No. 656,408. Patented Aug. 21, 1900.

J. W. LAMBERT.

GAS ENGINE GOVERNOR VALVE.

(Application filed May 2, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

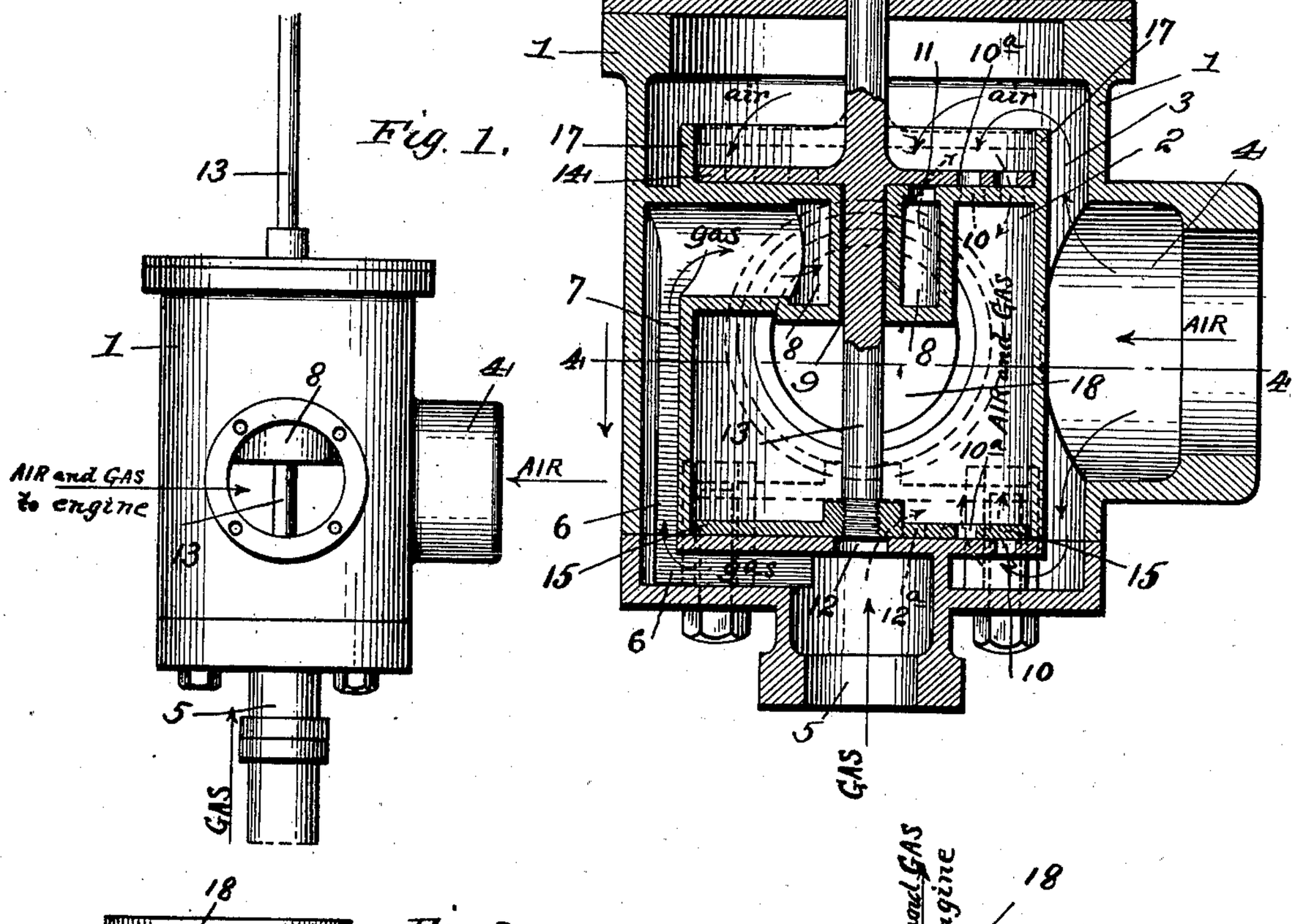


Fig. 2.

