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GAS GENERATOR

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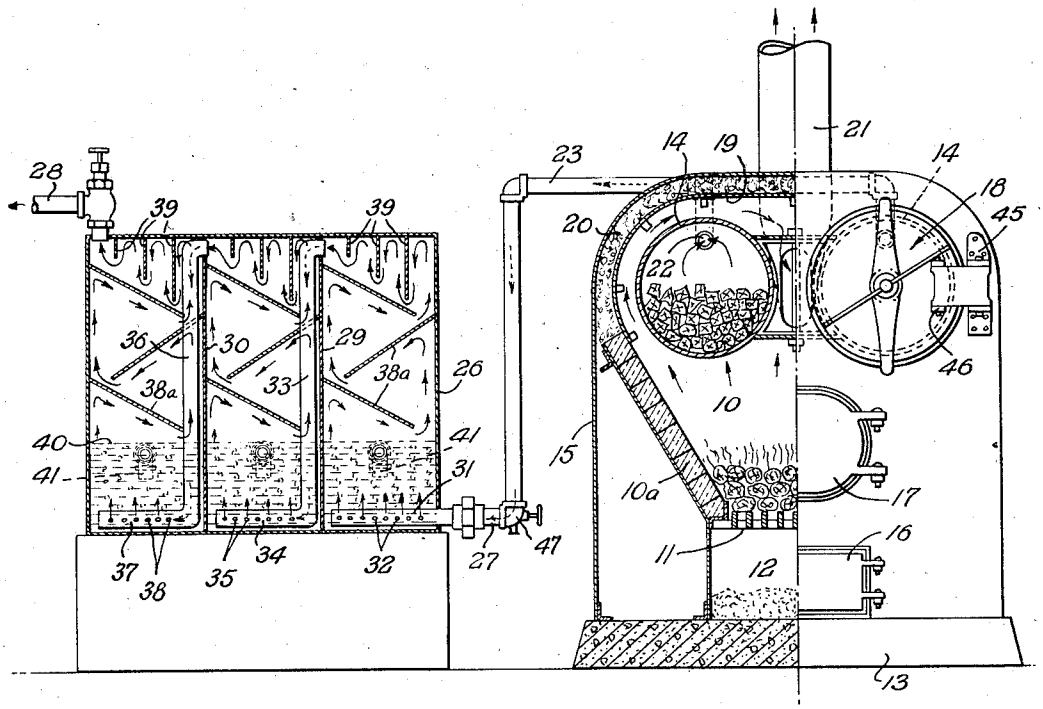


Fig. 1.

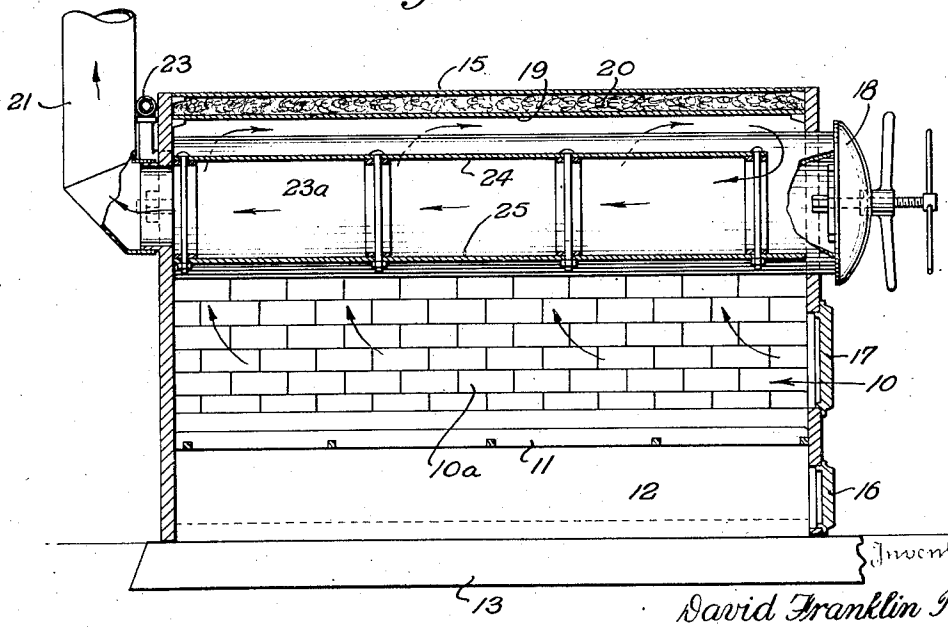


Fig. 2.

