

No. 658,127.

Patented Sept. 18, 1900.

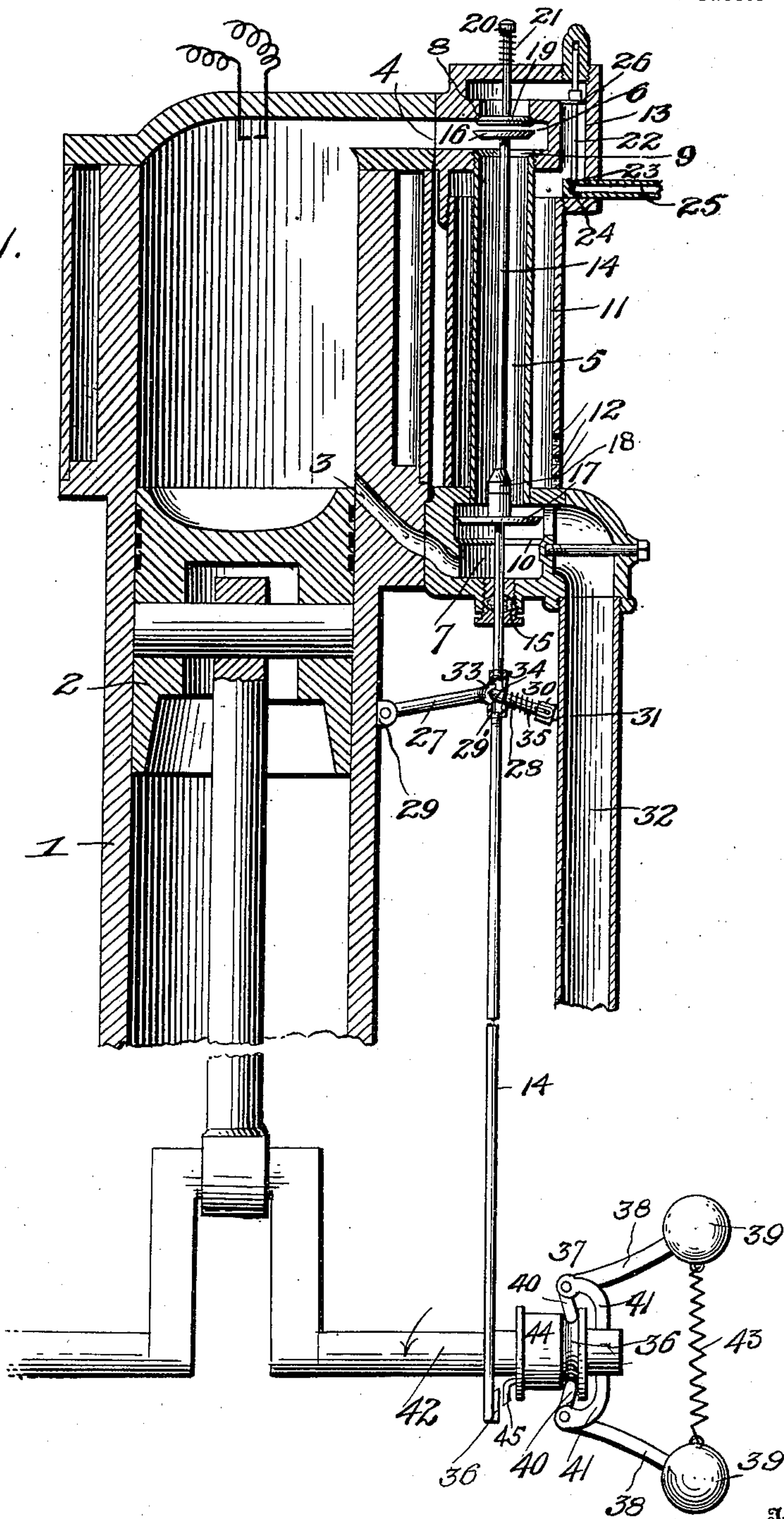
J. J. SIMMONDS.
GAS OR GASOLENE ENGINE.

