No. 827,643. PATENTED JULY 31, 1906.

R. S. LAWRENCE.

CARBURETER.

APPLICATION FILED OCT. 18, 1905.

2 SHEETS—SHEET 1.

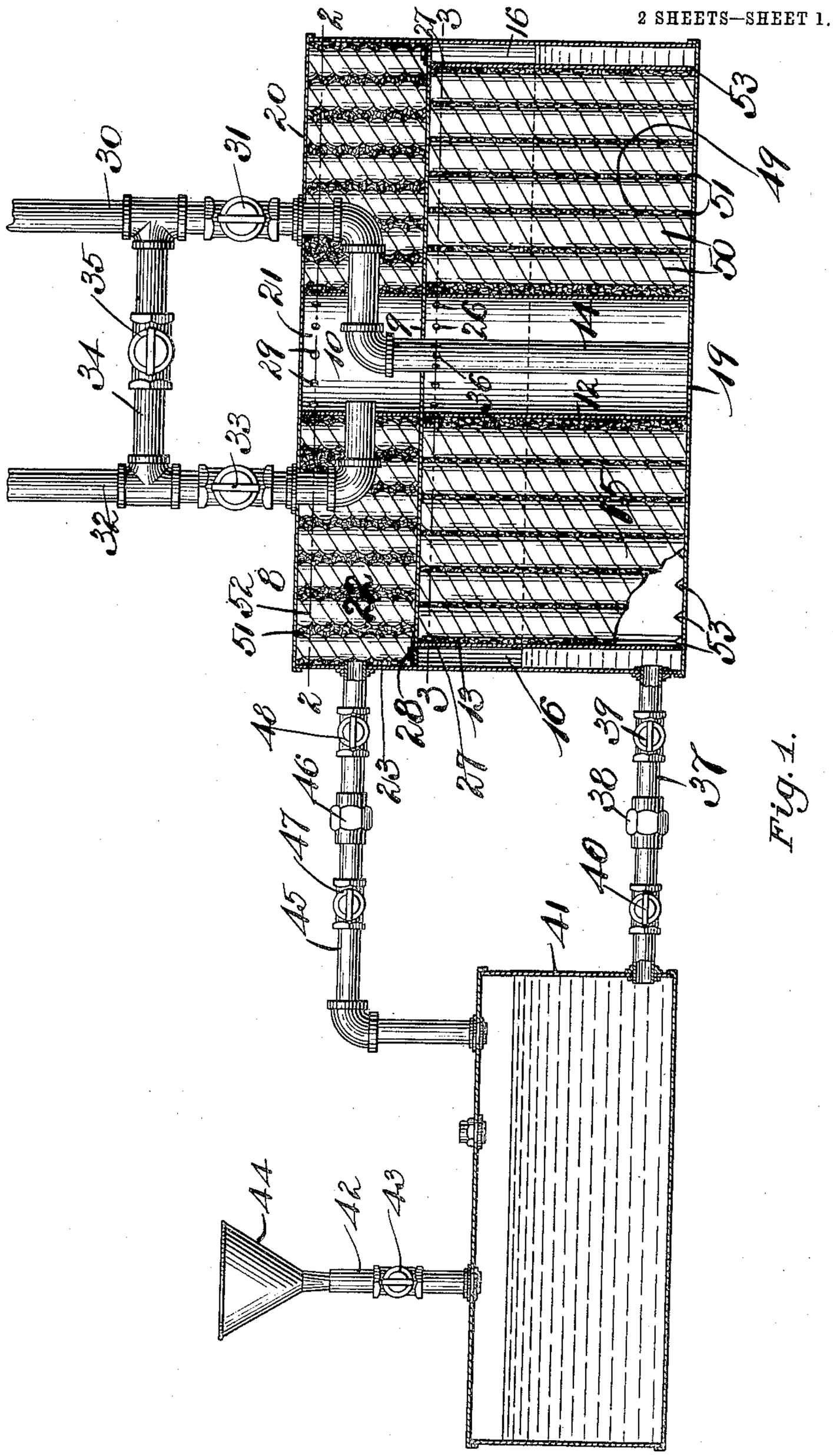

Fig. 1.

