H. P. & A. L. ALLEN & G. W. HARRIS.

Processes and Apparatus for Generating Heat.

No. 154,166. Patented Aug. 18, 1874.

Fig. 1.

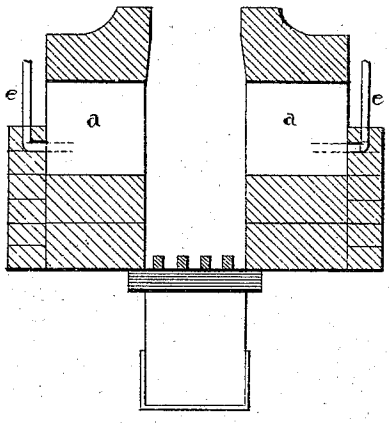


Fig. 2.

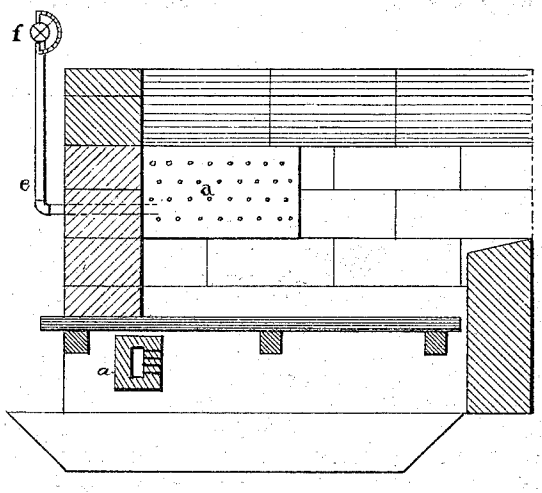


Fig. 3.

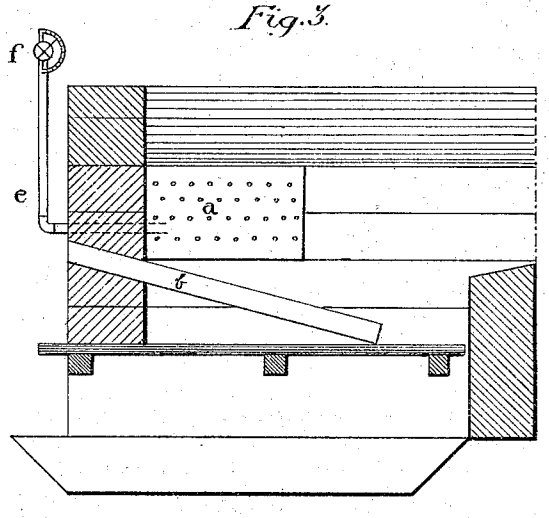
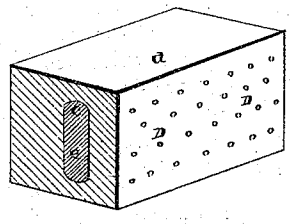


Fig. 4.



Witnesses.

Alfred H. Allen

John B. Talmage

Inventors.

H. P. Allen

A. L. Allen

Geo. W. Harris,

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

HORATIO P. ALLEN, OF NEW YORK, AUGUSTUS L. ALLEN, OF POUGHKEEPSIE, N. Y., AND GEORGE W. HARRIS, OF ELIZABETH, N. J.

IMPROVEMENT IN PROCESSES AND APPARATUS FOR GENERATING HEAT.

Specification forming part of Letters Patent No. **154,166**, dated August 18, 1874; application filed July 14, 1874.

To all whom it may concern:

Be it known that we, HORATIO P. ALLEN, of the city of New York, AUGUSTUS L. ALLEN, of the city of Poughkeepsie, county of Dutchess, State of New York, and GEORGE W. HARRIS, of the city of Elizabeth, county of Union and State of New Jersey, have invented and made an improvement in the use of gases made from the decomposition of steam, in combination with bituminous and other coals, bitumens, petroleum and other oils, and coal-tar, or any or either of them, separately or in conjunction, for heating purposes, of which the following is a specification:

Our invention relates to a new and improved method and apparatus for burning the gas produced by the Gwynne-Harris process or ordinary "water-gas," in connection with anthracite or bituminous coal, petroleum, bitumen, or other similar fuel, for the purpose of generating an intense heat for heating retorts, furnaces, ovens, kilns, and the like; and it is particularly designed for heating gas-retorts.

