No. 682,211. Patented Sept. 10, 1901.

E. B. LUDWIG.

CARBURETER.

(Application filed Dec. 10, 1900.)

(No Model.) 2 Sheets—Sheet 1.

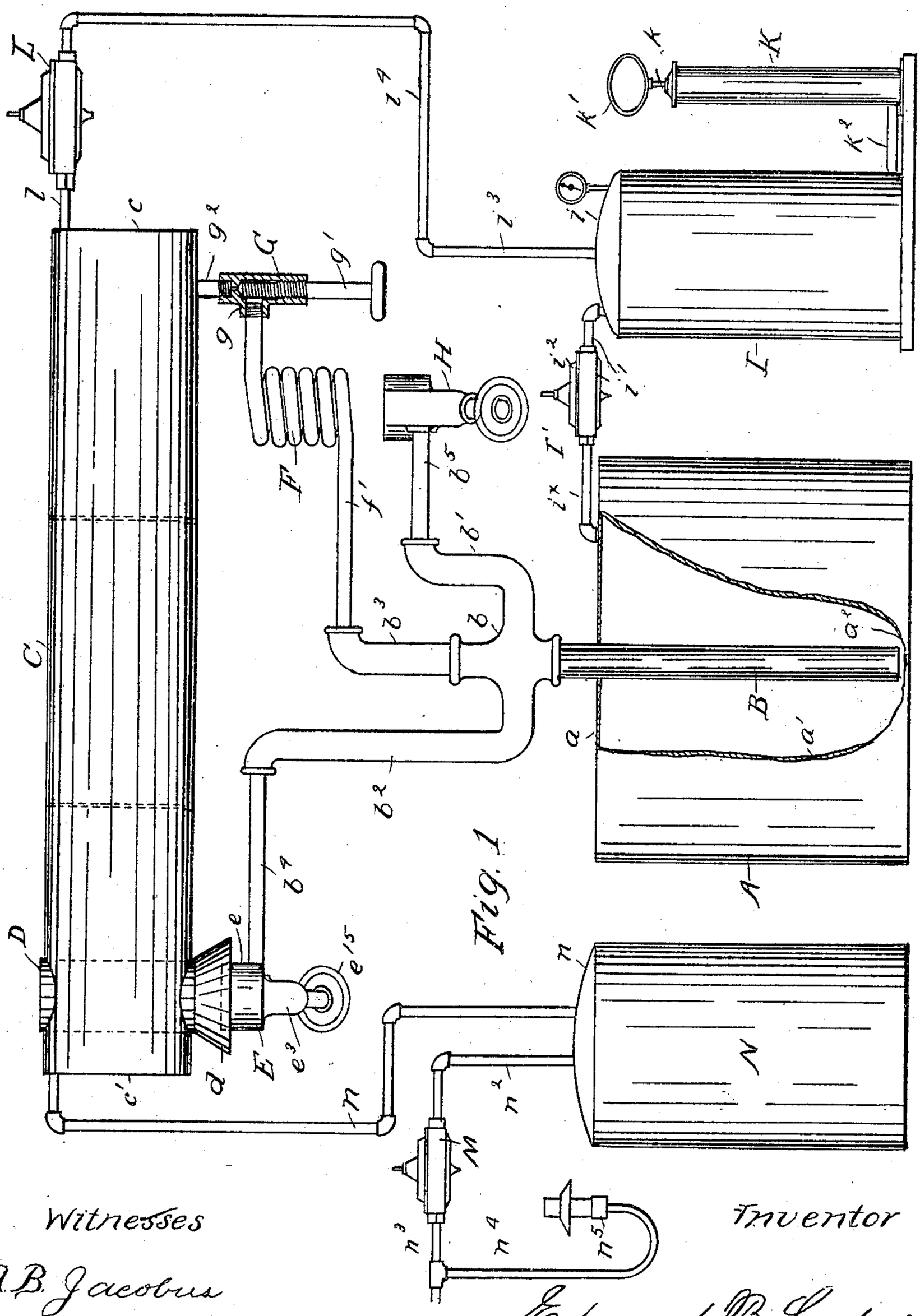

Fig. 1

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 682,211. Patented Sept. 10, 1901.

E. B. LUDWIG.

CARBURETER.

(Application filed Dec. 10, 1900.)

(No Model.) 2 Sheets—Sheet 2.

