

No. 633,339.

Patented Sept. 19, 1899.

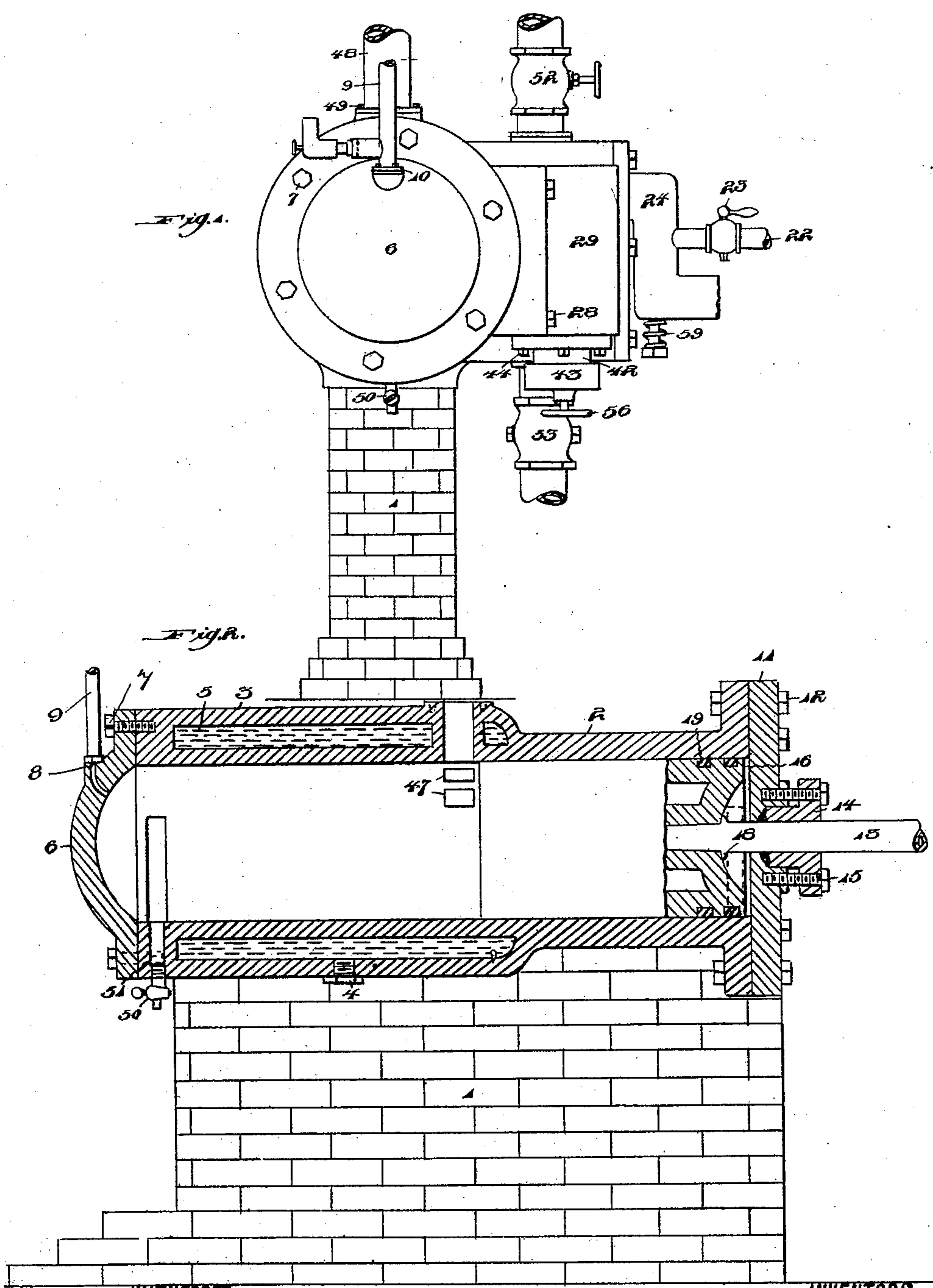
G. DAHLBERG, J. CLICQUENNOI & E. UHLIN.

COMBINATION STEAM AND GAS ENGINE.

