on the rock shaft, the spring will restore the rock shaft and the inner rigid arm to their normal position in readiness for the next advance of the piston and electrode. I have shown the outer arm, H, and a spring, I, as the means for restoring the inner rigid arm to its working or normal position; but, as it is obvious that weights or other kinds of springs could be employed for the same purpose, I do not care to limit myself to these particular details of construction. I arrange an electric battery, K, in suitable position, and carry a wire, *k*, from one of its poles to the cylinder, and a wire, *k'*, from the other of its poles to the rock shaft, so as to bring the cylinder and the rock shaft, with its rigid inner arm, into an electric circuit as parts thereof. It will be understood that the piston is not insulated from the cylinder, so that when the cylinder is in the circuit, the piston and electrode are also. It will thus be seen that as the piston advances and carries its electrode into contact with the inner rigid arm within the combustion chamber, the circuit will be completed, so as to generate a spark within the combustion chamber to ignite the explosive gas or vapor with which such cylinder is charged preparatory to each explosion.

In Figs. 4 and 5, I have shown a modification of my improved gas engine. I secure to the piston B', as in Fig. 2, an electrode D', so that it will partake of the same motions as the piston. Pivoted entirely within the combustion chamber, C', on the rock shaft, F', is a rigid electrode, G', in position to have one of its free ends contracted by the electrode on the piston, as the same moves into and out of the combustion chamber. Pivotally secured to the opposite free end of the electrode is a rod *g*, which extends upward and out through the head of the combustion chamber. The rod is provided with a collar *g'* at its extreme end. Interposed between the collar and an insulated washer which rests against the head of the combustion chamber is a spiral spring, I', which serves to hold the electrode, by means of its rod, in its normal position, and adapted to be contacted by the electrode on the piston as the same approaches its limit of motion. As the electrode on the piston contacts the electrode pivoted in the combustion chamber, it vibrates the same on the rock shaft, and produces a scraping contact which serves to keep the contact points clear, and insures the generation of an electric spark. The electric circuit is formed by connecting the cylinder to the battery, K', by means of the wire K^2, and the rod, *g*, to the battery by means of the wire K^3.

I claim—

1. In a gas engine, the combination of a cylinder, a piston movable back and forth therein, an electrode connected to and moving with the piston, a combustion chamber into which the point of the electrode moves, a rock shaft passing through the wall of the combustion chamber and insulated therefrom, an inner rigid arm mounted on the inner end of the rock shaft with its free end in position to be contacted by the point of the electrode and moved back, thereby rotating the rock shaft, means for restoring the rigid arm to its normal position as the electrode retreats, and an electric circuit which includes the electrode and the inner rigid arm as parts, substantially as described.

2. In a gas engine, the combination of a cylinder, a piston movable back and forth therein, an electrode connected to and moving with the piston, a combustion chamber into which the point of the electrode moves, a rock shaft passing through the wall of the combustion chamber and insulated therefrom, an inner rigid arm mounted on the inner end of the rock shaft with its free end in position to be contacted by the point of the electrode and moved back, thereby rotating the rock shaft, an arm on the outer end of the rock shaft, a spring exerting its tension on such arm for restoring it, the rock shaft and the inner rigid arm to their normal position as the electrode retreats, and an electric circuit which includes the electrode and the inner rigid arm as parts, substantially as described.

JOHN B. CARSE.

Witnesses:
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SAMUEL C. HIBBEN.