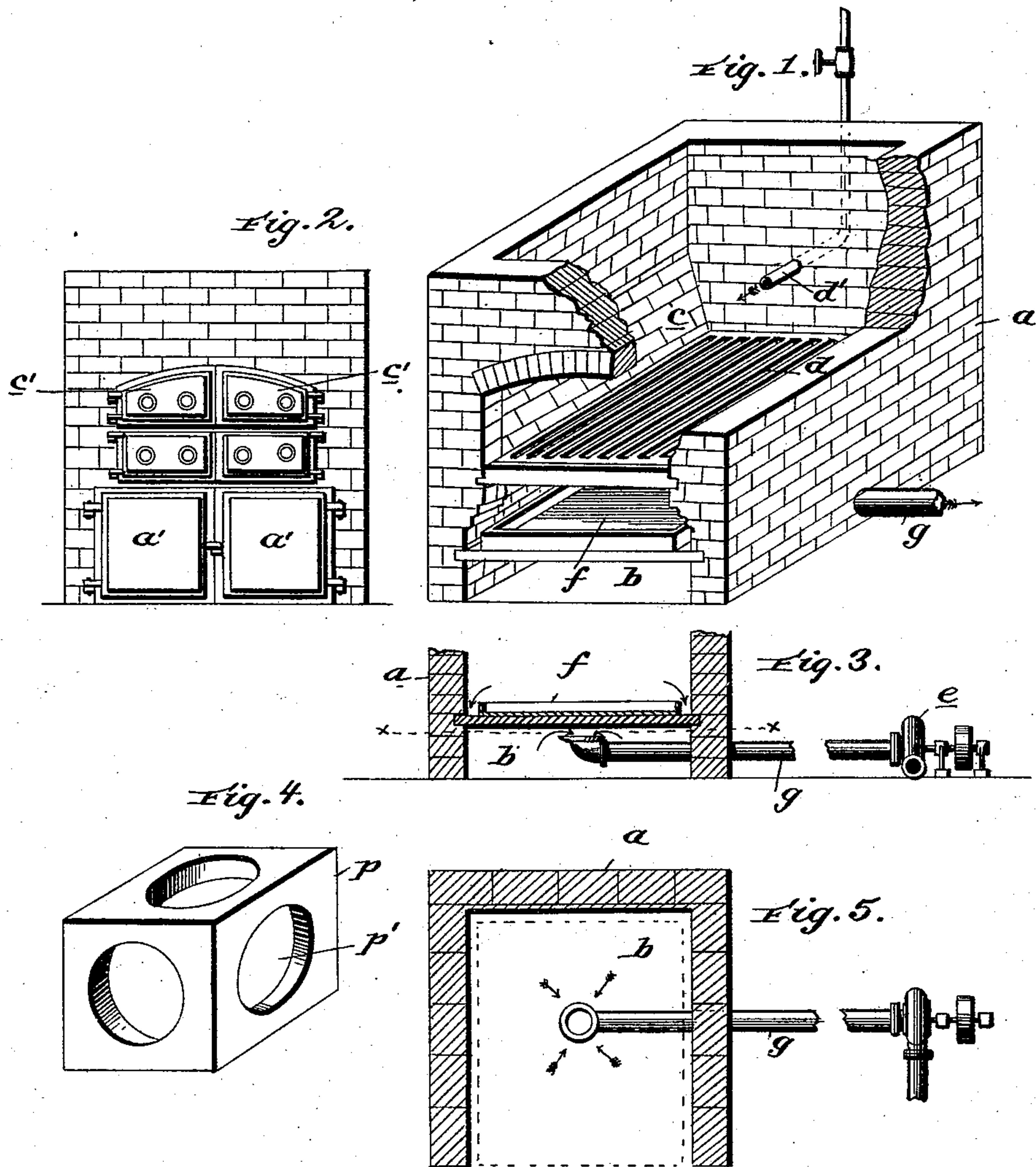


(No Model.)

E. A. ERB.
PROCESS OF TOTAL COMBUSTION.

No. 478,693.

Patented July 12, 1892.



Witnesses:
Chandler
H. F. Matthews.

Inventor
Emil A. Erb.
By *James Shuey*
Attorney

UNITED STATES PATENT OFFICE.

EMIL A. ERB, OF APPLETON, WISCONSIN.

PROCESS FOR TOTAL COMBUSTION.

SPECIFICATION forming part of Letters Patent No. 478,693, dated July 12, 1892.

Application filed February 12, 1891. Serial No. 381,233. (No specimens.)

