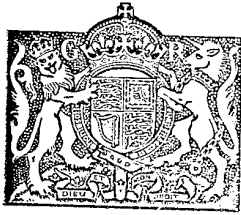


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PATENT SPECIFICATION



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COMPLETE SPECIFICATION

Improvements relating to Gas Producers.

I, JEAN GOHIN, of 35, Avenue de Paris, Choisy-le-Roi (Seine), France, of French nationality, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to gas producers and its object is to provide an improved gas producer in which the disposition and form of the parts is adapted to render practically constant and uniform, for any rate of output, the quality and the pressure of the gas, to improve the operation and the thermic efficiency of the apparatus, to eliminate or reduce to a minimum water consumption, to instantaneously gasify such fuel as coal, to furnish a relatively pure gas, to facilitate the starting of the producer, and the discharging of the ashes therefrom, etc.

Preferred embodiments of my invention will be hereinafter described with reference to the accompanying drawing, which is given by way of example and in which:

Fig. 1 is a diagrammatic view of a standard producer shown by way of comparison;

Fig. 2 is a diagrammatic sectional view of an improved gas producer made in accordance with the present invention;

Fig. 3 shows a producer having a small output;

Fig. 4 shows a producer having a great output;

Fig. 5 is a detail view of the gas pressure controlling arrangement;

Figs. 6 and 7 are sectional views illustrating the removal of the ashes;

Fig. 8 is a corresponding diagrammatical view;

Fig. 9 is a view of another embodiment of the device for removing the ashes;

Fig. 10 diagrammatically shows another embodiment comprising a secondary tuyere;

Fig. 11 shows another embodiment of a gas producer according to my invention;

Figs. 1 and 2 bring forth the difference between the standard producer of Fig. 1, which has a considerable volume, and the principle of the improved gas

producer shown in Fig. 2 producing an instantaneous gasification.

The improved gas producer according to my invention is equally fitted to give small outputs and large outputs, provided it is suitably modified.

The producer according to my invention comprises essentially a chamber 1 for instantaneous gasification and a reservoir made of sheet metal 2 for the fuel, these two elements being connected by a conduit 3, the dimensions of which depend upon the use for which the producer is intended.

The chamber 1 comprises broadly flared part 4 which is the termination of conduit 3, one, two, or more tuyeres 5, 5¹, 5², for performing the gasification, and, if need be, completing the combustion and the melting of the slag, said tuyeres being provided either at the bottom or on the sides, being preferably inclined and having an air outlet 6, leading into the middle part of the gasifier. Alternatively a main tuyere may be disposed vertically and co-axially with respect to the body of the producer and have lateral outlets 6¹ for the gasifying air (see Fig. 4). Said air causes the formation of carbon monoxide gas when coal is the fuel used in a relatively restricted space and along a path of travel through the coal that is very short, the gas thus formed issuing subsequently from the gas producer through pipe 7. The producer further comprises a poker and a device for removing the slag and, if need be, a pricker 8, preferably mounted with a ball and socket joint so as to permit pricking in all directions during the operation of the producer. The chamber 1 may, if necessary, be provided with a double wall 9, through which water is caused to flow (see Fig. 2).

Conduit 3 may comprise a valve 10 (see Fig. 4) for stopping or regulating the feed of fuel from reservoir 2. Reservoir 2, made of ordinary sheet iron, of any shape whatsoever, is provided with one or two feeding apertures 11 and, for the producers adapted to give a great output, with an axial tuyere 5² having several lateral outlets 6¹.

The tuyere consists of a tube 5 (see Fig.

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5), with an air outlet nozzle having an aperture 6, provided with a conical seat 12 closed by a cone 13 which has a lateral aperture 14.

