

No. 708,716.

Patented Sept. 9, 1902.

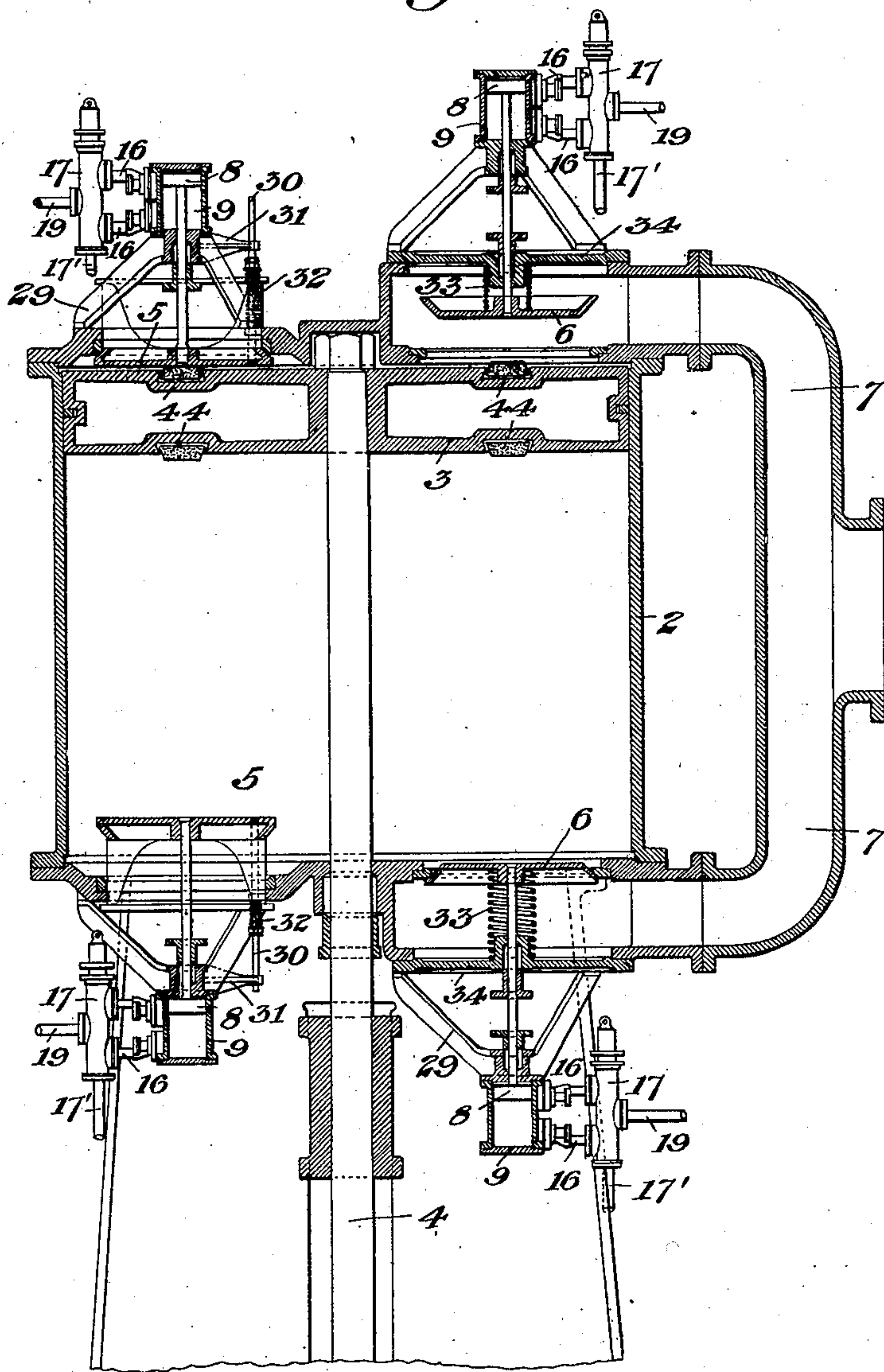
W. KENNEDY.
BLOWING ENGINE.

(Application filed July 2, 1900.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.



