

UNITED STATES PATENT OFFICE.

PAUL SCHMIDT, OF HANOVER, GERMANY.

METHOD OF MANUFACTURING GAS.

No. 836,054.

Specification of Letters Patent.

Patented Nov. 13, 1906.

Original application filed December 8, 1903, Serial No. 184,297. Divided and this application filed December 10, 1904. Serial No. 236,401.

To all whom it may concern:

Be it known that I, PAUL SCHMIDT, a subject of the German Emperor, residing at Hanover, Germany, have invented certain new and useful Improvements in Methods of Manufacturing Gas, of which the following is a specification.

This invention relates to a method of manufacturing water-gas, producer-gas, and the like and is a division of application Serial No. 184,297, filed December 8, 1903.

In the method of manufacturing gas wherein the gases generated above the body of fuel and in the upper zones of the latter and which contain tar are drawn off and injected in the lower hottest part of the fuel-column for the purpose of effecting their decomposition and conversion into carbon monoxid and other permanent combustible gases it has been found that in carrying out such method a series of disadvantages arise; and the object of the present method is to overcome such disadvantages. The gases generated above the body of fuel and in the upper zone of the latter contain a large extent of heavy easily-condensable hydrocarbons that condense, more or less, in the pipes conveying their gases to the lower part, and therefore pass in a liquid condition in the lower part of the fuel-column. By such procedure a considerable amount of heat is lost, the fuel is considerably cooled down on that side where the introduction of the liquid hydrocarbons takes place, as can easily be seen through sight-holes, the fuel being considerably darker near where the liquid enters than at a greater distance therefrom and is consequently of a lower temperature. A portion of the condensed vapors also drops down into the water seal of the apparatus and is therefore lost. The consequence of the unequal degree of combustion resulting from the above is the formation of cavities in the body of fuel, and consequently want of uniformity in the production of combustible gas and an unequal descent of the fuel. These disadvantages are obviated according to the present invention by preventing the condensation of the tarry gases drawn off from the upper layers of fuel on its way to the lower layers by maintaining them during their transit at a high temperature by means either directly or indirectly by the outgoing hot gases of generation. This can be effect-

ed, by way of example, by causing generator-gas to pass from the hot zone of the generator through a suitable channel into the pipe through which the gases and vapors given off at the upper part descend to the lower strata, so as to be directly mixed with such gases or vapors, or the said hot generator-gases may be made to pass through a jacket surrounding the said pipe on their way to the place of utilization.

The above-described improved method of operating can only be employed with advantage if the central inverted-V-shaped fire-grate heretofore generally employed is replaced by a lateral inclined grate arranged opposite the part of the combustion-chamber where the downward-conducted gases enter, so that the air-currents entering through the fire-grate and the injected hydrocarbon vapors impinge upon each other at an angle of about ninety degrees in the zone of incandescence fuel, so as to effect their intimate mixture and a perfect conversion of the hydrocarbons into carbon monoxid and other permanent gases.

In the accompanying drawing is illustrated in vertical transverse section one form of a gas-generator suitable for carrying out a method for manufacturing gas in accordance with this invention.

Briefly described, the method consists in drawing the gases and vapors from the upper part of the generating-chamber, heating the withdrawn gases and vapors to prevent condensation, introducing the heated gases at one side of the generating-chamber into the glowing fuel, and leading off the finished gases at the side of the generating-chamber opposite to that where the heated gases and vapors are introduced to the generator.

The gas-generator *a* is constructed with a number of escape-channels *b* in the upper layers of the fuel-column and also in the space above the latter, which channels communicate with a jacket *t*, which surrounds the downdraft-pipe *c*. The gases are drawn down the latter and injected into the lower hottest zone of the fuel-column by means of a steam-injector at *d*.

As with the construction shown the gases and vapors are drawn off from all the different zones by means of a single injector *d*, the branch pipes *b*, leading into jacket *t*, are provided with suitable dampers or valves in

order that the quantity of gas drawn off from each zone may be separately regulated.

The jacket *t* communicates with a pipe *s*, connected at its other end with the discharge-pipe *g* for the hot generator-gases, a portion of which consequently passes through the jacket, so as to impart their heat to the gases and vapors in pipe *c*, eventually passing off again through a branch in the upper end of the jacket to the place of consumption.

For effecting the perfect decomposition of the introduced hydrocarbons the central V-shaped grate usually employed is replaced by an inclined grate *k*, arranged at the side of the generator opposite that at which the upper gases are introduced, such grate being supported on a bridge *y*, so as to overhang the water seal *p*. Doors *w* are provided below the grate for clearing the ash-pit and grate. For preventing the grate-bars being clogged with slag stoking-holes *o* are provided above the same, closed by doors *z*. By this arrangement of the fire-grate in conjunction with stoking-holes the grate can be kept clear of slag, so as to admit a sufficient supply of air-blast. In order to insure a uniform production of generator-gas and in particular to prevent the formation of cavities through which on the one hand the hydrocarbons could pass direct into the gas-outlet and on the other hand a caking of the fuel

might take place, other stoking-holes, such as *i i*, may be provided above the holes *o* on the same side of the generator as well as holes *x* on the opposite side.

The discharge-pipe *g* for the generator-gas is provided with a shut-off valve for enabling the gases to be blown out of the generator on starting. The downdraft-pipe *c* is provided with a dust-collector *l* in the known manner.

Having thus fully described my invention, what I claim as new is—

A method for the continuous and uniform production of gas which consists in blasting, heating and distilling a bed of fuel, drawing the distilled gases and vapors from the upper part of the generating-chamber, heating the withdrawn gases and vapors by the outgoing blast-gases to prevent condensation, introducing the heated gases at one side of the generating-chamber into the glowing fuel, and leading off the finished gases at the side of the generating-chamber opposite to that where the heated gases and vapors are introduced to the generator.

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

PAUL SCHMIDT.

Witnesses:

LEONORE KASCH,
ANNA DIGGAD.