

No. 799,009.

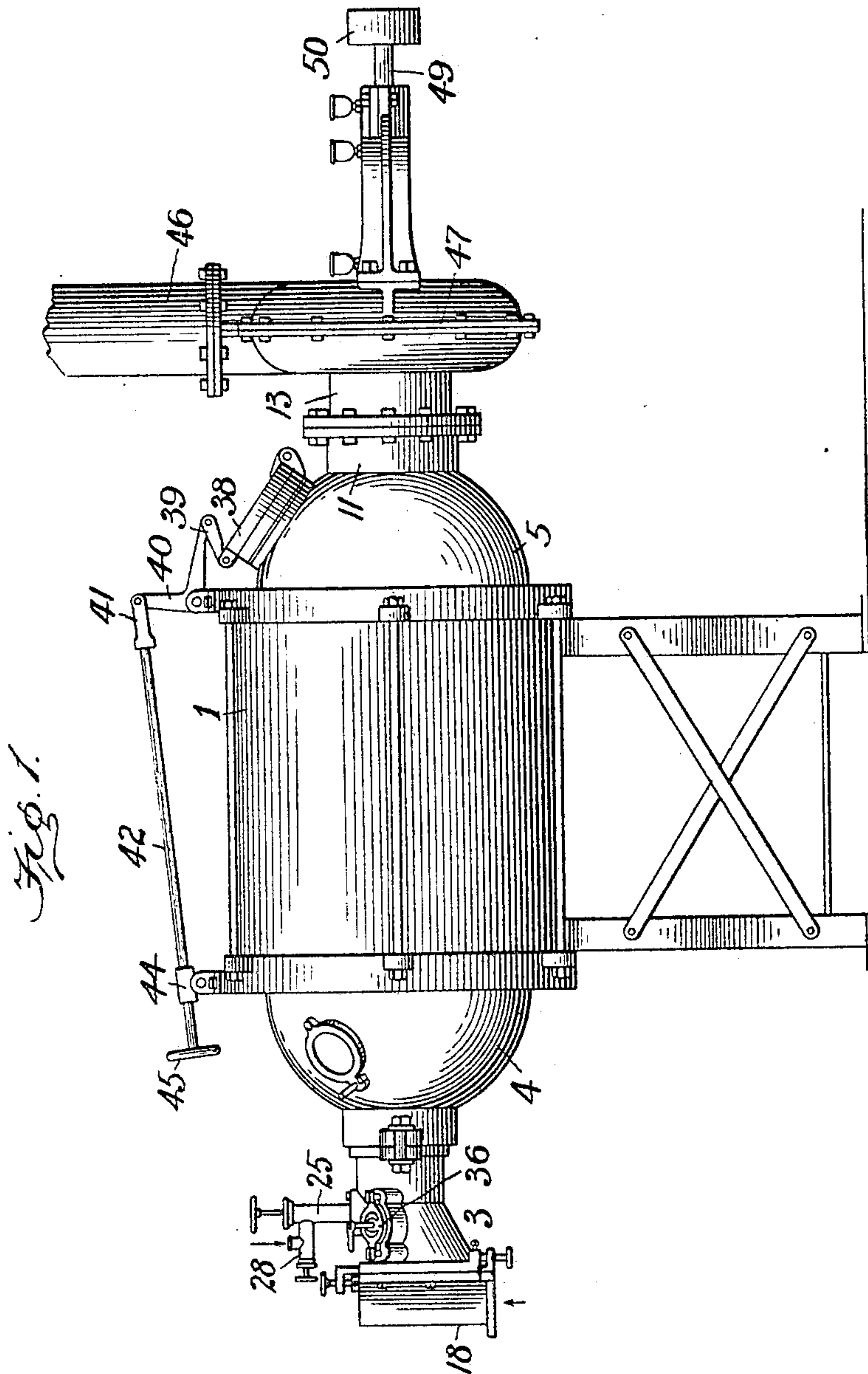
PATENTED SEPT. 5, 1905.

J. LEEDE.

APPARATUS FOR MAKING GAS.

APPLICATION FILED NOV. 7, 1904. RENEWED AUG. 14, 1905.

3 SHEETS—SHEET 1.



Inventor.

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Witnesses

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Fig. 2.