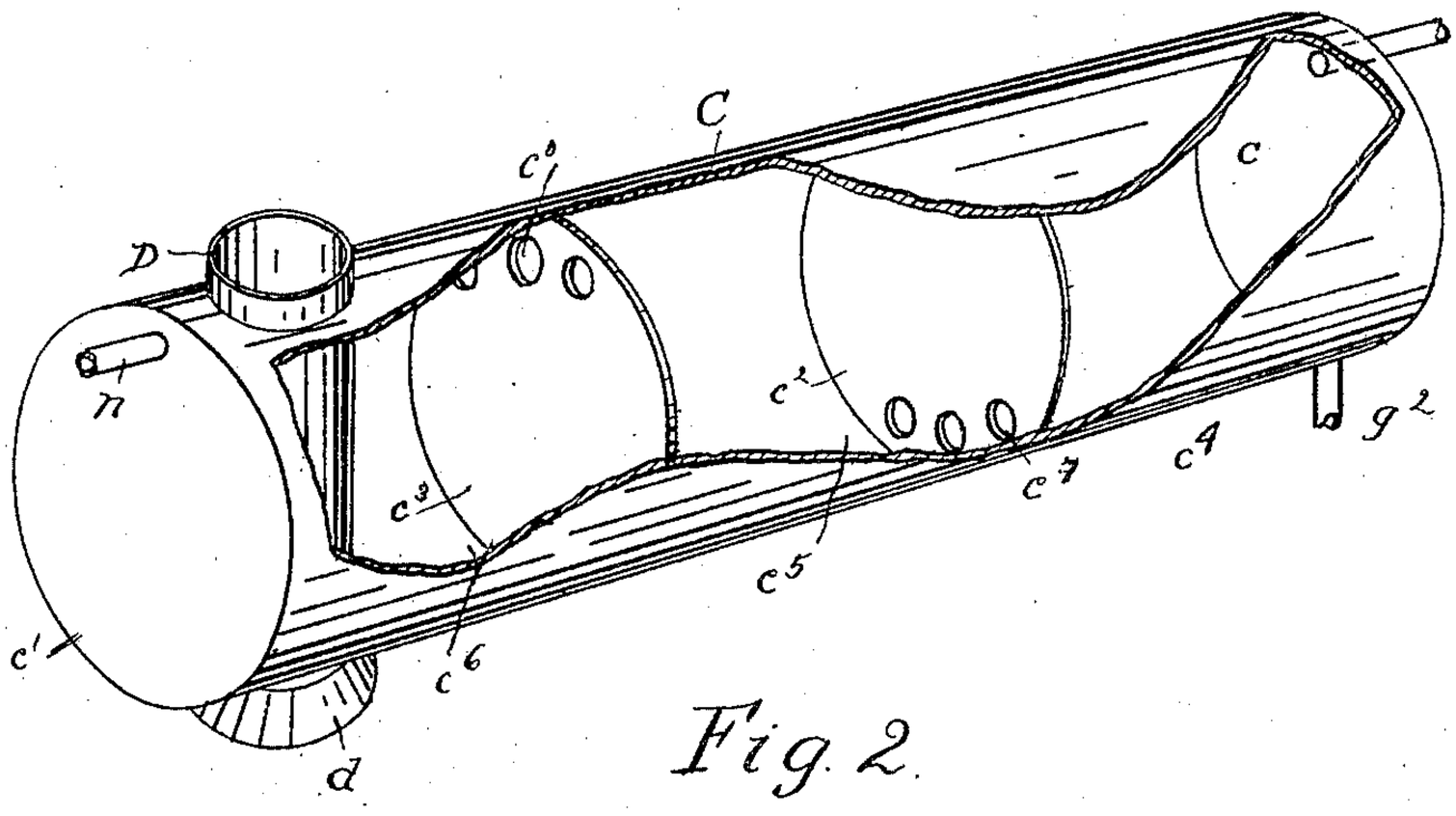

Fig. 2.

