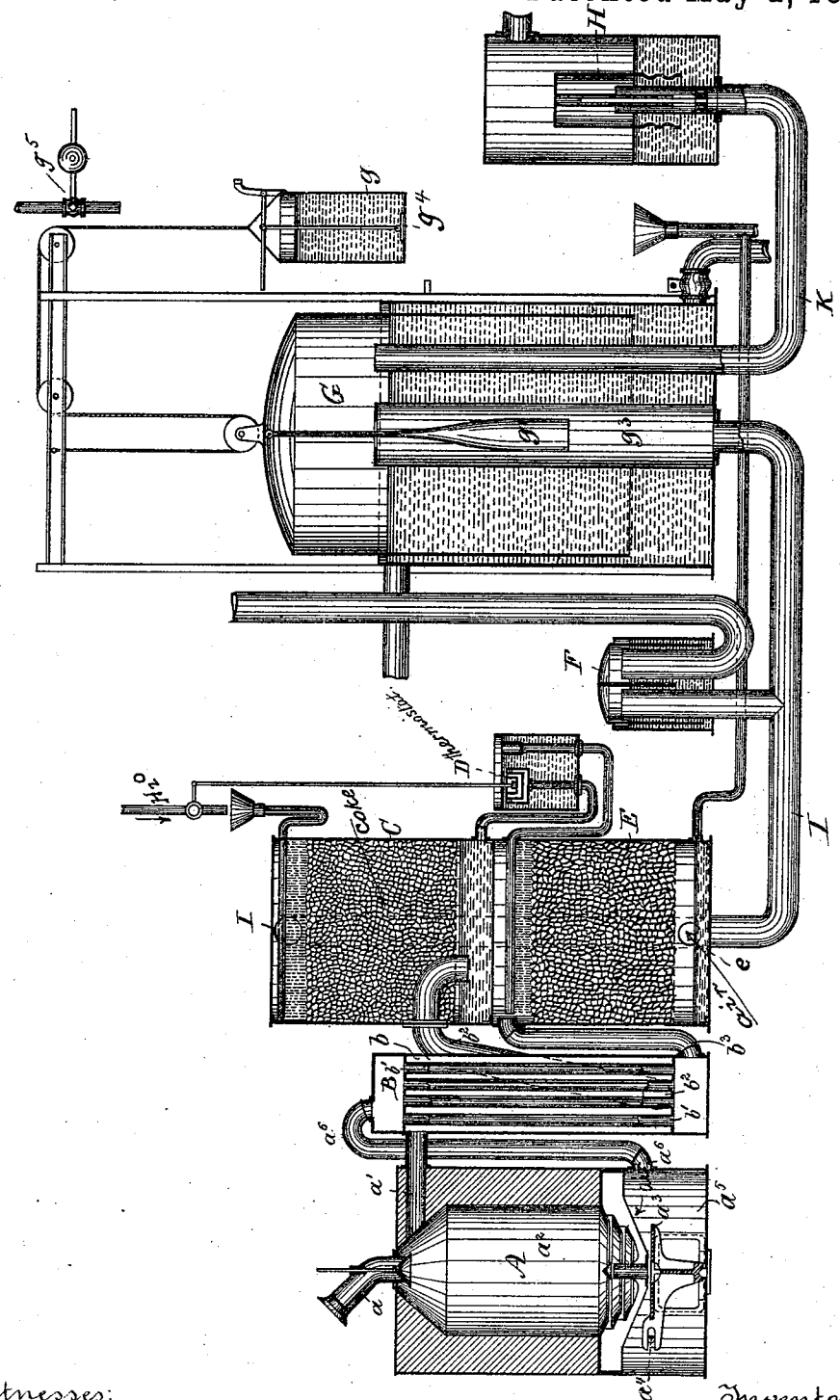
(No Model.)

P. A. N. WINAND.

METHOD OF MAKING GAS.

No. 496,502. Patented May 2, 1893.



Witnesses:
Chas. C. Collier,
John Cochrin

Inventor.
Paul A. N. Winand
By Chas. B. Collier
Atty.

UNITED STATES PATENT OFFICE.

PAUL A. N. WINAND, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO SCHLEICHER, SCHUMM & CO., OF SAME PLACE.

METHOD OF MAKING GAS.

SPECIFICATION forming part of Letters Patent No. 496,502, dated May 2, 1893.

Application filed March 29, 1890. Serial No. 345,893. (No specimens.)

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 Methods of Making Gas, of which the following is a specification.

My invention in general relates to the manufacture of gas from solid fuel.

In the apparatus for making producer gas generally in use, the air that is introduced to the fuel in the producer is moistened by bringing it in contact with steam obtained either by boiling water in a vessel through the upper part of which the air is led on its way to the fuel in the producer, or by the use of a steam jet blower to force the air into the producer. In either case a constant proportion of air and moisture is not obtained, for the reason that the pressure of steam, and consequently its temperature and density are subject to great variation in ordinary generators, and variations in the proportions of air and moisture produce a varying quantity of gas. By means of my invention the proportion of air and moisture is regulated and kept constant so as to give the best results. This is done by the application of the physical law, that gas or air when brought in thorough contact with a liquid of a certain temperature takes up a certain amount of the vapor of said liquid and not more. I therefore bring the air, on its way to the producer, in thorough contact with water whose temperature is kept constant. For that purpose heated water is introduced continually into an apparatus called the moistener, where it meets the air, presenting a large contact surface to the air. The heating of the water is effected by any suitable means and a thermostat is provided which keeps the temperature of the heated water uniform, either by regulating the flow of water or by regulating the amount of heat supplied to the water. In the apparatus hereinafter described, for illustration, the heating of the water is effected by the heat of the gas leaving the producer. In this way the gas is cooled by the water and the heat which is thus taken up by the water is used subsequently for evaporating the water in the moistener. Instead of this, the water may, however, be heated by the combustion of some of the gas or of any other fuel in a special burner and heating apparatus. This would be the course taken when it is not intended to cool the gas.

