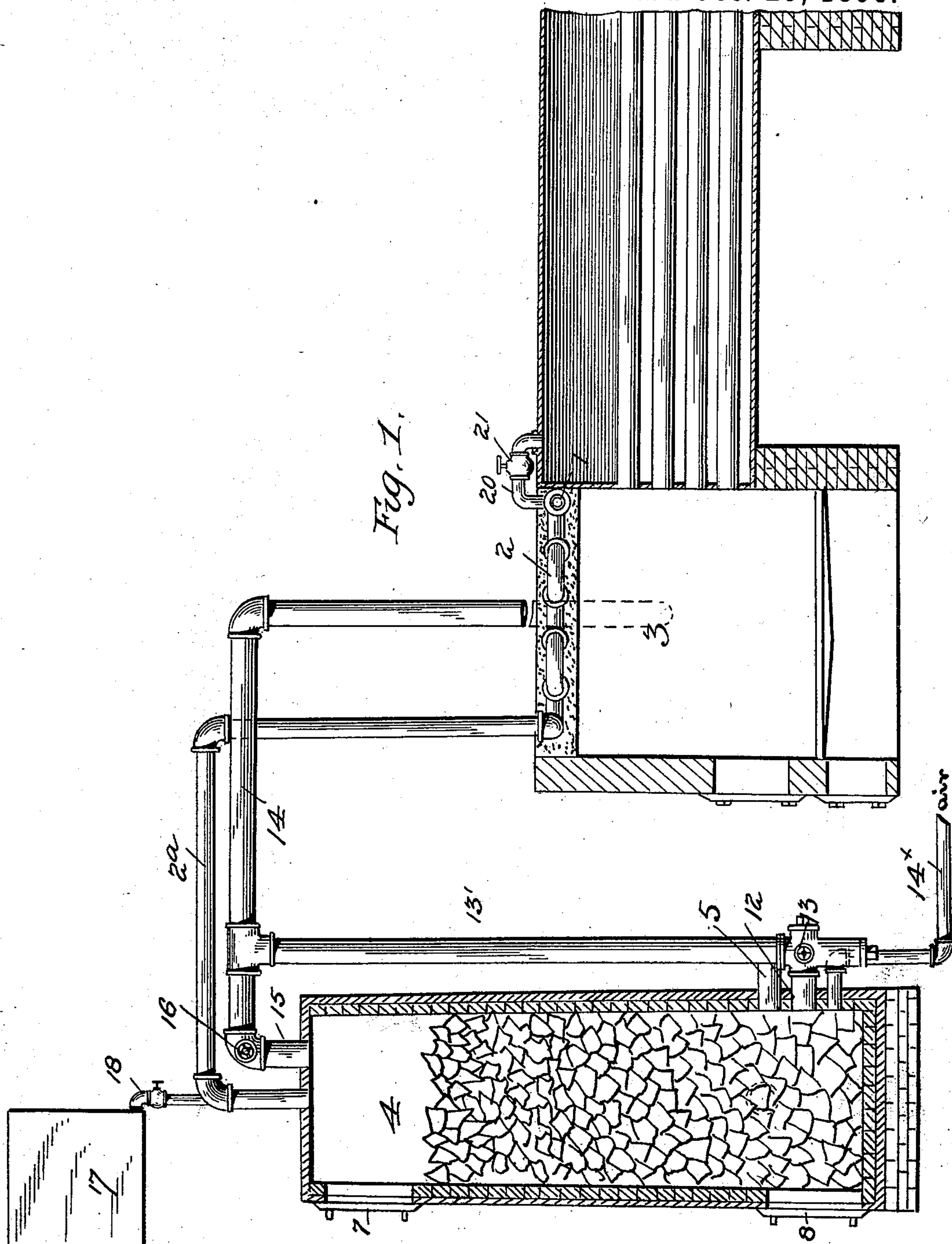


2 Sheets—Sheet 1.

No. 548,816.

Patented Oct. 29, 1895.



Attest  
Thos. F. Hall  
J. M. Spear

Inventor  
Thomas H. Paul  
by W. D. Wadsworth  
Attys.

