

J. H. HIRT.
GAS PRODUCER.
APPLICATION FILED APR. 29, 1907.

1,064,905

Patented June 17, 1913.

3 SHEETS-SHEET 1.

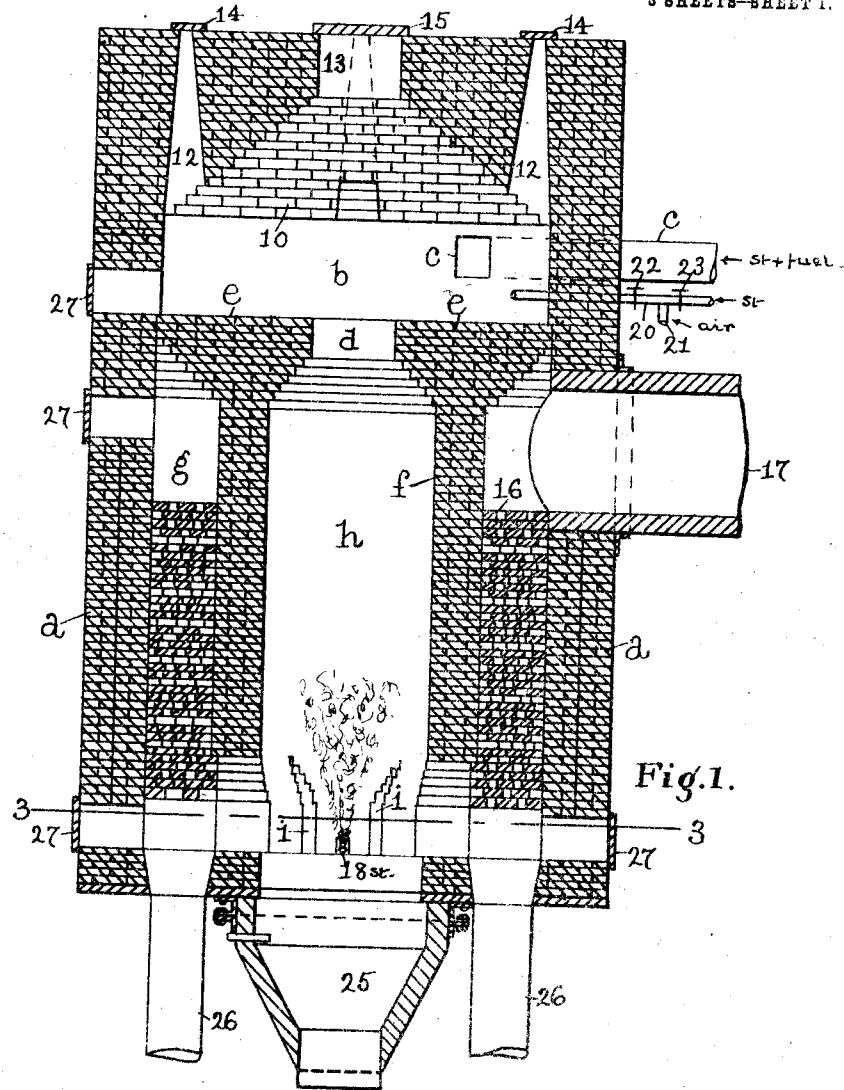


Fig. 1.

Witnesses.
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J. Murphy

Inventor.
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att'y.

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3 SHEETS—SHEET 2.

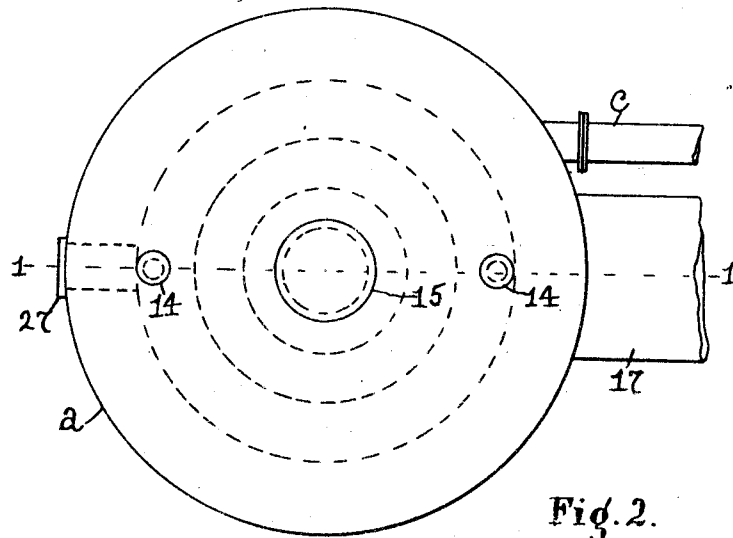


Fig. 2.