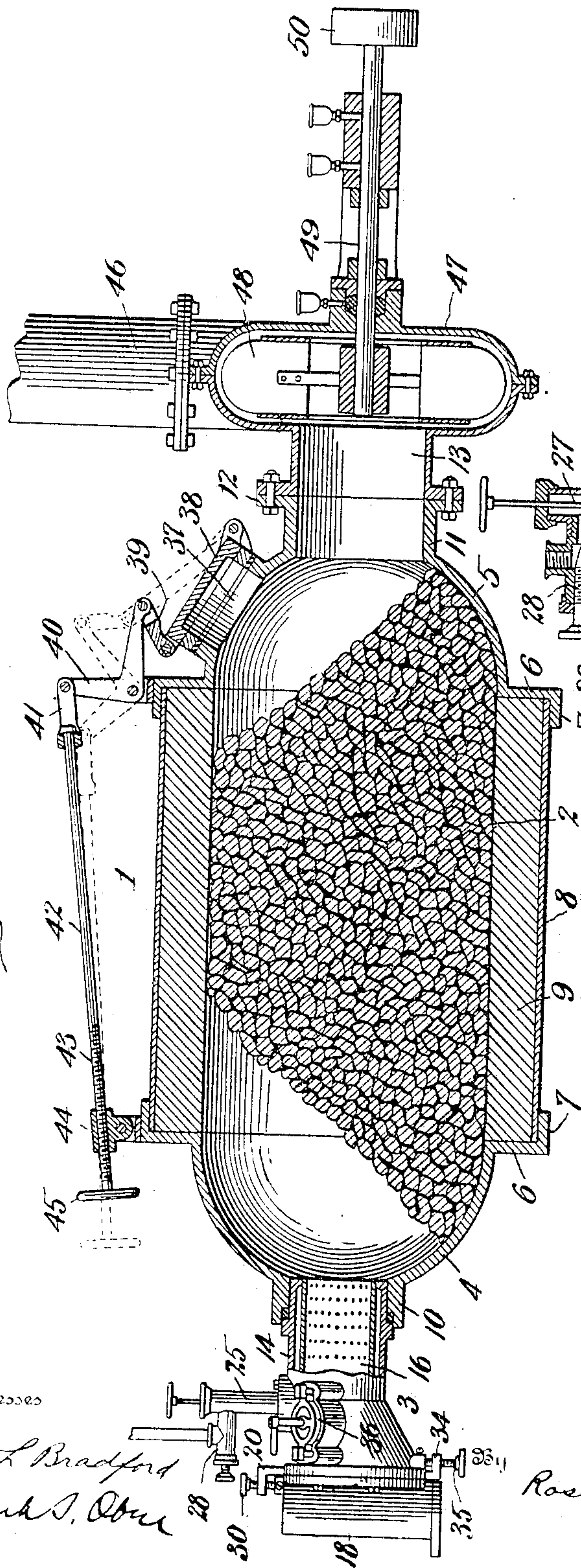
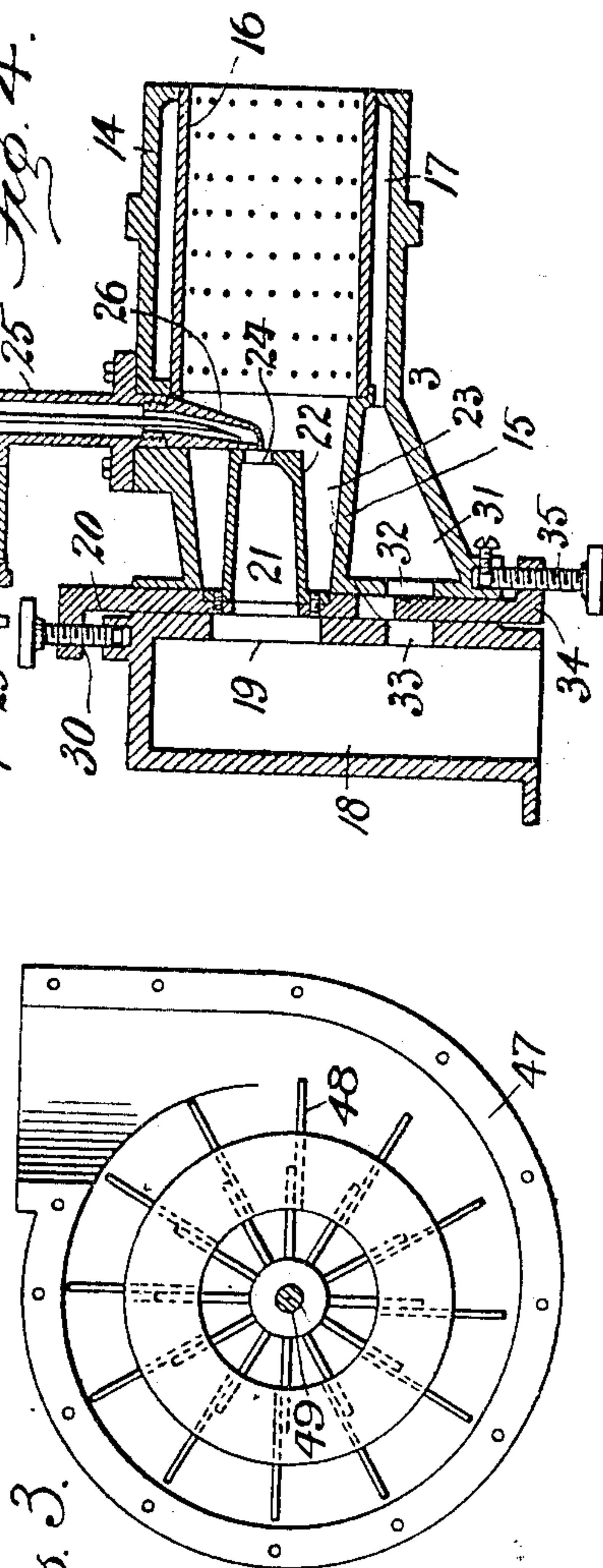


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 5.

