

BEST AVAILABLE COPY

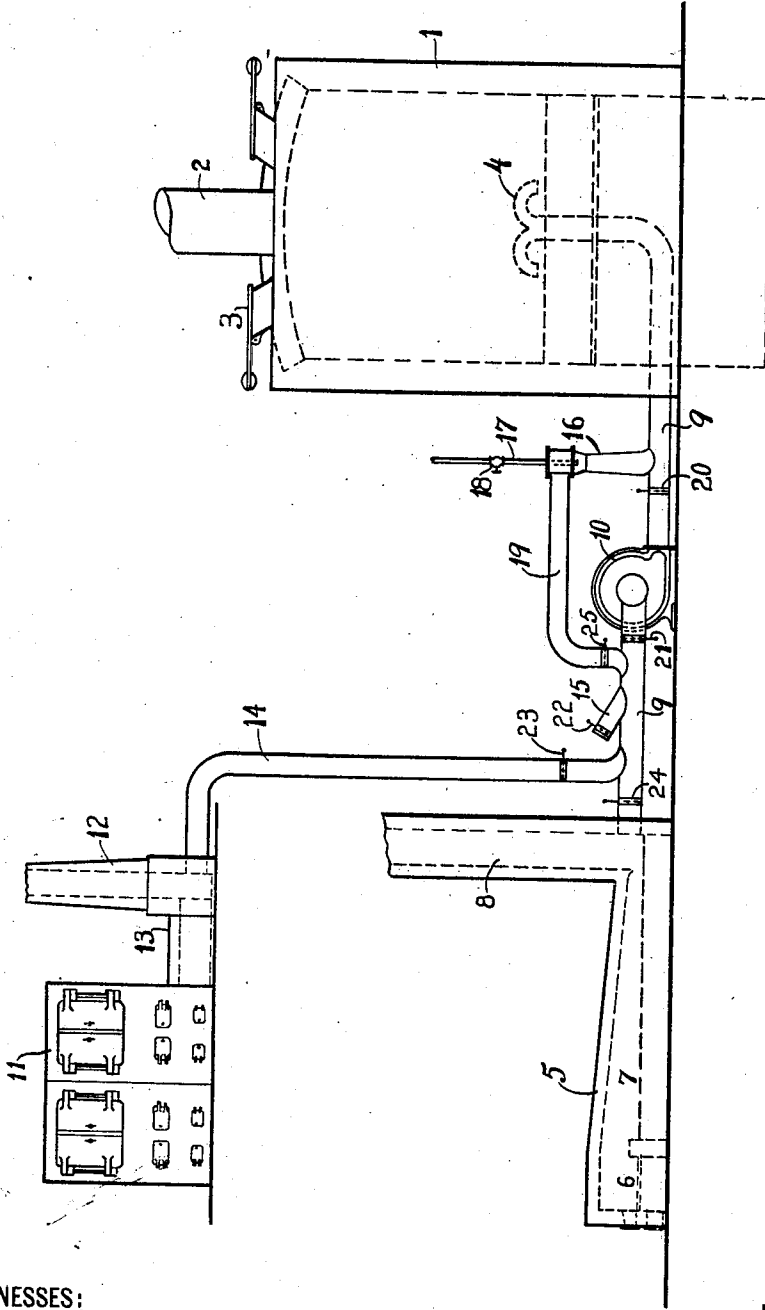
No. 814,001.

PATENTED FEB. 27, 1906.

C. ELLIS.

## PROCESS OF GENERATING GAS.

APPLICATION FILED MAY 5, 1905.



**WITNESSES:**

Warren E. Dixon.  
a. m. Senior.

INVENTOR

Carleton Ellis

## UNITED STATES PATENT OFFICE.

CARLETON ELLIS, OF NEW YORK, N. Y., ASSIGNOR TO COMBUSTION UTILITIES COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

## PROCESS OF GENERATING GAS.

No. 814,001.

Specification of Letters Patent.

Patented Feb. 27, 1906.

Original application filed March 6, 1905, Serial No. 248,468. Divided and this application filed May 5, 1905. Serial No. 259,037.

*To all whom it may concern:*

Be it known that I, CARLETON ELLIS, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Processes of Generating Gas, of which the following is a specification.

My invention relates to process for the manufacture of producer-gas in which carbon dioxide in lieu of the commonly-used steam is employed as the endothermic cooling agent for regulating or depressing the temperature of the fuel-producing mass.

In United States Patent No. 790,489 of May 23, 1905, I have described a method for the use of carbon dioxide and air for the purpose aforesaid which requires that the carbon dioxide or products of combustion used in the draft-current supplied to the gas-producing appliance be used alternately in a cooled and heated condition.

