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(12) Patent:

(54) MANUFACTURE OF WATER GAS OR GAS CONSISTING LARGELY OF CARBON MONOXIDE AND HYDROGEN

(54) FABRICATION DE GAZ D'EAU OU DE GAZ CONSISTANT LARGEMENT D'OXYDE DE CARBONE ET D'HYDROGENE

(72) Inventor (Country): **NORMAN HENRY WILLIAMS** (Not Available)

(73) Applicant (Country): **IUMPHREYS AND GLASGOW LIMITED**

(71) Applicant (Country):

(74) Agent:

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This invention has reference to the manufacture of water gas or a gas consisting largely of carbon monoxide and hydrogen by a cyclic process in which the air and steam and/or other gases supplied to the fuel bed are preheated, and in particular to such a process in which some or all of the air is preheated in a recuperative heat exchanger by the gaseous products of its passage through the generator, with or without secondary combustion of these gases prior to their passage through the heat exchanger, and some or all of the steam is preheated in the same heat exchanger by the hot water-gas and undecomposed steam resulting from the passage of the steam through the generator. Other gases, such as hydrocarbon containing gases, which it is desired to subject to reaction or thermal treatment in the fuel bed may also be supplied to the generator with or without preheating in the said heat exchanger and with or without admixture with steam.

According to this invention whereof two arrangements are disgrammatically illustrated in Figs. 1 and 2 of the accompanying drawings in apparatus for carrying out the process referred to there is provided in the gas path between the water gas generator 1 and the hot gas inlet 2 to the heat exchanger 3 a regenerator 4, whereby cyclic fluctuations in the temperature of the gaseous products and undecomposed steam passing therethrough to the heat exchanger are reduced in extent and rapidity and more constant conditions are ensured at the hot end of the heat exchanger, thereby reducing troubles arising from continual cyclic thermal expansion and contraction. More constant temperature of the air and steam and any other gases preheated in the heat exchanger are also secured.

Moreover, by providing a sufficient mass of heat storing

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refractory material 5,5<sup>a</sup> within the regenerator 4, steam which is required to flow through the generator 1 in the reverse direction to the air and steam (derived through valves 6,7 and 8) preheated in the heat exchanger 3, for example steam for down-running, may upon opening valve 9 be preheated by passage through the part 5 of the heat storage mass nearest to the generator, instead of in the heat exchanger 3, without directly cooling the portion 5<sup>a</sup> of the regenerative mass adjacent to the heat exchanger 3; or any gas, for example, hydrocarbon-containing gas, supplied through valve 10, which it is desired to subject to thermal treatment in the fuel bed of the generator by its passage, in the downward direction, through the fuel bed may also be preheated in this way. For the removal of gases formed by downward flow through the fuel bed, an offtake 11 including valves 12,13 is provided from the bottom of the generator to the wash box 14. In cases in which it is desired to recover the heat from gases leaving the generator through this off-take they may upon closing valve 13 and opening another valve 15, Fig.1 be led to the wash box 14 through a waste-heat boiler 16. Again, as shown in Fig.2, gases formed by downward flow through the fuel bed and leaving the generator from the bottom by way of an offtake 11<sup>a</sup>, may pass through a recuperative heat exchanger 3<sup>a</sup>, thence to the wash box 14 or waste heat boiler 16 as in Fig.1. In such modified arrangement steam or gas or both may be supplied to the heat exchanger 3<sup>a</sup> by way of either valve 9, valve 10 or both, and valve 17 there to be preheated and then passed through the upper part of the regenerator 4 for further preheating in the checkerwork 5 on their way to the generator.

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Provision may be made for regulating the degree of preheating of the air and/or steam. For example, means, such as valves 8, 19, 18 and 24 in Figure 1 and 8, 19, 18, 24, 17, 20, 32 and 21 in Figure 2 may be provided for enabling part of the hot gases and/or part of the air and/or steam to bye-pass either or both of the heat exchangers 3 and 3a, or means, not shown, may be provided to enable part of the heat exchangers to be bye-passed by the hot gases and/or air and/or steam.

Any sensible or potential heat remaining in the blast gases and/or any sensible heat remaining in the water gas leaving the recuperator may be recovered in a waste heat boiler after, if desired, the completion of combustion of the blast gases with added air. 22 is a valve for controlling supply of tertiary air to gases entering waste heat boiler 16. 23 is the customary valve controlling the air supply for secondary combustion to the regenerator. 25 is the usual stack pipe with the usual outlet valve 26.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. In a cyclic process of gas manufacture in which gases to be supplied to a generator fuel bed are preheated in a recuperative heat exchanger, reducing in extent and rapidity cyclic fluctuations in the temperature of the gas products passing from the generator to the heat exchanger, by passing the gases from the generator through a regenerator on their way to the heat exchanger.