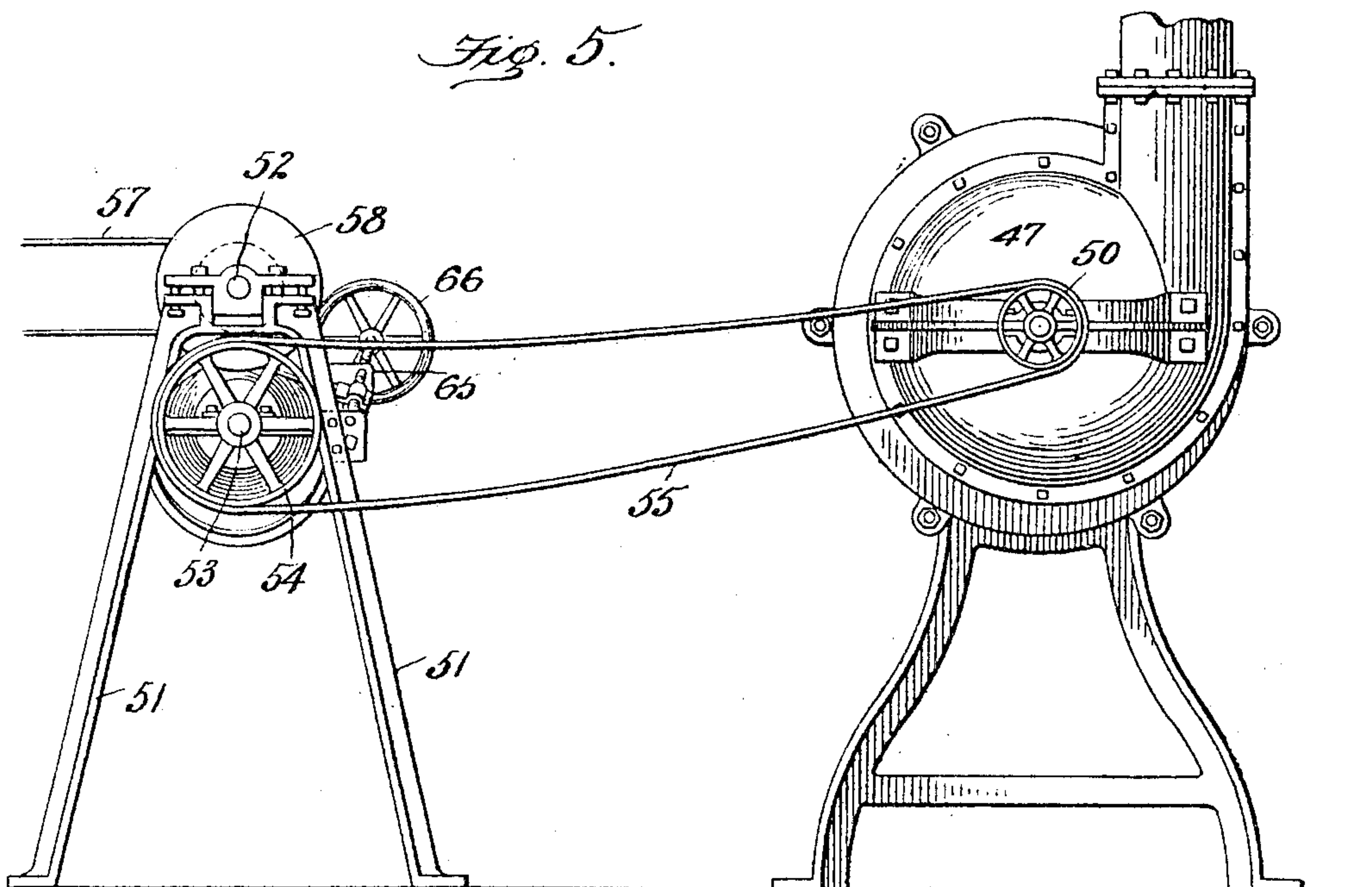


Fig. 6.