The principal difficulty in substituting any other material in place of bituminous coal for the manufacture of illuminating-gas is the want of suitable and economical fuel in the place of coke, one of the products obtained in the ordinary process of manufacturing gas from such coal. Bituminous coals, bitumen, coal-tar, and oils have such an excess of carbon that in the use of them in any considerable quantities for fuel a large portion passes off unconsumed, thereby choking up or obstructing the fire flues or passages under the benches, preventing the regular and high heat required, and causing a great loss of valuable fuel for want of proper combustion. Similar difficulties exist in using such materials in all furnaces, ovens, kilns, and stoves. Anthracite coal will not produce sufficient heat for the purpose of manufacturing gas, as it is not quick, free, and regular enough in its combustion.

The object of our invention is to greatly lessen, if not to wholly obviate, all of the above difficulties by introducing a volume of the gases produced by the decomposition of steam, ordinarily known as water-gas, into the furnace, oven, kiln, or grate in which the coal, bitumen, or other fuel is being consumed, so that when such gases are ignited in combination with such fuel there will be a full, free, and perfect combustion of the smoke or volatile carbons thereof, and when anthracite coal is used as fuel a regular and intense heat is produced. Bitumen and anthracite coal, bitumen and oils, or other compounds may be used in conjunction with such gases with advantageous and economical results. Our invention consists in a new and improved method of burning water-gas in conjunction with the products of combustion of anthracite or bituminous coal, bitumen, coal-tar, petroleum, or other like fuel by bringing the two together in the upper part of the furnace, as will be hereinafter described, and also in a new and improved apparatus or furnace for burning the gases and fuel in conjunction.

In the drawing, Figure 1 represents a front view of a furnace constructed according to our invention; Fig. 2, a longitudinal section of the same; Fig. 3, a longitudinal sectional view of a modification of our invention, showing a furnace for burning coal-tar, coal-oil, and the liquid hydrocarbons in conjunction with the water-gas; and Fig. 4 shows a perforated tile, which forms part of the furnace, and by means of which the water-gas is introduced into the same.

In the front part, at each side of the furnace, is placed a narrow perforated tile or block of fire-clay or other suitable material, (indicated by the letter *a*,) the perforations opening into the furnace some distance above the grate-bars. When bituminous coals or other substances rich in hydrocarbons are used the perforated tiles should be so placed in the side walls that the greater part of the gases will enter the furnace above the surface of the coals, and will instantly combine with the products of combustion of the same, and the tiles should be of sufficient length to conduct the gas well into the furnace. We prefer that they should be about eighteen inches in length, twelve inches in height, and of a thickness equal to the side walls of the furnace. These dimensions may be varied, however, according to the size of the furnace. These tiles or blocks are formed with chambers or passages *c c*, for the

reception of the gases which are admitted at the front end of the furnace through the pipes *e e*. D D are the apertures or perforations through which the gases escape into the furnace. The tubes *e e* may be provided with a register, F, which will regulate and indicate the amount of gas entering the furnace.

We sometimes place the perforated tile immediately below the fire-grate, in the front of the furnace, horizontally across the same. In such case it should be of sufficient length to rest securely in the side walls of the furnace, and the perforations should be made at the rear, to prevent the same from being clogged by the ashes falling from the grate. The gases, when thus admitted, combine and are consumed with the products of combustion of the coal or other fuel at the moment they are eliminated. In some cases we employ both forms of the tile in the same furnace with great advantage.

When oil, coal-tar, or liquid hydrocarbons are employed as the fuel, in conjunction with water-gas, we make use of the furnace shown in Fig. 3, which is similar to the furnace first described, but is provided with a clay tile, *b*, extending backward from the front to near the rear of the furnace in an inclined direction, as shown. The coal-oil or coal-tar is admitted to the upper end of said tile by means of suitable pipes, and allowed to drip down the same, so that when ignited the flame therefrom will come in contact with the flame from such gases, creating an intense heat.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The method herein described of generating heat by burning water-gas, in conjunction with the products of combustion of coal, bitumen, coal-oil, coal-tar, and other similar fuel, alone or mixed, as and for the purposes herein specified.

2. In combination with a furnace, the chambered and perforated tiles *a*, for admitting the gases to said furnace, as herein described.

3. In combination with the furnace provided with the perforated tiles *a*, the tile *b*, for the purpose of supplying and burning liquid hydrocarbons in conjunction with water-gas, as herein set forth.

H. P. ALLEN.
A. L. ALLEN.
GEO. W. HARRIS.

Witnesses:
AUG. H. ALLEN,
JOHN B. TALMAGE.