Industry Canada Industrie Canada

Canada

strategis.gc.ca

Strategis Index:
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

CIPO OPIC

The Canadian Intellectual Property Office

Canadian Patents Database

01/09/2002 - 16:42:54

(12) **Patent:** (11) **CA 427487**

(54) INDUSTRIAL GAS PRODUCTION

(54) PRODUCTION DU GAZ INDUSTRIEL

(72) Inventors (Country):	**MICHAEL STEINSCHLAEGER** (Not Available)
(73) Owners (Country):	**MICHAEL STEINSCHLAEGER**
(71) Applicants (Country):	
(74) Agent:	
(45) Issued on:	**May 15, 1945**
(22) Filed on:	
(45) Laid open on:	
(52) Canadian Class (CPC):	**48/35**
(51) International Class (IPC):	**N/A**

Patent Cooperation Treaty (PCT): **No**

(30) Application priority data: **None**

Availability of licence:	**N/A**
Language of filing:	**Unknown**

ABSTRACT:

CLAIMS: Show all claims

*** Note: Data on abstracts and claims is shown in the official language in which it was submitted.

View or Download Images :

- ○ Cover Page Image
- ○ Abstract Image
- ○ Claims Image
- ○ Disclosures Image
- ◉ Drawings Image

4

427889
867

This invention relates to a process for the production of industrial or power gases.

In producing carburetted water gas or similar gases such as oil gases, it is of great importance to be in a position to vary considerably the proportion of consumption of solid fuels to oil and the capacity of an existing plant at short notice to meet the changeable requirements.

The object of the present invention is to provide a simple and efficient process, which has the above mentioned characteristics, flexibility and advantages coupled with a considerable decrease in solid and fluid fuel consumption.

Accordingly the present invention provides a process for the manufacture of industrial and power gases such as carburetted water gas and oil gases in which a bed of solid fuel or a mixture of solid fuel with tar or oil in a generator is reacted with a gas or gases wherein the sensible heat of the gases leaving the generator is utilised, with or without further heating, and with or without the addition of other hot gases, for the evaporation or cracking of the oil, tar or the like which is mixed with said gases leaving the generator for carburetting the same, said mixing being effected in one or more stages, the amount of the sensible heat leaving the generator being regulated by choosing the point or points at which said gases leave the generator.

According to one embodiment of the invention the bed of fuel in the generator is subjected to alternate blowing and gas making periods and the sensible heat of the gases leaving the generator in a gas making period is utilised, with or without further heating, and with or without the addition of other hot gases, to effect evaporation or cracking of oil, tar or the like mixed with said gases leaving the generator in a gas making period for carburetting the same, said mixing being effected in one or more stages, the amount of the

sensible heat of the gases leaving the generator being regulated by choosing the point or points at which said gases leave the generator.

According to a further embodiment of the invention a bed of solid fuel or a mixture of solid fuel with tar or oil in a generator is subjected to alternate blowing and gas making periods and the heat of the gases leaving the generator in a blowing period alone or together with the heat obtained by burning other fuels is utilised to heat a regenerator whereafter steam and/or carbon dioxide, with or without a fluid fuel or with or without a mixture of water gas, oil vapour and cracking products is passed through the regenerator and the sensible heat of the gases leaving the regenerator is utilised, with or without further heating and with or without the addition of other hot gases, to effect evaporation or cracking of oil, tar or the like mixed with said gases leaving the regenerator for carburetting the same.

If a mixture of solid fuel with tar or oil is used the tar or oil is evaporated and burnt during the blow period.

A The gases leaving the reaction zone in the generator have the average temperature of the reaction zone. If these gases are removed at the top or bottom of this zone the temperature of these gases will be the averagetemperature in the reaction zone. If a lower temperature is required or desirable or less sensible heat is required in the gases the point or points at which these gases are removed is at some distance from the top or bottom of the reaction zone so that a part of the heat is stored in the ash and/or fuel bed and the gases will be cooler or in the latter case one part of the gases is removed at the top or bottom of the reaction zone and the other part at a distance from the reaction zone.

Further tar, oil or the like may be mixed with the industrial and power gases obtained by the process of the present invention and the mixture then further heated to crack the oil, tar or the like. This treatment may be repeated if desired.

In the application of the invention to the manufacture of gases used for power generation a carburetted water gas

produced by the process of the invention may be used to drive an engine and the sensible heat of exhaust gases from said engine with or without admixture with other gases may be used to evaporate and crack oil, tar or the like mixed with said exhaust gas for the carburettion thereof.

A carburetted water gas plant comprising a generator, a carburettor and a superheater may be used to carry out the process of the invention or an ordinary water gas plant comprising a generator and a regenerator can be used.

The following is a more detailed description of an embodiment of the invention in which steam is used.