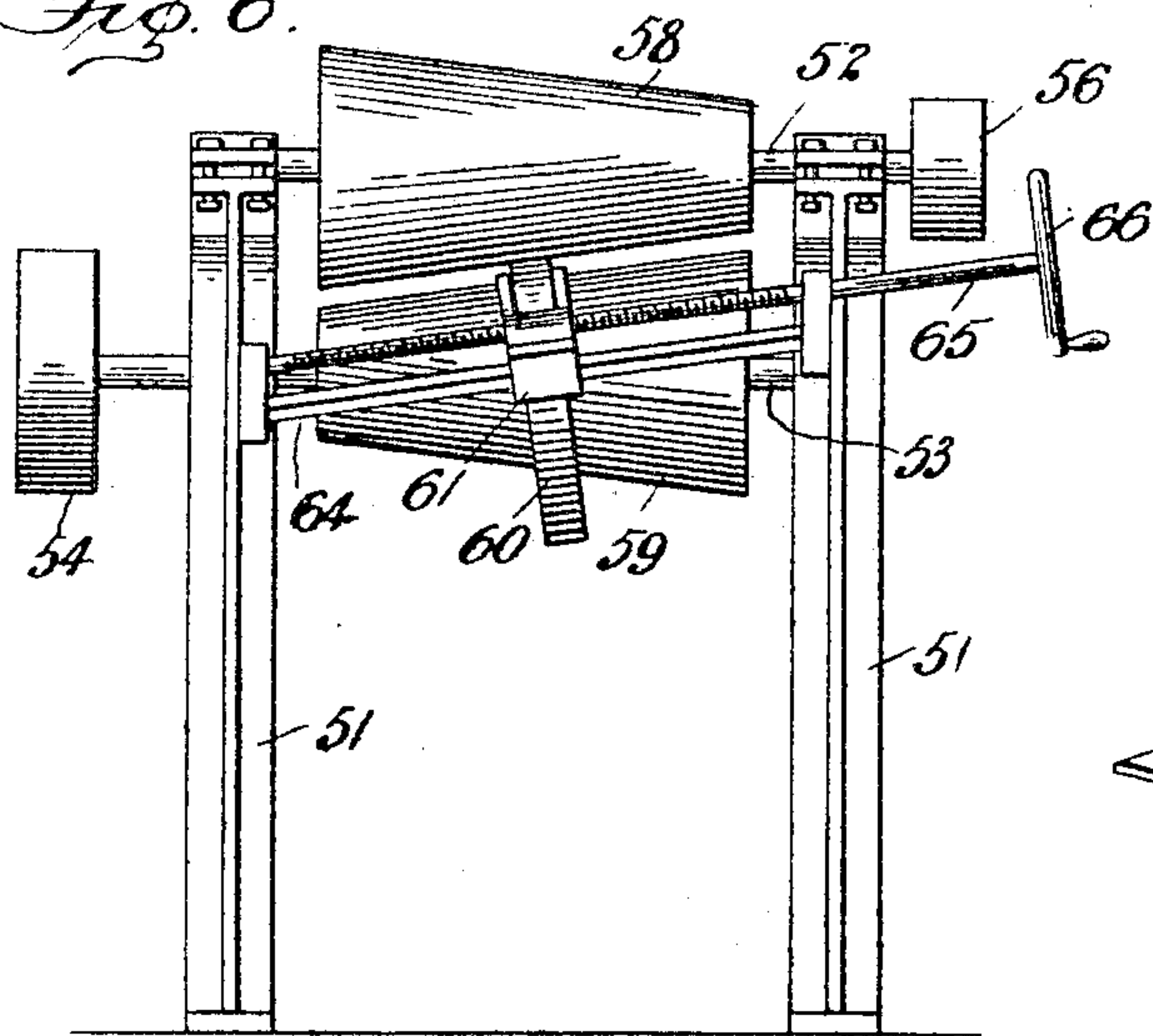


Fig. 7.