Fig. 3

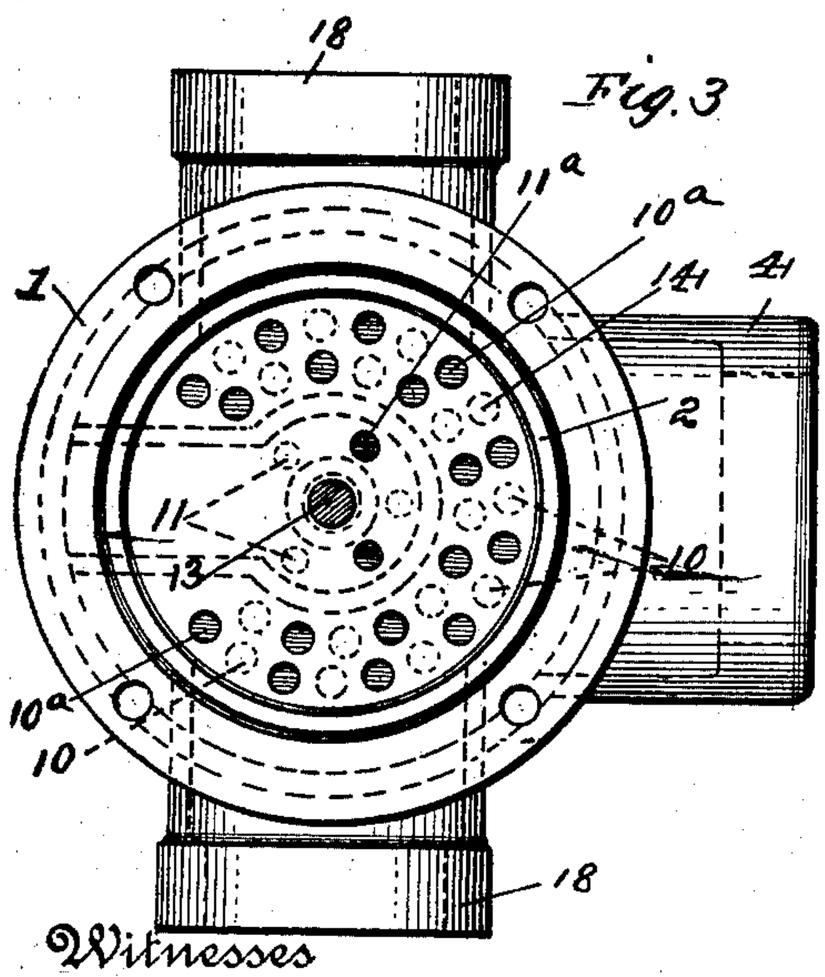
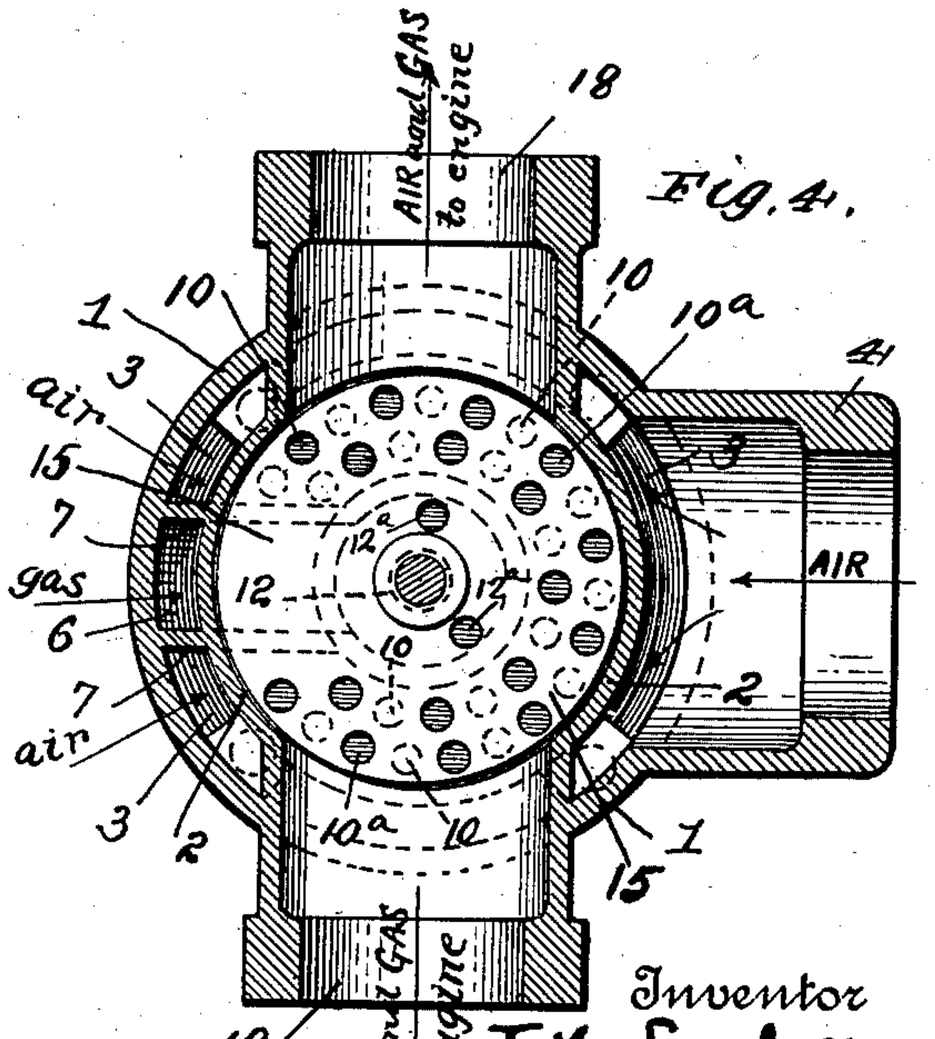