Witnesses:
William C. Glass.
Franklin E. Low

Inventor:
Robert S. Lawrence,
by his attorney,
Charles S. Fooding.

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2 SHEETS—SHEET 2.

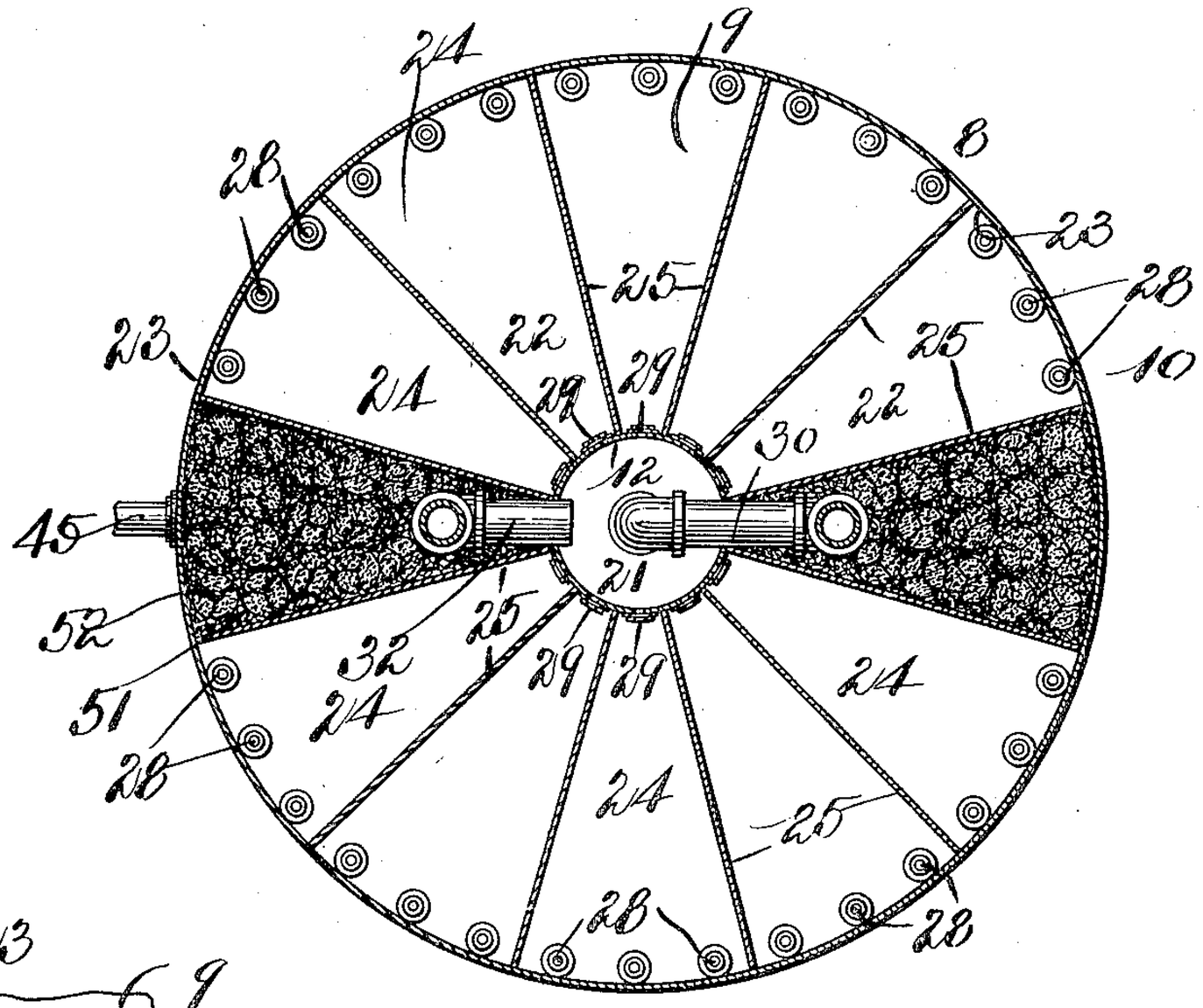

Fig. 2.

