

Feb. 6, 1923.

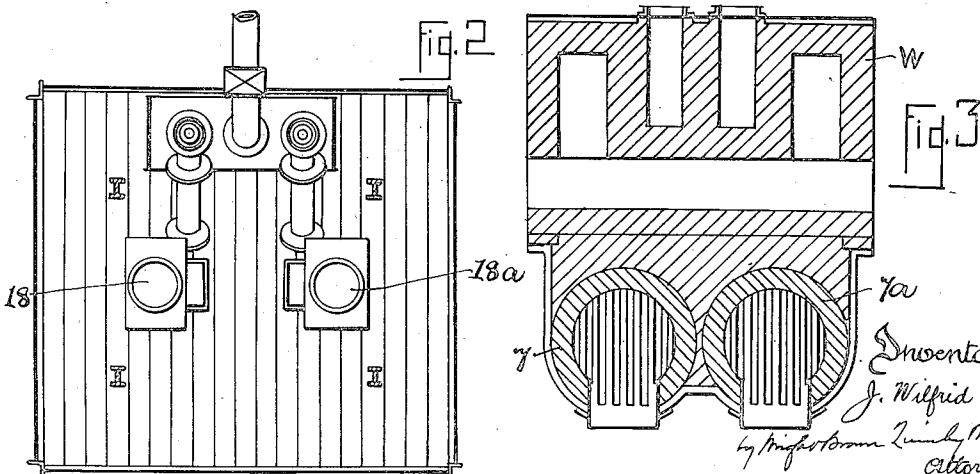
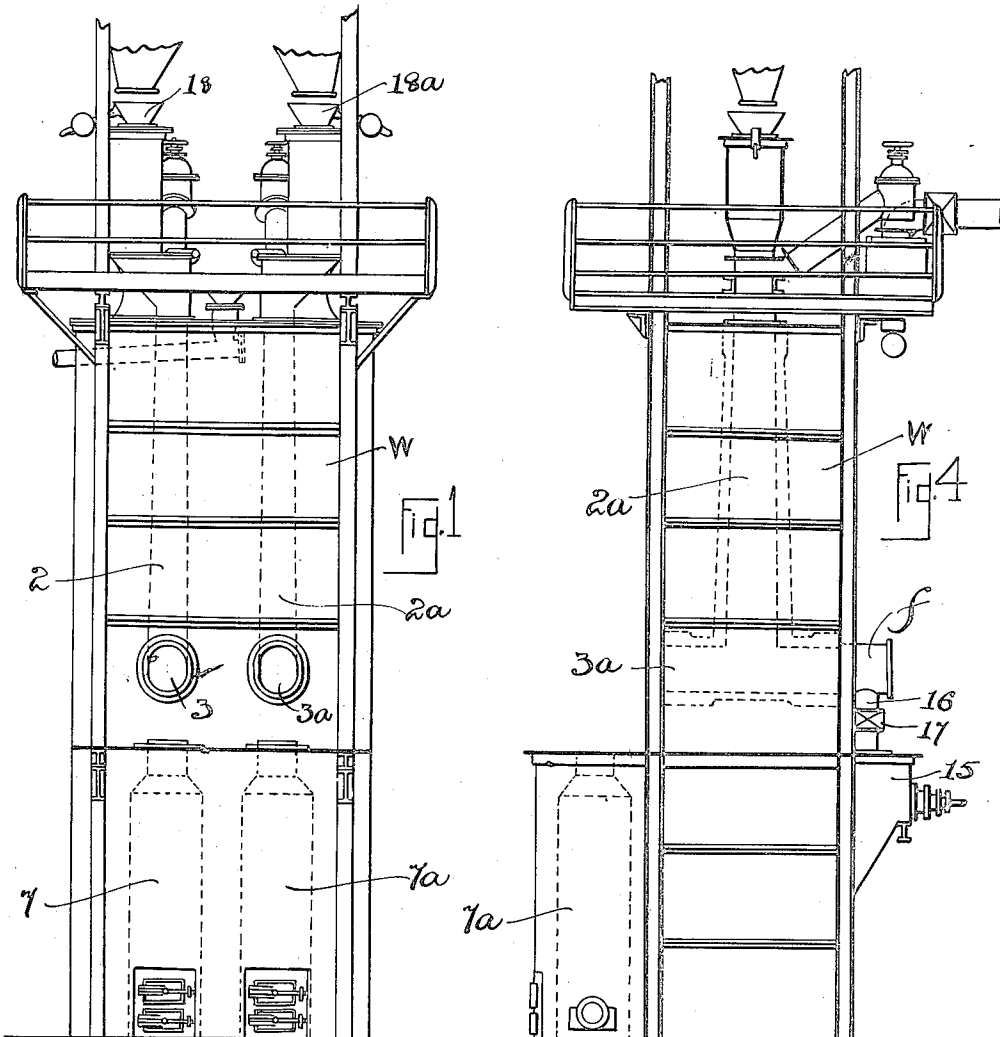
1,444,498.