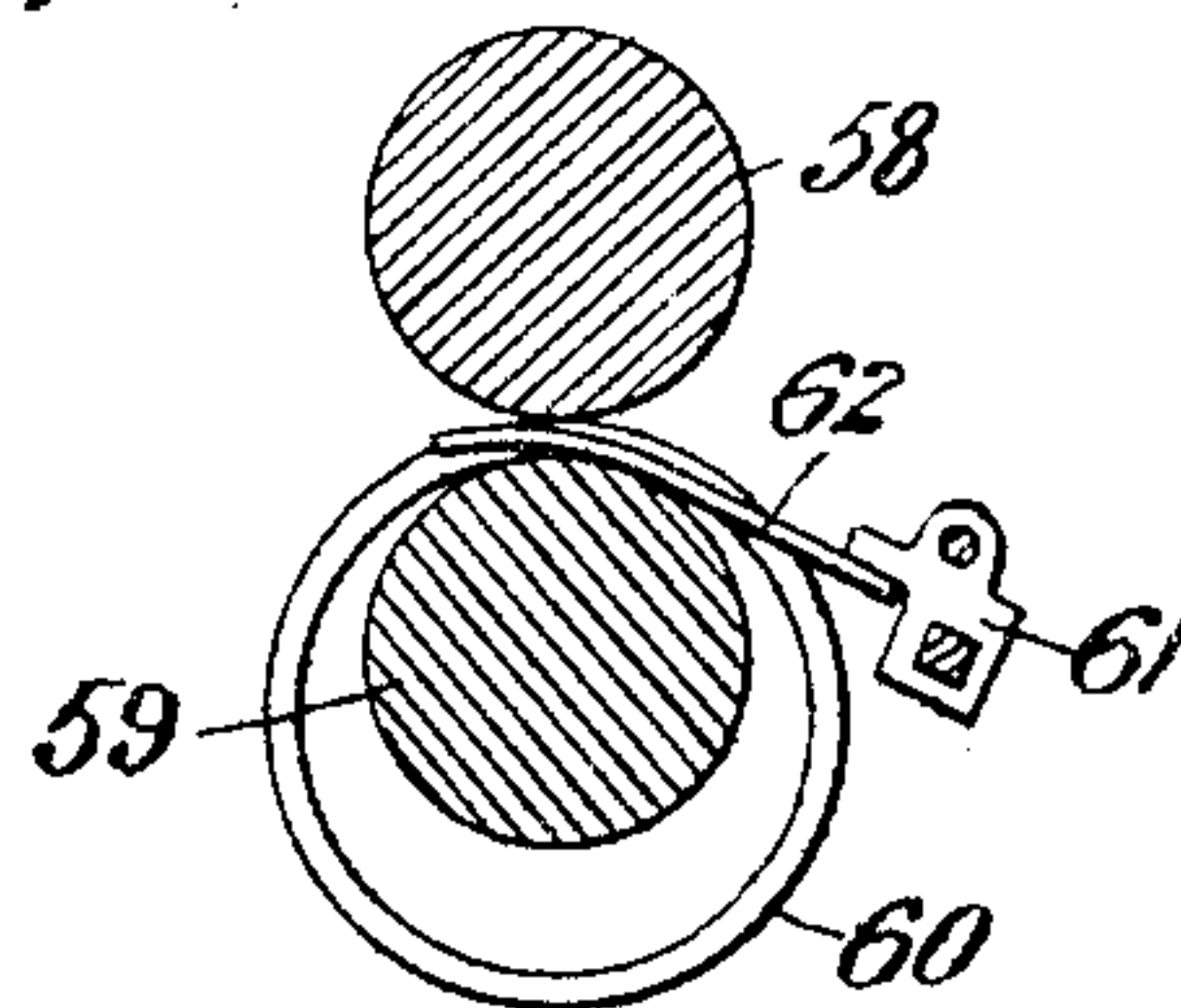
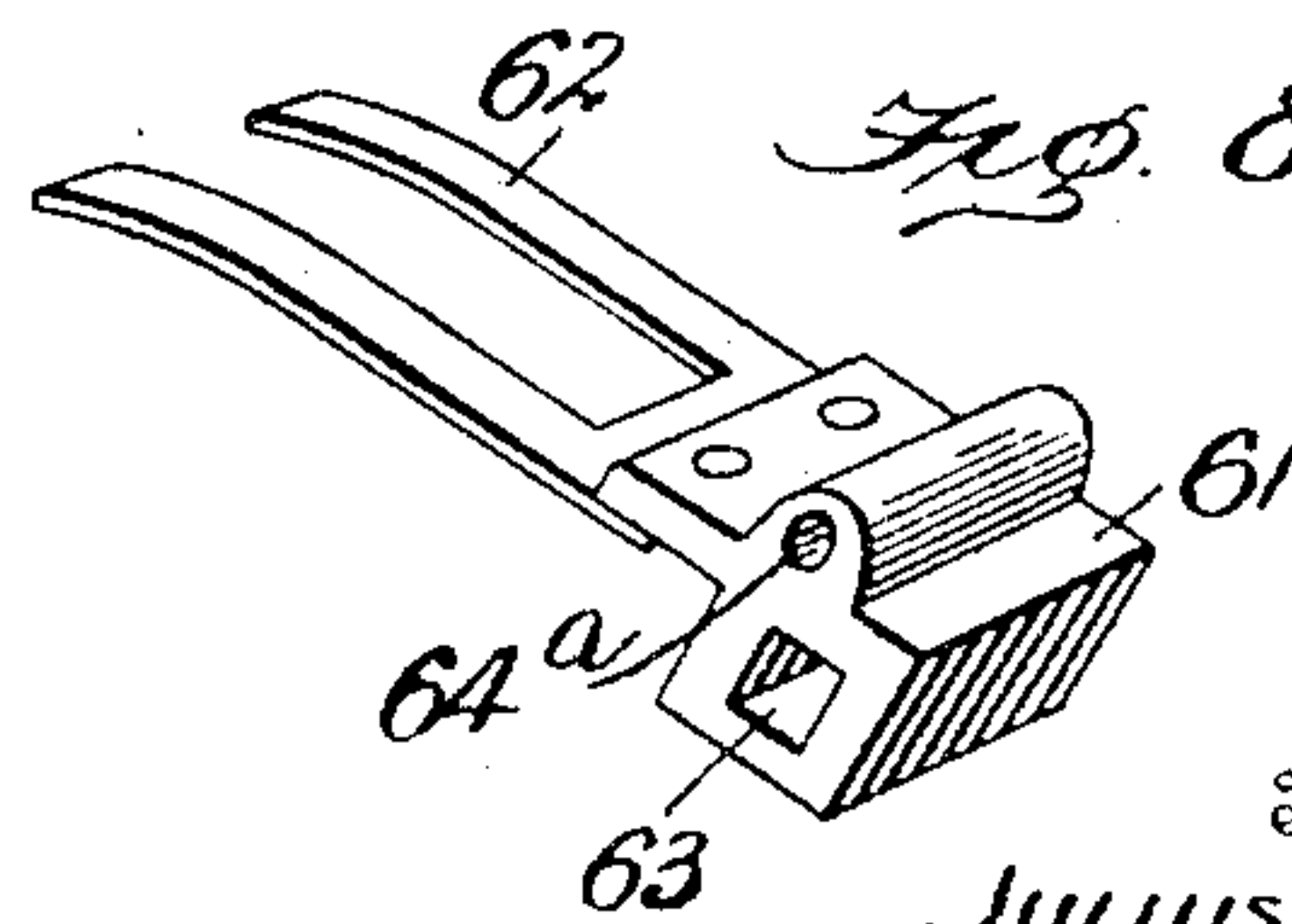


Fig. 8.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAKING GAS.

