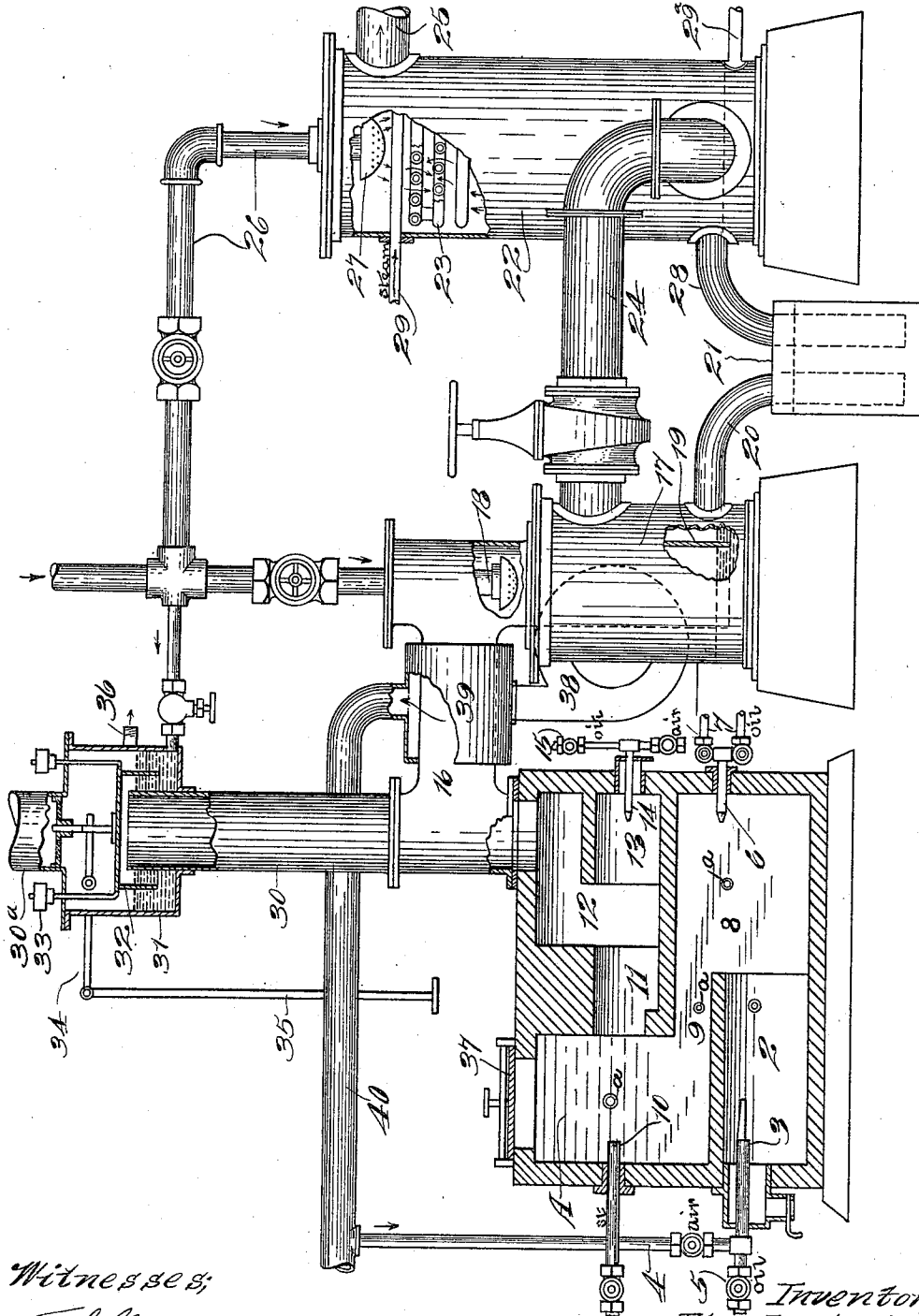


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CONTINUOUS MAKE GAS APPARATUS.
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CONTINUOUS-MAKE GAS APPARATUS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ELMER E. WICKERSHAM, a citizen of the United States, residing at Watsonville, in the county of Santa Cruz and State of California, have invented new and useful Improvements in Continuous-Make Gas Apparatus, of which the following is a specification.