WITNESSES

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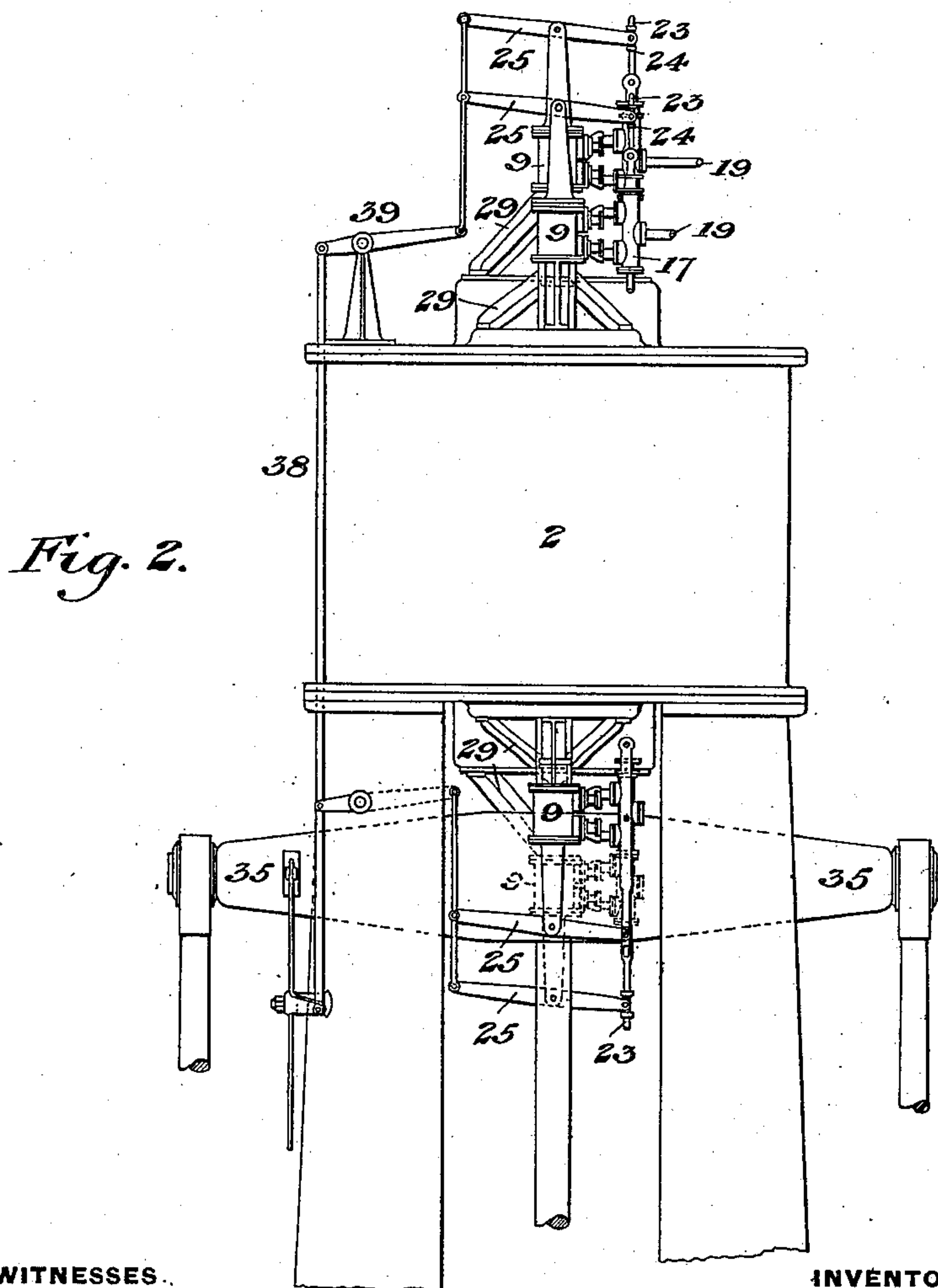
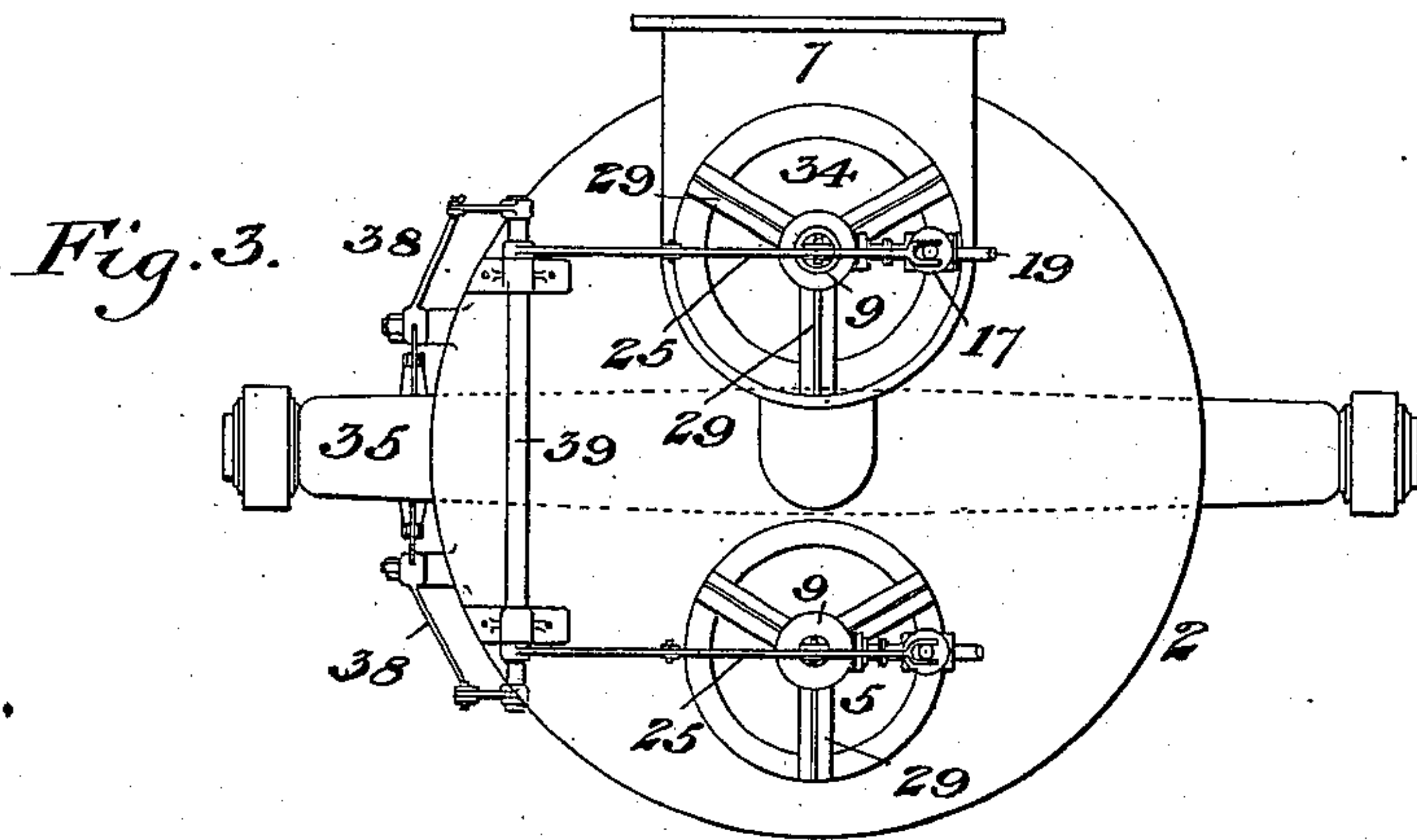
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WITNESSES.

