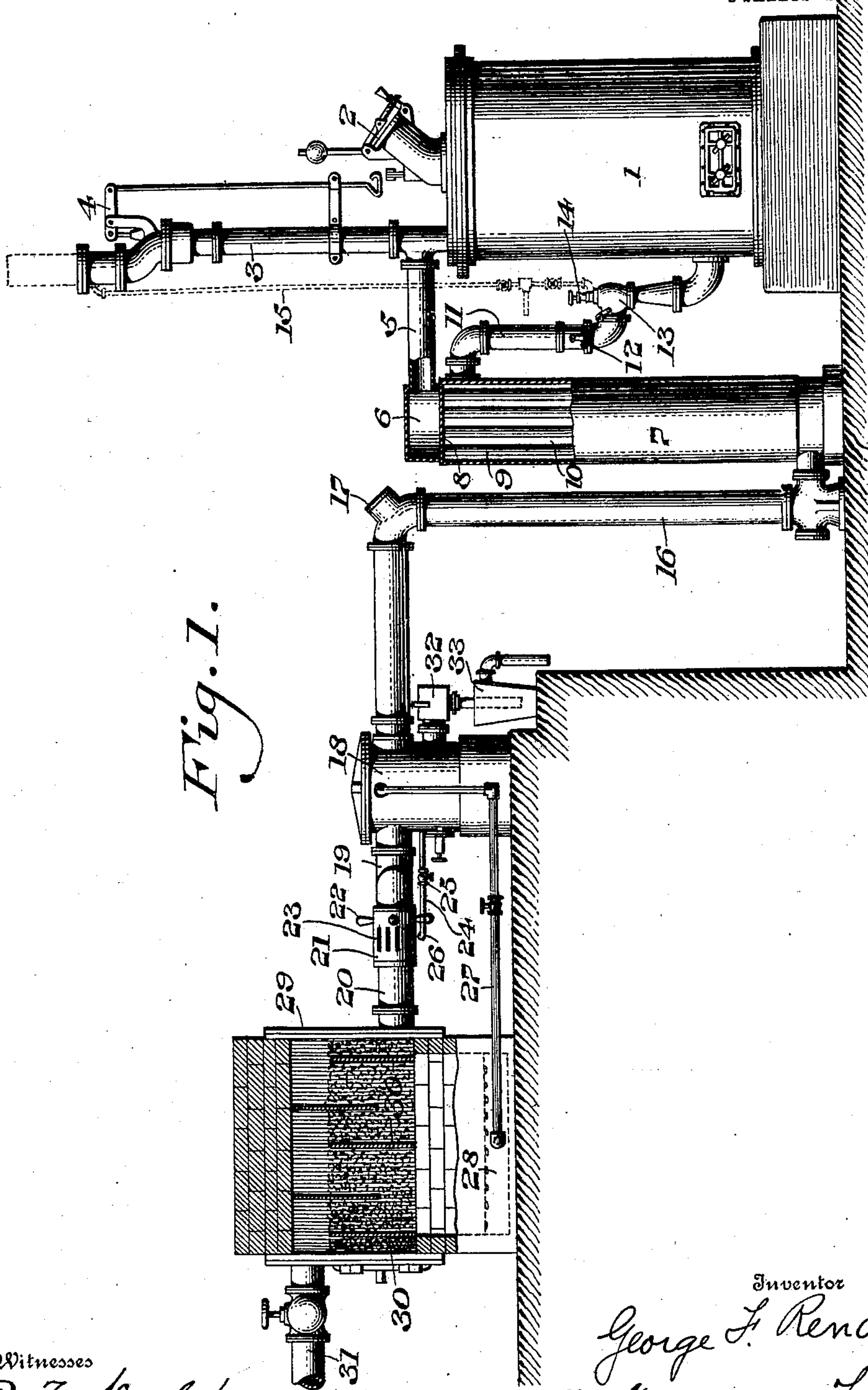


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**903,503.**

Patented Nov. 10, 1908.

