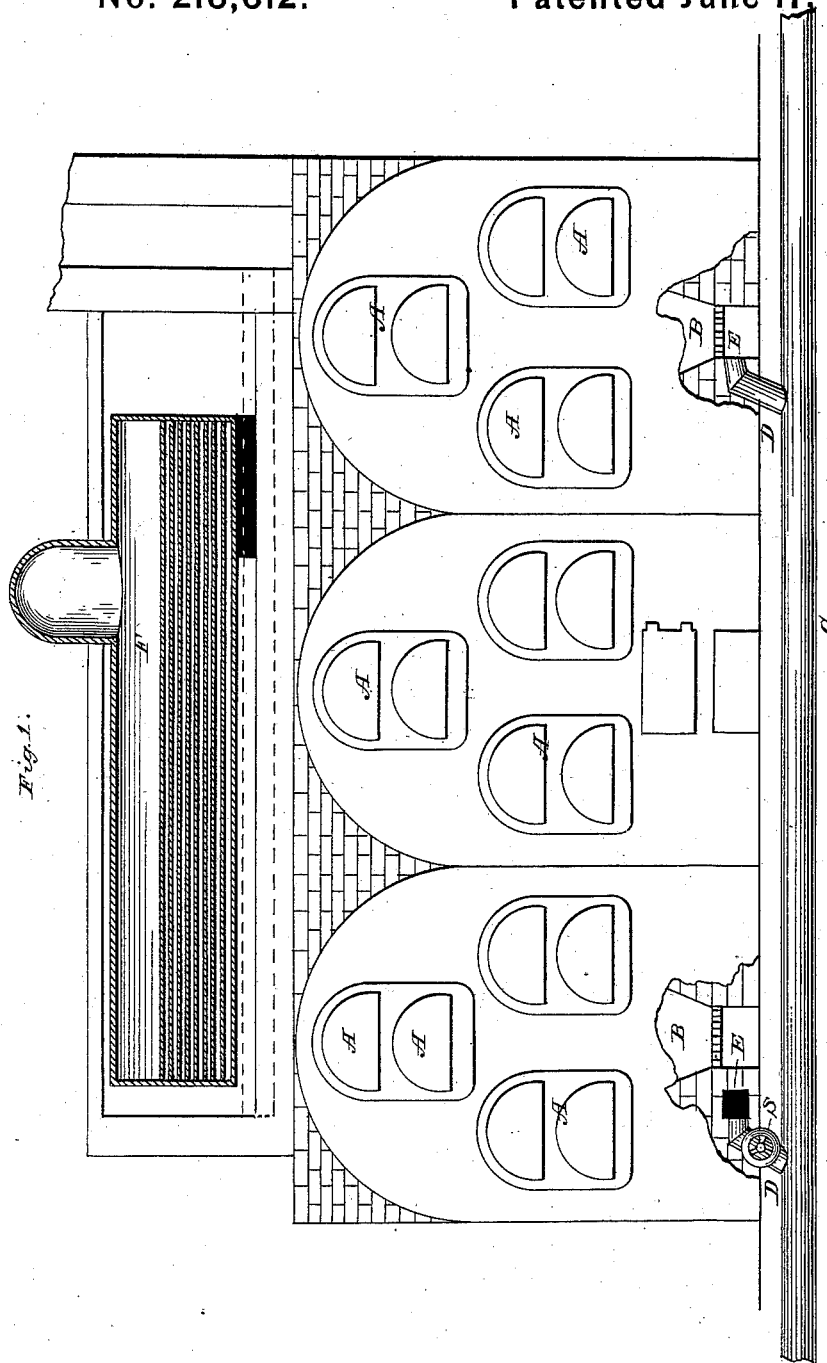


G. W. HARRIS & A. L. ALLEN.
Process and Apparatus for the Manufacture of Gas.

No. 216,612.

Patented June 17, 1879.



Attest:
W. C. Redmond
Alex. Scott

Inventor:
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Fig. 2.