1. Gas making period. Preferably preheated steam or preheated gases alone or a mixture of both is used. If the gases and steam leaving the generator do not possess sufficient heat for the evaporation and the cracking, preheated steam alone and/or other preheated gases are added to the gas and undecomposed steam leaving the generator. The preheated steam and/or the gases are preferably used in an injector to bring the cold or hot oils, tars, pitches, distillation gases etc. used for carburetting, into the gases. If more steam and/or gases are used so that the sensible heat of them is sufficient to evaporate the oil the steam and/or the gases are brought into the oils, tars, etc. and the outgoing steam and/or gases are saturated with oils vapours or cracked gases necessary for carburetting or increasing the calorific value.

The temperature of the steam and/or gases and the ratio of oil to steam and/or gases can be also so chosen that evaporation and cracking of the oil takes place before the mixture of cracked gas with steam and/or other gases

(before or after cooling or using the sensible heat in other ways) is added to the gases produced to increase the calorific value of the latter. All these modifications of oil addition or carburetting can be used together and oils with different characteristics can be used at the same time using the most advantageous conditions for treating each oil. The sensible heat of the carburetted water or like gas is used (as in this form of making carburetted water or like gas no vessels need to be used as carburettors or superheaters) to heat one of the two vessels of which one is used in the blow period for preheating the air necessary for blowing or heating purposes. A part or the whole of the sensible heat of the carburetted water gas can be used for steam generating.

If a higher preheating temperature of the preheated air is preferable a part of the sensible heat of the gases and undecomposed steam leaving the generator is not used for carburetting but is used direct for the heating of the vessel. To this gas and undecomposed steam more preheated steam and/or gases can be added or only preheated steam alone or by using more units blow gases or combustion gases are used for heating the vessel. In the case of using steam alone the cooled steam leaving the vessel can be used for heating the water necessary for steam generating. If the steam used in the plant has originally a higher pressure which must be reduced before using the steam in the generator plant, instead of reducing the pressure of the steam the energy in this steam is used in an injector to re-cycle the steam leaving the vessel. Another possibility is to use a part of the time required for

gas making for carburetting and in the other part of the period to use the gases leaving the generator for heating the vessel. If a plant is used which consists of several units other suitable arrangements for preheating steam, air etc. for heating the vessels and for carburetting can be made and the number of vessels can be decreased.

If the gas production is accomplished under pressure the temperature and the pressure of the steam leaving the vessel can be so adjusted as to use the steam for electric current or power generating. The carburetted water gas and undecomposed steam which are in this case under pressure can be also used alone or after admixture of steam and if desired regulating the temperature and if necessary after removal of dust for electric current or power generating. The preheating of the steam is accomplished in the other vessel.

2. Blowing period. Preferably preheated air is brought into the generator. The blow gases or a part of the blow gases leaving the generator are used for heating the vessel which is necessary for preheating the steam. The sensible heat of the blow gases alone or in admixture with preheated steam and/or gases can be used for carburetting by injecting oil or a mixture of oil and steam and/or gases or preheated steam and/or gases into the blow gases. The gas thus obtained can be used separately or in admixture with the gas made in the gas making period. The blow gases without being used for carburetting and/or combustion products can be used in admixture with the carburetted gases made. The sensible heat of the combustion products can also be used for carburetting purposes. The gases and undecomposed steam leaving the generator may be still further preheated or superheated

in a regenerator before the oil, tar or the like is injected into them for evaporation and cracking.

If coke or coal of smaller size should be used for gas production and the plant consist of several units, some of the units can be used for generating producer gas for admixture with the carburetted water gas. The sensible heat of the producer gas alone or in admixture with preheated steam and/or gases can also be used for carburetting purposes. By this method a considereble increase in capacity can be achieved and fuels of low calorific and market value used.

As solid fuels different kinds of coke, coal, briquettes, etc. can be used.

As fluid fuels hot or cold oils, tars, pitches, distillation gases etc. can be used with better results than in well known processes because the treatment of the oil or gas is not so severe as in the known processes.

The process can be applied to generator constructions in which the ash leaves the generator in solid or fluid condition or with mechanically operates grates.

The preheated steam and air are introduced according to their temperature and the construction of the generator at such places as to achieve the most advantageous conditions and results. For instance when using a generator having a mechanically operated grate they are introduced above the grate or if the temperatures of the air and steam are different at different distances from the bottom or top of the generator.

When using coal this is preferably only partly preheated in the blow period (up to a temperature at which carbonisation just begins) so as to obtain oil or a greater part of the carbonisation gases and the tar or cracked tar in the gases

leaving the generator in the gas making period. Thereby the calorific value of these gases is increased and less oil is used for carburetting or by using the same proportion of oil a higher calorific value of the gas produced is obtained.

When using coke for generating gas the preheating of the coke is preferably divided between the blow and gas making periods or the blow gases and the gases produced are taken out at different points of the generator, so as to achieve the most advantageous temperatures and conditions for carburetting the oil, fuel consumption and increase in capacity.