2 SHEETS—SHEET 1.



*Fig. 1.*

Witnesses

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**ପ୍ରାଚୀନମାତୃସ୍ତ**

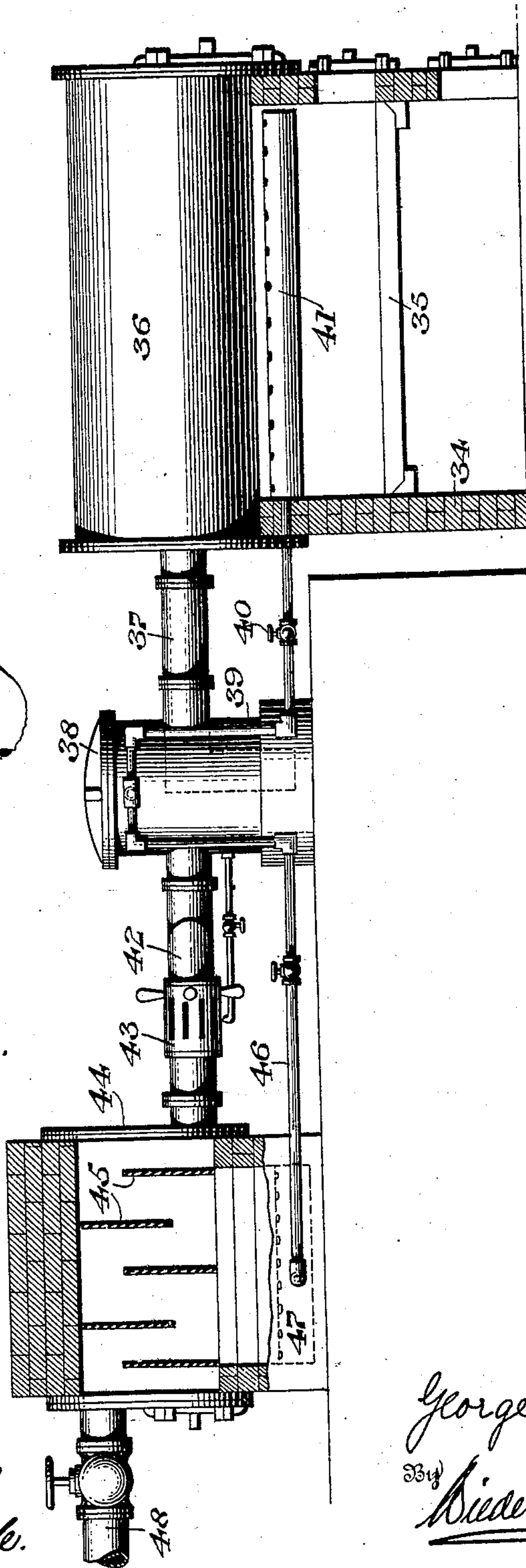
G. F. RENDALL.  
 APPARATUS FOR PRODUCING GAS.  
 APPLICATION FILED NOV. 20, 1908.

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2 SHEETS—SHEET 2.

903,503.

*Fig. 2.*



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR PRODUCING GAS.

No. 903,503.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed November 20, 1906. Serial No. 344,269.

*To all whom it may concern:*

Be it known that I, GEORGE F. RENDALL, a subject of the King of Great Britain, residing in the city, county, and State of New York, have invented a new and useful Apparatus for Producing Gas, of which the following is a specification.

In a pending application having the same filing date as this application, I have described and claimed a novel method for producing gas and my present invention consists of a novel construction of an apparatus adapted to carry out said method and produce a gas in which all the inert compounds have been removed to such an extent that a fuel gas is produced which may be employed to advantage in explosive engines, furnaces and for many other purposes.

It further consists of a novel construction for heating and deoxidizing the gas after it has passed through the scrubber.

