No. 744,438. PATENTED NOV. 17, 1903.

J. S. THURMAN.

GOVERNOR FOR GAS ENGINES.

APPLICATION FILED FEB. 9, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

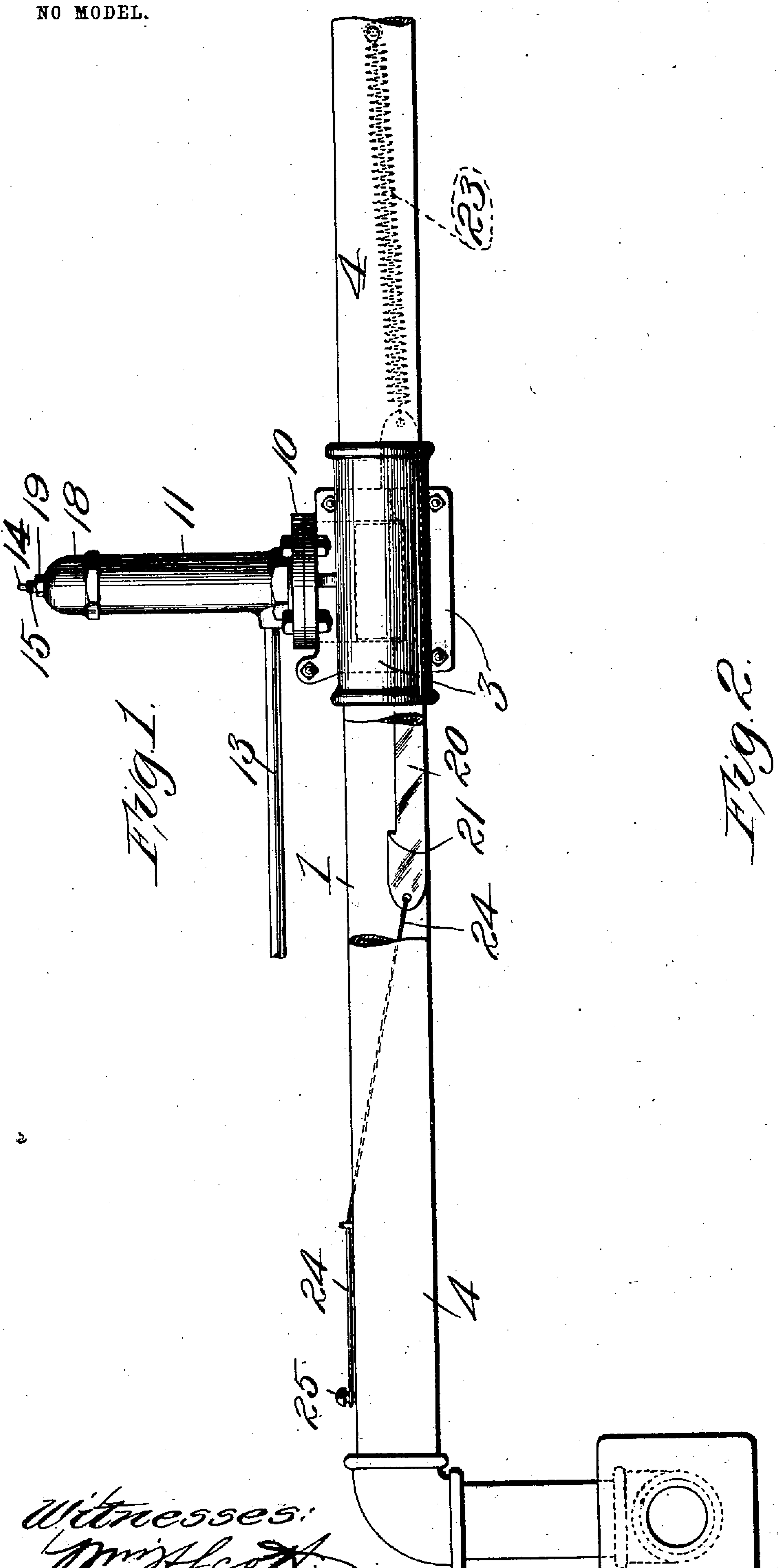

Fig. 1.

