No. 664,025. Patented Dec. 18, 1900.

L. H. NASH.

GAS ENGINE.

(Application filed Mar. 1, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

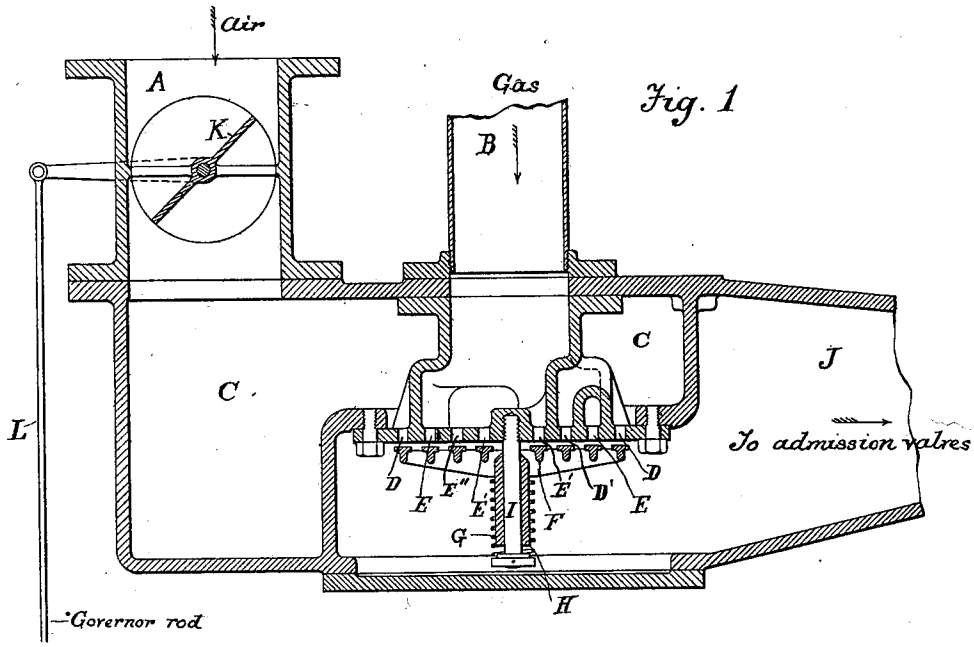


Fig. 3

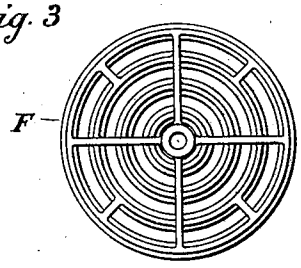
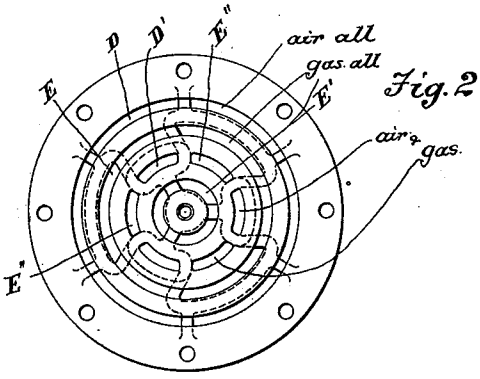