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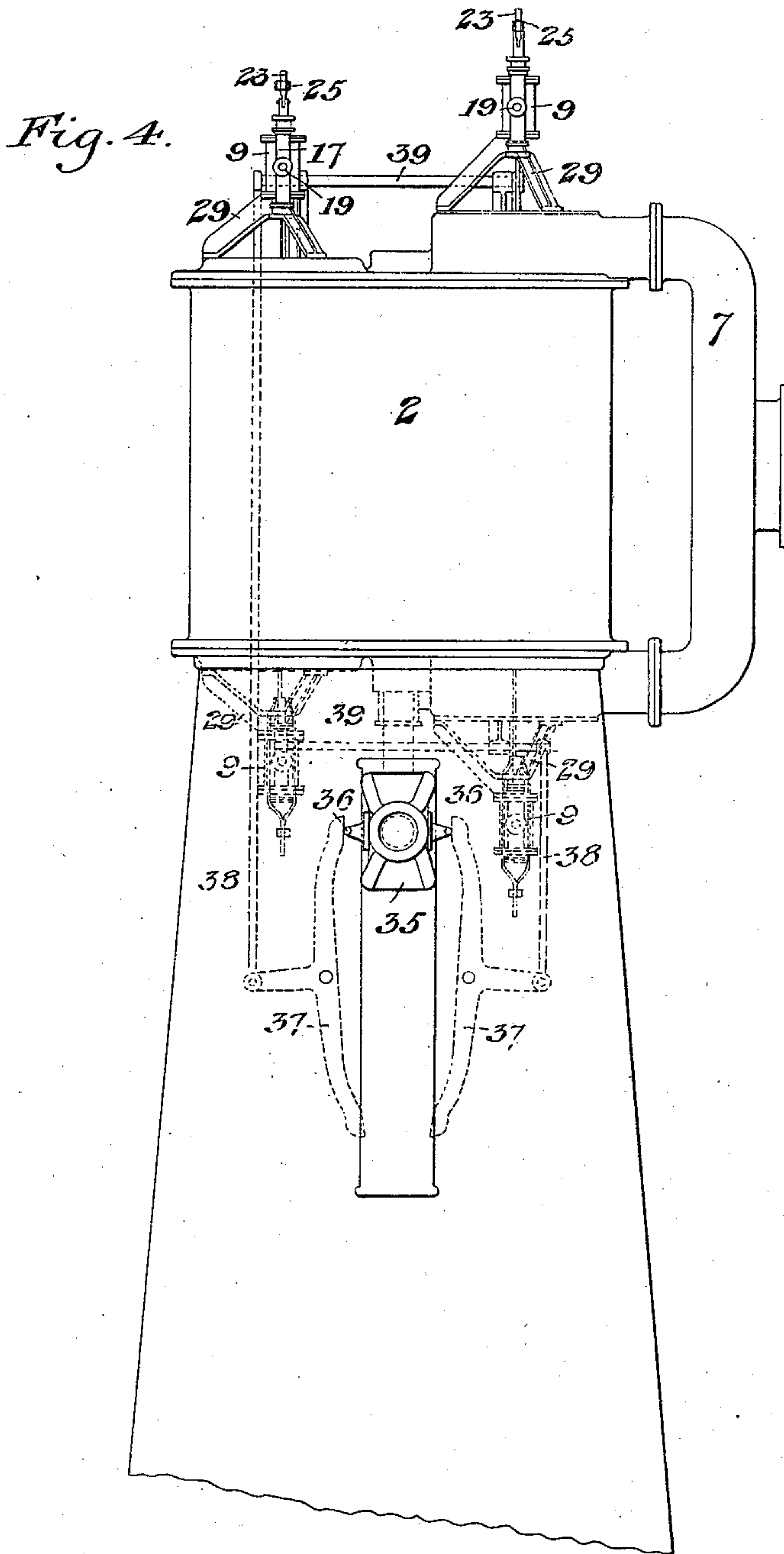
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4 Sheets—Sheet 3.