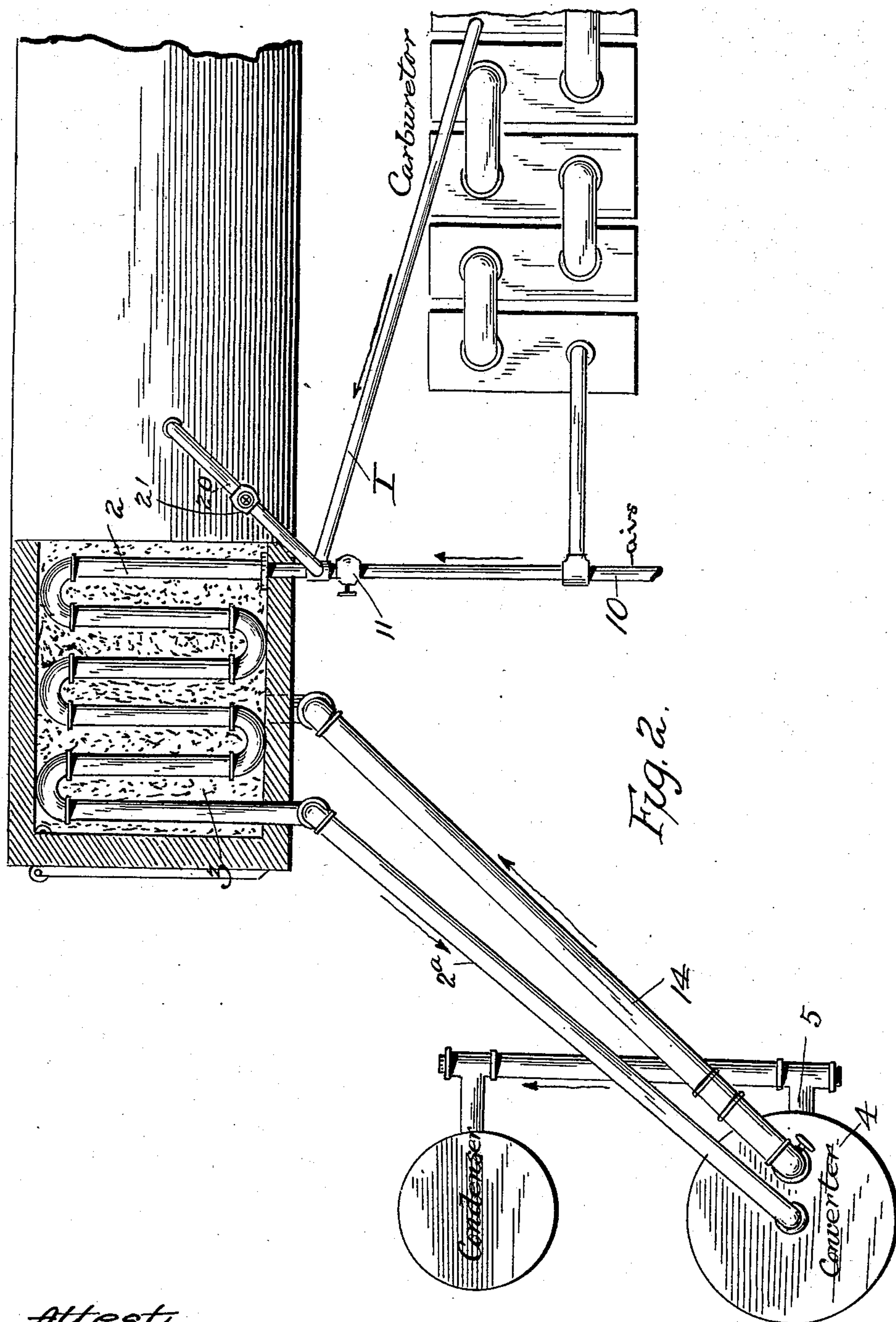
(No Model.)

2 Sheets—Sheet 2.

T. H. PAUL.  
APPARATUS FOR MANUFACTURING GAS.

No. 548,816.

Patented Oct. 29, 1895.



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# UNITED STATES PATENT OFFICE.

THOMAS H. PAUL, OF FROSTBURG, MARYLAND.

## APPARATUS FOR MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 548,816, dated October 29, 1895.

Application filed January 14, 1895. Serial No. 534,880. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS H. PAUL, a citizen of the United States, residing at Frostburg, in the county of Allegany and State of Maryland, have invented certain new and useful Improvements in Apparatus for Manufacturing Gas, of which the following is a specification, reference being had therein to the accompanying drawings.

10 It is the object of my invention to provide an apparatus for the economical manufacture of gas in which the highly-heated products of combustion escaping from the converter or fixer may be returned to the furnace to be  
15 burned.

My object is, also, to provide such an apparatus as will be durable and in which there will be no liability of the highly-heated parts being burned out.

20 My invention includes a boiler for supplying steam for the blower and injector, a mixer arranged to receive the steam-jet, a furnace for heating the boiler arranged to heat, also, the mixer, a vertically-arranged cupola into  
25 the top of which the mixed and enriched gas is introduced vertically, and an air-blast and outlet system connected with the top and bottom of the said cupola and having connections with the furnace whereby the products of  
30 combustion from the coke in the converter-cupola may be returned to the furnace to be reburned.

In the accompanying drawings, Figure 1 is a side view of the apparatus with parts in  
35 section, and Fig. 2 is a plan view.

