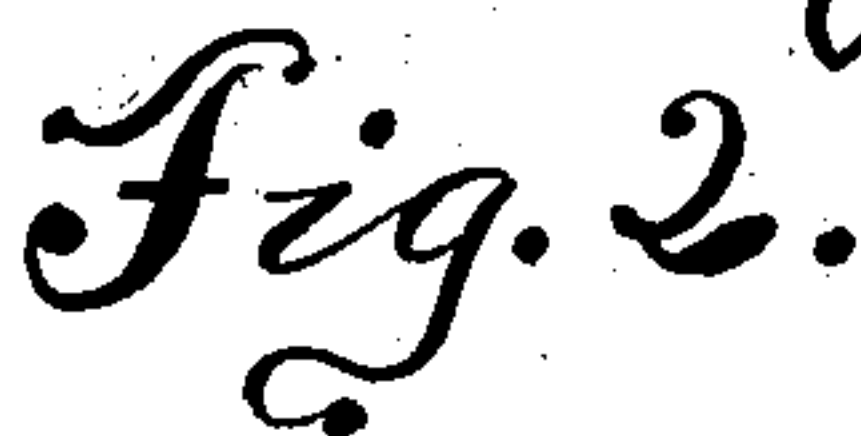


2 Sheets—Sheet 1.

No. 601,210.

Patented Mar. 22, 1898.



Inventor:
Samuel E. Maxwell

By J. H. Stevenson. Atty.

(No Model.)

2 Sheets—Sheet 2.

S. E. MAXWELL.
GAS ENGINE.

No. 601,210.

Patented Mar. 22, 1898.

