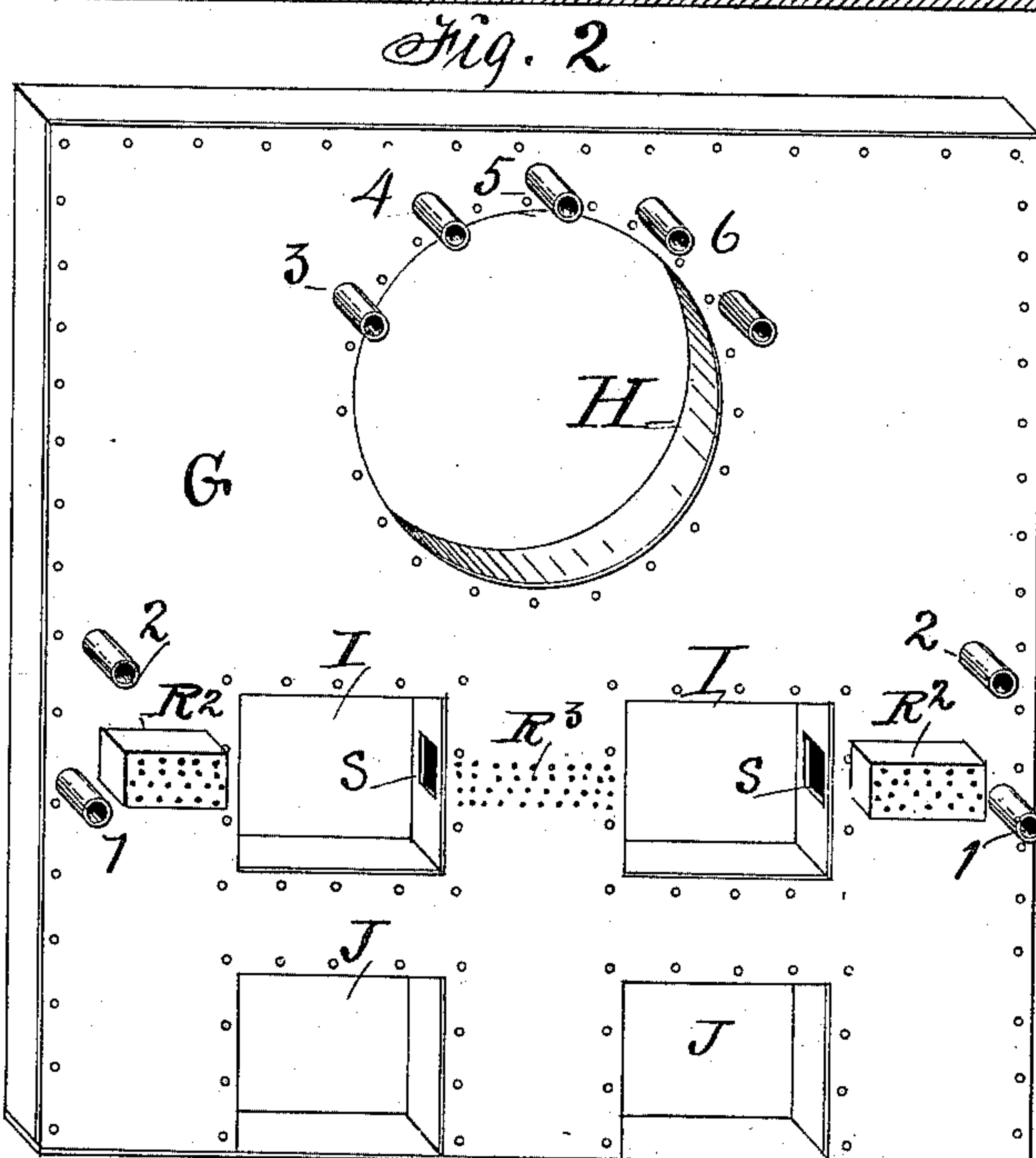