WITNESSES

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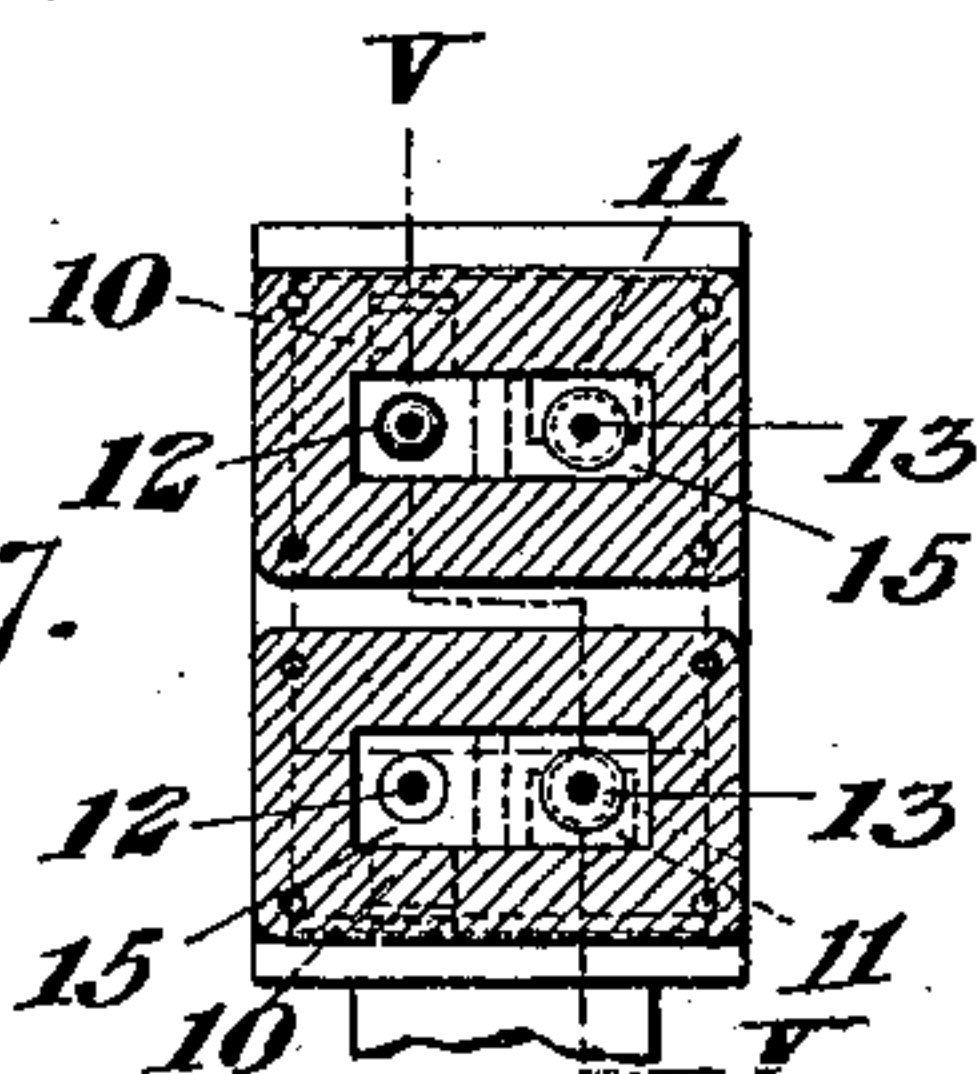
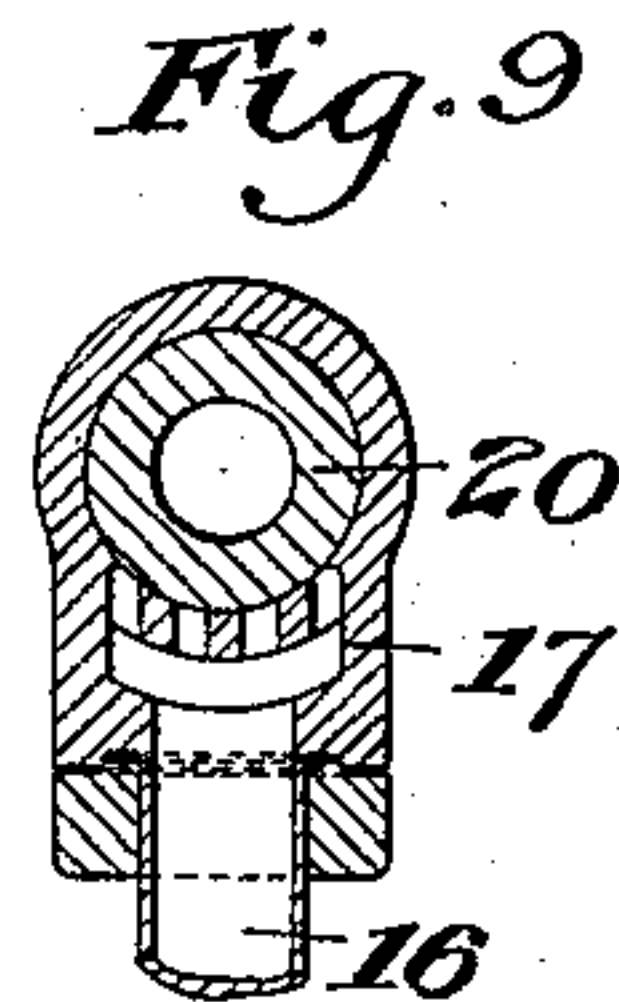
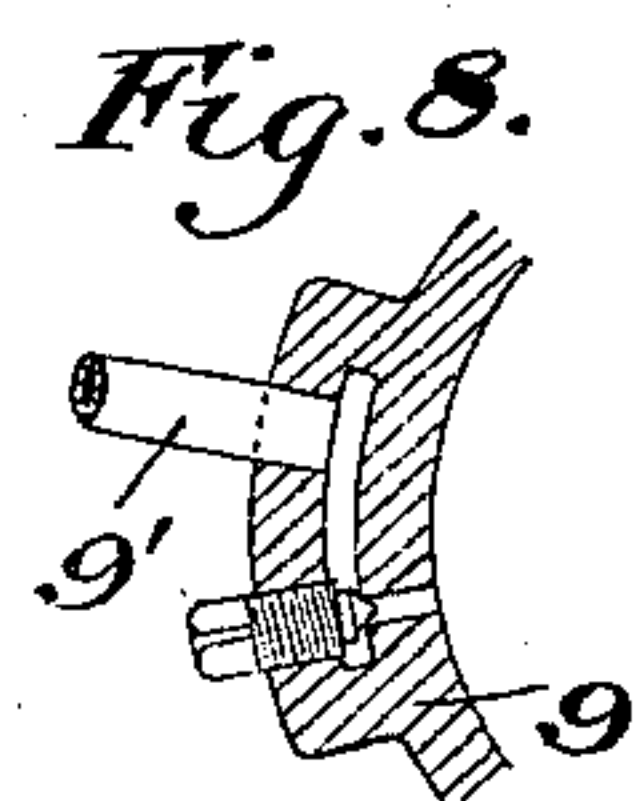
