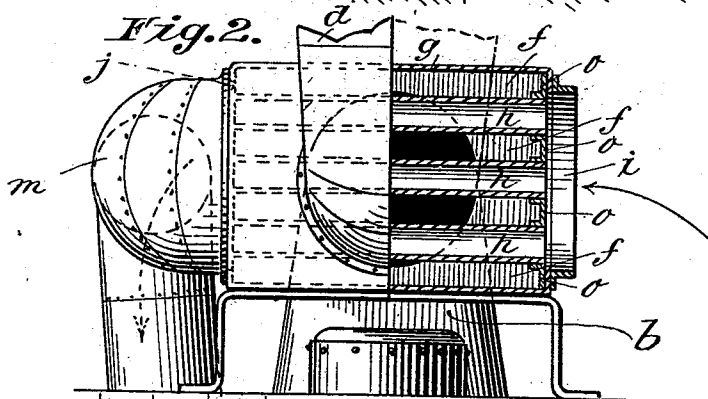
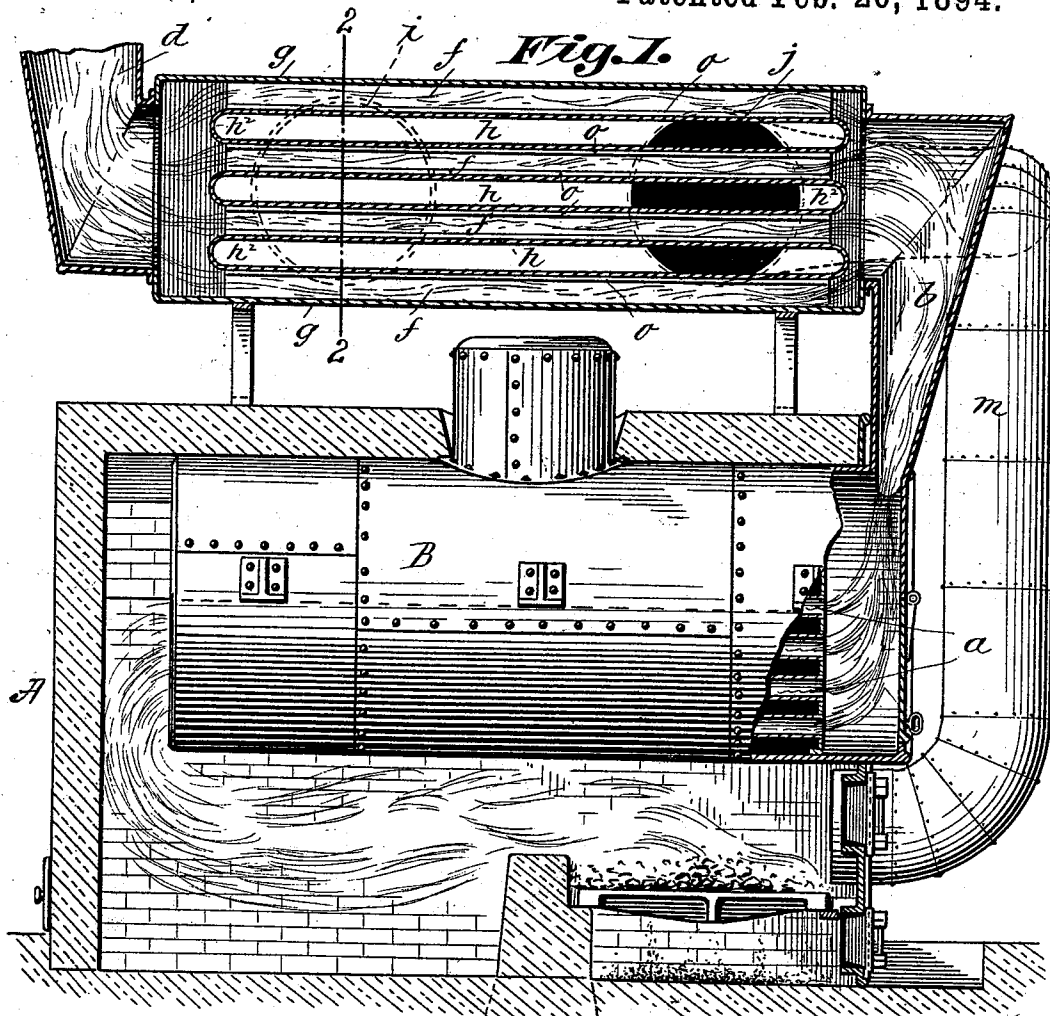


(No Model.)

M. C. BROWNE.
FURNACE.

No. 514,906.