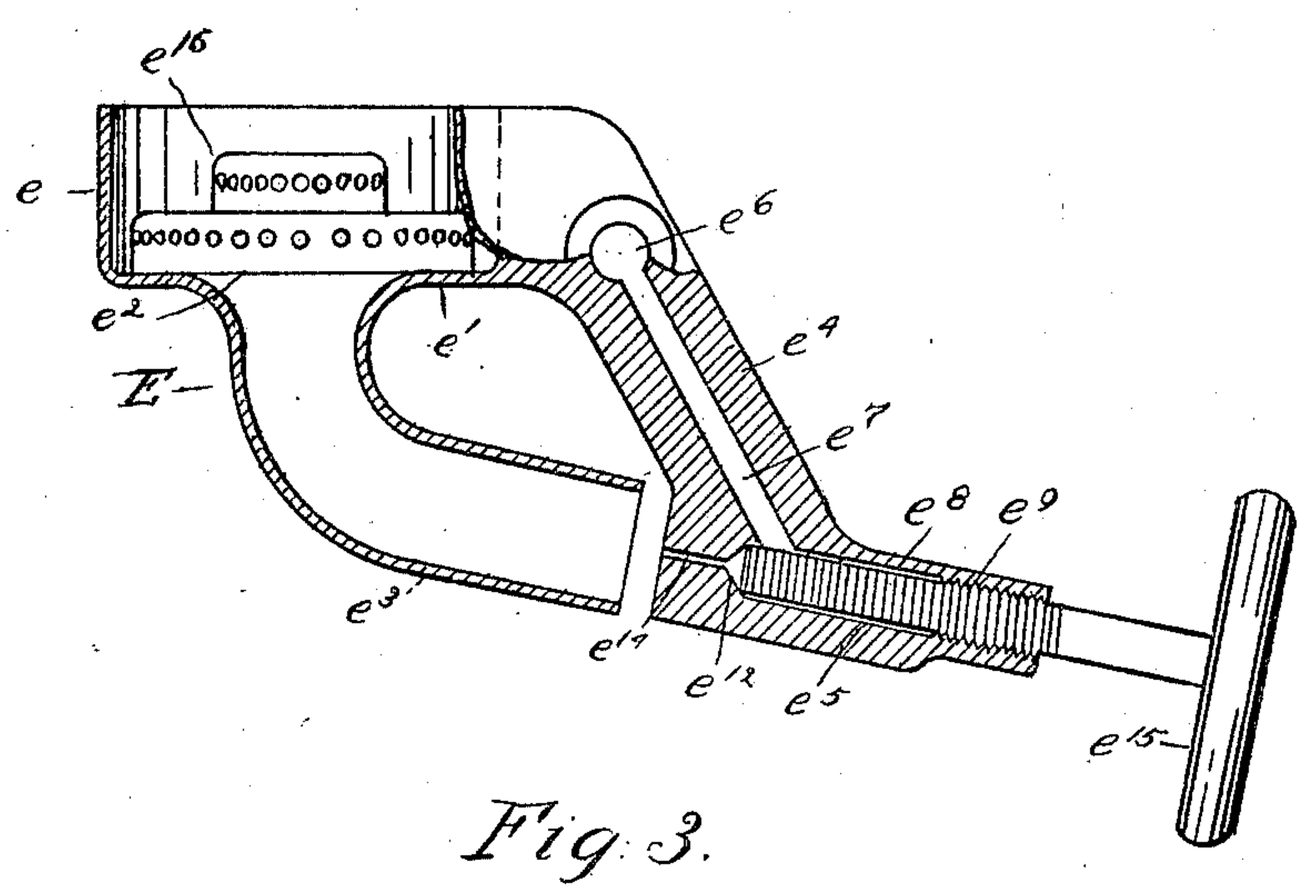

Fig. 3.

Witnesses

A. B. Jacobus

Anne L. Greer

Inventor

Edmund B. Ludwig

By Richd. V. Manning Att'y

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDMUND B. LUDWIG, OF KANSAS CITY, MISSOURI.

CARBURETER.

SPECIFICATION forming part of Letters Patent No. 682,211, dated September 10, 1901.

Application filed December 10, 1900. Serial No. 39,396. (No model.)

To all whom it may concern:

Be it known that I, EDMUND B. LUDWIG, a citizen of the United States of America, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Apparatus for Making Illuminating-Gas; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

The objects of my invention are, first, to obtain an admixture of the air and gas in definite proportions and facilitate such admixture; second, the distribution of the gas for consumption under pressure, and, third, the automatic regulation of the generation of the vaporized fluid in proportion to the amount of the mixed gases consumed.

The invention consists in the novel construction and combination of parts, such as will be first fully described, and specifically pointed out in the claims.

In the drawings, Figure 1 is a view in elevation of the improved apparatus. Fig. 2 is a detail view in perspective of the air and gas mixing receiver, with parts broken away to show the separate compartments and separate diaphragms and heating-tube. Fig. 3 is a vertical sectional view of the gas-burner.

