(No Model.) 2 Sheets—Sheet 1.

E. HEALEY, R. WILLIAMS & E. LONGMEYER.

SMOKELESS BOILER FURNACE.

No. 522,368. Patented July 3, 1894.

Fig. 1

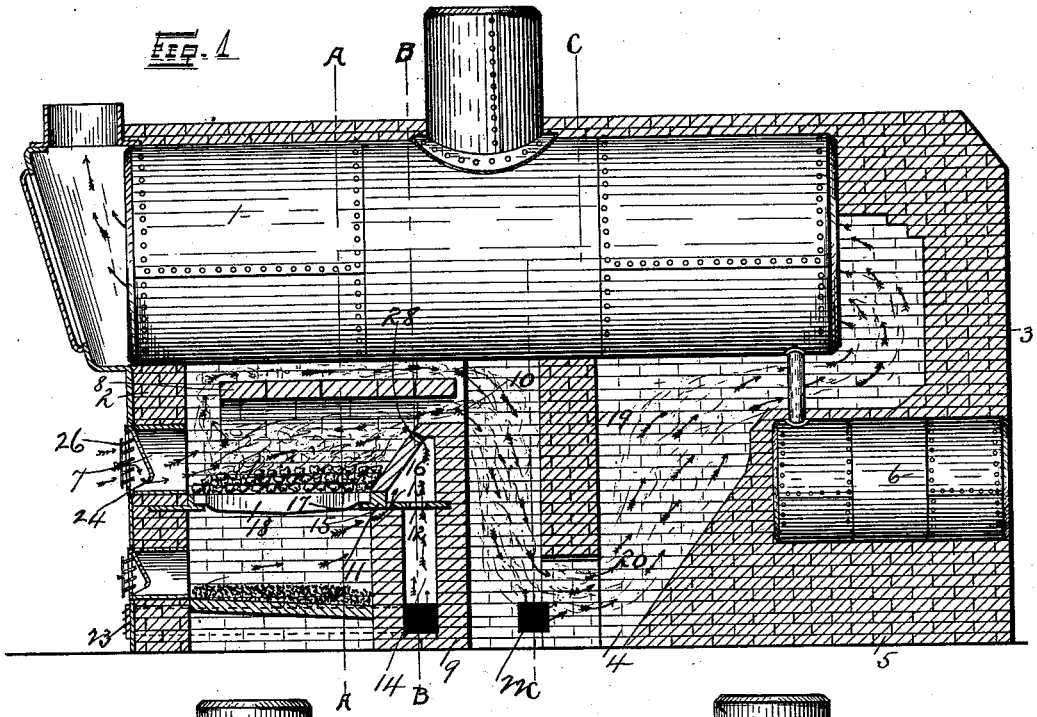


Fig. 2

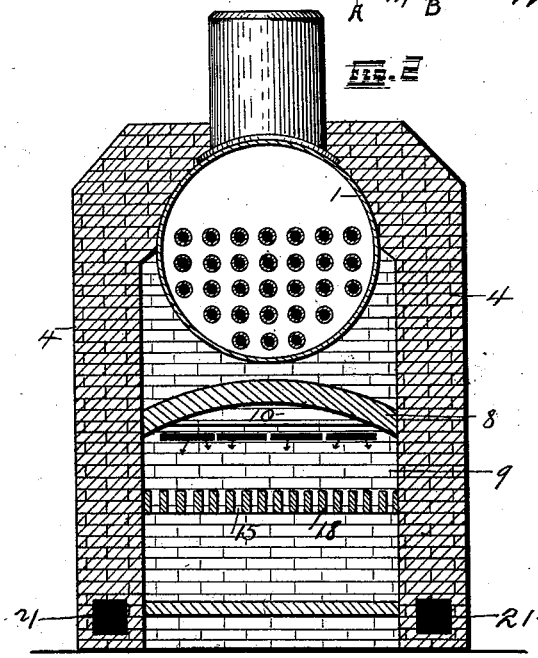
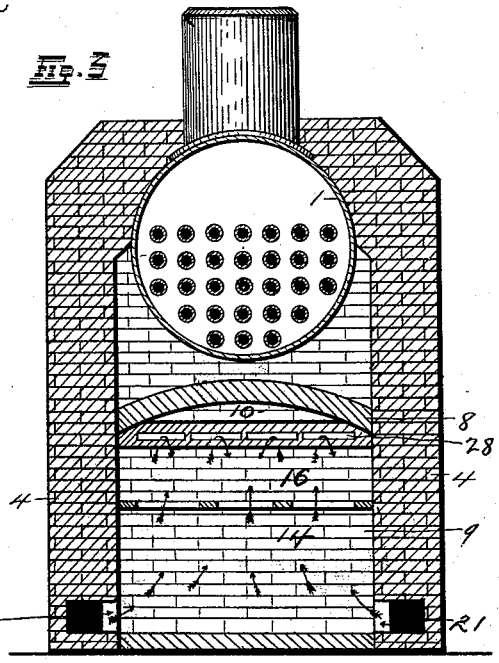