According to a further modification of the process a plant consisting of a generator and one or two regenerators is used and theprocess is carried out as follows:

1. Blowing period. Air or oxygen-containing gases which may be pre-heated if desired are passed through the generator. The blow gases leaving the reaction zone pre-heat the coke and above this a part of the heat in the blow gases (with or without the addition of secondary air) may be stored in the coke bed for superheating the steam used in the gas making period. The rest of the heat in the blow gases (sensible and potential) is stored in the regenerator. If required this heat may be increased by the addition of other gases or liquid fuels such as water gas tar, oils and tars or the heat is provided entirely by the latter fuels and the blow gases are used in another regenerator for superheating the steam or pre-heating the air used in the reaction.

2. Gas making period. Steam and/or carbon dioxide and/or superheater steam and/or preheated carbon dioxide

is introduced into the generator (in the up and/or down direction). The gases and undecomposed steam and/or carbon dioxide leaving the reaction zone may leave the generator so as to possess a pre-determined amount of sensible heat by taking out the gases at a point where they leave the reaction zone or by storing a part of the heat in these gases in the coke or ash bed. The sensible heat of these gases may be increased by adding superheated steam or other gases to them.

The sensible heat of these gases is used for evaporating and cracking of the oil. At the same time steam and/or carbon dioxide or a mixture of steam and/or carbon dioxide and the water gas tar produced and/or other oils, tars, pitches or the like is introduced into the regenerator for pre-heating or superheating and/or water gas production. The sensible heat of the above mentioned gases leaving the regenerator is also used for evaporating or cracking the oil used. If desirable oxygen may be added to the mixture, in this case the regenerator can be used continuously for gas production. The gases coming from the generator and regenerator may be mixed or used separately. The sensible heat of the gases produced may be used for steam generating preferably using an electrostatic precipitator as a boiler.

The process is very flexible concerning the alteration of the output of the same plant, the possibilities of the alteration of the calorific value of the gas produced, and the variation of the ratio between the ratio of liquid to the solid fuels used, gases with

different calorific values can be produced and different oils (cracked at different temperatures) can be advantageously used at the same time.

The invention will now be further described by way of example with reference to the accompanying diagrammatic drawings, in which:

Fig. 1 shows an up blowing period,

Fig. 2 shows a down gas making period,

Fig. 3 shows a down blowing period and

Fig. 4 shows an up gas making period.

Referring to Fig. 1 of the drawings, the generator 1 contains a solid fuel such as coke or a mixture of solid fuel and oil or tar and air which is preferably pre-heated is admitted below the grate 2 through the conduit 3 controlled by valve 3a and also above the grate through the conduits 4, 5 and 6 controlled respectively by valves 4a, 5a and 6a thereby heating the reaction zone 1a in which a part of the fuel (including the oil or tar if used) is burnt. A part of the blow gases is removed a short distance above the reaction zone through the conduits 7 and 8 controlled respectively by valves 7a and 8a and the remainder through the conduit 9 controlled by valve 9a at the top of the generator 1. The blow gases leaving the generator may be used to heat one or more regenerators (not shown).

Referring to Fig. 2 of the drawings, steam (which is preferably superheated) is admitted through the conduit 10 controlled by valve 10a at the top of the generator and also through conduits 11 and 12, controlled respectively by valves 11a and 12a to the top of the reaction zone

which is maintained at an average temperature of 1100°C. Part of the mixture of water gas produced and excess steam leaves the generator through conduits 5 and 6 at a temperature of 950°C. and oil for carburetting is admitted through conduits 15 and 14 controlled respectively by valves 13a and 14a the oil being evaporated and cracked and the carburetted water gas leaves through conduit 4 at a temperature of 750°C. The remainder of the water gas produced and excess steam leaves the generator through conduit 3, part of the heat being stored in the ash 15.

Referring to Fig. 3 of the drawings, air (preferably pre-heated) is admitted through conduits 10, 11 and 12 and the blow gases leave through conduits 3, 4, 5 and 6 and may be used to heat one or more regenerators (not shown).

Referring to Fig. 4 of the drawings, steam is admitted below the grate through conduit 3 and also above the grate through conduits 4, 5 and 6. The mixture of water gas produced and excess steam leaves the generator A at a temperature of 1100°C. at the top of the reaction zone through conduits 16 and 17 controlled by valves 16a and 17a respectively, oil for carburetting being admitted through conduits 11 and 12. The carburetted water gas produced has a temperature of 750°C.

It should be understood that the term "tar, oil or the like" as used herein includes hydrocarbon gases and when these are used no evaporation will be necessary prior to the cracking.

The term "oil" as used in the appended claims includes tars and similar substances including hydrocarbon gases.

14

427489
487

I CLAIM:

1. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil in a generator is reacted with at least one gas which comprises mixing hot gases leaving said generator with an oil, the said hot gases being at a temperature sufficiently high and possessing sufficient sensible heat to crack the oil, the amount of the sensible heat of the gases being controlled by a choice of the point or points at which the said gases leave the generator.

2. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil in a generator is reacted with at least one gas which comprises further heating hot gases leaving said generator and mixing said gases with an oil, the said hot gases being at a temperature sufficiently high and possessing sufficient sensible heat to crack the oil, the amount of the sensible heat of the gases being controlled by a choice of the point or points at which the said gases leave the generator.

3. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil in a generator is reacted with at least one gas which comprises mixing hot gases leaving said generator with other hot gases and with an oil, the said hot gases being at a temperature sufficiently high and possessing sufficient sensible heat to crack the oil, the amount of the sensible heat of the gases being controlled by a choice of the point or points at which the said gases leave the generator.

15

427689
487

4. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil is subjected to alternate blowing and gas making periods which comprises mixing hot gases leaving said generator in a gas making period with an oil the said hot gases being at a temperature sufficiently high and possessing sufficient sensible heat to crack the oil, the amount of the sensible heat of the gases being controlled by a choice of the point or points at which the said gases leave the generator.

5. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil is subjected to alternate blowing and gas making periods which comprises further heating hot gases leaving said generator and mixing said gases with an oil, the said hot gases being at a temperature sufficiently high and possessing sufficient sensible heat to crack the oil, the amount of the sensible heat of the gases being controlled by a choice of the point of points at which the said gases leave the generator.

A

6. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil is subjected to alternate blowing and gas making periods which comprises mixing hot gases leaving said generator with other hot gases and with an oil, the said hot gases being at a temperature sufficiently high and possessing sufficient sensible heat to crack the oil, the amount of the sensible heat of the gases being controlled by a choice of the point or points at which the said gases leave the generator.

16

427489

7. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil is subjected to alternate blowing and gas making periods which comprises heating a regenerator with gases leaving the generator in a blowing period, thereafter passing steam through said regenerator to produce gases and mixing said gases with oil, the said gases being at a sufficiently high temperature and possessing sufficient sensible heat to crack the oil.

8. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil is subjected to alternate blowing and gas making periods which comprises heating a regenerator with gases leaving the generator in a blowing period, thereafter passing steam and fluid fuel through said regenerator to produce gases and mixing said gases with oil, the said gases being at a sufficiently high temperature and possessing sufficient sensible heat to crack the oil.

9. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil is subjected to alternate blowing and gas making periods which comprises heating a regenerator with gases leaving the generator in a blowing period, thereafter passing steam and carbon dioxide through said regenerator to produce gases and mixing said gases with oil, the said gases being at a sufficiently high temperature and possessing sufficient sensible heat to crack the oil.

10. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil is subjected to alternate blowing and gas making periods which comprises heating a regenerator with gases leaving the generator in a blowing period, thereafter passing steam, fluid fuel and carbon dioxide through said regenerator to produce gases and mixing said gases with oil, the said gases being at a sufficiently high temperature and possessing sufficient sensible heat to crack the oil.

11. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil is subjected to alternate blowing and gas making periods which comprises heating a regenerator with gases leaving the generator in a blowing period, thereafter passing steam through said regenerator to produce gases, further heating said gases and mixing them with oil, the said gases after the further heating being at a sufficiently high temperature and possessing sufficient sensible heat to crack the oil.

A

12. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil is subjected to alternate blowing and gas making periods which comprises heating a regenerator with gases leaving the generator in a blowing period, thereafter passing steam through said regenerator to produce gases, mixing said gases with other hot gases, mixing the gas mixture thus obtained with oil, the said gas mixture being at a sufficiently

high temperature and possessing sufficient sensible heat to crack the oil.

13. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil in a generator is reacted with at least one gas which comprises mixing hot gases leaving said generator with an oil, the said hot gases being at a temperature sufficiently high and possessing sufficient sensible heat to crack the oil, the amount of the sensible heat of the gases being controlled by a choice of the point or points at which the said gases leave the generator, driving an engine with the gases thus produced and mixing the exhaust gases from said engine with oil, the said exhaust gases being at a sufficiently high temperature and possessing sufficient sensible heat to crack the oil.

14. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil in a generator is reacted with at least one gas which comprises mixing hot gases leaving said generator with an oil, the said hot gases being at a temperature sufficiently high and possessing sufficient sensible heat to crack the oil, the amount of the sensible heat of the gases being controlled by a choice of the point or points at which the said gases leave the generator, driving an engine with the gases thus produced and mixing the exhaust gases from said engine with other hot gases and with oil, the said gases being at a sufficiently high temperature and possessing sufficient sensible heat to crack the oil.

A

427489
487

15. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil in a generator is reacted with at least one gas which comprises mixing hot gases leaving said generator with an oil, the said hot gases being at a temperature sufficiently high and possessing sufficient sensible heat to crack the oil, the amount of the sensible heat of the gases being controlled by a choice of the point or points at which the said gases leave the generator, driving an engine with the gases thus produced, further heating the exhaust gases from said engine, mixing said heated exhaust gases with oil, the said heated exhaust gases being at a sufficiently high temperature and possessing sufficient sensible heat to crack the oil.

16. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil is subjected to alternate blowing and gas making periods which comprises mixing gases leaving the generator in a blowing period with another fuel, heating a regenerator with the mixture, thereafter passing steam through said regenerator to produce gases, and mixing said gases with oil the said gases being at a sufficiently high temperature and possessing sufficient sensible heat to crack the oil.

17. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil is subjected to alternate blowing and gas making periods which comprises heating a regenerator with gases leaving the generator in a blowing period, thereafter passing steam, water gas, oil vapour and cracking products through said regenerator to produce gases and mixing said gases with oil, the said gases being at a sufficiently

high temperature and possessing sufficient sensible heat to crack the oil.

18. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil in a generator is reacted with at least one gas which comprises mixing hot gases leaving said generator with an oil, the said hot gases being at a temperature sufficiently high and possessing sufficient sensible heat to crack the oil, the amount of the sensible heat of the gases being controlled by a choice of the point or points at which the said gases leave the generator, mixing the gas thus produced with an oil and heating the mixture to a temperature sufficiently high to crack the oil.

19. In a process for the manufacture of carburetted water gas in which a bed of solid fuel or a mixture of solid fuel with oil is subjected to alternate blowing and gas making periods and in which oil is mixed with at least a part of the gases leaving the generator in a gas making period to crack the oil the step which comprises re-cycling through the generator part of the gases leaving the generator in a gas making period together with steam in order to provide part of the heat necessary to compensate for heat losses and part of the heat necessary for the reaction.

20. A process for the production of industrial and power gases in which a bed of solid fuel or a mixture of solid fuel with oil in a generator is reacted with at least one gas which comprises mixing hot gases leaving said generator with an oil, the said hot gases being at a temperature sufficiently high and possessing sufficient

sensible heat to crack the oil, the amount of the sensible heat of the gases being controlled by a choice of the point or points at which the said gases leave the generator, heating a regenerator with gases leaving the generator in a blowing period, thereafter passing steam through said regenerator to produce gases and mixing said gases with oil, the said gases being at a sufficiently high temperature and possessing sufficient sensible heat to crack the oil.

A

427489
957

Fig. 1.

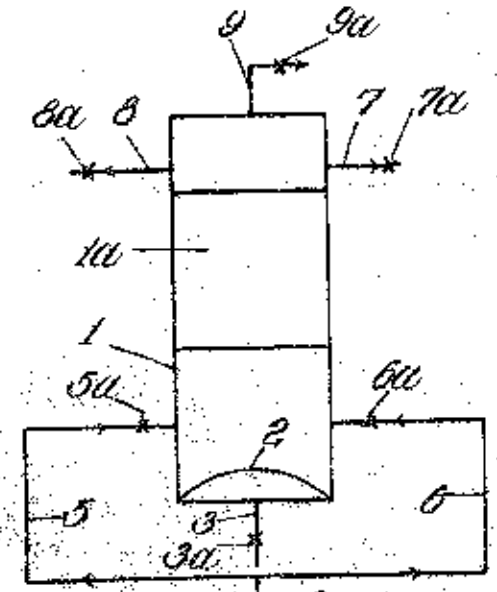


Fig. 2.

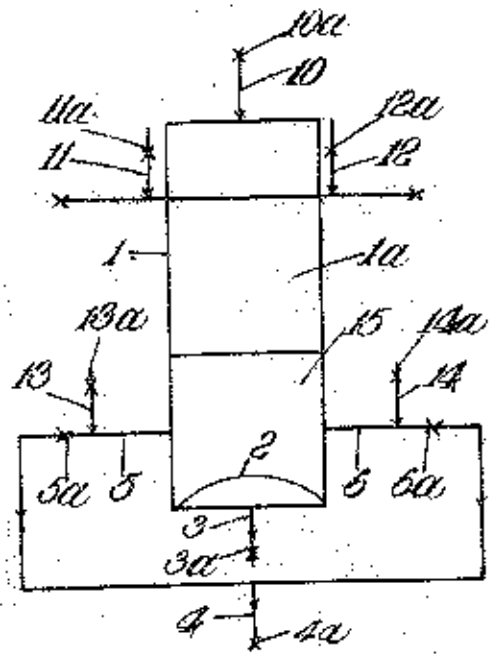


Fig. 3.