(Application filed Mar. 15, 1900.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



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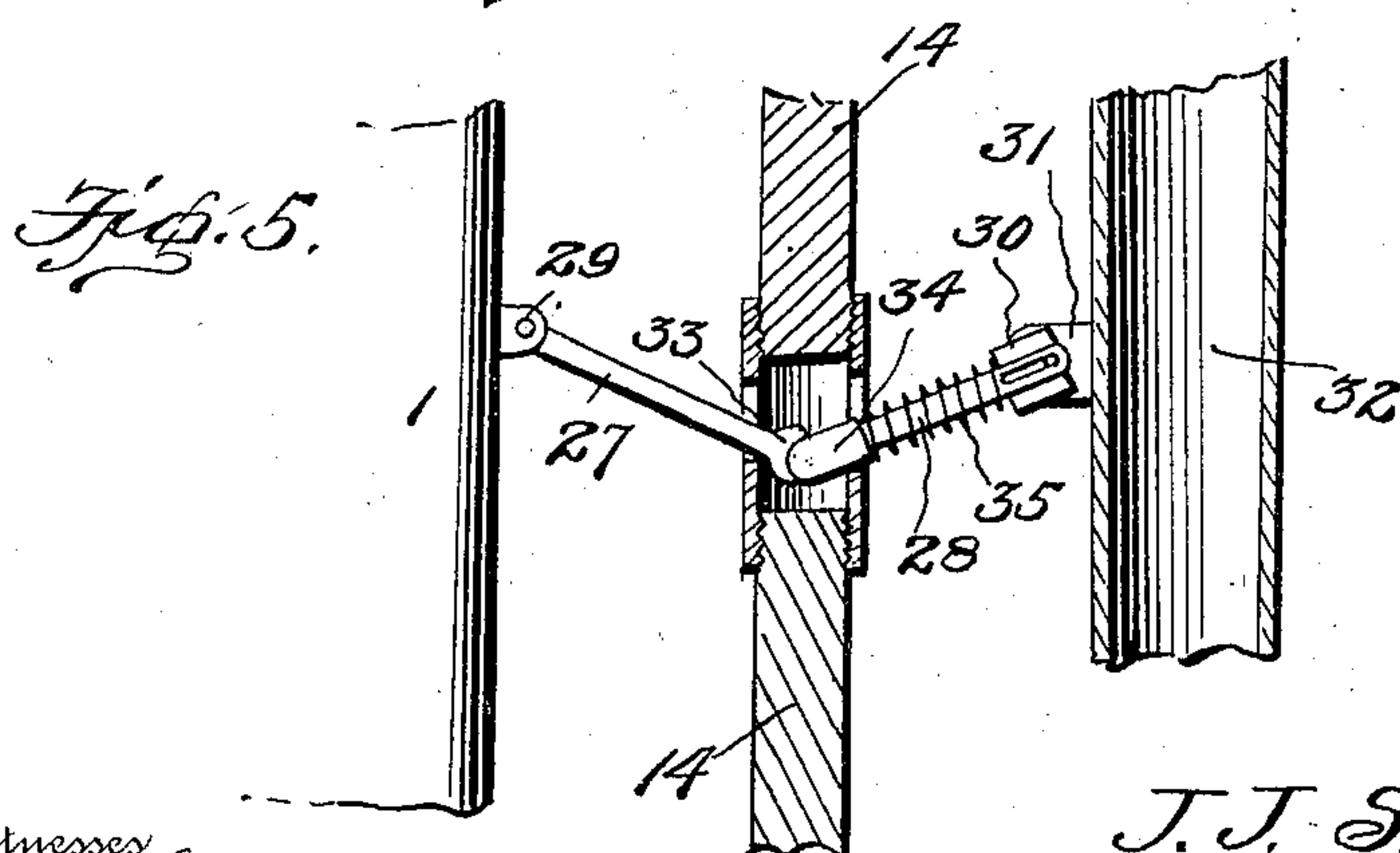
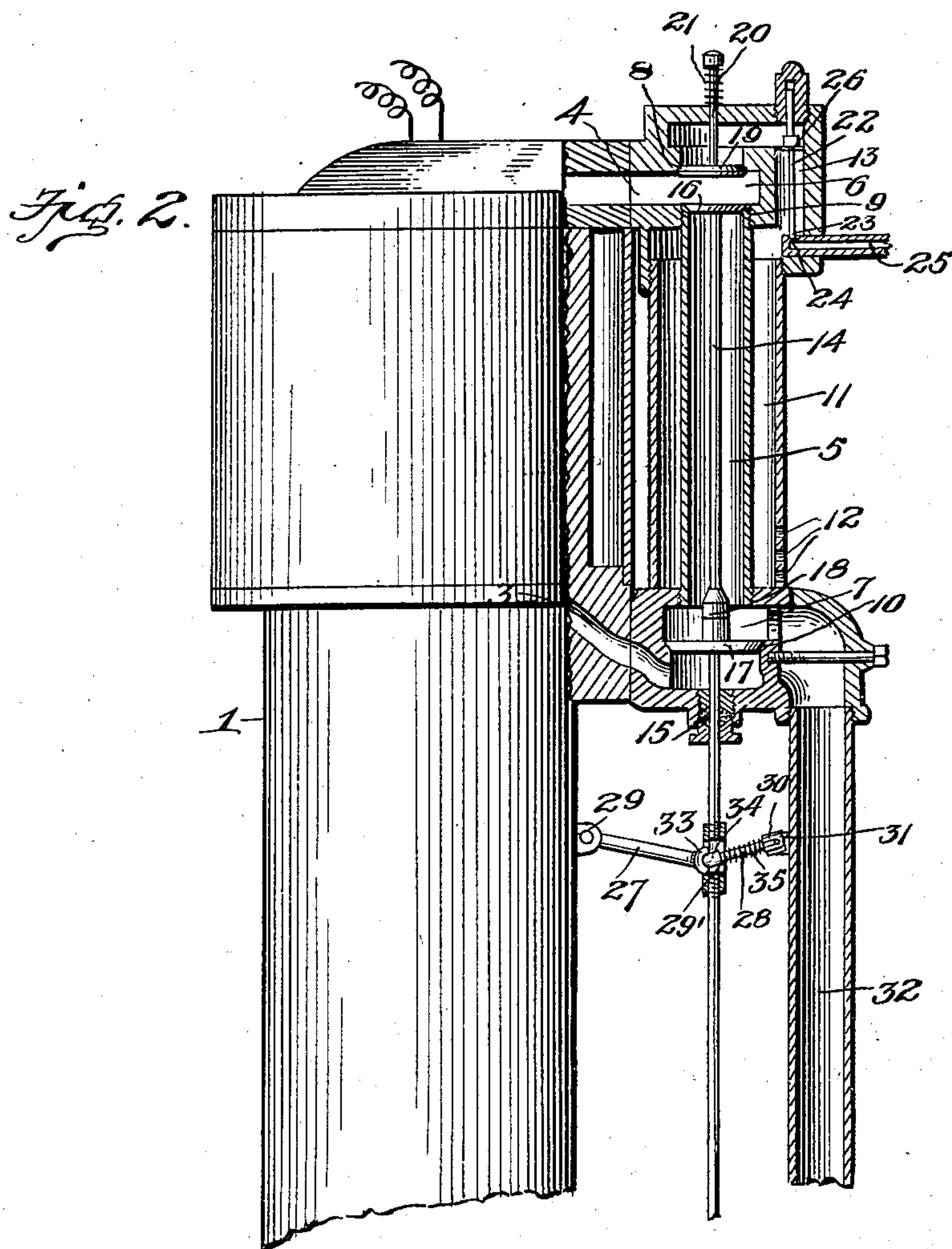
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3 Sheets—Sheet 2.