It further consists of a novel construction in which the gas passing from the scrubber to the retort connected therewith is adapted to be ignited so that the retort may be heated therewith as desired.

It further consists of a novel construction of an apparatus in which the gas is cooled before it passes into the scrubber, the gas passing therefrom to a retort suitably heated and containing metallic content in order that all of the inert compounds in the gas such as sulfur, sulfurous products, and varying satisfied compounds of oxygen and carbon which have passed through the scrubber will be removed by their combination with the heated metallic content in the retort and the completed gas will contain hydrogen, hydrocarbons and some active and combined oxygen compounds.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

The instrumentalities of which my invention consists may be variously arranged and organized and in the accompanying drawings I have shown the preferred embodiments thereof which have been found in practice to give satisfactory and reliable results.

Figure 1 represents a side elevation partly

in section of an apparatus for producing gas embodying my invention. Fig. 2 represents a side elevation partly in section of another embodiment which may be employed.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings. In Figure 1, 1 designates a gas producing retort or furnace of any desired or conventional type, the same having connected therewith a suitable feeding or stoking mechanism 2 whereby any desired fuel such as coal may be automatically introduced into the furnace. 3 designates a discharge pipe leading from the gas producer 1, the same being provided with a suitable valve controlling mechanism 4. 5 designates a pipe or conduit leading from the discharge pipe 3 intermediate the producer 1 and the valve mechanism 4, the same discharging into a chamber 6 in a condenser 7. 8 designates an apertured plate at the upper end of the condenser 7 through the apertures of which pass the pipes 9, it being understood that a similar apertured plate is provided at the lower end of the condenser thus forming an air chamber 10 within the condenser 7. This air chamber communicates by means of a pipe 11 provided with a suitable controlling valve 12 with a steam injector pipe 13 having a controlling valve 14 therefor. The steam injector pipe 13 discharges into the gas producer or furnace 1 near the lower end thereof and the waste steam from the pipe 13 is discharged into the discharge pipe 3 by means of a valved pipe 15 leading from the steam pipe 13. 16 designates a conduit leading from the condenser 7 communicating with the pipes 9 in said conduit and having at a suitable point thereon a man-hole or cover 17, in order that the device may be readily cleaned when necessary. The conduit 16 discharges within the scrubber 18 at the lower end thereof. In this scrubber a suitable alkaline material such as caustic soda is placed, in order that the oxid contained in the gas will combine therewith and remove therefrom the inert compounds. In the scrubber I use preferably some form of alkaline. The scrubber 18 has leading therefrom a conduit 19 which communicates with a conduit or pipe 20,



which has thereon a sleeve 21 provided with actuating handles 22 and having slots 23, said sleeve 21 forming with the pipe a construction similar to a Bunsen burner. 24 designates a pipe leading from the scrubber 18 provided with a controlling valve 25 and having at its end a pilot burner 26 by means of which the gas in the Bunsen burner may be ignited. 27 designates a valved pipe leading from the scrubber 18 and communicating with a burner 28 located beneath the retort 29 with which the pipe 20 communicates. The retort 29 has located therein baffle plates 30 between which is placed any suitable metallic substance such as iron turnings or filings. 31 designates a valved pipe or conduit leading from the retort 29 to a desired point of utilization. The scrubber 18 is provided with an overflow pipe 32 by means of which the tar, alcohol or other substance may be drained from the scrubber and discharged into the receptacle 33 from which they may be removed as desired.