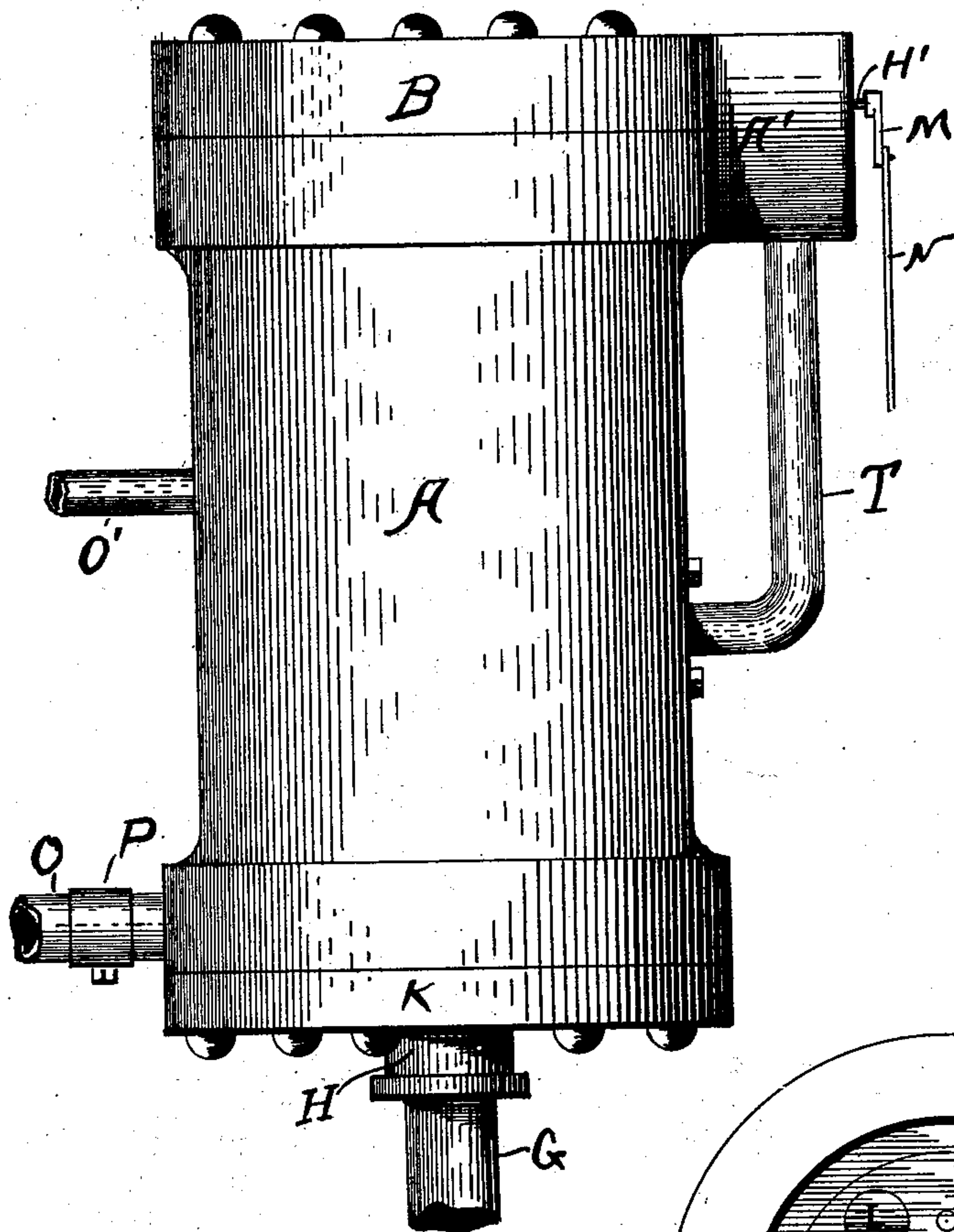
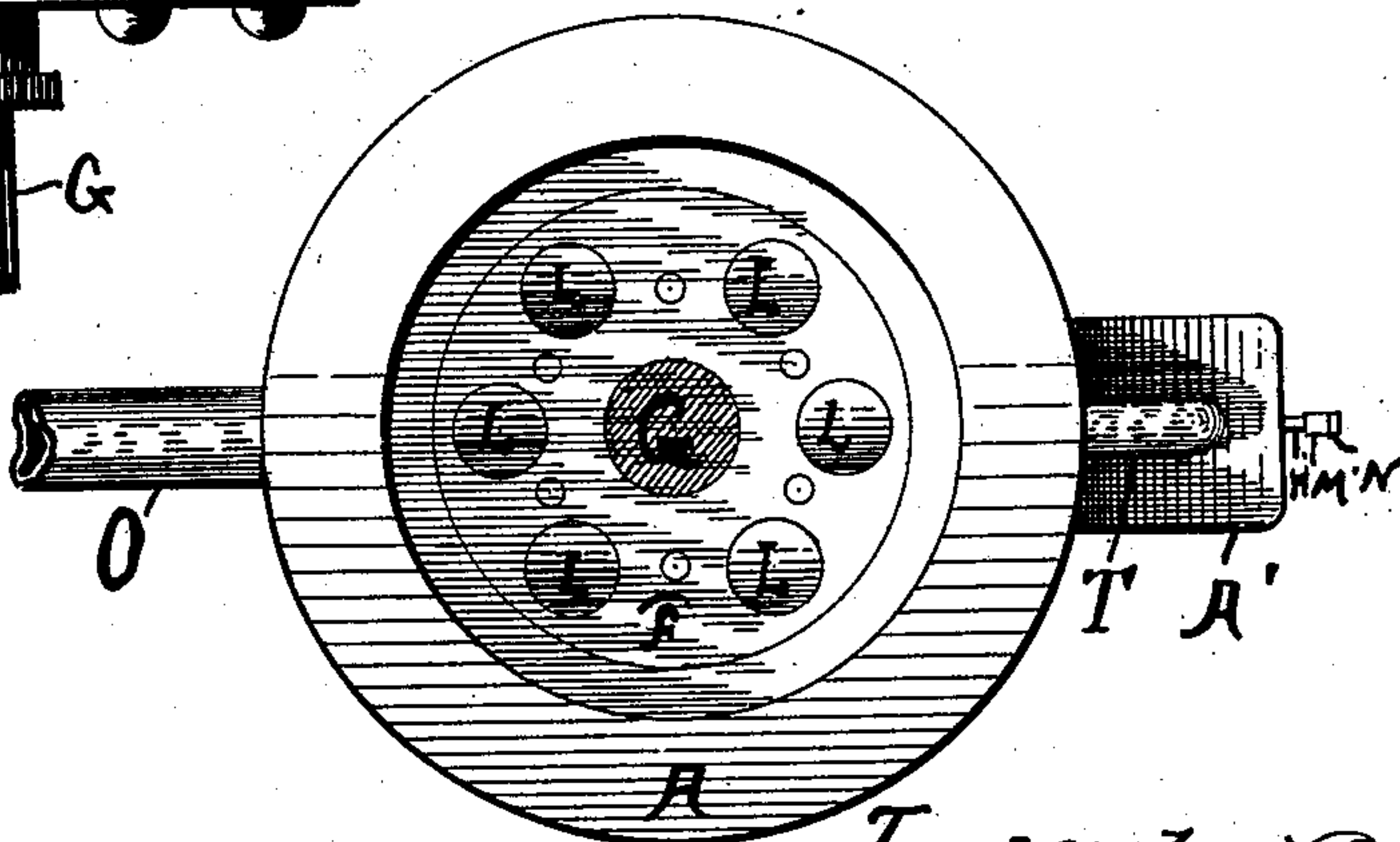