Fig. 2



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Fig. 4

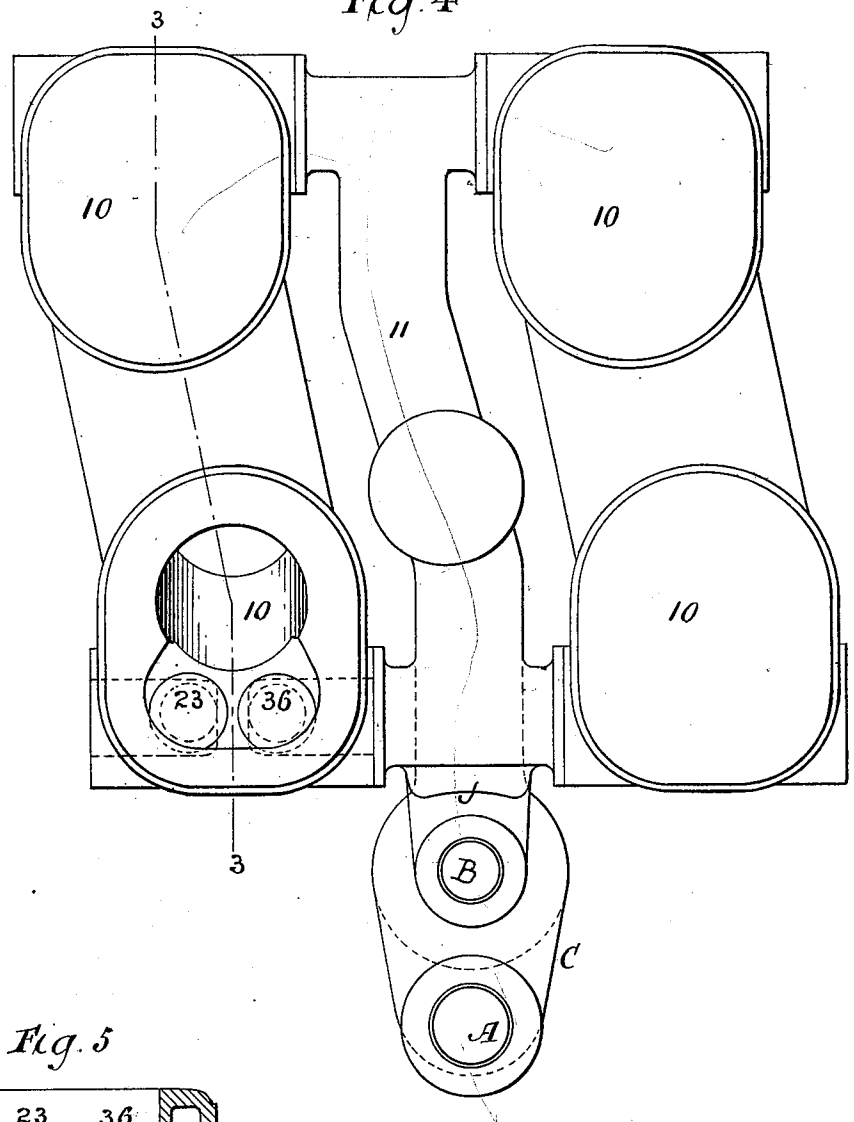
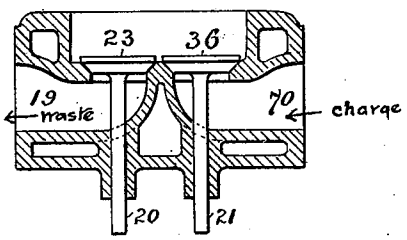


Fig. 5



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UNITED STATES PATENT OFFICE.

LEWIS HALLOCK NASH, OF SOUTH NORWALK, CONNECTICUT.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 664,025, dated December 18, 1900.

Application filed March 1, 1897. Serial No. 625,431. (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-Engines, of which the following is a specification.

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

In the accompanying drawings I have shown my invention applied in the form which is 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.

Figure 1 is a longitudinal section through a mixing device involving some of the features of my present invention. Fig. 2 is a top view of the ports of the mixing device. Fig. 3 is a bottom view of the valve for controlling the ports shown in Fig. 2. Fig. 4 is a top view of the power-cylinders and valve mechanism, and Fig. 5 is a vertical section through the admission and exhaust valves.

The following is a description of the structures illustrated in the accompanying drawings.

Referring to Fig. 1, A is the air-inlet to the mixing-valve, and B the gas-inlet to the same. C C is the chamber, into which the air-inlet leads. D D is an annular port connected throughout its entire length with the air-inlet. E E is an annular port connected throughout its entire length with the gas-inlet. E′ E′ is another annular port connected throughout its entire length with a gas-inlet. D′ D′ and E″ E″ E″ form a ring of alternate air and gas ports. F is a valve for controlling all of the ports above described. In the mixing-valve herein shown the areas of the air and gas ports are substantially equal, because the structure here shown is designed to be used in connection with producer-gas, the combustible mixture in this instance being formed by a mixture of substantially equal parts of such gas and air; but it will be understood that when other qualities of fuel are employed the areas of the gas and air ports should be properly proportioned with reference to the quality of the gas and the character of the combustible charge to be used. H is the hollow sleeve attached to the valve F and forming a bearing with the stud I, on which it moves longitudinally. G is a spring for forcing the valve upon its seat to close the ports. The valve is opened by the suction of the engine. J is a passage leading to the admission valve or valves of the power cylinder or cylinders. K is a valve arranged in the air-inlet to control the amount of air supplied to the mixture. The gas-inlet might be, if preferred, provided with a valve, and in this case the valve in the air-inlet might be omitted. L is a rod attached to the governor device, which may be of any desired description, by means of which governor the valve K is controlled.

