

(No Model.)

3 Sheets—Sheet 1.

G. W. LAMOS.  
GAS ENGINE.

No. 562,307.

Patented June 16, 1896.

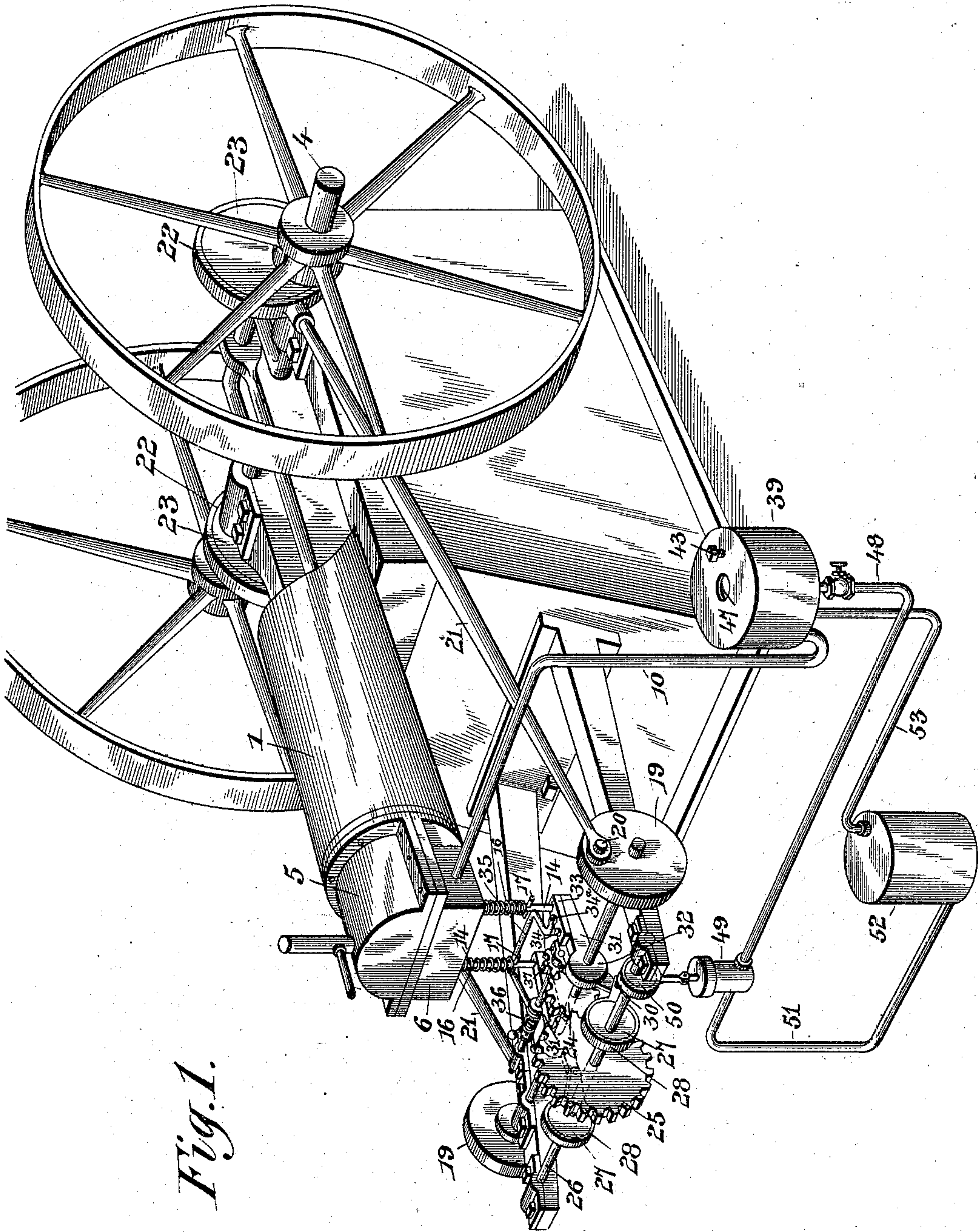


Fig. 1.