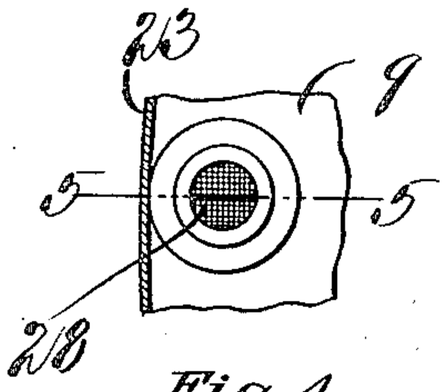

Fig. 4.

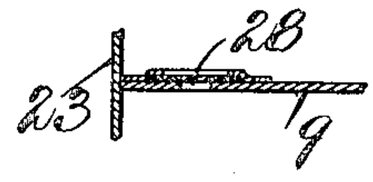

Fig. 5.

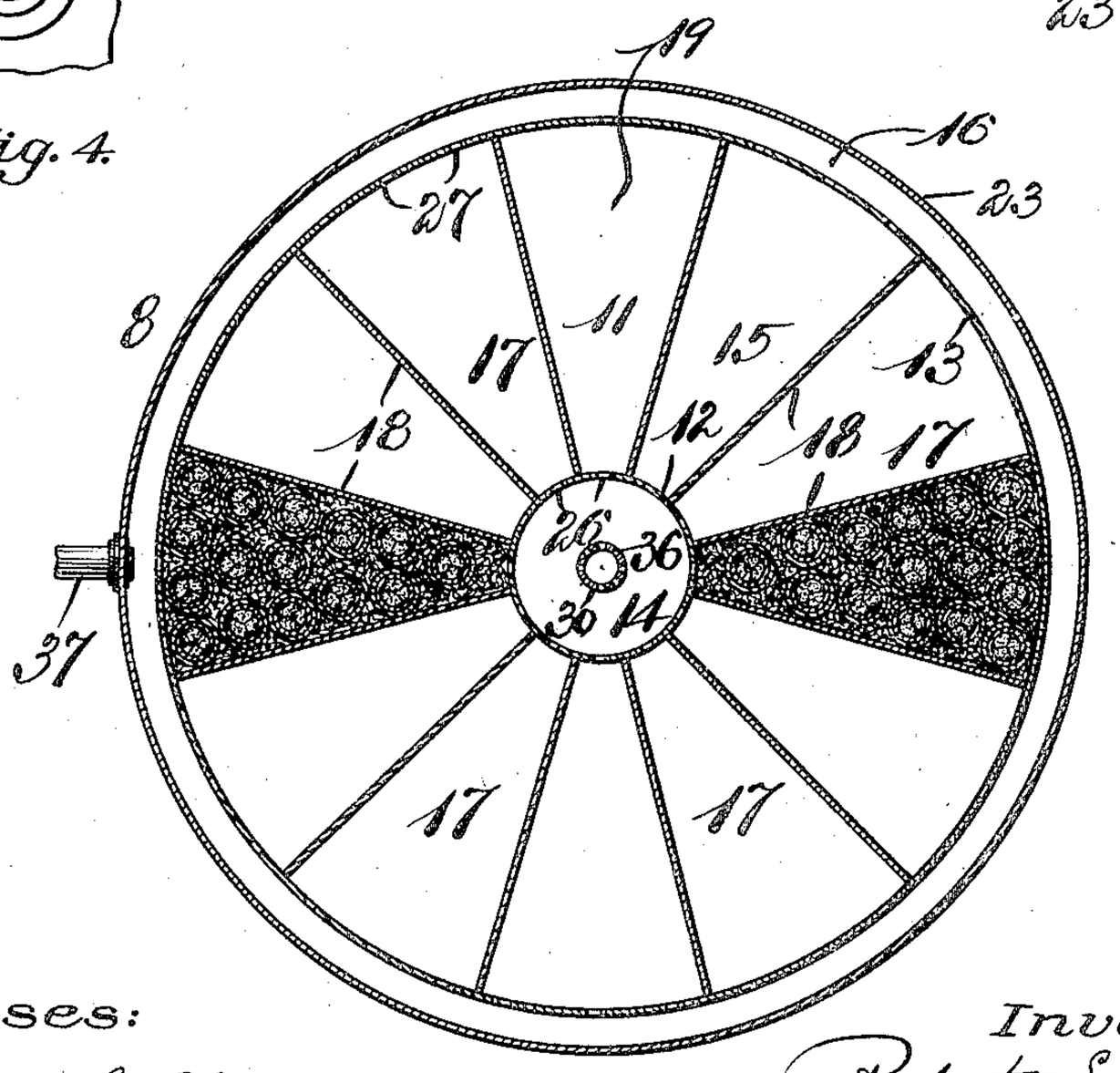

Fig. 3.

