

No. 633,338.

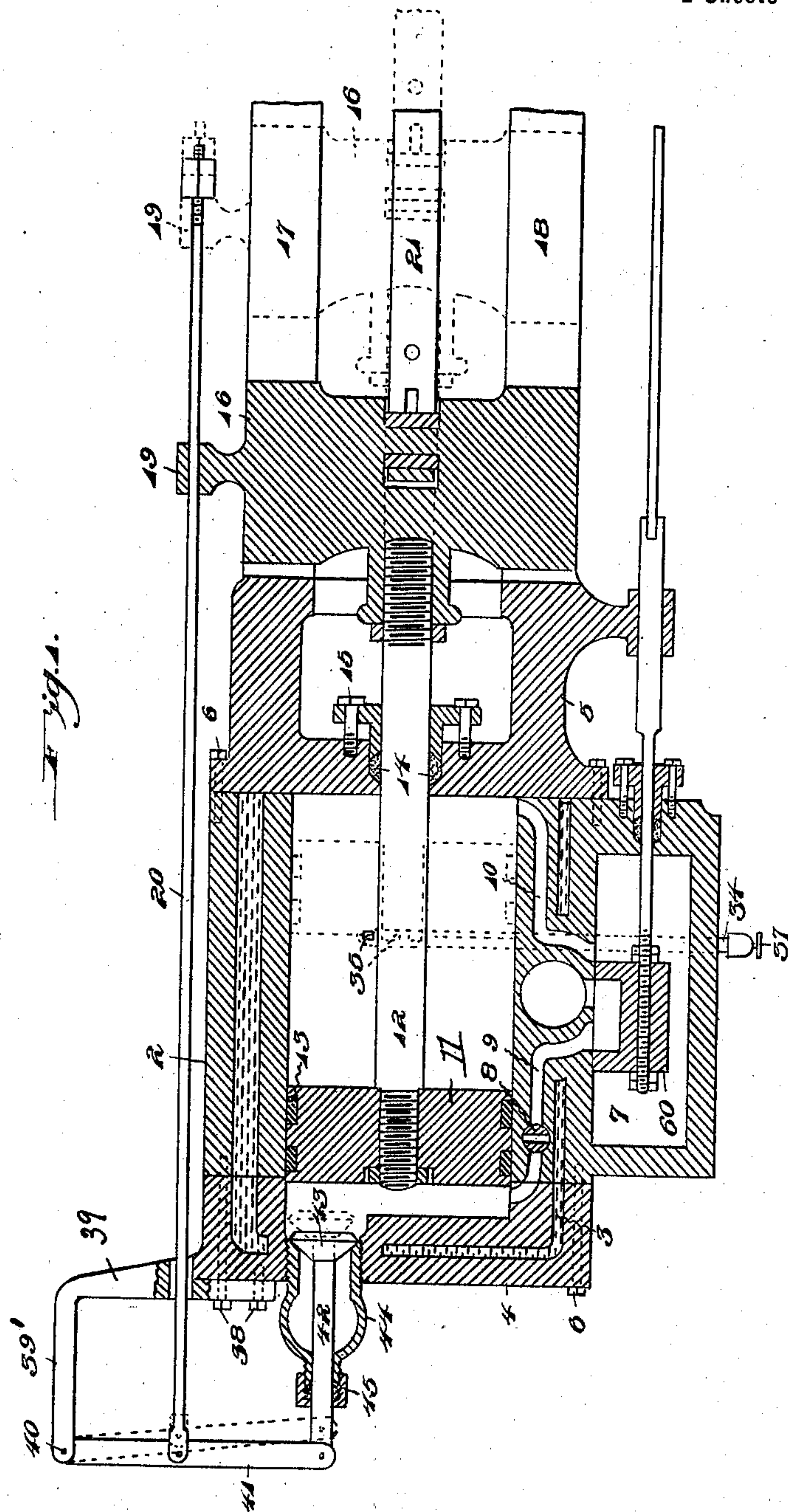
Patented Sept. 19, 1899.

