

P. W. MACKENZIE.

FURNACE FOR PRODUCING HEATING GASES.

No. 189,367.

Patented April 10, 1877.

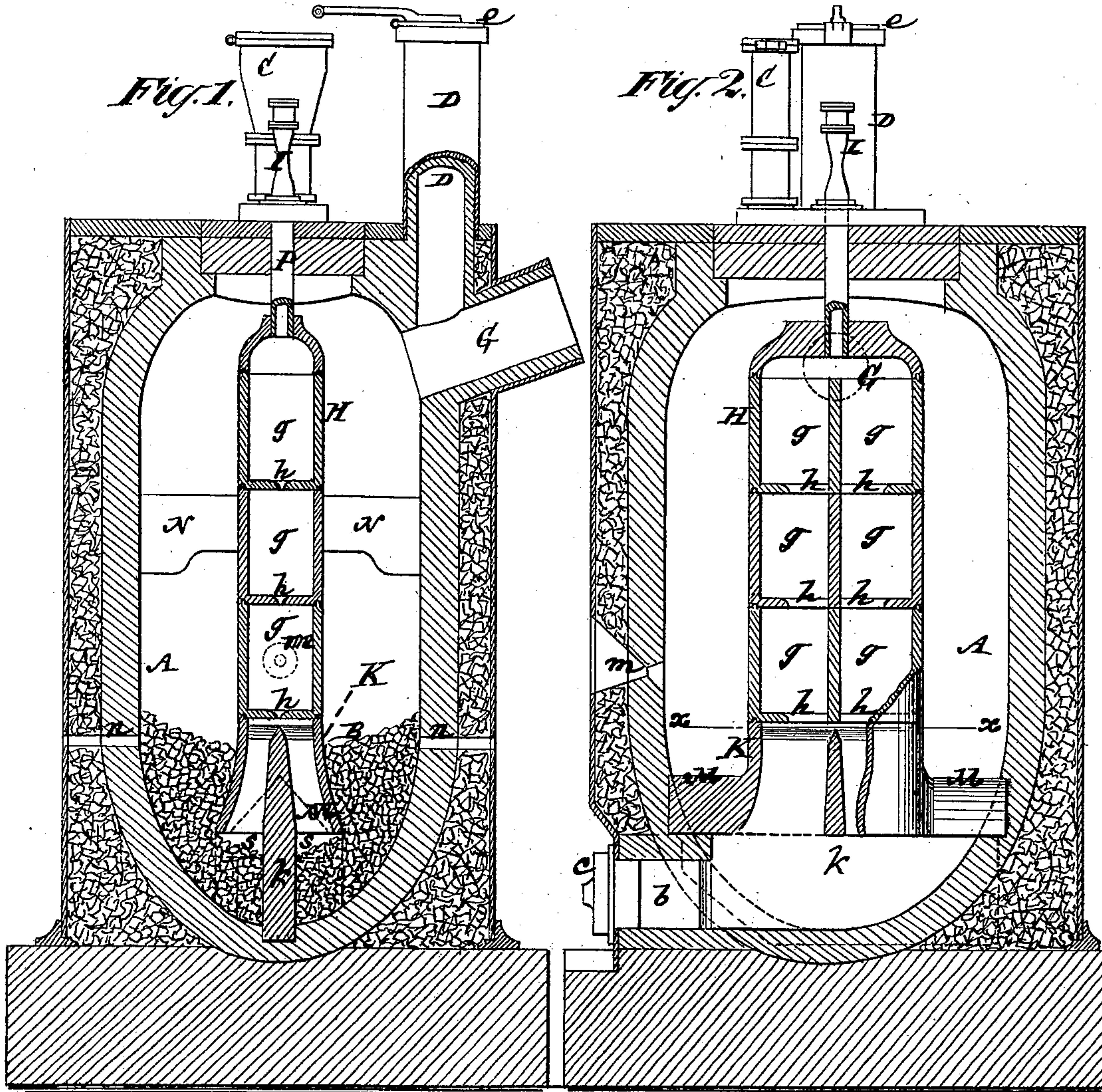
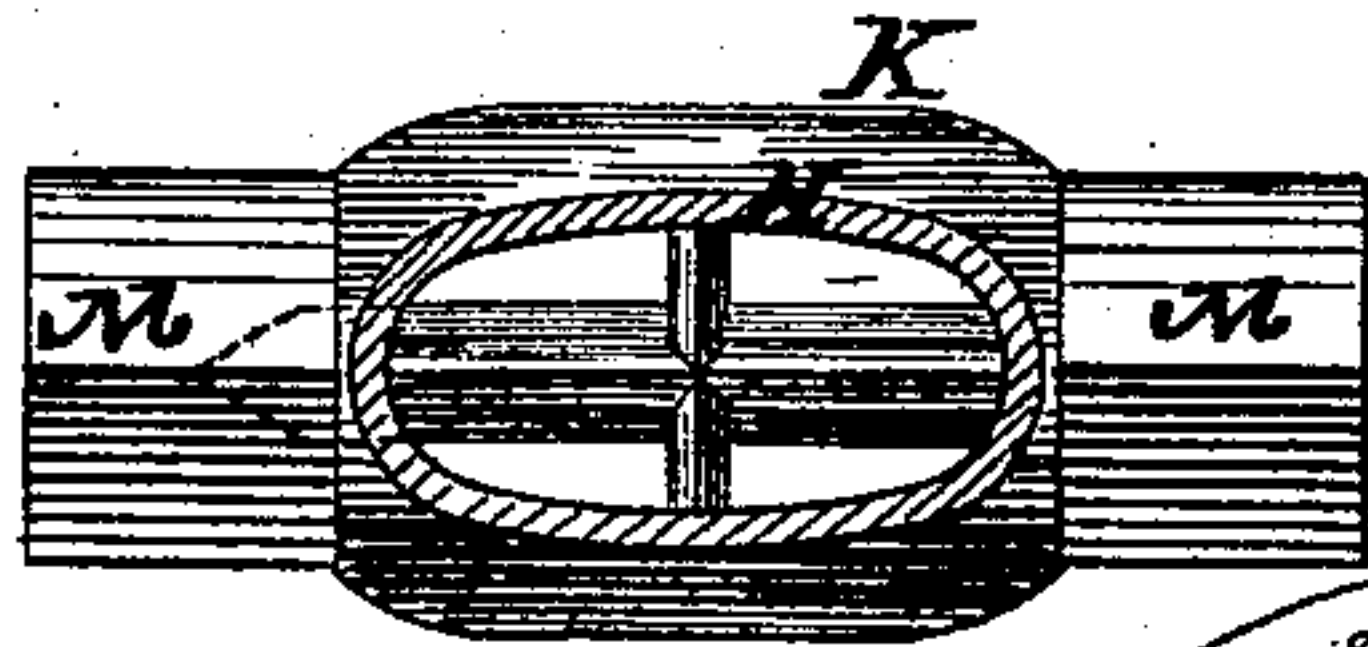