My invention relates to an apparatus for the manufacture of gas by a substantially continuous process as distinguished from apparatus in which the making is done in charges and interruptedly.

It consists in the combination of parts, and in details of construction which will be more fully explained by reference to the accompanying drawings, in which the figure is an elevation and partial section of my apparatus.

In many forms of gas making apparatus, the generator is raised to a high temperature, and the liquid from which the gas is to be manufactured is then passed through the generator as long as the proper temperature can be sustained; but when this temperature has been reduced below the economical point, the process is interrupted, and the generator again heated.

It is the object of my invention to enable the gas to be made in a substantially continuous process, and without such interruptions.

In carrying out my invention I employ an apparatus which will produce the desired result. It consists of a mixing chamber A, a preliminary combustion and heating chamber, a means for introducing oil and vaporizing it, and passing it into the mixing chamber where it meets a jet of super-heated steam, thence conducting the gas to what is known as the "cracking" or "fixing" chamber, in connection with which is a second combustion chamber to raise the temperature to the desired fixing point, and thence the gas is conducted to a scrubber and washer.

As shown in the drawings, A is the mixing chamber. Beneath this chamber is a combustion chamber 2 provided with a burner 3 which is supplied with heated air through a pipe 4, and with oil through a pipe as at 5. This combustion chamber is designed to raise the temperature of the generator (which is

built of brick or any suitable heat-retaining material) to such a point that gas may be made therein.

At a point preferably opposite to the inner and open end of the combustion chamber is a jet tube 6, through which oil and air are admitted from valve-controlled pipes as at 7. This jet tube is preferably slightly above the burner 3, and the spray of oil injected into the chamber 8 with which the open rear end of the combustion chamber 2 communicates, will be vaporized, and passing from the chamber 8 through an arch or passage 9, it enters the mixing chamber A. At this point it meets with a jet of superheated steam supplied through the pipe and jet nozzle as at 10, and the union of the two forms the gas which then passes from the mixing chamber through an arch 11, and into what is termed a "cracking" or "fixing" chamber 12. In this chamber the temperature is raised to the desired fixing point by means of a combustion chamber 13, in which a burner 14 is located. This burner is supplied with oil and air through a pipe 15. By the higher temperature thus produced, the fixing of the gas takes place, and it passes from this chamber through a pipe or passage 16, and thence into the washer 17 where it meets a spray of water discharged through a spraying head 18. This spray serves to wash out the soot or lamp black which has been produced.

19 is a vertical plate in the washer which forms a trap, beneath which the lamp black may pass into a pipe or passage 20, and thence into a trap as at 21.

22 is the scrubber which is here shown as a vertical cylinder having its interior substantially filled with crossed pipes or coils 23.

The gas from the washer 17 passes through the valve-controlled pipe 24 into the lower part of the scrubber 22, and thence rises through this chamber, and is eventually discharged at 25.

26 is a valve-controlled water-pipe entering the top of the chamber 22, and having a spray-head 27 within the chamber and above the tubes 23. The spray of water thus discharged into the apparatus cools and condenses the gas to a point where it may be

discharged through the outlet 25. As the gas is thus condensed, the tar which is carried by it will be thrown down into the bottom of the chamber 22, and will be discharged through the pipe or passage 28 into the trap 21. During the passage of the gas through the chamber 22, and its gradual cooling, a certain amount of tar will be deposited upon the coils or pipes 23, and when this deposit becomes sufficiently large to make it necessary to remove it, steam is admitted to the interior of the coils through a pipe or passage 29. Circulation of steam within these coils will heat them to a point where the deposit of tar upon their exterior will be melted and caused to fall into the lower part of the chamber, thence discharging through the pipe 28. As soon as the coils are cleansed, the steam is shut off and passes out of the coils through an outlet 29^a, and the cold water discharge continued through the spray nozzle 27.

30 is a stack, the lower end of which communicates with the chamber 12, and through this stack, when opened, the products of combustion from the combustion chamber 2, are allowed to escape, while the preliminary heating of the apparatus is going on. In order to control this draft I have shown the stack as made in two sections, the upper end of the section 30 terminating within a chamber 31, and the lower end of the upper portion 30^a of the stack communicating with the upper part of the chamber.