Referring to Fig. 4, this shows an engine in which there are four power-cylinders. 10 10 10 10 are the power-cylinders, each of which is provided with suitable entrance and exhaust valves, as 23 36. These are shown in detail in Fig. 5, in which 70 is the inlet for the charge and 19 the outlet for the waste gases, these passages being respectively controlled by the valves 36 and 23, carried on valve-stems 21 and 20, operated by any suitable mechanism, so that the cylinders may receive and exhaust their charges at the proper time and in the proper order. In the engine illustrated (which is a four-cycle engine) the cylinders are preferably put into action, so that there shall be a power impulse at each cycle of operation. 11 is a duct connecting with the duct J and with the inlet-valves of all four cylinders, to which it constitutes a common supply-duct.

The operation is as follows: Air in controlled quantities is admitted through inlet A, and gas is admitted through inlet B. The air and gas issuing from the annular or circular ports strike against the upper faces of the circular valve-sections and are thus spread out and a jet of air and a jet of gas are caused to impinge upon each other at angles, thus insuring a complete intermingling of the two elements of the combustible charge. The gas issuing through the ports E″ is not in this way mixed with air; but this is a mere incident of the form of structure shown in the drawings. If preferred, these ports E″ and D′ could be wholly air-ports, in

which case the annular air-ports and gas-ports would alternate. It is not necessary, however, that these ports strictly alternate in this way, because by the structure shown an approximately even mixture is effected and during its passage to the inlet ports and cylinders whatever inequalities in the mixture there may be are equalized.

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 invention in the form at present preferred by me and to enable them to understand its 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. An air and gas mixing device provided with concentric ports alternately communicating respectively with the air and gas supply and a valve composed of similar concentric rings and ports adapted to cover the admission-ports.

2. An air and gas mixing device, provided with ports alternating with bars, and constituting a grid, said ports being connected part with the air-supply and part with the gas-supply, combined with a valve having alternating ports and bars, the bars of one member registering with the ports of the other.

3. In a gas-engine an air-supply, a throttle controlling the air-supply, a valve-seat having independent air and fuel supply ports, a fuel-supply, and a suction-lifted valve common to said air and fuel supply ports.

4. In a gas-engine an air-supply, a throttle controlling the air-supply, means controlled by the speed of the engine for throttling the air-supply, a valve-seat having independent air and fuel supply ports, a fuel-supply, and a suction-lifted mixing-valve common to both said air and fuel supply ports, substantially as described.

5. In combination, in a gas-engine, an air-inlet chamber and a gas-inlet chamber surrounded by the former, a fixed disk having a concentric port outside of the gas-inlet chamber, and a series of concentric rings and ports within the gas-inlet chamber, a spring-sustained disk valve provided with multiple concentric rings and intervening ports, the latter being opposite the rings of the fixed inlet-disk and closed by them.

6. In a gas-engine and in combination with a fixed disk having a series of concentric ports, an air-inlet and a gas-inlet surrounded by the latter both inlets in communication with the upper face of the disk, a valve provided with multiple concentric rings and intervening ports, the rings of the valve being opposite the fixed ports and a spring for forcing the valve upon the ported disk.

7. In a gas-engine, a mixing device composed of a fixed and a movable disk, the fixed member having multiple concentric ports and the valve having concentric rings and ports, the rings controlling the ports of the fixed member the outer port of which is in communication with the air-inlet chamber and the inner port in communication with the gas-inlet chamber and the jets of air and gas from their respective chambers caused to impinge upon each other to insure a complete commingling of the two elements of the combustible charge.

8. A fixed mixing-disk for a gas-engine having an outer annular port in communication with the air-inlet, and a series of concentric ports in communication with the gas-inlet, in combination with a valve having concentric rings and ports arranged to control all the disk-ports, the gas-inlet chamber, and the air-inlet chamber surrounding the former, both chambers in communication with the fixed disk.

9. In a mixing device for gas-engines, and in combination with a valve-controlled inlet-chamber and an uncontrolled gas-inlet chamber surrounded by and separated from the former, a disk provided with concentric ports, the outer one in communication with the air-inlet chamber and multiple inner concentric ports in communication with the gas-chamber, and a spring-sustained valve of concentric rings and ports for controlling the inlet-ports, the inlet from both chambers being at the same side of the fixed disk.

10. In a gas-engine an air-supply having an automatically-controlled regulator or throttle therein, a fuel-supply joining the air-supply between said regulator and the engine, a valve-seat having independent air and fuel supply ports, and a suction-opened valve controlling the ports of both the air and fuel supply.

11. In a gas-engine an air-supply, an automatically-controlled throttle therein, a gas-supply joining the air-supply between the throttle and the engine, a ported plate or valve-seat having certain ports connected with the air-supply and other ports connected with the gas-supply, and a suction-opened valve controlling all of said ports.

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