Fig. 3.



Witnesses
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PHILIP W. MACKENZIE, OF BLAUVELTVILLE, ASSIGNOR TO THE SMITH & SAYRE MANUFACTURING COMPANY, OF NEW YORK, N. Y.

IMPROVEMENT IN FURNACES FOR PRODUCING HEATING-GASES.

Specification forming part of Letters Patent No. **189,367**, dated April 10, 1877; application filed June 15, 1876.

To all whom it may concern:

Be it known that I, PHILIP W. MACKENZIE, of Blauveltville, in the county of Rockland and State of New York, have invented certain new and useful Improvements in Furnaces for Producing Gases for Heating Purposes; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

This invention relates to furnaces for producing a mixture of hydrogen, carbonic-oxide, and nitrogen gases for heating purposes, principally by the combustion of carbon with the gases resulting from the decomposition of water, as by the process described in Letters Patent No. 165,347, issued to me July 6, 1875, and which generally consists in burning suitable carbonaceous material and keeping it at a white heat in a close chamber, and passing through said heated material the gases derived from steam heated to its decomposing temperature while said gases are at such temperature.

In carrying out my invention I usually employ a steam-superheating retort similar to that used in putting my improved process as above referred to into practice, so far as said retort is composed of a series of hollow sections mounted one upon another, with contracted communications between them for obtaining prolonged exposure and up-and-down circulation of the steam as it passes downward through the retort into and through the heated carbonaceous material, as described in my patent, No. 168,265, for gas apparatus issued September 28, 1875. But this invention essentially differs from such apparatus in several important respects. Thus, I dispense with a separate fire for heating said retort, and arrange the latter within the furnace itself in which the carbonaceous material is contained, and heat it by the gases within said furnace. This combination of a steam-superheating retort with the furnace constitutes a leading feature of my invention, which furthermore consists in a peculiar construction of the lower part of said retort, whereby the steam at a decomposing temperature is distributed through the burning carbonaceous

material. The invention likewise includes one or more bridges extending from said retort to the sides of the furnace, above the aperture or apertures used to rake out the ash from the furnace, whereby the fresh or burning carbonaceous material is prevented from passing out with the ash.

In the accompanying drawing, Figures 1 and 2 represent sectional elevations, at right angles with each other, of my improved furnace or apparatus; and Fig. 3, a horizontal section through the retort on the line *xx*.

In view of the reference which has hereinbefore been made to the process on which this invention operates, and the apparatus on which it forms an improvement, it will only be necessary here to fully describe the distinguishing features of the invention.

A is the furnace proper and gas-generating chamber of the apparatus. Said furnace, which is an upright and close one, is constructed of any suitable refractory and non-conducting materials, and may be of any desired shape in its horizontal section. It may be made without a grate, the coke, coal, or other carbonaceous material, B, resting on the bottom of the furnace, and only being piled up for a limited distance within it. The kindling of said material is effected through an aperture, *b*, which is afterward closed by a stopper, *c*, and the combustion kept up by the current or currents of superheated steam and air, as hereinafter described.

C is a hopper, fitted with a lid, for supplying the furnace with fresh carbonaceous material as required; and D is the chimney for the natural draft when kindling the fire, but which is also afterward closed by a damper or lid, *e*.

G is the outlet from the furnace for the resultant gases.

H is the sectionally-constructed retort, for superheating the steam, and for introducing it at a decomposing temperature within and through the burning carbonaceous material B. This retort is arranged in an insulated manner up within the furnace A, and is heated externally by the gases generated within the furnace. The steam, which is introduced to said retort above through a pipe, P, with or

without a small proportion of atmospheric air, by means of a steam-injector, I, of any suitable description, circulates up and down within the compartments *g* of the retort, passing from one compartment to the other in a downward direction by means of the contracted communicating apertures *h*, till it is finally discharged, in its necessary highly-superheated state, through an open bell-mouthed chamber, K, which forms an adjunct to or extension of the retort at its bottom, and forms or leaves on either side of a base-support, *k*, a receiving space or cavity, *s*, for the steam at a decomposing temperature to collect in and distribute itself through the burning carbonaceous material, which is kept burning by the oxygen contained in the steam and atmospheric air.

The resultant gases produced by the decomposed elements of the steam, with the carbon of the fuel, fill the entire space in the furnace above the fuel, and keep up the necessary temperature of the retort, which, being of a much larger transverse area than the pipe P, which supplies it, presents a large heating-surface in proportion to the steam passing through it, and also provides for the expansion within it of the steam to be superheated, so that the superheating is very effectually performed.

This heating of the retort by the gases of the furnace is not only economical by avoiding separate firing, but enables me to use a larger amount of steam, increasing the proportion of hydrogen gas produced in the apparatus.

One or more inverted V or arched shaped bridges, M, are arranged to connect the chamber K at its base with the sides of the furnace above the kindling-aperture *b*, which latter also serves as the hole for raking out the ashes. Such bridge or bridges serve to support the upper body of coal or carbonaceous material from passing out along with the ashes.

The stoking is done through an aperture, *m*, and the furnace furthermore provided with one or more peep-holes, *n*.

N N are side supports for staying the retort.

I claim—

1. The combination, with the furnace proper for generating heating-gases, of a steam-superheating retort, provided with delaying devices, said retort being of a larger transverse area than the pipe which supplies it with steam, and arranged within the furnace, substantially as and for the purpose or purposes herein set forth.

2. The interior bell-mouthed distributing-chamber K, in combination with a steam-superheating retort and its surrounding or inclosing furnace A, essentially as described.

3. The combination of one or more bridges, M, the chamber K, and the furnace proper A, with its ash-clearing aperture *b*, substantially as and for the purpose specified.

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Witnesses:

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