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GAS GENERATOR

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5 Claims. (Cl. 48—111)

The invention relates to plants for producing gas for heating and illuminating purposes, and more particularly to plants adapted to consume cheap or refuse farm products such as wood slabs, bark chips, corn stalks, garbage or the like, and to produce therefrom gas and by-products adapted to be used on the farm.

Among the objects of the invention, therefore, are to provide an improved gas producing plant marked by its efficiency, cheapness and simplicity of operation.

Another object of the invention is to provide an improved furnace for a gas producing plant in which the heat of the combustion gases is most efficiently utilized for the heating of retorts and the production of gas and by-products, such as tar, creosote, charcoal, coke and the like.

Other objects of the invention will be apparent from a consideration of the accompanying drawing and the following detailed description in which are set forth for the purpose of illustration a preferred embodiment of the invention.

In the drawing,

Fig. 1 is a view partly in section and partly in elevation, showing a gas producer and purifier;

Fig. 2 is a section on line 2—2 of Fig. 1 through the central portion of the furnace of the gas producing plant.

The gas plant includes a gas generator A consisting of a fire box 10, having flaring side walls 10*a*, which may be lined with fire brick or other suitable material. A grate is indicated at 11 beneath which is an ash pit 12 mounted upon a concrete base 13. In the upper enlarged portion of the furnace are mounted a pair of retorts 14, extending parallel to each other lengthwise of the furnace and spaced from each other and from the walls of the furnace. An outer casing 15 is preferably provided, which likewise rests upon the concrete base. The front and rear walls of the furnace are preferably vertical and parallel and the front wall is provided with an ash pit door 16, a fire box door 17 and suitable doors 18 for the retorts. In the upper enlarged portion of the furnace there is provided an inner lining 19 extending over the retorts and spaced from the outer casing 15. Preferably suitable insulation material 20 is provided within the space between the lining 19 and the casing 15. A flue or chimney 21 leads from the rear wall of the furnace. The retorts are provided with gas offtakes 22, 22, which communicate with a common pipe 23 leading to a gas purifier generally designated by the reference character B.

In order to economize heat, a flue 23*a* is provided between the two retorts. This flue is formed by means of spaced partitions 24 and 25. The lower partition extends the entire length of the furnace from the front to the rear wall and the upper partition extends from the rear wall nearly to the front wall, leaving an opening at the front as indicated in Fig. 2. The chimney 21 communicates with the flue 23*a*.

The purifier B comprises an outer casing 26 of rectangular plan. An inlet 27 is provided at the bottom of the casing and an outlet 28 at the opposite end of the casing from the top thereof. Partitions 29 and 30 divide the purifier chamber into communicating sections. Any desired number of such sections may be provided, but three such sections have been found to give satisfactory results. The partitions are vertical and extend laterally across the chamber.

Gas is introduced into the first casing through a nozzle 31 having a plurality of openings 32 therein. A pipe 33 leads from the top of the first section to the bottom of the second, this pipe being likewise provided with a nozzle 34 having openings 35, and another pipe 36 leads from the top of the second section to the bottom of the third section, being provided with a nozzle 37 having openings 38. Suitable baffles 38*a* are secured to the ends of the casing and to the intermediate partitions 29 and 30. These baffles extend from opposite walls and are downwardly and inwardly inclined, a baffle on one wall being shown as interfitting between a pair of baffles on the other. From the top of the casing a plurality of baffles 39 of different sizes extend toward the inclined baffles 38*a*. The purifier is preferably filled with water to a level 40 at about one-third of the height of the casing. Suitable pipes 41, 41, 41 are provided, one for each section, which serve as drains or as fillers. These pipes are preferably provided with valves or cocks and may be turned either upwardly or downwardly, according to whether they are to be used for supplying water or for draining off by-products.

Operation

To commence operation, a fire is built on the grate 11 within the fire box 10, using slabs of wood, coke from the retorts, or other available material. The flue gases pass upwardly and around the cylindrical exterior of the retorts, as indicated by the arrows in Fig. 1, and thence through the opening at the front of the upper partition and thence into the flue 23*a* between the retorts, from which the gases pass outwardly through the chimney 21. In this manner the heat of the flue gases is very effectively utilized. The retorts 14 are filled with slabs of wood, corn stalks, hay, straw or other inexpensive or readily available material with which the average farm is supplied. Garbage may even be used, in which case the device serves the added function of an incinerator. The material in the retorts is highly heated by the gases of combustion passing around the same and a gas-tight fit is maintained by the doors 18, provided with double hinges 45

and 46 and with suitable locking mechanism, clearly illustrated in Figs. 1 and 2.

