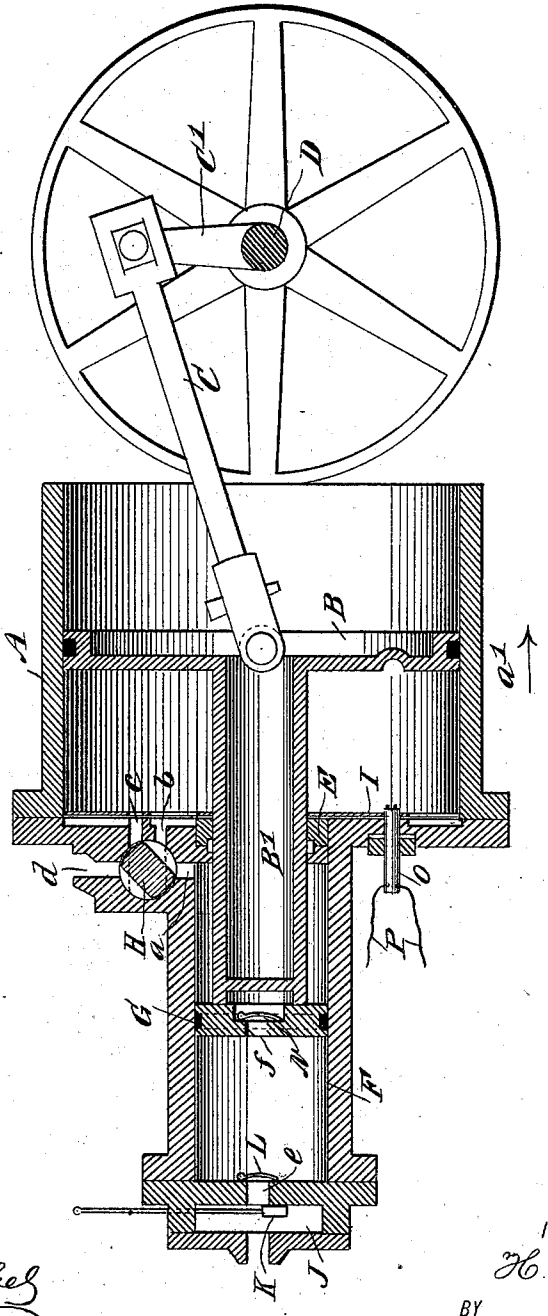
(No Model.)

H. L. PARKER.

GAS ENGINE.

No. 560,920. Patented May 26, 1896.



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HARRY L. PARKER, OF PRINCETON, ILLINOIS.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 560,920, dated May 26, 1896.

Application filed August 14, 1895. Serial No. 559,283. (No model.)

To all whom it may concern:

Be it known that I, HARRY L. PARKER, of Princeton, in the county of Bureau and State of Illinois, have invented certain new and useful Improvements in Gas-Engines, of which the following is a full, clear, and exact description.

The object of the invention is to provide certain new and useful improvements in gas-engines, whereby the motive power is utilized to the fullest advantage and the charge can be varied to suit the work of the engine.

The invention consists of an auxiliary cylinder having a valved connection with the main cylinder and provided with a valved piston moving in unison with and traveling in the same direction as the main piston.

The invention also consists of certain parts and details of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawing, forming a part of this specification, in which the figure is a sectional side elevation of the improvement.

The gas-engine is provided with a main cylinder A, containing a main piston B, connected by a pitman C with a crank-arm C′, held on the main driving-shaft D. The piston B is provided with a rearwardly-extending hollow piston-stem B′, passing through a stuffing-box E into an auxiliary cylinder F, formed or secured on the head of the main cylinder A. In this auxiliary cylinder F operates an auxiliary piston G, secured on the end of the piston-stem B′, and serving to compress and draw in the explosive mixture, as hereinafter more fully described.

The inner end of the cylinder F is connected by a port *a* with a valve H, preferably made in the form of a conical plug made to turn in suitable bearings and operated by suitable mechanism from the main driving-shaft D. The valve H is adapted to connect the port *a* with a second port *b*, leading into the cylinder A, and from the latter leads a port *c* to the valve H to connect with an exhaust-port *d*, leading to the outer air. Thus, when the valve H is in the position shown in the drawing, the cylinders F and A are connected with each other by the ports *a* and *b*; but when the piston B begins the return or inward stroke then the valve H shifts into the position shown in dotted lines to close the port *b* and to connect the ports *c* and *d* with each other. Dotted lines show position of valve when main crank is on dead-center, and all ports are then closed. Upon the return stroke of the piston B the valve H inclines in opposite directions.

On the inner end of the cylinder A is arranged a perforated diaphragm I for preventing the mixture from burning faster than it enters the cylinder A through the port *b*. On the outer end of the cylinder F is arranged a chest J, connected with the gas and air supply and containing a valve K, operating over a port *e*, controlled at its inner end by a self-closing valve L within the cylinder F. A similar port *f* is in the piston G, and is controlled at its inner end by a self-closing valve N, to permit the explosive mixture to pass through the piston G from one end of the cylinder F to the other end.