Witnesses:
William C. Glass.
Franklin E. Low.

Inventor:
Robert S. Lawrence,
by his attorney, Charles D. Lodwig.

UNITED STATES PATENT OFFICE.

ROBERT S. LAWRENCE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE INDEPENDENT AND AUXILIARY GAS COMPANY, A CORPORATION OF MASSACHUSETTS.

CARBURETER.

No. 827,643. Specification of Letters Patent. Patented July 31, 1906.

Application filed October 18, 1905. Serial No. 283,244.

To all whom it may concern:

Be it known that I, ROBERT S. LAWRENCE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to an apparatus for enriching gases used for illuminating and heating purposes by the addition thereto of hydrocarbons, said apparatus being equally well adapted for carbureting air.

The object of the invention is to provide a cheap, simple, and efficient device whereby gases for illuminating and heating purposes may be enriched, and thus better subsequent combustion of said illuminating-gases secured, raising the candle-power thereof and increasing the heat units contained in coal and water gases, thus resulting in the production of better light and greater heat or power with less cost.

The object of the invention is again to carburet air in localities where gas is not procurable, as in small country towns or in the suburbs of cities not provided with gas-mains.

The invention consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claims thereof.

Referring to the drawings, Figure 1 is a vertical central longitudinal section, partly in elevation, illustrating the gas mixing and atomizing device with the tank for storage of the hydrocarbon oil in connection therewith. Fig. 2 is a section, partly in elevation, taken on line 2 2 of Fig. 1 looking downwardly in said view. Fig. 3 is a section, partly in elevation, taken on line 3 3 of Fig. 1. Fig. 4 is an enlarged detail plan of one of the apertures leading from the expansion to the separating chamber with a portion of the casing shown in section. Fig. 5 is a detail section taken on line 5 5 of Fig. 4.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 8 is a casing formed of sheet metal suitably fastened together and comprising in its construction a horizontal partition 9, which extends laterally across the interior of said casing, dividing said interior into an upper compartment 10 and a lower compartment 11. The lower compartment 11 is divided by cylindrical partitions 12 and 13 into a cylindrical inlet-chamber 14, an intermediate chamber 15 surrounding said inlet-chamber, and an expansion-chamber 16, which surrounds said intermediate chamber, the outer wall of said expansion-chamber being the outer wall 23 of the casing 8. The intermediate chamber 15 is subdivided into a plurality of compartments 17 by radial walls 18, extending from the partition 12 to the partition 13 and from the horizontal partition 9 to the bottom 19 of the casing 8.

The partition 12 is extended from the top 20 of the casing to the bottom 19 thereof, and thus divides the upper compartment 10 into a cylindrical outlet-chamber 21, which is surrounded by a separating or stripping chamber 22, the inner wall of said separating-chamber being formed by the partition 12 and the outer wall thereof by the outer wall 23 of the casing 8. The separating-chamber 22 is subdivided into a plurality of compartments 24 by radial partitions 25, which extend from the wall 12 to the wall 23 and from the top 20 to the horizontal partition 9.

Communication from the inlet-chamber 14 to the compartments 17 of the expansion-chamber 16 is established by means of apertures 26, extending through the partition 12 and from the compartments 17 to the expansion-chamber 16 by apertures 27, extending through the partition 13. Communication is established from the expansion-chamber 16 to the radial compartments 24 in the separating-chamber 22 by apertures 28, which extend through the horizontal partition 9. Communication between the radial compartments 24 and the outlet-chamber 21 is established by means of apertures 29, extending through the partition 12.