The gas pipes from the retorts lead to the common offtake pipe 23 by means of which gas is delivered into the bottom of the purifier through the openings in the nozzle 31. The gas bubbles upwardly through the water in the first section of the purifier, thereby removing a large portion of the condensible and soluble materials from the gas. The partially cleaned and purified gas then passes upwardly and around the deflecting baffles extending from the end wall and the partition 29. It will be noted that as shown, one baffle 38a extending from one side wall or partition fits between a pair of similar baffles extending from the opposite wall or partition, and a comparatively narrow space is provided between opposite baffles adjacent their ends. The path of the gas through these baffles is indicated by the arrows. Moisture or condensible material carried upwardly with the gas will tend to condense on the under surfaces of the baffles and will run downwardly and be returned to the liquid in the bottom of the purifier. After leaving the space occupied by the baffles 38a, the gases pass around the top baffles 39 and thence downwardly through the pipe 33 into the bottom of the second section, where they are delivered beneath the surface of the liquid and thence pass upwardly between the deflecting baffles and thence into the bottom of the third section and upwardly through the baffles therein. The cleaned and purified gases are withdrawn at 28 and may be stored in the tank C until such time as they are required for heating or illuminating purposes.

It will be found that tar will accumulate in the first section of the purifier, strong creosote in the second section, and a relatively weak creosote in the third section. The tar may be withdrawn from time to time through a drain 47 at the bottom of the intake pipe 23. Creosote may be withdrawn from the second section and a weaker creosote from the third section. These by-products have a definite commercial value and may be sold or may be utilized about the premises, as for example, for dipping shingles, etc. The coke from the retorts may be utilized for any suitable purpose or may be burned within the furnace. Gas produced and purified in accordance with the herein-described process has been found to have a high commercial value.

The following is an analysis of a gas made in accordance with my process from a fuel consisting of 90% pine slabs and 10% refuse coal:

Carbon dioxide	14.3
Illuminants	7.2
Oxygen	0.5
Carbon monoxide	9.9
Hydrogen	13.3
Methane	52.4
Nitrogen	2.4
	100%

Cal. B. t. u	780
Total inerts, including carbon dioxide, oxygen and nitrogen	17.2%
Specific gravity	.72

What I claim is:

1. In a gas plant, a gas generator comprising a furnace having upwardly and outwardly flaring side walls and vertical end walls, a pair of parallel retorts extending lengthwise of the furnace and mounted in the upper portion but spaced from the top thereof, gas-tight closures for said retorts, gas offtakes for the retorts, a pair of vertically spaced partitions between the retorts forming a flue for the passage of waste gases, the lower partition extending the entire length of the furnace and the other terminating short of the front wall, providing an opening, and a chimney communicating with the opposite end of the flue.

2. In a gas plant, a gas generator comprising a furnace having side and end walls, a pair of parallel gas making retorts extending between the end walls of the furnace and spaced from the other walls thereof, a pair of vertically spaced partitions between the retorts forming a flue for the passage of waste gases, the lower partition extending the entire length of the furnace and the other terminating short of one of the end walls, providing an inlet opening, and a waste gas offtake communicating with the opposite end of the flue.

3. A gas plant as set forth in claim 2, wherein the side walls are upwardly and outwardly flaring and a grate for carrying solid carbonaceous fuel is provided at the bottom of the furnace below the retorts, whereby the heating gases pass upwardly to said retorts, outwardly between the retorts and the side walls and over the retorts, thence through the inlet opening into and through said flue, passing lengthwise between the two retorts to said waste gas offtake.

4. In a gas plant, a gas generator comprising a furnace having upwardly and outwardly flaring side walls and vertical end walls, a pair of parallel cylindrical retorts extending lengthwise of the furnace between the end walls and mounted in the upper portion thereof and spaced from the top, bottom and side walls, gas-tight closures for said retorts, gas offtakes for the retorts, a pair of vertically spaced partitions between the retorts forming a flue for the passage of heating gases, the lower partition extending the entire length of the furnace and the other terminating short of the front wall, providing an opening, and a chimney communicating with the opposite end of the flue.

5. A gas plant as set forth in claim 4, wherein a grate supporting a bed of solid fuel is provided at the bottom of the furnace and heating gases from the fuel bed pass upwardly about the bottom and sides of the retorts, thence over the retorts to and through said flue and out of said chimney.

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