

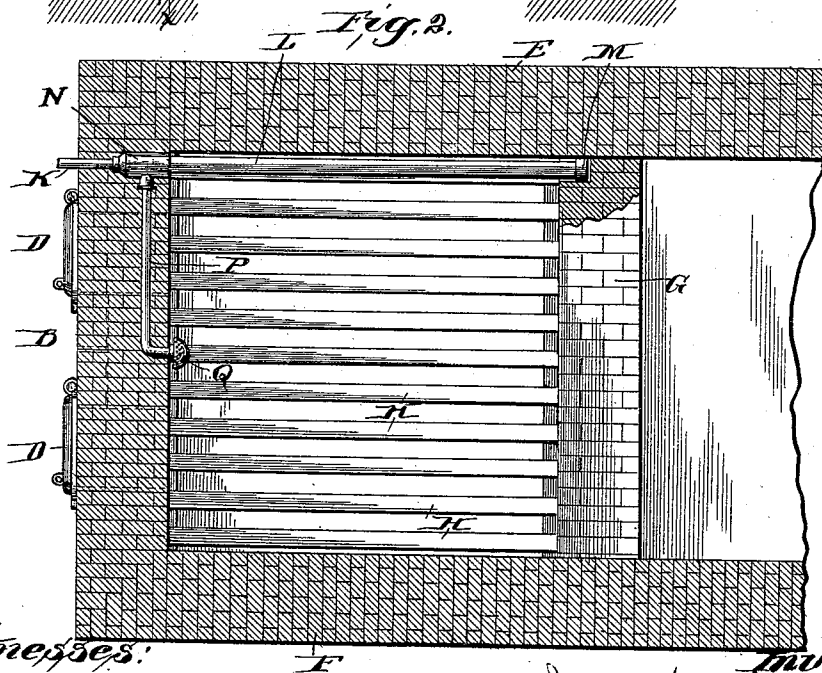
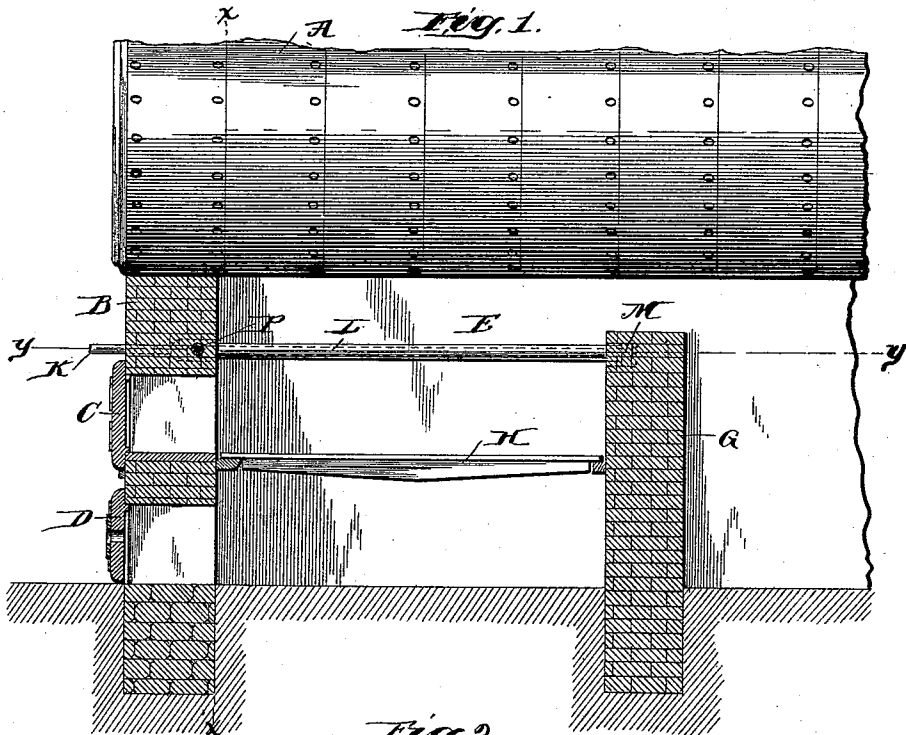
(No Model.)

2. Sheets—Sheet 1.

J. N. MERRILL.
SMOKE CONSUMER.

No. 469,212.

Patented Feb. 16, 1892.



Witnesses:

Wm. M. Rheem.

Wm. H. Smith.