Fig. 3



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4

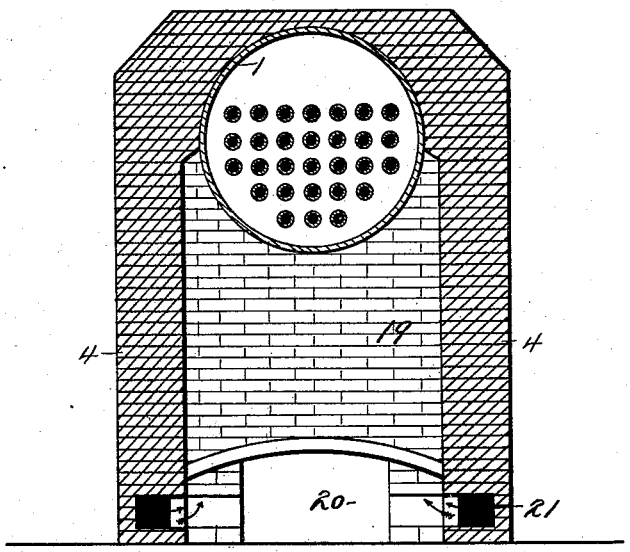


Fig. 5

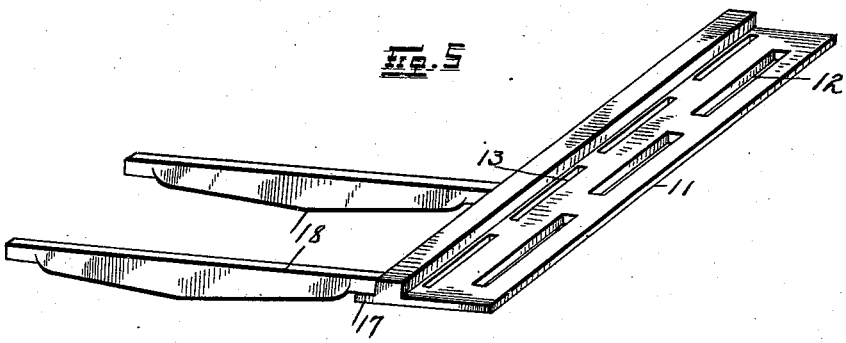


Fig. 6

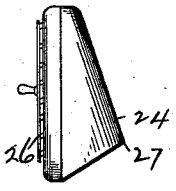


Fig. 7

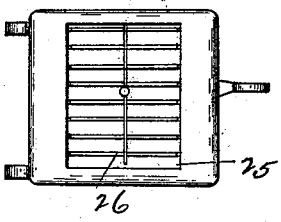
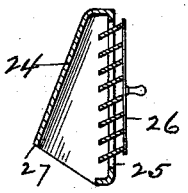


Fig. 8



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UNITED STATES PATENT OFFICE.

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SMOKELESS BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 522,368, dated July 3, 1894.

Application filed March 12, 1894. Serial No. 503,360. (No model.)

To all whom it may concern:

Be it known that we, EDWARD HEALEY, RICHARD WILLIAMS, and EMANUEL LONGMEYER, all of St. Louis, State of Missouri, have invented certain new and useful Improvements in Smokeless Boiler-Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

Our invention relates to improvements in a "smokeless boiler furnace," and consists in the novel arrangements and construction of parts, as will be more fully hereinafter described and designated in the claim.

The object of our invention is to provide means for constructing boiler furnaces in such a way as to prevent smoke, in providing for the consumption of same.

It is not thought that the principles involved in this invention are new, but the combination of their application brings about a different and a better result without in any way affecting the action of the furnace. In point of economy, it has been found that a lesser amount of fuel is consumed while at the same time a more direct heat is obtained and the results brought about, are much more satisfactory. The soft bituminous coal generally used in firing boilers, contains a large per cent. of gas which is extracted when the coal is subjected to a high degree of heat. It is the object of our invention therefore to utilize this gas in consuming the smoke, or rather in making such a combustion as will not produce the smoke.