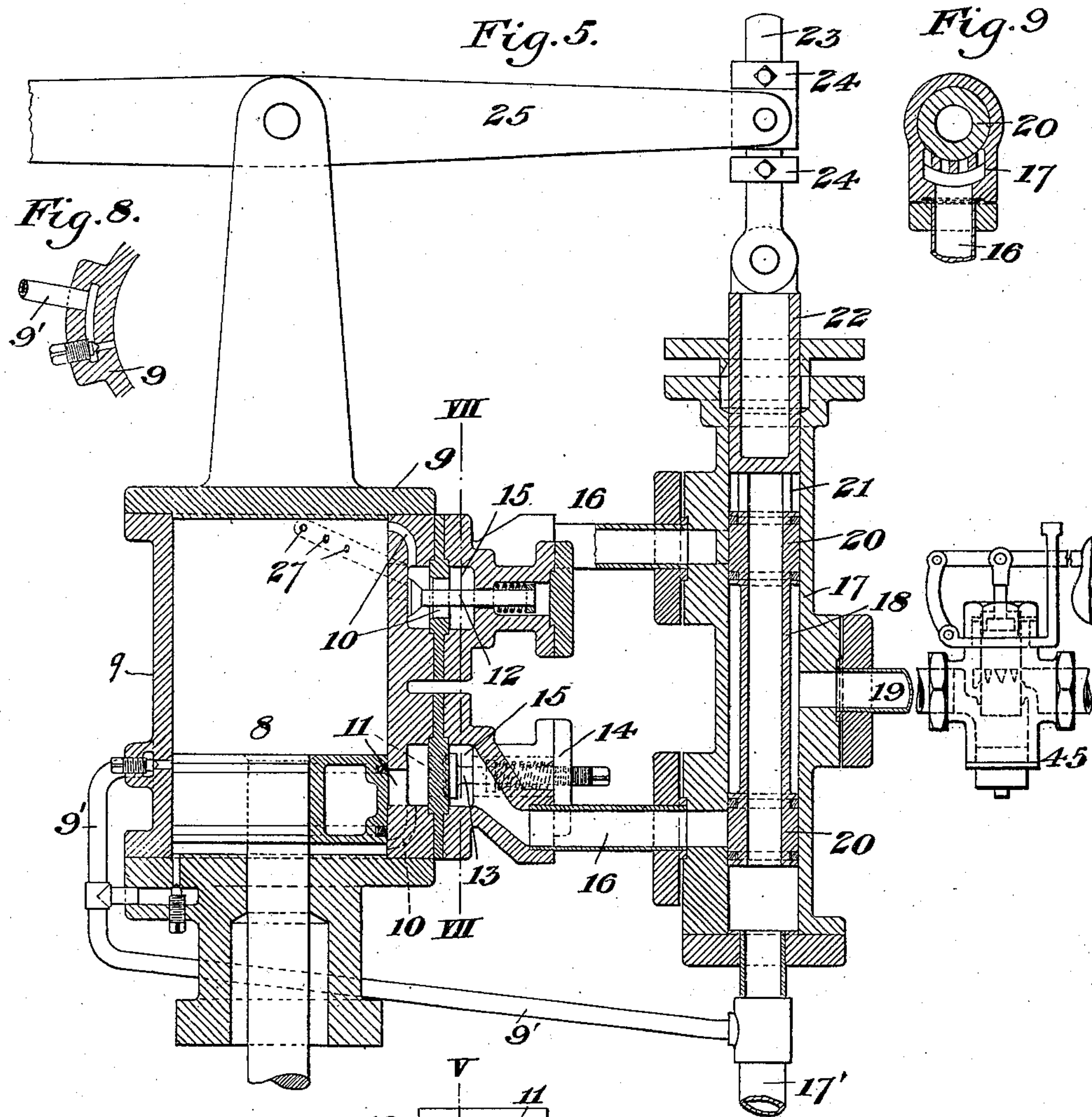
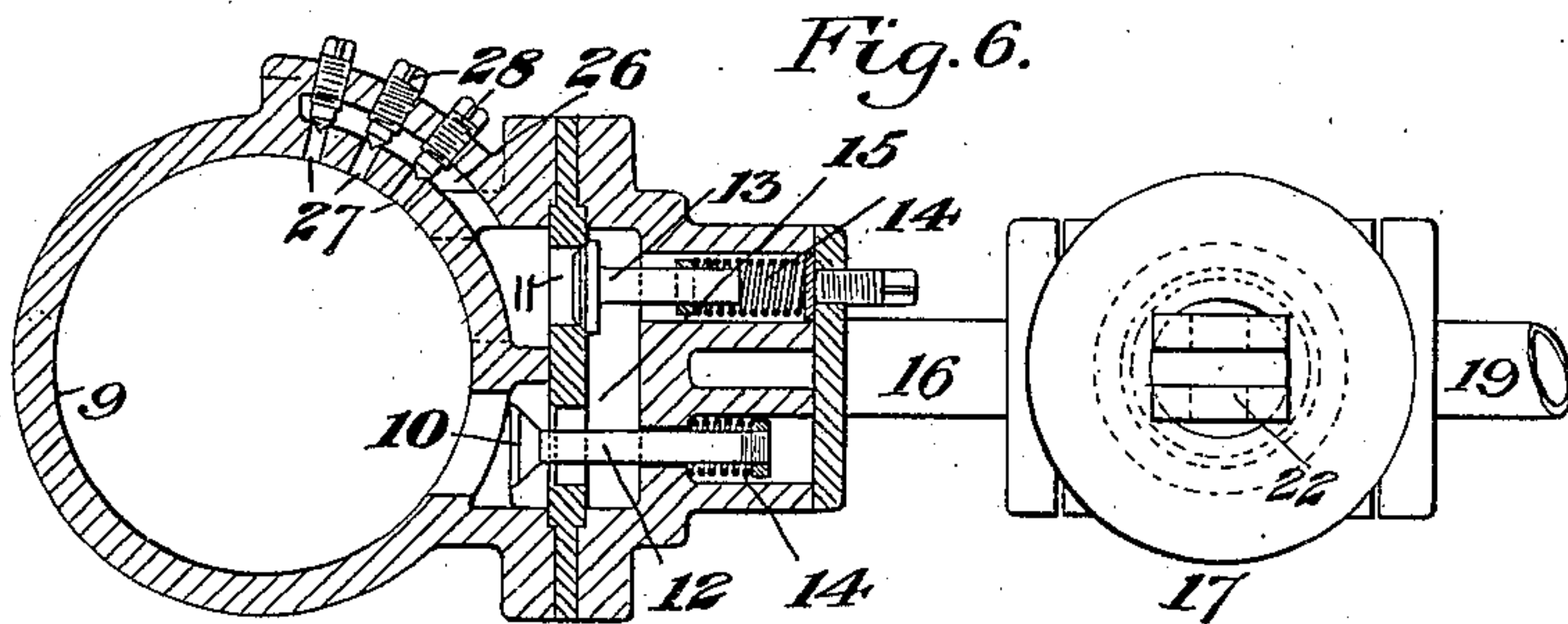
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(No. Model.)

