(No Model.)

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METHOD OF AND APPARATUS FOR CARBURETING AND MIXING GAS AND AIR.

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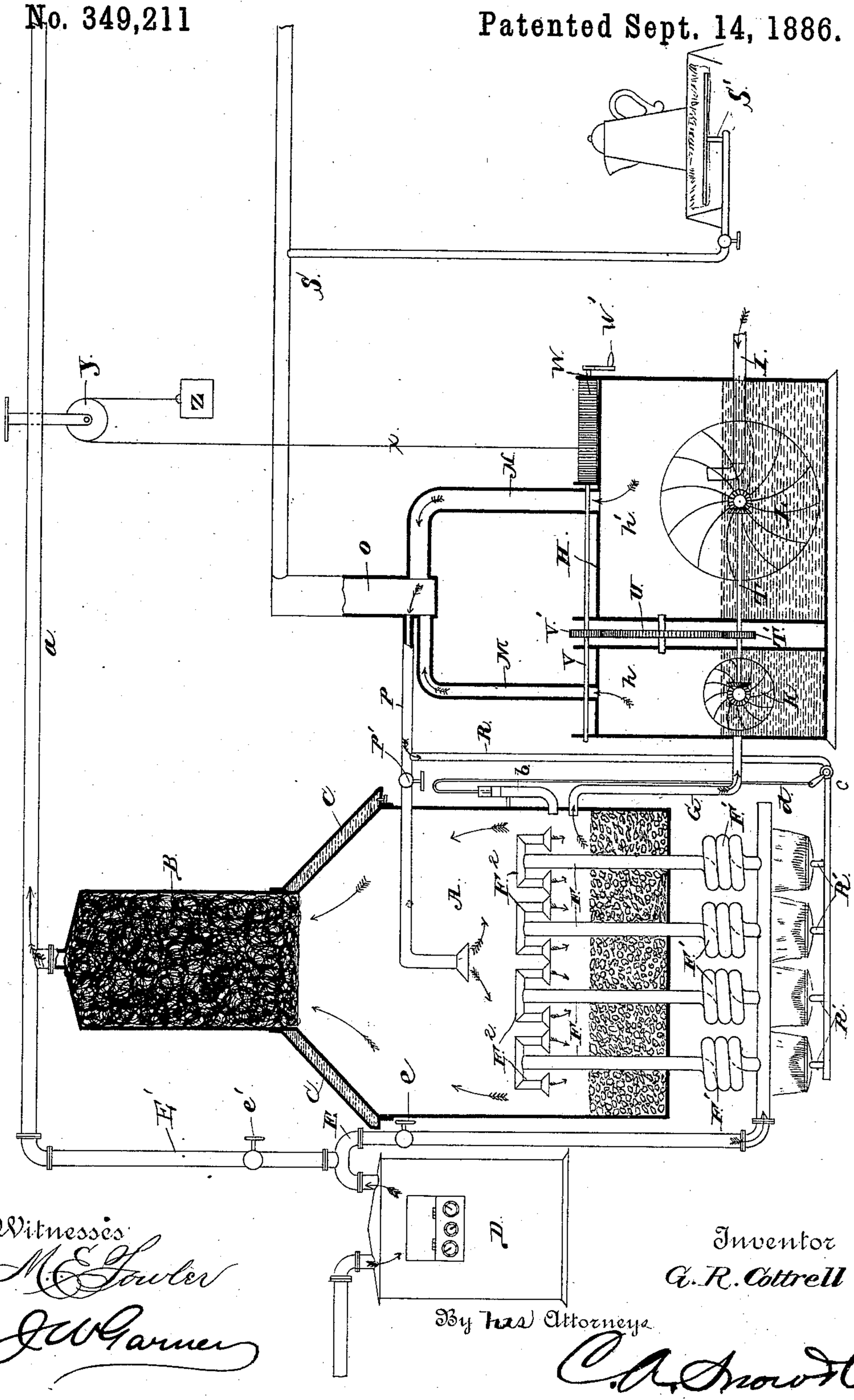

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METHOD OF AND APPARATUS FOR CARBURETING AND MIXING GAS AND AIR.