Similar letters of reference indicate corresponding parts in all the figures of the drawings.

Referring to the drawings, A represents a hermetically-sealed tank for the reception of fluid, such as gasolene, of which a is the top, a' the side, and a^2 the bottom. Through the top a of the tank A is extended one end of a delivery-pipe B for the fluid, which end extends downwardly to within a short distance of the bottom a^2 of said tank. The upper end of pipe B extends upwardly a short distance above the top a of the tank A, and with said end is connected a four-way pipe-joint b. From the opposite sides of the pipe-joint b extend the branch pipe connections b' b^2, which are bent at right angles and extend upwardly the proper distance, the branch b^2 extending nearly twice the height of the branch b'. From the upper part of the four-way joint b extends vertically the branch pipe connection b^3, which is intermediate in height that of the branches b' b^2, the upper ends of the branches b' b^3 being bent at right angles in one direction and the branch b^2 in an opposite direction.

Directly above the branches b' b^2 b^3 of the pipe-joint b is the air and gas mixing receiver C, which consists of a cylindrical shell of considerable length and having the ends c c'. The interior of the shell or receiver C is divided into three compartments c^4 c^5 c^6 by the two circular plates or diaphragms c^2 c^3, which are connected transversely with the inner side of the receiver and arranged in position at an equal distance from the respective heads or ends c c' of the receiver and at a corresponding distance apart. Near the bottom of receiver C and lower part of the diaphragm c^2, separating the compartments c^4 c^5, are several perforations c^7, and in the upper part of the diaphragm c^2 are a number of perforations c^0. Through the receiver and the compartment c^6 in line with the chamber of said receiver extends a vertical gas-heating tube D, which in position is arranged a short distance from the end c' of the receiver toward the diaphragm c^3, the ends of the tube extending a short distance beyond the outer side of the receiver. Upon the lower end of tube D is an annular downwardly-extended outwardly-flaring flange d. With the bent upper end of the branch pipe b^2 of the pipe-joint b is connected in the usual manner one end of a short pipe b^4, which extends horizontally to a position beneath flange d on the flue D in receiver C and is connected with the gas-burner E, which is shown in detail in Fig. 3. Said burner consists of a cup-shaped receptacle e, arranged in position within the annular flange d of the flue D and having a bottom e', in which is an opening e^2. With the bottom e' is connected one end of a tube e^3, which extends around the opening e^2. The other end of tube e^3 is bent nearly at right angles to the cup e and extends a short distance therefrom. With the side of cup e is connected the upper end of a casting or arm e^4, the lower end of which is inclined outwardly and downwardly at an angle to the cup e and to a position a short distance from the lower end of tube e^3, and with said end of said casting is connected a short arm or

casting e^5, which extends at an angle to the casting or arm e^4, the inner end of which extends in the direction of and to within a short distance of the lower end of tube e^3. In the side of the arm or casting e^4, near the side of the receptacle e, is a transverse perforation e^6, which receives the end of the pipe b^4, and which perforation extends about half way through the said arm. Within the arm e^4 is a channel or passage e^7, which extends from the perforation e^6 downwardly within the casting e^5. In the casting e^5, extending from the outer end nearly to the inner end of said casting, is a screw-threaded perforation e^8, which communicates with the passage e^7 and in which perforation is a screw-threaded valve-stem e^9 of the needle-valve, which is seated at e^{12} in the end of the perforation e^8, the needle-valve extending through a smaller-sized opening e^{14}, extending toward the tube e^3. Upon the outer end of the stem e^9 is a hand-wheel e^{15}. In the receptacle or cup e is a removable perforated cap e^{16} for the distribution of the gas-flames. With the upper bent end of the branch b^3 of the pipe-joint b is connected one end of a pipe f', the other end of which pipe extends horizontally to a position directly beneath the chamber c^3 in the receiver C and is wound spirally to form the coil or retort F, the other end of the pipe extending from the coil being connected with the opening g' in the side of a vertical casting or three-way pipe-joint G, which is screw-threaded internally and provided with a screw-threaded valve-stem g', the inner end of which stem closes the opening g to the coil of pipe F. With the upper end of the pipe-joint G is connected one end of a short length of pipe g^2, the other end of which pipe extends through the bottom of the receiver C into the chamber c^4. With the bent upper end of the branch b' of the joint b is connected one end of a pipe b^5, the other end of which pipe extends to a position beneath the coil of pipe or retort F, and with said end is connected a burner H, which is precisely the same in construction as the burner E, heretofore described, and which burner H is arranged a short distance beneath the coil or retort F.