5 The tuyere further comprises a pipe 16 through which air from any suitable compressor is fed.

10 The cone 13, which varies the section of flow of the air fed through the aperture 6, is controlled, through pressure regulators of a known type, or, preferably, through a device comprising a membrane 20 connected with the gas outlet tube on either side of a diaphragm and acting upon the cone 13 for regulating the flow, either in combination or not with a servo motor (see the details in Fig. 5).

15 By means of a diaphragm 17, which has a variable and adjustable orifice located in the gas outlet tube 7 any change of pressure on one side of said diaphragm with a corresponding change on the other produces a movement of said diaphragm which is transmitted through conduits 18, 19 to membrane 20. Said membrane 20 adjusts, through a rod 21 and a needle valve 22 provided in a chamber 23, the flow of air coming from the conduit 16 through pipe 24 and led, through pipe 25, into servo motor 26, under piston 27, the rod of which acts upon cone 13, as shown in Figs. 4 and 5.

20 The adjustment might well be made without servo motor 26 and, in this case, rod 21 of the membrane will act directly upon cone 13, as shown in Fig. 3.

25 Similar modes of regulation might be applied with suitable modification of the elements concerned.

30 The tuyere (5, 5₁, 5₂) is surrounded with a water jacket 28 connected through conduits 29, 30 to a thermosyphon consisting of a small tank 31 containing water, oil, or any other solid or liquid body boiling at a high temperature for cooling the tuyere, said tank being in turn surrounded by a vessel 32 containing cooling water.

35 In order to facilitate starting, a suction effect is produced in the gas outlet pipe 7 and, to this end, an injector 33 is suitably arranged.

40 In the producers having a limited output (see Figs. 6—7—8) the ashes become agglomerated so as to form a solid block or mass 34, which is removed, when the apparatus is stopped, by means of a kind of semi-cylindrical shovel 35 which is introduced through a door 36 and which serves to support the material above the block whilst the latter is being removed.

45 A combustion chamber 37, which may be movable or not, having a simple or a double wall with air or water circulation, may also be provided (see Fig. 9), which chamber may be shut off by means of a

movable partition 38, or any analogous device, for taking it out and emptying it.

For large outputs, the length of operation is much increased by placing (see Fig. 10), under the main air inlet of tuyere 5, a second tuyere 5₁, having a limited output, which completes the combustion and causes the masses 34 of slag produced by the main air inlet of tuyere 5 to be liquefied & so move down.

Said second admission of air through tuyere 5₁ may take place either at high speed or at slow speed.

In the first case it produces directly carbon monoxide with melting of the ashes; in the second case (Fig. 4) it produces carbon dioxide, which is transformed into carbon monoxide in the mass of coal, and it causes the formation of ashes.

In the producers adapted to have a very high output (Fig. 11), the ashes and the slag blocks are melted by the second tuyere 5₁ and flow, through the orifice 39 through which the gases issue, into a receiver 40 having a hydraulic joint and being full of water, while the gases issue through pipe 7.

In that case, the bottom of the producer is lined with a refractory material 41 so as to form a kind of crucible.

In the large and small apparatus in which the continuous flow of the ashes is not effected, a chamber 42 for evacuating the masses of agglomerated ashes may be provided (Fig. 3). That chamber comprises a register 43 and an outlet door 36. A grate may also be disposed upon the door, under which grate arrives a light air current which burns the fuel and leaves the slag.

The gas may be purified by passing, when issuing from the apparatus, through filtering elements comprising two surfaces disposed like blades of Venetian shutters 44 placed in a chamber 45 and containing a filtering material 46 such as gravel, sand, etc.

While I have disclosed what I deem to be preferred embodiments of my invention, it should be well understood that I do not wish to be limited thereto, as there might be changes made in the arrangement, disposition and shape of the parts without departing from the principle of my invention as comprehended within the scope of the appended claims.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A gas producer of the type in which compressed air is injected through a cooled

tuyere, comprising in combination a chamber for instantaneous gasification, a reservoir for fuel connected thereto by means of a conduit, a cooled tuyere disposed axially or laterally in said chamber and means for poking and removing slag from the said chamber, means for regulating the pressure of the gas generated in said chamber, means for producing a suction effect in the outlet pipe of said chamber to facilitate starting the gasification of the fuel, and means for purifying the outflowing gas, all for the purpose herein set forth.

