

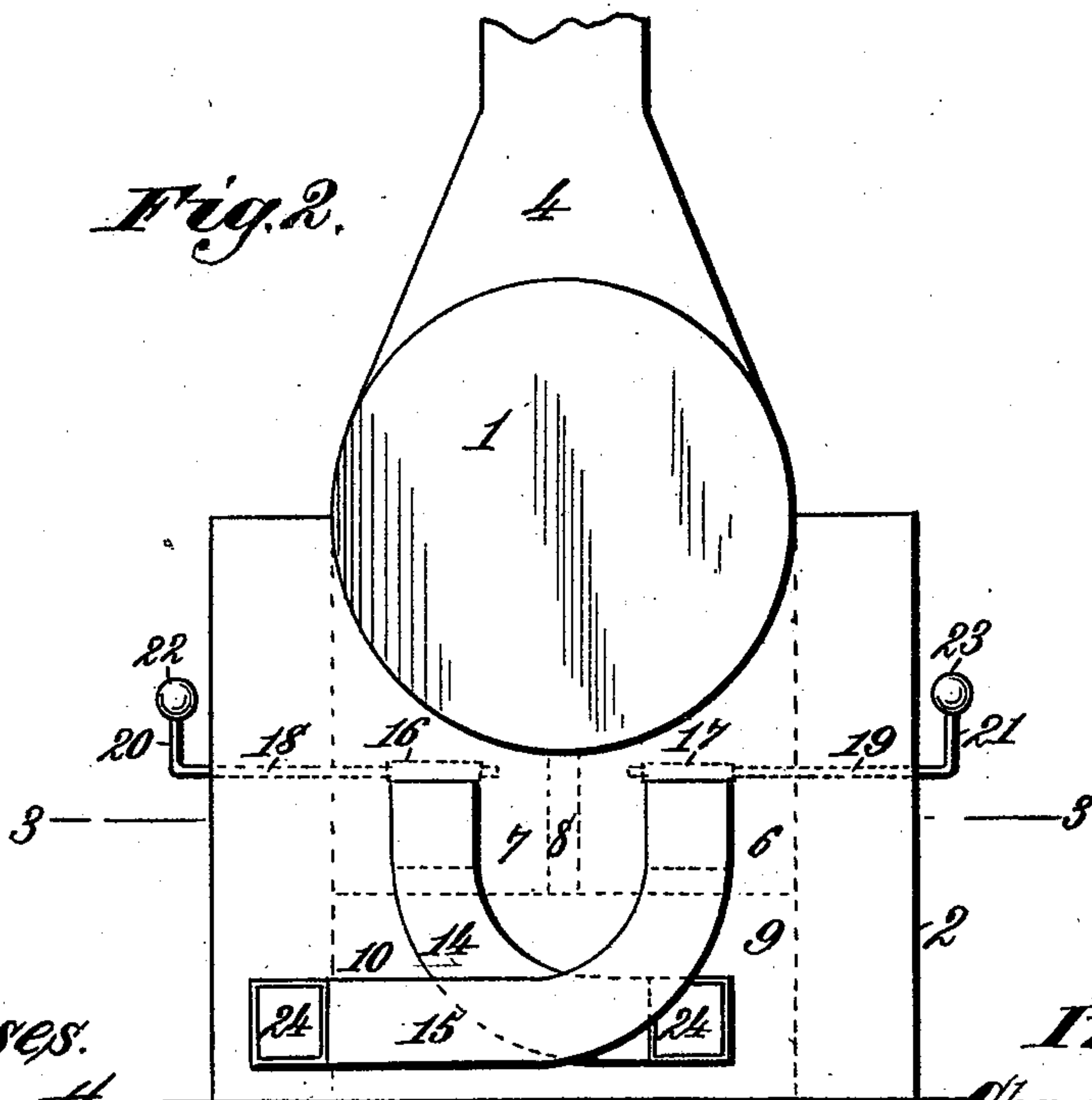