The pipe 30 extends far enough into the chamber 31 to allow a body of water around its upper end, and this in connection with an annular cover 32, forms a water-seal which effectively closes this stack when desired. This seal may be supplied with weights as at 33 which will maintain it in closed condition when desired.

The valve may be opened by means of a lever 34, and suitable connections as at 35, and this valve is opened so as to allow a free draft through the pipe 30—30^a until the temperature of the generator has been raised to the desired point.

When the proper temperature has been reached, the cover 32 is dropped so that the lower edge dips into the water, and thus closes the outlet in this direction. The manufacture of the gas being then commenced, the gas will be diverted through the passage 16 to the washer chamber 17, as before described.

The water-pipe 26 is so located as to supply the washer, the scrubber, and the water-seal 31. A suitable overflow from the seal is provided as shown at 36.

Pyrometers may be disposed at suitable points within the apparatus so that the temperature of the various portions can always be ascertained at a glance.

37 is a manhole with suitable cover; said manhole allowing access to the mixing chamber when desired.

The air supply for the apparatus is produced by means of a fan 38, the air discharge therefrom passing into a drum 39 which surrounds the gas discharge passage 16 leading from the cracking chamber. The air is heated within the drum thus formed, and passing out through the pipe 40, provides a supply of air for the burners 3 and 14.

The small rings *a* shown in chambers A—2—8, and neck 9 indicate observation windows made in the side of the chamber for the purpose of noting the condition of the flames and the degree of incandescence of the linings of the various chambers, while preliminary heating or the generation of gas is being carried on, also the condition of such linings. They are simply tubular openings having transparent covers, through which such observation may be made, and when commencing operation, either of them may be opened for the purpose of igniting the gas in the chambers.

The operation of the apparatus may be commenced by opening the water-sealed stack valve 32, as previously described, and setting fan 38 in operation, the different burners 3, 6 and 14 being supplied with inflammable oil, then lighted, for the purpose of heating up the linings of the chambers to the proper temperature. When this temperature has been reached in the generator, the valves in the pipes 24 and 25 are opened. Water is admitted to the spray-heads 18 and 27, and also to the water-seal 31 in connection with the stack 30, and valve 32 is then closed. Oil is sprayed continuously into the chamber through the atomizer 6. Burners 3 and 14 are also in continuous operation. Superheated steam is admitted into the chamber A through the nozzle 10. The vaporized oil coming from the chambers below the chamber A pass through the neck or passage 9 into the chamber A, where the oil vapor and gas are mixed with superheated steam in proper proportions. After being thus mixed, the mixed product passes from the chamber A under the incandescent arch 11 and into the chamber 12, where the oil vapor undergoes a complete physical change and becomes a perfect fixed water-oil gas. After this process of vaporizing, gasifying, mixing, cracking or fixing, the now fixed gas passes from the chamber 12, through the pipe 16, into the washer 17, where lampblack and tar are removed from the gas. The lampblack and tar pass out of the washer at 29 into the trap 21. The then partially cleansed gas passes from the washer 17 through the pipe 24 into the scrubber 22, entering at the bottom. The

gas passes upward within the scrubber around the numerous cross pipes or pipe coils and finally out at 25, thus producing what may be termed a counter current, the hottest gas meeting the warmest water at the bottom and the coolest and cleanest gas meeting the cooler water at the top, being thus thoroughly cleansed, cooled and ready for storage.

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

1. The combination in a gas apparatus, of a mixing chamber, a combustion chamber below the mixing chamber having an arch separating it from said mixing chamber, a burner in the combustion chamber, a chamber in the rear of the combustion chamber and connecting with a space above said arch, the combustion and mixing chambers opening into the rear chamber, and an atomizer with an oil and air supply connection, said atomizer discharging in the rear chamber and approximately in line with the mixing chamber and above the combustion chamber burner.

2. The combination in a gas apparatus, of a mixing chamber, a combustion chamber below the mixing chamber and having an arch separating it therefrom, a burner in the combustion chamber, a chamber in the rear and into which the combustion and mixing chambers open, an atomizer with oil and air supply connections, said atomizer discharging in the rear chamber and approximately in line with the mixing chamber and above the combustion chamber burner, and a cracking chamber located above the arch of the rear atomizing chamber.