In the drawings:—Figure 1 is a longitudinal vertical sectional view of the boiler and furnace set after the method of our invention. Fig. 2 is a vertical transverse sectional view taken on the line A—A in Fig. 1. Fig. 3 is a similar view taken on the line B—B in Fig. 1. Fig. 4 is a similar view taken on the line C—C in Fig. 1. Fig. 5 is a perspective view of a device located within the furnace and provided with ports for the passage of air. Fig. 6 is an end elevation of an improved door which we make use of. Fig. 7 is a front elevation of the same. Fig. 8 is a vertical transverse sectional view of the door.

Referring to the drawings:—1 indicates the boiler which is of the ordinary horizontal tubular pattern and provided with the usual appurtenances.

The boiler setting consists of the usual front wall 2, back wall 3 and side walls 4 while in the rear of the pit is located a bank 5 in which is located a mud drum 6 suitably connected to the boiler 1.

In the rear of the front wall 2 and with its highest point a little above the fire door 7 is sprung an arch 8 which extends entirely across the width of the fire chamber and merges into the side portions of a hollow bridge wall 9, leaving a passage 10 as particularly shown in the transverse sectional views. The forward upper face of the bridge wall 9 is beveled to facilitate the passage of the combustive elements through the passage 10.

In Fig. 5 is illustrated a device 11 provided with a number of ports 12 and 13, the ports 12 being in communication with the interior 14 of the bridge wall 9 and the ports 13 with a passage 15 in the front of the bridge wall. These ports lead to a chamber 16 above the construction 11, which is set into the bridge wall and behind the bevel forward face of the bridge wall. The device 11 is also provided with a longitudinal ledge 17 which supports the inner ends of the grate bars 18. A little in the rear of the bridge wall 9 is sprung an arch 19 which extends nearly to the floor of the pit 20 as shown in Fig. 4. Extending through the side walls 4 of the setting, is an opening 21, located near the foundation and in a position as indicated in the sectional figures. These openings are coincident at their inner ends with the opening in the bridge wall and are used for the draft inlet.

Located in the side walls 4 and adjacent the arch 19 are openings 22 which are used to adjust the draft in order to produce a perfect combustion.

The openings 21 are provided at their forward ends with ventilating doors 23 by which the inlet of air can be controlled.

Attention is called to an improved door which is made use of instead of the ordinary ash and fire doors. This door is illustrated in Figs. 6, 7 and 8 and consists of a canted hood 24 open at its lower extremity and provided in its front with a rectangular opening 25 in which is located a set of ventilating

slats 26 controlled by any suitable means for their adjustment. The air is allowed to pass through the slats 26 and under the edge 27 presented by the lower extremity of the hood 24 and thus passes directly into the fire.

The object of the construction above shown is to provide for the admittance of fresh air into the furnace in such a manner that the amount of air to produce a perfect combustion can be introduced and also that such amount of air may be adjusted to suit the different conditions of cold, atmosphere, &c. All the smoke can be consumed by such combustion owing to the fact that the larger per cent. of it consists of the gas extracted from the bituminous coal generally used for the purpose. The air therefore is admitted in the desired quantities through the ventilating slats 25, through the passage leading to the ports 13 from the ash pit, through the ports 12 leading from the chamber within the bridge wall and the air from the latter two sources passing through openings 28 in the beveled face of the bridge wall 9.

The amount of air to be admitted to the bridge wall chamber can be adjusted by the operation of the doors 23 located at the forward ends of the opening 21.

The openings 22 are connected with the openings 21 and are used to admit air in the pit 20 to form a combustion of any gas that may pass under the arch 19.

Practical experiments with this furnace have proven its efficiency and the claim for its being a perfect smoke consumer has been substantiated. The result of the improvement therefore is the production of a furnace in which the air is admitted in such a manner as to form a perfect combustion of the gases extracted from the coal and at the same time the adjustment of such air admittance.

It is thought that a concise idea of the construction and principles of our invention can be obtained from the description and accompanying drawings.

In point of efficiency, economy and especially cleanliness, we believe that the invention is an improvement and as such

We claim—

An improved smokeless boiler furnace having doors provided with adjustable ventilating slats, a hollow bridge wall, an arch sprung over the fire chamber and beneath the boiler, an arch sprung in the rear of the bridge wall and near the base of the pit and the combination of air admitted from the front and from the bridge wall, with the gas extracted from the coal, adapted to form a smokeless combustion, substantially as set forth.

In testimony whereof we affix our signatures in the presence of two witnesses.

EDWARD HEALEY.
RICHARD WILLIAMS.
EMANUEL LONGMEYER.

Witnesses:
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HERBERT S. ROBINSON.