Fig. 3.

Fig. 4.



Witnesses:
Frank H. Wright
O. M. Wilson

Inventor
Samuel E. Maxwell

By J. H. Stevenson. Atty.

UNITED STATES PATENT OFFICE.

SAMUEL E. MAXWELL, OF NEW CASTLE, PENNSYLVANIA, ASSIGNOR TO
WILLIAM H. SMITH, OF SAME PLACE.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 601,210, dated March 22, 1898.

Application filed January 21, 1897. Serial No. 620,044. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL E. MAXWELL, a citizen of the United States, residing at New Castle, in the county of Lawrence and State of Pennsylvania, have invented certain new and useful Improvements in Gas-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 letters of reference marked thereon, which form a part of this specification.

This invention relates to certain new and useful improvements in gas-engines, and relates more particularly to that class of engines worked by combustible gases or petroleum vapors or spray, wherein a combustible charge is only introduced at every alternate stroke of the piston, the improvements being such that an engine constructed in accordance therewith will be extremely simple in its construction, strong, durable, effectual in its operation, and comparatively inexpensive to manufacture.

The invention consists in the novel construction, combination, and arrangement of parts to be hereinafter more specifically described, and particularly pointed out in the claims.

In describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, and wherein like letters of reference indicate similar parts throughout the several views, in which—

Figure 1 is a vertical sectional view of my improved gas-engine. Fig. 2 is a top plan view of the same. Fig. 3 is a side elevation, and Fig. 4 is an underneath plan view with the bottom plate removed.

Referring now to the drawings by reference-letters, A indicates the explosion-cylinder; B, a chamber within the piston-head, said piston-head being formed of a casing C, provided with an interior screw-thread at its upper end to receive a plate D and at its base with a similar interior screw-thread to receive a plate E. The inner end of the piston-rod G is secured to the piston-head by means of the plate E and works through a stuffing-box H,