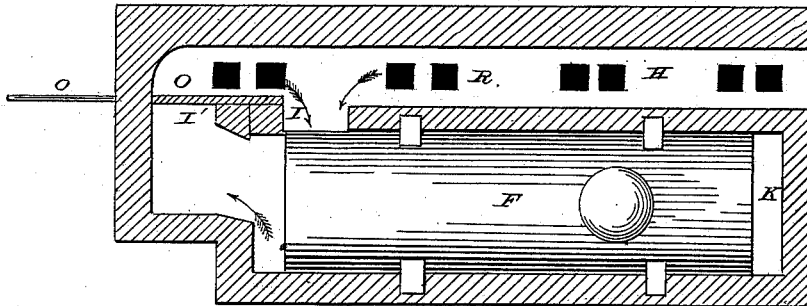
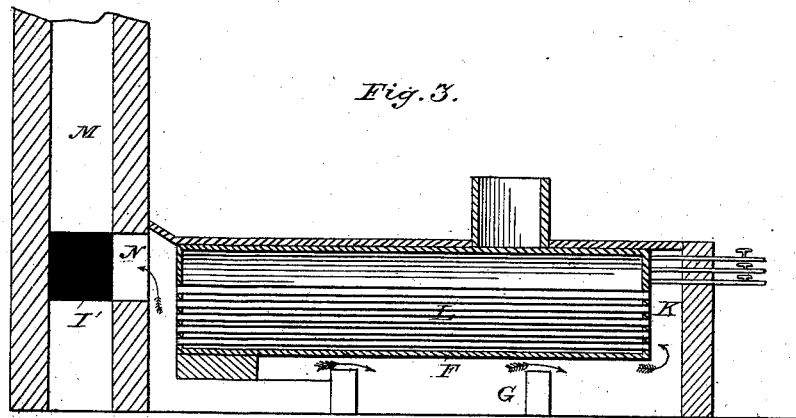


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE W. HARRIS AND AUGUSTUS L. ALLEN, OF POUGHKEEPSIE, N. Y.

IMPROVEMENT IN PROCESSES AND APPARATUS FOR THE MANUFACTURE OF GAS.

Specification forming part of Letters Patent No. **216,612**, dated June 17, 1879; application filed August 20, 1878.

To all whom it may concern:

Be it known that we, GEORGE W. HARRIS and AUGUSTUS L. ALLEN, of Poughkeepsie, in the county of Dutchess and State of New York, have invented certain new and useful Improvements in the Manufacture of Gas, which improvements are fully set forth in the following specification and accompanying drawings.

This invention relates to certain improvements in the manufacture of gas for heating and illuminating purposes, and apparatus therefor, and it is particularly designed to be employed in connection with what is known as the "Allen-Harris or American hydrocarbon process of manufacturing gas," in which the gas is produced by the decomposition of water by means of highly-heated carbon, and afterward enriched by distilling with it rich bituminous coals, petroleum, or other hydrocarbon, in order to secure the necessary illuminating properties, and at the same time to increase its volume.

In the manufacture of gas by the decomposition of water, it is essential to maintain the decomposing-retorts at an intense heat. To effect this it is absolutely necessary that a large quantity of oxygen should be supplied to and caused to pass through the fuel. This has heretofore been accomplished by giving the products of combustion from the furnace a direct passage to the chimney to create the necessary draft. When the intensely-heated products of combustion, however, are thus allowed to directly escape, it is evident that great waste of available heat occurs, entailing useless expense in the manufacture of the gas, which it is the object of our present invention to obviate by utilizing the waste heat to generate the steam in a suitable boiler for subsequent decomposition.

It has been found in practice, however, that if a boiler or generator is interposed between the exit-flues of the furnace and the chimney it forms such an obstruction to the draft that the proper intensity of heat cannot be obtained in the furnace.

We have discovered that, by the use of anthracite coal or other non-bituminous fuel,

and a forced blast of air through the same, the proper intensity of heat for the decomposition of the water may be maintained in the decomposing-retorts, while at the same time the waste heat may be utilized for generating the steam for subsequent decomposition for the manufacture of the gas; and to this end our invention consists, first, in an improved method of heating gas-retorts, and utilizing the waste-heat of the furnace by charging the fire-box of the furnace with anthracite coal or other non-bituminous fuel, urging the combustion by a forced air-blast through the fuel, and conducting the waste products of combustion through flues, so as to heat a steam boiler or generator, whereby the steam for subsequent decomposition is generated, as more fully hereinafter specified; second, in the combination, with the furnace, of a bench of retorts, consisting of one or more hydrogen-retorts and one or more hydrocarbon or oil retorts, of an air-blast pipe leading into the furnace below the fire-box, and a boiler located above the retorts and heated by the waste heat of the furnace, as more fully hereinafter specified.