To all whom it may concern:

Be it known that I, EMIL A. ERB, a citizen of the United States, residing at Appleton, in the county of Outagamie and State of Wisconsin, have invented certain new and useful Improvements in Processes for Total Combustion; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in the combustion of carbonaceous fuel of various descriptions; and it has for its object to provide for an approximately perfect combustion of the fuel and the production of a high temperature for various purposes, as more fully hereinafter explained.

Combustion is usually effected in furnaces by the admission of atmospheric air below the fuel which has been ignited, the combustion being kept up by the continuous admission of air throughout the process. The oxygen of the air, which combines with the carbon of the fuel and supports combustion, results in the formation of carbonic-acid gas and other products of combustion, which are carried off by high chimneys, which create the necessary draft. The carbonic acid, being a non-supporter of combustion, has a tendency to dampen the process of the combustion while being drawn up through the fuel, interfering with the perfect combustion thereof and reducing the intensity of the heat which might otherwise be produced. As the carbonic acid is much heavier than air, I take advantage of its specific gravity to clear the fuel of the same, and assist the escape of the gas by the exhaust-fan pump or other exhaust devices. When the bituminous coals are employed, they are liable to run together at high temperatures and obstruct the passage of the carbonic-acid gas, and the same obstruction occurs in the use of anthracite or harder coals when they are small or are employed in the form of breeze or coal-dust, the particles of which pack together and prevent the passage of the gases. To obviate this, I employ in connection with the fuel cubical blocks of iron, which are perforated from side to side and which are mixed with the fuel in any

quantities desired, or short tubes of iron may be used instead. These afford free passage of the gas through the fuel, so that it may sink by gravity and be drawn off from below. 55

In the fuel-chamber steam is injected, whenever the iron cubes are red-hot, to augment the heat at will. By the decomposition of water (in the steam) hydrogen is formed with its intense heat, and oxygen in the iron by hydrogen composition (FeOFeO_3) (formed at the same time) is disengaged, and by its (oxygen) combustion to some extent the total combustion of coal is accomplished, even to the exclusion (of the oxygen) of air. 65

Any furnace in which the products of combustion of the fuel may be drawn off from below may be employed; but in practice I prefer the following:

Figure 1 represents a perspective view of a portion of a furnace with parts broken away in order to more clearly show the interior. Fig. 2 represents a front elevation of the furnace. Fig. 3 represents a transverse vertical section of the lower part of the furnace. Fig. 4 represents a perspective view of one of the perforated cubical blocks, and Fig. 5 represents a transverse vertical sectional view taken on the line xx of Fig. 3. 75

Referring to the drawings, a indicates the walls of the rectangular furnace, b the ash-pit, and f the ash-pan thereof. 80

The letter c indicates the fuel-chamber, and d the grate thereof.

The letter c' indicates the doors of the fuel-chamber, and d' the doors of the ash-pit. 85

Into the fuel-chamber, at a proper distance above the grate, extends a steam-supply pipe d' , and from the ash-pit extends a pipe g , which connects with an exhaust-fan e , by means of which the escape of the products of combustion of the fuel may be assisted, the course being shown by the arrows. 90

The letter p indicates a cubical block of iron provided with apertures p' . A number of these blocks are intended to be distributed throughout the fuel in the furnace to offer free passage for the gas. 95

It will be seen that by my process the carbonic-acid gas naturally passes off below, and, if necessary, is assisted, thus leaving the fuel free to combine with fresh oxygen through- 100

out the whole process, resulting in almost perfect combustion and the generation of a high degree of heat.

Having described my invention, what I claim is—

1. The herein-described improvement in the combustion of carbonaceous fuel, the same consisting in mixing the fuel with perforated iron cubes or other forms of perforated iron, so as to facilitate the running off of the generated carbonic-acid gas by its own gravity, substantially as described.

2. The improvement herein described in the combustion of carbonaceous fuel, the same consisting in running off the generated carbonic-acid gas by its own gravity assisted by an exhaust-fan or other exhaust-pump devices, and further assisted by feeding fuel mixed with perforated iron cubes or other

forms of perforated iron, substantially as specified.

3. The improvement herein described in the combustion of carbonaceous fuel, the same consisting in running off the generated carbonic-acid gas by its own gravity assisted by an exhaust-fan or other exhaust-pump devices, and further assisted by feeding the fuel mixed with perforated iron cubes or other forms of perforated iron, and further assisted by injecting steam in the fuel-chamber, substantially as specified.

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

EMIL A. ERB.

Witnesses:

T. J. FRANKLIN,
JOS. E. LINNER.