(Application filed Apr. 5, 1899.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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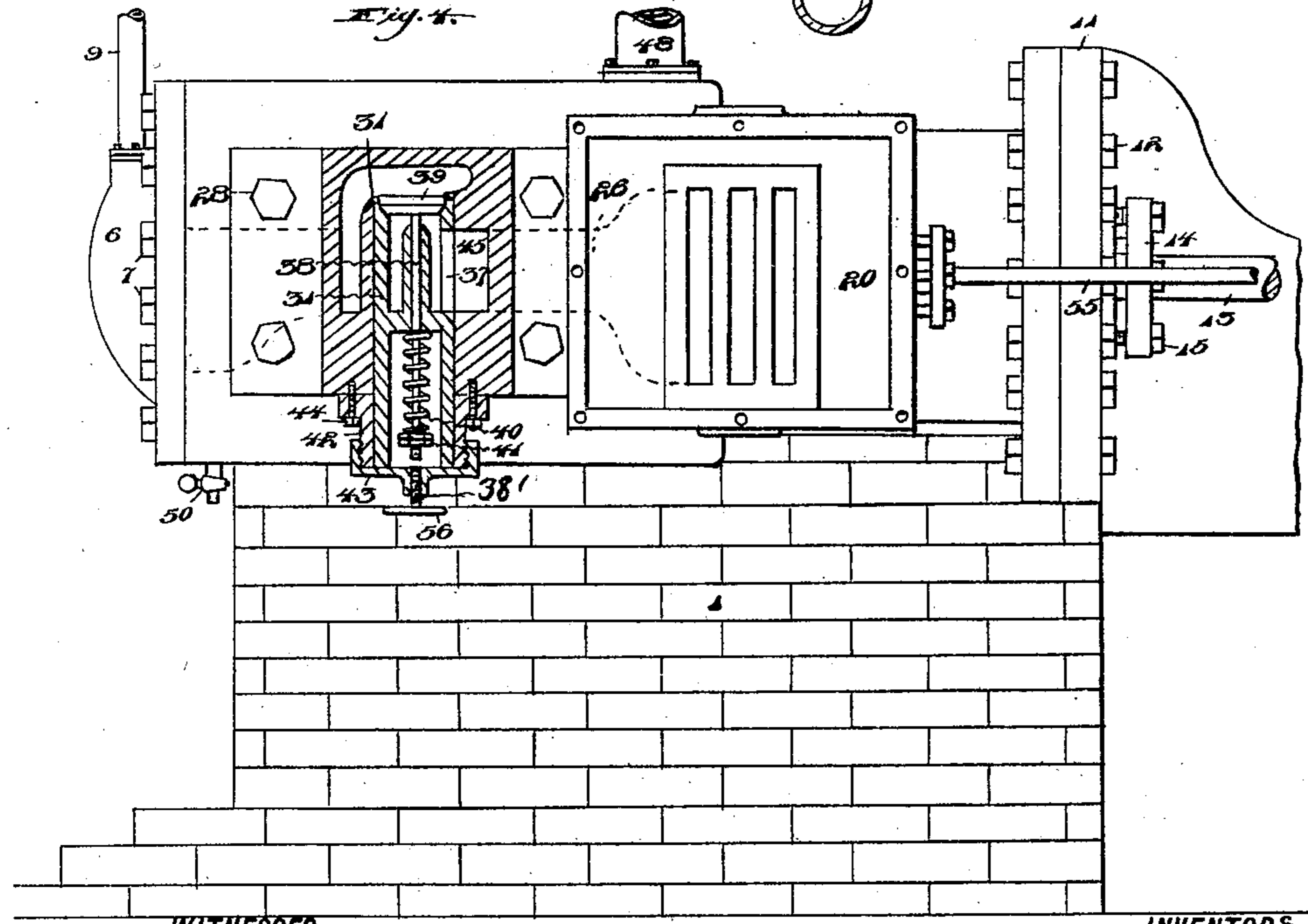
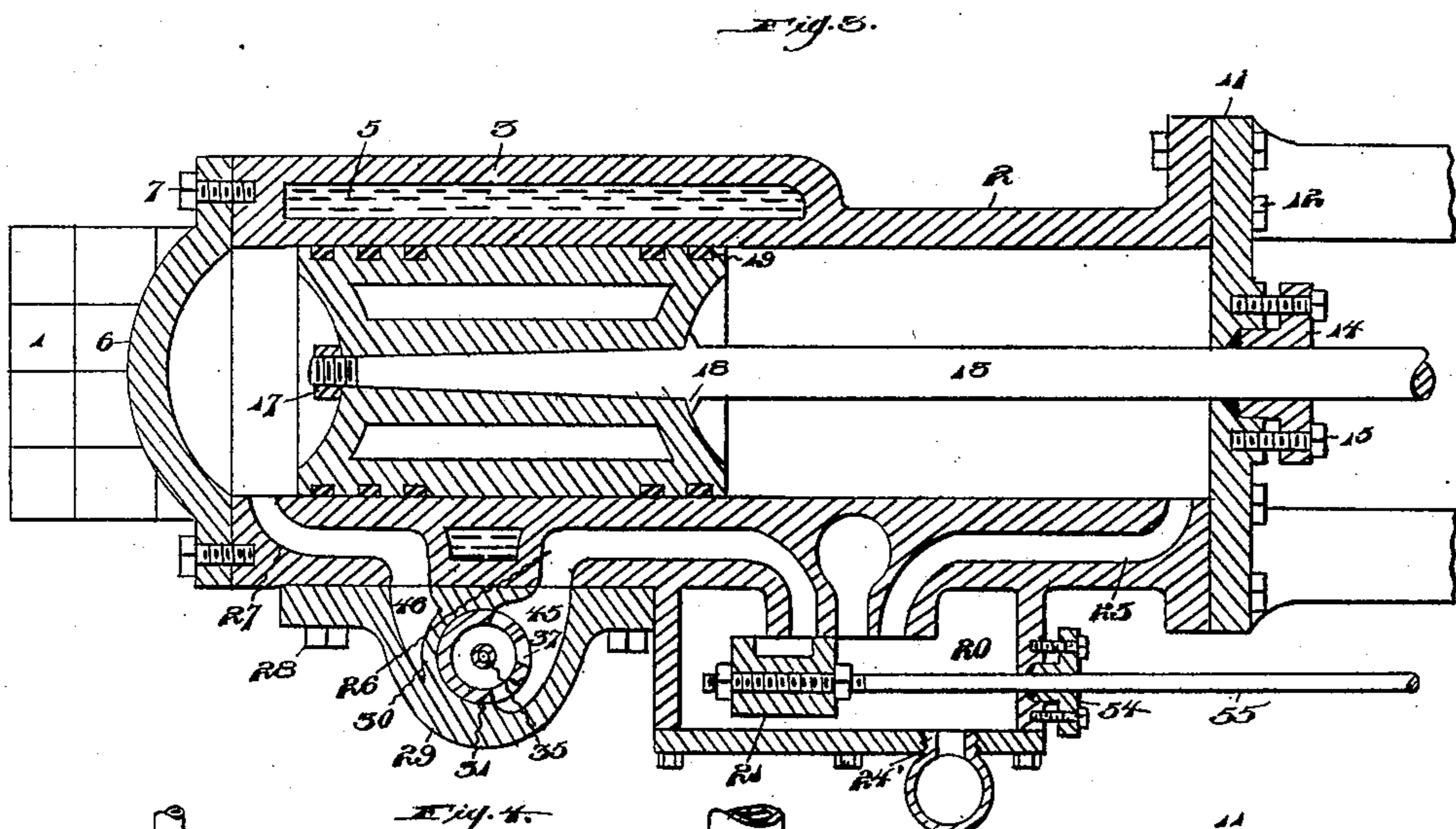
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