SPECIFICATION forming part of Letters Patent No. 349,211, dated September 14, 1886.

Application filed January 25, 1886. Serial No. 189,662. (No model.)

To all whom it may concern:

Be it known that I, GEORGE ROSCO COTTRELL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Method of and Apparatus for Carbureting and Mixing Gas and Air, of which the following is a specification, reference being had to the accompanying drawing.

My invention is an improved method of and apparatus for carbureting and mixing gas and air; and it consists, first, in heating the gas and conveying it to a carbureting-chamber containing crystallized naphthaline, and thereby enriching the gas; second, introducing a mixture of oxyhydrocarbon gas and atmospheric air into the carbureting-chamber with the heated enriched gas; third, condensing the mixture of enriched carbureted gas and oxyhydrocarbon gas and air; and, fourth, purifying the same preparatory to introducing it to the service-pipes.

My invention further consists in the peculiar construction and combination of devices that will be more fully set forth hereinafter, and particularly pointed out in the claims.

The object of my invention is to provide a method of and apparatus for carbureting fixed illuminating-gas, and submitting it to any desired pressure, and thereby cause it to yield a light of uniform and any desired candle-power.

The accompanying drawing is a vertical longitudinal central sectional view of an apparatus embodying my invention.

A represents a carbureting-chamber, which is preferably made cylindrical in form, having its upper end forming the section of a cone and communicating with a purifying-chamber, B, which forms a cylinder of reduced diameter. Surrounding the inclined sides of the upper portion of the carbureting-chamber is a water-jacket, C.

D represents the usual gas-meter—such as supplied by the gas companies in cities that are illuminated by gas—from which extends a pipe, E, having a series of branch pipes, F. Coils F′ are formed in the lower ends of these branch pipes below the bottom of the carbureting-chamber, and the upper ends of the said pipes are provided with downwardly-extending discharge-pipes, F^2. The pipe G leads from one side of the carbureting-chamber to a mixing-machine, H. This mixing-machine is divided into two compartments, *h* and *h′*, which are filled to any desired depth with water. The pipe G leads to the compartment *h*, which is only about one-third as large as the compartment *h′*, and the latter has an inlet-pipe, I, for supplying atmospheric air. In the compartment *h* is journaled a horizontal rotating screw or pump, K, and in the compartment *h′* is journaled a similar pump or screw, L, which has about three times the capacity of the pump K. Any other preferred form of pump may be substituted for those hereinbefore shown and described, and the water may be omitted from the compartments *h* and *h′*, as these are particulars which are not essential to the operation of my invention.

From the compartment *h* extends the pipe M, and from the compartment *h′* extends a pipe, N, of about three times the capacity of the pipe M. These pipes M and N lead to a mixing-chamber or union pipe, O, the capacity of which is a little more than equal to the combined capacity of the pipes M and N.

P represents a pipe which extends from the mixing-chamber or union pipe O into the carbureting-chamber, and the inner end of the said pipe P is turned downwardly in the center of the carbureting-chamber. A stop-cock, P′, is located in the pipe P, and from the said pipe depends a branch pipe, R, the lower end of which is bent at right angles and extends horizontally under the horizontal branch of the pipe E, and at a suitable distance below the same and below the coils F′. A series of burners, R′, are provided for the horizontal branch of the pipe R.

From the union pipe O extends a second pipe, S, which leads to any desired portion of the building, and is provided with burners S′, (one or more,) which are used for heating or culinary purposes.

In order to rotate the screw-pumps K and and L, I connect them by suitable gearing with a shaft, T, which has the pinion T′. A gear-wheel, U, meshes with the pinion T′, which gear-wheel and pinion are located between the compartments *h* and *h′*, and on the upper side of the mixing-machine is journaled a shaft, V, having a pinion, V′, that meshes with the gear-wheel U. To the outer end of the shaft V is at-

tached a drum, W. A crank, W′, is also provided for the shaft V, by means of which the latter may be rotated by hand. A cord, X, is coiled on the drum W and passes over a pulley, Y, and to the free end of the cord is attached a weight, Z. It will be readily understood that as the weight descends, the shaft V will be rotated, and thereby cause the screw-pumps K and L, which are geared to the said shaft, to rotate.