Fig. 4.



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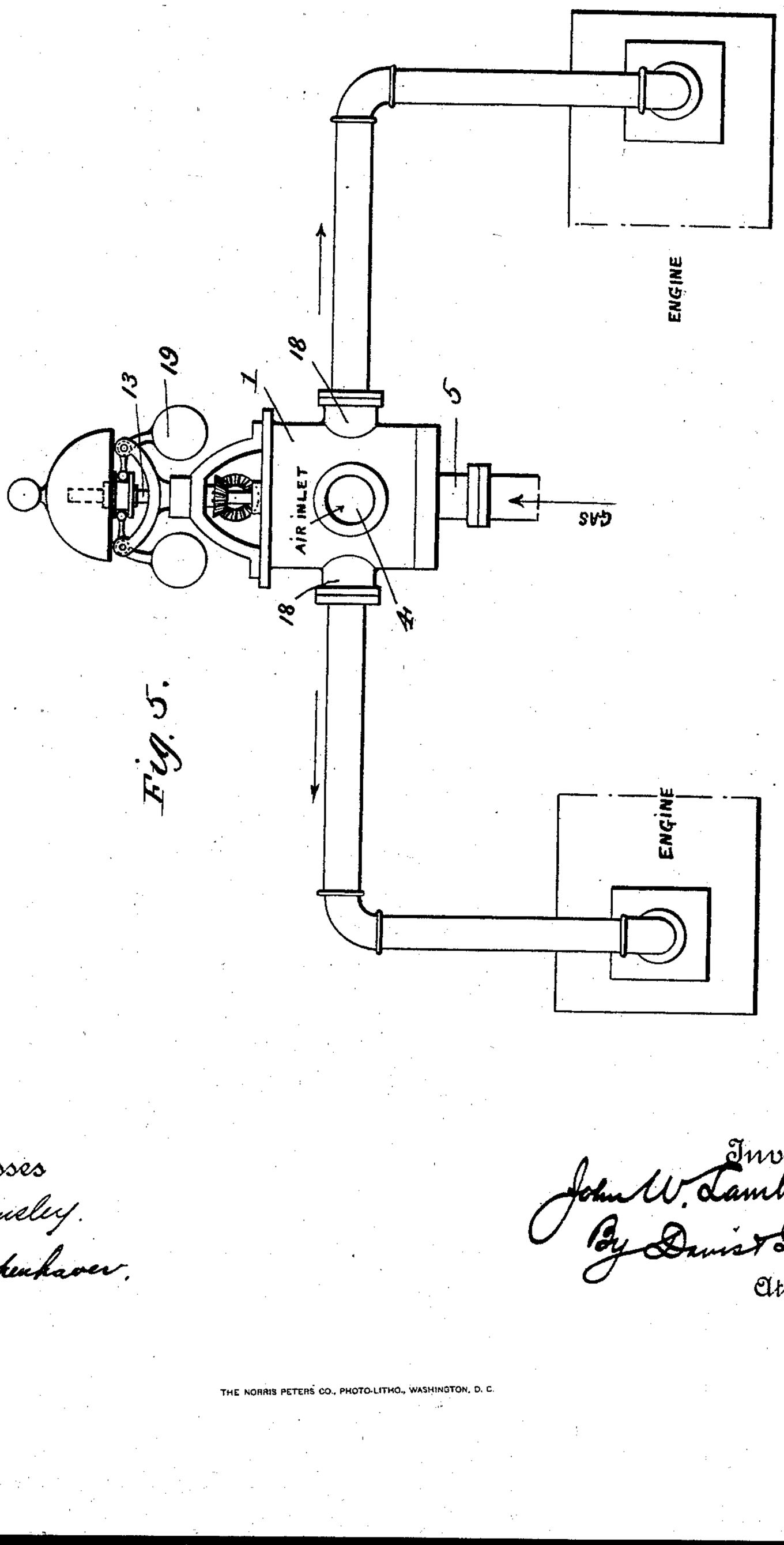