G. DAHLBERG, J. CLICQUENNOI & E. UHLIN.
GAS AND STEAM COMBINATION ENGINE.

(Application filed Nov. 25, 1898.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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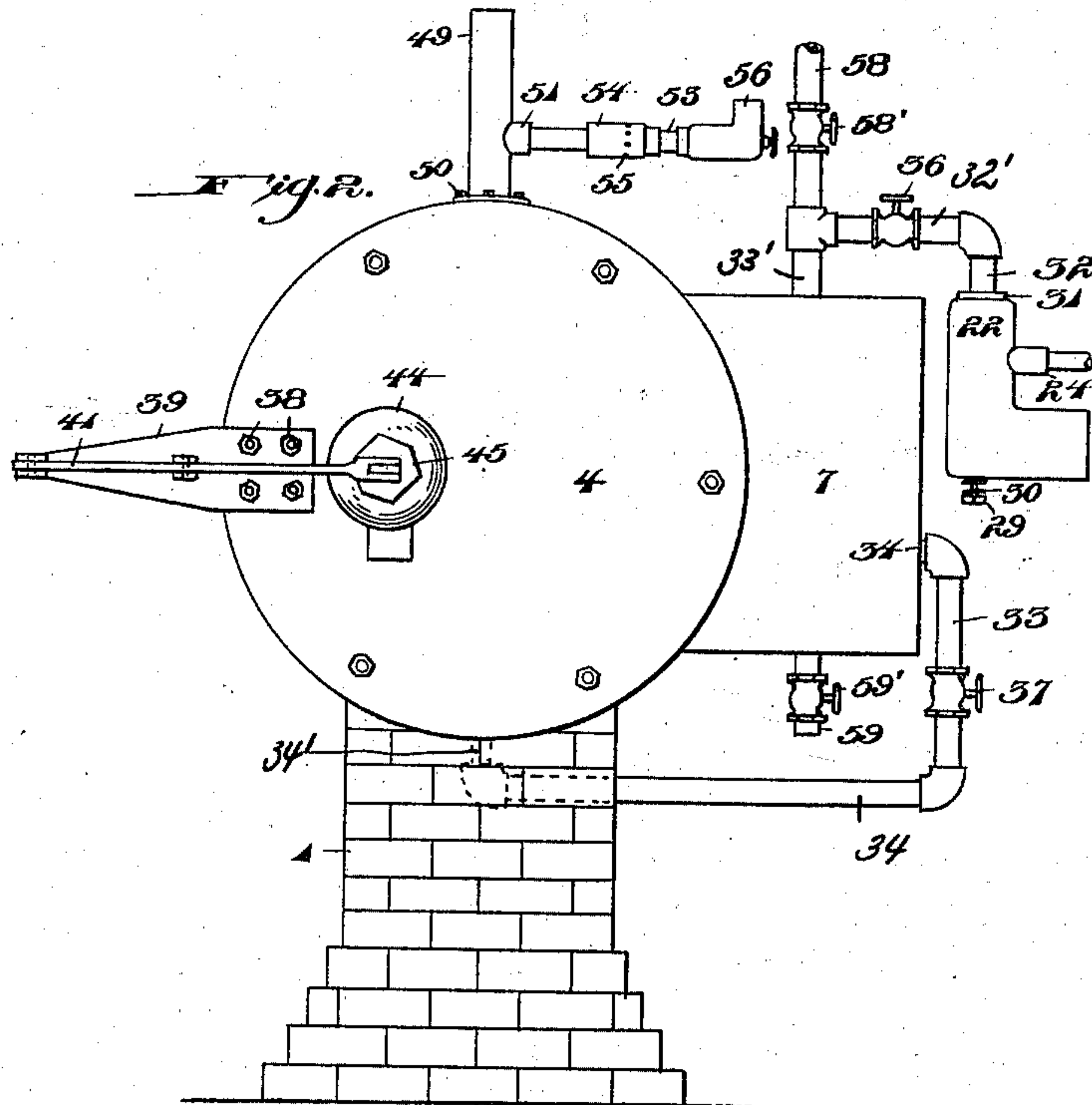


Fig. 3.

