(No Model.)

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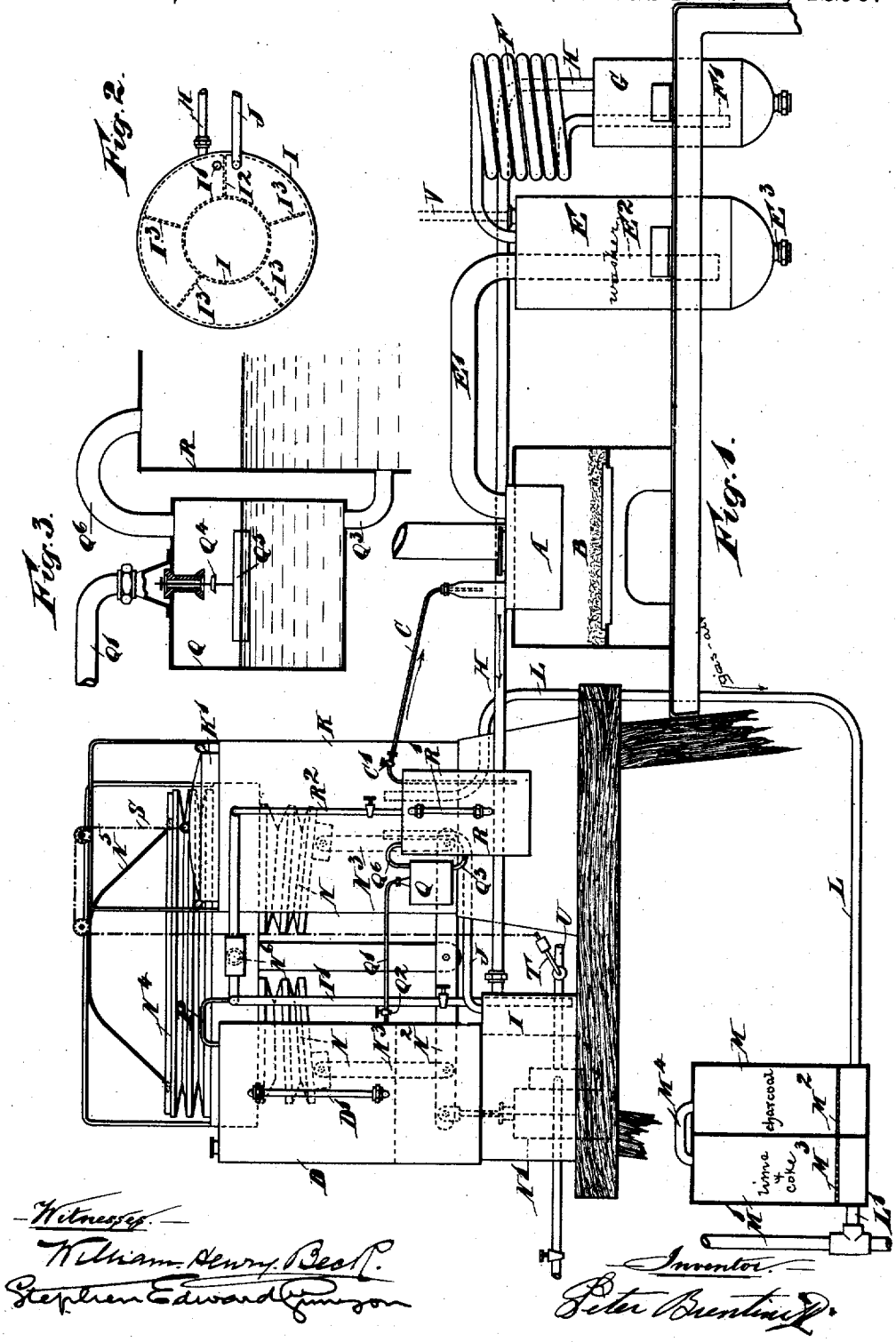
APPARATUS FOR MANUFACTURING GAS.

No. 571,062. Patented Nov. 10, 1896.



UNITED STATES PATENT OFFICE.

PETER BRENTINI, OF LONDON, ENGLAND.

APPARATUS FOR MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 571,062, dated November 10, 1896.

Application filed February 10, 1896. Serial No. 578,768. (No model.) Patented in England February 15, 1895, No. 3,354.

To all whom it may concern:

Be it known that I, PETER BRENTINI, soap-powder manufacturer, a citizen of the Swiss Republic, residing at 5 Windermere Villas, Earlsfield, London, England, have invented a certain new or Improved Apparatus for the Manufacture of Gas, (for which I have obtained Letters Patent in Great Britain, dated February 15, 1895, and numbered 3,354,) of which the following is a specification.