Gas or air is admitted to the inlet-chamber 14 through the pipe 30, the supply of gas or air passing through said pipe being controlled by a suitable valve 31. After the gas or air has been treated and enriched, as hereinafter described, it passes out from the outlet-chamber 21 through the outlet-pipe 32, said outlet-pipe being also provided with a valve 33 to control the passage of the enriched gases or air therethrough. A by-pass 34 connects the inlet-pipe 30 with the outlet-

pipe 32 and is provided with a valve 35 to control the amount of gas or air admitted to the outlet-pipe 32 directly from the inlet-pipe 30 without passing through the different compartments of the casing 8.

In order to strengthen the casing and to afford a support for the horizontal partition 9, the inlet-pipe 30 is extended downwardly in the interior of the inlet-chamber 14 to the bottom 19 of the casing and is closed at its lower end, but is provided with apertures 36 near the top of the inlet-chamber 14, through which the gas or air enters said chamber from the inlet-pipe 30. Hydrocarbon oil is supplied to the expansion-chamber 16 by means of a pipe 37, which is supplied with a suitable connection 38 and with valves 39 40 to regulate the flow of the hydrocarbon oil, such as gasolene, to the expansion-chamber 16 from the supply-tank 41. The oil thus supplied to the expansion-chamber 16 passes through apertures 53 in the bottom of the partition 13 and also in the bottom of the radial walls 18 whereby said oil may circulate from said expansion-chamber to and throughout the radial compartments 17. Said supply-tank is formed of suitable sheet material and filled by any suitable means, preferably by means of the inlet-pipe 42, which is supplied with a valve 43 and tunnel 44. The supply-tank 41 is preferably connected from the top thereof by means of a pipe 45 to the separating-chamber 22, said pipe 45 being provided with a suitable connection 46 and with valves 47 and 48.

Each of the radial compartments 17 is filled with a combination of absorbent and draining material 49, said material consisting, preferably, of Manila rope cut in lengths to form wicks 50, which extend from the bottom 19 of the casing to the top of said intermediate chamber and in contact with the partition 9. Said Manila rope is wrapped with twisted crash and asbestos, and the spaces between the wicks 50 are filled with excelsior 51. The radial compartments 24 of the separating or stripping chamber 22 are also filled with wicks 52, formed of absorbent material; but in these upper compartments said wicks 52, of absorbent material, are formed, preferably, of Manila rope, the twisted crash and asbestos being omitted, but the spaces between the rope being filled with excelsior 51.

It will be understood that the different radial compartments 17 and 24 are completely filled with the wicks of absorbent material hereinbefore described; but in the drawings only two of said compartments 17 and two of the compartments 24 are illustrated as filled with absorbent material. The apertures 26, 27, 28, and 29 are covered with wire-gauze to prevent any extraneous material being accidentally carried into the different chambers by the gases or air.

The operation of my improved carbureter is as follows: The hydrocarbon oil passes from the expansion-tank 41 through the pipe 37 into the expansion-chamber 16 and stands at about the same level in said expansion-chamber as it does in the supply-tank 41. The wicks 50 by capillary attraction feed the oil upwardly to the top of the radial compartment 17 directly beneath the partition 9. Gas or air is introduced into the inlet-chamber 14 by means of the inlet-pipe 30 passing from said inlet-pipe into said inlet-chamber through the apertures 36. From the inlet-chamber 14 said gas or air passes through the apertures 26, said apertures being small and of uniform size and one aperture being supplied for each of the radial compartments 17. The gas spreads through the absorbent material, which is saturated, as hereinbefore described, with the hydrocarbon oil, until it reaches the outer wall of the intermediate or enriching chamber 15, from which it passes through apertures 27 of uniform size into the expansion-chamber 16. The gas then passes upwardly through apertures 28 of uniform size in the partition 9 into the radial compartments 24 of the separating or stripping chamber 22. Said gas then passes through the absorbent material in said radial compartments 24 and through the apertures 29, also of uniform size, into the outlet-chamber 21, and thence through the pipe 32 to any desired gas-burners.

