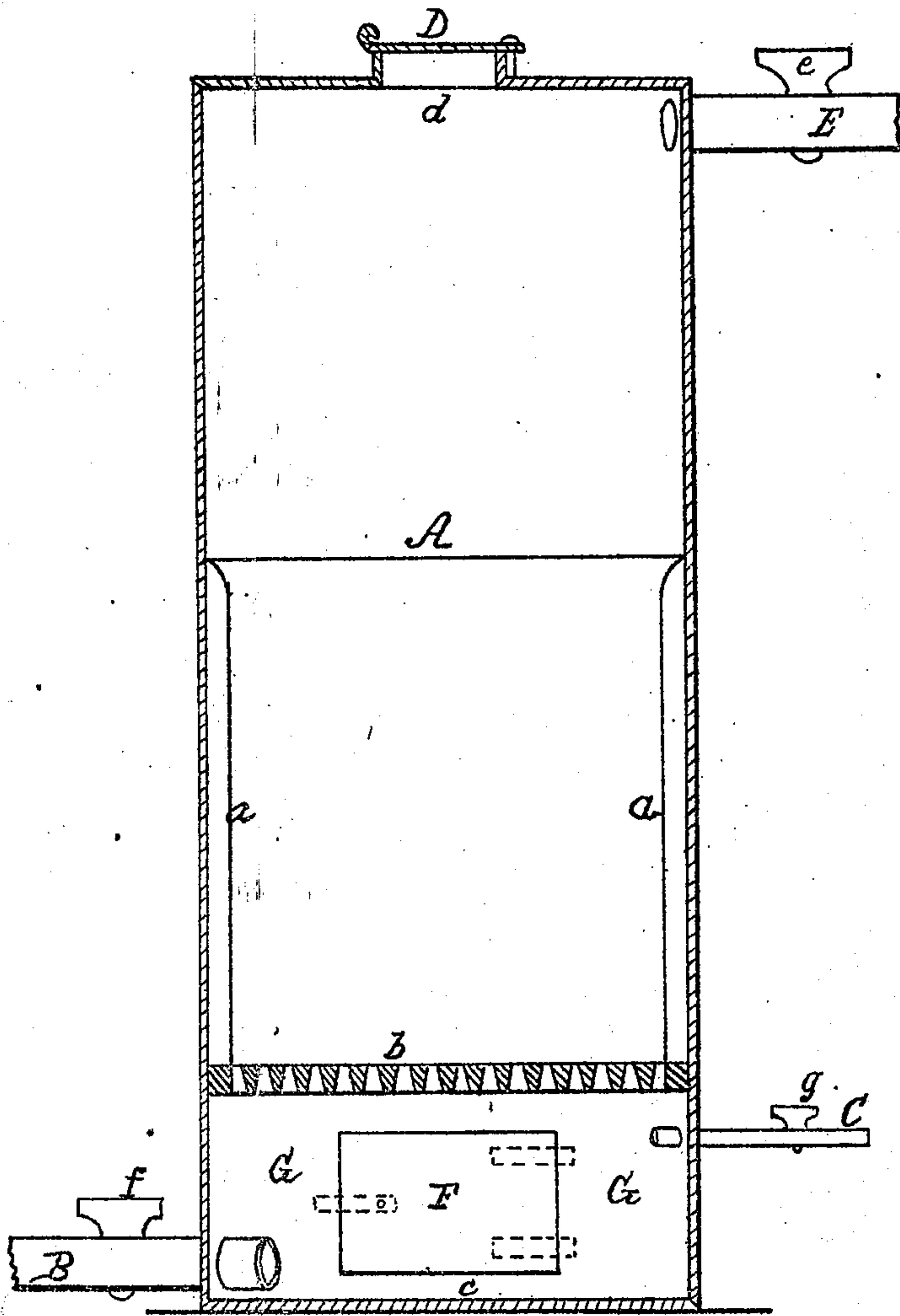


*J. M. Sanders.*

*Steam-Gas Furnace.*

*Nº 92.212.*

*Patented Jul 6. 1869.*



Witnesses

*A. C. Wilson*

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# UNITED STATES PATENT OFFICE.

J. MILTON SANDERS, OF NEW YORK, N. Y.

## IMPROVED FURNACE FOR GENERATING STEAM-GAS.

*Specification forming part of Letters Patent No. 92,212, dated July 6, 1869.*

*To all whom it may concern :*

Be it known that I, J. MILTON SANDERS, of the city, county, and State of New York, have invented certain new and useful Improvements in Steam-Gas Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents a vertical section through a furnace which I have found to answer a good purpose, but which, of course, may be modified without changing the general characteristics of the invention.