Witnesses

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By *Trus* Attorneys.

*CA Snow & Co.*



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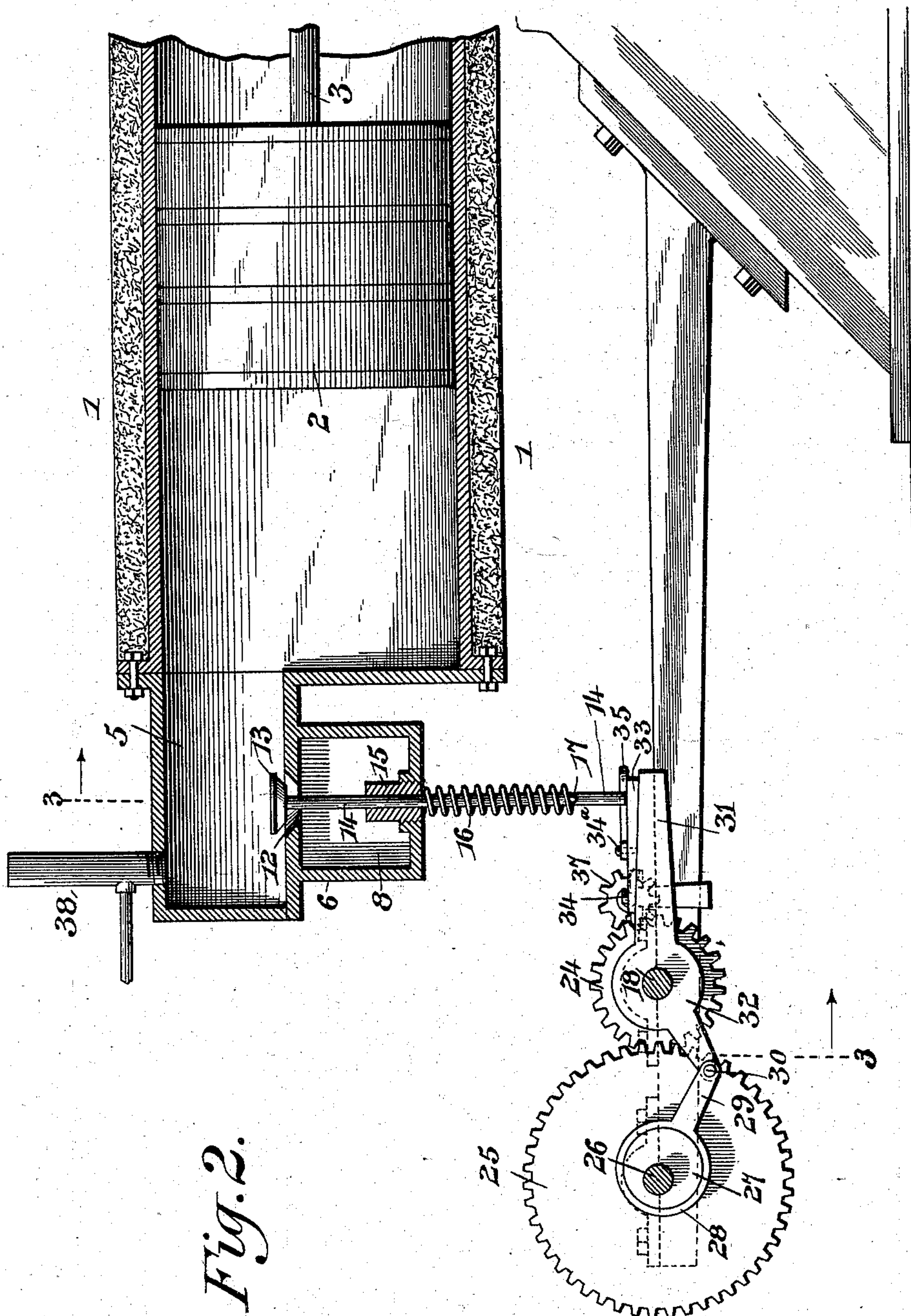


Fig. 2.