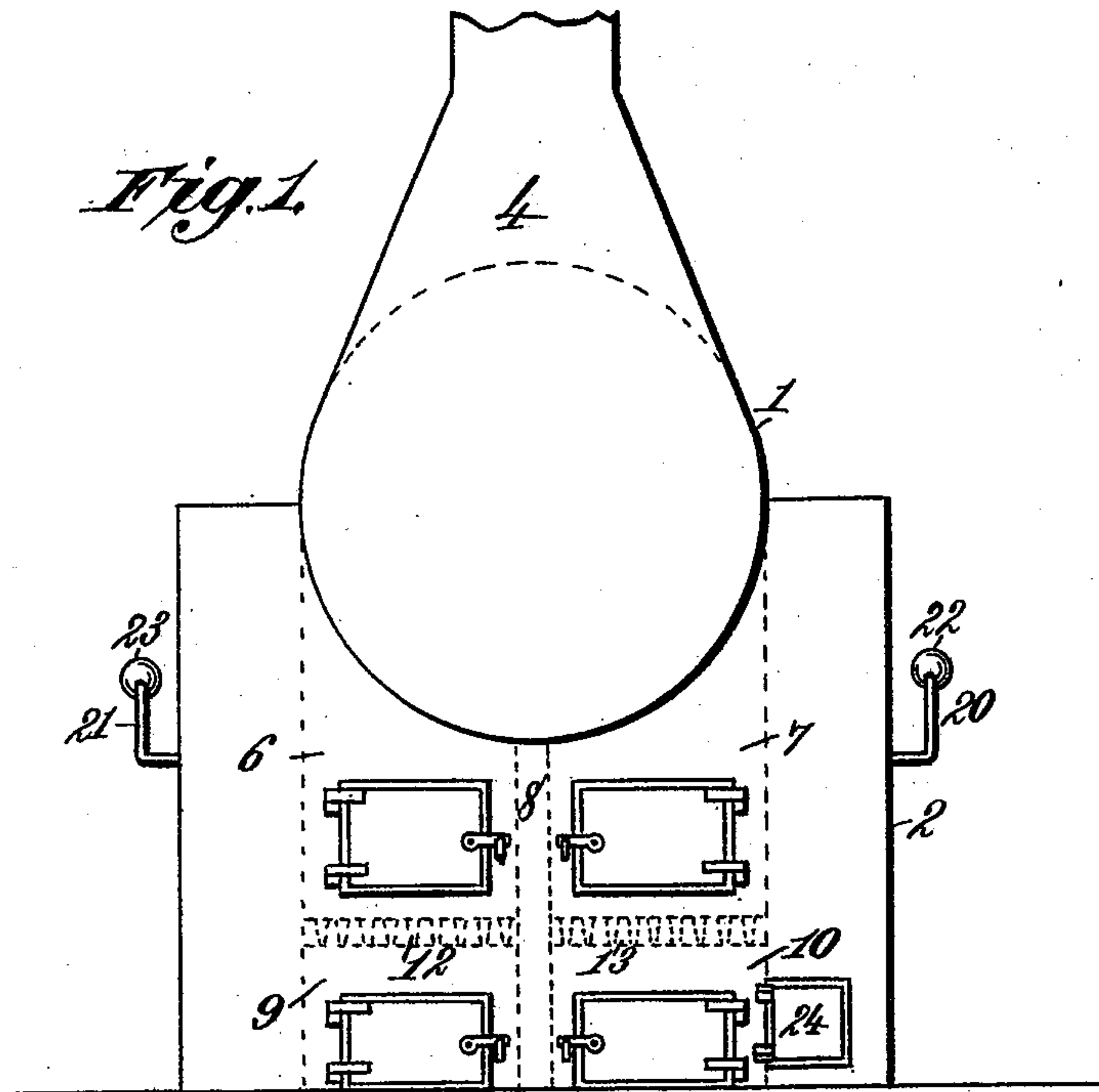
(No Model.)