2. A cyclic process of gas manufacture according to claim 1 in which gas intended to be passed in downward direction through the generator is preheated in the regenerator instead of in the heat interchanger, by passage through part of the regenerator heat storage mass nearest the generator without directly cooling the portion of the regenerator mass adjacent to the heat exchanger.

Fig. 1.

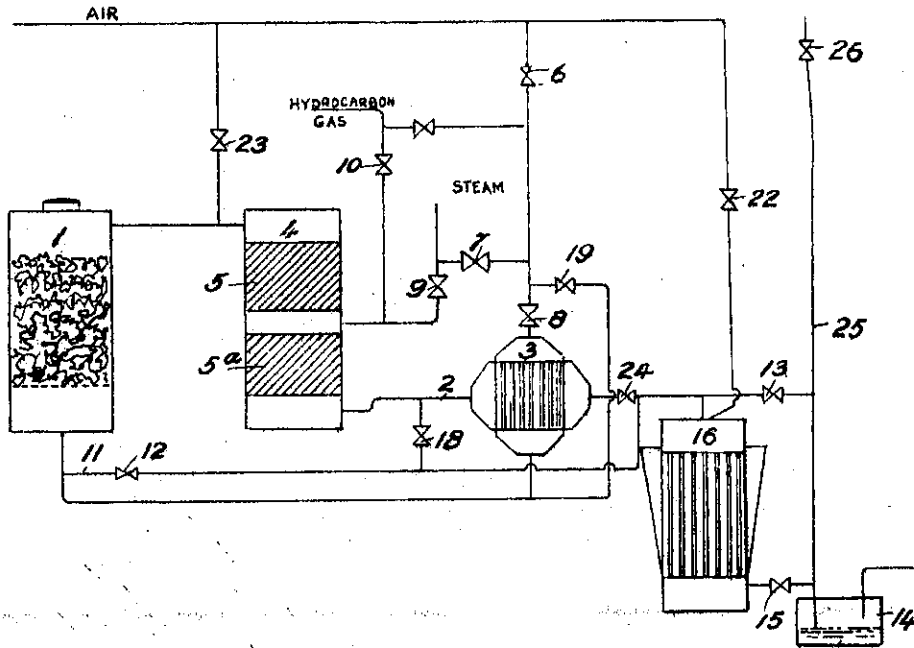
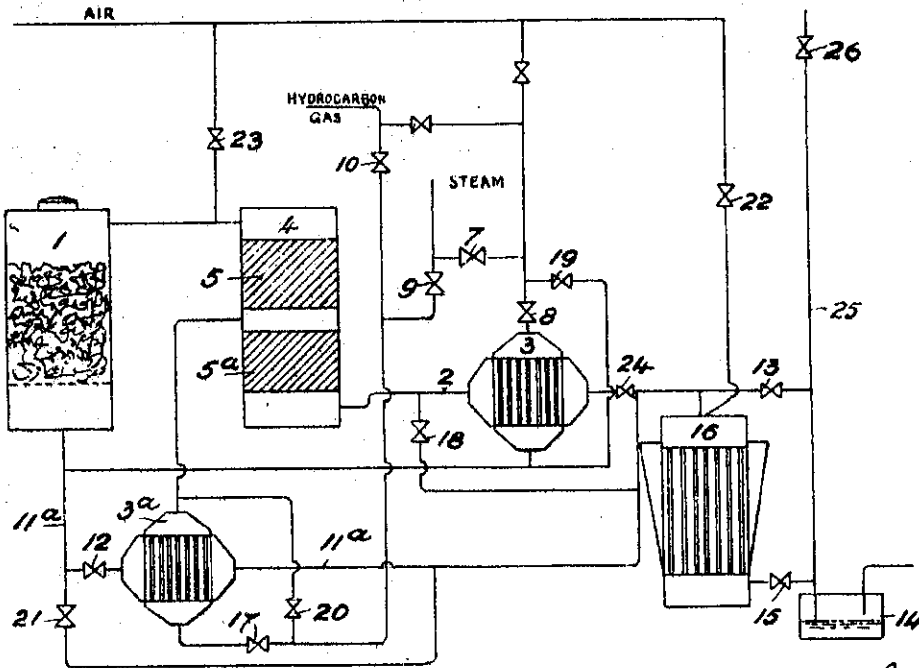


Fig. 2.



Norman Henry Williams  
Inventor  
By

Hetherington & Co.  
attorney

Certified to be the drawings referred to  
in the specification hereunto annexed.  
Ottawa, Can., October 20th, 1946.