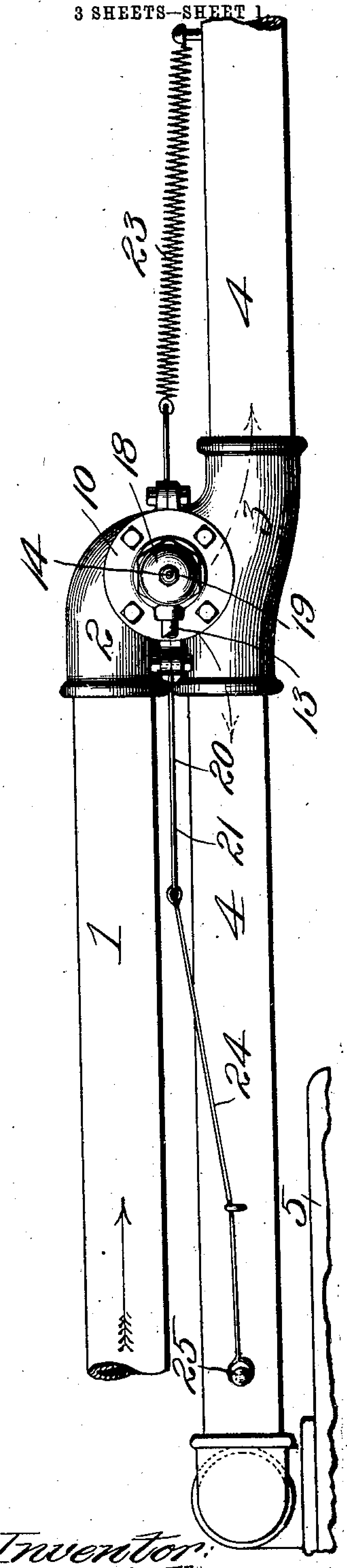

Fig. 2.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