2 Sheets—Sheet 1.

C. W. MILLS.  
SMOKE CONSUMING FURNACE.

No. 498,182.

Patented May 23, 1893.



Witnesses:  
*Robert G. Smith,*

*William Haskin*

Inventor:

*Chauncey W. Mills.*

By *James L. Norris,*  
Atty.

(No Model.)

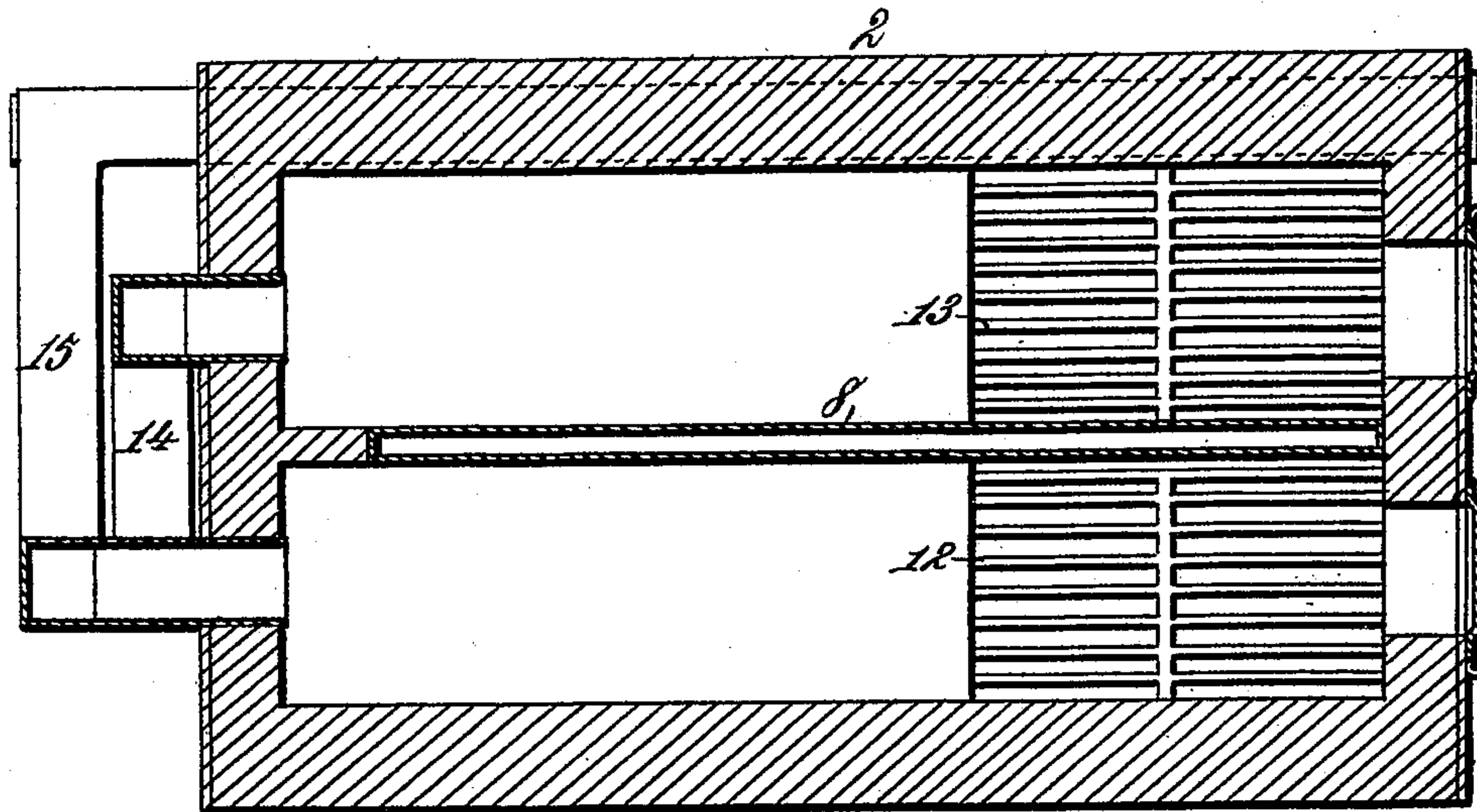
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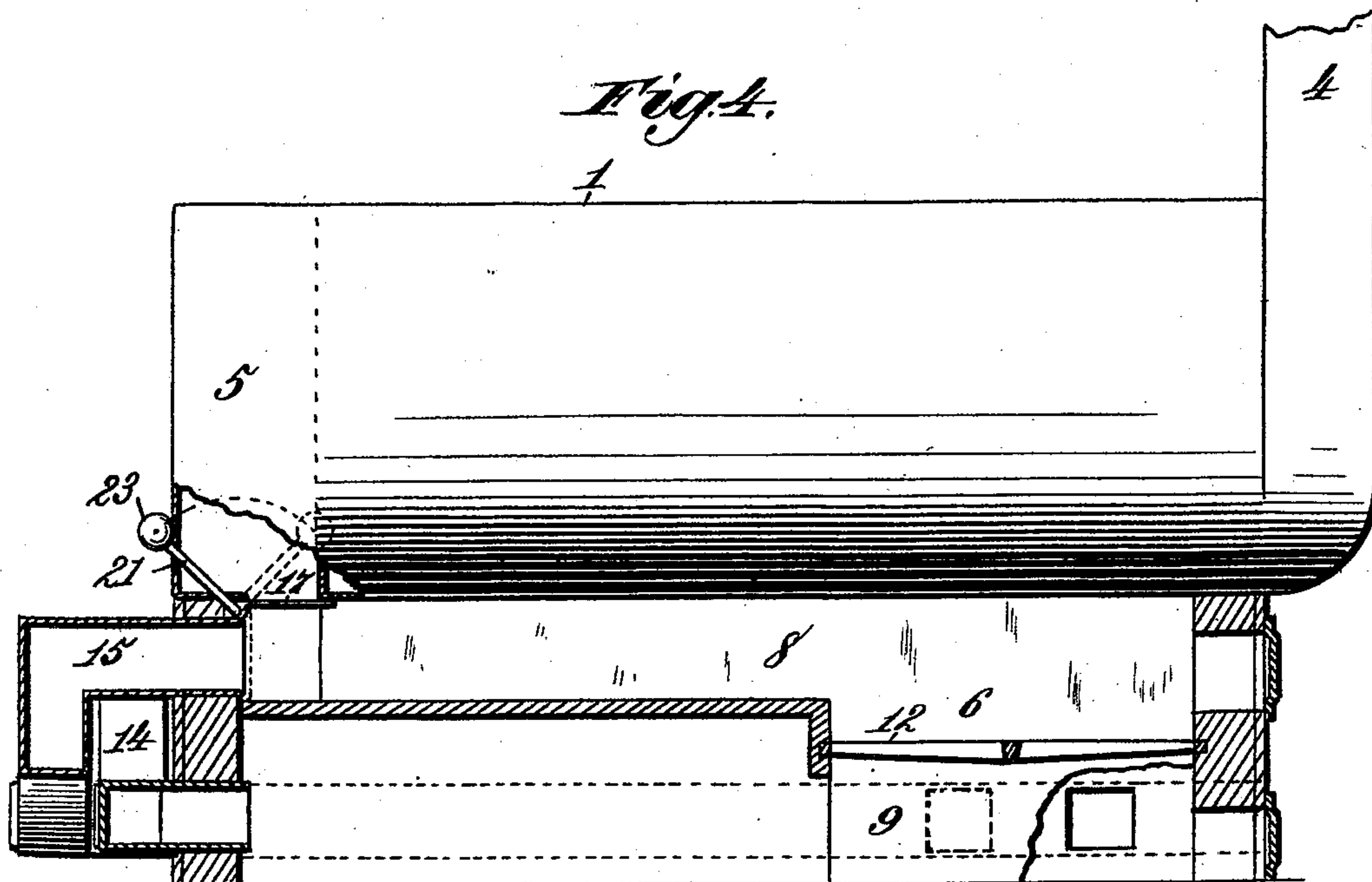
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*Fig. 3.*



