

No. 690,581.

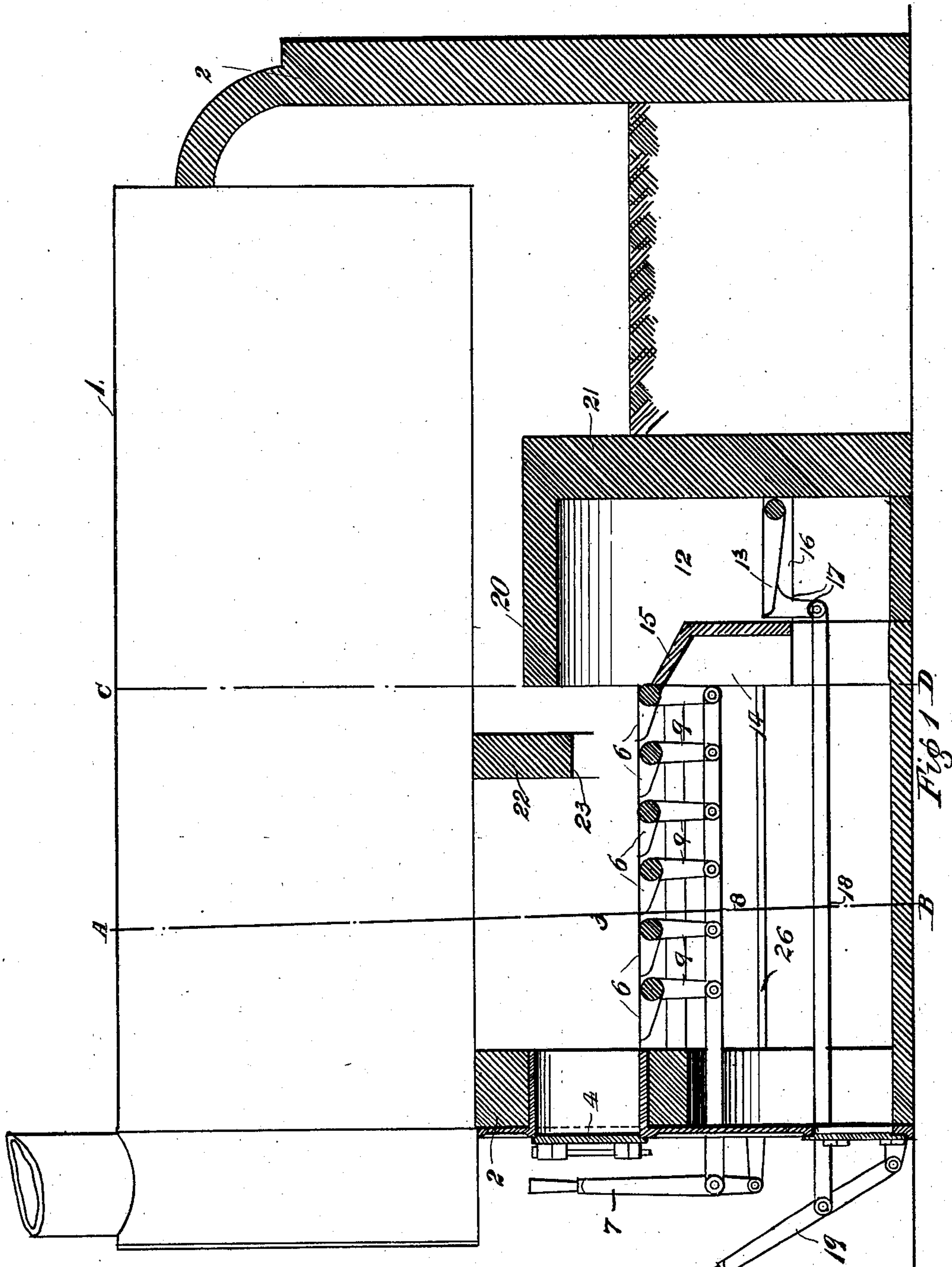
Patented Jan. 7, 1902.