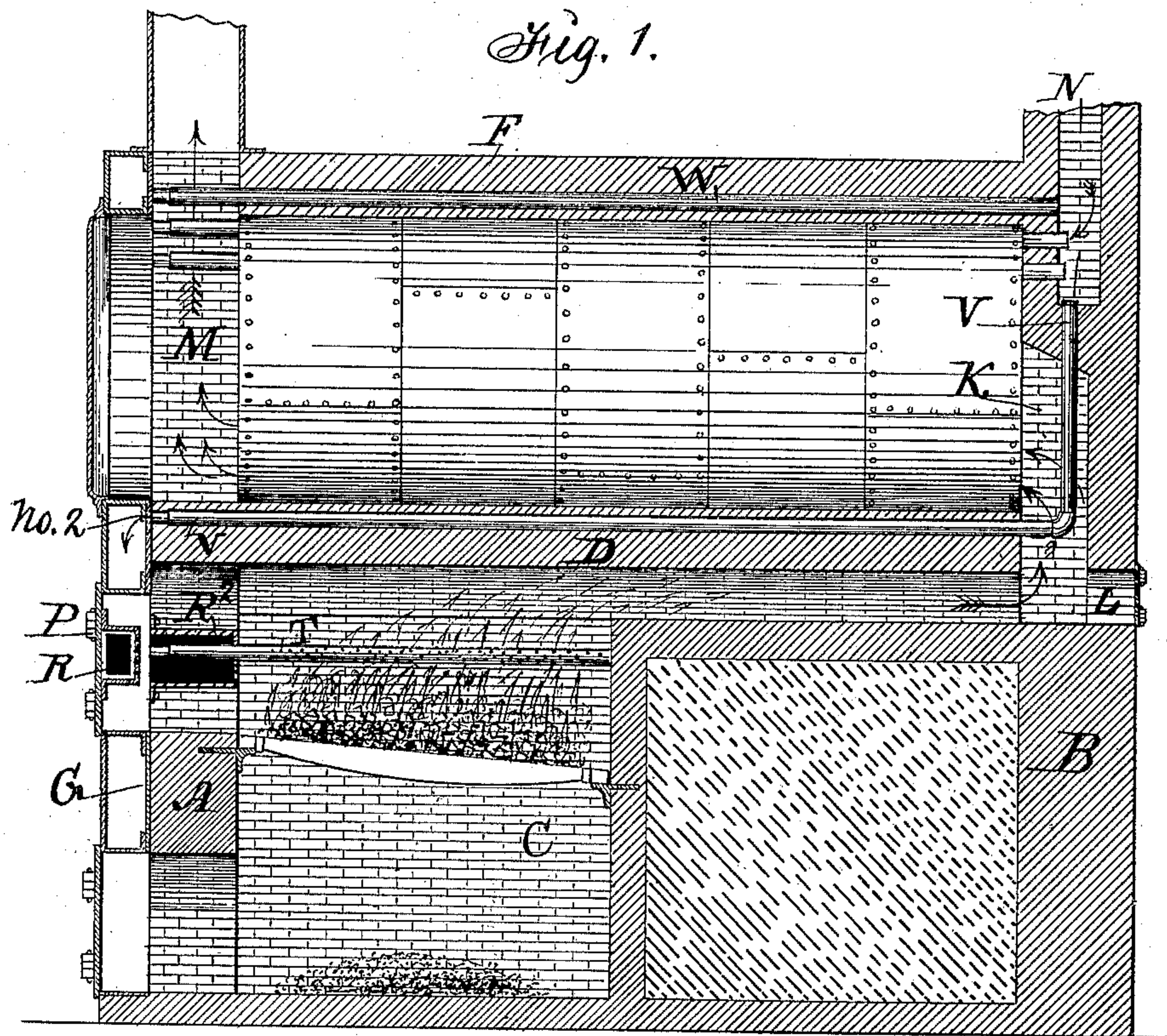