J. W. DRAKE.

RETORT AND APPARATUS IN CONNECTION THEREWITH FOR USE IN THE MANUFACTURE OF GAS.

FILED SEPT. 26, 1918.

3 SHEETS—SHEET 1.



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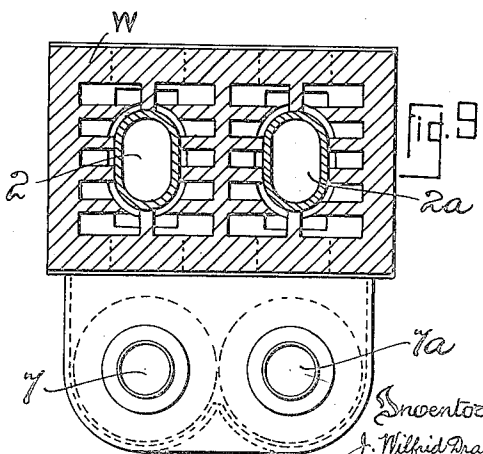
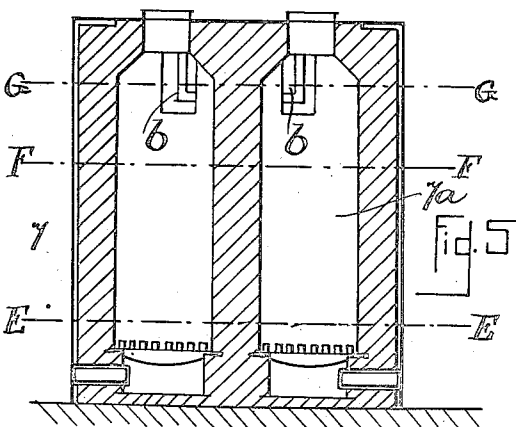
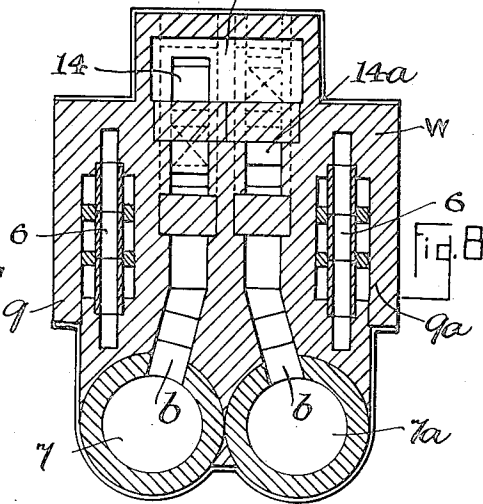
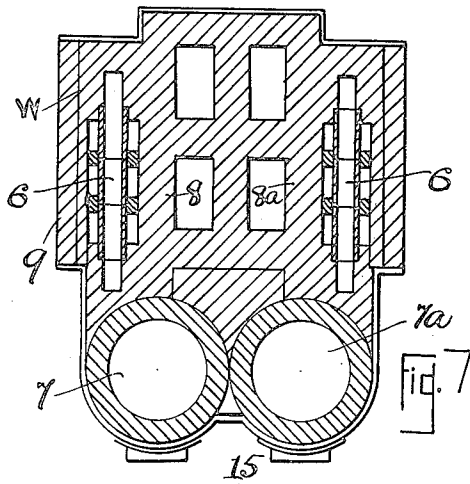
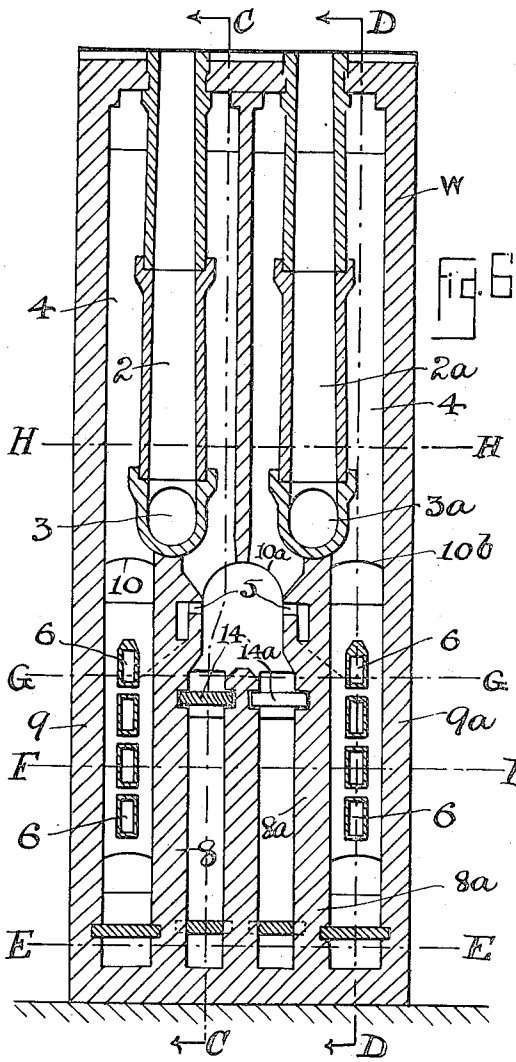
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3 SHEETS—SHEET 2.