4 Sheets—Sheet 4.



WITNESSES

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Fig. 7.

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UNITED STATES PATENT OFFICE.

WALTER KENNEDY, OF PITTSBURG, PENNSYLVANIA.

BLOWING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 708,716, dated September 9, 1902.

Application filed July 2, 1900. Serial No. 22,266. (No model.)

To all whom it may concern:

Be it known that I, WALTER KENNEDY, of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Blowing-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical sectional view of my improved blowing-engine. Fig. 2 is a front elevation of the same. Fig. 3 is a top plan view. Fig. 4 is a side elevation. Fig. 5 is an enlarged irregular section of one of the valve motor-cylinders with the control-valve therefor. Fig. 6 is a horizontal section of the said motive cylinder with its control-valve in top plan view. Fig. 7 is a cross-section on the line VII VII of Fig 5; and Figs. 8 and 9 are detail sectional views of the valve and cylinder-cushion, respectively.

My invention relates to the class of blowing-engines having puppet-valves, and is designed to overcome the disadvantages heretofore experienced in this type of blowing-engine and produce a simple, cheap, and economical engine for the purpose.

The main feature of my invention lies in connecting such a puppet-valve with the movable member of a cylinder which is arranged to prevent the sudden and violent seating of the valve and, further, to use such cylinder as a motive cylinder for the positive opening and closing of these valves.

The invention further consists in the peculiar arrangement and construction of these valve motive cylinders and connected parts, as hereinafter more fully described and set forth in the claims.