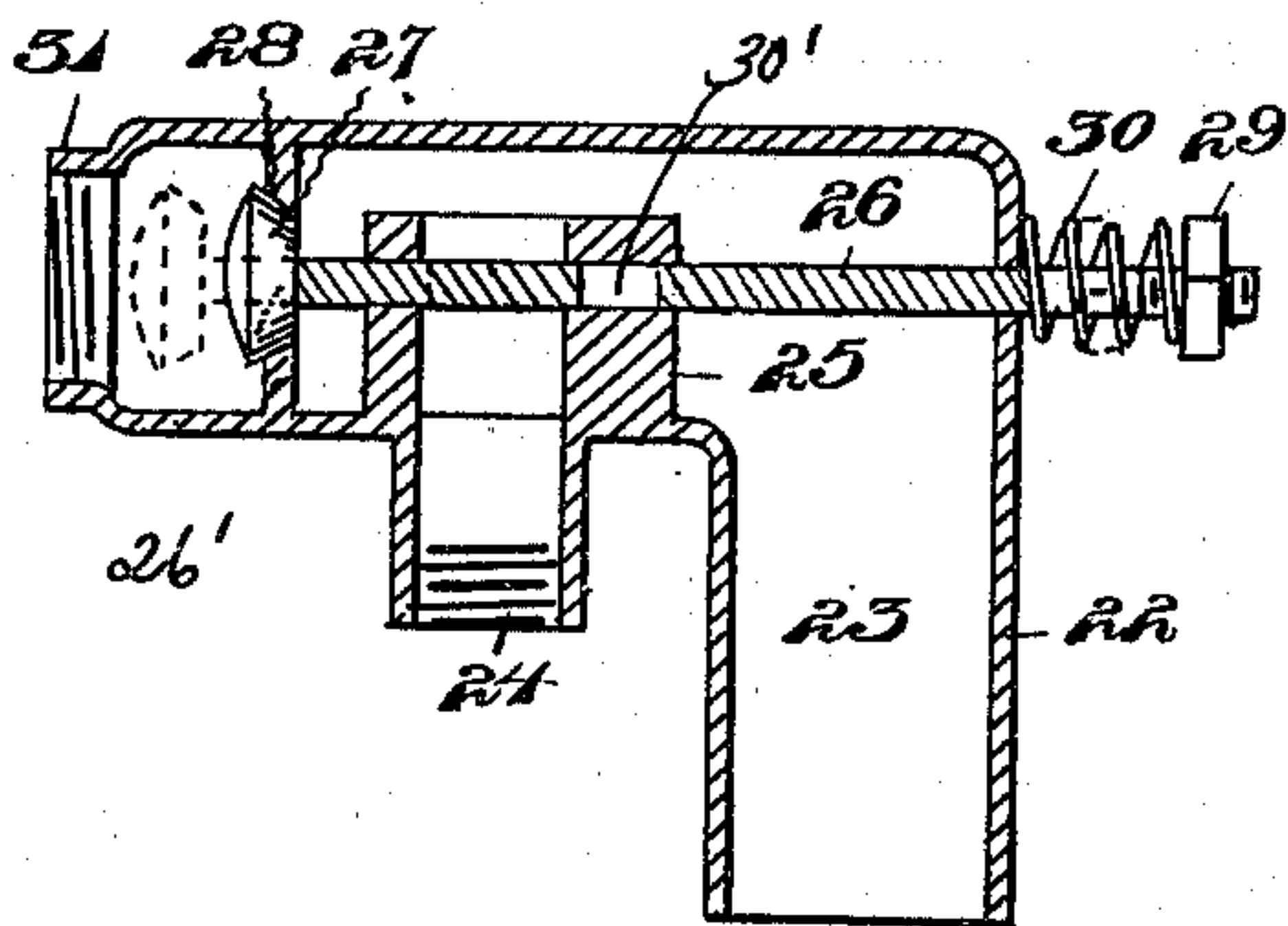


Fig. 4.

