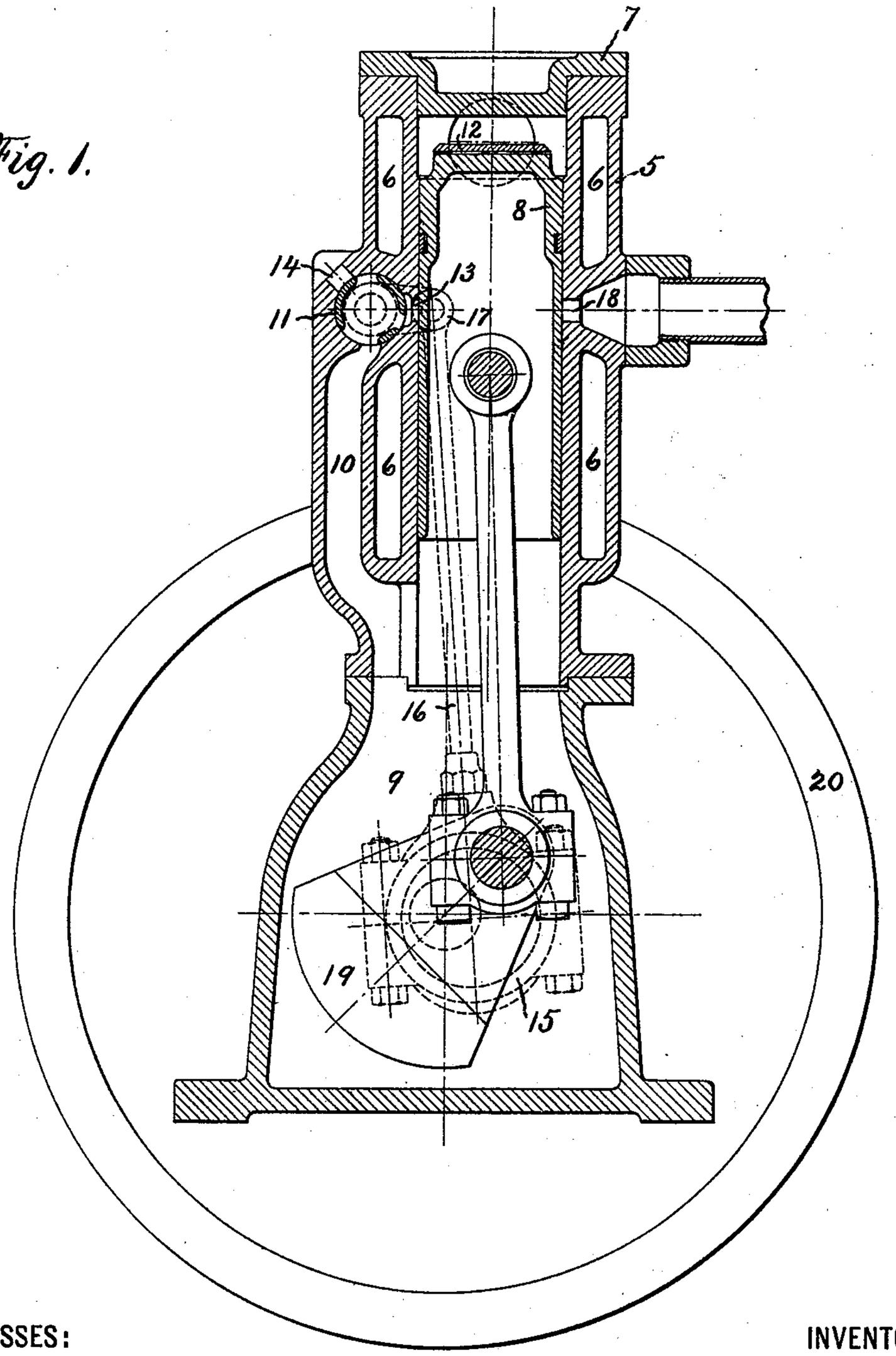
(No Model.) 2 Sheets—Sheet 1.

L. H. NASH.

GAS OR OIL ENGINE.

