

UNITED STATES PATENT OFFICE.

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APPARATUS FOR MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 789,266, dated May 9, 1905.

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To all whom it may concern:

Be it known that we, BYRON E. ELDRED and CARLETON ELLIS, citizens of the United States, and residents of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for the Manufacture of Composite Gas, of which the following is a specification.

Our invention relates to apparatus for the manufacture of composite illuminating-gas, and particularly to the kind known as "coal" or "retort" gas.

The object of this invention is to effect a mixture of producer-gas with retort-gas of such a character that a composite gas is secured having a candle-power approximating that of ordinary retort-gas.

Producer-gas is much cheaper to manufacture per cubic foot than retort-gas. Its employment as an addition to retort-gas has in the past proved unsatisfactory, as such mixtures were deficient in illuminating power and low in heat energy. Producer-gas as ordinarily made through the action of an air-current carrying water-vapor or steam upon a mass of incandescent fuel is not suited for this purpose, as the extremely small amount of hydrocarbon volatilized by such a method makes the gas lean and unsatisfactory. The gas-producing system operated through the agency of a draft-current carrying carbon dioxide instead of steam has, however, proved capable of producing a gas rich in volatile hydrocarbons, and consequently possessing high luminosity. It is therefore suitable for admixture with retort-gas.

The apparatus hereinafter described illustrates a form of application which we regard as the best of the various means which may be employed to obtain satisfactory results in the production and admixture of producer-gas made by the aforesaid process with the retort-gas.

Our invention comprises apparatus for the generation of producer-gas by means of a draft-current supplied to the producer con-

taining carbon dioxide derived from products of combustion.

It comprises a retort-gas apparatus consisting of a gas-bench heated, preferably, by a coke-gas producer.

It further comprises mechanical draft appliances for impelling the various gaseous currents in their passage through the system, also various conduits, flues, dampers, and valves for the conduction, regulation, and adjustment of the relative proportions of gases entering into the reactions.

In the accompanying diagrammatic drawing, 1 designates a gas-bench having the retorts 3, heated by the attached producer 2, the fuel for which ordinarily is the hot coke derived from the retorts in chamber 1. The details of this gas-bench have not been fully shown, as they are well known in the art, and the method of operating the benches in connection with a coke-producer of the kind above indicated has been described in United States Patent No. 274,829. It will therefore suffice for the purposes of this invention to state that 23 is a passage connecting the gas-producer 2 with the combustion-chamber, in which the retorts 3 are situated.

24 is a passage for the admission and preheating of the secondary air required to support the combustion around the retorts.

25 26 are passages for the stack-gases from aforesaid combustion-chamber. The products of combustion in traversing these passages highly heat the adjoining passages through which the combustion-air is passing and cause the latter to acquire a high temperature.

27 and 28 are passages through which the blast-gases entering at 15 pass into the ash-pit 29 of the producer 2. The products of combustion after traversing the passage 26 enter the stack-tunnel 5.

The gas distilled from the retorts in chamber 1 passes into the conduit 4. The products of combustion from chamber 1 are discharged into stack-tunnel 5.

6 is a gas-producer having an inlet-pipe at

7 for the entrance of the gas-producing draft-current. The gases generated in its passage through the mass of incandescent fuel in producer 6 are withdrawn at 8 into pipe 9.

5 A fan-blower 10 connects with the stack-tunnel 5 by means of pipe 11. An air-inlet on the inlet side of the fan is shown at 12.

13 is a pipe connecting the fan with the gas-producer 6.

10 14 is a pipe connecting the fan with the gas-bench producer 2, entering the gas-producing chamber at 15.

The gates or valves 16, 17, 18, 19, 20, and 21 serve to proportion the relative amounts of the various gases employed in or discharged from the gas-generating system.

At 30 are shown water-cooled grates supporting the fuel in producer 6.

20 The pipe 9 joins the pipe 4 at 22, and from this point the gases are led to the various purifying apparatus, such as are ordinarily used in the manufacture of illuminating-gas.

The method of operation of such an apparatus is as follows: Products of combustion are drawn from stack-tunnel 5 by means of the fan-blower, and air is admitted through the pipe 12. A portion of this stack-gas and air mixture is sent through pipe 14 to the producer 2 to regulate and control its temperature and prevent the formation of clinker by the endothermic action of carbon dioxide on the lower layers of incandescent fuel. The valves 19 and 20 are adjusted until a mixture is found which gives the requisite amount of carbon dioxide to secure the desired temperature. The volume of gas delivered from the producer 2 may be regulated by the gate 21. Another portion of the aforesaid stack-gas and air mixture is impelled through pipe 13 to the gas-producer 6. The fuel used in this producer is preferably bituminous coal. The adjustment of the valve 18 affords the requisite regulation of the draft-current. The gas mixture introduced into the producer-chamber 6 acts endothermically in the manner al-

ready described and as there are no noticeable interreactions such as ordinarily occur in the use of steam, the volatile matter of the coal is distilled and carried away largely in the form of a fixed gas. The retort-gas and the producer-gas mingle at 22 and depart to the purifiers. This method of manufacturing composite illuminating-gas is a great improvement over any heretofore used. Less tar and coke are produced as by-products, and a gas of high candle-power and high thermal value may be made at a manufacturing cost fully one-third less than that of retort-gas and, too, with a relatively inexpensive plant. The manufacture of producer-gas is comparatively simple, as the regulation of the gas-producer by carbon dioxide is easily accomplished.

What we claim is—

1. In apparatus for the manufacture of illuminating-gas, the combination of a gas-bench provided with a suitable heating device, such as a coke-gas generator, a gas-producer adapted to gasify bituminous coal, a means for introducing into said gas-producer a draft-current carrying oxygen and carbon dioxide in predetermined proportions and means for mingling the retort-gas and the producer-gas.

2. In apparatus for the manufacture of illuminating-gas, the combination of a gas-bench provided with a suitable heating device, such as a coke-gas generator, a gas-producer adapted to gasify bituminous coal, a means for introducing into said gas-producer a draft-current carrying air and products of combustion in predetermined proportions and means for mingling the retort-gas and the producer-gas.

Signed at New York city, in the county of New York and State of New York, this 16th day of February, A. D. 1905.

BYRON E. ELDRED.
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Witnesses:

WARREN E. DIXON,
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