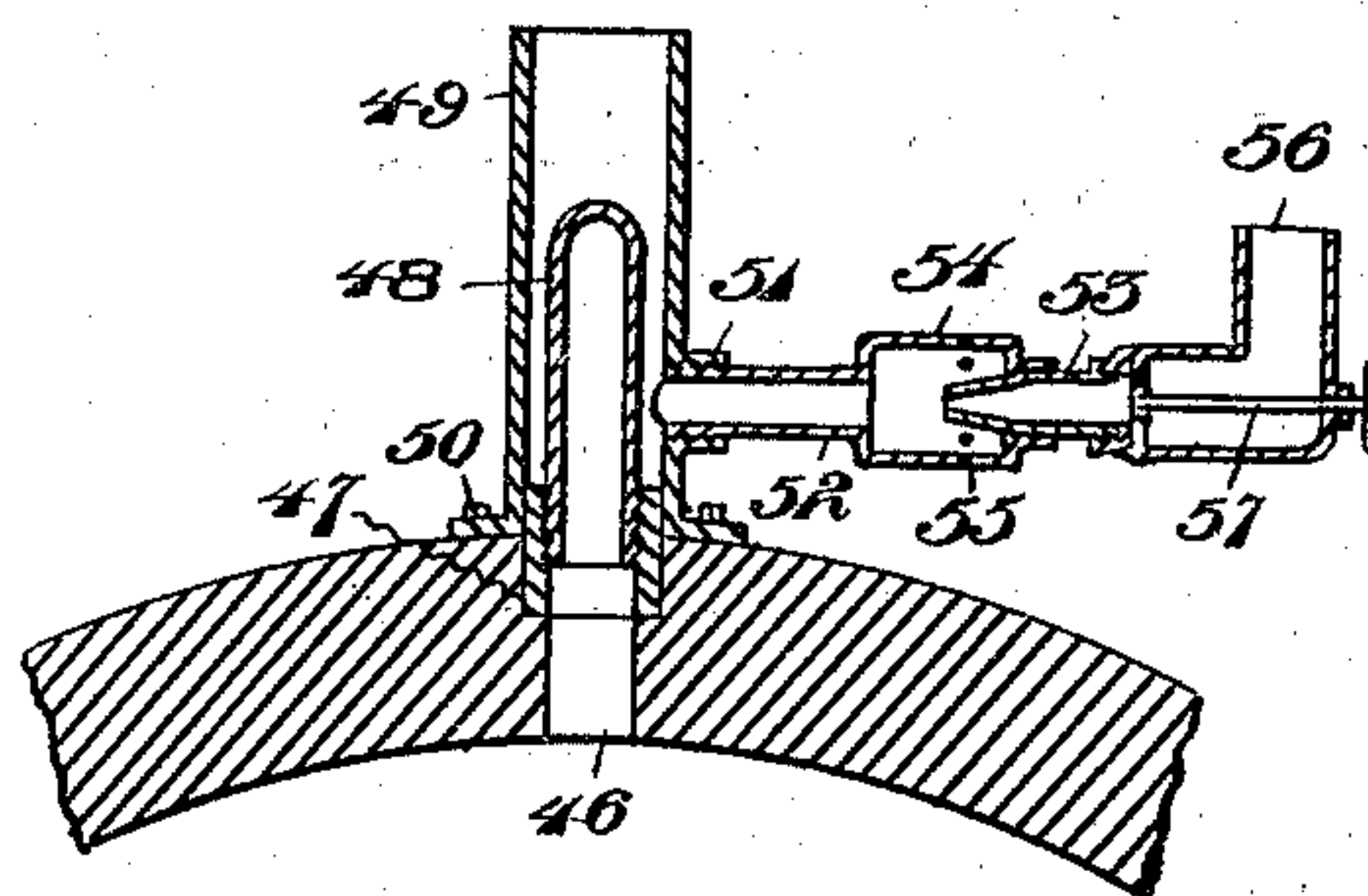