I is a compressed-air tank arranged in position near the tank A. Between the tanks A and I is arranged an air or gas pressure regulator I′ of the ordinary and well-known description. With the inlet to regulator I′ is connected one end of a pipe i', the other end of which pipe extends through the top e of the tank I. With the inlet to regulator I′ is connected one end of a pipe $i^{\times}$, the other end of which pipe extends through the top a of tank A.

Near the tank I is an air-compressing pump K of the ordinary construction and which is provided with a piston-rod k and handle k'. At the bottom of the pump K is a pipe k^2, which extends within the tank I and through which the compressed air is supplied to said tank. With the top i of tank I is connected one end of a pipe i^3 for the compressed air, the other end of which pipe extends in an upward direction and is bent at right angles, as at i^4, and thence extended upwardly nearly to a position in line with the top of receiver C and within the inlet-opening to an air or gas regulator L, which is the same as regulator I′. With the outlet to said air-pressure regulator is connected a separate pipe l, which extends through the end c of the receiver C within the chamber c^3. Upon a horizontal line with the tank A is shown a gas supply or storage tank N. With the top n of said tank is connected one end of a pipe n', the other end of which pipe extends upwardly to the receiver C and through the end c' of said receiver within the chamber c^6. With the said top n' is also connected a gas-distributing pipe n^2, the other end of which pipe extends within the inlet-opening to a gas-pressure regulator M, which is the same as the regulator I′ and of the ordinary description. With the outlet to the regulator M is connected one end of a pipe n^3, which leads to the place of consumption and upon which is shown a branch pipe n^4 and a gas-lamp of ordinary description, and these lamps may be of any number and the distribution through any number of branch pipes.

In operation the tank A is supplied with the proper quantity of the fluid, such as gasolene, the nature of which is well known to condense after being vaporized in the heretofore employment of the fluid for conversion into gas. The compressed-air pump K is then operated to supply the tank I with compressed air, or this supply may be obtained from any source of compressed air, and a sufficient pressure of air is supplied to the tank A, which exerts its pressure to force the gasolene up the pipe B to the burners E and H and the retort or coil F. The compressed air in tank I passes through pipe i^3 to the air-pressure regulator L, and a defined amount of air passes into the chamber c^4. Heat being applied to the burners E and H, the flame from said burner H heating the coil or retort F and generating gas on said coil, while the heat from the flame of the burner E passes through the flue D, and the radiation from flue D heats the chamber c^6, the height of the flame being regulated by the stem of the needle-valve e^9, the heat from the burner converting the gasolene into gas, which is mixed with the air in passing through the tube e^3. The gas generated in the retort or coil F is admitted to the pipe-joint G, the valve-stem g' regulating the quantity desired for admixture with the compressed air, and which gas passes within the chamber c^4 in the proportion of about ten per cent. of gas to that of ninety per cent. of compressed air, which is admitted through the air-regulator L. The compressed air in chamber c^4, which is largely molecular oxygen, passes downwardly from the point of entrance from the pipe l toward the orifices c^7

in the diaphragm c^2, while the heated gas, which is lighter and enters the bottom of the receiver, rises to the top of said receiver and passes through the compressed air at different angles, the heated gas mixing with the molecular oxygen of the air, which is also increased in temperature, and in the proportion stated passes through the orifices c^0 in the diaphragm c^3, being subjected to filtration through said orifices, and upon entering the chamber c^6 the gas formed is reheated in circulating around the flue D, and the product is an illuminating-gas of great efficiency and under constant pressure. This gas passes through the pipe n into the storage-tank N, in which the pressure is maintained as in the receiver C and from which its consumption in the lamp is regulated by passing through the regulator M. In the tortuous admission of the gas through the small orifice in the valve G to the chamber c^4 of the receiver C in the proper quantity for due admixture of the air and gas it will be observed that while the pressure of air is constant and uniform in the receiver C and the separate compartments of said receiver the quantity of air supplied will be in proportion to the gas consumed—as, for instance, should the number of lamps in a series which are not required for lighting purposes be cut out from the others the pressure of the air in the receiver C will react upon the gas passing into the chamber c^3, and thus minimizing the quantity of gas supplied to said chamber, while the admixture in the proper proportions of air and gas is maintained—while, upon the other hand, should the whole number of lamps be ignited, which causes a large demand for gas upon the tank N, the release of the pressure within the separate compartments of the receiver also enable the pressure of the air in tank A to cause an increase of supply of the gasolene to the coil F, and consequently a larger amount of gas is generated in the coil F and supplied to the chamber c^4, thus increasing and decreasing the supply automatically and at the same time maintaining, as heretofore stated, the relative mixing proportions of air and gas at all times.