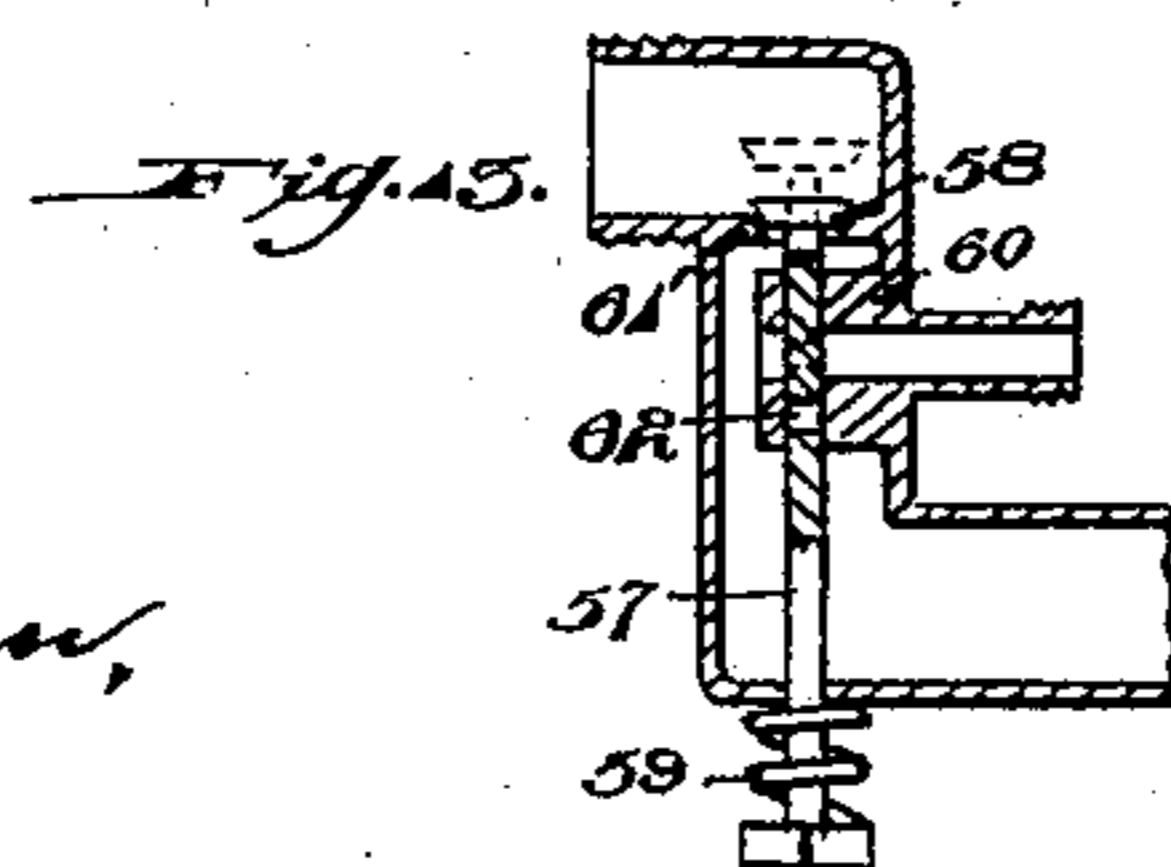
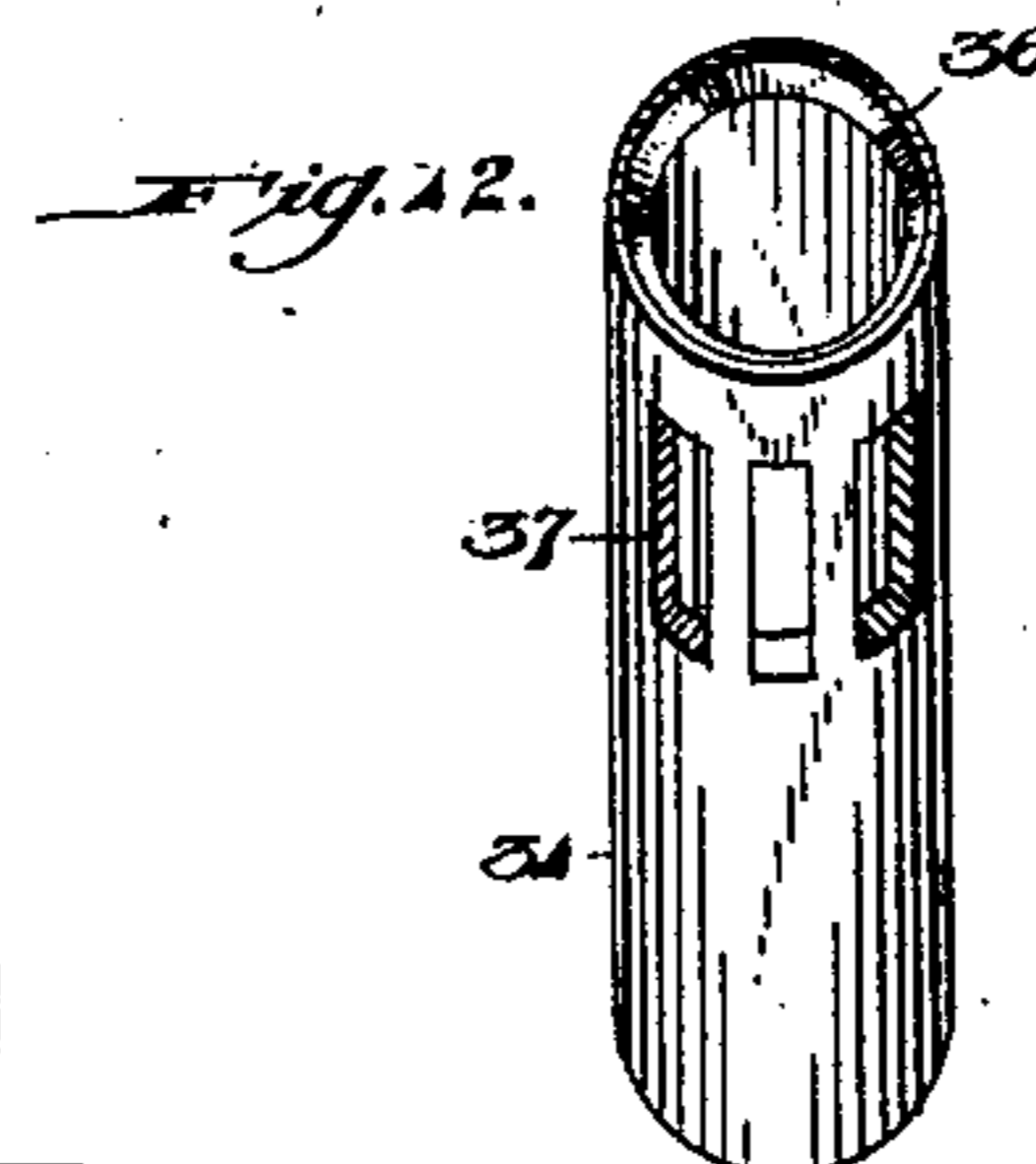
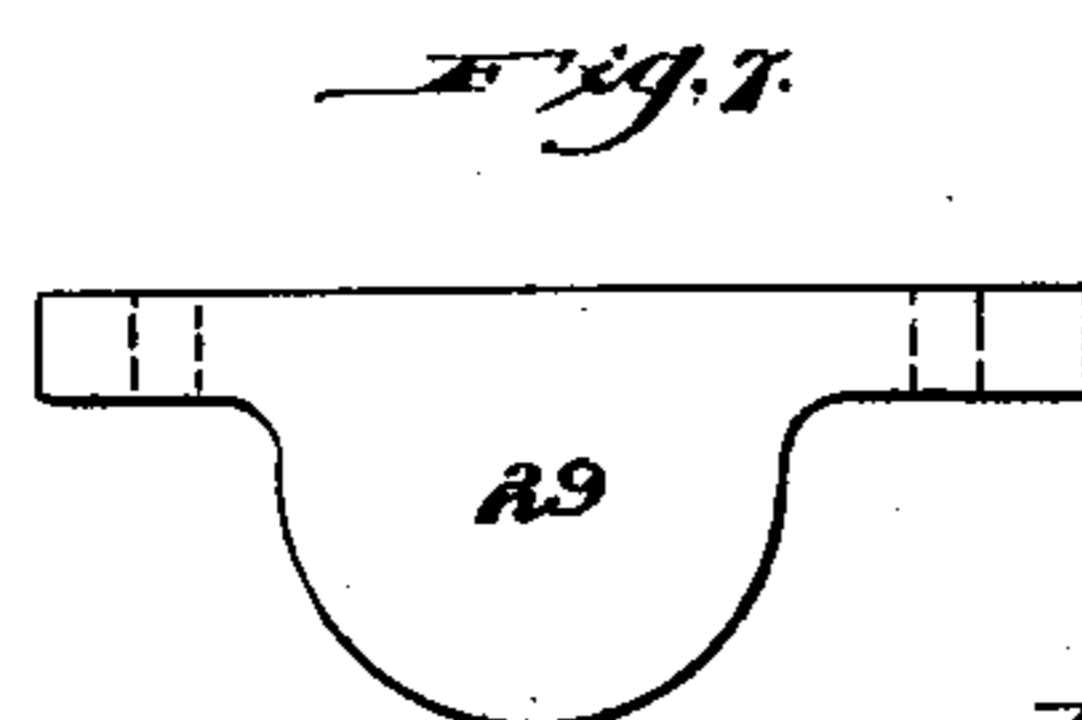