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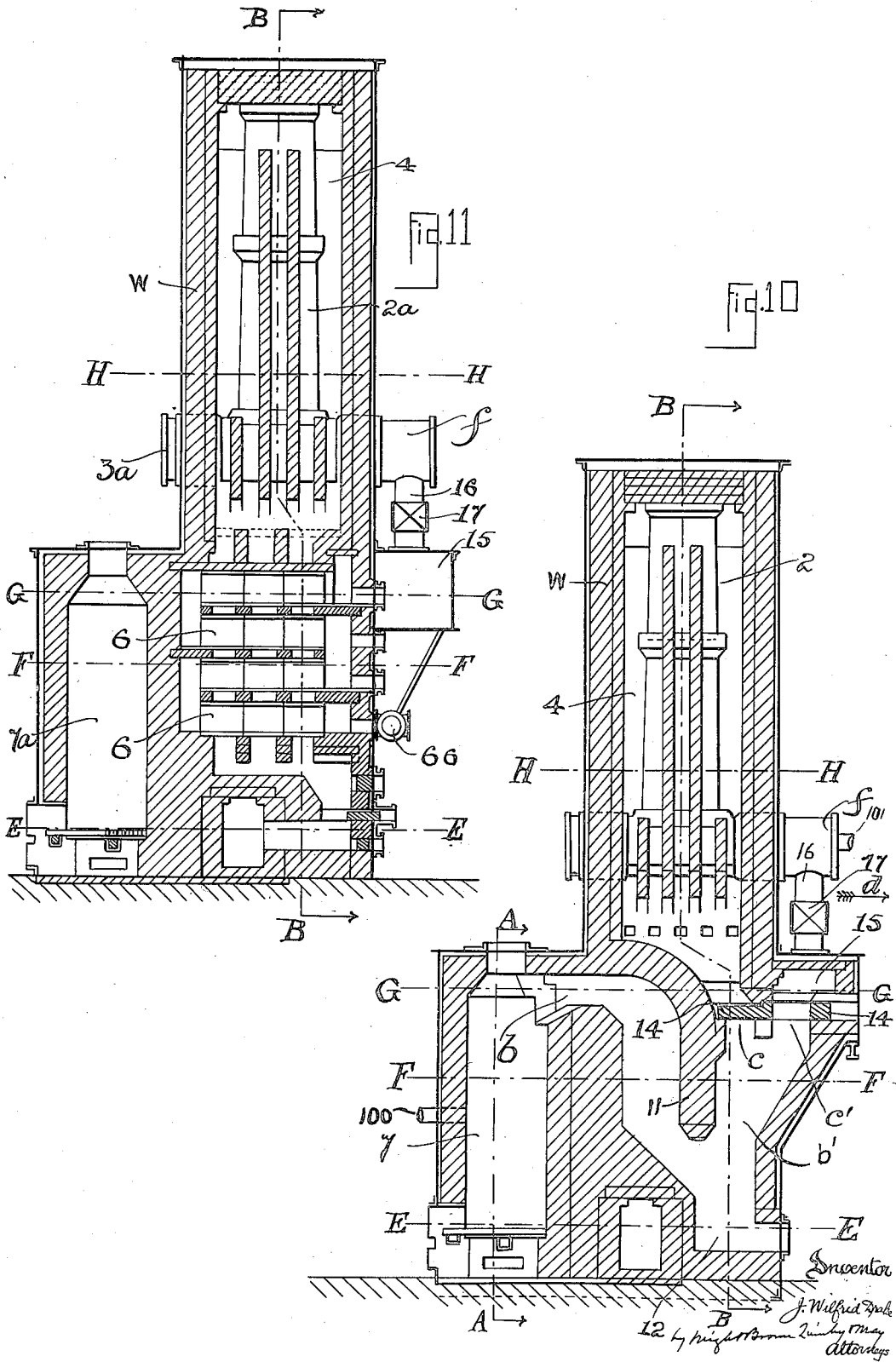
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FILED SEPT. 26, 1918.