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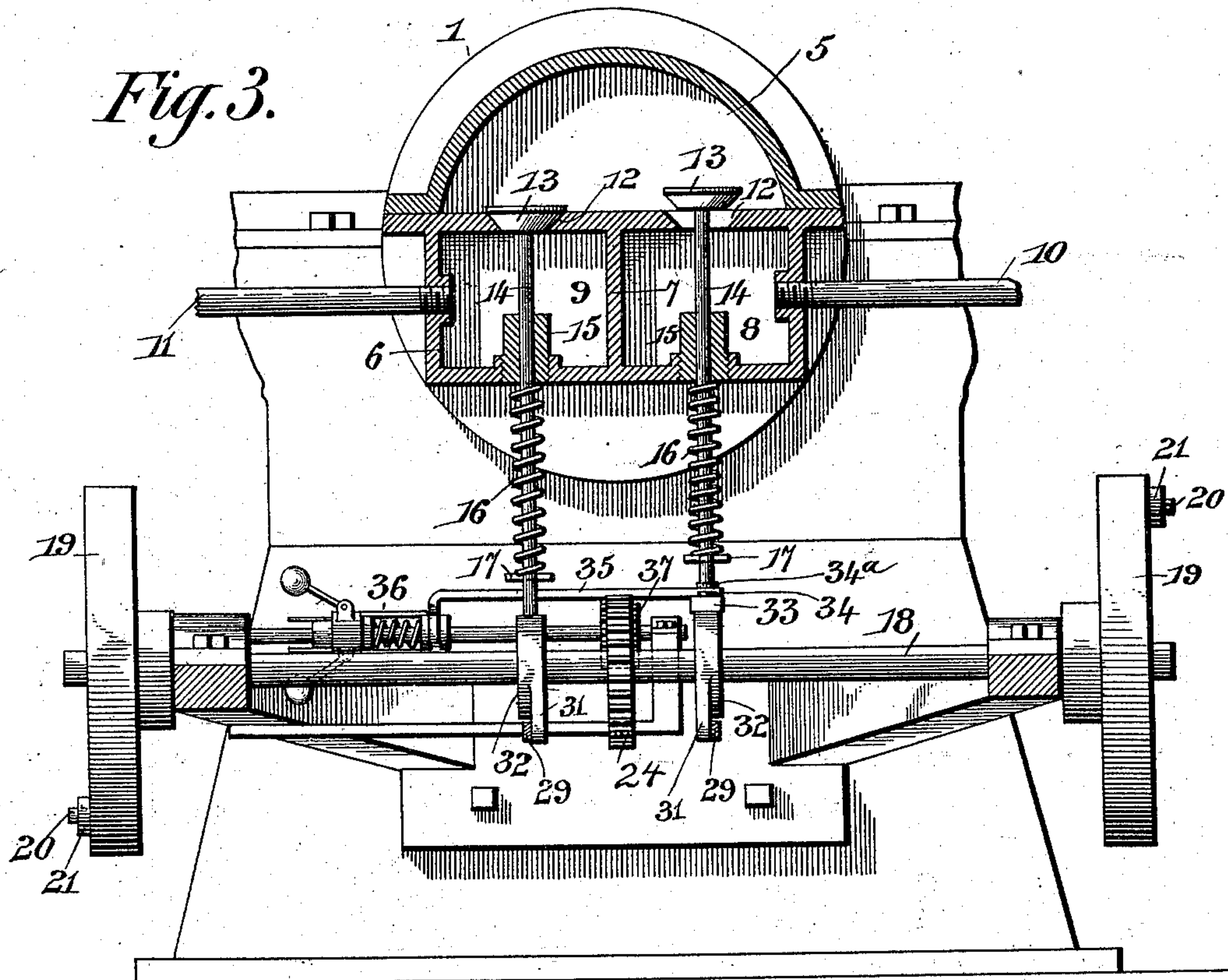
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3 Sheets—Sheet 3.