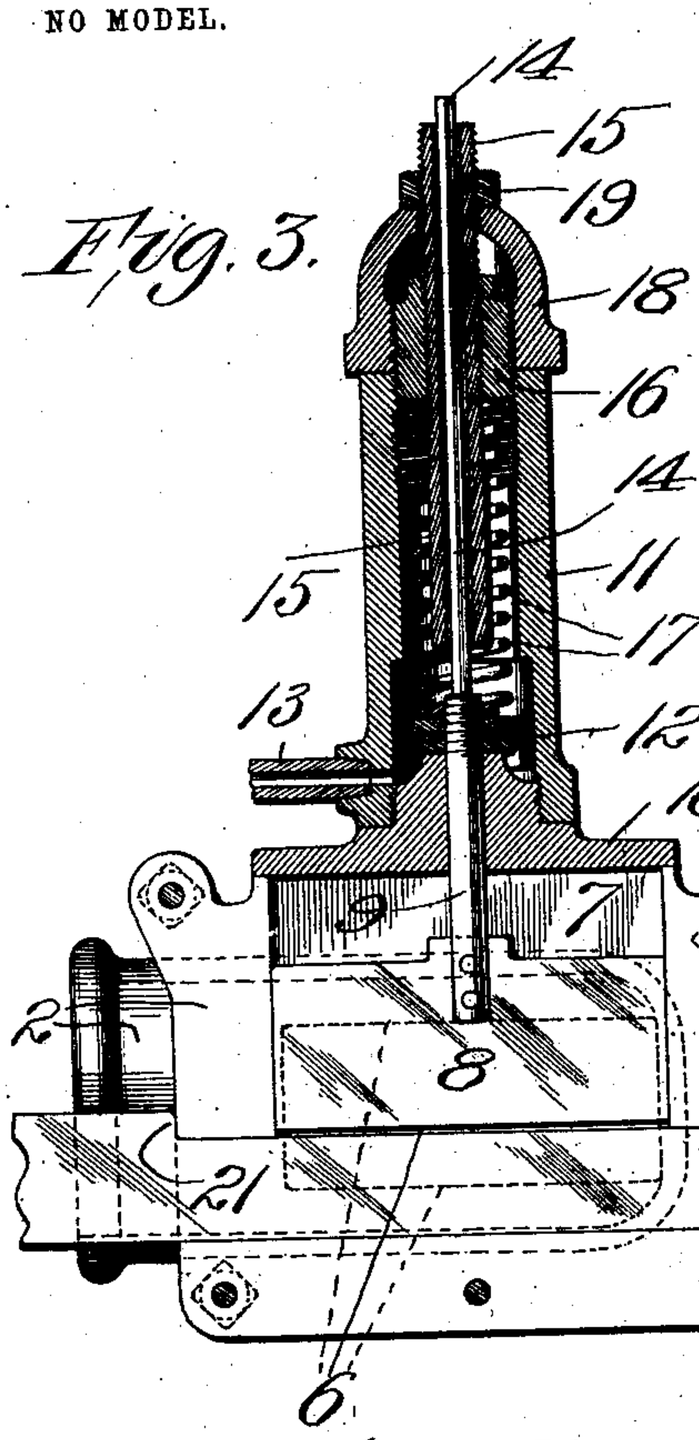


Fig. 4.

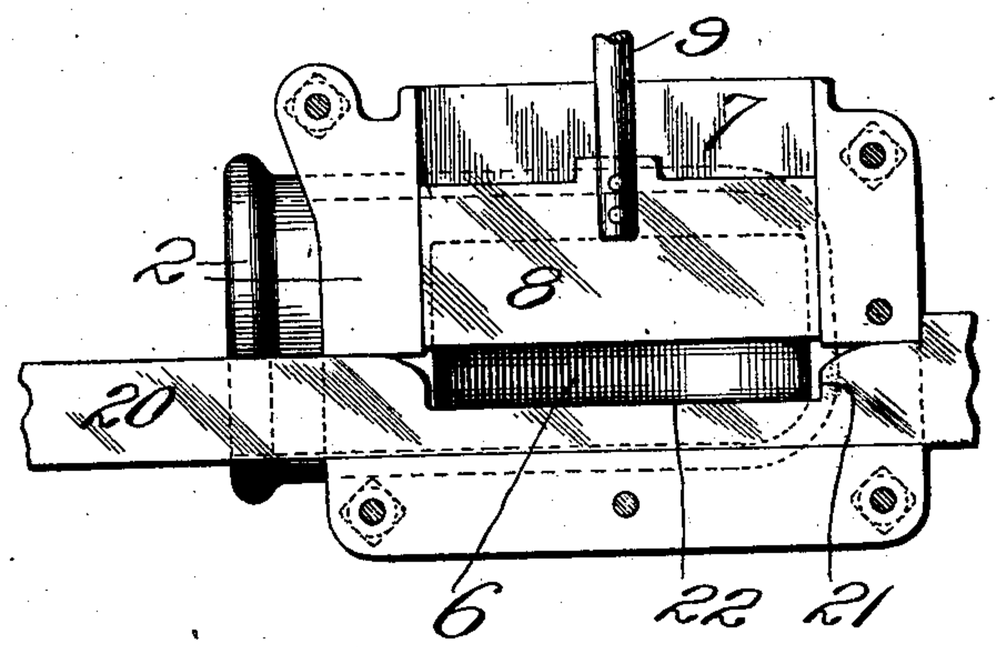


Fig. 5.