3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

JONAS WILFRID DRAKE, OF HALIFAX, ENGLAND.

RETORT AND APPARATUS IN CONNECTION THEREWITH FOR USE IN THE MANUFACTURE OF GAS.

Application filed September 26, 1918. Serial No. 255,752.

To all whom it may concern:

Be it known that I, JONAS WILFRID DRAKE, a subject of the King of Great Britain, and resident of "Glenmore," Savile Park, Halifax, in the county of York, England, have invented a certain new and useful Improvement in Retorts and Apparatus in Connection Therewith for Use in the Manufacture of Gas, of which the following description, having reference to the accompanying sheets of drawings, is a specification.

It relates to retorts and apparatus in connection therewith for use in the manufacture of varied gases, that is to say for the manufacture of coal gas, water gas, or producer gas, or for the manufacture of a combination of any two or three of these gases, and my said invention consists in the construction and arrangement of the retorts and apparatus in connection therewith of such a character that the continuous production of one or other or of all three gases and the mixing of said gases can readily be effected and changed or altered as occasion may require, and that by the adjustment of devices which are simple of construction and the operating or adjusting of which may be readily understood whether such adjustments are to be effected manually or by the employment of mechanical means that may be automatically controlled according to the conditions for which it is necessary to have them to be adjusted.

In the accompanying sheets of drawings which are illustrative of my invention,

Fig. 1 is a front elevation of apparatus produced in accordance with one arrangement of my invention, from which and from the description hereinafter given it will readily be understood how same may be modified.

Fig. 2 is a plan of the parts shown by Fig. 1.

Fig. 3 is a sectional plan taken on line E E of Figs. 6, 10 and 11.

Fig. 4 is a side elevation of the apparatus shown by Figs. 1 and 2.

Fig. 5 is a sectional elevation taken on line A A of Fig. 10.

Fig. 6 is a sectional elevation taken on line B B of Figs. 10 and 11.

Fig. 7 is a sectional plan taken on line F F of Figs. 4, 10 and 11.

Figs. 8 and 9 are sectional plans taken re-

spectively on lines G G and H H of Figs. 55, 6, 10 and 11.

Fig. 10 is a sectional side elevation taken on line C C of Fig. 6.

Fig. 11 is a sectional side elevation taken on D D of Fig. 6.

The arrows at the ends of the lines showing where the sections are taken, indicate the directions in which the several figures are seen.

Similar letters and figures of reference indicate similar parts throughout the several views.

In carrying my invention into effect according to one arrangement which I prefer or which may be modified as hereinafter described, I make use of vertical retorts 2, 2^a which are situated in settings W above horizontal retorts 3, 3^a which latter extend crosswise the bases of the said vertical retorts 2, 2^a, thus said vertical retorts 2, 2^a are open at their lower ends into the horizontal retorts 3, 3^a respectively.