The nature and principal features of my method of making gas will be more fully understood from the following description taken in connection with the accompanying drawing representing in vertical longitudinal section one form of plant adapted to the manufacture of gas for gas engines and other somewhat analogous purposes.

Referring to the drawing A is a producer or generator of the type forming the subject matter of an application for a patent filed by me of even date herewith, Serial No. 345,892, and Patent No. 474,202, of May 3, 1892. The principal parts, however, of the same may be briefly described as follows: a is the hopper for introducing fuel into the combustion chamber; a' is a gas off-take or pipe located at the upper part of the producer; a^2 is the combustion chamber; a^3 is a pivotally supported bottom capable of being rocked or oscillated by means of a crank shaft a^4; a^5 is a sealed ash-chamber, and a^6 is an inlet pipe for the admission of air into the ash-chamber a^5. B is a regenerator for utilizing the heat of the gas to re-heat the warm and moist air, subsequently introduced into the ash-chamber a^5, of the producer or generator. The hot gas from the producer enters the space b, and passes around the series of vertical tubes b', and leaves the regenerator B, through the pipe b^2. The warm and moist air enters the regenerator B, through the pipe b^3, and in passing through the series of vertical tubes b', is reheated thereby and then allowed to pass into the ash-chamber a^5, of the producer. C is a scrubber. D is a thermostat. E is a moistener. F is a safety or presser valve. G is a gas holder. H is a check valve; I a pipe to convey the gas from the scrubber C to the gas holder; and K a pipe to convey gas from the holder past the check valve H. All these features are fully described in an application for a patent filed by me of even date herewith, Serial No. 345,891.

As my present invention relates only to the

method of making the gas, and not to the storing and use thereof, the gas holder and its adjuncts need not be further referred to.

Having pointed out the parts constituting a plant which is adapted for the conduct of my method of making gas for the purposes described, I will now proceed to describe the operation of said apparatus for carrying out my invention therein. A fire is started on the bottom a^3 of the producer A, and fuel introduced through the hopper a, into the combustion chamber a^2. At the same time with the firing of the producer, water is permitted to enter at or near the top of the scrubber C, and percolate downward through suitable porous material contained therein thereby forming a water-seal in the bottom of said scrubber, while, at the same time, the hot-gas passes through the off-take or pipe a', of the producer into the space b, around the series of vertical tubes b', of the regenerator B, giving up a portion of its heat to the said tubes, thence through the pipe b^2 and the water-seal in the bottom of the scrubber C up through the said scrubber. In rising through said scrubber, the gas is purified by coming in contact with moist coke and imparts its remaining heat to the water which is constantly percolating through the coke in said scrubber. The heated water leaves the scrubber C, and after circulating around the thermostat D, is distributed upon the surface of the coke in the moistener E, and percolates downward therethrough; simultaneously therewith, air is introduced through a suitable aperture e at or near the base of the moistener E, and ascending through the same is heated and moistened by contacting with the warm damp coke. The warm moist air is drawn from the top of the moistener E, through the pipe b^3, and the vertical tubes b', of the regenerator B, and in passing through said tubes, heated by the gas from the producer or generator A, it becomes highly heated, and after leaving the regenerator this highly heated air passes through the pipe a^6, and is discharged into the ash-chamber a^5, of the producer or generator A, thereby supporting the combustion of the fuel therein.

In order to avoid draining the water from the scrubber C, at an unduly high temperature, a thermostat D is employed which regulates or controls the admission of the water from a suitable source of supply to the top of the scrubber C, and thus permits the water to leave the bottom of the scrubber C, at a uniform temperature. For instance, if the temperature of the water is from any cause increased and becomes higher than is necessary or required, such increase of the temperature causes the thermostat to automatically increase the supply of cold water entering the scrubber C, whereby the temperature of the water flowing from the bottom is decreased and thus it will be seen that the higher the temperature of the water leaving the scrubber, the greater will be the quantity of cold water supplied thereto. The cooled and purified gas is drawn from the upper interior part of the scrubber C, through the pipe I, and is collected in the gas holder G.

Having described my invention, I claim—

In the manufacture of gas from solid fuel, the method herein described of providing the fuel with a supply of uniformly heated and moistened air, which consists in bringing cool water into contact with a heating medium, conveying said heated water to a suitable receptacle, causing the heat imparted to the water to regulate the supply of the cool water to the heating medium whereby a uniform temperature is maintained in the water introduced to said receptacle, bringing a supply of air into contact with the water of uniform temperature in said receptacle, and then conveying the uniformly heated and moistened air from the receptacle to the body of fuel.

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.