I may at will increase or decrease the pressure of air in the apparatus to meet the requirements of distance or length of supply-pipes, the gas, however, being of great efficiency and of less cost than other forms of illuminating-gases. I may employ oxygen gas in place of common air when required. The gas may also be supplied from the receiver direct when required.

Having fully described my invention, what I now claim as new, and desire to secure by Letters Patent, is—

1. In a gas-mixing apparatus, a receiver having separate compartments for the gases, and tortuous passages leading from one of said compartments to the other, a tank for compressed fluid, and a pressure-regulating device, and a conductor of the compressed fluid connected with said tank and leading to one of the compartments in said receiver through the pressure-regulating device, a generator for gas and a conductor of the heated gas connected with the generator and also with said compartment receiving the fluid under pressure, means for reheating the mixed gases in another compartment of the receiver, and a separate pressure-regulating device controlling the distribution of the mixed gases from said receiver.

2. An apparatus for making illuminating-gas, comprising a receiver for the mixing of gases, having separate compartments and tortuous orifices or passages leading from one of said compartments to the other, and a gas-generator, a conductor for the heated gas extending from the generator to one compartment of the receiver, and with the lower part of said compartment, and a tank for compressed air, and an air and gas pressure reducing device, and a pipe connected with the said compressed-air tank, and the inlet to said pressure-reducing device, and a pipe connecting the outlet to said device with the upper part of the said receiver and the compartment in which the generated gas is admitted, a gas-heating flue extending through another compartment of said receiver, and a heating device within said flue, and means for regulating the discharge of the mixed gases from said receiver.

3. In an apparatus for making illuminating-gas, comprising a receiver for mixing of gases having separate compartments and tortuous passages leading from one of said compartments to the other, of a gas-generating retort and a conductor of the generated gas connected with said generator and one of said compartments of the receiver, a tank for the gas-making fluid, and a delivery-pipe extending within said tank at one end and having the other end connected with said gas-generating retort, a separate tank for compressed air and an air-pressure-reducing device between said tanks and conductors of the compressed air connected with said tanks and with the respective inlet and outlet openings to the reducing device, a separate pressure-reducing device between said air-compressing tank and said receiver for the mixed gases, and conductors of compressed air connected with the said tank for compressed air and with said receiver and the compartment receiving the generated gas and connected with the respective inlet and outlet to the air-pressure-reducing device, means for heating the gas-generating retort, and a gas-pressure-regulating device regulating the delivery of the mixed gases from said receiver.

4. An apparatus for making illuminating-gas, comprising a receiver for the mixing of gases having separate compartments for mixing and reheating the gases, and tortuous passages leading from one of said compartments to the other, a tank for the fluid to be

vaporized, and a delivery-pipe extending within said tank at one end and branches of said pipe-joint, a gas-generating retort or coil of pipe having one end connected with one of the branches of said pipe-joint, and the other end extending within the gas-mixing chamber of said receiver, separate gas-burners, one of which is arranged beneath said coil of pipe, and the other beneath said chamber for reheating the mixed gases, and conducting-pipes for said fluid connected with said burner and the said branches of said three-way pipe-joint, a separate tank for compressed fluids, and a pressure-regulating device between said tank and the tank containing the fluid to be vaporized, and pipes connected with said tanks and the respective inlet and outlet to said air or gas pressure regulating device, a separate air or gas pressure regulating device between said tank for compressed fluids and said receiver, and pipes connected with the gas-mixing chamber of said receiver and said tank for compressed fluids and connected with the respective inlet and outlet to said air or gas pressure regulating device, a distributing-pipe for the mixed gases connected with the chamber for reheating the mixed gases, and an air or gas regulating device connected with said pipe.

EDMUND B. LUDWIG.

Witnesses:
JOHN T. MARSHALL,
THOMAS A. ALEXANDER.