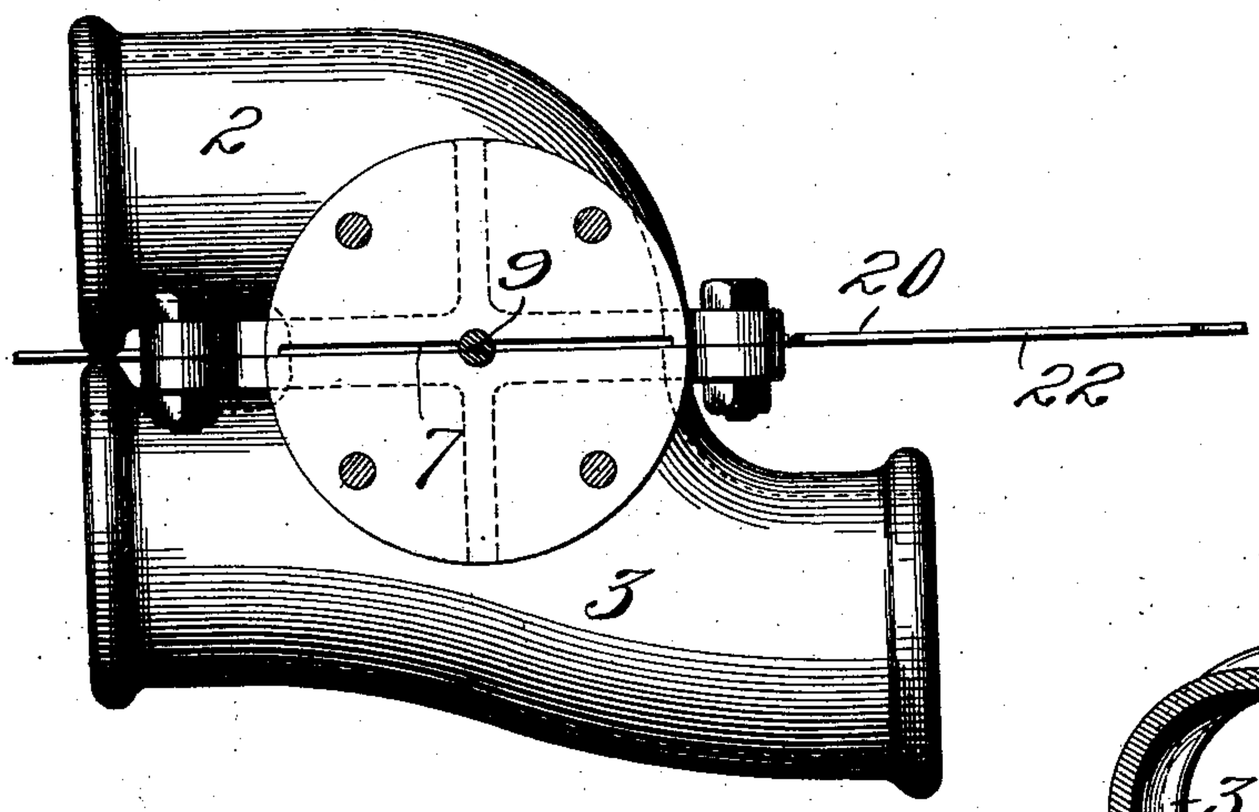
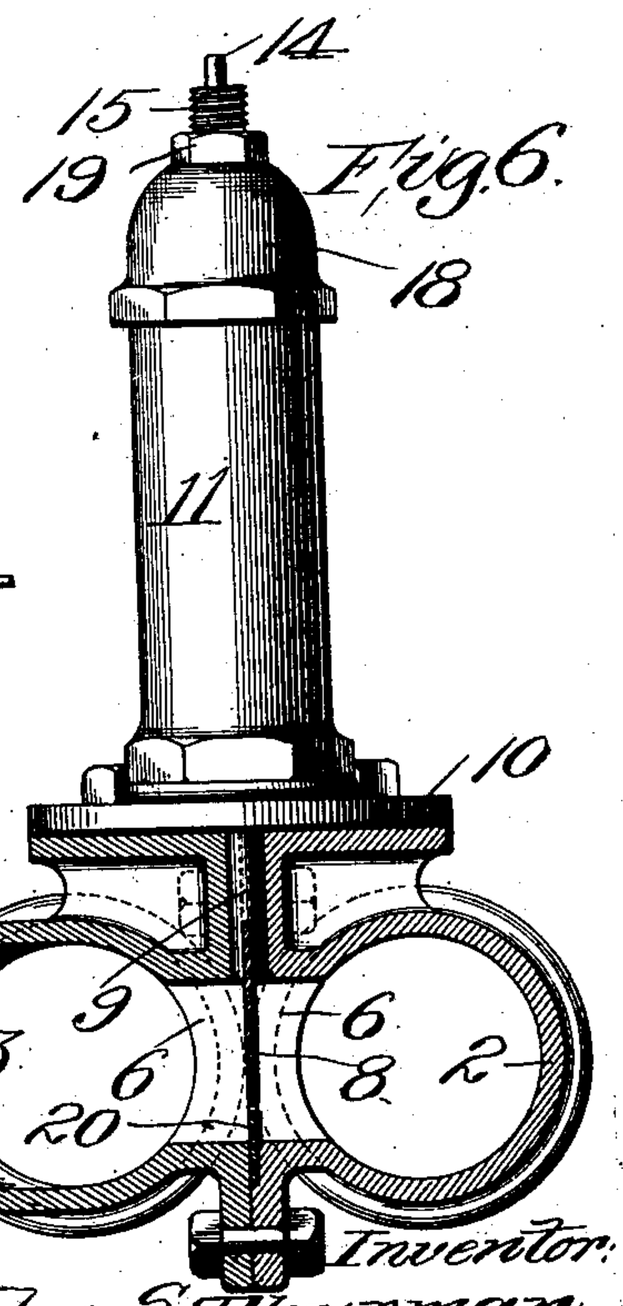