Fig. 5.

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UNITED STATES PATENT OFFICE.

JOHN W. LAMBERT, OF ANDERSON, INDIANA, ASSIGNOR TO THE BUCKEYE MANUFACTURING COMPANY, OF SAME PLACE.

GAS-ENGINE GOVERNOR-VALVE.

SPECIFICATION forming part of Letters Patent No. 656,408, dated August 21, 1900.

Application filed May 2, 1899. Serial No. 715,319. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. LAMBERT, a citizen of the United States, residing at Anderson, county of Madison, State of Indiana, have invented certain new and useful Improvements in Gas-Engine Governor-Valves, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is a side elevation of the valve-casing. Fig. 2 is a central vertical sectional view thereof. Fig. 3 is a plan view, one end being removed. Fig. 4 is a horizontal sectional view taken on line 4 4 of Fig. 2, and Fig. 5 is a diagrammatic view showing the device connected to a gas-engine and governor.

One object of the invention is to provide means for automatically and simultaneously controlling the admission of air and gas to the mixing-chamber in such a manner that the proportions of air to gas admitted will remain the same, while the volume will be varied according to the speed of the engine.

Another object of the invention is to secure the thorough mixing of the air and gas before said mixture is permitted to enter the cylinder of the engine.

Referring to the various parts by numerals, 1 designates the outer casing of the valve, which is shown as cylindrical, but which may be of any desired form. Supported centrally within this casing is the mixing-chamber 2. Opening into the air-space 3 formed between the walls of the valve-casing and the mixing-chamber is an air-inlet 4, said inlet being the only opening through the casing 1 into said air-space. The mixing-chamber is so supported within the valve-casing that the air-space extends practically entirely around it and above and below it. Entering through the center of the bottom of the valve-casing is a gas-inlet 5, which connects with a gas-duct 6, which is formed by the walls of the valve-casing and of the mixing-chamber, and the partitions 7, which bridge the space between said walls. This gas-duct extends up the side of the mixing-chamber and opens into a central gas-chamber 8 at the top of and within the mixing-chamber, said chamber being formed with a vertical central tubular passage 9. The upper and lower heads or walls of the mixing-chamber are each provided with a series of perforations 10, which put the air-space 3 and the mixing-chamber into communication with each other at each end of the chamber. The upper wall of the gas-chamber 8 is provided with a series of perforations 11, which permit gas to flow out from the gas-chamber 8, and the lower wall of said mixing-chamber is provided with a central opening 12, which permits gas to flow into the mixing-chamber from the gas-duct 6. Passing centrally through the upper closed head of the valve-casing and through the passage 9 of the gas-chamber is a vertical non-rotatable valve-stem 13. Carried by this stem within the casing are two horizontal valve-disks 14 and 15, the upper one, 14, being adapted to fit down closely on the upper side of the top of the mixing-chamber, and the lower one, 15, being within the mixing-chamber and adapted to fit closely down upon the lower wall of the said chamber. These valve-disks are of the same diameter as the adjacent top and bottom walls of the mixing-chamber, and are adapted, when closed down on said walls, to close all the openings therein. Formed in each of these disks is a series of openings 10^a, which correspond with the openings 10, but are out of line therewith, as shown in Figs. 3 and 4, the openings 10 being shown in dotted lines in these figures. The upper disk 14 is formed with a series of openings 11^a, which correspond with the openings 11, said two series of openings being also out of line with each other, and the lower disk is provided with a series of openings 12^a adjacent to the openings 12. The lower disk 15 fits within and is guided in its reciprocation by the walls of the mixing-chamber, while the upper disk fits closely within and is guided by an annular vertical flange 17, formed around the top of the mixing-chamber.