In the embodiment shown in Fig. 2, I have shown a slightly modified construction in which I have omitted the condenser 7 and have connected the gas producer directly with the scrubber, said gas producer as well as the retort being adapted to be heated by gas from the scrubber, there being also provided a suitable grate beneath the gas producing retort, in order that the same may be initially heated when the apparatus is first set in operation. In this embodiment 34 designates the foundation walls having a grate 35 supported thereon above which is located the gas producing retort 36. 37 designates a conduit leading from the gas producer 36 and discharging directly into the scrubber 38 near the lower end thereof, as indicated in dotted lines. 39 designates a pipe having a suitable controlling valve 40, leading from the scrubber 38 and communicating with the burner 41 located directly under the retort or gas producer 36. In this arrangement the gas after passing through the scrubber passes through a construction precisely similar to that indicated in Fig. 1, there being a conduit 42 having a Bunsen burner 43 thereon, said conduit 42 communicating with a retort 44 having baffle plates 45 therein between which is located the metallic substance which is adapted to combine with the oxid in the gas and remove the oxids therefrom. 46 designates a valved pipe leading from the scrubber 38 and communicating with the burner 47. The purified gas from which the inert compounds have been removed is led to a desired point of utilization through the valved conduit 48. In both embodiments the number of retorts such as 29 and 44 employed will vary according to the condi-

tions and requirements and I do not therefore desire to be limited to a construction in which only one retort is employed.

The operation is as follows:—Referring first to Fig. 1, the fuel from which the gas is to be produced is automatically fed into the furnace 1 by means of the feeding mechanism 2. Since any desired form or type of mechanism may be employed, I have deemed it unnecessary to illustrate or describe the same in detail. The smoke is allowed to pass from the furnace by opening the valve 4 after which said valve is closed. Steam is then admitted to the pipe 13 and to the bottom of the furnace either alone or with a desired mixture of air from the chamber 10 surrounding the conduits 9 in the condenser 7 through the pipe 11 and is drawn by suction into the pipe 13, so that it passes into the furnace with the steam and passes up through the heated carbonaceous material within the furnace 1. The gas thus produced passes through the conduit 5 into the chamber 6 of the condenser 7, thence through pipes 9 therein which are surrounded with air passing through the condenser 7. The gas passes from the condenser 7 in a cooled condition into the conduit 16 and is discharged within the scrubber 18 near the bottom thereof. In this scrubber is contained any alkaline material and I have found in practice that caustic soda may be advantageously used therein either in solution or in solid form. The gas after passing through the alkaline material within the scrubber has removed therefrom a material amount of its carbon dioxide content. The gas passes from the scrubber 18 through the conduit 19 into the conduit 20, which latter is provided with a sleeve forming a construction similar to a Bunsen burner, whereby when the pilot burner 26 is ignited by means of gas passing from the scrubber 18 through the pipe 24, the gas within the conduit 20 may be ignited, there being mixed therewith a suitable amount of oxygen, since the air may pass through the apertures 23 into the pipe 20. The ignited gas passes into the furnace or retort 29 and heats the same to a desired extent after which by means of the handles 22 the sleeve 21 is closed thus extinguishing the gas. The pilot burner 25 is now closed and gas passing from the scrubber 18 through the valved pipe 27 is utilized as fuel for the burner 28, whereby the retort 29 may be heated as desired. The metallic material contained within the retort 29 such as baffle plates 30 and the iron turnings, filings or other metallic material located therebetween will be highly heated so that the gas passing into and through the retort 29 will be oxidized in such a manner that substantially all the



inert contents of the gas will be removed. By means of the valved conduit 31 the gas may be led to a desired point of utilization. The by-pass 15 is employed to permit  
 5 any excess of steam in the pipe 13 to escape into the discharge pipe 3. In the present instance, I have shown a single retort 29 as being connected with the scrubber 18 but it is to be understood that in practice the number of these retorts with which the scrubber  
 10 is in communication varies according to conditions and requirements.