The settings W within which the vertical retorts 2, 2^a are situated, form the combustion chambers 4 with arrangements for the secondary air supply through the inlets 5, as may be found advantageous; or without such secondary air supply under the conditions hereinafter explained, while regenerative fuses 6 for the secondary air or other purpose are arranged at the rear of the producers 7, 7^a and are situated at the base of the settings W and below the horizontal retorts 3, 3^a so that when said secondary air is desired to be heated for use for the combustion of the producer gas in the chamber 4 this may be at any time carried out by admitting the entrance of such air through the inlet pipe 66 to the flues 6.

The producers 7, 7^a are arranged at a lower level than are the horizontal retorts 3, 3^a and in all cases these said producers are never less than two in number as illustrated except when intermittent production will suffice as is hereinafter explained. By the producers being arranged as stated and by the supporting walls 8, 8^a for the structure above occupying the positions relatively thereto as shown by the drawings, the whole of the superstructure (that is the horizontal and vertical retorts and their settings with- in which they are situated) is supported by the solid walls 8, 8^a the outer walls 9, 9^a and

the arches 10, 10^a and 10^b in such a manner as to give ample support in every direction.

Each of the producers 7, 7^a is arranged so that the gases rising therefrom will firstly
 5 travel through a passage or flue *b* (see Fig. 10) to encounter a baffle 11 that will deflect the dust or ashes carried by said gases and make them descend to a convenient place 12 where they may be of easy access
 10 so that the attendant may remove same as and when desired. The passage or flue *b* is continued through the space *b*¹ which leads in a vertical direction so that it may be divided into two parts *c* and *c*¹ each of
 15 which passages *c* and *c*¹ is intercepted by a damper 14 of a duplex character or of such shape that said damper 14 may at one time cover one passage as the passage *c* shown by Fig. 10 (during which time the other pas-
 20 sage *c*¹ is open through said damper) or by moving the damper 14 in the direction indicated by the arrow *d* then the passage *c* may be laid bare while the passage *c*¹ is covered. By this arrangement when the
 25 damper 14 is in one position, the gases from the producer 7 will ascend and pass through and into the chambers 4 surrounding both horizontal and vertical retorts 2, 2^a and 3, 3^a while when the damper 14 is in the posi-
 30 tion shown by Fig. 10 said gases will pass through said damper into a chamber 15 from which chamber 15 a pipe 16 leads to the outer end *f* of the horizontal retort 3 hence said gas from the producer 7 may then
 35 pass (after arriving the common chamber 15) through the valve 17 into the retort 3 and forward through the retort 3 into the retort 2. Leading from the common chamber 15 are also another pipe and valve (similar
 40 to those at 16 and 17) to conduct gases to the retorts 3^a and 2^a.

Both of the producers 7, 7^a lead through similar flues *b* and *b*¹ to the common chamber 15, hence the gas from said common
 45 chamber 15 may be conducted either to the horizontal retort 3 or to the other horizontal retort 3^a or to both of these retorts as will be understood.

Although in the accompanying sheets of
 50 drawings and as above described I have only shown two producers 7 and 7^a yet when it is desired to vary the time of what is known as "blowing" and "running" then I may have three or more such producers for each
 55 retort or each set of retorts which lead into the common chamber 15.

One feature of my combined apparatus is that I can manufacture coal gas, water gas or producer gas either intermittently or continuously and separately or combined and
 60 in any relative proportions.

When manufacturing coal gas, coal is fed through the hoppers 18, 18^a to the vertical retorts 2, and 2^a and is there distilled by
 65 utilizing the producer gas and secondary air

(which latter will enter the chamber 4 through the nozzles 5 after passing through the regenerative flues 6) at which time the duplex dampers 14, 14^a will be opened for the producer gas to travel through the pas-
 70 sage *c* to the combustion chamber 4 and will be prevented from travelling through the passage *c*¹ to the common chamber 15 hereinafore referred to, and this manufacture of coal gas may continue as long as de-
 75 sired.