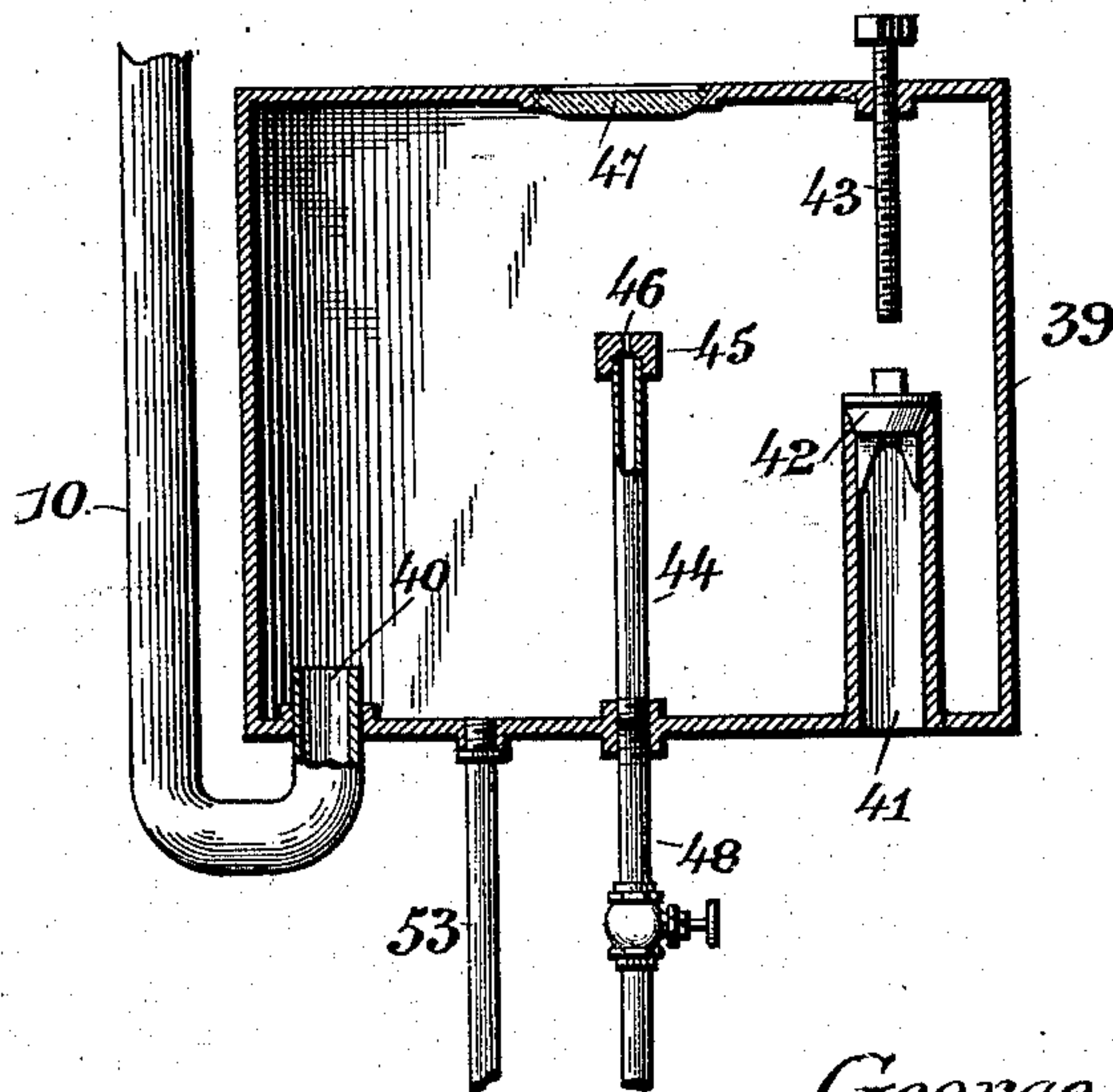
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*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

GEORGE W. LAMOS, OF FORT MADISON, IOWA.

## GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 562,307, dated June 16, 1896.

Application filed October 31, 1895. Serial No. 567,493. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. LAMOS, a citizen of the United States, residing at Fort Madison, in the county of Lee and State of Iowa, have invented a new and useful Gas-Engine, of which the following is a specification.

This invention relates to gas-engines.

The main and primary object of the present invention is to effect certain improvements in engines of that type employing either ordinary gas or vaporized oil as the explosive agent to actuate the piston, such improvements relating particularly to the valve-operating mechanism and the vaporizing or carbureting device employed in connection with the engine.

To this end the invention contemplates a simple and efficient valve-controlling mechanism, and a vaporizing or carbureting device which will positively insure the delivery of the requisite amount of gas and air to the engine, while at the same time to greatly economize on the gas that is used.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the drawings, Figure 1 is a perspective view of a gas-engine constructed in accordance with this invention. Fig. 2 is a central vertical longitudinal sectional view thereof. Fig. 3 is a transverse section on the line 3 3 of Fig. 2. Fig. 4 is an enlarged vertical sectional view of the vaporizer.

Referring to the accompanying drawings, the numeral 1 designates a cylinder of an ordinary construction and accommodating for movement therein the piston 2, connected to the inner end of the piston-rod 3, the outer end of which piston-rod is connected to the crank drive-shaft 4, from which motion is communicated to the machinery to be operated by means of a suitable belt and pulleys in the ordinary manner.

The cylinder 1 is provided at one end with an offstanding contracted explosion-chamber 5, into which the mixture of gas and air is led, compressed by the piston, then exploded to actuate the piston in the ordinary manner.

The offstanding explosion-chamber 5 at the closed end of the cylinder has fitted to its under side the valve-box 6, which is provided with a central partition-wall 7, dividing the interior of the box into the separate supply and exhaust chambers 8 and 9, respectively. The supply-chamber 8 of the valve-box has connected therewith one end of the main suction-pipe 10, which delivers the mixture of gas and air into said supply-chamber, while the exhaust-chamber of the valve-box has connected therewith the exhaust-pipe 11, which provides for exhausting the products of explosion before a fresh supply of gas and air is again admitted to the explosion-chamber of the cylinder.

The valve-box 6 is provided at the top of the supply and exhaust chambers 8 and 9 with the valve-openings 12, which communicate with the interior of the explosion-chamber 5, and said valve-openings are designed to be covered and uncovered by the vertically-movable valves 13, which work within the chamber 5 and are fitted on the upper ends of the valve-stems 14. The valve-stems 14 are arranged to slide in the guide-bushings 15, fitted in the bottom of the chambers 8 and 9, and have coiled thereon, below the valve-box, the closing-springs 16. The upper ends of the springs 16 bear against the under side of the box 6, and the lower ends of said springs bear against the stop-pins 17, fitted in the lower ends of the valve-stems, whereby the springs will normally exert a downward pressure on the valve-stems 14, so that the valves 13 will be normally held closed on their seats to cut off communication between the chambers 8 and 9 and the explosion-chamber 5.