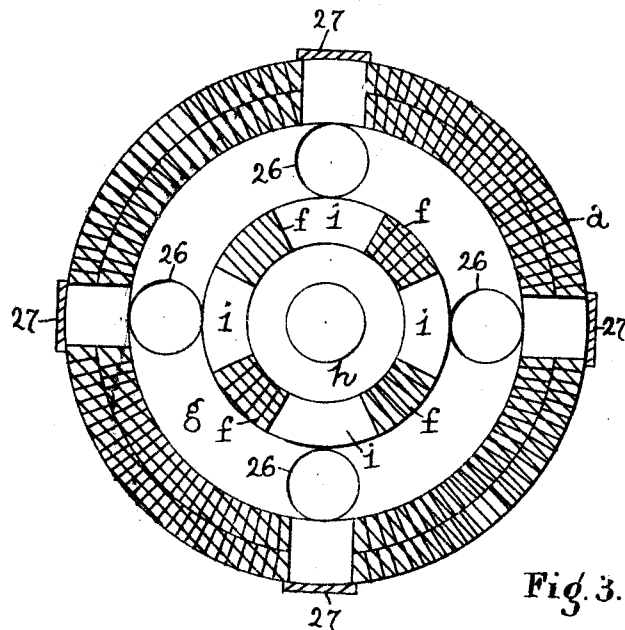


Fig. 3.

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3 SHEETS—SHEET 3.

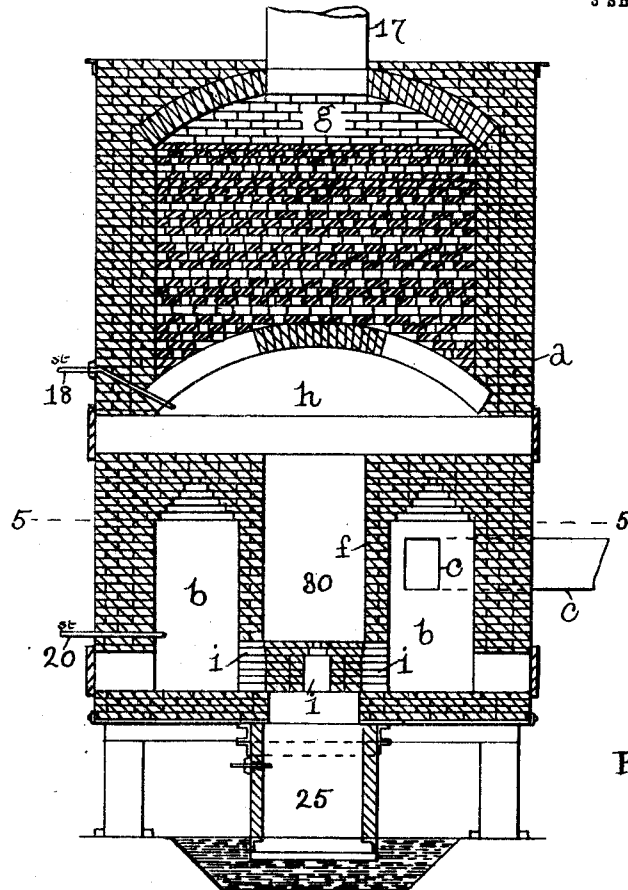


Fig. 4.

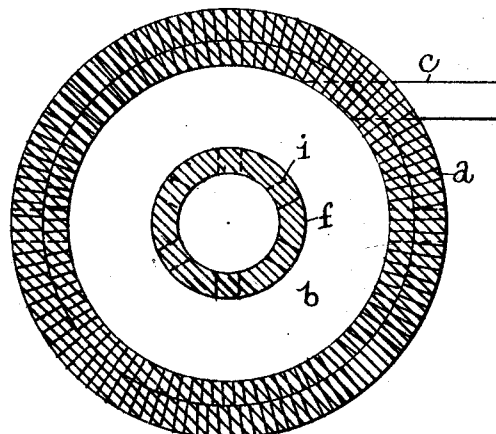


Fig. 5.