No. 583,628. Patented June 1, 1897.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

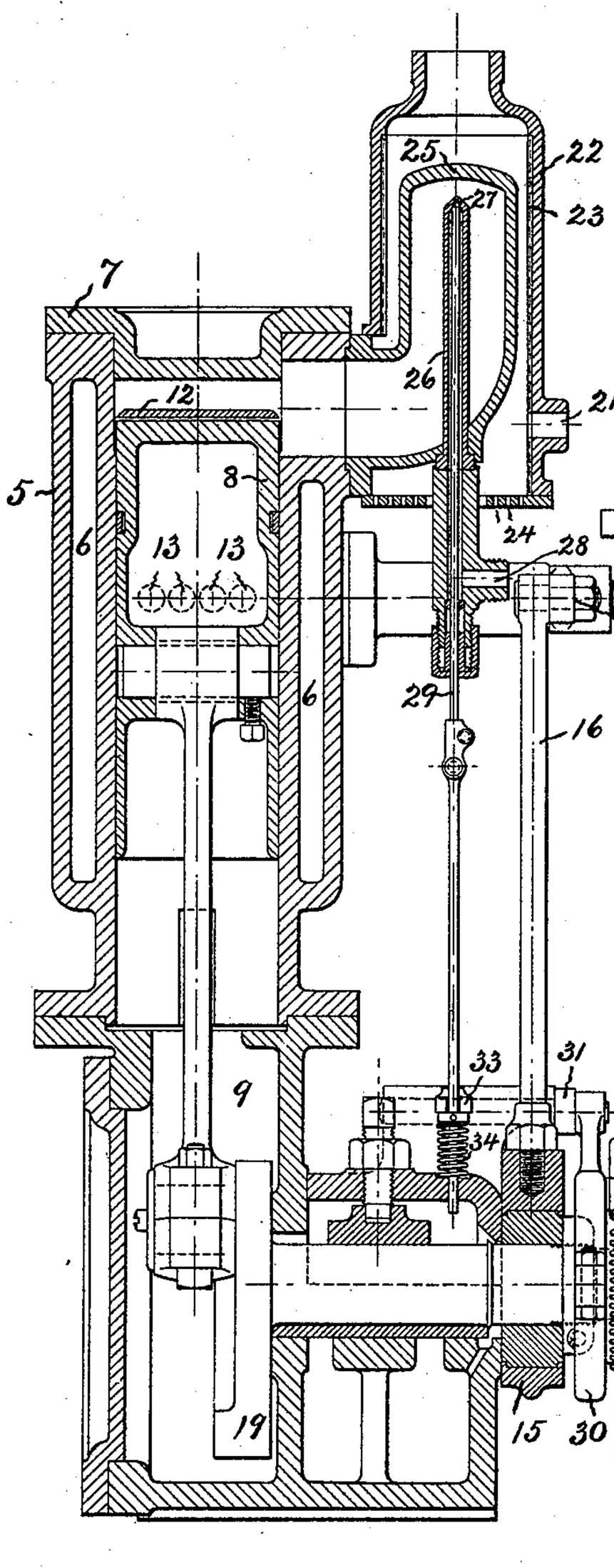
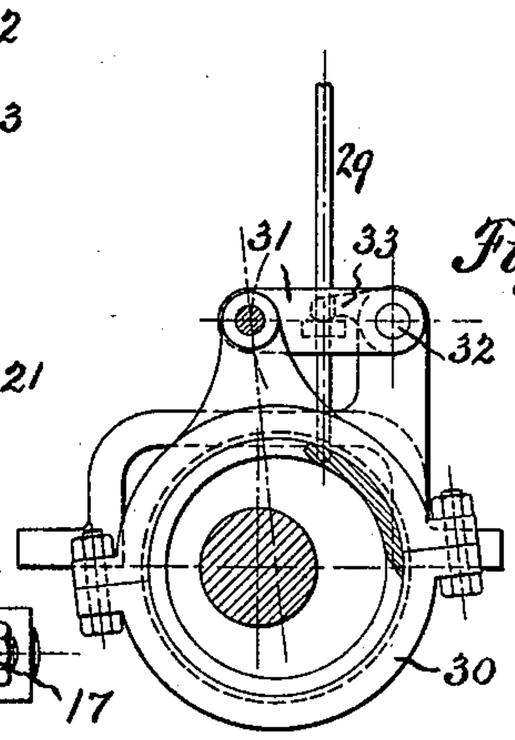


Fig. 3.