Mounted in suitable supports below the closed end of the cylinder is a transversely-arranged counter-shaft 18, carrying at its opposite ends the crank-disk 19, having the wrist-pins 20, connected with one end of the eccentric-rods 21, the other ends of which connect with the eccentric-straps 22, encircling the drive-eccentrics 23, mounted on the crank drive-shaft 4, and providing for communicating motion to the counter-shaft 18. The shaft 18 has fitted thereon at an intermediate point a gear-wheel 24, meshing with a larger gear-wheel 25, mounted on the valve-controlling shaft 26 at a point intermediate



of its ends. The valve-controlling shaft 26 is mounted in suitable bearings at one side of the counter-shaft 18, and carries a pair of valve-controlling eccentrics 27, which are so  
5 set on the shaft 26 as to provide means for properly controlling the supply and exhaust valves at different times.

The valve-controlling eccentrics 27 are encircled by the eccentric-straps 28, provided  
10 with the short strap-arms 29, pivotally connected at 30 to one extremity of the oscillating bell-crank valve-levers 31. The oscillating bell-crank valve-levers 31 are provided at their angles or between their opposite ex-  
15 tremities with the bearing-collars 32, which loosely receive the counter-shaft 18, so that the said levers can freely oscillate on the counter-shaft. The extremities of the bell-crank levers opposite the extremities con-  
20 nected with the eccentric-straps 28 are arranged to play under the lower extremities of the valve-stems 14, it being of course understood that there is one of the bell-crank levers for each of the valve-stems, and, by reason  
25 of adjusting the eccentrics 27, respectively, to different positions, it will also be understood that the two bell-crank levers do not move in unison but at different times, whereby the supply and exhaust valves will be opened  
30 and closed at different intervals.

During the operation of the engine the bell-crank levers 31 will strike against the lower extremities of the valve-stems 14, and will move such stems upwardly, thereby raising  
35 their valves from their seats, and since the valve-levers have an alternate operation, the valve for the supply-chamber 8 will first be opened to admit a mixture of gas and air into the explosion-chamber, and then, after the  
40 explosion and on the return stroke of the piston, the valve for the exhaust-chamber 9 will be opened to allow the products resulting from the explosion to escape out through the pipe 11.

The bell-crank valve-lever for operating the valve of the supply-chamber 8 has arranged on its upper side a trip-plate 33. The trip-plate 33 is pivoted at one end, as at 34, to the lever, so as to leave its other end free for ad-  
50 justment under the extremity of the valve-stem, against which the lever operates, and intermediate of its ends the trip-plate 33 has pivotally connected thereto, as at 34<sup>a</sup>, one end of a governor-rod 35, the other end of which  
55 is suitably connected to a suitable centrifugal speed-governor 36, which is given its rotation through the medium of a gear connection 37 with the gear-wheel 24, driven by the counter-shaft 18.

At a normal speed of the engine the trip-plate 33 lies entirely on the bell-crank lever to which it is attached, so that as the said bell-crank lever is oscillated the trip-plate will strike against the adjacent valve-stem  
60 in order to lift the valve for the supply-chamber 8 to a sufficient height to admit a proper supply of gas and air into the explosion-

chamber 5. When the speed of the engine becomes abnormal, through the operation of the governor 36, the rod 35 will draw or swing  
70 the plate 33 from under the adjacent valve-stem, thereby limiting the opening of the valve or supply-chamber to such a degree that the supply of gas and air to the explosion-chamber will be practically cut off until  
75 the engine again reaches the normal speed, as will be readily understood by those skilled in the art, and at this point it may be noted that the mixture of gas and air which is introduced into the explosion-chamber of the  
80 cylinder may be ignited through the medium of any suitable igniter 38, connected with the said chamber at a convenient point.

