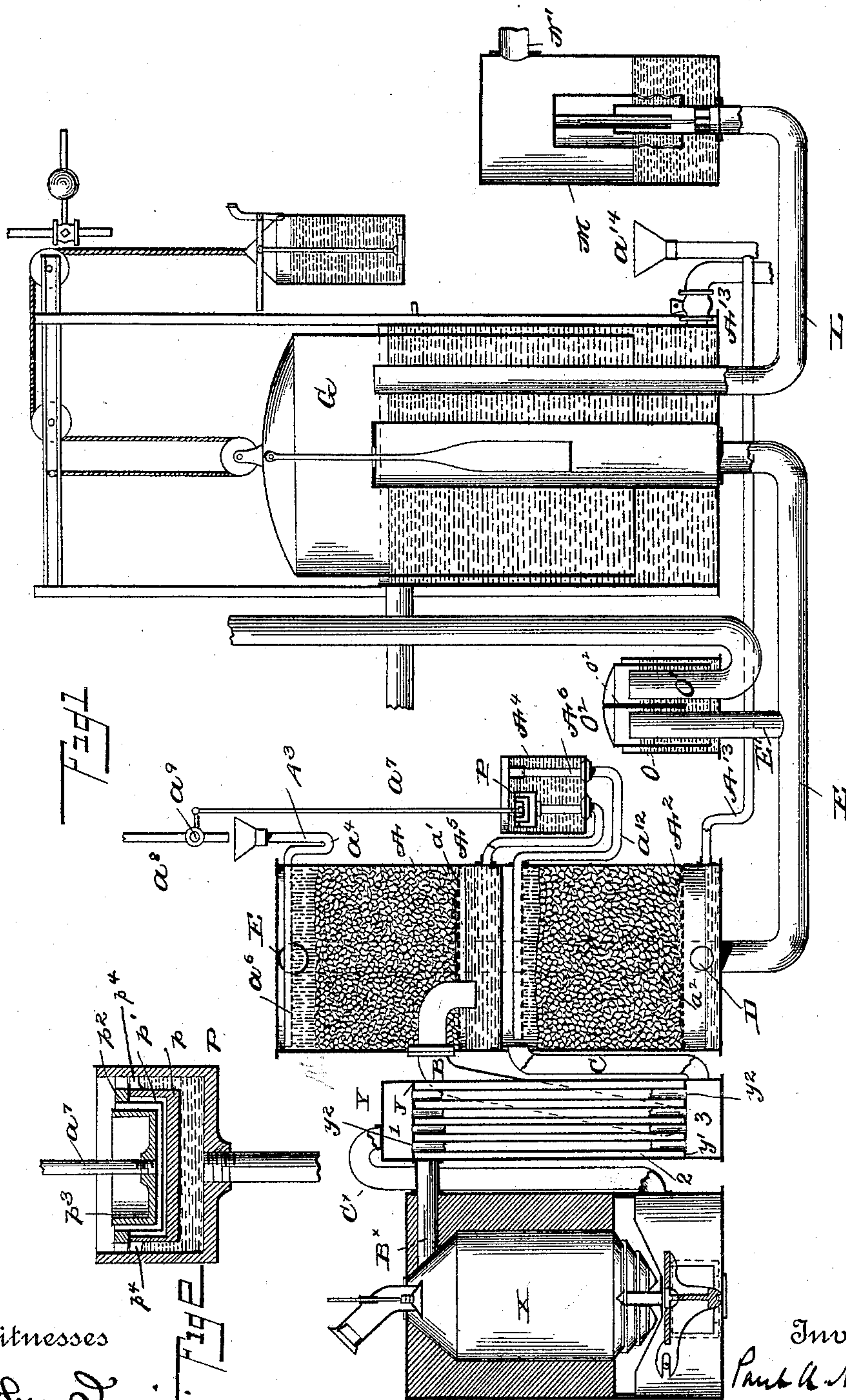


(No Model.)

P. A. N. WINAND.
APPARATUS FOR MAKING GAS.

No. 474,201.

Patented May 3, 1892.



Witnesses

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAKING GAS.

SPECIFICATION forming part of Letters Patent No. 474,201, dated May 3, 1892.

Application filed March 29, 1890. Serial No. 345,891. (No model.)

To all whom it may concern:

Be it known that I, PAUL A. N. WINAND, a subject of the King of Belgium, but now residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Making Gas, of which the following is a specification.

My present invention relates to apparatus for cooling, purifying, and distributing gas generated, preferably, from solid fuel and especially adapted for gas-engine purposes.

The principal objects of my present invention are, first, to provide simple, efficient, and durable apparatus for cooling, purifying, and distributing gas; second, to introduce into the producer a mixture of air and steam at a uniform temperature, and, third, to employ the heat of the gas to warm the mixture of air and steam introduced into the producer.