Inventor

John N. Merrill

*By Butterworth Hall Brown
attys*

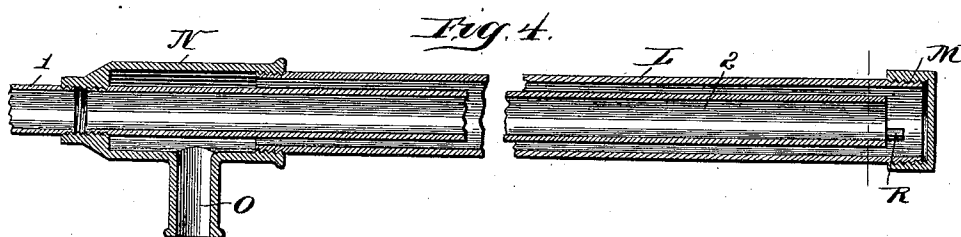
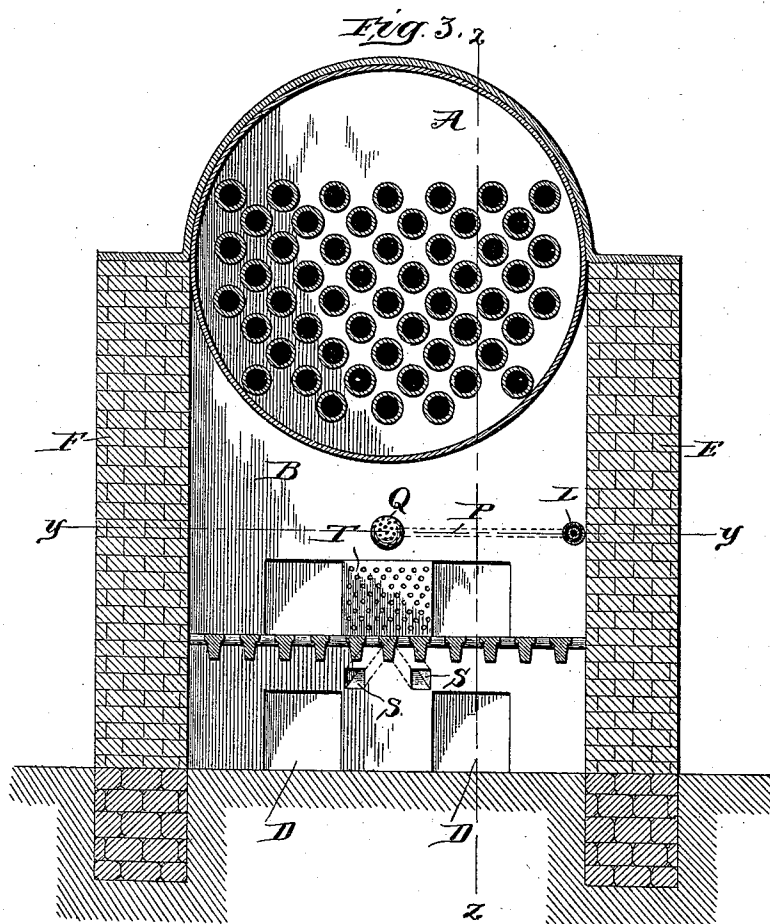
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2 Sheets—Sheet 2.

J. N. MERRILL.
SMOKE CONSUMER.

No. 469,212.

Patented Feb. 16, 1892.



Witnesses:

Wm. M. Rheem.
Jm. H. Scott.

Inventor
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UNITED STATES PATENT OFFICE.

JOHN N. MERRILL, OF BURLINGTON, IOWA, ASSIGNOR OF ONE-HALF TO
SAMUEL E. NIXON, OF SAME PLACE.

SMOKE-CONSUMER.

SPECIFICATION forming part of Letters Patent No. 469,212, dated February 16, 1892.

Application filed April 13, 1891. Serial No. 388,679. (No model.)

To all whom it may concern:

Be it known that I, JOHN N. MERRILL, a citizen of the United States, residing at Burlington, in the county of Des Moines and State of Iowa, have invented a new and useful Improvement in Smoke-Consumers, of which the following is a specification.

My invention relates to an improvement in smoke-consumers in furnaces; and its object is to provide for a more perfect consumption of the carbon and gases evolved in the combustion of coal and passing off in smoke; and I attain this object by the mechanism shown in the accompanying drawings, in which—

Figure 1 is a vertical sectional view through the doors of the furnace and the ash-pit, and is taken upon the line $z z$ of Fig. 3. Fig. 2 is a horizontal sectional view taken upon the line $y y$ of Figs. 1 and 3. Fig. 3 is a vertical cross-sectional view taken upon the line $x x$ of Figs. 1 and 2. Fig. 4 is a detail view of the steam-pipes employed in communicating heated steam from the boiler to the furnace; and Fig. 5 is a detail cross-sectional view of the two pipes, one inclosed within the other and held in place by means of lugs.

A represents the boiler in the ordinary position above the furnace, which latter is constructed of masonry or otherwise.

B represents the front wall of the fire-chamber and ash-pit.

C represents the door to the fire-chamber or grate, and D the door opening into the ash-pit.

E and F represent the side walls of the fire-chamber, and G represents the rear wall of the fire-chamber and ash-pit.

H represents the ordinary fire-grate, supported in the usual manner in the fire-chamber.