The main suction-pipe 10 of the engine leads from its point of connection with the  
85 supply-chamber 8 to a vaporizer box 39, located at a convenient point. The suction-pipe 10 projects into the bottom of the box 39 a sufficient distance, as at 40, so that surplus oil which may collect in the bottom of  
90 said box will not run thereinto. The suction created in the pipe 10 by the piston within the cylinder provides for forcibly drawing a quantity of air into the box 39 through the air-supply tubes 41, projecting upwardly  
95 within the box 39 and communicating with the outer air. The upper end of the tube 41 has fitted therein a vertically-movable valve 42, which is limited in its upward movement by the stop-screw 43, adjustably fitted in the  
100 top of the box 39, and depending within the same to a point directly above the said valve 42. The valve 42 opens during the operation of the engine to admit air into the box 39, but reseats itself immediately upon the stop-  
105 page of the engine, so that there can be no leakage of gas into the room where the vaporizer is located. The vaporizer-box 39 has fitted in its bottom the lower end of the inwardly-extending oil-jet pipe 44, provided at  
110 its upper end with a cap 45, having the jet-orifice 46 therein to provide for directing a fine stream of oil against the rounded glass spray-bulb 47, fitted in the top of the vaporizer-box directly beyond and in line with the  
115 jet-pipe 44. The pipe 44 is connected at its lower end with the valved oil-feed pipe 48, which forms the discharge-pipe of an ordinary force-pump 49, the piston of which is controlled by an eccentric 50, mounted on one  
120 end of the valve-operating shaft 26. The force-pump 49 also has connected therewith one end of the oil-supply pipe 51, which forms the inlet-pipe of the pump and leads from a suitably-arranged gasoline tank or can 52.  
125 The tank or can 52 has connected thereto at its top one end of an oil-return pipe 53, the other end of which is fitted to the bottom of the vaporizer-box 39, to provide for conducting any accumulations of surplus oil in the  
130 bottom of said box back to the tank or can 52, so that there will be no waste.

During the operation of the engine, the pump 49 is operated through the medium of



the eccentric connection 50, so that the jet of oil discharged against the bulb 47 will be broken up into a fine spray, and vaporized by and thoroughly commingled with the air drawn into the box by the suction of the engine, and this mixture of vapor and air is delivered by the pipe 10 to the engine in the manner already described.

The construction, operation and many advantages of the herein-described engine will be readily apparent to those skilled in the art, and it will be understood that changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a gas-engine, the combination with the cylinder carrying at one end a valve-box having a valve-opening; of a spring-depressed valve-stem projecting below the valve-box and having a valve working over said valve-opening, a suitably-rotated counter-shaft arranged below the valve-box, an oscillating bell-crank lever loosely mounted on said counter-shaft and having one of its extremities working under and against the lower extremity of said valve-stem, a valve-controlling shaft geared with the counter-shaft and having a slower rotation than the same, an eccentric fitted on the valve-controlling shaft, and an eccentric-strap encircling said eccentric and provided with a short strap-arm pivotally connected to one extremity of the oscillating bell-crank lever, substantially as set forth.

2. A vaporizer for gas-engines consisting of a vaporizer-box having a suction discharge-pipe connection at its bottom, an air-supply tube projecting inwardly within the box and communicating with the outer air, a vertically-movable valve fitted within the upper end of said tube, an adjustable stop arranged above said valve, an inwardly-extending oil-jet pipe fitted at one end to one side of the box and provided at its opposite end with a cap having a jet-orifice, an oil feed-pipe connection with said jet-pipe, a rounded spray-bulb arranged in the box directly beyond and in a line with the jet-pipe, and an oil drain or return pipe connection with the bottom of said box, substantially as set forth.

3. In a gas-engine, the combination with the cylinder carrying at one end a valve-box having a valve-opening; of a spring-depressed valve-stem projecting below the valve-box and having a valve working over said valve-opening, a suitably-rotated counter-shaft arranged below the valve-box, a valve-controlling shaft geared with said counter-shaft, an eccentric fitted on the valve-controlling shaft, and a pivotally-supported lever having an operative connection with said eccentric and having one of its extremities working under and against the lower extremity of said valve-stem, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

GEORGE W. LAMOS.

Witnesses:

GEORGE D. HUTCHISON,  
LOUIS FLESHBEIN.