J. J. & G. S. HUFF.  
SMOKE CONSUMING FURNACE.

(Application filed Nov. 5, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

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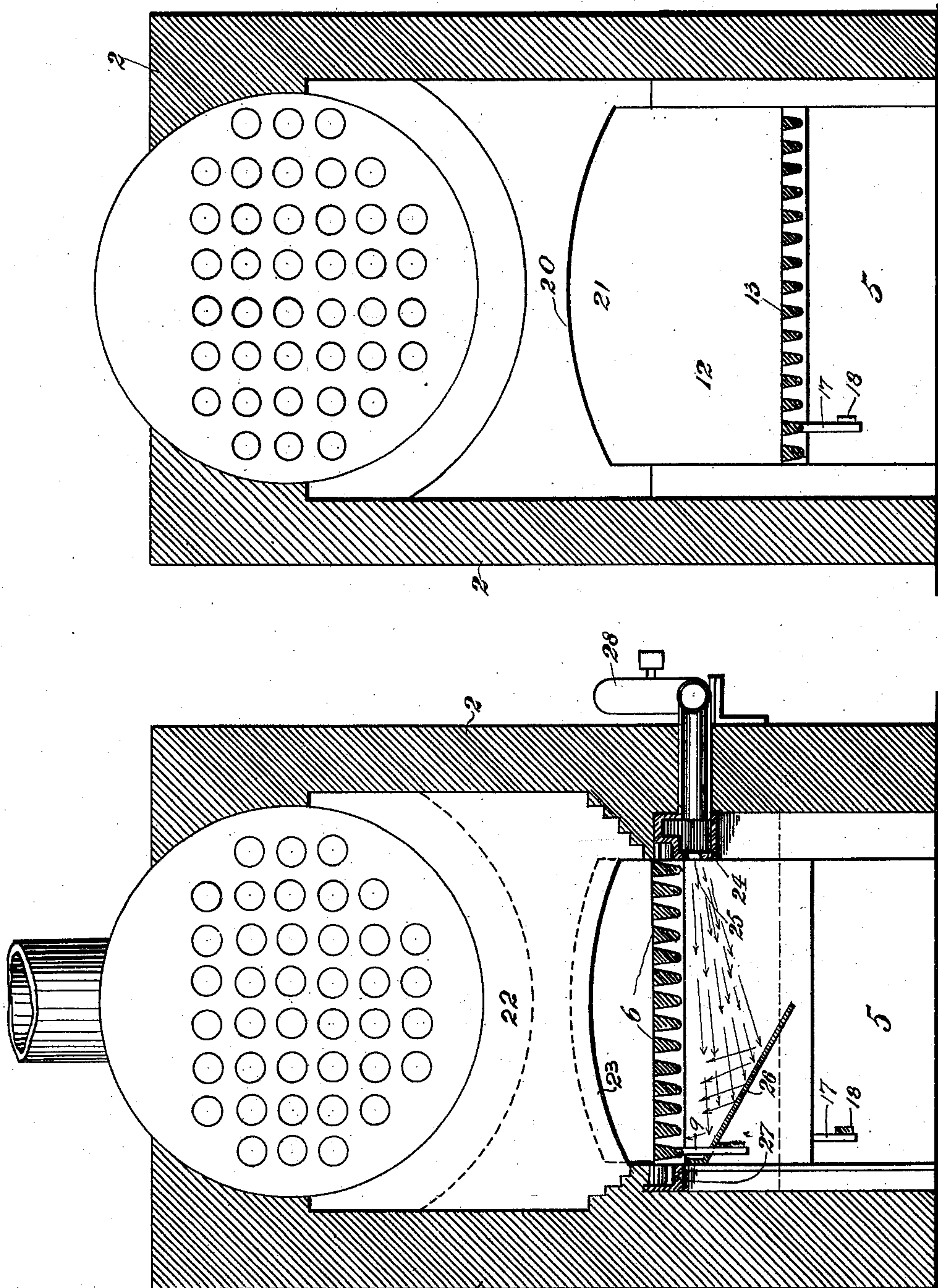
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# UNITED STATES PATENT OFFICE.