The pipe 1 leads from the carburetors—such for instance, as shown in my United States Patent No. 470,629, dated March 8, 1892. From  
40 this pipe the carbureted air passes to the superheater-coil 2, arranged in the upper part of the furnace 3 and forming a roof for the same, said coil being embedded or filled in with asbestos or like material. The air and  
45 gas are superheated in this coil and thoroughly mixed and passes from the same to the top of the cupola or converter 4 and discharged vertically into the same upon a bed of incandescent coke contained therein. This cupola  
50 is of cylindrical form lined with fire-brick and filled to the point shown with the coke. In its passage through this bed of coke down to the outlet 5 the gas is freed from all impuri-

ties and converted into a fixed gas. From the outlet 5 the fixed gas passes to the condenser and washer, of ordinary form. The  
55 converter in this arrangement constitutes its own furnace, the coke therein being lighted and allowed to burn up to the desired point and then the gas is passed through and when the coke burns low the fire is blown by an  
60 air-blast, hereinafter described, until the desired heat is again reached, when the gas, which had been turned off during the firing up, is turned on again and the process is continued in this way.

65 The cupola is provided with an upper feed-door 7 and a lower ash-door 8. The bottom, as well as the top, is lined with fire-brick and in the bottom an ordinary grate may be arranged. This cupola is durable and is not  
70 liable to be burned out, as would be the case were the cupola heated by the furnace acting against its outer sides. The gas passes vertically through it, and the action of the coke therein is positive. In order to support the  
75 combustion of the coke, a pipe 10, through which the blast of air passes, connects with the superheater or mixer coil, and the valve 11 in the air-blast pipe is opened and the air  
80 passes through the superheating-coil and through the gas-pipe 2<sup>a</sup> into the cupola. The coke is thus fired and its combustion supported by the blast of hot-air, thus economizing in fuel and securing the maximum heating effect. This blast of air passing through  
85 the superheater-coils keeps them from being burned out, as does also the carbureted air in its passage through these pipes.

The smoke and products of combustion, during the firing up of the bed of coke through  
90 the hot-air blast, escape through the lower smoke-outlet 12, the valve 13 now being opened, and thence through the branch pipe 13' and pipe 14 to the furnace where said  
95 products are burned. In starting up the cupola the air-blast is introduced through the lower pipe 14<sup>x</sup> and the smoke escapes through the branch pipe 15, the valve 16 of which is now opened. The gas is enriched  
100 before passing into the cupola from the enricher-tank 17, having a valved connection 18 with the inlet-pipe for the gas. From this arrangement it will be seen that the manufacture of the gas is carried on in the most



economical manner, the air-blast being heated before being introduced into the cupola and the products of combustion from the cupola being burned in the furnace. The carbureted  
 5 air, before being mixed and superheated, is supplied with steam from a jet-pipe 20, extending from the boiler and controlled by a valve 21.

The superheater-pipes being embedded in  
 10 the asbestos answer the purpose of fire-bricks and prevent the pipes from being burned out.

The oil in the carburetors may be heated by the exhaust-steam. I can also use the hot-air, as this will in many cases answer the purpose.  
 15

I claim as my invention—

1. In combination in a gas manufacturing apparatus, a carburetor, a converter containing material to be heated to incandescence, an  
 20 outlet blast pipe for the converter a pipe between the converter and carburetor arranged independent of the said blast outlet, a condenser and a pipe connecting the converter and condenser independent of the blast outlet,  
 25 substantially as described.

2. In combination in a gas manufacturing apparatus, a carburetor, a converter, the supply pipe extending between them, the mixer interposed in the said connection, the furnace  
 30 for superheating the carbureted air and acting upon the said mixer, the said converter containing incandescent material, the connections for firing the said material to maintain the same independently of the furnace,  
 35 and the smoke pipe extending from the converter back to the furnace, substantially as described.

3. In a gas manufacturing apparatus, the supply pipe for the carbureted air the super-

heater or mixer, the furnace for heating the  
 40 same, the converter adapted to contain incandescent material and connected with the supply pipe and the smoke pipe extending from the converter back to the furnace, substantially as described.

4. In combination in a gas manufacturing apparatus, the carburetor, the converter containing incandescent material, the supply pipe  
 45 between them, the superheater or mixer interposed in said connection, the furnace for heating the mixer the air blast pipe connected with the mixer to be heated by the furnace  
 50 and thence passed to the converter, the condenser and the connection from the condenser to the converter to receive the gas after passing through the bed of incandescent material,  
 55 substantially as described.

5. In combination, the carburetor, the converter, the pipe connecting them, the mixing coil interposed in said pipe, the furnace  
 60 heating the mixer, the air blast connecting with the mixer, the said converter containing incandescent material, the smoke pipe leading from the converter back to the mixer  
 65 furnace whereby an air blast may be sent through the mixer to fire up the material in the converter, and the products of combustion be led back to the furnace, the boiler  
 70 arranged to be heated by the furnace and the steam jet from the boiler to the mixer, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS H. PAUL.

Witnesses:

THOS. G. PORTER,  
 M. R. GEER.