The valve-stem 13 is connected to a governor 19, of any suitable construction, and is reciprocated thereby. When the engine is at rest, the stem 13 is raised by the governor and the valve-disks assume the positions shown by dotted lines in Fig. 2, leaving a space between the top and bottom walls of the mixing-chamber and said disks and permitting free communication between the air-space, gas-duct, and the mixing-chamber.

From the mixing-chamber, midway its ends, there are suitable outlets 18 to the engine-cylinders. The valve shown in the drawings is provided with two openings and is designed for a two-cylinder engine. If it were designed for a single-cylinder engine, only one outlet 18 would be employed.

The passage of gas to the engine-cylinders is controlled in the usual way by means of a valve located between the source of supply and the mixer. When the engine is started, air flows to the space formed between the disk 14 and the adjoining head of the mixing-chamber through the many small openings in the said disk, and gas flows to said space from chamber 8 through openings 11, while air flows into the space formed between the disk 15 and the lower head of the mixing-chamber through the openings 10 in said head and gas flows to said space through opening 12. The gas and air commingle in these spaces and will then flow into the mixing-chamber. From the upper space the flow will be down through the openings in the head of the mixing-chamber, while from the lower space it will be up through the perforations in the disk 15. The air and gas are forced to take a circuitous passage and to pass through many small openings, and enter the chamber in many small commingling streams. By dividing the air and gas and introducing a portion of each through each head of the mixing-chamber in many small commingling jets or streams a thorough mixing of the air and gas is secured. The flange 17 forms the side wall of the air-space between the disk 14 and the top of the mixing-chamber and practically prevents air entering such space except it pass through the perforations in the disk 14.

When the speed of the engine increases beyond the predetermined point considered safe or desirable, the governor will depress the valve-stem 13 and bring the valve-disks nearer the heads of the mixing-chamber, and thereby restrict the free passage of the air and gas and cause the engine to slow down. While this action will decrease the volume of air and gas passing to the mixing-chamber, the proportion of air to gas will always remain the same. Should the engine run at an excessive speed, the governor will force the valve-disks down upon the heads of the mixing-chamber and entirely cut off the passage of air and gas to the mixing-chamber.

If desired, only one end of the mixing-chamber need be perforated and only one valve-disk need be employed.

The advantage of controlling the volume of air and gas flowing to the mixing-chamber by means of the reciprocating disks 14 and 15 is that they provide spaces of variable area in which the air and gas may be partially mixed before passing into the mixing-chamber. Another great advantage of this structure is that the desired proportion of air to gas may be readily secured and surely maintained during the operation of the engine. The air and gas ports may vary in size and number, may be of various shapes, and may be placed in any desired position; in fact may be arranged in any way to secure the desired proportion of air to gas and the proper distribution thereof around the heads of the mixing-chamber, and yet as the valve is reciprocated by the governor the proportion of air to gas will always remain the same. This is so because the cross-sectional area of the jets will always remain the same and the pressure through all the ports into the mixing-chamber will always be equal at any one time. This pressure will change with the reciprocation of the valve, it being greatest when the valve is in its normal position and growing less as the valve-disks are brought nearer to the heads of the mixing-chamber.