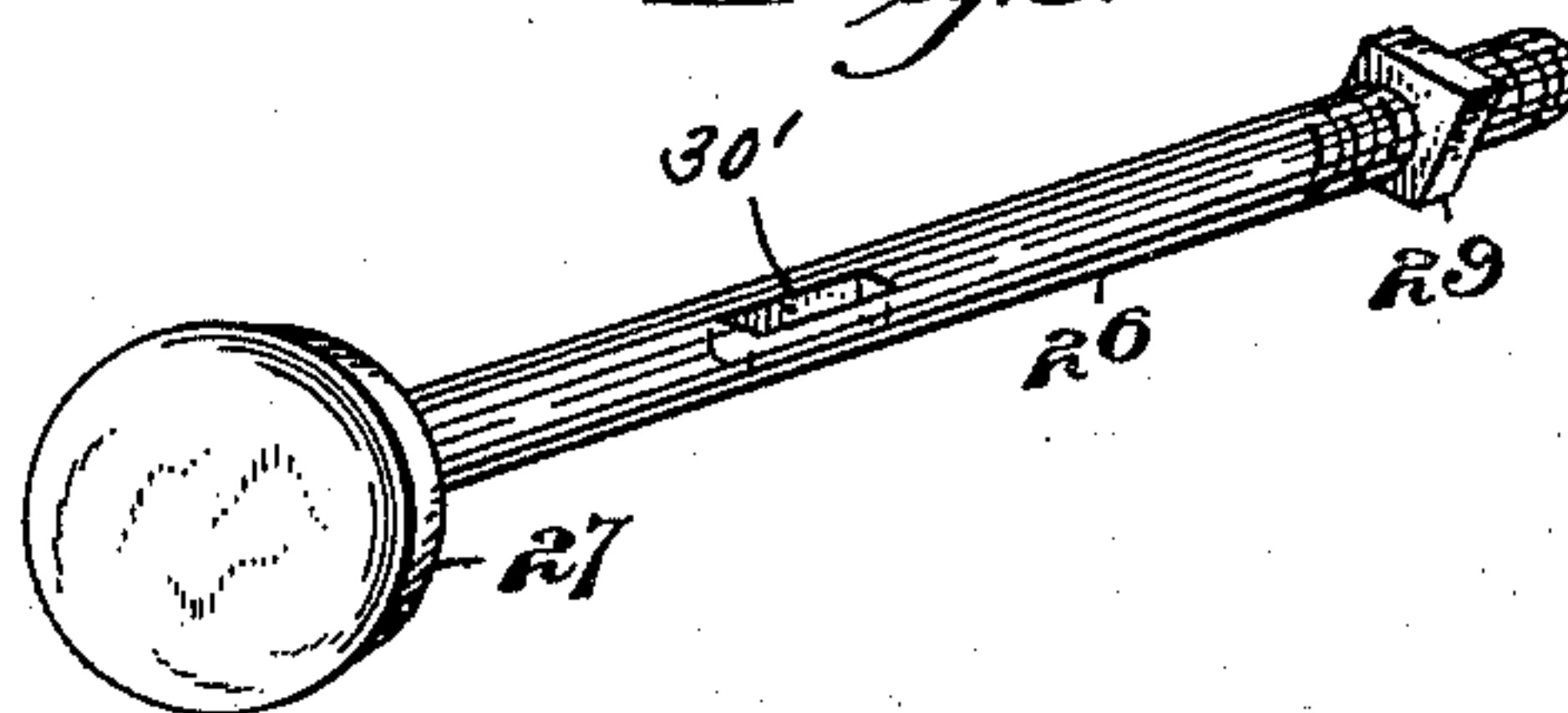