JAKE J. HUFF AND GEORGE S. HUFF, OF INDIANAPOLIS, INDIANA,  
ASSIGNORS OF TWO-FIFTHS TO FRANK H. EWERS AND JOSEPH M.  
BERAUER, OF INDIANAPOLIS, INDIANA.

## SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 690,581, dated January 7, 1902.

Application filed November 5, 1900. Serial No. 35,525. (No model.)

*To all whom it may concern:*

Be it known that we, JAKE J. HUFF and GEORGE S. HUFF, citizens of the United States, residing at Indianapolis, in the county  
5 of Marion and State of Indiana, have invented new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

Our invention relates to a certain new and  
10 improved furnace which is so arranged and peculiarly constructed that the gases escaping from the fuel are consumed and the formation of smoke is completely prevented, as hereinafter more fully described, and particu-  
15 larly pointed out in the claims.

The objects of our invention are to construct a furnace that will be universally applicable to all types of boilers, that will be effective, and wherein combustion of the gases escap-  
20 ing from the fuel therein will be completely consumed before leaving said furnace and smoke will be effectually prevented. We attain these objects by means of the form of construction of the furnace illustrated in the  
25 accompanying drawings, in which similar numerals of reference designate like parts throughout the several views.

Figure 1 is a longitudinal sectional elevational view of our invention of a furnace ap-  
30 plied to steam-boilers. Fig. 2 is a transverse sectional elevational view of the same, taken through the line A B, (see Fig. 1;) and Fig. 3 is a similar view taken through the line C D. (See Fig. 1.)

35 The boiler 1 illustrated in the drawings is of the tubular type, but any other form of boiler may be used in connection with this furnace with equal facility, and is set in the brick-work or "setting" 2.

40 The main or heating furnace 3 is provided with the furnace-door 4 and the ash-pit 5 beneath the grates 6 of said furnace. The atmospheric air required to support the combustion of the fuel placed on the grates 6 is  
45 admitted through the ash-pit door 5<sup>A</sup> into the ash-pit 5 under the grates 6 and is drawn through the bars of the latter to the fuel by means of the natural draft.

The grates 6 may be of any suitable type—

fixed bars, rocker-grates, as illustrated in the  
50 drawings, or movable or traversing grates. The shaking-grates 6 selected for use in connection with the boiler-furnace in this case are provided with the usual rocking or shaking and dumping mechanism, which consists  
55 of the rocking-lever 7, the connecting-rod 8, and the depending grate or rocking arms 9, which latter are connected at their ends to the connecting-rod 8 to be operated simultaneously by the lever 7, to which latter the  
60 outer prolonged end of the said connecting-rod 8 is connected to remove the ashes or to dump the fires, as required.

A secondary furnace or fire-pit 12 is situated at the rear of the main-furnace grate 6  
65 and is provided with the dumping-grate 13, which is situated in said fire-pit so its top surface is below the surface of the grate 6 a distance sufficient to obtain a sufficient capacity of the fire-pit 12 to contain the entire  
70 fuel lodged on the grate 6.

The dividing or forward metallic bridge-wall or separating-plate 14 is situated between the fire-pit dumping-grate 13 and the  
75 main-furnace grate 6, and said wall is provided with the inclined sloped top 15, which is sloped or inclined from the main grate 6 downwardly toward the grate 13 and is provided for the purpose of facilitating the free  
80 discharge of the burned or coked incandescent fuel from the main-furnace grate 6 into the fire-pit or secondary furnace 12.

The dumping-grate 13 is constructed in one single piece and is pivoted at its ends on suitable grate-supporting bars 16, which are built  
85 in the side walls of the furnace-setting, and said grate is provided at its forward end with the arm 17, to which is connected the connecting-rod 18, which latter connects said arm 17 with the dumping-lever 19, situated on the  
90 front of the furnace and by means of which lever 19 the grate 13 is dropped to dump the refuse or burned-out fuel that may be contained in the secondary furnace or fire-pit 12 into the ash-pit 5.

