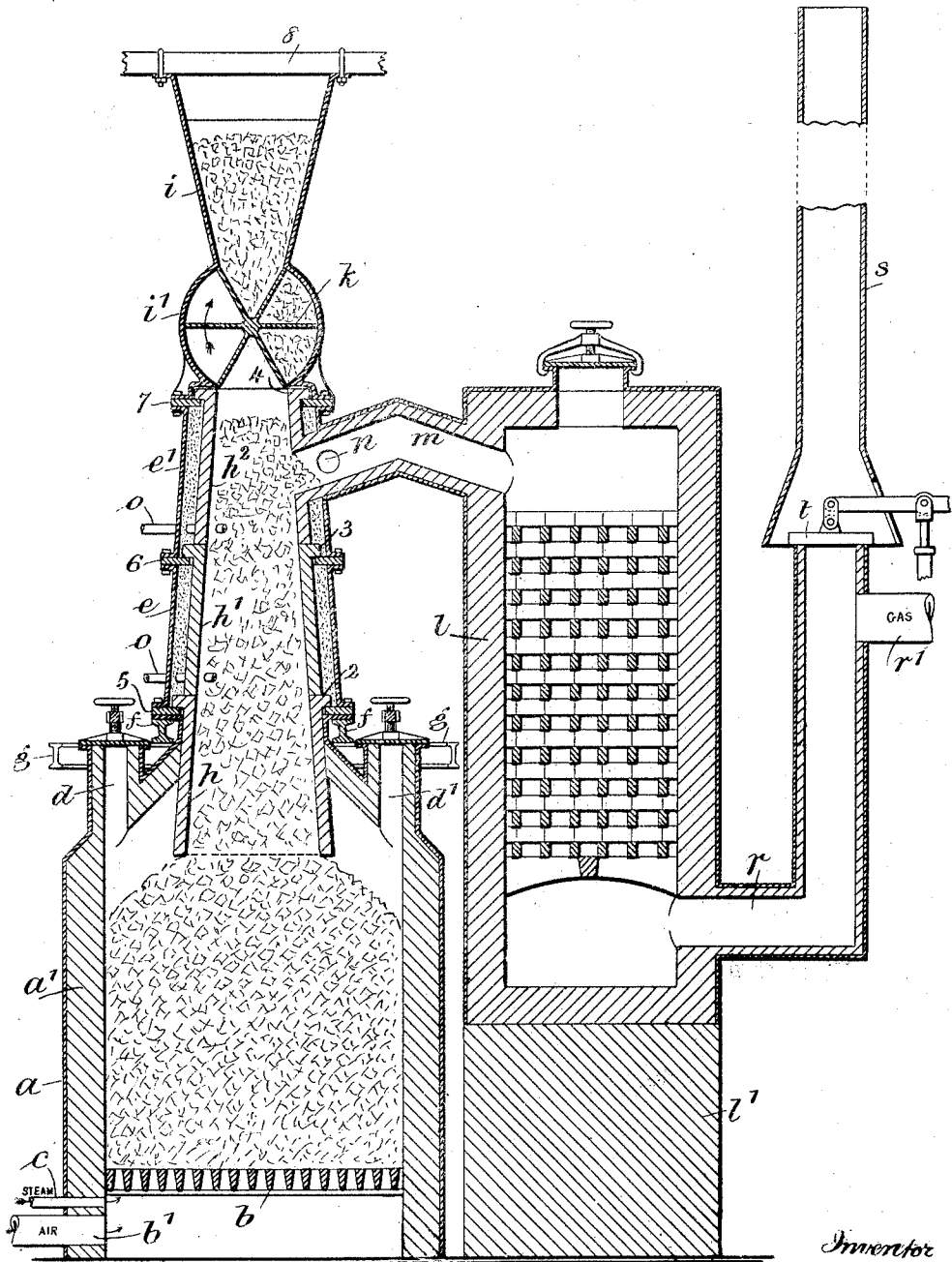


No. 882,909.

PATENTED MAR. 24, 1908.

H. M. PIERSON.
METHOD OF MANUFACTURING GAS.

APPLICATION FILED APR. 22, 1907.



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METHOD OF MANUFACTURING GAS.

No. 882,909.

Specification of Letters Patent.