The present application is a division of the above-mentioned patent and relates specifically to the simultaneous use of heated and cooled products of combustion or carbon dioxide.

The use of the cooled carbon dioxide offers many advantages in most instances; but in some cases, however, hot carbon dioxide may be used to advantage. A well-known difficulty arising from the use of the latter, unless large quantities of steam be employed therewith, is that the gas-producer temperature is not easily controlled.

The present invention relates particularly to the use of such highly-heated products of combustion and in a novel manner of such a character that the evil effects heretofore experienced from the use of such intensely-heated gases are avoided.

My invention consists in the use of not solely hot products of combustion, but in the simultaneous use of hot products of combustion in conjunction with cooled products of combustion.

The advantages and employment of cooled products of combustion for gas-producer control have been described in my United States Patent No. 790,253, and I do not lay claim generically to the method therein disclosed. The simultaneous use of heated and cooled products of combustion constituting the pres-

ent invention is of great utility whenever hot furnace gases and cooled steam-generator stack-gases are produced in the same locality. The employment of products of combustion in this way permits of such control of producer temperature that the fuel is most economically and effectively gasified. For this purpose the apparatus shown in the accompanying drawing illustrates a means by which my process may be carried into effect.

In the drawing, 1 is a gas-producer having the gas-outlet 2, feed-hopper 3, and the blast-twyers 4.

5 is a reverberatory furnace having the grate 6, the hearth 7, and the stack 8. From the stack of this reverberatory furnace a conduit 9 leads to the producer-twyers 4. Interposed in this conduit is shown the fan-blower 10. At 11 is shown a steam-boiler having the stack 12 and connecting-flue 13.

14 is a conduit extending from the boiler-stack to the conduit 9, entering same on the inlet side of the fan.

16 is a steam-blower having the steam-pipe 17 and valve 18. 19 is a passage connecting the furnaces with the twyers 4 through the steam-blower 16.

20, 21, 22, 23, 24, and 25 are blast-gates for regulating the flow of the gases and air used in this process.

My method of operation is as follows: A deep bed of coal is brought to a suitable state of ignition in the gas-producer 1, the gas being drawn through the outlet and the green fuel being admitted through the hopper 3. Stack-gases are drawn through the pipe 9 in regulated amount from both the reverberatory furnace 5 and the steam-boiler 11. Those coming from the reverberatory furnace are in a highly-heated condition, while those coming from the steam-boiler are relatively cool, as they have been "water-cooled" by contact with the water-tubes of the boiler. These products of combustion mingle in the conduit 9, and to these are added, if found necessary, a regulated amount of air through the air-inlet 15. In case the fan-blower (shown at 10) is used for propelling the gases into the producer the gate 25 will be closed, while the gates 20 and 21 will be open. When it is desired to use steam in the gas or when it is found desirable to use only the steam-blower for propelling the products of combus-

tion and air into the producer, the gates 20 and 21 may be closed and the gate 25 may be opened. The mixture of heated and cooled products of combustion and air and, in certain cases, steam is passed through the producer, where it comes in contact with the ignited carbon contained in a deep bed of fuel. The oxygen of the blast is converted into carbon monoxid, while the carbon dioxid contained in the producer-blast is more or less reduced to carbon monoxid. A portion of the carbon dioxid introduced from external sources may act in such a manner as to create a partial pressure of carbon dioxid without the formation of carbon dioxid from the fixed carbon of the coal, in which case a considerable economy of fuel is brought about. Through the splitting up of the carbon dioxid introduced in the blast an endothermic absorption of heat is brought about and the temperature of the producer is kept at an effective gasifying-point, which is that at which no objectionable amount of soot or clinker forms to clog the producer and retard the uniform passage of the blast throughout the gas-producing mass of fuel. At very high temperatures the oxygen shows a selective action over the carbon of the fuel, and the

exothermic reaction therefore predominates over the endothermic reaction. This results in overheating the lower part of the fuel-bed. By introducing a mixture of hot and cooled products of combustion this overheating is largely prevented, and the amount of clinker which is formed is not objectionable.

What I claim is—

1. In the generation of gas in a gas-producer, the process which consists in supplying to the draft-current an endothermic body consisting of mixed and averaged products of combustion from different sources, whereby the temperature of said endothermic body may be regulated to any desired degree.

2. In the generation of gas in a gas-producer, the process which consists in supplying to the draft-current as an endothermic body, products of combustion from a furnace treating ore and admixing therewith further products of combustion from a boiler-furnace.

Signed at New York city, in the county of New York and State of New York, this 3d day of May, A. D. 1905.

CARLETON ELLIS.

Witnesses:

WARREN E. DIXON,  
A. M. SENIOR.