Fig. 5.



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UNITED STATES PATENT OFFICE.

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

GAS AND STEAM COMBINATION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 633,338, dated September 19, 1899.

Application filed November 25, 1898. Serial No. 697,377. (No model.)

To all whom it may concern:

Be it known that we, GUSTAVE 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 Gas and Steam Combination-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, and which is particularly adapted for use in operating oil-well pumping machinery.

The object of our invention is to construct an engine of this character which can be operated either by steam or gas and overcome the uneven irregular power production and transfer which is usual in engines of this character.

Our invention finally consists in the novel combination and arrangement of parts hereinafter more fully described, and particularly pointed out in the claim.

In describing the invention in detail reference is had to the accompanying drawings, 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 detail view, partially in section, of an engine embodying our improvements. Fig. 2 is a front elevation of an engine, showing our improved feeding mechanism. Fig. 3 is a cross-sectional view of the gas and air mixer. Fig. 4 is a vertical sectional view of the igniter mechanism. Fig. 5 is a perspective view of the valve and its stem for the gas and air mixer.

Referring to the drawings by reference-numerals, 1 indicates a suitable base portion constructed of any desirable material and upon which is mounted the cylinder 2, surrounded by the water-jacket 3, as shown in Fig. 1. This cylinder 2 is closed at its back end by the head 4 and at its crank end by the head 5. The heads 4 and 5 may be secured to the cylinder 2 by any suitable means, but as shown by the screws 6.

Formed integral with the cylinder 2 at one side thereof is the steam or explosive chest 7, which is provided with the passages 9 10, opening into the cylinder. The passage 9 has arranged therein a suitable cut-off 8, which is opened to allow steam to pass through the passage into the cylinder when the engine is driven by steam. The passage 10 allows the pressure of air created by the forward stroke of the piston to pass therethrough into the chest and force the explosive mixture through suitable pipe connections into the cylinder, which will be hereinafter described. When the explosive mixture is used for operating the engine, the cut-off 8 is always closed.

Operating in the cylinder 2 is a piston 11, which is suitably connected to the piston-rod and provided on its periphery with the packing-rings 13. The head 5 is provided with a suitable opening having arranged therein the packing-box 14, secured to the head 5 by means of the screws or bolts 15, the piston-rod 12 operating through the opening and packing-box, as shown. The outer end of the piston-rod 12 is suitably connected to the cross-head 16, this cross-head 16 operating upon the guides 17 18, which are or may be cast integral with the head 5.

19 indicates an apertured extension formed integral with the top of the cross-head 16 for supporting as well as operating the rod 20.

21 indicates a pitman which is suitably connected at one end to the cross-head, and at its opposite end to a drive-shaft (not shown) of the mechanism desired to be operated by the engine.

22 indicates the gas and air mixer, which is substantially elbow shape and is provided with the air-inlet 23 and a gas-inlet 24.

Formed integral with the inner face of the mixer 22 and registering with the gas-inlet is the collar or support 25 for the valve-stem 26; this valve operating through an opening in the collar or support, and one end thereof extending through an opening in the mixer into the atmosphere. The mixer 22 is also provided with a partition 26', forming a valve-seat 28 for the valve 27, which is secured to one end of the valve-stem 26, the opposite end of the valve-stem having secured thereon the nut 29, between which and the mixer is

mounted on the valve-stem 26 the coiled resistance-spring 30. The valve-stem is further provided with an opening 30', which registers with the gas-inlet 24 when the valve 27 is off its seat. The spring 30 normally keeps the valve 27 in engagement with the valve-seat 28.

The gas and air mixer is connected by the pipes 32, 32', and 33' to the gas or steam chest 7 for supplying the explosive mixture thereto, and the chest 7 is connected by the pipes 33, 34, and 34' to the cylinder 2 for supplying the explosive mixture thereto.

36 indicates a cut-off mounted in the pipe connection 32 for controlling the admission of the explosive mixture to the chest 7, and 37 a similar cut-off arranged in the pipe connection 33 for controlling the admission of explosive mixture to the cylinder.

35 indicates the inlet-port, arranged in the cylinder, this port registering with the end of the pipe connection 34'.

Secured to one end of the cylinder 2 by means of the bolts is a vertical extension 39, having the end thereof bent at right angles, as at 39', forming a supporting-arm, to which is pivotally secured, as at 40, the operating-lever 41, the lower end of this lever being also pivotally connected to the valve-stem 42 of the exhaust-valve 43.

44 indicates a hollow valve-casing having its lower end exteriorly screw-threaded and secured in a screw-threaded opening formed in the cylinder-head 4. The inner end of the valve-casing is beveled and forms a seat for the valve 43, while the outer end thereof is provided with packing or stuffing box 45, through which the valve-stem 42 operates. The valve 43 and its stem 42 are operated by means of the rod 20, which is connected to the operating-lever 41 at its center.

The top of the cylinder is provided with an opening 46, the upper end thereof being of greater diameter, and mounted in this enlarged upper end is a collar 47, which is interiorly screw-threaded and is adapted to receive the screw-threaded lower end of the igniter-tube 48. The tube 48 is surrounded by the upwardly-extending sleeve 49, which is secured in position by means of the annular flange formed integral with its lower end, the flange being secured to the cylinder, as at 50. The sleeve 49 is also provided with an annular flange 51, which is adapted to receive one end of the pipe 52 for guiding the flame from the burner 53 to the igniter-tube. The opposite end of the pipe is enlarged, as at 54, which is provided with a series of apertures 55 for the admission of air for supporting combustion. The burner 53 is connected to a suitable gas-supply pipe 56, which has arranged therein a cut-off 57 for regulating the flow of gas to the burner.