Witnesses.
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UNITED STATES PATENT OFFICE.

JULES H. HIRT, OF NASHUA, NEW HAMPSHIRE, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ALLIS-CHALMERS COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF NEW JERSEY.

GAS-PRODUCER.

1,064,903.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed April 29, 1907. Serial No. 370,757.

To all whom it may concern:

Be it known that I, JULES H. HIRT, a citizen of the United States, residing in Nashua, in the county of Hillsboro and State of New Hampshire, have invented an Improvement in Gas-Producers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to a novel apparatus for making producer gas from pulverized or finely divided fuel.

In accordance with this invention, the apparatus is provided with a chamber into which is forced finely divided or pulverized coal or other fuel admixed with air, and which is provided with an outlet opening communicating with a second chamber wherein the incandescent particles of fuel are admixed with steam to form producer gas, which is preferably led through a regenerative chamber on its passage to the outlet for the apparatus. The inlet for the pulverized coal or other fuel may and preferably will be located tangentially with relation to the chamber with which it communicates, so that the said fuel may be given a circulatory motion within the chamber for a purpose as will be described. These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a vertical section of an apparatus embodying this invention, the section being taken on the line 1—1, Fig. 2. Fig. 2, a plan of the apparatus shown in Fig. 1. Fig. 3, a cross section on the line 3—3, Fig. 1. Fig. 4, a vertical section of a modified form of apparatus, and Fig. 5, a section on the line 5—5, Fig. 4.

Referring to Fig. 1, *a* represents the outer side walls of a producer or apparatus, which is provided with a chamber *b* into which the pulverized coal or other fuel admixed with air is forced through a fuel supply pipe *c*, by a blower (not shown) or in any other suitable manner. The chamber *b* is closed except as to an outlet port or opening *d* formed in the bottom *e* of the said chamber, which bottom may be formed by the upper

part of an internal upright circular wall *f* of smaller diameter than the outer walls *a* so as to leave an annular chamber *g*. The upright circular wall *f* forms within it a chamber *h*, which communicates with the outside chamber *g* through suitable ports or openings *i*. The chamber *b* may be designated the ignition chamber; the chamber *h* the gas chamber; and the chamber *g* the regenerative chamber. The ignition chamber *b* may be provided with a dome-shaped top 10 having suitable openings 12, 13, formed in it, which are normally closed by covers 14, 15. The chamber *g* may and preferably will be provided with a checkerwork 16 of bricks or baffling material, and has connected to it the outlet pipe 17 for the producer gas. The gas chamber *h* has communicating with it a steam or water supply pipe 18, which as shown in Fig. 1 is located near the lower end of the said chamber and directs the steam or water spray upward, so as to meet the incandescent particles of fuel and the flame descending downward through the port or opening *d*, at what is the zone of greatest heat, and where the producer gas is formed, which latter passes down to the ports or openings *i* and into the chamber *g*, wherein the gases rise through the checkerwork 16 and finally pass out through the gas outlet pipe 17. The fuel inlet pipe *c* is preferably located at one side of the center of the ignition chamber or tangentially with relation thereto, so that the finely divided coal has imparted to it a circulatory motion around the chamber, thereby enabling a surplus quantity of fine coal to be admitted into the chamber *b*, which accumulates on the outer circumference of the same and serves as a reserve for insuring the production of producer gas at all times and for maintaining a flame in the ignition chamber, so that in case the supply of fuel and air should be interrupted for a considerable length of time, enough heat would be present in the chamber to ignite the fuel when the supply was resumed. The ignition chamber *b* may be provided with a supply pipe 20 for steam and air, and in the present instance the pipe 20 is provided with a branch pipe 21 communicating with the atmosphere, the

supply of air being controlled by the valve 22 and of steam by the valve 23. The outlet port *d* for the ignition chamber may and preferably will be located near the center of the bottom as represented in Fig. 1, so that the fuel admitted into the ignition chamber may be subjected to a substantially prolonged heat before passing in the form of flame and incandescent particles into the gas producing chamber *h*. The bottom of the apparatus may be provided with a dust or ash outlet 25 in line with the chamber *h* and may further be provided with dust or ash-outlet pipes or chutes 26 communicating with the chamber *g*. The openings 12 afford opportunity for the insertion of rods or pokers into the ignition chamber, for the loosening up of the carbon, which may accumulate on the side walls, and also serves as a means for testing the presence of the surplus fuel. The outer walls *a* may be provided with suitable clean-out doors 27.