No. 799,009.

Specification of Letters Patent.

Patented Sept. 5, 1905.

Application filed November 7, 1904. Renewed August 14, 1905. Serial No. 274,018.

To all whom it may concern:

Be it known that I, JULIUS LEEDE, a citizen of the United States, residing in the city of Baltimore and State of Maryland, have in-
5 vented certain new and useful Improvements in Apparatus for Making Gas, of which the following is a full, clear, and exact description.

My invention relates to apparatus for making fuel or other gas, the object of the same
10 being to provide novel means for supplying air in regulated quantities to the gas at or near the discharge end of the retort or producer, and thereby regulating the quality of the gas discharged from the producer.

15 Other objects of the invention will hereinafter appear.

The invention consists of a retort or producer containing a mass of refractory material adapted to be brought to incandescence,
20 means for supplying to said retort and passing through said mass a quantity of burning oil or vapor, means for admitting a supply of air to said retort at or near its discharge end, and means for regulating such supply.

25 The invention also consists in certain features and details of construction and combinations of parts, which will be hereinafter more fully described and claimed.

In the drawings forming part of this specification, Figure 1 is a side elevation of a gas-
30 producer embodying my invention. Fig. 2 is a longitudinal section of the same. Fig. 3 is a detail view of the fan, one of the sides of its casing being removed. Fig. 4 is a sectional view of the burner employed. Fig. 5
35 is an end view of the fan-casing and the speed-controlling mechanism for the fan. Fig. 6 is a side elevation of the speed-controlling mechanism, and Figs. 7 and 8 are details of
40 construction.

Like reference-numerals indicate like parts in the different views.

In the embodiment of my invention illustrated herein the apparatus comprises a re-
45 tort or producer 1, having a mass 2 of refractory material therein and an oil-burner 3, connected to the front end thereof and discharging into it. The retort 1 constitutes a combustion and heating chamber and is preferably
50 made of the two substantially hemispherical end castings 4 and 5, having their adjacent ends formed with the outwardly-extending flanges 6, which are themselves formed with the substantially circular flanges 7. Within

the flanges 7 is located a cylindrical metallic
55 band 8, which incloses a body 9 of fire-brick or other suitable material, the said body being located between the flanges 6 of the castings 4 and 5. The casting 4 is formed with
60 a tubular extension 10, to which the burner 3 is connected, and the casting 5 is formed with a tubular extension 11, provided with a flange 12, by means of which a supplemental pipe or coupling-piece 13 may be connected thereto. The refractory material 2 may be of broken
65 fire-brick or other like substance.

The burner 3 may be of any suitable construction. I prefer to employ such a burner, however, as is illustrated in detail in Fig. 4
70 of the drawings. The same consists of a body or casting having a cylindrical forward end 14 and a tapering rear end 15. The cylindrical portion 14 of said body is provided with a lining 16, having a large number of small perforations therein, the said lining being
75 separated from said cylindrical portion by an annular space 17. Coöperating with these parts is an air-chamber 18, connected at its lower end with a suitable blower or other source of supply for air under pressure and
80 provided near its upper end with an opening 19, through which air passes for atomizing the oil to be consumed. Between the air-chamber 18 and the end of the tapering portion 15 of the burner-body is a sliding plate
85 20, having an opening 21 therein and carrying a tube or nozzle 22, which projects into the primary combustion-chamber 23, inclosed by said tapering portion 15. The said tube or nozzle 22 surrounds the opening 21 at its
90 rear end and is provided with a discharge-orifice 24 at its forward end. The oil-delivery tube 25 is preferably vertically disposed and provided with a flattened oil-nozzle 26 at its lower end, the said nozzle 26 lying in close
95 relation to the discharge-orifice 24 of the tube 22. A cleaner-rod 27 is provided in the tube 25 for removing any accumulation of gum or condensed oil which may collect at the discharge end of the nozzle 26. A coupling-
100 piece 28 is connected to the delivery-tube 25 and communicates therewith. The said coupling-piece is further connected with an oil-tank or other source of oil-supply, and the feed of the oil to the tube 25 is controlled by
105 a needle-valve 29. The plate 20 is vertically adjustable by means of a screw 30, which is swiveled to the upper end of the air-chamber

18 and extends through a threaded opening in a lug or flange on said plate. When said plate is raised or lowered, it necessarily carries with it the air tube or nozzle 22 and varies the position of the discharge-orifice 24 with respect to the oil-nozzle 26. Said tube 22 therefore serves as a valve for regulating the volume of air supplied for atomizing or vaporizing the oil discharged from the nozzle 26. An air-chamber 31 is formed beneath the primary combustion-chamber 23, the same communicating with the annular space 17 and having an opening 32 therein, which communicates with the air-chamber 18 through an opening 33 in the side wall of the latter air-chamber. An adjustable valve or plate 34, controlled by the screw 35, regulates the volume of air passing through the openings 33 and 32, and consequently the amount of air supplied to the annular space or chamber 17. An ignition-opening 36 is provided in the wall of the primary combustion-chamber 23, the said opening being closed as soon as ignition is effected and being provided with peep-holes for observation purposes.