It will be noted that the enriching or intermediate chamber 15 is completely surrounded and protected from outside changes in temperature by the expansion-chamber, which entirely surrounds the same, and by the separating or stripping chamber, which extends over the entire top of the same. As the gas passes from the inlet-chamber 14 to the expansion-chamber 16 it is very much enriched, taking on particles of the hydrocarbon oil contained in the absorbent material, this enriching or carbureting taking place at a point below the degree of vaporization, and as the enriching-gases pass through the upper radial compartments 24 the adhering particles or molecules are separated by the friction of attrition, thus presenting a much greater number and extent of surfaces to the oxygen at a point where the gas is finally subjected to combustion and where the atoms are subjected to the heat of the gas-flame, which is normally about 2,000°. As the gas passes from the expansion-chamber and into the converging compartments of the stripping or separating chamber 22 the velocity of said gas will be increased, thus aiding atomization by friction, the gas finally delivered from each converging avenue or compartment to the cylindrical outlet-chamber 21 being of the lightest quality.

The advantages of my improved device for mixing and atomizing gases is that the

gases are not only enriched, as hereinbefore set forth, thus rendering in the case of illuminating-gas gases of higher candle-power and in the case of coal, water, and natural gases gases of greater heating or working power, but heavy hydrocarbons may be used instead of light hydrocarbons, thus greatly reducing the risk in the use of said hydrocarbons. The heavy hydrocarbons being used by means of my improved mixer and atomizer at a temperature below the vaporizing degree, all danger resulting from extreme pressure is eliminated, and also the condensation of said gases in the surface pipes of a house is eliminated, as the gas leaves the machine at a lower temperature than it is likely to encounter in any building heated to a degree suitable for occupancy.

While I have described what I consider to be the preferable material and construction of the wicks for feeding the hydrocarbon oil, I do not wish to be understood as confining myself to any particular construction or material in the formation of said wicks.

Having thus explained my invention, what I claim, and desire by Letters Patent to secure, is—

1. In a device of the character described, a casing comprising in its construction a partition extending laterally thereacross and dividing the interior of said casing into an upper and a lower compartment, said lower compartment divided by suitable partitions into an inlet-chamber, an intermediate chamber surrounding said inlet-chamber and an expansion-chamber surrounding said intermediate chamber, said intermediate chamber subdivided into a plurality of compartments increasing in area from said inlet to said expansion-chamber, said upper compartment divided by a suitable partition into an outlet-chamber and a separating-chamber, the latter surrounding said outlet-chamber and subdivided into a plurality of compartments decreasing in area from the outer wall of said casing to the wall of said outlet-chamber, said partition provided with suitable apertures to establish communication from said inlet to said intermediate chamber and thence to said expansion, stripping and outlet chambers consecutively, other apertures being provided connecting said expansion and intermediate chambers through which oil may pass, means to admit hydrocarbon oil to said expansion-chamber, means to admit gas to said inlet-chamber, and means to discharge gas from said outlet-chamber.

2. In a device of the character described, a cylindrical casing comprising in its construction a partition extending laterally therethrough and dividing the interior of said casing into an upper and a lower compartment, said lower compartment divided by two cylindrical partitions into an inlet-chamber, an intermediate chamber surrounding said inlet-chamber, and an expansion-chamber surrounding said intermediate chamber, said intermediate chamber divided into a plurality of compartments by radial walls extending thereacross, said upper compartment divided by a cylindrical partition into an outlet-chamber and a separating-chamber, the latter surrounding said outlet-chamber and subdivided into a plurality of compartments by radial partitions extending from the outer wall of said casing to said outlet-chamber, said partition provided with suitable apertures to establish communication from said inlet to said intermediate chamber and thence to said expansion, stripping and outlet chambers consecutively, other apertures being provided connecting said expansion and intermediate chambers through which oil may pass, means to admit hydrocarbon oil to said expansion-chamber, means to admit gas to said inlet-chamber, and means to discharge gas from said outlet-chamber.