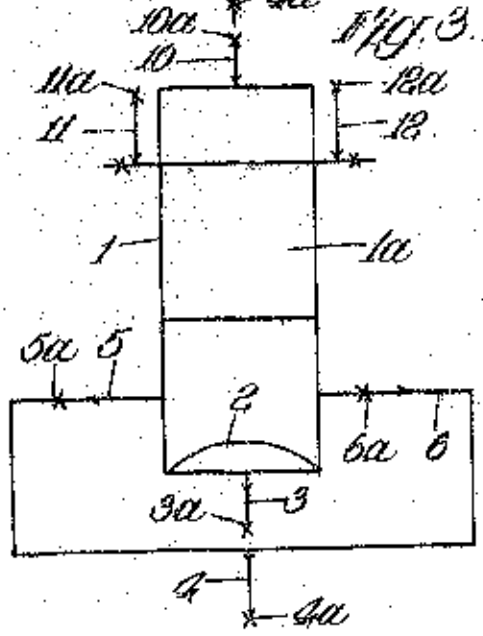
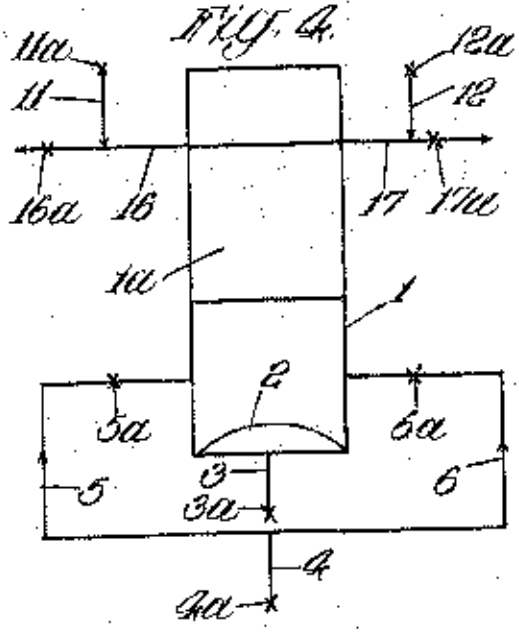


Fig. 4.



Certified to be the Drawings referred to in the Specification hereunto annexed.

Montreal, 17 July 1944.

Inventor
M. Steinschlaeger

by

Attorney

Canadian Patents Database

01/09/2002 - 16:45:08

(12) **Patent:**

(11) **CA 427488**

(54) GASEOUS FUEL MANUFACTURE

(54) PRODUCTION DE COMBUSTIBLE GAZEUX

(72) Inventors (Country):	**MICHAEL STEINSCHLAEGER** (Not Available)
(73) Owners (Country):	**MICHAEL STEINSCHLAEGER**
(71) Applicants (Country):	
(74) Agent:	
(45) Issued on:	**May 15, 1945**
(22) Filed on:	
(43) Laid open on:	
(52) Canadian Class (CPC):	**48/40**
(51) International Class (IPC):	**N/A**

Patent Cooperation Treaty (PCT): **No**

(30) Application priority data: **None**

Availability of licence:	**N/A**
Language of filing:	**Unknown**

ABSTRACT:

CLAIMS: Show all claims

*** Note: Data on abstracts and claims is shown in the official language in which it was submitted.

View or Download Images :

- Cover Page Image
- Abstract Image
- Claims Image
- Disclosures Image
- Drawings Image

This invention relates to a process for the manufacture of gaseous fuels of high calorific value.

The advantages which are achieved by using gases containing methane, ethane, propane and other hydrocarbon gases as motive power fuels, power fuels, carburetted gases or by using propane as a refrigerating medium are well known.

Some of the difficulties in the widespread use of these gases are that the gases are not available everywhere, that the production of some of them is difficult and that their transportation and storage is difficult.

The object of this invention is to introduce a simple and efficient process for the manufacture of such gases from hydrocarbon oils and tars such as crude oils, residual oils, fuel oils, gas oils, tars, shale oils or similar fuels with or without using other gases and/or solid fuels.

According to the present invention a process is provided for the production of gaseous fuels of high calorific value wherein gases are produced in a gas producer or generator from liquid and/or solid fuels, the gases produced are partially or completely burnt by means of oxygen or oxygen-containing gases and at least a part of the sensible heat of the gases obtained by the partial or complete burning is used to heat a regenerator which is then used to superheat steam and/or to pre-heat gases, at least a part of the sensible heat of which is used for the cracking of oils, tars, or hydrocarbon gases or liquids to produce gaseous fuels of high calorific value.

A

When only a part of the sensible heat of the gases obtained by partial or complete burning is used to heat the regenerator the remainder of the sensible heat may be used for the cracking of oils, tars or hydrocarbon gases or liquids.

If desired, the sensible heat of the gases leaving the regenerator after the heating thereof may be used for the evaporation and cracking of oils, tars, hydrocarbon gases or the like to produce gaseous fuels of high calorific value.

The process may be carried out in a plurality of stages in which different temperatures, time of contact and other conditions are used.

The gaseous fuels of high calorific value produced according to the invention may be used in an internal combustion engine, gas turbine or the like and the exhaust gases therefrom (if required the temperature of these exhaust gases can be increased) can be used to pre-heat gases or superheat steam used in the production of further gaseous fuels of high calorific value.

Examples of gases which may be produced in a gas producer or generator are producer gases, water gases, carburetted gases or mixtures of these gases. The liquid fuels may be oils (the oils may be the same as used for the manufacture of the above-mentioned gases or other oils may be used) such as tar produced by cracking. Solid fuels such as coal or coke may also be used. For the combustion oxygen-containing gases such as air, or steam and oxygen-containing gases such as air may be used; other gases such as inert gases may be added. The gases, air, steam, or oxygen may be pre-heated before being used.