K represents the pipe which proceeds from the steam-chamber of the boiler and is introduced through the wall, by means whereof the steam from the boiler is introduced into the fire-chamber through my device, as hereinafter explained, for the purpose of superheating the steam, effecting its dissociation, and forcibly ejecting it into the fire-chamber.

L represents a larger tube or pipe into which the small pipe K is introduced, as hereinafter explained.

M is a head that is put upon the interior end of the larger tube or pipe.

N is a coupling and joint with an eduction-pipe O, through which the steam and dissociated gases pass into the pipe P, upon the end of which is attached a nozzle Q, the convex surface of which is provided with perforations for spraying or scattering the superheated steam and dissociated gases upon the fuel in the fire-chamber and into the mixture of smoke and gases evolved therefrom.

T represents a plate filled with perforations, permanently located at the interior of an air-chamber, which in the drawings is located between the doors C of the fire-chamber, and this air-chamber is provided with ports in the bottom of the chamber, which extend downwardly and inwardly with openings S S into the chamber of the ash-pit, so that air may be drawn through these ports and passages into the air-chamber and through the openings in the plate P into the fire-chamber. It is to be understood that this air-chamber, with the perforated plate P, is preferably located between the two openings or doors C C when the furnace is constructed with two such doors; but when constructed with a single door or otherwise it may be located upon the side of the single door or at such other location as may be deemed advisable, provided that its ports and openings S S are introduced into the ash-pit, so as to draw air therefrom.

It is not absolutely indispensable that the ports or openings for the supply of air into the air-chamber through the perforations in the plate P shall proceed from the chamber of the ash-pit, although I prefer that construction. The air may be admitted from the outside by some other well-known means without departing from the spirit of my invention.

As already stated, the smaller pipe K is connected with the steam-chamber of the boiler and is conducted to a proper point, where it is introduced through the wall of the furnace-chamber, and is preferably made in sections, as shown in Fig. 4, section 1 being connected with section 2 by means of screw-threads in the coupling N, by which means the larger tube L is made to inclose the smaller one K, and at its interior end a cap M is fast-

ened upon the end of L by screw-threads, as shown. Of course it is not essential that the larger pipe shall have its interior end closed by a cap with screw-threads, as shown, although that is desirable and preferable in order to have access to the interior of the pipes; but it may be inclosed by permanent means.

In order to support the central pipe K in proper relation to the sheath or exterior pipe L, lugs are introduced at different points, which may be permanently attached to the interior pipe K or exterior pipe L, as may be desired. The coupling N is provided with an eduction-pipe O, which connects with the pipe P, which proceeds toward the central portion of the fire-chamber and is there provided, as already stated, with the nozzle Q, being wholly within the chamber. I prefer that the coupling N and the end piece M and also the pipe P shall be wholly within the walls of the furnace and not exposed to the intense heat of the furnace, for the reason that the heat is apt to loosen the screw-threads or joints and impair the efficiency of the coupling, although their location within the wall is not absolutely essential, and they can be located either within or without the fire-chamber without departing from the spirit of my invention. The steam, already heated to a high degree in the boiler, passes through the pipe K into the space between it and the sheath or exterior pipe L, and is there retarded by the enlarged space through which it must pass and is exposed to the intense heat of the fire-chamber, and the steam, being superheated, is to a large extent dissociated into its gases, hydrogen and oxygen, so that by the time it reaches the nozzle Q it is forced into and sprayed over all parts of the fire-chamber, coming in contact with the fuel and also the smoke and gases evolved therefrom. The escaping steam and gases being forced toward the direction of the rear wall of the chamber necessarily creates a draft and causes

a larger amount of cold air to be drawn from the ash-pit or from the outside of the chamber, as the case may be, and the oxygen and hydrogen of the dissociated steam and the oxygen from the fresh air thus introduced have the effect of igniting and consuming the combustible smoke and gases evolved from the burning fuel, thus preventing the escape of a large quantity of combustible matter and increasing the intensity of the heat and reducing the quantity of fuel necessary for the heating of the boiler.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination, with a steam-boiler, of a furnace provided with an air-chamber in its bridge-wall and an air port or ports leading from the floor of said chamber, said air-chamber having a perforated plate or door, a steam-pipe leading from the steam-chamber of the boiler and entering the fire-chamber through and in a sheathing or inclosing tube or pipe of larger diameter and closed at both ends, but provided at or near its forward end with an opening, and an eduction-pipe provided with an enlarged nozzle provided with perforations, all substantially as shown.

2. A smoke-consuming device consisting of a steam-pipe in sections, two of said sections coupled or united by a screw-threaded thimble or collar which is provided with an opening and also connected with an inclosing tube or pipe in which the second section of said steam-pipe is inclosed, said inclosing tube or pipe being of larger diameter than said steam-pipe and closed at both ends, and an eduction-pipe connected with the opening in said thimble or collar and provided with a nozzle having perforations, all substantially as shown.

JOHN N. MERRILL.

Witnesses:

J. LAWRENCE GERRY,
WILLIAM S. CAMERON.