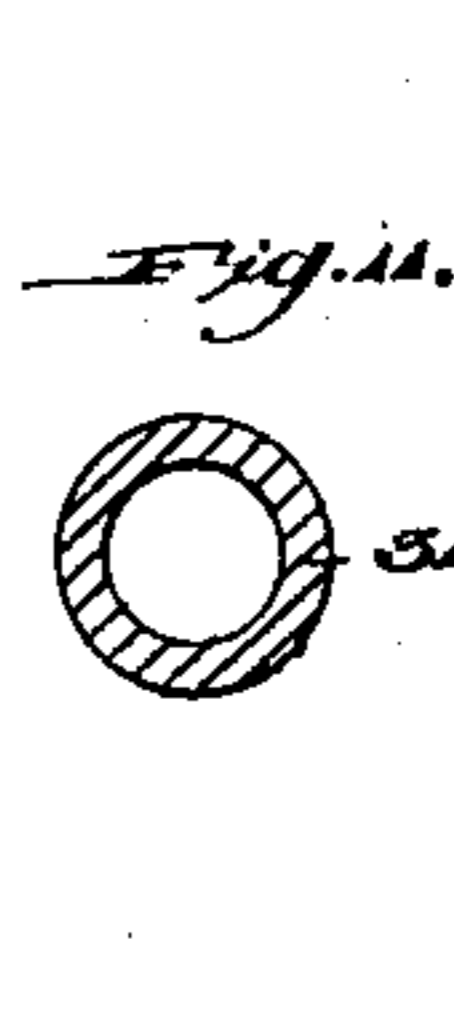
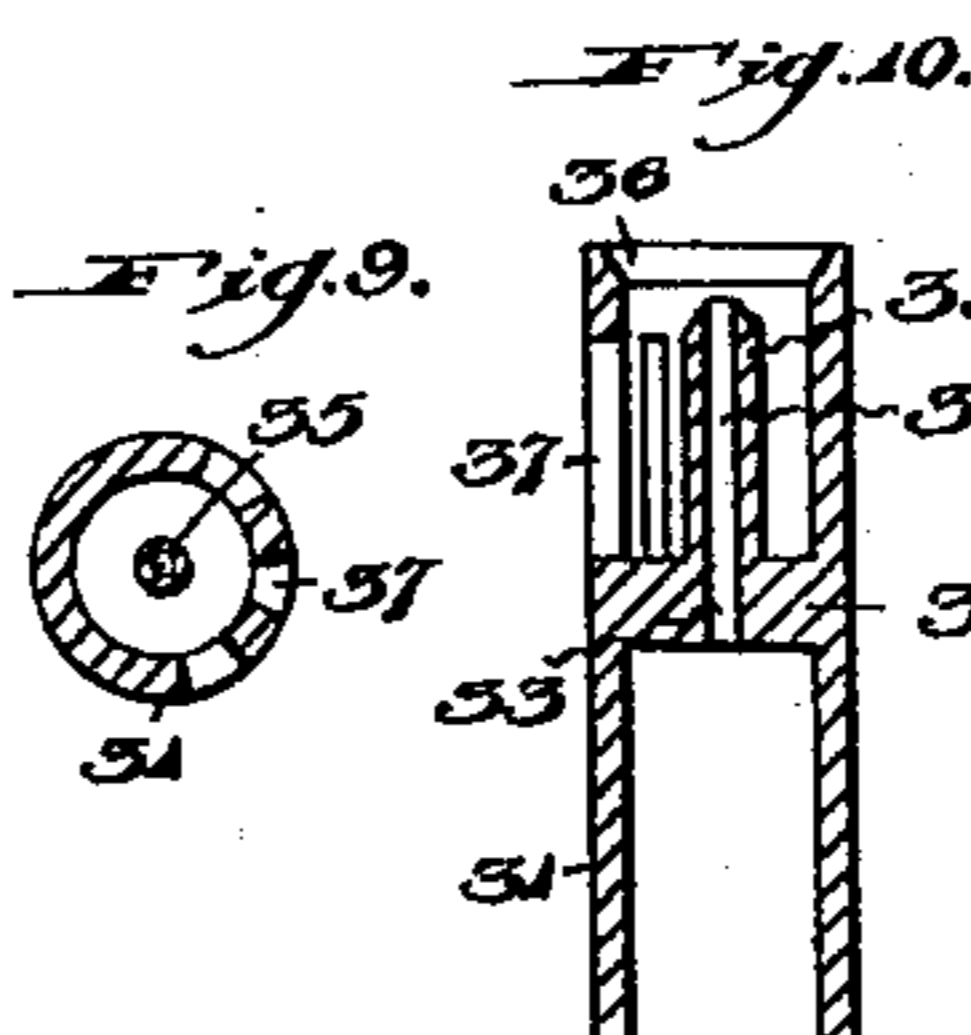
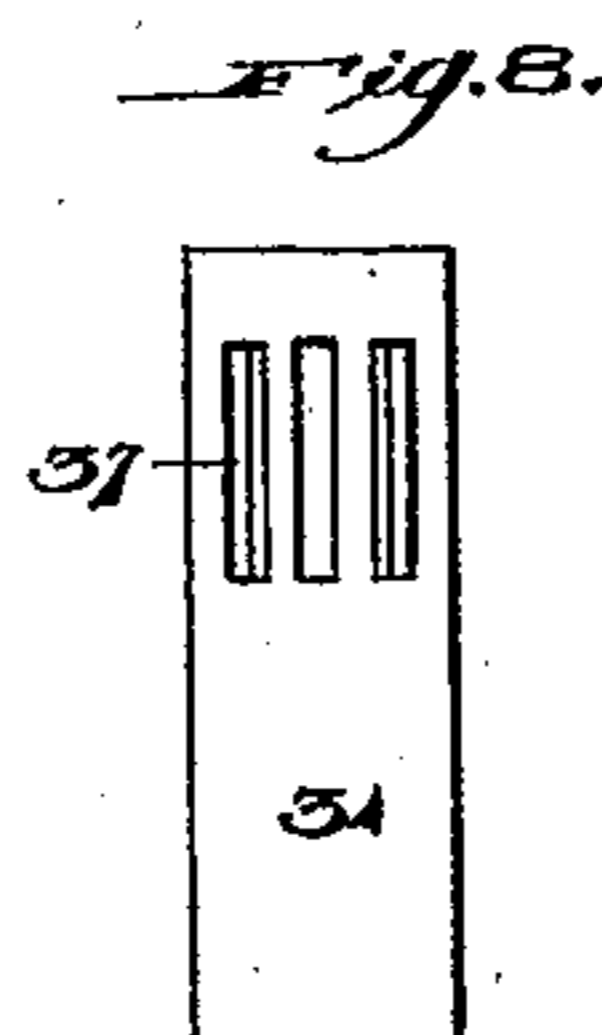
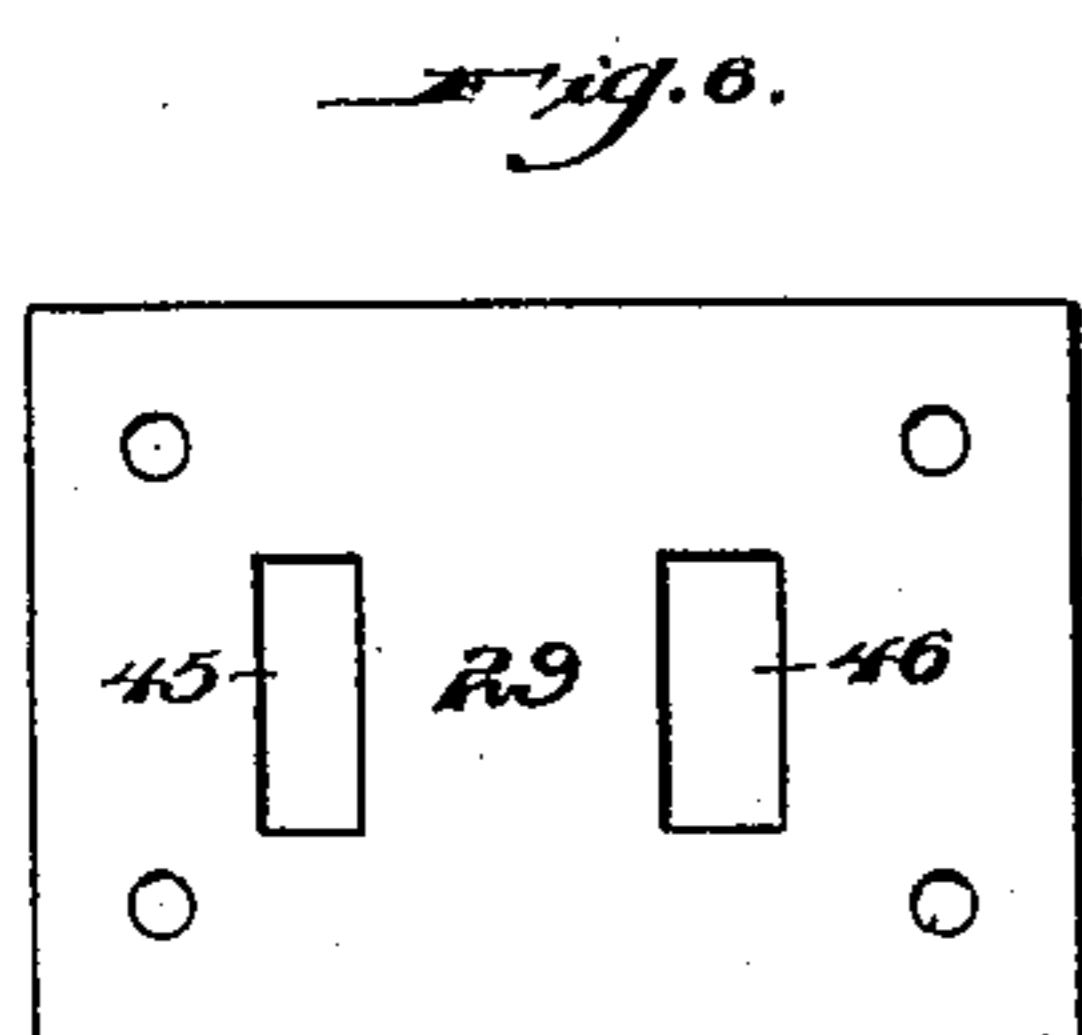