The nature and characteristic features of my present invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a view, partly in elevation and partly in vertical section, of an apparatus embodying the characteristic features of my invention. Fig. 2 is a sectional view, drawn to a larger scale, of the thermostat shown in Fig. 1.

In the drawings, A represents a cylindrical casing or shell divided horizontally into two compartments A' and A² and provided with the various pipe connections hereinafter explained. In the interior of these compartments and near the respective floors thereof are located the horizontal perforated plates or grills a' and a² for supporting a mass of broken material of a porous nature, such as coke.

X represents a gas-producer, and Y a superheater, consisting of a shell or casing divided into three compartments 1, 2, and 3 by the partitions y y'. A series of vertical tubes y² are contained in the compartment 2, their ends being secured in the partitions y y'. These tubes establish communication between the compartments 1 and 3. A pipe B^x leads from the upper part of the producer to the

upper part of the compartment 2, and a pipe B leads from the lower part of the compartment 2 and dips beneath the surface of the water contained in the bottom of the compartment A'.

A³ is a water-supply pipe provided at or near the external end with a U-shaped trap a⁴ and a funnel a⁵, and at the opposite extremity with a perforated extension a⁶, extending into the interior of the compartment A' above the coke or other porous material.

a⁸ is a pipe located vertically above the funnel a⁵, with a valve or stop-cock a⁹, and communicating with a water-main or other suitable source of supply of water.

A⁵ is a pipe communicating with the lower portion of the interior of this compartment and discharging hot water therefrom around the thermostat P into a receptacle A⁴.

a⁷ is a rod actuated by the thermostat to turn the plug of the valve or stop-cock a⁹.

Referring now to the lower compartment or "moistener" A², C is a pipe leading to the upper interior portion thereof for conveying a mixture of air and steam to the compartment 3, from whence it passes up through the tubes y² to the compartment 1, thence through a pipe C^x to the ash-pit of the producer X.

A⁶ is an overflow-pipe provided with a U-shaped trap a¹², extending upward through the bottom to near the top of the receptacle A⁴. This pipe A⁶ also communicates with the interior of the compartment or moistener A² and discharges its contents through perforations formed therein above the bed of the coke or other porous material mounted in said moistener. A¹³ is a waste-pipe provided with a funnel a¹⁴, communicating with the lower portion of the interior of this compartment or moistener. D is an inlet near the bottom of this compartment A² for the admission of air therein for subsequent delivery at a constant temperature.

E is a pipe for conducting the gas away from the compartment A' after it is purified and cooled by contact with the water and with the moist coke or other porous material. This pipe may lead either directly to the place where the gas is consumed or it may communicate with a small gas-holder.

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A small gas-holder G is preferably employed in order to equalize any sudden changes in the production of gas which occur in practice, although the producer may be continuous in action and the gas generated therein of constant quality. It may be found convenient in some instances to connect the small holder with a blower, fan, or exhauster for readily controlling the quantity of gas forced or drawn into the same from the producer.

L is a pipe extending beneath the gas-holder G and communicating with the interior of the sealed vessel M above the surface of the liquid contained therein.

N' is a pipe communicating with the upper portion of the vessel M and with a gas-engine, for example, of the type known as the "Otto" gas-engine.

The branch E' of the pipe E extends for a short distance above the surface of the liquid in the open tank O. The pipe O' also extends for a short distance above the surface of the liquid in the open tank O and communicates with the air or with a flue or chimney. The inverted bell O² envelops the extremities of the pipes E' and O' and dips beneath the surface of the liquid in the tank O. The interior of the bell O² is divided into two compartments by a short partition o², so that when the bell or dome O² is raised the pipes E' and O' communicate with one another, and when the bell or dome is lowered adjacent extremities of the these pipes are sealed.

Referring to the drawings, and especially to Fig. 2, wherein is illustrated an efficient thermostat and in which P is a metallic cup, p is a metallic shell open at the upper end and secured by lugs p⁴ to the interior of the cup P. The elastic diaphragm p' covers the upper open portion of the shell p and is firmly clamped in position by a ring p². The space between the shell p and the diaphragm p' is filled with a liquid which is volatilized when the temperature of the water flowing through the cup P exceeds the required number of degrees. The piston p³, secured to or made part of the rod a⁷, rests upon the diaphragm p' and is elevated whenever the liquid beneath the diaphragm is volatilized.