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UNITED STATES PATENT OFFICE.

LEWIS HALLOCK NASH, OF SOUTH NORWALK, CONNECTICUT, ASSIGNOR TO THE NATIONAL METER COMPANY, OF NEW YORK, N. Y.

GAS OR OIL ENGINE.

SPECIFICATION forming part of Letters Patent No. 583,628, dated June 1, 1897.

Application filed January 14, 1896. Serial No. 575,459. (No model.)

To all whom it may concern:

Be it known that I, LEWIS HALLOCK NASH, a citizen of the United States, and a resident of South Norwalk, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Gas or Oil Engines, of which the following is a specification.

My invention relates to gas or oil engines; and it consists of certain parts or combinations of parts particularly pointed out in the claims concluding this specification.

In the accompanying drawings, Figure 1 is a vertical section through a gas-engine involving my invention. Fig. 2 is a vertical section of the same on a plane at right angles to that shown in Fig. 1, and Fig. 3 is a detailed view of the governing device.

In the accompanying drawings I have shown my invention applied in the forms which are at present preferred by me; but it will be understood that various modifications and changes may be made without departing from the spirit of my invention and without exceeding the scope of the concluding claims.

The following is a description of the preferred form of structure shown in the drawings.

5 is the cylinder, and 6 6 are water-jackets of ordinary construction.

7 is a cylinder-head.

8 is the piston.

9 is a compression-chamber communicating with the valve 11 by means of duct 10. The valve 11 is of the rotating or oscillating type, and in connection with the piston 8 controls the admission of air to the compression-chamber 9 and into the power-chamber 12. When the piston 8 and the valve 11 are in the position shown in Fig. 1, the valve is closed. The admission of air to the cylinder is prevented by one of its faces and the admission of compressed air to the chamber 12 is prevented by the piston-face closing the port 13. The piston in this position has just begun its downward stroke and is therefore compressing air in the chamber 9. When on descending it has uncovered the port 13, the compressed air enters the chamber 12. When the piston on returning closes the port 13, the valve is rotated so as to open the air-admission port 14 and to permit the entrance of air to the chamber 9. The motion of this valve is controlled by the eccentric 15, connected to the valve by means of the rod 16 and crank 17.

19 is a counterbalance-weight for the crank and connections.

20 is the fly-wheel.

Referring to Fig. 2, 22 is a hood or chimney provided with an interior layer of asbestos or other suitable non-conducting material 23, provided at its lower end with openings 24 and with a lateral opening 21, through which a Bunsen flame is introduced on starting the engine.

25 is a permanent igniter and evaporator.

26 is a tube having a valve-seat 27 at its inner end, through which tube oil is introduced into the evaporating and igniter chamber 25.

28 is the oil-duct.

The valve-rod 29 is caused to reciprocate by means of the mechanism shown in Figs. 2 and 3. An eccentric 30 operates an arm 31, shaft 32, and arm 33. The eccentric 30 causes the arm 33 to depress the rod 29 against the force of the coiled spring 34 at suitable intervals, thereby opening the valve 27 and permitting the injection of oil. This eccentric 30 in its operation is controlled by a governor-weight 35 of ordinary construction, which varies the throw of the eccentric and therefore the movement of the arm 33. The oil-duct 28 extends up into the igniting-chamber and the oil is therefore heated before it passes the valve 27.

The operation of the device is as follows: Air is compressed in the chamber 9 by the downward stroke of the piston and is admitted to the power-chamber 12 when the piston is at the bottom of its stroke. In this position the upper face of the piston is level with or projects above the inlet-port 13, due to the fact that it is contracted in cross-section near the top. (See Fig. 1.) This upper portion of the piston deflects the inrushing current of air upward, causing a complete or nearly complete evacuation of the spent gases through the exhaust-port 18. The piston ascending closes the inlet and exhaust ports and compresses the charge of atmospheric air in the power-cylinder and in the evaporating and