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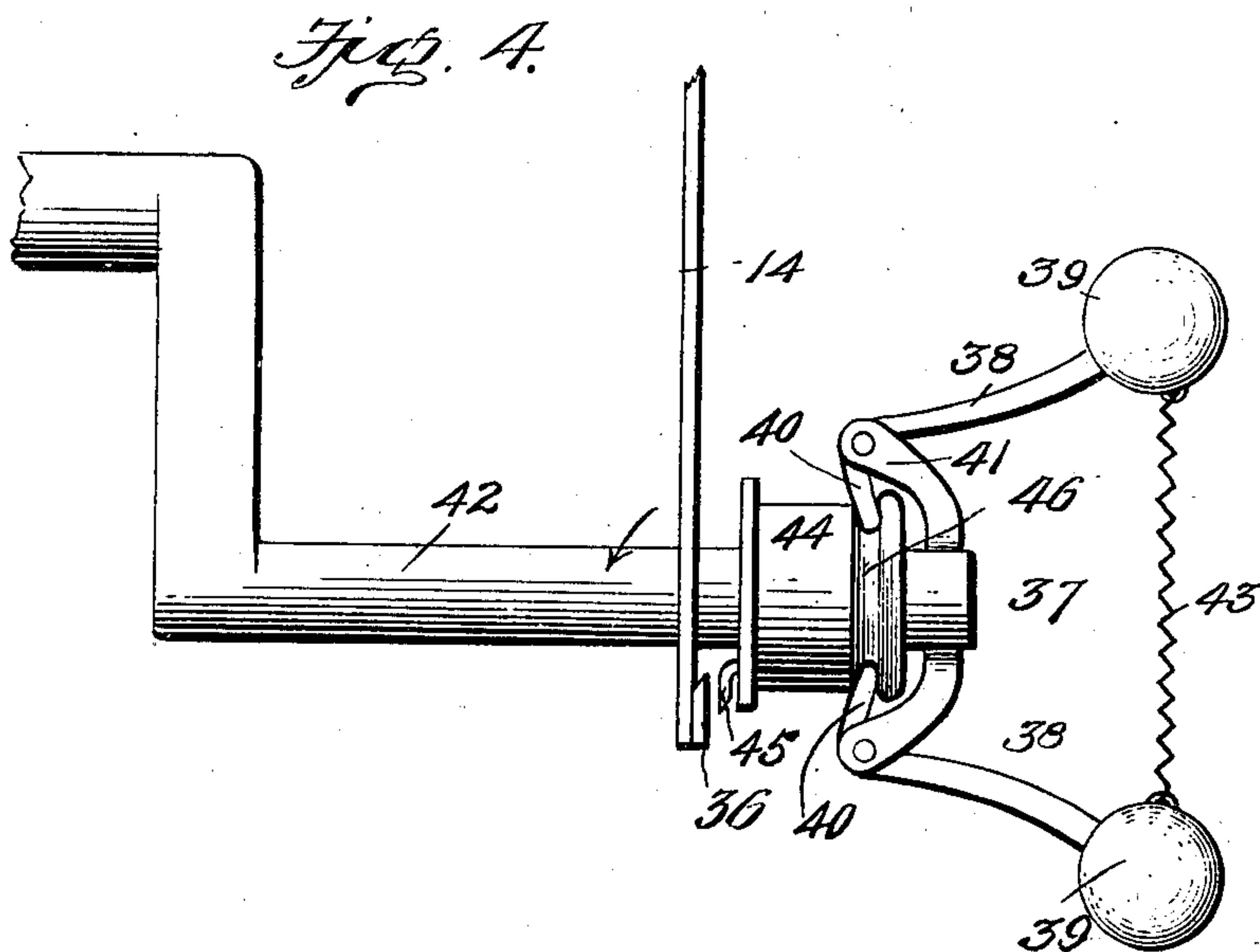