In the drawings, 2 represents the cylinder of a vertical blowing-engine, having piston 3 and piston-rod 4. The heads of the cylinder are provided with oppositely-located outwardly-seating inlet-valves 5 5 and with correspondingly inwardly-seating outlet-valves 6 6. The inlet-valves open to the outer air, while the outlet-valves open into the pipes 7 7, leading to the wind-box. The stem of each puppet-valve is connected to the piston 8 of a motive cylinder 9. These motive cylinders are all similarly constructed and are shown in Figs. 5, 6, 7, 8, and 9. Each cylin-

der is provided near each end with an inlet-port 10 and an outlet-port 11. Each inlet-port is controlled by an outwardly-seating valve 12 and each outlet-port by an inwardly-seating valve 13. These valves 12 and 13 are normally pressed to their seats by springs 14 and control the fluid flow. The chambers 15, with which the inlet-ports 10 communicate at each end of the cylinder, are connected by pipes 16 to the end portions of a valve-chamber 17, containing a hollow balanced valve 18. I provide the cylinder 9 with a suitable drainage-pipe 9', which communicates with the exhaust-pipe 17' at the lower end of the valve 17. Any condensation in the cylinder 9 which may form while the parts are at rest is readily removed. The intermediate portion of this valve 18 is reduced in diameter to form a space for fluid-supply entering from pipe 19, while its end portions are enlarged to form valve portions 20, which are provided with suitable packings. At its upper end the valve is provided with separated arms 21, connected to a plunger 22, which moves through a stuffing-box in the end of the valve-chamber and is pivotally connected with tappet-rod 23, having adjustable tappets 24, acted upon by a tappet carried upon a lever 25.

The outlet-ports 11 are near the ends of the cylinder 9, and from each of them an inclined passage 26 leads to the end of the cylinder and is provided with several small holes 27, controlled by screw-plugs 28, by which the cushioning action of the motive fluid at the end of the stroke may be regulated.

The valve motive cylinders are supported upon suitable tripod standards 29, and the inlet-valves are provided with stems 30, preferably three in number, which extend through guides 31 and are provided with springs 32, which are compressed as the valves are alternately opened. Springs 33 are also provided between the outlet-valves and the outer head 34, which springs are compressed when these valves are opened.

The levers which operate the valves 17 may be operated by any suitable connections from the moving parts of the engine, and I have shown in Figs. 2 and 4 one such system. In this system the engine cross-head 35 is provided with rollers 36, which operate upon the

end portions of double-arm rockers 37, having link connections 38, operating rock-shafts 39, connected to the various levers, as shown.

The inlet-pipe 19 is preferably provided with a regulating-valve 45, as shown in Fig. 5, by which the inlet-pressure may be adjusted as desired.

In operating my improved engine the tap-pet-rod connections are arranged so that at either end of the stroke as the piston begins to move the inlet-valve at this end will open and move inwardly by reason of the steam admitted to its motive cylinder, it remaining in contact with the face of the piston until the limit of the motion of the valve is reached, and to cushion these inlet-valves on the piston I preferably provide this piston with rubber buffers 44. The outlet-valve at this end of the cylinder closes at or about the time the inlet opens and the inlet-valve at the other end of the cylinder closes. At the same time steam is admitted to the motive cylinder of the outlet-valve in the opposite head of the blowing-engine cylinder, the pressure on this motive cylinder being such that the outlet-valve will not open against the pressure in the wind-box until the air in the cylinder has been considerably compressed by the movement of the piston. Thus as the pressure varies in the wind-box the outlet-valve will always open at a certain pressure below such wind-box pressure. For example, if the outlet-valve be set so that it commences to open at three-pounds pressure in the cylinder when the wind-box pressure is four pounds it will begin to open at nine-pounds pressure when the wind-box pressure is ten pounds and at nineteen-pounds pressure when the wind-box pressure is twenty pounds. This is an important advantage flowing from the use of the motive cylinders on the puppet-valves. As the piston starts upon its return stroke the inlet and outlet valves operate in the same manner and order as that just described. By this arrangement the pistons of the small motive cylinders may travel rapidly in either direction until the piston has passed the outlet-port, when the air remaining in the cylinder will be compressed and cushion the puppet-valve to prevent its seating violently, and by adjusting the regulating-valves at the ends of these cylinders the operator can control the speed of travel of the puppet-valves during their seating. The reciprocating movements of the hollow valves for the small motive cylinders will give them the movements just described, except with the outlet-valve, which is being opened, it opening when the pressure in the blowing-cylinder added to the pressure exerted in the small motive cylinder will equal the wind-box pressure, when it will open quickly. In this way the wiredrawing of the air due to the pressure of the springs in the former constructions will be eliminated, as the steam-pressure will hold the valve wide open. The pressure on the small motive pistons may be controlled by a regulating-valve

to be adjusted by the operator, and the pressure in the negative end of these small cylinders may be adjusted by springs controlling their check-valves.

The advantages of my invention will be appreciated by those skilled in the art. The use of cylinders connected to the puppet-valves prevents the violent seatings of these valves whether these cylinders are used merely as motive cylinders or dash-pots in connection with heavy springs on the valves, and I intend to cover the same broadly. The use of these cylinders as motive cylinders is of special advantage, as it enables the valve to be moved positively and to be regulated as desired and prevents the wiredrawing of the air. The system is simple and effective and may be applied to existing engines by replacing their heads.