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Application filed April 22, 1907. Serial No. 369,468.

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To all whom it may concern:

Be it known that I, HENRY M. PIERSON, a citizen of the United States, residing at the borough of Brooklyn, in the county of Kings, city and State of New York, have invented an Improvement in the Method of Manufacturing Gas, of which the following is a specification.

My invention relates to a method of manufacturing luminous water gas. In other words, illuminating gas for lighting purposes by which its economical and rapid production is made possible and by which at the same time a fuel is produced that is available in its manufacture.

My improved method consists generically in forcing air into and heating a body of fuel and making therein producer gas, passing the heated producer gas through a body of bituminous coal and thereby extracting chemical substances therefrom and so producing of the bituminous coal a fuel coke, conveying away the gases so formed and burning the same and so bringing to a high heat the interior of a suitable apparatus or carbureter, in which the said gas is to be fixed, then closing off the supply of air at both the generator and at the place where the producer gas is burned by the further introduction of air, then introducing steam under pressure into the body of incandescent fuel and decomposing the same into its component parts and forming water gas, simultaneously introducing hydro-carbon of suitable consistency into the body of coke and bituminous coal and vaporizing the same, passing the water gas on through the body of coke and bituminous coal and enriching the same by taking up such substances as olefines and carrying the same through the aforesaid heated chamber where the gas is fixed; thereafter conveying the gas to a suitable holder for use as an illuminant and thereafter adding the fuel coke produced from the bituminous coal to the body of fuel—the temperature of which has been greatly reduced by making the water gas—for replenishing the same and progressively repeating the process described.

In the drawing I have represented by a vertical section an apparatus adapted for carrying out the method of my invention.

In this drawing the generator is shown as composed of a shell *a* of suitable metal, a lining *a'* of refractory material with grate-bars

b and with an air-inlet pipe *b'*, a steam inlet pipe *c* and preferably with stoke-holes *d d'* having removable covers. A vertically disposed retort enters the top of the generator; said retort essentially comprising the shell parts of metal *e e'* between which are secured the support rings 5 6 7 and within these are the retort chambers *h h' h''* formed with flanges 2 3 4, resting the one on the other and tapering from one end to the other, the lower end of the larger chamber extending down into the retort and said retort chambers supported at their flanges upon the support rings 5 6 7, said structure being firmly supported upon the eye-beams *f* and the cross support beams *g*. At the upper end of the retort there is a hopper *i* connected by preference to a beam 8 and formed at its lower end with a drum *i'* within which is a revoluble feeder *k*.

The hopper is to be supplied with bituminous coal and the same is fed by the feeder *k* into the smaller end of the retort, falling through the retort and filling up the same; the said bituminous coal or coke resting upon the fuel in the generator at all times. I provide a carbureter *l* of well-known construction which is shown resting upon a suitable foundation *l'*. This carbureter is provided with a shell, a refractory material lining and is connected by the throat *m* to the upper and higher end of the retort. An air-pipe *n* opens within the throat *m* and pipes *o* for oil or suitable hydro-carbon are introduced into the retort. Gas conduits or pipes *r r'* extend from the lower end of the carbureter and the carbureter is preferably filled with checker-brick, or equivalent broken particles. The upper end of the pipe *r* is provided with a valve *t* to close off the same and resting above this pipe is a smoke-stack *s*; the pipe *r'* being employed for conveying away the illuminating gas to a suitable gasometer or holder.

In the method of manufacturing luminous or illuminating gas with this apparatus, the fuel in the generator is first fired by the introduction of air from the pipe *b'* under pressure and is blown up to incandescence and producer gas is made; the said producer gas passing on through the bituminous coal and extracting therefrom some of the chemical substances. As the enriched producer gas enters the throat *m* it is met by an in-coming supply of air from the pipe *n* and is then

burned so that perfect combustion is produced by the abundant supply of air. The heated gases then pass on through the throat into the carbureter heating up the checker-brick therein to the desired and visually determined condition or degree of heat. In the meantime however, and with the starting of the apparatus, the valve *t* has been lifted off the end of the pipe *r* and the products of the perfect combustion pass up the stack *s*. When the fuel in the generator and the checker-brick in the carbureter have been brought to a proper degree of heat or heated condition recognized in this art, the air from the pipe *n* and the air inlet by the pipe *b'* are closed off and the valve *t* shut down upon the end of the pipe *r*. Steam is then introduced into the generator by the pipe *c* and liquid hydro-carbon is introduced by the pipes *o* into the hot coke and bituminous coal in the retort where the same is vaporized and resolved into its constituent elements.