The ignition of the explosive mixture within the cylinder A is preferably done by electrodes held in a porcelain tube O set in the head of the cylinder A, the electrodes being connected with an induction-coil by terminals P.

The operation is as follows: When the piston B moves forward in the direction of the arrow *a*′, then the piston G is drawn in the same direction, thereby causing the explosive mixture contained in the chest J to pass through the port *e* and valve L into the outer end of the cylinder F. The amount of the mixture thus drawn into the cylinder F can be regulated by the valve K. On the return stroke of the pistons B and G the mixture in the outer end of the cylinder F passes through the port *f* and valve N into the forward end of the cylinder F and is compressed therein at the time the piston G reaches the outer end of the cylinder F. The mixture is now under a pressure of four or more atmospheres, according to the relative diameters of the cylinder F and the enlarged piston-stem B′. The object of making the piston large is to give this initial pressure. The next forward stroke does not influence this pressure. Unless the engine is carrying full load the pressure will always be less than the relative diameters require, as the mixture is throttled at K. The valve H is now in the position shown in the

drawing to admit the mixture into the cylinder A, in which it is ignited at the proper time, to give an impulse to the piston B. During this operation another charge is drawn into the outer end of the cylinder F, as previously explained, and a new impulse is given to the piston B at each revolution of the engine. It is understood that the force which drives the main piston B forward will be three or more times in excess of the force which holds the auxiliary piston G back, so as to give the mixture of gas and air a chance to expand a little over three times in volume before exhausting the gases from the cylinder A. It is understood that the relative sizes of the cylinders A and F can be varied without departing from my invention. It is understood that when the piston B is on the return stroke—that is, in the inverse direction of the arrow *a'*—the valve H changes position, so as to connect the ports *c* and *d* with each other and permit the burned gases to pass to the outer air, and at the same time close the ports *a* and *b*, so that the mixture for the next charge may be compressed.

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

1. In a gas-engine, the combination with the main cylinder, and its piston, of an auxiliary cylinder having a valved connection at its inner end with the main cylinder and provided with a valved inlet for the explosive mixture at its outer end, and a piston in the auxiliary cylinder and provided with a valve for admitting the explosive mixture to the inner end of the auxiliary cylinder, said piston moving in unison with and traveling in the same direction as the piston of the main cylinder, substantially as described.

2. In a gas-engine, the combination with the main cylinder, and its piston, of an auxiliary cylinder of less diameter than the main cylinder and having at its inner end a valved connection with the said main cylinder and provided with a valved inlet for the explosive mixture at its outer end, and a piston in the auxiliary cylinder and connected with the piston of the main cylinder to be operated by and to move in unison therewith, said piston being provided with a valve for admitting the explosive mixture to the inner end of the auxiliary cylinder, substantially as described.

3. In a gas-engine, the combination with the main cylinder, and its piston having an enlarged piston-stem, of an auxiliary cylinder into which the said piston-stem projects, said auxiliary cylinder being of less diameter than the main cylinder and having a valved connection at its inner end with the main cylinder and a valved inlet at its outer end for admitting the explosive mixture thereto, and a piston on the end of the said stem and having a valve for admitting the explosive mixture to the inner end of the auxiliary cylinder, substantially as described.

4. In a gas-engine, the combination with the main cylinder, a piston therein and having an enlarged piston-stem, and means for operating the piston, of an auxiliary cylinder into which the stem of the said piston projects, said cylinder being of less diameter than the main cylinder and provided at its outer end with a valved inlet for admitting the explosive mixture thereto, a piston on the end of the piston-stem and provided with a valved inlet for admitting the explosive mixture to the inner end of the auxiliary cylinder, and a valve for controlling communication between the said cylinders at their adjacent ends, said valve being operated from the main-piston-operating mechanism, substantially as described.

5. A gas-engine, comprising a main cylinder containing a piston, an auxiliary cylinder, a piston operating therein and held on the piston-stem of the main piston, a valve in the said auxiliary piston for controlling the flow of the explosive mixture from one end of the auxiliary cylinder to the other, and a valve controlling the admission of the said explosive mixture from the auxiliary cylinder into the main cylinder, substantially as shown and described.

6. A gas-engine, comprising a main cylinder containing a piston, an auxiliary cylinder, a piston operating therein and held on the piston-stem of the main piston, a valve in the said auxiliary piston for controlling the flow of the explosive mixture from one end of the auxiliary cylinder to the other, a valve controlling the admission of the said explosive mixture from the auxiliary cylinder into the main cylinder, and a chest containing a valve and connected with the gas and air supply and with the outer end of the said auxiliary cylinder, substantially as shown and described.

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Witnesses:
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