Fig. 6.



Witnesses:
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J. S. THURMAN.

GOVERNOR FOR GAS ENGINES.

APPLICATION FILED FEB. 9, 1903.

NO MODEL. 3 SHEETS—SHEET 3.

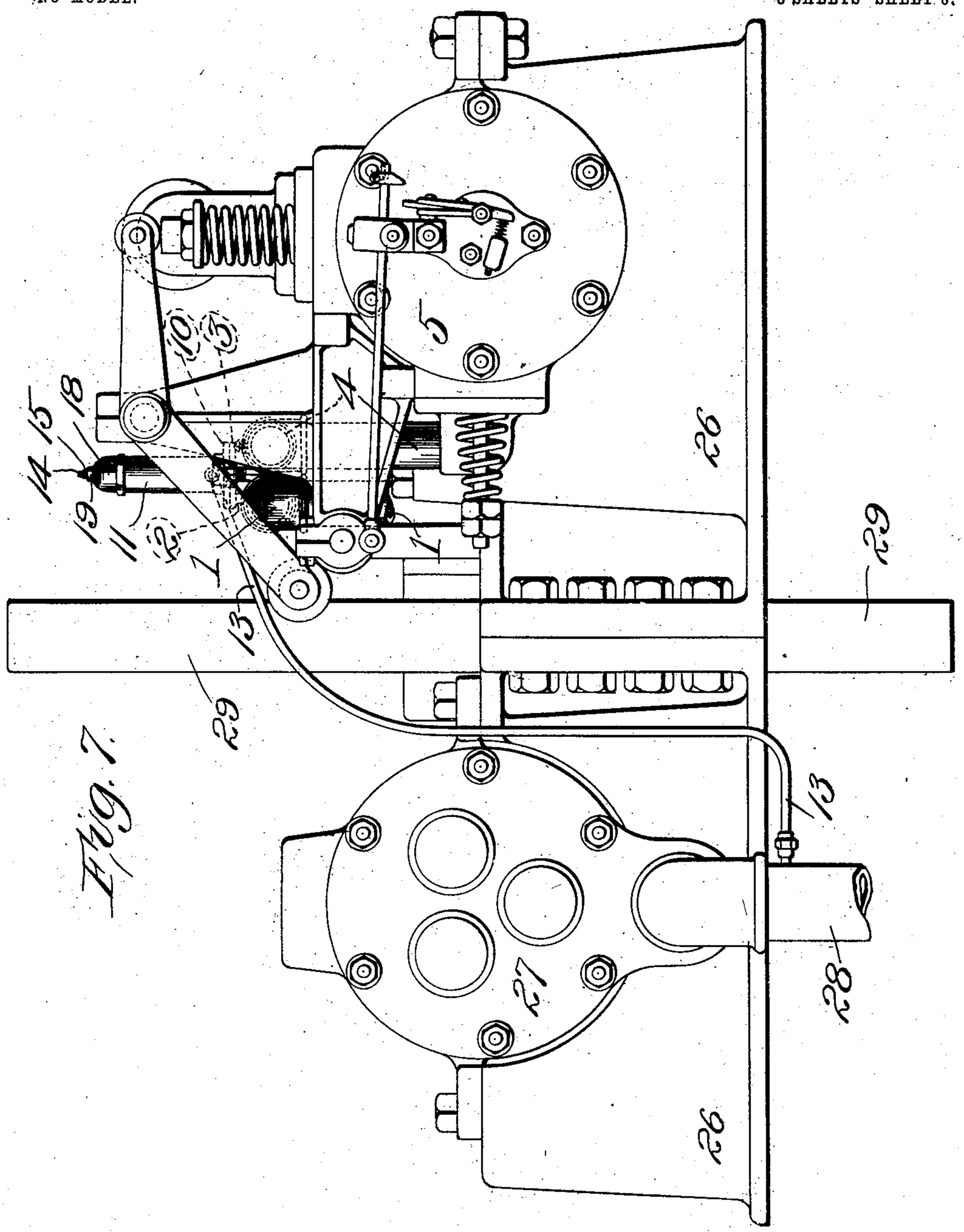

Fig. 1.

Witnesses:
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No. 744,438. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

JOHN S. THURMAN, OF ST. LOUIS, MISSOURI.

GOVERNOR FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 744,438, dated November 17, 1903.

Application filed February 9, 1903. Serial No. 142,558. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. THURMAN, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Governors for Gas-Engines, of which the following is a full, clear, and exact description, 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, forming part of this specification, in which—

Figure 1 is a side elevational view of my improved governor for gas-engines. Fig. 2 is a top plan view. Fig. 3 is an enlarged longitudinal vertical sectional view. Fig. 4 is a detail view showing the governing-valve in changed position. Fig. 5 is a plan view with the cylinder removed. Fig. 6 is a vertical transverse sectional view showing the cylinder in elevation; and Fig. 7 is an end elevational view of the gas-engine and its driven air-compressor, showing my improved governing device in position to control the fuel supplied to the gas-engine, said governing device being connected to the discharge side of the air-compressor, and therefore two pipes 4, shown in Figs. 1 and 2, lead to two tandem-arranged engine-cylinders.

This invention relates to a new and useful improvement in governors for gas-engines, the object being to construct a governor for use in connection with an engine of the character described which will control the supply of air and gas to the engine in proportion to the amount of work being done by the engine. The engine to which my governing device is attached is designed to operate an air-compressor, the governor being under the influence of the reservoir-pressure or pressure on the discharge side of the air-compressor, whereby the amount of carbureted air admitted to the engine is under direct control of the reservoir-pressure, and when the reservoir-pressure is low the carbureted-air supply is curtailed in proportion to the amount of work done by the engine, and when the reservoir-pressure is high the amount of carbureted air admitted to the engine is increased, because the engine under such circumstances has to be necessarily more powerful to compress the air to the higher pressure in the reservoir.