This invention relates to a new or improved apparatus for the manufacture of gas; and it consists of the following arrangements: Into a heated retort or crucible of any suitable material and construction I cause to fall, drop by drop or in a fine stream, petroleum or paraffin oil, which on coming into contact with the heated surface of the retort or crucible is transformed into a vapor which passes off from the retort or crucible into a condenser of any suitable or convenient construction. From the condenser the gas or vapor is passed into a chamber or chambers where it is further cooled, and a certain proportion of atmospheric air is added to it by a bellows, pump, or other suitable means. It is then passed into a gas-holder of any suitable construction, the rising and falling or expansion and contraction of which is preferably caused to automatically shut off, turn on, or regulate the supply of oil or spirit to the retort or crucible, and in some cases to the lamp for heating the latter, and likewise to regulate the motor or other apparatus employed for forcing the air into the gas and, if necessary, the supply of water to the condenser.

In order that the said invention may be fully understood, I will now proceed to describe the same with the aid of the accompanying drawings, in which—

Figure 1 is a diagrammatic representation of a gas-making apparatus constructed in accordance with my invention; Fig. 2, a plan of a part of same to be hereinafter described, and Fig. 3 is a section of parts marked Q and R in Fig. 1.

A is the retort, made of cast-iron or other suitable material and arranged to be heated by an ordinary furnace B, or by a lamp or other heating device, either fed from the apparatus itself or from an independent source. The retort is preferably inclosed, more or less, in a casing or jacket, so as to insure the proper heating of as large a portion of its surface as practicable.

C is a pipe through which the petroleum, paraffin, benzolin, or other hydrocarbon oil or spirit is supplied drop by drop or in a fine stream, to the retort from a reservoir D by means of devices to be hereinafter described.

E is a washer containing water.

E′ is a pipe which conveys the vapor produced in the retort A to the condenser E, delivering the same by the dip-pipe E^2 below the surface of the water contained therein. In this condenser the vapor is cooled and the greater portion of the tar is deposited at the bottom thereof, whence it can be drawn off through an outlet E^3, normally closed by a tap or otherwise. The partly cooled and washed vapor passes off from the top of the condenser through a cooling-coil F, and is delivered through the dip-pipe F′ below the surface of the water contained in a second washer G, similar to the first, E, where it is further cooled and where the remainder of the tar is deposited. A pipe H leads the cooled and washed vapor from the condenser G to a vessel I, where it is mixed with a suitable proportion of atmospheric air, and this mixture of vapor and air is conveyed from the vessel I through a pipe J to a gas-holder, which may consist of a tank K, containing water, and a bell K′, rising and falling therein in the usual and well-known way.

From the gas-holder the mixture of gas and air may be led off by the pipe L direct to the burners, or it may be caused to pass on its way to the burners through a purifying and drying apparatus consisting of two chambers M M′, provided, respectively, with perforated false bottoms M^2 M^3 and connected together at the top by a pipe M^4. The chamber M is filled with powdered or granulated charcoal and the chamber M′ with caustic lime, preferably resting on a layer of coke. The mixture of gas and air is delivered by the pipe L into the space below the perforated false bottom M^2 in M, rises through the charcoal and passes by the pipe M^4 into the upper part of the chamber M′, descends through the lime and coke into the space be-

low the perforated false bottom M^3, and thence passes off by the pipe L′ to the illuminating or heating burners, as the case may be.

The atmospheric air is supplied to the vessel I for admixture with the vapor by means of a pump or by bellows actuated by clockwork, hydraulic, steam, gas, electric, or other motive power engine. In the drawings the air-forcing apparatus consists of bellows N, actuated by a hydraulic motor N′ by means of the lever N^2 and connecting-links N^3. These bellows force air into the collapsible air chamber or reservoir N^4, acted upon by a weight or by a spring N^5. From this chamber or reservoir the air is conveyed to the mixing vessel I through a pipe I′ for admixture with the vapor, as before stated, but I also employ the pressure of the air delivered by the bellows N to force the petroleum or other hydrocarbon into the retort A and the mixture of air and vapor into the gas-holder. For this purpose I employ the following arrangements: D is a closed reservoir containing a supply of petroleum or other hydrocarbon liquid, and preferably furnished with a level-indicator or gage-glass D′. Q is a closed vessel connected to the reservoir D by means of a pipe Q′, the supply to which from the reservoir D can be regulated by a tap Q^2. A pipe Q^3 leads from the lower part of the vessel Q to a closed reservoir R, preferably furnished with a level-indicator or gage-glass R′.