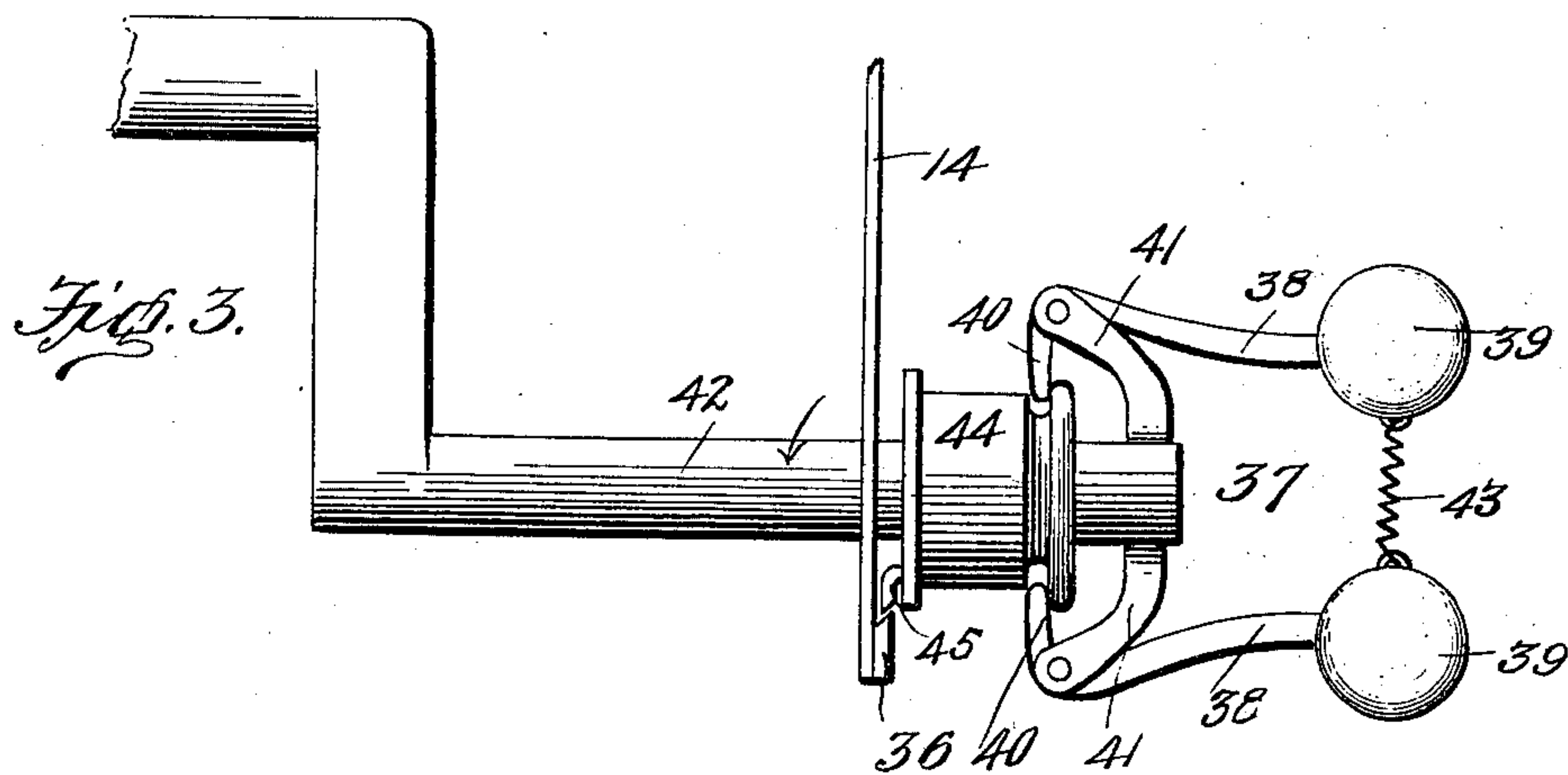
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3. Sheets—Sheet 3:



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UNITED STATES PATENT OFFICE.

JOHN J. SIMMONDS, OF DEVON, KANSAS.

GAS OR GASOLENE ENGINE.

SPECIFICATION forming part of Letters Patent No. 658,127, dated September 18, 1900.

Application filed March 15, 1900. Serial No. 8,781. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. SIMMONDS, a citizen of the United States, residing at Devon, in the county of Bourbon and State of Kansas, have invented certain new and useful Improvements in Gas or Gasolene Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to gas or gasolene engines.

One of the objects of the invention is to provide means for utilizing the exhaust-gases of the engine for operating the valves.

Another object of the invention is to provide means for heating the air before it is mixed with the fuel, whereby if gasolene be employed as motive power it will be more thoroughly vaporized by the heated air before or at the time of its introduction to the engine-cylinder.

With these and other objects in view the invention consists in certain features of construction and combination of parts, which will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a vertical sectional view through the cylinder on a line with its ports and through the valves for controlling the ports, the piston being shown in the position it assumes in the completion of its first stroke and the valves in the position to which they are shifted at the instant the piston uncovers the piston exhaust-port. Fig. 2 is a similar view through the side of the cylinder and its exhaust-ports, showing the positions the valves assume when shifted by the governor. Fig. 3 is a side elevation of the governor when the valves are in the position shown in Fig. 2. Fig. 4 is a similar view of the governor when the valves are in the position shown in Fig. 1. Fig. 5 is a detail view showing the connections of the arms 27 28 to the sleeve 29'.

In the drawings the same reference characters indicate the same parts of the invention.