At or near the discharge end of the retort 1 is an air-admission opening 37, the same being shown in the form of a hollow or tubular extension on the end casting 5. Coöperating therewith is a valve, damper, or cover 38, which is pivoted at one end so that it may be opened or closed to a greater or less extent, and thereby regulate the supply of air admitted to the rear or discharge end of the retort, and is connected through a link 39, bell-crank lever 40, and link 41 with an operating-rod 42. The rod 42 has a loose or swiveled connection with the link 41 and is provided with a screw-threaded portion 43, which extends through a similarly screw-threaded opening in a block 44, mounted upon the retort 1. A handle 45 is also provided upon the operating-rod 42, by means of which the same may be turned. By turning the operating-rod 42 in one direction or the other the bell-crank lever 40 will be rocked in its bearings and the cover or damper 38, which controls the passage to the opening 37, will be opened or closed to a greater or less degree. The supply of air admitted to the rear end of the retort 1, therefore, may be readily, conveniently, and accurately controlled.

A delivery pipe or conduit 46 is provided for conveying the gas from the retort or producer 1 to service or storage. Interposed between said pipe or conduit and the rear end of the retort 1 is a fan or blower casing 47, the pipe or coupling-piece 13, heretofore referred to, being centrally connected to or formed upon one side thereof and the upper or discharge end of said casing being secured to the pipe or conduit 46. Within the casing 47 is a rotary fan 48 of any suitable or preferred construction, the said fan being secured to a shaft 49, mounted in suitable bearings

and having a pulley 50 on one end thereof. When this fan is operated, as may be done by the means hereinafter described, its acts to positively withdraw from the retort 1, through the extension 11 and coupling-piece 13, the gas which is generated in said retort and to positively force said gas through the delivery-pipe 46. It also acts to draw through the opening 37 and mix with the gas before it leaves the retort or generator 1 a quantity of air which is controlled by the position of the damper or cover 38. It acts, moreover, to prevent back pressure in the retort from the pipe 46 and the consequent interference with the continuous process of making the gas and formation or deposit of carbon on the mass of refractory material 2 in said retort.

Mechanism is provided for regulating the speed at which the fan 48 is rotated, the same being directly under the control of the operator and adapted to be employed with a continuous or constant source of power. This mechanism is most clearly illustrated in Figs. 5, 6, 7, and 8 of the drawings. As shown therein, I mount upon suitable uprights 51 adjacent to the retort 1 and fan 48 a pair of parallel horizontally-disposed shafts 52 53. The shaft 53 is provided with a pulley 54, around which and the pulley 50 on the shaft 49 passes a power-transmitting belt 55. On the shaft 52 is secured a pulley 56, which receives power through a belt 57 from any suitable source of constant power. The shaft 52 also carries a cone-pulley 58 and the shaft 53 a similar cone-pulley 59. The said cone-pulleys are oppositely disposed, with the enlarged end of one opposite the reduced end of the other. Their adjacent surfaces, however, are parallel. Contact between the pulleys 58 and 59 at any points in their peripheries is effected by a band 60 of leather or other suitable material. The said band embraces one of said cone-pulleys and is capable of adjustment longitudinally thereof. The same is adjusted and held in adjusted position by means of a block 61, having parallel fingers 62 secured thereto, between which said band is located. The said block has a rectangular opening 63 therein which receives a correspondingly-shaped fixed guide-rod 64, secured to the uprights 51 and parallel to the adjacent surfaces of the two pulleys 58 and 59. The said block is also provided with a threaded opening or passage 64^a, through which a threaded rod 65 passes. The said rod is mounted for turning movement on the uprights 51 and is provided with a handle 66. With this construction it will be seen that by turning the rod 65 in one direction or the other the block 61 will be moved in one direction or the other longitudinally of the two cone-pulleys, and the band 60, which is guided by said block, will be moved so as to bring about frictional contact between the pulleys 58 and 59 at different points. In this way the speed of rota-

tion of the fan 48 may be controlled—that is to say, if the band 60 be moved in the manner described, so as to bring about contact between the pulleys 58 and 59 nearer the enlarged end of the upper pulley 58, an increased speed will be imparted to the pulley 59, and consequently to the shaft 53, pulley 54, belt 55, pulley 50, and shaft 49, on which the fan 48 is mounted. Conversely, the speed of the fan 48 may be decreased or reduced by adjusting the position of the band 60 to a point nearer the contracted or reduced end of the pulley 58. This fan 48 with its functions of positively withdrawing the gas from the retort 1 and mixing therewith at or near the discharge end of the retort a regulated supply of air and of forcing said mixture of gas and air through the pipe or conduit 46 and preventing back pressure through said pipe into said retort, in connection with the means for accurately controlling the speed of said fan, are important features of my invention. The regulation of the fan speed enables me to produce and supply to the proper point exactly the quantity of gas which is needed of exactly the quality desired.