When it is desired to manufacture water gas then the vertical retorts 2, 2^a are filled with coke, the temperature of which may be raised or kept up by the combustion of the
 80 producer gas (from any producer) being consumed or passing through the chambers 4 while to the other producer, steam will be admitted by the pipe 100 and caused to travel and will in the form of water gas
 85 pass through said producer into the common chamber 15 hereinbefore described and forward through the pipe 16 past the valve 17 into the horizontal retort 3 (or 3^a) from which it will pass through the vertical retort
 90 as will be understood. Or if this is desired to be varied the producer gas from both or all of the producers may pass through the combustion chamber 4, while steam that has to pass through the retort may be caused to
 95 enter said retort at any desired part as through the part *f* by the inlet pipe 101 shown by Fig. 10 and from the common chamber 15 said steam will travel through the retort 3 mixing with the coal gas and
 100 travel forward to the apparatus for subsequent treatment in manner well known.

After the passing of steam through the producer 7 for such a time as to cool down
 105 said producer by said steam (which operation is known as "the run") then the damper 14 of said producer is adjusted to shut off the passage *c*¹ and open up the passage *c* to the combustion chamber 4 surrounding the retorts at the same time the steam is
 110 also shut off and air is admitted to carry out the process known as "blowing" thus to raise the temperature of the coke or fuel in the producer 7 in manner well known. During the changing of position of the damper 14
 115 so that the producer 7 which formerly generated water gas shall now commence to blow, the other producer has its damper 14 moved so that there will be commenced the production of water gas by the admission of
 120 steam thereto as in the previous case, thus the changing of one to the other and the blowing of one during the running of the other enables me to carry out the process of manufacture of coal gas or of water gas
 125 continuously.

By the arrangement of the producers 7, 7^a and the dampers 14 which control the travelling of the gases from said producers so that at one time they (said gases) will all enter
 130

a common chamber while at another time they may travel through the combustion chamber 4 surrounding the retorts, I am enabled to make a mixture of producer gas with water gas and with coal gas as and when desired. For example by passing the producer gas to the common chamber 15 and from there to the retorts 3, 3^a where coal gas is being produced then we have a mixture of producer gas and coal gas. Again by passing steam into the retorts 3 and 3^a during the mixing of the producer gas and coal gas, I obtain a mixture of water gas, producer gas and coal gas. If I do not desire to consume or burn the producer gas in the chamber 4 said gas may travel forward from said chamber 4 to be used for any purpose desired. It may not be necessary at any time to consume the producer gas within the combustion chambers 4 since said producer gas when generated by my arrangement of apparatus will be at a high temperature whilst passing through said chambers 4. Again said producer gas of high temperature when passing freely through the retorts may carbonize the coal therein without any external heating of said retorts, and this effect may also be carried out when water gas is generated in the producers and passed through the retorts.

I may make use of my apparatus for the manufacture of hydrogen by arranging the retorts 3, 3^a to receive charges of iron or iron ore to be heated by producer gas consumed in the chambers 4. Steam or water gas is then passed through the retort in contact with the iron ore and hydrogen is liberated as will be understood.

When the process of blowing is adjusted to be of an equal duration to the process of "running" I arrange the intensity of said blow to be only sufficient during the first part of same as to produce appropriate pro-

ducer gas until nearly reaching the end of such blow when I may intensify same in order to prepare the fire ready for the run, hence during the first part of the blow the producer gas may be conducted to the chambers 4 and there consumed or it may be conducted through said chambers 4 unconsumed and forward to be used for steam generating or other purposes.

It is obvious that if desired I can carburet any of the gases for the purpose of increasing their illuminating properties.

It will be observed that in the arrangement of the retorts and the several parts of the apparatus in connection therewith as is hereinbefore described, the coke resulting from the distillation of the coal in the retorts has to be discharged from the horizontal portion of said retorts, so that part of said coke may enter the generators or may be taken away for other purposes. Further than this employment of complicated valve or damper devices is avoided and by the simple operation of the duplex valves 14, 14^a each of which is adjusted by one movement, the controlling of the gases from the generators is regulated as desired.

Such being the nature and object of my said invention, what I claim is:—

In combination with a vertical retort, two gas producers adjoining said retort, a chamber surrounding the retort, a chamber common to and intervening between the retort and the producers, a passage leading from each of said gas producers to said common chamber, and another passage leading from said common chamber to the chamber surrounding the vertical retort, and a duplex valve mounted between each of the producers and the said common chamber, substantially as herein specified.

JONAS WILFRID DRAKE.