In the embodiment shown in Fig. 2, I have shown the gas producing furnace as being  
 15 adapted to be heated by gas conducted from the scrubber, provision also being made for initially heating the gas producer, in order to start the apparatus. In this embodiment the desired fuel preferably wood from which  
 20 the gas is to be produced is placed in the retort 36. The fire is now built on the grate bars or members 35, in order to initially heat the retort. The gas passing from the retort 36 is conducted through the conduit  
 25 37 into the scrubber 38 and discharged near the bottom thereof. In this scrubber suitable alkaline material is placed which removes from the gas the greater portion of the inert compounds therein. By manipu-  
 30 lating the valve 40, gas is permitted to pass from the scrubber 38 to the burner 41 located beneath the retort 36 in order to heat the same, it being understood that after the apparatus is once started it is unnecessary  
 35 to have a fire on the grate 35. In a manner similar to that already described in connection with Fig. 1, the gas passes from the scrubber 38 through conduit 42 into the retort 44. The retort 44 may be heated either  
 40 by means of gas passing from the scrubber 38 through the pipe 46 to the burner 47 or by means of the Bunsen burner 43. The purified gas is led from the retort 44 to a desired point of utilization by means of the  
 45 valved conduit 48.

It will be apparent from the foregoing that I have produced a novel and useful construction of apparatus for producing a gas in which the inert compounds have been re-  
 50 moved and while in the present instance I have shown the preferred embodiments thereof, which I have found in practice to give satisfactory and reliable results, it is to be understood that they are susceptible of  
 55 modification in various particulars without departing from the spirit and scope of my invention or sacrificing any of its advantages.

Having thus described my invention, what  
 60 I claim as new and desire to secure by Letters Patent, is:—

1. In a device of the character described, a gas producer, a condenser connected there-

with, a scrubber connected with said condenser, a retort having metallic content  
 65 therein connected with said scrubber and means for heating said retort by igniting the gas passing thereinto.

2. In a device of the character described, a gas producer, a condenser into which said  
 70 producer discharges, a steam connection discharging into said producer near the lower end thereof, a scrubber constructed to contain an alkaline solution connected with said  
 75 condenser, a conduit leading from said scrubber, a retort having metallic content therein connected with said conduit, means for igniting the gas passing through said  
 80 conduit and means for heating the said retort.

3. In a device of the character described, a gas producer, a condenser connected therewith, a scrubber constructed to contain an alkaline solution connected with said con-  
 85 denser, means for passing steam into said producer, a conduit leading from said scrubber, a retort having metallic content connected with said conduit, means for igniting the gas passing through said conduit,  
 90 a burner located beneath said retort and a valved conduit leading from said scrubber to said burner.

4. In a device of the character described, a gas producer, a condenser directly connected therewith and having an air chamber, a  
 95 steam connection discharging into said producer, a pipe leading from the condenser, an air chamber communicating with said steam connection, a scrubber constructed to contain alkaline material connected with said con-  
 100 denser, a conduit leading from said scrubber having a Bunsen burner therein, a retort having metallic content therein connected with said conduit and a valved conduit leading from said retort.  
 105

5. In a device of the character described, a gas producer, a condenser directly connected therewith and having an air chamber, a  
 110 steam connection discharging into said producer, a pipe leading from the condenser air chamber and communicating with said steam connection, a scrubber constructed to contain alkaline material connected with said  
 115 condenser, a conduit leading from said scrubber having a Bunsen burner therein, a retort having metallic content therein connected with said conduit, means for leading gas from said scrubber to ignite said Bunsen burner and a valved conduit leading  
 120 from said retort.

6. In a device of the character described, a gas producer, means for admitting air and steam therein, a condenser connected with  
 125 said producer, a scrubber constructed to contain alkaline material connected with said condenser, a conduit leading from said

scrubber, a retort having baffle plates therein connected with said conduit, means for igniting the gas passing through said conduit and means for heating said retort.

7. In a device of the character described, a gas producer, a condenser connected therewith, means for passing steam into said producer beneath the fuel, means for utilizing air from said condenser to mix with said

steam, a scrubber into which the gas passes 10 from said condenser, a retort having heated metallic contents therein into which the gas passes from said scrubber, and means for igniting the gas passing into said retort.

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Witnesses:

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