My invention is designed particularly for use in connection with gas-engines which drive air-compressors for supplying air to carpet-renovators and the like, where the consumption of compressed air from the reservoir is approximately constant. In machinery of this character using compressed air it is desired that the pressure be maintained within certain limits, because such pressure has been found to be most efficient, and it is of great advantage to control the supply of the carbureted air to the gas-engine in proportion to the demands upon the gas-engine. This is preferable to supplying a full charge to the engine at all times, running it at its maximum speed and capacity, which necessarily means at some considerable expense when the devices consuming the compressed air are either inoperative or are so manipulated as not to take the full supply of air. Under these circumstances my invention is adapted to shut off the supply of carbureted air to the engine in order to save fuel, because when a low pressure is being used or a small amount of compressed air is being consumed the engine can be run to the best advantage and at small expense with a charge sufficient to compress the air to the required pressure.

With these objects in view my invention consists in the construction, arrangement, and combination of the several parts, all as will be hereinafter described and afterward pointed out in the claims.

In the drawings, 1 indicates a pipe leading from a source of carbureted-air supply, said pipe terminating in a casting 2, forming one member of a coupling, to which casting is bolted or otherwise secured a casting 3, forming the other member of the coupling, said casting 3 having pipes 4 leading from each end thereof to the cylinders of the gas-engine. One of these cylinders is indicated at 5 in Figs. 2 and 7. Castings 2 and 3 are formed with communicating openings 6, and one of said castings is provided with a way 7, in which moves a gate-valve 8, said valve controlling the available area of opening 6.