2. A gas producer as claimed in claim 1, wherein said conduit connecting the reservoir and the chamber for instantaneous gasification, is provided with a register adapted to guide or stop the flow of the fuel.

3. A gas producer as claimed in claim 1 or 2, wherein said chamber has a flared part adapted to regulate the fall of the fuel and the separation of the gases produced.

4. A gas producer as claimed in claims 1, 2 or 3, comprising a pricker for cleaning the tuyere and to poke in all directions, being mounted ball and socket fashion.

5. A gas producer as claimed in any of the preceding claims, wherein said chamber is surrounded by a water or air jacket.

6. A gas producer as claimed in any of the preceding claims wherein a plurality of tuyeres are provided adapted to complete the combustion or the melting of the slag formed from the gasification of said fuel.

7. A gas producer as claimed in any of the preceding claims wherein said tuyere or tuyeres is or are cooled by means of a thermo-syphon, comprising a small tank containing water, oil or like substance boiling at a high temperature, and a vessel surrounding said tank and adapted to cool the same by means of water contained in it.

8. A gas producer as claimed in any of the preceding claims wherein carbon monoxide gas is formed in a single step, the zone of gasification being very limited and the gas formed issuing from the coal close to the point of air admission which takes place through said tuyere.

9. A gas producer as claimed in any of the preceding claims wherein the means for regulating the pressure of the gas generated comprise a diaphragm having a variable and adjustable aperture positioned in the gas outlet pipe, a membrane arranged so as to be deflected when gas pressure on one side of the diaphragm becomes in excess of that on the other, the deflection produced causing a servo motor to be operated which controls the

flow of air from the tuyere responsible for gasification.

10. A gas producer as claimed in claim 9 wherein said membrane carries a rod and upon deflection of the former, said rod acts directly to increase or decrease the air supply of the gasifying tuyere.

11. A gas producer as claimed in any of the preceding claims, wherein the means for producing a reduction in pressure in the outlet pipe of said chamber comprise an injector provided in the said pipe and adapted to feed air under pressure thereto and in doing so, facilitating the starting of gasification within said chamber.

12. A gas producer as claimed in any of the preceding claims, wherein the means for purifying outflowing gases comprise one or more filters which contain two supporting surfaces made after the fashion of Venetian blinds and having between them gravel, sand or like filtering material.

13. A gas producer as claimed in any of the preceding claims wherein a chamber for the evacuation of ungasified material is provided with a register at its upper part and at its lower part with a door to which is fitted a grate and with means for feeding air so as to burn fuel mixed with said materials.

14. A gas producer as claimed in any of the preceding claims 6 to 12, wherein a conduit for the continuous outflow of slag is located approximately at the level of the tuyere arranged to liquify the same, and is adapted to serve also for the outflow of the gases cooperating with a sole made of refractory material and formed as a crucible, a hydraulic seal being provided for separating the ashes from the gases, substantially as described with reference to Fig. 11.

15. A gas producer as claimed in any of the preceding claims wherein said means for removing slag comprise a movable partition below which is situated a removable chamber for the collection of the slag, the partition being placed in its operative position when it is desired to remove said chamber.

16. A gas producer as claimed in any of claims 1 to 12, wherein a chamber is provided below the main gasifying tuyere having a register at its upper part and, its lower extremity, an outlet door and a grate, an air inlet being provided below the latter to gasify any fuel that might remain with the slag.

17. A gas producer substantially as described with reference to the accompanying drawing.

Dated this 23rd day of July, 1931.

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Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1932.

[This Drawing is a reproduction of the Original on a reduced scale.]