Many variations may be made in the form and arrangement of the valve-cylinders and their operating mechanism within the scope of my invention as defined in the claims.

I claim—

1. A blowing-engine having a piston reciprocated by external power connections, the head of the cylinder having inlet and outlet puppet-valves, motive cylinders having their pistons connected with said puppet-valves, and a source of fluid-pressure connected to the valve-cylinders and arranged to actuate the piston in both directions, said source of pressure being separate from the engine-cylinder; substantially as described.

2. A blowing-engine having its piston connected to an external source of power, the engine-cylinder having a puppet-valve, a double-acting motive cylinder having its piston connected to said valve, a source of fluid-pressure separate from the cylinder of the engine connected to the motive cylinder, and arranged to actuate the piston in both directions, and means for automatically applying the fluid to and exhausting it from the motive cylinder; substantially as described.

3. A blowing-engine having its piston connected to an external source of power, the engine-cylinder having a puppet-valve, a double-acting motive cylinder connected thereto, a source of fluid-pressure separate from the engine-cylinder connected to said motive cylinder and arranged to actuate its piston in both directions, and a valve controlling the supply of fluid to the motive cylinder and connected to a moving part of the engine; substantially as described.

4. A blowing-engine having its piston connected to an external source of power, the engine-cylinder having a puppet-valve in its head, a motive cylinder, a piston therein connected to the said valve and arranged to move the same positively in both directions, a source of fluid-supply separate from the engine-cylinder and connected to the motive cylinder, a valve controlling said supply to and its exhaust from both ends of the cylinder, and a connection between said valve and

a moving part of the engine; substantially as described.

5 A blowing-engine having its piston connected to an external source of power, the engine-cylinder having inlet and outlet puppet-valves in its head, double-acting motive cylinders connected to the said valves, a source of pressure separate from the engine-cylinder connected to the motive cylinders, 10 and valves controlling the fluid-supply to said motive cylinders and connected to a moving part of the engine; substantially as described.

6 A blowing-engine having its piston connected to an external source of power, the 15 engine-cylinder having a puppet-valve connected to a cylinder having a piston therein, said valve-cylinder having valve-controlled ports at each end whereby the seating of the puppet-valve is cushioned, and a source of 20 fluid-pressure separate from the engine connected to the valve-operating cylinder; substantially as described.

7. An air-compressor having its piston connected to an external source of power, the 25 engine-cylinder having a puppet-valve in its head, a motive cylinder connected to said valve and arranged to move it in one direction, and power mechanism for moving it in the opposite direction, both the motive cylinder and the power mechanism being independent of the pressure in the compressor-cylinder; substantially as described. 30

8. A blowing-engine comprising an engine-cylinder, wind-box, piston, piston-driving 35 means, an outwardly-opening puppet-valve controlling the passage from the cylinder to the wind-box, a motor connected to said valve and a source of power for said motor distinct from the air-pressure in said cylinder or wind-box but controlled by the movement of said 40 piston; substantially as described.

9. A blowing-engine comprising an engine-cylinder, wind-box, piston, piston-driving 45 means, a puppet-valve in the cylinder-head, a motor connected to the valve and arranged to move it in both directions, and a source of power distinct from the air-pressure in the cylinder or wind-box but controlled by the movement of said piston; substantially as 50 described.

10. A blowing-engine comprising an engine-cylinder, wind-box, piston, piston-driving means, an outwardly-opening puppet-valve

controlling the passage from the cylinder to the wind-box, a motor connected to said valve, 55 a source of power for said motor distinct from the air-pressure in said cylinder or wind-box but controlled by the movement of said piston and a regulator capable of adjustment during the operation of the engine, for maintaining 60 the power applied to the motor substantially uniform; substantially as described.

11. A blowing-engine comprising an engine-cylinder, wind-box, piston, piston-driving 65 means, a puppet-valve in the cylinder-head, a motor connected to the valve and arranged to move it in both directions, a source of power for said motor distinct from the air-pressure in said cylinder or wind-box but controlled by the movement of said piston and a 70 regulator capable of adjustment during the operation of the engine, for maintaining the power applied to said motor substantially uniform; substantially as described.

12. A blowing-engine comprising an engine-cylinder, wind-box, piston, piston-driving 75 means, an outwardly-opening puppet-valve controlling the passage from the cylinder to the wind-box, a motor connected to the valve, a source of power distinct from the air-pressure 80 in said cylinder or wind-box but controlled by the movement of said piston, and a device arranged to maintain the power supplied to said motor at a point insufficient to open the valve against the back pressure of 85 the air in the wind-box; substantially as described.

13. A blowing-engine comprising an engine-cylinder, wind-box, piston, piston-driving 90 means, a puppet-valve in the cylinder-head, a motor connected to the valve and arranged to move it in both directions, a source of power distinct from the air-pressure in said cylinder or wind-box but controlled by the movement of said piston, and a device arranged 95 to maintain the power supplied to said motor at a point insufficient to open the valve against the back pressure of the air in the wind-box; substantially as described.

In testimony whereof I have hereunto set 100 my hand.

WALTER KENNEDY.

Witnesses:

H. M. CORWIN,
L. A. CONNER, Jr.