The object of my invention is to decompose steam by passing it through ignited coke, charcoal, or other suitable form of carbon, so as to save its hydrogen and oxygen for after use, as will be explained, and in such manner as to make the operation economical and easily controlled; and

My invention consists in combining, with a fire-chamber or furnace, air and steam inlets, introduced through a tight chamber, and gas-outlets, controlled by stop-cocks or cut-offs, so that the ignition of the carbon fuel may be kept up, or brought up, after it has been reduced by the passage of the steam into or through it, and the steam shut off, or the steam let on and the draft shut off, while a corresponding closing or opening of the gas escapes or avenues is made, as will be explained.

To enable others skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawings.

The furnace or fire-box A may be of such varied dimensions as circumstances may require, and may be made of boiler-iron and lined with fire-clay, bricks, or other suitable material, as shown at *a a*. Or it may be built entirely of bricks or any other material. The grate *b* is set so as to leave a chamber, G, between it and the bottom *c* of the furnace, which chamber, though accessible through a door, F, for the purpose of cleaning it out, is tight or close. On the top of the furnace there is an opening, *d*, controlled by a tight-fitting cover or cut-off, D, which opening I term a gas-outlet, though it may be used as an inlet for supplying the coke, charcoal, or other form of carbon to the fire box or chamber. Near the top of the furnace is an exit-pipe, E, controlled by a cock, *e*, through which pipe the hydrogen

and carbonic oxide, made by the decomposition of the steam passing through the ignited carbon, may pass into any suitable gasometer or receiver.

Into the chamber G is introduced a pipe, B, leading from a fan-blower, bellows, or other draft-supply, and controlled by a cock, *f*. Into the same chamber is also introduced a pipe, C, controlled by a cock, *g*, which pipe leads from a steam generator or superheater, and is designed for admitting the steam into or shutting it off from the close chamber G.

The furnace or fire-chamber having been charged with the coke, charcoal, or other suitable form of carbon, the latter is blown up to red heat by opening the passage from the blower through B, as also opening the flue or passage through *d*, to make a suitable draft. As soon as the carbon has reached the temperature of ignition, the flue *d* is closed by its cover D, and likewise the passage or draft through the pipe B. The opening through the pipe E to the gasometer or other receiver and holder is disclosed, and steam is allowed to flow through the pipe C into the bottom of the furnace or chamber G.

The steam in passing through the ignited carbon becomes decomposed, its oxygen combining with a portion of the carbon and forming a carbonic-oxide gas, and its hydrogen passes through intact to the gasometer. This flow of steam, and consequent generation of the above-named gases, must be continued until the carbon falls below the point of ignition, when the steam must be cut off and the pipe B opened to allow the blast or draft to come in and bring the carbon again up to a red heat. Before, however, the blast or draft is let on, the cover D must be removed from the flue *d* to allow the gas inclosed in the furnace to escape, which it will instantly do in virtue of its light specific gravity, and the cock *e* in the pipe E is also closed, to prevent the gas in the gasometer escaping. The air from the blower being let on and into the furnace, as before, and the carbon again brought up to a red heat, the blast is shut off, the opening *d* closed, the cock *e* opened, and the steam (dried or superheated, by preference) let on, and the gases are again generated. Thus the steam-gas is obtained by alternately fanning the carbon up to ignition by a blast or draft, and generating gas until the fall of temperature of the



carbon requires another kindling or brightening up, and so on.

The steam-gas thus made is without illuminating property, but burns with a flame of a blue color. To render this steam-gas luminous, it may be passed through a carbureter containing some light hydrocarbon, where it will combine with sufficient of the hydrocarbon to become highly illuminating. Or the steam-gas as it comes hot from the furnace may be passed through a hydrocarbon, in which case the hydrocarbon need not be of so light a specific gravity. Or, the crude petroleum may be caused to flow into the furnace simultaneously with the decomposition of the steam, where the gas derived from the latter will combine with the petroleum-vapor, forming the illuminating-gas in question. By either of these methods the gas combines chemically with the hydrocarbons, forming an illuminating-gas of

great brilliancy, and more permanent than coal-gas, the steam-gases being inflammable ones and therefore capable of holding the hydrocarbon with an affinity stronger than that with which coal-gas holds its illuminating material.

Having thus fully described my invention, what I claim therein as new, and desire to secure by Letters Patent, is—

An apparatus for generating steam-gas, consisting of a furnace, air and steam inlets introduced through a close chamber under said furnace, and gas-outlets controlled by stop-cocks or cut-offs, and the whole arranged to operate as herein described, and for the purposes set forth.

J. MILTON SANDERS.

Witnesses:

GEO. H. KEITH,  
CHAS. A. SMITH.