Patented Feb. 20, 1894.



Witnesses:

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UNITED STATES PATENT OFFICE.

MICHAEL C. BROWNE, OF HOLYOKE, MASSACHUSETTS.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 514,906, dated February 20, 1894.

Application filed April 6, 1893. Serial No. 469,243. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL C. BROWNE, a citizen of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Furnaces, of which the following is a specification.

The object of this invention is to construct, in an improved manner, a boiler or any other furnace so that the products of combustion, after passing away from the combustion chamber, either directly, or by way of the boiler flues, but before passing up the chimney or smoke-stack may be utilized for heating to a material degree the air to be entered into the furnace chamber for supporting combustion of the coal resulting, as manifest, in an economy of fuel. And to this end the invention consists in arrangements and constructions of parts, all substantially as will hereinafter fully appear and be set forth in the claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a sectional elevation from front to rear of a boiler furnace with the present improved appliances combined therewith. Fig. 2 is in part a rear elevation and in part a vertical cross section on line 2—2, Fig. 1.

Similar letters of reference indicate corresponding parts in both views.

In the drawings, A represents a boiler furnace of the type in which the boiler, B, is set over the fire-box and combustion chamber, it having flues, *a*, through it from end to end, as usual, the products of combustion passing from the rear end forwardly and up the smoke-pipe, *b*, to the smoke-stack, or chimney, which is indicated in part at *d*.

In the improved arrangement it will be seen that the smoke-pipe, *b*, and chimney, *d*, are not, as it were, the one a part of the other, but there are a series of longitudinally running separated flues, *f*, *f*, above the boiler, the ends of which are open to the said smoke-pipe and chimney, *b*, *d*. These flues are inclosed within a casing, *g*, through which are a series of cross air-flues, *h*, *h*, the ends of which are closed, as at *h*².

At one portion of the casing, at one side, is an air inlet opening, *i*, for the free entrance of atmospheric air to the cross flues, while at the other side of the casing, preferably at a

different point along its length, is an air egress opening, *j*, connected with which is a pipe, *m*, which leads forwardly and downwardly to communication with the furnace chamber.

Air,—entering all of the air flues through the opening, *i*,—by contact with the flues through which the waste products of combustion are passing, becomes heated in a material degree so that in being drawn out of the opening, *j*, and through the pipe, *m*, in coming into the furnace chamber, is in a condition to more readily establish combustion than if it were entered cold.

In my air-heating apparatus, as I have constructed it, I have formed the air flues by long, rectangular sheets of thin metal bent to form flattened tube sections, (the cross section of which is seen in Fig. 1, while the lengths thereof appear in Fig. 2) and these tube sections are placed one above another, with separation between them corresponding to the vertical dimensions of the smoke flues, *f*, and are held in such separation by longitudinally arranged angle-strips, *o*, *o*, which are interposed between the end portions of the contiguous flattened tube sections. This rectangular formed bank of longitudinal and cross flues,—each with wide, superficial area at top and bottom,—is set within the rectangular casing having preferably a length somewhat longer than the bank of flues, with the ends of which casing the smoke-pipe and chimney are connected, and through the opposite sides of which the openings, *i* and *j*, are formed.

The apparatus, substantially as described, is not necessarily limited to use in conjunction with a boiler-furnace, as, manifestly, it may be used with other descriptions of furnace.

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

1. In combination, a furnace and a horizontally extended rectangular casing thereabove with one end of which the combustion chamber is in communication, and the smoke stack with which the other end of said casing communicates, and said casing having openings through its sides at different parts of its length, horizontal partitions which extend across the width of said casing, alternating pairs of which are closed at their sides, but

open at both ends thereby constituting broad flat longitudinal smoke flues, while the relatively intermediate alternating pairs of said partitions are closed at their ends but open at their sides to the aforesaid side openings and constituting broad, flat intermediate air heating passages and a conduit communicating with the one of said side openings and leading to the combustion chamber, substantially as described.

2. The combination with a furnace, of a bank of cross-flues for air and longitudinal flues for smoke consisting of flattened tube-sections arranged with their lengths cross-wise of the smoke flues, and in separation

corresponding to the height of the smoke flues, the angular or channel strips, *o, o*, separating the tube sections at their end portions and forming the side boundaries of the smoke flues, the casing into which the bank of flues is set, with the smoke pipe, *b*, and smoke stack, *d*, connected at its ends, and having the side opening, *i*, and the side opening, *j*, and pipe connected thereat and leading to a forward portion of the furnace-chamber, substantially as and for the purpose set forth.

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Witnesses:

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