igniting chamber, which is in free communication therewith. While the piston is on its upward stroke oil is admitted into the igniting and evaporating chamber and is there converted into a vapor by contact with the hot walls of the chamber 25 and is at the same time there mixed with a small portion of air. As the piston ascends compressed air is forced into the evaporating and igniting chamber, compressing the vapor above it, but not forming therewith a complete mixture until the piston on its upward stroke has passed the lower edge of the mixing-chamber, when a jet of air is injected into that chamber, the velocity of said jet increasing as the space above the piston contracts, or, in other words, as the orifice through which the air passes into the evaporating-chamber diminishes. Thus a jet of air is forced into the mixing-chamber, which agitates and mixes its contents and forms a complete combustible mixture which is ignited by the hot walls of the chamber. The agitating-jet of compressed air referred to is caused by the contraction of the clearance space, as will be readily understood by reference to Fig. 2. The explosion which follows drives the piston downward, and during its downward stroke air is drawn into the compression-chamber 9. When it has reached its lowest position, the inrushing of compressed air clears the chamber of spent gases, as already described.

I have described the engine shown operating as an oil-engine, but it might be operated by gas, either by introducing the gas through the valve 27, as shown, or by introducing a combustible mixture formed externally, in which latter case suitable changes now known in the art to adapt it for the new conditions should of course be made. The evaporator and igniter might be used with any other form of engine—for example, a four-cycle engine. Similarly, the construction minus the igniter could be used with any other form of igniter, either permanent or controlled.

In the foregoing specification I have incidentally referred to some of the modifications which might be adopted in the practice of my invention, but I have not endeavored to specify all the modifications which might be employed, the object of this specification being to instruct persons skilled in the art to practice my inventions in their present preferred forms and to enable them to understand their nature; and I desire it to be distinctly understood that mention by me of a few modifications is in no way intended to exclude others not referred to, but which are within the spirit and scope of my invention.

Many of the details and combinations illustrated and above described are not essential to the several inventions, broadly considered. All this will be indicated in the concluding claims, where the omission of an element or the omission of reference to the detail features of the elements mentioned is intended to be a formal declaration of the fact that the omitted elements or features are not essential to the inventions therein severally covered.

What I claim is—

1. In a gas-engine the combination with a permanent igniter of a mixing-chamber into which fuel and compressed air are introduced, said chamber being in free communication with the power-cylinder and means for causing an agitating-jet of atmospheric air to be introduced into said chamber at or before the instant of explosion to mix its contents and form a combustible charge.

2. In a gas-engine the combination with a permanent igniter of a chamber into which a fuel is introduced, means for introducing into said chamber a charge of air and for compressing therein without mixing the air and fuel and means for injecting therein an agitating-jet of air at or before the instant of explosion to mix its contents and form a combustible charge.

3. In a gas-engine, the combination with the valve for admitting the charge or a component part thereof of levers 31, 33 and rock-shaft 32, with the eccentric having a variable throw controlled by governor-weight 35.

4. In a gas-engine, a permanent igniter combined with a chamber into which fuel and compressed air are introduced and finally mixed, said chamber being in free communication with the power-cylinder through a lateral opening and a piston which when approaching the limit of its upward stroke leaves a clearance-space in the power-cylinder of smaller cross-section than the passage to the mixing-chamber.

5. In a gas-engine, the combination with the power-cylinder of a mixing-chamber into which fuel and compressed air are introduced, said chamber being in free communication with the power-cylinder and means for causing an agitating-jet of atmospheric air to be introduced into said chamber at or before the instant of explosion to mix its contents and form a combustible charge.

6. In a gas-engine, the combination with a power-cylinder of a chamber into which fuel is introduced, means for introducing into said chamber a charge of air and for compressing therein air mixing the air and fuel, and means for injecting therein an agitating-jet of air at or before the instant of explosion to mix its contents and form a combustible charge.

7. In a gas-engine the power-cylinder combined with a chamber into which fuel and compressed air are introduced and finally mixed, said chamber being in free communication with the power-cylinder through a lateral opening and a passage which when the piston is approaching the limit of its upward stroke leaves a clearance-space in the power-cylinder of smaller cross-section than the passage in the mixing-chamber.

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Witnesses:
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C. RATHJEN.