A fire or bridge arch 20 has its rear end  
95 closed by the rear bridge-wall 21 and extends forwardly above and over the fire-pit 12 and



has its forward open end directed toward the main furnace 3 and situated at the rear end of the same.

Over the main furnace directly in front of the arch 20 is situated the baffling-wall 22, which extends transversely across the furnace and depends vertically from the boiler and terminates at its base or open end in an arch 23, which latter supports said wall and sustains it against the boiler. The spaces between the main-furnace fire and the arch 23 and between the baffling-wall 22 and the front of the arch 20 and the space between the top of the arch 20 and the boiler 1 are preferably equal in area and equal to the area of the smoke-stack of the boiler.

The fuel is first spread on the grate 6 of the main furnace, and fresh fuel is always applied to the front of the furnace as the fuel on the said grate is consumed. The gases and smoke escaping from the fuel in the main furnace are deflected downwardly by the baffling-wall 22 against the partially burned or coked fuel at or toward the end of said grate 6, and these are again met by the heated gases and air escaping from the rear fire-pit through the front opening or mouth of the arch 20, at which point the cooler gases and smoke from the main furnace are reheated and charged with atmospheric air and reignited to perfectly consume them before entering the tubes of the boiler and to support a perfect combustion, and thereby effectually prevent the formation of smoke.

In order to facilitate the combustion of the fuel on the grate 6, particularly at the front portion or that portion nearer the fire-door, an air-box 24 extends along the ash-pit under the grates 6 and is provided with a series of outlet-openings 25, through which the air escapes and impinges against the deflecting-plates 26, which latter deflect the air upwardly against the under side of the grate 6. The deflecting-plates 26 are bolted to the grate-bar support 27 and extend from the front to the rear of the ash-pit 5.

Air is supplied to the air-box 24 by a suitable fan 28, which may be driven by power taken from a suitable motor or other available means, as the line-shafting of the factory in which the boiler is situated.

Having thus fully described this our invention, what we claim as new and useful, and desire to cover by Letters Patent of the United States therefor, is—

1. In a furnace, the combination with a main furnace, and the bridge-wall thereof, of a division-wall arranged between said main furnace and the bridge-wall, a secondary

furnace between the division-wall and the bridge-wall, an arch extending from said bridge-wall over said secondary furnace and having its rear end closed by the bridge-wall and its open end directed toward the main furnace, and a baffling-wall having its upper portion closed and its base open, said wall extending transversely over the grate of the main furnace at the rear of the latter and in advance of the bridge-wall to form a passage for the gases from the main and secondary furnaces.

2. In a furnace, the combination with a main furnace and the rear bridge-wall thereof, of a secondary furnace or fire-pit to the rear of said furnace in advance of said bridge-wall, a dividing-wall between said main furnace and said secondary furnace or fire-pit, an arch extending from said bridge-wall over said secondary furnace or fire-pit and having its rear end closed by said bridge-wall and its open end directed toward said main furnace, said arch so situated that the area of the space at its mouth between the fuel on the grate of the main furnace and the said arch will be either equal to or slightly in excess of the area of the space between the top of said arch and the boiler or top of the furnace.

3. In a furnace, the combination with a main furnace, and the rear bridge-wall thereof of a secondary furnace or fire-pit to the rear of said main furnace and in advance of said bridge-wall, a dividing-wall between said main furnace and fire-pit, an arch extending from said bridge-wall over said secondary furnace or fire-pit and having its rear end closed by said bridge-wall and its open end directed toward said main furnace, and a baffling-wall having its top end closed and its base open, said wall extending transversely across and over the grate of said main furnace to the rear of the latter and in advance of said rear or bridge arch, said arch and said depending wall so situated in said furnace and relatively to each other that the areas of the spaces between the main-furnace fire and the depending wall, the depending wall and said bridge-arch, and said bridge-arch and the boiler shall be equal, substantially as and for the purpose set forth.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

JAKE J. HUFF.  
GEORGE S. HUFF.

Witnesses:

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