In the drawings, Figure 1 represents a front view of a series of furnaces and benches and a boiler located above the same with portions of the walls of the furnace cut away, showing the boiler and flues around the same in longitudinal section. Fig. 2 represents a view looking down upon the boiler, the upper part of the furnace being removed in order to show the flues around the boiler; and Fig. 3 represents a longitudinal section of the boiler and the upper part of the furnaces.

The letter A represents a series of retorts arranged in benches above the furnace B. At the front of the benches, preferably below the floor of the retort-house, extends a pipe or main, C, which is connected with an air-forcing apparatus of any suitable description. From the pipe C extend a series of branch pipes, D, entering the ash-pits of the respective furnaces, as shown at E, or a chamber, E', extending around, or partially around, the ash-pit, and communicating with the same, whereby the air will be warmed before escaping into

the ash-pit, the mouth of which may be closed by a suitable door when the furnace is in operation.

The benches of retorts are arranged above their respective furnaces, and are connected with each other in the manner usually practiced in carrying out the Allen-Harris process of manufacturing gas, the retorts at the sides of each bench forming what are technically known as the "hydrogen-retorts," and the intermediate retorts "the hydrocarbon or oil retorts," of the benches, and, as this arrangement of retorts is common and well known, no further description of the same is here deemed necessary.

The letter F represents a steam-boiler, which may be of any suitable description, an ordinary horizontal tubular boiler being illustrated in the present instance. Said boiler is located above the fire-chamber of the furnace or furnaces, in the path of the escaping products of combustion.

In the present case it is represented as located in a flue, G, extending across the upper part of the furnaces B B B above the retorts. At one side of said flue G, and running parallel with it, is a flue, H, communicating with said flue G by means of an opening or passage, I. Said flue G, at the end opposite the passage I, opens into a short vertical flue, K, which connects with the tubes I of the boiler, the said tubes leading into an escape flue or chimney, M, through a passage or flue, N.

The flue H also leads into the escape flue or chimney M through an opening or passage, I'.

The letter O represents a damper, adapted to be shifted by means of a damper-rod, o, so as to fall opposite the passage I or the passage I', as may be desired, in order to pass the products of combustion into the flue G' when it is desired to heat the boiler, or directly into the chimney in order to start the fires in the furnaces, or cut off the heat from said boiler.

From the respective furnaces or combustion-chambers of the same extend a series of vertical or uptake flues, R R, which terminate in the flue H, for the purpose of conducting the products of combustion from the furnaces to said flue H, and from thence to the flues under and through the boiler.

The operation of our invention is as follows: The furnaces, retorts, and boiler being properly charged and the fuel in the furnaces fired, the air-blast is turned on, so as to force a current of air up through the burning fuel. This causes an active combustion, resulting in an intense heat around the retorts. Owing to the intensity of the heat thus produced, the escaping products of combustion are highly heated, which heat is absorbed and utilized by the water in the boiler or steam-generator, generating the steam for subsequent decomposition.

I claim—

1. The method herein-described for heating gas-retorts, and utilizing the waste heat of the furnace by charging the fire-box of the same with anthracite coal or other non-bituminous fuel, urging the combustion by a forced air-blast through the fuel, and conducting the waste products of combustion through flues for heating a steam boiler or generator, all substantially as herein set forth.

2. In combination with the furnace of a bench of retorts, the hydrogen-retorts and hydrocarbon retort or retorts, a dry air-blast pipe leading into the furnace below the fire-box, and a boiler located on top of the furnace for supplying steam to the hydrogen-retorts, and heated by the waste heat of the furnace, substantially as herein specified.

GEO. W. HARRIS,
AUGUSTUS L. ALLEN.

Witnesses:

H. P. ALLEN,
AUG. H. ALLEN.