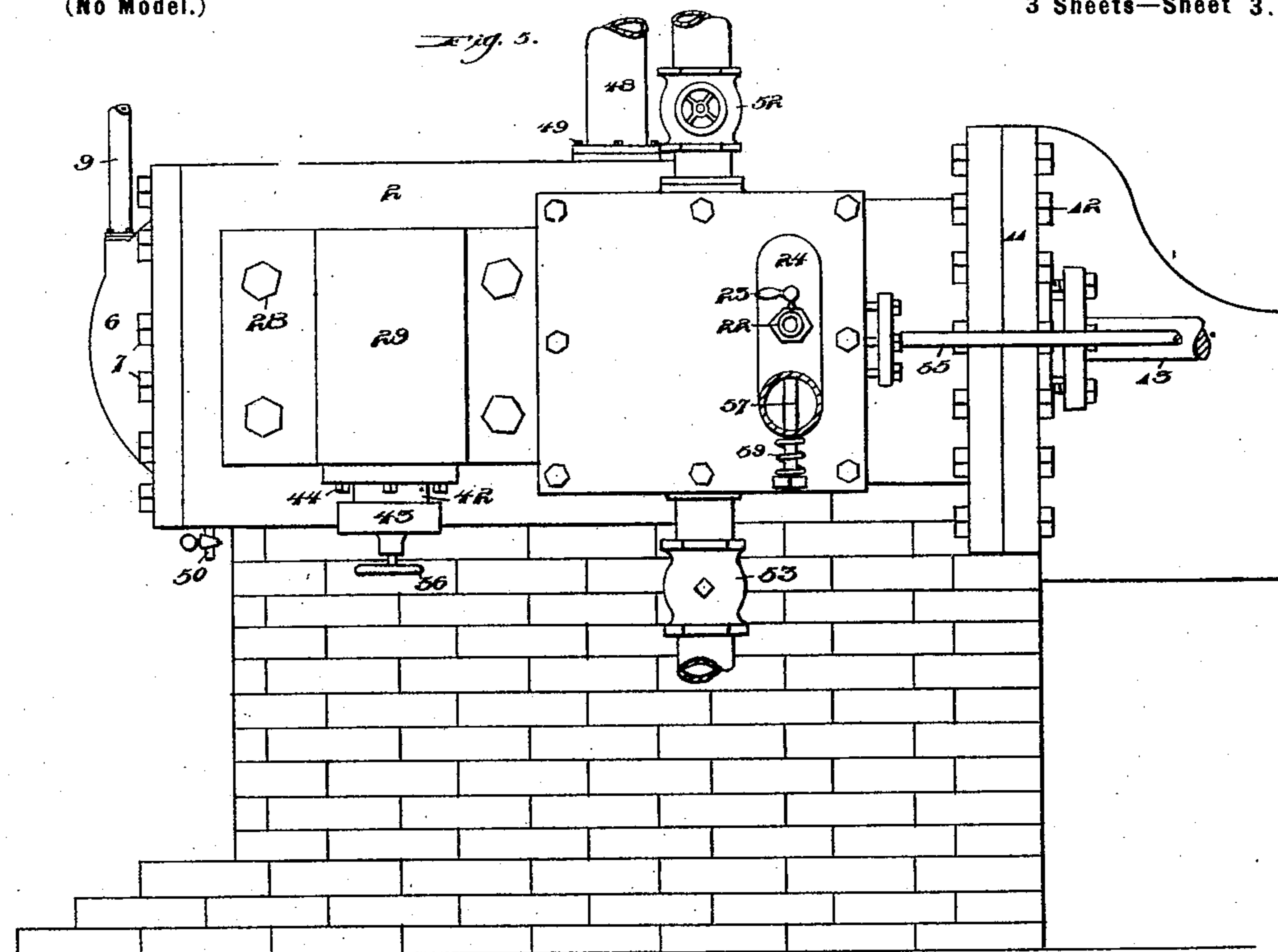
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UNITED STATES PATENT OFFICE.

