Aug. 18, 1925. 1,550,558

H. MEHNER

PROCESS FOR MAKING COMBUSTIBLE GAS

Original Filed Feb. 14, 1922

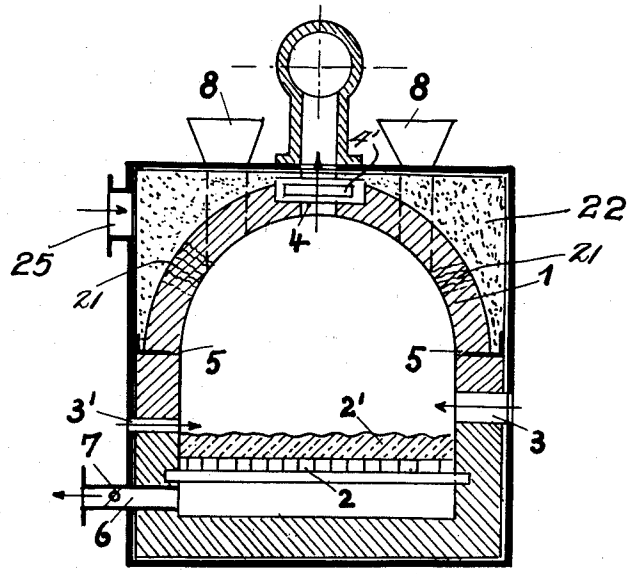


Fig. 1.

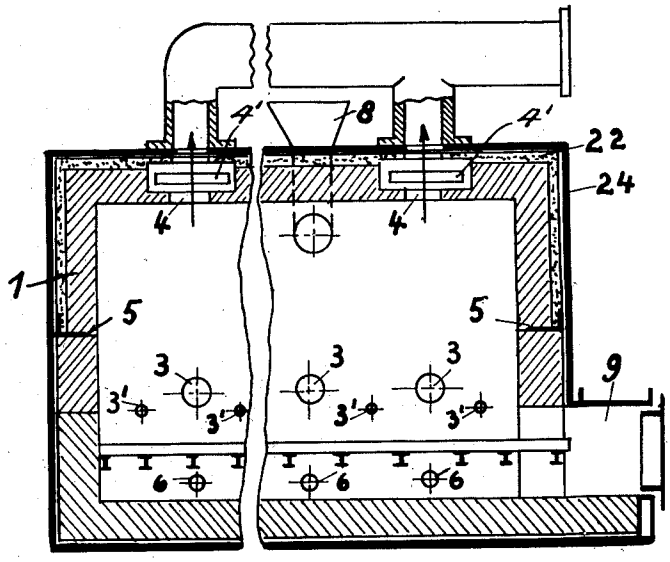


Fig. 2.

Inventor:
Hermann Mehner,
by Marks Appleman
Atty

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HERMANN MEHNER, OF BERLIN-CHARLOTTENBURG, GERMANY.

PROCESS FOR MAKING COMBUSTIBLE GAS.

Original application filed February 14, 1922, Serial No. 536,569. Divided and this application filed April 10, 1925. Serial No. 22,211.

To all whom it may concern:

Be it known that I, HERMANN MEHNER, a citizen of the German Republic, residing at Berlin-Charlottenburg, Germany, have invented certain new and useful Improvements in a Process for Making Combustible Gas, of which the following is a specification.

This invention, which is a division of my application Serial No. 536,569, filed February 14, 1922, relates to the process of making combustible gas by the use of a generator which uses gaseous fuel to produce a source of heat above a fuel charge.

In accord with my invention, the manufacture of combustible gas is carried out in a generator by placing a charge of carbon upon a pervious grate, and in admitting above said charge, steam or water vapor, in introducing combustible gases into a generator, and in causing combustion of the combustible gases in the upper zone of the generator which is supplied with heated air, such air being heated by being passed through a heat absorbing filling and a pervious or porous arch which constitutes the upper zone of the generator.

In the manufacture of other combustible gases, steam may be dispensed with, and in accord with my invention, the steam and combustible gases are both admitted above the charge supported by the grate and form an intermediate protecting layer between the charge and the upper zone of the generator which keeps the products of combustion remote from the charge, and these combustion gases are drawn off continuously through the top of the generator. The combustible gas is drawn off continuously from below the bottom of the fuel bed in the lower part of the generator.

In the accompanying drawings which illustrate my invention,—

Figure 1 is a vertical cross section; and Figure 2 is a longitudinal section.

The generator is preferably made up to provide an arch 1 of appropriate pervious material having interstices 21, this arch being surrounded by a filling 22 of broken stone or other appropriate heat retaining material, and the entire generator is surrounded or encased by a sheet metal covering 24 which is provided with apertures registering with openings through the generator.

When operating the generator, air will pass through opening 25 to the filling 22 surrounding the arch and through the arch to the interior of the generator. The arch 1 has an outlet opening 4 leading to the chimney and is provided with a valve or regulator 4′ for regulating or closing said opening during combustion in the upper zone of the generator. The charge of material may be supplied to the generator through hoppers 8 which have openings that pass through the filling and the pervious arch 1, and it is through these hoppers that the fuel charge is supplied to a pervious grate positioned above the lower portion of the generator.