Valve 8 is mounted on a stem 9, passing upwardly through a flanged plate 10, secured to the castings 2 and 3. On this plate 10 is secured a cylinder 11, in which operates a piston-head 12, secured to the rod 9. A pipe 13

leads into the cylinder beneath the piston-head for supplying compressed air from the reservoir or discharge side of the air-compressor to the space in the cylinder beneath the piston-head. The rod 9 extends above the piston-head 12 and is preferably reduced in diameter, said reduced portion 14 passing through a guiding-sleeve 15, secured in a plug 16, threaded in the upper end of cylinder 11. Between plug 16 and the piston-head 12 is a coiled spring 17, whose resistance may be adjusted by screwing the plug 16 in and out, and in this way the pressure on the upper side of the piston-head 12 may be regulated according to the pressure in the reservoir it is desired to control. In other words, if spring 17 is set to resist ninety pounds, pressure entering through pipe 13 must exceed ninety pounds before the piston 12 and its connected gate-valve 8 will be raised.

The adjustable sleeve 15 in addition to forming a guide for the piston-rod extension also provides a stop for limiting the upward movement of the piston-head and its connected gate-valve, so that a maximum pressure in the reservoir can raise the gate-valve 8 only to the limit determined by the position of the sleeve 15, and consequently the available area of opening 6 will admit only so much carbureted air to the gas-engine.

18 indicates a cap-nut threaded on the plug 16 and serving as a lock-nut to hold such plug in its adjusted position.

19 indicates a lock-nut on the upper end of the sleeve 15 and impinging against the cap-nut 18, so as to hold the sleeve 15 in its adjusted position. Sleeve 15 is preferably provided with an opening slightly exceeding in diameter the reduced portion 14 of the piston-rod, so as to permit air above the piston-head to be displaced and replaced through said opening.

The governing device above described will operate to control the supply of carbureted air to the engine-cylinders and accomplish the result sought to be obtained; but it is obvious that when there is no pressure in the reservoir the gate-valve occupies its lowermost position, (shown in Fig. 3,) when it reduces the supply of carbureted air and prevents the admission of a sufficiently great amount of fuel to get the engine up to the proper speed, where it will develop sufficient power to raise the pressure in the reservoir, and consequently elevate the gate-valve to admit more pressure. I therefore provide means in starting the engine which will increase the available area of opening 6 until the proper speed and pressure are attained, after which the opening 6 is partially closed, so as to leave the further regulation of the engine entirely to the gate-valve. The means for controlling the available area of opening 6 independently of the gate-valve consists of a sliding plate 20, working in suitable ways in castings 2 or 3, said plate being provided with shoulders 21 and a recessed portion 22. A spring 23 is connected to one end of the plate, and the energy of this spring is exerted to normally hold the plate in position where its widened portion is opposite the opening 6, so as to reduce the available area of the opening.

24 indicates a rod attached to the other end of the plate, said rod being provided with an eye in its end to coöperate with a button 25, whereby when the eye is engaged over the button, as shown in Figs. 1 and 2, the plate occupies a position wherein its narrow portion is opposite the openings 6, thus increasing the available area of said opening.

In starting the engine the plate is moved to the position shown in Fig. 1, wherein the rod 24 is engaged by the button and the narrow portion of the plate is located opposite the openings 6. (See also Fig. 4.) This enables the carbureted air to pass to the engine-cylinders notwithstanding the fact that valve 8 is in its lowermost position. When the engine has attained speed and a sufficient amount of pressure has been generated in the reservoir to raise the valve 8, the rod 24 is disengaged from the button 25 to permit the spring to move the plate, so as to locate the wide portion opposite the opening 6 and in this way reduce the available area, as shown in Fig. 3. Of course the valve 8 is above the lowermost position in which it is shown in Fig. 3, and consequently the engine will now run under the control of its governor. This sliding plate 20 is practically the equivalent of a manually-operated valve in a by-pass for initially supplying fuel to the engine in starting out to attain speed.