The hydrocarbon oil or tar or gas which may be pre-heated or a mixture of oil or tar or gas and steam and/or carbon dioxide or pre-heated mixtures to which other gases such as carburetted gases or pre-heated carburetted gases may be added, may be injected into the combustion gases with or without the addition of steam and/or carbon dioxide which may be pre-heated.

The following example illustrates how the process of the

invention may be carried into effect:

A gas producer is used for the production of gas from solid and/or liquid fuels. The gases generated are burnt partly or wholly, a part of the sensible heat of the combustion gases is stored in one or two regenerators and steam or carbon dioxide is then superheated or pre-heated with the heat so stored, and oil or tar (which may be pre-heated if desired) alone or in admixture with steam, or carbon dioxide, is injected into these gases for cracking by means of the sensible heat of the steam or carbon dioxide.

The temperature of the combustion gases leaving the regenerator after the heating thereof is preferably so chosen that it is sufficient to evaporate and crack a further part of the oil. The carburetted gases thus obtained may then be used separately or in admixture with the other carburetted gases produced.

Instead of generating producer gas in a gas producer, water gas may be generated and a part of the water gas burnt and the other part used for gas production.

Examples of hydrocarbon oils and tars and gases which may be used according to the present invention are crude oils, residual oils, fuel oils, gas oils, coal tars, petroleum tars, shale oils, and natural gases or refining gases and petrol.

Using this invention it is possible to obtain gases with high calorific value and with different calorific values.

The sensible heat of the manufactured gas and steam and other gases may be used for generating steam, pre-heating steam and the gases used in the process and for pre-heating the oils or tars or gases.

The manufactured gases can be freed before use from valuable or undesirable components such as carbon dioxide, hydrogen sulphide and the like, if required.

The quality and characteristics of the oils and tars

and gases are chosen according to the purpose to which the manufactured gases are to be applied.

A part or the whole of the gases manufactured may be used for obtaining liquefied gases such as propane and butane and for obtaining liquid hydrocarbons such as aromatic hydrocarbons and unsaturated hydrocarbons.

An embodiment of the invention will now be described with reference to the accompanying drawing which shows diagrammatically an apparatus according to the invention.

Referring to the drawing, the apparatus consists of the blower 1 having an inlet pipe 2 controlled by valve 2a and an outlet pipe 3 controlled by valve 3a having branches 4 and 5 controlled by valves 4a and 5a respectively; a gas producer 6 having an outlet pipe 7 controlled by valve 7a having a branch 8 controlled by valve 8a said branch 8 having in turn a branch 9 controlled by valve 9a; and a regenerator 10 having an outlet pipe 11 controlled by valve 11a and having a branch 12 controlled by valve 12a, an inlet pipe 13 controlled by valve 13a and a further outlet pipe 14 controlled by valve 14a and having a branch 15 controlled by valve 15a.

The apparatus is operated as follows:-

Air is admitted to the blower 1 through the pipe 2. Part of the air passes via the pipe 3 to the gas producer 6 which contains solid fuel, steam and/or carbon dioxide being admitted through pipe 5. The gas produced in the gas producer 6 leaves through the pipe 7 and is burnt by air admitted through pipe 4. A part of the combustion products is drawn off through pipe 8, hydrocarbon oil and/or

hydrocarbon gases being injected through pipe 9 thus carburetting the gas. The remainder of the combustion products pass into the regenerator 10 which is heated thereby, the products then leaving via pipe 11, hydrocarbon oil and/or hydrocarbon gases being injected through pipe 12 to carburet the gas leaving the regenerator. Steam and/or carbon dioxide is now admitted to the regenerator 10 through the pipe 13 and is heated thereby, and leaves the regenerator by the pipe 14 into which hydrocarbon oil and/or hydrocarbon gas is injected through pipe 15 to produce further carburetted gases.

The term "oil" used in the appended claims includes tars and hydrocarbon gases.

A

1. A. A process for the manufacture of gaseous fuels of high calorific value which comprises at least partially burning the gases produced in a gas producer or generator from carbonaceous fuels by means of a gas selected from the group consisting of oxygen and oxygen-containing gases, heating a regenerator with at least a part of the combustion products thus produced, passing steam through said heated regenerator to superheat the same and mixing the superheated steam with an oil, the mixture having a sufficiently high temperature and having sufficient sensible heat to crack the oil thereby to produce gaseous fuel of high calorific value.

2. A. A process for the manufacture of gaseous fuels of high calorific value which comprises at least partially burning the gases produced in a gas producer or generator from carbonaceous fuels by means of a gas selected from the group consisting of oxygen and oxygen-containing gases, heating a regenerator with at least a part of the combustion products thus produced, passing a gas through said heated regenerator to heat the same and mixing the heated gas with an oil, the mixture having a sufficiently high temperature and having sufficient sensible heat to crack the oil thereby to produce gaseous fuel of high calorific value.