3. In a device of the character described, a casing comprising in its construction a partition extending laterally thereacross and dividing the interior of said casing into an upper and a lower compartment, said lower compartment divided by suitable partitions into an inlet-chamber, an intermediate chamber surrounding said inlet-chamber and an expansion-chamber surrounding said intermediate chamber, said intermediate chamber subdivided into a plurality of compartments increasing in area from said inlet to said expansion chamber, absorbent material filling each of said last-named compartments, said upper compartment divided by a suitable partition into an outlet-chamber and a separating-chamber, the latter surrounding said outlet-chamber and subdivided into a plurality of compartments decreasing in area from the outer wall of said casing to the wall of said outlet-chamber, said partition provided with suitable apertures to establish communication from said inlet to said intermediate chamber and thence to said expansion, stripping and outlet chambers consecutively, other apertures being provided connecting said expansion and intermediate chambers through which oil may pass, means to admit hydrocarbon oil to said expansion-chamber, means to admit gas to said inlet-chamber, and means to discharge gas from said outlet-chamber.

4. In a device of the character described, a cylindrical casing comprising in its construction a partition extending laterally thereacross and dividing the interior of said casing into an upper and a lower compartment, said lower compartment divided by two cylindrical partitions into an inlet-chamber, an intermediate chamber surrounding said inlet-chamber, and an expansion-chamber sur-

rounding said intermediate chamber, said intermediate chamber divided into a plurality of compartments by radial walls extending thereacross, absorbent material filling each of said last-named compartments, said upper compartment divided by a cylindrical partition into an outlet-chamber and a separating-chamber, the latter surrounding said outlet-chamber and subdivided into a plurality of compartments by radial partitions extending from the outer wall of said casing to said outlet-chamber, absorbent material filling each of said last-named compartments, said partition provided with suitable apertures to establish communication from said inlet to said intermediate chamber and thence to said expansion, stripping and outlet chambers consecutively, other apertures being provided connecting said expansion and intermediate chambers through which oil may pass, means to admit hydrocarbon oil to said expansion-chamber, means to admit gas to said inlet-chamber, and means to discharge gas from said outlet-chamber.

5. In a device of the character described, a casing comprising in its construction an inlet-chamber, an intermediate chamber surrounding said inlet-chamber, and an expansion-chamber, said intermediate chamber subdivided into a plurality of compartments increasing in area from said inlet to said expansion-chamber, said chambers separated one from the other by partitions, apertures being provided in said partitions adapted to establish communication from said inlet to said intermediate chamber and thence to said expansion-chamber.

6. In a device of the character described, a casing comprising in its construction an inlet-chamber, an intermediate chamber surrounding said inlet-chamber, and an expansion-chamber surrounding said intermediate chamber, said intermediate chamber subdivided into a plurality of compartments increasing in area from said inlet to said expansion chamber, absorbent material filling each of said compartments, said chambers separated one from the other by partitions, apertures being provided in said partitions adapted to establish communication from said inlet to said intermediate chamber and thence to said expansion-chamber.

7. In a device of the character described, a cylindrical casing, a cylindrical inlet-chamber, an intermediate chamber surrounding said inlet-chamber, and an expansion-chamber surrounding said intermediate chamber, said intermediate chamber divided into a plurality of compartments by radial walls extending thereacross from said inlet to said expansion-chamber, said chambers separated one from the other by partitions, apertures being provided in said partitions adapted to establish communication from said inlet to said intermediate chamber and thence to said expansion-chamber through said compartments.

8. In a device of the character described; two chambers, each provided with apertures for the admission and for the discharge of gases, one of said chambers divided by suitable partitions into compartments which increase in area from the inlet to the outlet apertures thereof, and the other of said chambers divided by suitable partitions into compartments which decrease in area from the inlet to the outlet apertures thereof, and an expansion-chamber interposed between said chambers and having communication established therewith by means of the outlet-apertures of one and the inlet-apertures of the other.

9. In a device of the character described, two cylindrical chambers, each provided with apertures for the admission and for the discharge of gas, one of said chambers divided by radial partitions into compartments whose walls diverge from the inlet to the outlet apertures thereof and the other of said chambers divided by radial partitions into compartments whose walls converge from the inlet to the outlet apertures thereof, and an expansion-chamber interposed between said chambers and having communication established therewith by means of the outlet-apertures of one and the inlet-apertures of the other.

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

ROBERT S. LAWRENCE.

Witnesses:

CHARLES S. GOODING,

ANNIE J. DAILEY.