GUSTAV DAHLBERG, JACOB CLICQUENNOI, AND ERNEST UHLIN, OF
McDONALD, PENNSYLVANIA.

COMBINATION STEAM AND GAS ENGINE.

SPECIFICATION forming part of Letters Patent No. 633,339, dated September 19, 1899.

Application filed April 5, 1899. Serial No. 711,807. (No model.)

To all whom it may concern:

Be it known that we, GUSTAV DAHLBERG, JACOB CLICQUENNOI, and ERNEST UHLIN, citizens of the United States of America, residing at McDonald, in the county of Washington and State of Pennsylvania, have invented certain new and useful Improvements in Combination Gas and Steam Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to certain new and useful improvements in gas and steam engines.

Our invention is particularly adapted for use in operating oil-well-pumping machinery and the gas derived from the well being utilized for operating the engine, or, if desired, the engine may be readily converted to allow of its operation by steam.

The object of our invention is to construct an engine of this character which will overcome multiplicity of parts; expenses of construction, and the uneven irregular power production and transfer which is usual in engines of this character.

A further object of our invention is to construct an engine of this character by which the exhaust of the foul gases of the explosion is discharged through suitable openings in the cylinder when the piston is out of registering engagement therewith.

A further object of our invention is to construct an engine of this character which can be readily adjusted, so that the same can be operated by gas or steam, as desired, without changing the mechanism of the engine.

A further object of our invention is to simplify the feeding to the cylinder of an explosive mixture.

A further object of our invention is to provide a suitable valve operated by the downward and outward stroke of the piston to allow of the feeding to the cylinder of an explosive charge.

A further object of our invention is to construct an engine of this character in which the explosive mixture is inclosed, compressed, and ignited in one cylinder.

Our invention finally consists in the novel

combination and arrangement of parts hereinafter more fully described, and particularly pointed out in the claims.

In describing the invention in detail reference is had to the accompanying drawings, 55 forming a part of this specification, wherein like numerals of reference indicate corresponding parts throughout the several views thereof, and in which—

Figure 1 is a front view of our improved 60 engine. Fig. 2 is a vertical sectional view thereof. Fig. 3 is a horizontal sectional view thereof. Fig. 4 is a side view with the casing of the steam-chest, showing in section the feeding-valve. Fig. 5 is a side view thereof. 65 Fig. 6 is an inverted plan view of the valve-casing, showing the inlet and outlet ports. Fig. 7 is a top plan view of the valve-casing. Fig. 8 is a side view of the valve-cylinder, which is arranged in the valve-casing. Fig. 70 9 is a cross-sectional view thereof. Fig. 10 is a vertical sectional view thereof. Fig. 11 is a cross-sectional view taken on the line *xx*, Fig. 10. Fig. 12 is a perspective view of the valve-cylinder, showing the inlet-ports arranged therein. Fig. 13 is a vertical sectional 75 view of the gas and air mixer.

Referring to the drawings by reference-numerals, 1 indicates a suitable base constructed of any desirable material and upon which is 80 mounted a cylinder 2, having formed integral therewith a water-jacket 3, which is provided with an inlet in which is arranged a plug 4 to allow of the admission thereto of the water 5 for cooling the cylinder. This 85 cylinder 2 is closed at its front end by a head 6, which is secured thereto by means of the screws 7, and this head 6 is provided with a port 8, which registers with suitable igniting mechanism 9 and is suitably secured to the 90 head 6, as at 10. The cylinder 2 is also closed at its crank end by means of the head 11, suitably secured thereto by the bolts 12. This head is provided with an opening to allow of the operation therethrough of a piston-rod 13. 95 14 indicates a suitable stuffing-box surrounding the piston-rod 13 and connected to the head 11 by means of the bolts 15. The piston-rod 13 is suitably connected to the cross-head of a drive or fly wheel of an engine. 100

Mounted within the cylinder 2 is a piston-head 16, which is suitably secured to the piston-rod by means of the nut 17 operating on the screw-threaded end of the piston-rod and holding the piston against the lugs or projections formed on the piston-rod, as at 18. This piston-head may be of any desirable construction and is provided with the usual packing-rings 19.