A

3. A. A process for the manufacture of gaseous fuels of high calorific value which comprises at least partially burning the gases produced in a gas producer or generator from carbonaceous fuels by means of a gas selected from the group consisting of oxygen and oxygen-containing gases, heating a regenerator with at least part of the combustion products thus produced and mixing the gases leaving the regenerator with an oil, the mixture having a sufficiently

high temperature and having sufficient sensible heat to crack the oil thereby to produce gaseous fuel of high calorific value.

4. A process for the manufacture of gaseous fuels of high calorific value which comprises at least partially burning the gases produced in a gas producer or generator from carbonaceous fuels by means of a gas selected from the group consisting of oxygen and oxygen-containing gases, heating a regenerator with at least a part of the combustion products produced, passing a gas through said heated regenerator to heat the same, mixing the heated gas with an oil, the mixture having a sufficiently high temperature and having sufficient sensible heat to crack the oil thereby to produce gaseous fuel of high calorific value, and removing undesirable products from said gaseous fuel of high calorific value.

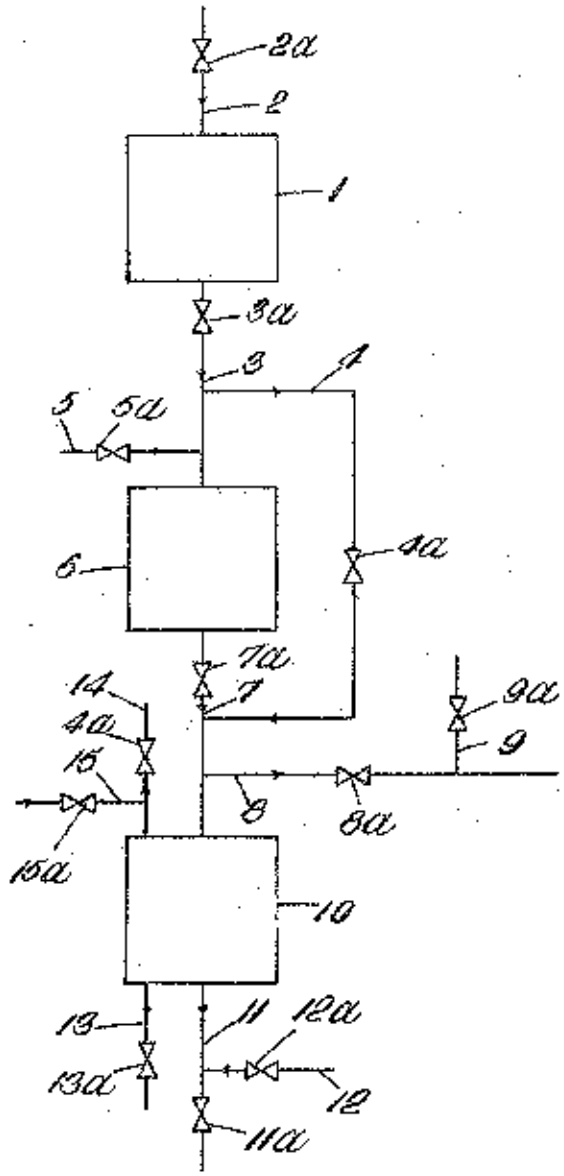
5. A process for the manufacture of gaseous fuels of high calorific value which comprises at least partially burning the gases produced in a gas producer or generator from carbonaceous fuels by means of a hot gas selected from the group consisting of oxygen and oxygen-containing gases, heating a regenerator with at least a part of the combustion products produced, passing a gas through said heated regenerator to heat the same, and mixing the heated gas with an oil, the mixture having a sufficiently high temperature and having sufficient sensible heat to crack the oil thereby to produce gaseous fuel of high calorific value.

6. A process for the manufacture of gaseous fuels of high calorific value which comprises at least partially burning the gases produced in a gas producer or generator from carbonaceous fuels by means of a gas selected from

the group consisting of oxygen and oxygen-containing gases, heating a regenerator with at least a part of the combustion products produced, passing a gas through said heated regenerator to heat the same, mixing the heated gas with an oil, the mixture having a sufficiently high temperature and having sufficient sensible heat to crack the oil thereby to produce gaseous fuel of high calorific value, driving an engine with said gaseous fuel and mixing the hot exhaust gases from said engine with other gases to heat the same.

10. A process for the manufacture of gaseous fuels of high calorific value which comprises at least partially burning the gases produced in a gas producer or generator from carbonaceous fuels by means of a gas selected from the group consisting of oxygen and oxygen-containing gases, heating a regenerator with at least a part of the combustion products produced, passing a gas through said heated regenerator to heat the same, mixing the heated gas with an oil, the mixture having a sufficiently high temperature and having sufficient sensible heat to crack the oil thereby to produce gaseous fuel of high calorific value, driving an engine with said gaseous fuel and mixing the hot exhaust gases from said engine with steam to superheat the same.

427489



Certified to be the Drawings referred to in the Specification hereunto annexed.
Montreal, 18th. July 1945.

Inventor
M. Steinschlaeger

by

Attorney