1 denotes the engine-cylinder; 2, the piston; 3, the "piston" exhaust-port, (so called as it is opened and closed by the piston,) and 4 the final exhaust-port.

5 denotes an exhaust-pipe having valve-

casings 6 and 7 at its ends, the former provided with valve-seats 8 and 9 and the latter with a valve-seat 10.

11 denotes an air-supply pipe which preferably surrounds the exhaust-pipe and is provided at its lower end with air-inlet openings 12 and communicates at its upper end with a mixing-chamber 13, which leads to the upper end of the engine-cylinder.

14 denotes a valve-rod which works in the exhaust-pipe and has its lower end projecting through a stuffing-box 15 of the valve-casing 7. Fixed to the upper end of the valve-rod is a final exhaust-valve 16, adapted to seat on the seat 9 of the valve-casing 6. 17 denotes the piston exhaust-valve of greater area than the final exhaust-valve and mounted to slide upon said rod and adapted to seat on the seat 10. A shoulder or stop 18 is carried by said rod and in the upward movement of the valve 17 it abuts against said shoulder and lifts said rod.

19 denotes the gas-check valve, which is adapted to seat upon the seat 8. This check-valve is provided with a stem 20, which projects through the top of the mixing-chamber and has coiled around it a spring 21, the energy of which is exerted to hold the valve to its seat. The valve is opened by the suction of the piston and closed by the spring and is within the path of movement of the valve 16.

22 denotes a gas or gasolene inlet valve having a conical point 23, working in a conical seat 24 in the fuel-inlet pipe 25. The stem of this valve projects upward through the top of the mixing-chamber and is provided with a diaphragm 26, located in said chamber and adapted to be moved upward by the suction of the piston and to open the inlet-valve 22.

27 and 28 denote two arms, one of which is pivoted to a lug 29, projecting from the side of the cylinder, and the other of which has a pin-and-slot connection with a block 30, pivoted to a lug 31, projecting from the exhaust outlet-pipe 32. The inner ends of these arms 27 28 extend through a coupling-sleeve 29' on the valve-rod 14, and the arm 27 is formed with a socket 33 and the arm 28 with a head 34 to fit said socket. A coil-spring 35 is placed upon the arm 28 and is confined be-

tween the pivoted block 30 and the head 34 and exerts its energy to hold said head into engagement with the socket of the arm 27.

A governor 37 is used to close the final exhaust-valve when the engine-crank is on an upper center, which may occur at any revolution, even or uneven. This governor comprises a pair of arms 38, carrying balls 39 at their outer ends and having hook-shaped inner ends 40, pivotally mounted upon brackets 41, fixed to the drive-shaft 42 of the engine. The free ends of the arms are normally drawn toward each other by a retractile spring 43, connecting the balls and are adapted to move outwardly or away from each other against the resistance of the spring by centrifugal force. A sleeve 44 is slidably mounted on the engine-shaft and carries a hook or like contact-piece 45, adapted to engage the hooked end 36 of the rod 14 to draw said rod downwardly. The sleeve is also provided with a circumferential groove 46 to receive the hooked ends 40 of the pivoted arms. The motion of the arms 38 in or out thus causes the said hooked ends 40 to slide the sleeve back and forth on the shaft and to move the contact-piece 45 into and out of the path of the hooked end 36 of the rod 14. The direction of revolution of the shaft is indicated by the arrows in Figs. 3 and 4, and by reference to these figures the operation will be readily understood.

In operation it will be assumed that the piston has been moved to the extreme end of its stroke, as shown in Fig. 1 of the drawings, in which position the piston has uncovered the piston exhaust-port. While the piston is moving toward the lower end of the cylinder the valves 16 and 17 are seated on their respective seats, and the instant the piston uncovers the exhaust-port 3 the gases within the cylinder will escape through said port and lift the valve 17 from its seat. This movement of the valve upward lifts the rod 14 and also the valve 16 from its seat. After the valve 16 has been unseated it is held in that position by the arms 27 28, while the valve 17 drops to its seat 10 and prevents any of the escaping exhaust-gases rushing through the port 3 in advance of the lower end of the piston, which in the meantime has about completed its upward stroke. The valve 19 is held closed by the valve 16 when the latter is in its elevated position, thus preventing the piston prematurely sucking in light charges of fuel and exhausting them without being ignited when the engine is running on a light load. When the speed is high and the load light, the governor will not actuate the valve-rod 14 and the valve 16 will remain open and allow the piston to work free to the atmosphere. When the speed is reduced, the governor will actuate the rod 14, draw it downwardly into the position shown in Fig. 2, and close the valve 16, thus permitting the piston to suck in a charge from the mixing-chamber, the valve 19 being opened by such