10 Formed integral with the one side of the cylinder 2 is a steam-chest 20, having operating therein an ordinary steam-valve 21. This steam-chest is also used as an explosive-mixture chest, which mixture is fed thereto
15 by means of a gas-supply pipe 22, having arranged therein a cock 23', this supply-pipe 22 being connected to a feed-pipe 24, which is suitably secured to the steam or explosive-mixture chest, as at 24', Fig. 3. The one side
20 of the cylinder 2 is provided with an outlet-port 25 and auxiliary inlet-port 26 and a main inlet-port 27. The ports 25 and 26 register with the steam or explosive-mixture chest.

Secured to one side of the cylinder 2 by
25 means of the screws 28 is a valve-casing 29, which is provided with a supporting-partition 30 for the valve-cylinder 31. This valve-cylinder 31 is mounted within the valve-casing, as shown, and is divided by means of a
30 partition 32. This partition 32 has a central opening 33, which registers with an opening 34, formed in the guide 35, this guide 35 being formed integral with one side of the partition 32. The one end of the valve-cylinder
35 31 is provided with a valve-seat 36 and the one side thereof with a series of inlet-ports 37.

38 indicates a valve-stem which is arranged within the valve-cylinder, as shown, and the one end thereof is provided with a feed-valve
40 39 and a portion of the opposite end with a coiled tension-spring 40, operating against a regulating-nut 41. The valve-stem 38 is adapted to be engaged by the stem 38', operating through a cap 42, which is secured to
45 an auxiliary cap 43, this auxiliary cap being secured to the valve-casing by means of the screws 44.

45 indicates an inlet-chamber of the valve-casing, and 46 an outlet. The outlet-port 26
50 registers with the inlet-chamber 45 of the valve-casing and the main inlet 27 with the outlet-chamber 46 of the valve-casing.

The cylinder 2 is provided with a series of exhaust-ports 47 for the foul gases, which register with the exhaust-pipe 48, secured to the cylinder, as at 49.

50 indicates a suitable cock arranged in the cylinder 2, registering with an opening 51 to allow for the exhaust of the waters of condensation.
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52 indicates a steam-inlet pipe, which is suitably connected to the steam-chest, and 53 a steam-exhaust connected to the opposite side of the steam-chest.

65 54 indicates a suitable packing-box connected to the steam-chest for the valve-stem 55 of the steam-valve 21.

56 denotes a set-wheel for the auxiliary stem 38'.

The feeding of gas or explosive mixture to the steam or explosive-mixture chest is regulated by means of the valve-stem 57, having secured to one end the regulating-valve 58 and at its opposite end a tension-spring 59. This stem operates through the supports 60, formed in the pipe 24, and the valve 58 operates against the valve-seat arranged in the partition 61. The valve-stem 57 is provided with an inlet-opening for the gas 62, which is adapted to register with the supply-pipe 22 when the valve 58 is off its seat.

The operation of our improved device is as follows: The valve 58 being opened, the explosive mixture is fed into the steam or explosive-mixture chest, and the piston being started the backward movement of the same will force the explosive mixture from the steam or explosive-mixture chest through the port 26 into the valve-casing. From there it will pass through the inlet 37 against the valve 39, removing the same from its seat, passes out of the inlet-chamber 46 into the inlet 27, from thence into the cylinder, and on the forward movement of the piston the explosive mixture will be compressed, ignited, and exploded, forcing the piston backward, and so repeating the heretofore-described operation. On the forward movement of the piston the suction thereof will move the valve 58 from its seat, allowing another charge of explosive mixture to enter the steam or explosive-mixture chest, and on the backward movement of the piston the pressure obtained thereby will close the valve 58, as well as force another charge of explosive mixture through the various communications into the cylinder for its ignition and explosion. On the backward movement of the piston, the same passing the exhaust-ports 47, the foul gases will be discharged from the cylinder therethrough, and at this movement the explosive mixture will force the valve 39 from its seat and enter the forward part of the cylinder. It will of course be observed that when an engine is desired to be operated by steam by cutting off the gas or explosive supply by means of the cock 23 and removing the valve 39 from its valve-seat by means of the hand-wheel 56, bringing the auxiliary stem in engagement with the valve-stem 38, then turning on the steam, the operation will be identical, the steam being fed through the ports as the explosive mixture was. As there is an explosion at every revolution and as ignition can only take place when the piston on reaching the upper or dead point commences to release the fresh charge, there is no danger of premature explosions or back firing.

In our improved engine the backward movement of the piston forces the charge in the steam or explosive-mixture chest into the cylinder and the forward movement thereof compresses the charge to the point of ignition, while the charge of the explosive mixture will

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be fed to the chest only on the forward movement of the piston, the supply being cut off on the backward movement of the piston.

It will be noted that various changes may be made in the details of construction without departing from the general spirit of our invention.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

In gas and like engines, the combination of a cylinder closed at both ends, a piston operating therein, a steam or explosive-mixture chest suitably connected to the said cylinder and to a steam-supply, a mixer connected to the said chest and to an explosive-mixture supply, means arranged in the mixer for controlling the supply of explosive mixture to the said chest, a valve-casing secured to the said cylinder, connections between the said casing and cylinder for supplying an explo-

sive mixture thereto, connections between the said casing and said chest for supplying an explosive charge to said casing, a valve-cylinder arranged in the said casing provided with suitable inlet-ports, a valve arranged in the said valve-cylinder for controlling the admission of the explosive mixture to the first-named cylinder, suitable igniting mechanism suitably secured to the first-named cylinder for exploding the explosive mixture, and means arranged in the side of the first-named cylinder for exhausting the foul vapors after an explosion, substantially as set forth.

In testimony whereof we affix our signatures in the presence of two witnesses.

GUSTAV DAHLBERG.
JACOB CLICQUENNOI.
ERNEST UHLIN.

Witnesses:

JOHN NOLAND,
JOHN GROETZINGER.