It will be observed that the bottom wall of the ignition chamber *b* is formed by the top walls of the gas and regenerative chambers *h*, *g* and that said top walls are capable of moving with the walls *f* of the gas chamber as the latter walls are expanded and contracted, independently of the outer walls *a* of the apparatus, thereby preventing destruction of the outer walls *a* and the formation of cracks with consequent escape of gas.

In operation with the apparatus shown in Fig. 1, the finely divided coal mixed with air is forced into the chamber *b* and is ignited therein initially, in any suitable manner, as for instance, by burning wood on the bottom of the said chamber or by a torch. After the fuel has been ignited and burns in the chamber *b*, the flame carrying with it incandescent particles of carbon, passes through the port or opening *d* into the gas chamber *h*, where it meets the steam, which is decomposed and forms producer gas, the latter passing through the ports *i* into the chamber *g* and thence through the outlet pipe 17. The steam in the gas chamber *h* meets the incandescent fuel at the zone of greatest heat and serves to regulate the heat in said chamber, while the steam admitted into the ignition chamber also serves to regulate the temperature of the same.

I may prefer the construction of apparatus shown in Fig. 1, but I do not desire to limit my invention in this respect, as the invention may be embodied in other constructions, such for instance as shown in Figs. 4 and 5, wherein the ignition chamber *b* is located at the lower part of the apparatus and communicates through the ports *i* and a central passage 30 with the gas chamber *h*, which in turn communicates with the regenerative chamber *g* located above it and provided with the gas outlet 17. In the construction shown in Fig. 4,

the fuel inlet *e* is arranged tangentially, and the steam is admitted into the gas chamber *h* through the supply pipe 18 and preferably also into the ignition chamber *b* by the pipe 20.

I have herein shown the steam pipe 18 as being located near the bottom of the gas chamber *h* in the construction shown in Fig. 1 (presumably the zone of highest temperature), this may be varied dependent upon where the highest temperature occurs, without departing from my invention.

Claims:

1. In an apparatus of the class described, a structure having an ignition chamber at one end said chamber having a fuel inlet and an air inlet, a gas chamber located adjacent to said ignition chamber and communicating therewith through a central restricted outlet, a regenerative chamber surrounding said gas chamber and communicating therewith near that end of said gas chamber opposite its communication with the ignition chamber said regenerative chamber having an outlet, and means for supplying steam to said gas chamber.

2. In an apparatus of the class described, a structure having an ignition chamber at its upper end said chamber having a fuel inlet and an air inlet, a gas chamber located below said ignition chamber and communicating therewith through a central restricted outlet, a regenerative chamber surrounding said gas chamber and communicating therewith near the bottom of said gas chamber and having a gas outlet, and means for supplying steam to said gas chamber.

3. In an apparatus of the class described, a structure provided with an ignition chamber at its upper end having an inlet for fuel and another for air located in the side of said chamber, an upright wall within said structure having its upper end forming the bottom of said ignition chamber and provided with an opening forming an outlet for said ignition chamber, said upright wall forming a gas chamber communicating with the ignition chamber through said outlet, and also forming with the said side walls a chamber having a gas outlet.

4. In a gas producer, the combination of an ignition chamber free from obstruction and having a tangential inlet, a gas chamber free from obstruction and centrally communicating with said ignition chamber, a regenerative chamber having checkerwork therein and surrounding said gas chamber and communicating therewith at the bottom, a gas outlet from said regenerative chamber, and means for admitting steam to the ignition and to the gas chamber.

5. In an apparatus of the class described, a structure having an ignition chamber at its upper end said chamber having a fuel

inlet and an air inlet, a gas chamber located below said ignition chamber and communicating therewith through a central restricted outlet, and a regenerative chamber surrounding said gas chamber and communicating therewith near the bottom of said gas chamber and having a gas outlet.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

JULES H. HIRT.

Witnesses:

JAS. H. CHURCHILL,
J. MURPHY.