The generator is provided with openings 3′ for the admission of steam to the interior of the generator immediately above the fuel charge, the injected steam having a tendency to form a moving blanket of steam immediately above the fuel bed and thus assisting in preventing the products of combustion from passing downwardly into and through the fuel bed, and is also provided with openings 3 through which combustible gas is supplied above the steam zone. The openings 3 and 3′ admit of charges of steam and gas being forced into the generator in zones above the fuel charge. The arch rests upon angle irons 5 and the lower portion of the generator may have a doorway 9 for leveling the charge and for removing slag or other material from the grate, and the doorway is provided with a tight closure. The space below the grate has a discharge opening 6 provided with dampers or regulators 7. The present disclosure of the generator provides for admitting steam on opposite sides of the generator from the points of admission of the gaseous fuel.

In using the generator for the production of combustible gas, a charge of material, for instance, a charge of coal 2′ is dropped upon the grate 2 and directly above this charge steam is introduced through the openings 3′

while at a higher elevation, combustible gas is admitted through preferably controllable openings 3 and is ignited in the generator in order to heat the upper zone of the generator and maintain it at the necessary high temperature. The air for combustion is heated as it is forced or drawn into the casing of the generator through the filling about the arch and through interstices of the bricks forming the arch, and this heated air commingles with the combustible gases injected at 3 and generates the desired amount of heat which will cause the arch to glow and the heat therefrom will be radiated through the gases and steam upon the charge of coal supported on the pervious grate.

By means of the apparatus hereinbefore described, the operation of making combustible gas can be carried on without interruption. The radiated heat causes the distillation of the carbonaceous material in fuel bed 2′, thus producing combustible gas which production may be aided, if desired, by the steam injected at 3′. When properly operated by regulation of regulators 4′ and 7 the products of combustion will pass out of the top of the generator through 4 without intermingling with the combustible gas drawn off from the bottom of the fuel bed through outlet 6.

With a generator of the construction shown, which is particularly adapted for use in the manufacture of combustible gases, it will be noted that gas and heated air are burnt in the top part of the generator, the heated air being forced into the upper portion through an opening 25, with sufficient pressure to pass the same through a filling of pervious material, located between the arch of the generator and a non-pervious sheet metal casing, and through the arch which is of pervious fire brick, such air being heated on its way through the interstices of the filling and the arch. Upon a pervious grate, above the hearth of the generator is placed a charge of material containing carbon, and above said charge, steam is admitted to the interior of the generator through opening 3′, and combustible gas is introduced above the charge and the steam through openings 3. Combustion takes place in the upper combustion zone of the generator, and the burnt gases, smoke, and the like may be permitted to escape through valved openings 4. The products of combustion will heat the arch and the filling, so thereafter the gases will be supplied with heated air essential for the burning of the combustible gas.

During operation of the generator, as previously stated, heat will be radiated or deflected toward the fuel charge on the pervious grate, and steam or water vapor being admitted above the charge will have a tendency to form an intermediate protecting layer between this charge and the burning gases. If desired, the steam may be used to assist in producing the combustible gas in the fuel bed.

When admitting steam or water vapor, the operation of the process may be as follows. The molecular weight of air may be assumed to be 29, while the molecular weight of an ideal producer gas may be assumed as about 28, while an ideal chimney gas may be assumed to have a molecular weight of about 31. The gaseous mixture in the combustion zone may then be assumed to have a molecular weight of about 30. The temperature in the flame space of the upper combustion zone is about 1700 degrees centigrade, while the temperature of the introduced steam or water vapor is not much above 100 degrees centigrade, and accordingly due to the much higher temperature in the upper combustion zone the gases of combustion become relatively much lighter than the steam or water vapor in the zone immediately above the carbonaceous fuel bed. Thus the relatively heavier steam will be drawn down through the incandescent fuel bed thereby adding water gas to the combustible gas formed from the distillation of the carbonaceous fuel by the heat radiated from the upper glowing arch. The injected steam will also have a tendency to form an intermediate gaseous layer or blanket between the flame or upper combustion zone and the carbonaceous fuel bed in the lower part of the generator, and thus tend to prevent intermingling of the gases of combustion and the combustible gas. The gases of combustion are drawn off continuously from the top of the generator.

I claim:

1. The process of making combustible gas which consists in supporting and burning carbonaceous fuel upon a pervious grate maintained within the lower portion of a generator having an upper arch, introducing combustible gas into a zone of the generator above said carbonaceous fuel, admitting air into an upper combustion zone of the generator and burning said combustible gas by means of said air so as to heat the upper arch of the generator and thereby heat said charge of carbonaceous fuel to produce combustible gas by radiation from the said upper arch, passing the products of combustion out through the top of the generator, and drawing off the produced combustible gas from a zone below the pervious grate.

2. The process of manufacturing combustible gas which consists in supporting a bed of carbonaceous material upon a pervious grate maintained within the lower portion of a generator having an upper arch, admitting steam to a zone immediately above said bed of carbonaceous material, admitting

combustible gas to a zone above said steam zone, admitting air into an upper zone of the generator, said zone constituting a combustion zone for heating the upper arch of the generator thereby radiating its heat through said intermediate steam zone upon the carbonaceous material to produce combustible gas, drawing off the products of combustion through the top of the generator, and drawing off the produced combustible gas from a zone below the grate.

In testimony whereof I affix my signature this 16th day of March 1925.

HERMANN MEHNER.