I do not desire to limit myself to the weight, cord, and drum for rotating the screw-pumps, as these are merely shown for convenience in illustration, and any preferred motor may be employed for actuating the pumps.

The carbureting-chamber is partly filled to any required depth with crystallized naphthaline, and the purifying-chamber B is filled with excelsior, and any suitable purifying chemicals—such as lime, or chloride of calcium or a mixture of these and charcoal. The gas from the meter passes through the pipe E to the coils F′, and is heated by the flames from the burners R′, and forced through the pipes F into the carbureting-chamber, where it is enriched or carbureted by the crystallized naphthaline. This enriched gas is too rich to burn, and a portion of it passes through the pipe G into the compartment *h*, and from thence is forced by the pump K through the pipe M into the mixing-chamber or union pipe O. Atmospheric air is sucked into the compartment *h′* by the pump L, and forced through the pipe N into the mixing-chamber or union pipe O, where it mixes with the gas in the proportion of about three parts to one of the latter, forming a blue gas, which is suitable for heating and cooking purposes, but not for illuminating purposes. A portion of this blue gas is supplied to the burners R′ for heating the coils F′, and a portion also passes through the pipe S to the burners S′. The mixture of oxyhydrocarbon gas and air is supplied through the pipe P to the center of the carbureting-chamber, and there discharged upon the heated carbureted gas therein, which causes the said gases to mingle and expand against the sides of the carbureting-chamber, where the heavier hydrocarbons are condensed by the water-jacket for the purpose of removing carbonaceous particles that would cause the gas to smoke when burned. From the carbureting-chamber the gas passes upward through the purifying-chamber B to the service-pipe *a*, by which it is conducted to the burners for illuminating purposes.

A gas-gage, *b*, is provided for the carbureting-chamber, and a stop-cock, *c*, is provided for the horizontal branch of the pipe R, the said stop-cock being connected with the gas-gage by a rod, *d*. Gas is thus admitted to the burners R′ in a quantity proportioned to the degree of pressure in the carbureting-chamber, by which means the gas therein is maintained at a uniform pressure and supplied to the service-pipe, and thereby caused to yield a steady and uniform light. By regulating the quantity of gas and air supplied to the carbureting-chamber an illuminating-gas of any desired candle-power may be supplied to the burners.

The mixture of oxyhydrocarbon gas and air in the proportions specified forms a heating-gas which is very cheap and serviceable.

Crystallized naphthaline is a residue of coal-tar or crude petroleum, solid in form, and volatile at 115° Fahrenheit.

By oxyhydrocarbon gas I mean the mixture of ordinary carbureted hydrogen, vapor, and oxygen of the atmosphere, or, in other words, gas after having been enriched or carbureted in the chamber containing hydrocarbon—such as naphthaline—and then mixed with oxygen or air.

A branch pipe, E′, connects the pipe E at the upper end of the meter with the service-pipe *a* at the upper end of the carburetor. This pipe E′ has a valve, *c′*, and the pipe E has a valve, *c*. By closing the valve *c* and opening the valve *c′* the gas may be conducted directly from the meter to the service-pipe without passing into the carburetor or mixing-machine.

Having thus described my invention, I claim—

1. The method of producing carbureted gas of uniform candle-power, consisting, first, in heating the gas; second, conveying it to the carbureting-chamber, and thereby enriching the gas; third, introducing a mixture of oxyhydrocarbon gas and atmospheric air into the carbureting-chamber with the heated and enriched gas; fourth, condensing the mixture of enriched carbureted gas and oxyhydrocarbon gas and air; and, fifth, purifying the same for illuminating purposes, substantially as described.

2. The carbureting-chamber having the water-jacket and the purifying-chamber communicating with the carbureting-chamber, substantially as described.

3. The carbureting-chamber having the inclined upper sides and the water-jacket surrounding them, and the purifying-chamber communicating with said carbureting-chamber, substantially as described.

4. The combination of the carbureting-chamber, the heating-coils for supplying heated gas thereto, means for heating the coils, means for mixing gas and air, and the pipe for supplying the mixture of oxyhydrocarbon gas and air to the carbureting-chamber, substantially as described.