suction. The working cycle of the engine is thus repeated automatically. As the air is drawn into the pipe 11 through the openings 12 by the suction of the piston it raises the diaphragm 26, thus opening the needle-valve and permitting of a supply of fuel, which if in the form of gasoline mixes with the air which has been heated by passing up through the air-pipe, thus thoroughly vaporizing said gasoline, so that the mixture is supplied to the cylinder in the best possible condition.

It will be noticed that the rod is held in either of the positions shown in Figs. 1 and 2 by the arms 27 28 until actuated in one direction by the governor or in the other direction by the pressure of the gas on the valve 17.

From the foregoing description, taken in connection with the accompanying drawings, the construction, operation, and advantages of my improved gas or gasoline engine will be readily apparent without requiring an extended explanation.

It will be seen that the engine is simple of construction, that said construction permits of its manufacture at small cost, and that it is exceedingly well adapted for the purpose for which it is designed.

Various 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 or gasoline engine, the combination with the cylinder having exhaust-ports; of a piston adapted to open and close one of said ports, an exhaust-pipe communicating with said exhaust-ports and provided with valve-casings, a valve-rod, having a lug thereon, valves attached to said rod and adapted to seat in said casings, one of the valves having a loose connection with the valve-rod and adapted to contact with said lug to lift the rod, whereby after the port has been opened by the piston and the valve-rod lifted to unseat the valves, the loose valve will be permitted to fall to its seat, substantially as and for the purpose set forth.

2. In a gas or gasoline engine, the combination with the cylinder having exhaust-ports; of a piston adapted to open and close one of said ports, an exhaust-pipe communicating with said exhaust-ports and provided with valve-casings, a mixing-chamber communicating with one of the valve-casings, a valve-rod having a lug thereon, valves attached to said rod and adapted to seat in said casings, one of said valves being fixed to said rod and the other having a loose connection with the valve-rod and adapted to contact with said lug to lift the rod, whereby after the port has been opened by the piston and the valve-rod lifted to unseat the valves, the loose valve will be permitted to fall to its seat, and an inlet check-valve located in the

valve-casing to close the mixing-chamber and arranged in the path of movement of the valve carried at the upper end of the valve-rod, substantially as and for the purpose set forth.

5 3. In a gas or gasolene engine, the combination with the cylinder having exhaust-ports; of a piston adapted to open and close one of said ports, an exhaust-pipe communicating with said exhaust-ports and provided
10 with valve-casings, a valve-rod having a lug thereon, valves attached to said rod and adapted to seat in said casings, one of the valves having a loose connection with the valve-rod and adapted to contact with said
15 lug and lift the rod, whereby after the port has been opened by the piston and the valve-rod lifted to unseat the valves, the loose valve will be permitted to fall to its seat, said
20 valve having a greater area than the other set forth.

4. In a gas or gasolene engine, the combination with the cylinder having exhaust-ports; of a piston adapted to open and close
25 one of said ports; an exhaust-pipe communicating with said exhaust-ports and provided with valve-casings, a mixing-chamber com-

municating with one of the valve-casings, an air-pipe surrounding the exhaust-pipe and communicating with the mixing-chamber, a
30 fuel-supply pipe leading to the mixing-chamber, a valve-rod carrying a lug or contact device, valves attached to said rod and adapted to seat in said casings, one of said valves being fixed to said rod and the other having
35 a loose connection with the valve-rod and adapted to contact with said lug to move the valve inward, whereby after the port has been opened by the piston and the valve-rod moved inward to unseat the valves, the loose
40 valve will be permitted to fall to its seat, and an inlet check-valve located in the valve-casing to close the mixing-chamber and arranged in the path of movement of the valve carried at the upper or inner end of the valve-
45 rod, substantially as set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN J. SIMMONDS.

Witnesses:

H. A. ANDERSON,
JAS. MCGINNIS.