I claim—

1. In a gas-engine governor-valve, the combination of a mixing-chamber formed with perforated heads, means for admitting air and gas into the mixing-chamber through each of said perforated heads, perforated valves adapted to fit close against the heads of the mixing-chamber, the perforations in the valves being out of line with the perforations in the heads, a valve-stem carrying the valves, and a means connected to the valve-stem for moving said valves perpendicularly to the plane of the valve-seats to vary the capacity of the valve.

2. In a gas-engine governor-valve, the combination of a casing, a mixing-chamber therein formed with perforated heads, means for admitting air and gas into the mixing-chamber through each of said perforated heads, perforated valves adapted to fit close against the heads of the mixing-chamber but normally held away from said heads, the perforations of said valves being out of line with the perforations of the heads, a valve-stem carrying the valve-disks, and a governor connected to the valve-stem and adapted to reciprocate it.

3. In a gas-engine governor-valve, the combination of a mixing-chamber formed with a perforated head, a perforated valve adapted to fit close against the perforated head of the mixing-chamber, the perforations in said valve being out of line with the perforations in the head, means for reciprocating said valve, and a continuous wall around the edge of said valve to form a tubular part in which said valve reciprocates, said wall preventing the free passage of fluid around the edge of said valve.

4. In a gas-engine governor-valve, the combination of a mixing-chamber formed with a perforated head, a perforated valve adapted to fit close against the perforated head of the mixing-chamber, the perforations in the valve being out of line with the perforations in the head, means for reciprocating said valve and means for preventing the free passage of fluid around the edge of the valve when said valve is raised from the perforated head of the mixing-chamber.

5. In a gas-engine governor-valve, the combination of a casing having an air-inlet, a mixing-chamber in said casing, said chamber being formed with the air and gas ports in each of its ends, a perforated valve near each of the ends of the chamber, the perforations in said valves being out of line with the perforations in the ends of the mixing-chamber, a governor connected to said valves and adapted to normally hold them away from the ends of the mixing-chamber, a gas-admission port 5 at one end of the casing, a gas-chamber 8 within the mixing-chamber, and a gas-passage 6 connecting the gas-inlet 5 with the chamber 8.

6. In a gas-engine governor-valve, the combination of a casing formed with an air-inlet, a mixing-chamber within the casing and formed with air and gas ports in each of its ends, means for conveying gas to said gas-ports, a vertical annular flange extending upward from the top of the mixing-chamber, a perforated valve on top of the chamber and closely fitting within the flange, a perforated valve within the mixing-chamber, a valve-stem connecting said valves together, a speed-governor connected to said stem and adapted to reciprocate it and normally holding the valves away from the chamber ends.

7. In a gas-engine governor-valve, the combination of a casing having an air-inlet, a mixing-chamber 3 therein, said chamber being formed with the flange 17 and with the air and gas admission ports in each of its ends, a perforated valve within the chamber near the lower end and normally held away from said end, a perforated valve surrounded by flange 17 and normally held away from the top of the casing, a gas-chamber 8 within the mixing-chamber at its upper end and formed with an opening communicating with the space between the upper valve and the upper end of the chamber, a gas connection to the chamber 8 and to the space between the lower perforated valve and bottom of the mixing-chamber, a stem connecting the valves together, and a governor device connected to the valve-stem.

8. In a gas-engine governor-valve, the combination of a mixing-chamber having a plurality of perforations formed in its head through which the explosive mixture passes, a valve formed with a plurality of openings, the perforations in the valve being out of line with those in the mixing-chamber head whereby when the two parts are brought together the valve will be closed, a governor connected to the valve and normally holding it away from the perforated head to form a space between the two perforated parts, said governor being adapted to reciprocate the valve and to move it against the perforated head of the mixing-chamber to close the passages into said chamber, whereby fluid passing into the mixing-chamber through the two perforated parts will be divided into a plurality of streams and will be diverted from a straight course in the space between said perforated parts, and the governor will vary said space between said parts as the speed of the engine varies.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 29th day of April, 1899.

JOHN W. LAMBERT.

Witnesses:
G. S. KING,
G. H. LOCKWOOD.