secured in the base-plate K of the cylinder. The plate E is perforated or provided with ports, as shown at F, the upper end of each of which ports is beveled to form a seat for the valve-plates L L. The cylinder B is provided at suitable intervals on its exterior face with packing-rings M M. Communicating with the base of said cylinder B is the inlet-port N, to which is attached the inlet-pipe O, provided with a plug shut-off P and a check-valve R between said plug shut-off and the port. On the opposite side of the chamber B from the inlet-port N and near the top thereof the casing is provided with an outlet-port S, communicating with which is a vertical pipe T, engaging in the lower end of the projecting portion A' of the top plate B'. Pivotaly arranged at the top of this vertical pipe T is a flap-valve C', held in position by a spring D', attached thereto, and to a lug E', protruding into the port F'. The port F' extends partly through the plate B' and communicates with the cylinder B and with the vertical pipe T. About midway of the length of the cylinder A, preferably on the same side as the inlet-pipe, is a discharge-port O'. In the projecting portion A' of the plate B' is a rod H', carrying on its inner end a cam K', engaging the sparker L', depending through the plate B'. On the outer end of the rod H' is secured a crank M', to which is attached one end of the pitman N', the other end of which is attached to an eccentric on the engine, which it is not thought necessary to show in order to illustrate my invention.

The operation of my improved gas-engine is as follows: We will assume for this operation that the parts have been secured in their respective positions and the gas is passing through the plug P and the check-valve O to the cylinder B, which it reaches through the ports or openings F. The gas thence passes through the outlet-port S to the vertical pipe T, the pressure of the same lifting the flap-valve C' and admitting the gas into the port F' and into the cylinder A. The gas within the cylinder is then compressed by the movement of the piston-head toward the other end of the cylinder, which is effected by the momentum of the engine. After the gas has been compressed the engine is then rotated manually,

which compresses the gas, and it is exploded by reason of the cam K' coming in contact with the sparker L' as it is rotated by the pitman N'. By locating the check-valve C' within the port F' accidental firing of the charge within the cylinder B is prevented in case any of the products of combustion remain in the cylinder A, and if the gas within the chamber B should be fired the valves L will prevent its going into the inlet-pipe and causing further damage. The force of the explosion drives the piston-head back into its original position and thereby compresses the gas in the lower portion of the cylinder A, which has been drawn in through the inlet-pipe O by the suction caused by the upward movement of the piston-head. As soon as the piston has reached its lowest point the exhaust O' is opened and the products of combustion escape, and at the same time the port or opening S registers with the opening in the cylinder at the end of the pipe T, and the compressed gas in the lower end of the cylinder A rushes through the pipe T and port F' and into the upper end of the cylinder. By permitting the gas to enter the cylinder at the top and the products of combustion to escape at the bottom the cylinder is emptied of the one and filled with the other in a very short time, as must necessarily be the case when the engine is running at a rapid rate of speed. The ports S and O' are so arranged relatively that they are opened and closed to the upper end of the cylinder A at substantially the same instant, thus permitting the inflowing gas to assist in clearing the cylinder of the products of combustion, and by having the charge of gas in the lower end of the cylinder under compression as soon as port S registers with the end of the pipe T a sufficient quantity rushes into the upper end of the cylinder to charge it before the port is closed by being moved beyond the end of the pipe, thus always insuring the full efficiency of the engine.

As above described, it will be seen that my engine is very simple and compact and that it could be substituted for an ordinary steam piston and cylinder by simply removing the one and replacing it with the other and making the necessary connections with the pitman and with the gas-supply.

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

1. In a gas-engine, the combination, with a cylinder, provided with an inlet, an exhaust, and an opening below the exhaust, a plate on each end of the cylinder, one of which is provided with an extension and a port leading therefrom to the interior of the cylinder, a pipe leading from the extension to the opening, a check-valve and igniting devices in the port, and a piston-head within the cylinder, the wall of which is provided with an opening to register with the opening in the cylinder when the head is below the exhaust, substantially as set forth.

2. In a gas-engine, the combination, with a cylinder, provided with an inlet, an exhaust, and an opening below the exhaust, a plate on each end of the cylinder, one of which is provided with an extension and a port leading therefrom to the interior of the cylinder, a projection in the port, a pipe leading from the extension to the opening in the cylinder, a valve in the port at the end of the pipe, a spring between the valve and the projection in the port, and a piston-head within the cylinder, the wall of which is provided with an opening to register with the opening in the cylinder when the head is below the exhaust, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL E. MAXWELL.

Witnesses:

HIRAM G. MILLER,

II. H. GRAHAM.