The steam as it is forced through the hot body of fuel in the generator is decomposed and resolved into its constituent elements forming water gas and it passes on through the coke and the bituminous coal now in a hot condition in the retort to complete the taking up therefrom of the chemical substances and so produce of the bituminous coal a fuel coke and at the same time taking up the vapors of the hydro-carbon liquid and becoming enriched thereby. The enriched water gas now passes on through the throat *m* into the carbureter *l*, passing through the interstices of the hot checker-brick where the gases are thoroughly mixed and converted into fixed luminous or illuminating gas. The gas so produced is conveyed away by the pipe *r'* into a suitable generator or holder for future use. The temperature of the fuel in the generator is reduced, by thus making the gas, to such a point that it requires both replenishing and building up, the ashes are removed and the mass of fuel settles, the coke in the retort progressively descending or falling down from the retort onto the bed of fuel as additional fuel for replenishing the generator. The retort is then filled up from the hopper *i* by the feeder *k* with fresh bituminous coal and the operations as hereinbefore described are similarly progressively repeated.

In the manufacture of luminous or illuminating gas as hereinbefore described, the first product of blowing up the generator is producer gas, and the apparatus herein described utilizes and burns the same; or in other words, consumes it for the purpose of heating up the carbureter necessary and useful in the production of luminous or illuminating gas which follows:—

In the method hereinbefore described by me, and because the generator and the retort

opening therefrom and forming a continuation thereof produce an elongated fire chamber of hot fuel, the steam undecomposed in the fire of the generator is fully decomposed in the upper chambered end of the generator and in the fire of the retort, and considerable carbonic acid $C.O_2$ which in the manufacture of gas does escape in a shallow fire, is in my apparatus and process reconverted into $C.O.$ by the extra element of oxygen of the $C.O_2$ taking up an element of carbon in the retort and forming an additional volume of $C.O.$, thus doubling the volume of this gas made and greatly increasing the heat units of the same.

I claim as my invention:—

1. The method herein specified of making illuminating gas, the same consisting in blowing up a body of fuel to substantial incandescence and making therein producer gas, passing the producer gas through a body of bituminous coal which forms a substantially vertical continuation of the heated body of fuel and heating up the said fuel, adding air to the producer gas beyond this body of bituminous coal and burning the same and so heating up a fixing chamber; closing off all the air and introducing steam and passing the same through the body of incandescent fuel, decomposing the steam and forming water gas and passing the said water gas through the body of bituminous coal for the extraction of the chemical substances therefrom and the production of a fuel coke, simultaneously supplying liquid hydro-carbon to be vaporized and taken up by the decomposed steam or water gas in transit through the coke and bituminous coal and conveying the said gases and commingling and fixing the same in the presence of the stored up heat of the fixing chamber, and then conveying away the gases to a suitable receptacle.

2. The method herein specified of making illuminating gas, the same consisting in blowing up a body of fuel to substantial incandescence and making therein producer gas, passing the producer gas through a body of bituminous coal which forms a substantially vertical continuation of the heated body of fuel and heating up said fuel, adding air to the producer gas beyond this body of bituminous coal and burning the same and so heating up a fixing chamber; closing off all the air and introducing steam and passing the same through the body of incandescent fuel, decomposing the steam and forming water gas and passing the said water gas through the body of bituminous coal for the extraction of the chemical substances therefrom and the production of a fuel coke, simultaneously supplying liquid hydro-carbon to be vaporized and taken up by the decomposed steam or water gas in transit through the coke and bituminous coal and conveying

the said gases and commingling and fixing
the same in the presence of the stored up
heat of the fixing chamber, then conveying
away the gases to a suitable receptacle, the
5 coke formed from the bituminous coal being
progressively delivered onto the body of fuel
in the generator to replenish the same and

supplying additional bituminous coal and
successively repeating the operations.

Signed by me this 5th day of April 1907.

H. M. PIERSON.

Witnesses:

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