When it is desired to operate our improved engine by steam, the valves or cut-offs 36 37 are closed and steam is admitted to the chest by means of the pipe 58, which is connected

to a suitable source of steam-supply and provided with the cut-off or valve 58'.

59 indicates the steam-exhaust which is also provided with a cut-off or valve 59'. When the engine is operated by steam, the cut-off 8 in the passage 9 is opened and the steam admitted to the cylinder 2.

60 indicates the ordinary slide arranged in the steam-chest and is operated in the usual manner.

When it is desired to use our device as a gas-engine, the valve 60 and its stem are disconnected from the eccentric or other connection (not shown) and are placed in the position shown in Fig. 1 of the drawings.

The operation of our improved engine is as follows: The piston being in position, as shown in dotted lines in Fig. 1, the valves 36 37 are opened and the gas and air are admitted into the chest, and from there they are carried by the pipe 33 into the cylinder 2, through the opening 35, and on the back stroke of the piston the gas and air or other explosive mixture will be compressed and a portion thereof forced up into the igniting-tube, which will explode the same. The force of the explosion will drive the piston back again to the position shown in dotted lines in Fig. 1, and the operation as heretofore stated will be repeated. On the forward movement of the piston the cross-head 16 will be carried therewith, and the extension 19 will abut against the end of the rod 20, carrying the rod in a manner that will force the valve 43 inwardly, which will allow of the discharge of the vapors formed by the explosion. The pressure of the explosive mixture caused by the forward or outward stroke of the piston will close the valve of the air and gas mixer and prevent further admission of the explosive mixture to the cylinder and chest, and on the back movement of the piston the inward flow of the gas and air will open the valve in the gas and air mixer and will allow another charge of explosive mixture to pass into the cylinder as well as the gas and air chest.

In our improved method the back stroke of the piston allows an entrance of a fresh mixture to the steam or gas and air chest and compresses the fresh charge in the back end of the cylinder until the same is ignited or exploded, while the forward or outward stroke will open the exhaust-valve and allow the discharge of the foul gases caused by the explosion, and at the same time force the explosive charge from the chest into the cylinder. It will also be observed that the piston is cushioned at each end of its stroke, which with an explosion every revolution gives a steadiness of motion and removes all annoyances due to jarring.

It will be observed that owing to the apertures formed in the valve-stem in the gas and air mixer the gas is admitted thereto only when the valve in the gas and air mixer is opened.

We of course do not wish to limit ourselves

to the exact construction set forth, as various changes may be made in the details of construction without departing from the general spirit of our invention.

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

10 In a gas-engine, the combination of a cylinder closed at both ends and provided with an inlet-port for an explosive mixture in the side thereof, a piston operating in said cylinder, a cross-head suitably connected to the said piston, an operating-rod supported and operated by the cross-head, a chest connected
15 to the said cylinder adapted to receive an explosive mixture, a passage 10 arranged in the said chest for connecting the interior of the cylinder with the interior of the chest, connections between the chest and the said inlet-
20 port, a mixer connected to the said chest, a valve arranged in the said mixer for control-

ling the supply of mixture to the chest, a spring-actuated valve-stem connected to the said valve and provided with an opening to
25 allow of a supply of gas to the mixer, suitable igniting mechanism connected to the said cylinder for causing an explosion upon the compression of the explosive mixture, an operating-lever pivotally connected to the said rod,
30 a valve-stem connected to the said lever, a valve connected and operated by the said stem and lever to allow of the escape of the foul gases from the cylinder after an explosion, substantially as set forth.

In testimony whereof we affix our signatures in the presence of two witnesses. 35

GUSTAVE DAHLBERG.
JACOB CLICQUENNOI.
ERNEST UHLIN.

Witnesses:

A. DE FRANCE,
J. L. CSOME.