(No Model.)

J. COLLIS.
BOILER FURNACE.

No. 311,874.

Patented Feb. 10, 1885.



Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN COLLIS, OF DES MOINES, IOWA.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 311,874, dated February 10, 1885.

Application filed March 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN COLLIS, of Des Moines, in the county of Polk and State of Iowa, have invented an Improved Gas-Burner for Boiler-Furnaces, of which the following is a specification.

My object is to prevent the waste of fuel, the fouling of flues, and all the losses and annoyances occasioned by the production of smoke and soot in a furnace.

Heretofore air conveying and distributing tubes have been attached to furnaces above and below grate-bars, to keep the grates cool, and to aid in producing a draft and combustion within the furnace.

My invention consists in the construction and combination of a double-walled furnace-front, a door having an air receiving and distributing chamber, an air-chamber in the wall at the rear end of the boiler, air-conveying tubes above and below the boiler, and superheating and distributing tubes or burners in the combustion-chamber, as hereinafter fully set forth, in such a manner that cold air and oxygen will be drawn into the furnace from without and heated and distributed within to promote perfect combustion of fuel, so that all the valuable properties of the fuel will be utilized in generating heat, and all that is usually carried off in smoke and soot liberated and consumed within the furnace.

Figure 1 of my accompanying drawings is a vertical and longitudinal section of a furnace, and a side view of a horizontal boiler, to which my invention is applied. Fig. 2 is a perspective view of my double-walled hollow furnace-front.

Jointly considered, these figures clearly illustrate the construction, application, and operation of my complete invention.

A represents the masonry and solid wall at the front, B at the rear, and C at the side, of the furnace.

D represents an arched wall under the boiler, and F a corresponding wall over the top of the boiler.

G represents my double-walled hollow front, that is preferably made of cast-iron.

H is a circular opening in its upper and central portion, through which access is gained to the front end of the boiler, and to which a door of corresponding shape is hinged.

I are openings for doors, through which fuel is placed upon the grate-bars.

J are openings for doors, through which access is gained to the ash-pit under the grate. Corresponding openings extend through the solid wall A to the furnace-chamber and the ash-pit.

K represents a chamber formed in the wall B, at the rear end and lower portion of the boiler.

L is an opening through which the chamber is accessible.

M is the lower portion of the smoke-flue, that starts upward at the front of the boiler. Tubes extending horizontally through the lower portion of the boiler connect the chamber K with the chimney or smoke flue M.

N is a cold-air flue, formed in the rear wall, B, to extend upward from the upper portion of the end of the boiler.

P, shown in Fig. 1, is a door in the opening I.

R is an open-ended chamber on the inside of the door.

S are openings in the double wall, that coincide with the open ends of the chambers R when the doors are closed, and allow air to pass from the hollow front G into the chambers R, and from thence through perforations into the combustion-chamber.

R² are chambers corresponding with the chambers R on the doors P, formed integral with or fixed to the inside of the inner plate of the double wall, to project toward the combustion-chamber and to superheat and direct the air through their perforated backs into the fire upon the grate.

R³ is a perforated section, that can be used in place of the chambers R², for distributing hot air from the hollow wall G.

Nos. 1 and 2 are open-ended tubes, fixed to the inside of the hollow front G, below the circular opening H.

Nos. 3, 4, 5 represent a series of such tubes, fixed to the same hollow front around the upper portion of its circular opening.

T are perforated tubes, slipped over the fixed tubes No. 1, to extend into or through the combustion-chamber, for the purpose of conveying, superheating, and distributing air within the combustion-chamber and over the fuel and fire upon the grate, to promote combustion, and to prevent soot and smoke from escaping from the fire-chamber.

V are open-ended tubes, slipped over the fixed tubes No. 2, and extend rearward horizontally through the arched wall D, the chamber K, and the rear wall, B, to connect with the cold-air flue or chamber N, for the purposes of conveying cold air and oxygen into the hollow front G, and heating it in its passage thereto.

W are air-conveying tubes, connected with the series of fixed tubes 3 4 5, and extend through the arched wall F to the flue N, to act in concert with the tubes V in filling the hollow front and air-reservoir G with air brought from the outside of the furnace and heated on its passage.

From the detailed description of the construction and function of each part of my improved furnace, it is obvious that when a fire is started upon the furnace-grate cold air and oxygen will be drawn into the hollow front and air-reservoir G through the flue N and tubes V and W, and heated to a certain degree on its passage, its degree of heat raised in the reservoir, and from thence distributed, through the perforated chambers R and R² and the superheater and perforated tubes T, into the combustion-chamber, to aid in promoting the combustion of fuel and the burning and utilizing of all the valuable properties of the fuel in making heat, steam, and power without producing smoke and soot.

I claim as my invention—

1. A double-walled front and air-reservoir for furnaces, a boiler, a grate, and furnace-chamber, induction-tubes extending from the upper portion of the hollow front to the rear end of the boiler, for conveying and heating cold air, and superheating and distributing tubes extending into the fire-chamber from the lower portion of the same hollow front, arranged and combined to operate in the manner set forth, for the purposes specified.

2. A rear furnace-wall, B, having chambers K and N and tubes V and W, in combination with a hollow front wall and air-reservoir, to operate in the manner set forth, for the purposes specified.

3. The solid furnace-walls A, B, C, D, and F, the hollow front and air-reservoir G, having chambers R², the tubes V and W, extending from the chambers K and N to the said reservoir G, a boiler having flues extending from the chamber K to the smoke-flue M, and one or more perforated tubes, T, arranged and combined substantially as shown and described, to operate in the manner set forth, for the purposes specified.

JOHN COLLIS.

Witnesses:

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