5. The combination of the carbureting-chamber, the pipes F, for supplying heated gas thereto, the mixing-chamber O, communicating with the carbureting-chamber, and the means for supplying oxyhydrocarbon gas and atmospheric air to the mixing-chamber in suitable proportions, substantially as described.

6. The combination of the carbureting-chamber, the mixing-machine communicating therewith and having the pumps K and L, and the mixing-chamber communicating with

the mixing-machine, and also communicating with the carbureting-chamber for supplying a mixture of gas and air to the latter, substantially as described.

7. The combination of the carbureting-chamber having the gas-gage and the heating-coils with the pipe R, having the burners under the heating-coils, and the stop-cock connected to and controlled by the gas-gage, for the purpose set forth, substantially as described.

8. The method of producing carbureted gas of the desired candle-power for illuminating or heating purposes, which consists in heating the gas, then carbureting it, withdrawing such gas from the carburetor and mixing with it a suitable proportion of atmospheric air and conducting it to the place of use, substantially as described.

9. The method of producing carbureted gas of the desired candle-power for illuminating or heating purposes, which consists in heating the gas, then carbureting it by conducting it in a warm or heated state in contact with volatile hydrocarbon, withdrawing from the carburetor a portion of such gas and mixing with it a definite and measured proportion of atmospheric air to adapt it for use, substantially as described.

10. The method of producing carbureted gas of the desired candle-power for heating or illuminating purposes, which consists in heating or warming the carbureting-chamber, supplying heated gas thereto and carbureting it with hydrocarbon vapors, withdrawing such carbureted gas and mixing it with a suitable measured proportion of atmospheric air to adapt it for use, substantially as described.

11. The method of producing carbureted gas of the desired candle-power for illuminating or heating purposes, which consists in heating the gas and mingling therewith hydrocarbon vapors, withdrawing from the carburetor a portion of such gas and mixing with it a suitable proportion of atmospheric air, conducting such mixtures into the carbureting-chamber, and mingling therewith heated enriched gas to adapt it for use, substantially as described.

12. The method of producing carbureted gas of the desired candle-power for illuminating or heating purposes, which consists in heating gas and enriching it with hydrocarbon vapor, then mingling with such enriched gas a mixture of gas and air, united in definite and measured proportions to adapt it for use, substantially as described.

13. The method of preparing a carbureted mixture of gas and air of the desired candle-power for illuminating or heating purposes, which consists in enriching gas with hydrocarbon vapor, forming a mixture of gas and air by uniting them in definite and measured proportions, and then mixing the enriched gas with the mixture of gas and air to form a gas of the desired quality, substantially as described.

14. The method of preparing a carbureted mixture of air and gas of the desired candle-power for illuminating or heating purposes, which consists in vaporizing solid or crystalline hydrocarbons by heat and enriching gas with such vapors, then uniting with such enriched gas a measured proportion of atmospheric air to adapt it for use, substantially as described.

15. The combination, with a carbureting-chamber, of means for heating air and supplying it to such chamber in contact with carbureting material near its bottom, and means, as described, arranged at the top of the carburetor for condensing and removing heavy hydrocarbon particles from the gas, for the purpose described.

16. A carburetor provided with supply-pipes having heating-coils, means for heating such coils and the base of the carburetor, in combination with means for cooling the gas and removing impurities from it, placed at the top of the carburetor, substantially as described.

17. A carbureting-chamber having means for heating it at the base, and having a water-jacket cooling-surface applied to the top for the purpose set forth, substantially as described.

18. A carbureting-chamber having means for heating and vaporizing the carbureting material, and having inclined water-jacket top for condensing and removing an excess of hydrocarbon particles from the gas, substantially as described.

19. In combination with a carburetor, a gas-meter, a connecting supply-pipe leading from the meter to the carburetor, drums or pumps for delivering gas and air in measured proportions, and pipes connecting such measuring-drums with the carburetor, whereby carbureted gas and air may be mixed in suitable proportions to form illuminating or heating gas, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

GEORGE ROSCO COTTRELL.

Witnesses:
BALLARD S. DUNN,
J. FRANK PATTERSON.