In Fig. 7 I have shown my improved governing device in position on a gas-engine, which gas-engine is connected to drive an air-compressor. 5 indicates the cylinder of the gas-engine, into which leads the fuel-supply pipe 4 before described. This gas-engine is provided with the usual sparking device and means for operating the same as well as the mechanically-actuated exhaust-valve, said parts being well known, and no detailed description of the same is considered necessary. The engine-cylinder is mounted on a base 26, which base also carries the compressor-cylinder 27. From this compressor-cylinder leads a discharge-pipe 28 to a reservoir, as is well understood. Pipe 13 is connected to this discharge-pipe and to the cylinder 11.

29 indicates the balance-wheel. The engine and compressor-cylinders are preferably arranged in tandem, as in the well-known type of devices of this character.

I am aware that minor changes in the construction, arrangement, and combination of the several parts of my device can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

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

1. The combination with a gas-engine, an air-compressor, a fluid-actuated valve connected to the discharge side of the air-compressor, which valve controls the supply of fuel to the engine, and means whereby when pressure is reduced on the discharge side of the air-compressor the fluid-actuated valve is operated to decrease the available area of the opening through which fuel is supplied to the gas-engine; substantially as described.

2. The combination with a gas-engine, an air-compressor, a fluid-actuated valve connected to the discharge side of the air-compressor, which valve controls the supply of fuel to the engine, and means whereby when pressure is increased on the discharge side of the air-compressor the fluid-actuated valve is operated to increase the available area of the opening through which fuel is supplied to the gas-engine; substantially as described.

3. The combination with a gas-engine and an air-compressor, of a supply-passage for carbureted air to the gas-engine, a valve connected to and controlled by pressure from the discharge side of the air-compressor for controlling one side of the opening through which passes the fuel supplied to the gas-engine, and a manually-operable valve for controlling the other side of said fuel-opening; substantially as described.

4. In a governor for gas-engines, the combination with two separable couplings secured together, said couplings being provided with valveways between them, a vertically-operated governor-valve operating in one of said ways to vary the size of the communicating openings between said couplings, and a horizontally-arranged, manually-operable valve mounted in ways between said couplings for controlling said openings; substantially as described.

5. In a governor for gas-engines, the combination with two couplings having communicating openings, of means for securing said couplings together, a governor-valve arranged between said couplings for controlling the communicating openings between them, a cylinder secured to said couplings, a piston in said cylinder and connected to said valve, and an adjustable stop for limiting the upward movement of the piston so as to adjustably arrest the opening movement of the valve; substantially as described.

6. In a governing device for gas-engines, the combination with a cylinder and its piston, of a valve connected to the piston-rod, an adjustable plug in the upper end of the cylinder, a spring interposed between said adjustable plug and said piston, a sleeve threaded in said plug for adjustably limiting the upward movement of the piston, the upper end of the piston-rod being received in and guided by said sleeve, and means for locking the plug and sleeve in adjusted positions; substantially as described.

7. In a governor for gas-engines, the combination with a cylinder and fluid-actuated piston, a spring for opposing the fluid actuation of the piston, a plug threaded in the upper end of the cylinder for adjusting the resistance of the spring, a stop threaded in the plug for adjustably limiting the upward movement of the piston, a cap-nut threaded on the plug and impinging against the cylinder for locking the plug in its adjusted position, and a lock-nut threaded on the adjustable stop and impinging against the cap-nut for locking the stop in its adjusted position; substantially as described.

8. In a governing device for gas-engines, the combination with a fluid-actuated gate-valve for controlling the supply of fuel to the engine, and a sliding plate 20 also adapted to control the fuel-supply to the engine, said sliding plate having a wide and narrow portion designed to be placed opposite the opening through which the fuel passes to the engine, a spring attached to one end of said sliding plate, and means connected to the other end of said sliding plate for holding it in position against the action of said spring; substantially as described.

9. In a governing device for gas-engines, the combination with two separable couplings connected together and provided with communicating openings, a fluid-actuated governor-valve operating between said couplings for controlling the upper portion of said communicating openings, a slide-valve also mounted between said couplings controlling the lower portion of said openings, said sliding valve being provided with a wide and a narrow portion designed to be placed opposite said communicating openings, and means for holding said sliding valve in its different positions; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 6th day of February, 1903.

JOHN S. THURMAN.

Witnesses:
F. R. CORNWALL,
GEORGE BAKEWELL.