In the operation of my improved apparatus oil is admitted to the oil-supply tube 25 by opening the needle-valve 29, and the same is allowed to drip from the nozzle 26 in front of the air-tube 22. At the same time air under pressure from the air-chamber 18 is caused to pass through the discharge-orifice 24 opposite the nozzle 26, with the result that the oil is thoroughly atomized. The atomized mixture is ignited through the opening 36, although this opening is immediately closed. Combustion takes place in the primary combustion-chamber 23, and the products of combustion thence pass into the secondary combustion-chamber in the cylindrical portion 14 of the burner-body. Air is also being admitted through the openings 33 and 32, the air-chamber 31, and the annular space 17 through the perforations in the lining 16. This air admitted through said perforations serves to retard the progress of the products of combustion and to support the combustion of the vapor. When the apparatus is first started, the supply of air and oil is so proportioned by the means described as to bring about practically complete combustion, so that as the products of combustion pass into the retort 1 and through the mass of refractory material 2 they will serve to raise said mass to incandescence. When this condition of said refractory material is reached, the proportions of air and oil are varied, so that there will be an excess of oil. Imperfect or incomplete combustion therefore is effected in the primary and secondary combustion-chambers of the burner, and the carbonic acid, free carbon, and other particles of imperfect combustion pass into the retort 1. Here they meet the incandescent mass 2 of refractory mate-

rial and are caused to pass through the same. In so doing the carbon dioxid is reduced to carbon monoxid and other chemical changes are effected therein to fix the gas and convert it from a non-combustible to a combustible one. Passing through the refractory material 2 the gas thus produced has further mixed with it prior to leaving the retort 1 a quantity of air to support its further combustion in a furnace or elsewhere and to produce in such furnace an oxidizing-flame. The exact proportions of the mixture, and consequently the exact quality of the final product, may be accurately controlled by opening the valve or cover 38 to a greater or less degree. The gas is positively withdrawn from the retort 1 by the action of the fan 48, and the entrance of air through the opening 37 for mixture with the gas is positively produced by the same means. The fan 48 serves, moreover, to positively force the gas out through the pipe 46 to the point where it is desired. Said fan is actuated and its speed controlled by the means described, and it acts to prevent back pressure into the retort 1 from the furnace or other point to which the pipe 46 leads, and consequently prevents the deposit of carbon on the refractory material 2 therein. This back pressure, unless prevented, extinguishes the flame from the burner, and the latter causes the carbon deposit.

Having described my invention, I claim—

1. In an apparatus for making gas, a retort having a mass of refractory material therein, means for introducing oil and air thereto, the whole constituting a combustion and heating chamber, and means operating during the passage of the gas through the retort for admitting air to the retort, for mixture with the gas beyond the refractory material, adjacent to the discharge end of said retort.

2. In an apparatus for making gas, a retort having a mass of refractory material therein, means for introducing oil and air thereto, the whole constituting a combustion and heating chamber, means operating during the passage of the gas through the retort for admitting air to the retort, for mixture with the gas beyond the refractory material, at or adjacent to the discharge end of said retort, and means for regulating the quantity of air admitted.

3. In an apparatus for making gas, a retort having a mass of refractory material therein, means for introducing oil and air thereto, the whole constituting a combustion and heating chamber, the said retort having an air-admission opening beyond the refractory material at or adjacent to its discharge end, a valve or cover controlling the passage through said opening, means for adjusting the position of said valve and means operating during the passage of the gas through the retort for drawing in air through said opening.

4. In an apparatus for making gas, a retort having a mass of refractory material therein,

means for introducing oil and air thereto, the whole constituting a combustion and heating chamber, the said retort having an air-admission opening beyond the refractory material
5 at or near its discharge end, a gas-delivery pipe or conduit leading from said retort, and means operating during the passage of the gas through the retort for drawing air into said retort, through said opening, to mix with the
10 gas, for positively withdrawing the mixed air and gas from said retort and for forcing the same into and through said delivery-pipe.

5. In an apparatus for making gas, a retort having a mass of refractory material therein,
15 means for introducing oil and air thereto, the whole constituting a combustion and heating chamber, the said retort having an air-admission opening beyond the refractory material at or near its discharge end, a gas-delivery
20 pipe or conduit leading from said retort, and a fan interposed between said retort and said delivery-pipe and operating during the passage of gas through the retort for drawing air into said retort, through said opening, to mix
25 with the gas, and for withdrawing the mixed

air and gas from said retort, by suction, and for forcing the same into and through said delivery-pipe.

6. In an apparatus for making gas, a retort having a mass of refractory material therein, 30 means for introducing oil and air thereto, the whole constituting a combustion and heating chamber, means operating during the passage of the gas through the retort for admitting air to the retort at its discharge end, a gas-deliv- 35 ery pipe or conduit leading therefrom, a rotary fan interposed between said retort and said delivery-pipe for withdrawing the gas from said retort, by suction, and forcing it into and through said pipe, and means, under 40 the control of the operator, for controlling the speed of said fan from a source of constant power.

In witness whereof I subscribe my signature in the presence of two witnesses.

JULIUS LEEDE.

Witnesses:

FRANK S. OBER,
WM. M. STOCKBRIDGE.