The vessel Q and part of the vessel R are shown in section to a larger scale in Fig. 3. At the end of the pipe Q′ is placed a valve Q^4, opening downward and connected to a float Q^5. As soon as the level of the liquid in the vessel Q reaches a certain height the float Q^5 closes the valve Q^4 and prevents the further entrance of liquid through the pipe Q′. When the level of the liquid falls, the valve Q^4 opens and admits more liquid until the level rises high enough to close the valve again, and so on. By these means a practically constant level of the liquid is maintained in the vessel Q and consequently in the reservoir R, as the two vessels communicate with each other by the pipe Q^3. The two vessels are also in communication with each other at the top by means of a pipe Q^6, whereby the same pressure is maintained in the two vessels. I sometimes dispense with the vessel Q and place the valve and float in the vessel R, connecting the pipe Q′ thereto in the same manner as shown in connection with the vessel Q. The pipe C, through which the hydrocarbon liquid is conveyed from the reservoir R to the retort, extends down to near the bottom of the said reservoir and is furnished with a regulating-tap C′. As the vapor and mixture of vapor and air pervading the apparatus is under pressure, it is necessary to exert a similar pressure, or one somewhat in excess thereof, upon the hydrocarbon liquid in order to force the same into the retort A. For this purpose I connect the outlet-pipe N^6 from the air chamber or reservoir N^4 with the upper end of the reservoir D by a pipe P and with the upper end of the reservoir R by a pipe R^2. Now as the reservoir R is connected with Q by the pipe Q^6 it is obvious that the same air-pressure pervades the upper parts D, R, and Q, and that, too, quite independently of the flow of liquid through Q′. By this means the liquid in the reservoir D is forced through the pipe Q′ into the vessel Q, thence by the pipe Q^3 into the reservoir R, and the liquid in the latter into the pipe C by the pressure of air acting on the upper surfaces of the liquid contained in the vessels D, Q, and R, which pressure is equal to or somewhat in excess of the pressure in the retort. The quantity of air supplied, and consequently its pressure, is varied according to the quantity of gas required to supply the burners in the following way: When the gas is being consumed at the burners faster than it is being made in the apparatus, the gas-holder bell K′ falls and a cord S, connected to it, raises a weighted lever T, forming the handle of a tap in the exhaust-pipe U of the hydraulic motor N′. This tap is thereby opened, giving a freer outlet to the exhaust-water, enabling the motor to run quicker, so as to increase the supply of air, whereby the pressure is raised and consequently more hydrocarbon is delivered to the retort. When, on the other hand, the gas is being consumed at a slower rate than it is being made in the apparatus, the gas-holder bell K′ rises and allows the weighted lever T to fall, closing the tap in the pipe U more or less and reducing the speed of the motor or stopping it altogether, thereby reducing or stopping the supply of air and consequently that of the hydrocarbon to the retort, and therefore the manufacture of gas, until the gas-holder bell K′ again falls and allows the motor to start again or to move at increased speed. The supply of hydrocarbon liquid is thus regulated by the pressure of air, and this in turn is regulated by the speed of the motor and of the bellows, which speed is dependent upon the position of the gas-holder bell K′, and that again upon the consumption of gas at the burners, so that the apparatus acts quite automatically so long as the retort A is kept at a proper heat. When the retort is heated by the combustion of coke or coal, personal attention must be given to keep up a proper supply of fuel unless the latter be supplied automatically; but when the retort is heated by gas produced in the apparatus itself, which is generally the preferable method, no personal attention is required after the heating-burner is once lighted; but in order to avoid waste of gas by keeping the retort up to the full heat when little or no gas is being made in the apparatus the supply of gas to the burner for heating the retort may be regulated automatically by the rising and falling of the gas-holder bell K′ in a manner similar to that above described for the regulation of the speed of the motor.

When a hydraulic motor is employed, it will

generally be found convenient to connect the exhaust-pipe U of the motor with the water-inlet pipe V to the condenser E, and, if necessary, to the condenser G. By this means a supply of cold water to the condensers is secured proportionate to the quantity of gas being made at any given time.

The air and vapor mixing vessel I may be of any suitable construction, but I have found that the construction shown in plan in Fig. 2 is convenient and efficient. I is an annular cylindrical vessel closed at top and bottom and having a partition I^2 extending across from side to side and from top to bottom of the annular chamber.

I^3 are partitions which are somewhat less in width than the annular chamber, and are disposed therein so as to cause the gas and air to follow a zigzag path in passing from the gas and air inlets H and I′, respectively, to the outlet-pipe J, whereby the gas and air are thoroughly mixed together. The vessel I may contain a certain amount of water or heavy oil, and the air-pipe I′ may preferably dip into this water or oil, in order to prevent gas or mixture of gas and air passing back through the said pipe to the air chamber or reservoir N^4 and through the non-return valve usually provided in connection therewith.

The object of maintaining a constant level of the liquid in the regulating vessel R is to secure that the regulation of the supply of hydrocarbon liquid to the retort shall be effected by the variation of the air-pressure alone, and shall not be affected by varying depths and consequently varying resistance of the liquid itself.

The drying-chambers M M′ may be dispensed with, if preferred.

The gas produced by the process and apparatus above described is practically permanent, that is to say, it does not condense at comparatively low temperatures, as is the case with hydrocarbon vapor generated by the passage through it of atmospheric air, or by the application thereto of a slightly-elevated temperature only.

I claim—

A gas-making apparatus comprising the vaporizing retort or crucible, the washers connected therewith, a hydrocarbon-liquid holder connected with the retort, means for regulating the supply of liquid to the retort, the air and gas mixing chambers connected with the washers, means for forcing air into the mixing vessel and into the holders for the hydrocarbon liquid, a motor for actuating the air-forcing apparatus, a gas holder or receiver with connections to the mixer, and devices connected with the gas-holder for regulating the speed of the motor, substantially as described.

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

PETER BRENTINI.

Witnesses:

WILLIAM HENRY BECK,

STEPHEN EDWARD GUNYON.