The mode of operation of the apparatus embodying the features of my invention may be described as follows: Water from the main or other source of supply is introduced into the compartment A' through the perforated extension a⁶ of the pipe A³, and percolating downward moistens the coke and collects in the bottom of the compartment, while at the same time hot gas from the producer entering through the pipe B passes the water seal, and in ascending becomes purified by contact with the moist coke and imparts its heat to the water. The heated water leaves the compartment A' through the pipe A⁵, and circulating around the thermostat P is collected in the receptacle A⁴ for equalizing its temperature and flowing out of this receptacle through the overflow-pipe A⁶ is distributed upon the sur-

face of the coke in the compartment A² and percolating downward imparts its heat to the coke. At the same time air is introduced through the pipe D into the lower portion of compartment A² and ascending is heated and moistened by impinging upon or contacting with the warm damp coke. The heated and moistened air passes from the compartment A² through the pipe C to the compartment 3, thence through the vertical tubes y² to the compartment 1 and pipe C^x to the ash-pit, whence it passes to the burning fuel. During the passage of the heated and moistened air through the tubes y² it becomes superheated by reason of the heat imparted to the tubes by the gas from the producer, which circulates around them on its passage to the scrubber.

In the practice of the invention it is preferable that the heated and moistened air pass from the compartment A² at a constant temperature, and therefore a thermostat is employed for so regulating and controlling the admission of water from the main or other source of supply to the top of the compartment A' as that the water may leave the bottom of the compartment at a constant temperature. If the temperature of the water flowing through the cup P and contacting with the shell p is for any cause increased and becomes higher than is required to warm the air, such increase of temperature volatilizes the liquid inclosed in the space between the shell p and the diaphragm p' and actuates the piston p³ and rod a⁷ to open the valve or stop-cock a⁹, whereby the supply of cold water entering the compartment A' is increased, and consequently the temperature of the water flowing from the bottom thereof is decreased, and thus it will be seen that the greater the amount of heat imparted to the water in the compartment A' the greater the quantity of cool water will be supplied thereto. The cool and purified gas is forced or drawn from the upper interior portion of the chamber A' through the pipe E and is utilized or collected in a gas-holder. Should the supply of gas from the producer be greater than the gas-holder G can accommodate, the surplus will escape through the branch E' and pipe O'.

I do not claim herein the special construction of producer, as that forms the subject-matter of another application, Serial No. 345,892. Neither do I claim herein the special construction of the thermostat nor that of the gas-holder, as they may form the subject-matter of other applications; but,

Having described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, in apparatus for making gas, is—

1. The combination, with a producer, of a scrubber connected thereto, a moistener communicating with the scrubber and the producer, a water-feed pipe discharging into the scrubber, a thermostat interposed between the scrubber and moistener and connected with a controlling-valve in the water-feed pipe,

and an air-supply pipe opening into the moistener, substantially as and for the purpose specified.

2. The combination of a scrubber, a moistener, a water-feed pipe discharging into said scrubber, a waste-pipe leading from the scrubber, a tank into which said waste-pipe opens, a thermostat located in said tank, suitable connections between the thermostat and the water-feed pipe to regulate the supply of water to the scrubber, and a pipe leading from said tank and discharging into the moistener, substantially as and for the purpose specified.

3. The combination, with a producer, a scrubber, a superheater interposed between the producer and scrubber, and suitable connections between them, of a water-supply pipe constructed to discharge into the scrubber, a moistener connected to said scrubber to receive the heated water therefrom, a thermostat interposed between the scrubber and moistener and connected with a controlling-valve in the water-supply pipe, a pipe to supply air to the moistener, and suitable connections leading from the moistener to the superheater and from the latter to the producer, substantially as and for the purpose specified.

4. The combination, with a producer, a scrubber, a superheater interposed between them, and suitable connections between the producer, superheater, and scrubber, of a water-supply pipe constructed to discharge into the scrubber, a tank constructed to re-

ceive the water from the scrubber and discharge it into the moistener, a thermostat in said tank, means connected therewith to control the supply of water to the scrubber, a pipe to supply air to the moistener, and suitable connections leading from the moistener to the superheater and from the latter to the producer, substantially as and for the purpose described.

5. The combination, with a producer, a scrubber, a superheater interposed between and connected to the scrubber and producer, and a water-feed pipe discharging into the scrubber, of a tank into which the water is discharged from the scrubber, a thermostat in said tank, suitable connections between the thermostat and the water-feed pipe, whereby the supply of water to the scrubber is regulated, a moistener, a pipe leading from the tank and discharging into said moistener, an air-supply pipe opening into the moistener, suitable connections leading from the moistener to the superheater and from the latter to the scrubber, a gas-holder, and a pipe leading from the scrubber to the holder, substantially as described.

In witness whereof I have hereunto set my signature in the presence of two subscribing witnesses.

PAUL A. N. WINAND.

Witnesses:

GEO. W. REED,

CHAS. C. COLLIER.