3. The combination in a gas apparatus, of superposed combustion and mixing chambers, an atomizing chamber at the rear into which both said first named chambers open, combustion and cracking chambers superposed above the atomizing chamber, an arch through which connection is made between the mixing chamber and the cracking chamber, and an escape flue and draft-regulating means therefor.

4. The combination in a gas apparatus, of superposed combustion and mixing chambers, an atomizing chamber at the rear into which both said first named chambers open, combustion and cracking chambers superposed above the atomizing chamber, an arch through which connection is made between the mixing chamber and the cracking chamber, an escape flue and draft-regulating means therefor, said means including a chamber into which the separated ends of the escape flue open, and means to close the end of the lower member of said flue.

5. The combination in a gas apparatus, of superposed combustion and mixing cham-

bers, an atomizing chamber at the rear into which both said first named chambers open, combustion and cracking chambers superposed above the atomizing chamber, an arch through which connection is made between the mixing chamber and the cracking chamber, a vertical two-part flue, the lower member of which connects with the cracking chamber, a closed water-seal surrounding said lower member, and means to open and close communication through said seal to the upper part of said flue.

6. The combination in a gas apparatus, of superposed combustion and mixing chambers, an atomizing chamber at the rear into which both said first named chambers open, combustion and cracking chambers superposed above the atomizing chamber, an arch through which connection is made between the mixing chamber and the cracking chamber, a vertical two-part flue, the lower member of which connects with the cracking chamber, a closed water-seal surrounding said lower member, means to open and close communication through said seal to the upper part of said flue, and a washer and connection between the lower flue member and the washer.

7. The combination in a gas apparatus, of superposed combustion and mixing chambers, an atomizing chamber at the rear into which both said first named chambers open, combustion and cracking chambers superposed above the atomizing chamber, an arch through which connection is made between the mixing chamber and the cracking chamber, a vertical two-part flue, the lower member of which connects with the cracking chamber, a closed water-seal surrounding said lower member, means to open and close communication through said seal to the upper part of said flue, a washer and connection between the lower flue member and the washer, a scrubber, and a connection to deliver gas from the washer into the base of the scrubber.

8. The combination in a gas apparatus, of a mixing chamber, a combustion chamber below the mixing chamber and having an arch separating it therefrom, a burner in the combustion chamber, a chamber in the rear and into which the combustion and mixing chambers open, an atomizer with oil and air supply connections, said atomizer discharging in the rear chamber and approximately in line with the mixing chamber and above the combustion chamber burner, a cracking chamber located above the arch of the rear atomizing chamber, a washer and a scrubber through which the gas is successively passed, and an intermediate trap with which both washer and scrubber are connected at their lower ends.

9. The combination in a gas apparatus, of

a mixing chamber, a combustion chamber below the mixing chamber and having an arch separating it therefrom, a burner in the combustion chamber, a chamber in the rear and into which the combustion and mixing chambers open, an atomizer with oil and air supply connections, said atomizer discharging in the rear chamber and approximately in line with the mixing chamber and above the combustion chamber burner, a cracking chamber located above the arch of the rear atomizing chamber, a closable draft flue from the cracking chamber, a gas delivery pipe leading from the flue, a drum surrounding the pipe outside of the cracking chamber, means for passing air through said drum, and means to conduct the heated air from the drum to the combustion and atomizing chambers.

10. The combination in a gas apparatus, of a mixing chamber, a combustion chamber below the mixing chamber and having an

arch separating it therefrom, a burner in the combustion chamber, a chamber in the rear and into which the combustion and mixing chambers open, an atomizer with oil and air supply connections, said atomizer discharging in the rear chamber and approximately in line with the mixing chamber and above the combustion chamber burner, a cracking chamber located above the arch of the rear atomizing chamber, a stack for producing a draft from said chambers, means for cutting off the draft, and a gas pipe leading from the stack and through which the gas is caused to pass when the draft has been cut off.

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

ELMER E. WICKERSHAM.

Witnesses:

A. R. WICKERSHAM,
ELIZABETH WICKERSHAM.