*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

CHAUNCEY W. MILLS, OF ROCHESTER, NEW YORK.

## SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 498,182, dated May 23, 1893.

Application filed August 20, 1892. Serial No. 443,622. (No model.)

*To all whom it may concern:*

Be it known that I, CHAUNCEY W. MILLS, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

This invention relates to that type of smoke consuming furnaces wherein twin fire places are located in a furnace structure which supports a steam boiler.

The object of my invention is to provide simple, efficient and economical means for conveying the products of combustion direct to the smoke arch, or from the rear end of either fire place into the ash pit of the opposite fire place whereby the smoke and gases may be consumed and the consumption of fuel economized.

The invention consists in the combination with a furnace structure having twin fire places separated one from the other by a partition or wall extending from the boiler into the ash pits, of a pair of return smoke flues crossing each other at the rear portion of the furnace structure and each leading from the rear end of one fire place to the ash pit of the opposite fire place, and a valve for the upper end of each flue to control the passage of the products of combustion into such flue or into the smoke arch, as will more fully hereinafter appear.

The invention is illustrated by the accompanying drawings, in which—

Figure 1, is a front elevation of a steam boiler furnace embodying my invention. Fig. 2, is a rear elevation of the same. Fig. 3, is a horizontal sectional view taken on the line 3—3 Fig. 2; and Fig. 4 is a sectional side elevation of the furnace.

In order to enable those skilled in the art to make and use my invention I will now describe the same in detail, referring to the drawings wherein—

The numeral 1 indicates a steam boiler of any desired type supported by a furnace structure 2, composed of front, rear and side walls of any suitable material. The steam boiler may be of that type having tubes in which event it will be constructed with a smoke stack or chimney 4, at the front end,

and a smoke arch 5 at the rear end, which features being of well known construction it is deemed unnecessary to further illustrate and describe the same.

The front portion of the furnace structure is provided with twin fire places 6 and 7, separated from each other by a vertical partition or wall 8, of any suitable material, which extends from the lower side of the boiler to the base of the ash pits 9 and 10 arranged below the fire grates 12 and 13. The partition or wall 8 is hollow to form a water space for the purpose of separating the two fire spaces so that this water containing wall is protected and the water within it is heated before entering the boiler, and it extends longitudinally from the front to the rear of the furnace structure and separates the fire places and the ash pits throughout their extent.

The rear end of the furnace structure is provided with two exit passages located above the fire grates and communicating respectively with return smoke flues 14 and 15, which extend downwardly and cross or pass by each other in reverse directions as will be understood by reference to Fig. 2. The flue 14, as here illustrated, opens at its lower end directly into the rear portion of the ash pit 9 and the flue 15 is extended longitudinally through the brick work of the furnace structure and opens laterally into the ash pit 10, at one side thereof, as will be understood by reference to Fig. 4. The rear portions of the fire places may be made to communicate with the smoke arch 5 or with the return smoke flues 14 and 15, through the medium of two independent valve plates 16 and 17, mounted respectively on rock shafts 18 and 19, which extend through the side walls of the furnace structure and are provided with crank arms 20 and 21, carrying gravitating weights 22 and 23, which serve to hold the valve plates either in the position indicated by full lines Fig. 4, or in the position indicated by dotted lines Fig. 4. If the crank arms and gravity weights are adjusted for causing the valve plates to occupy the position indicated by full lines Fig. 4, the fire places are cut off from direct communication with the smoke arch, while if the crank arms and weights are adjusted for causing the valve plates to assume the position indicated



by dotted lines Fig. 4, the fire places are cut off from communication with the return flues as will be obvious.

In practice one or the other valve plate is adjusted to establish direct communication between one fire place and the smoke arch, and in operating the furnace if the fire place 6 is replenished with fuel, the damper plate 17 is adjusted to cut off communication with the smoke arch and establish communication with the flue 15, whereby the products of combustion descend and pass horizontally through such flue into the ash pit 10 beneath the fireplace 7. If the fire place 7 be replenished with fuel, the valve plate 17 is adjusted to close communication between the fire place 6 and the flue 15, and the damper plate 16 is adjusted to close communication between the fire place 7 and the smoke arch, whereby the products of combustion from the fire place 7 will descend through the return flue 14 and pass into the ash pit 9 below the fire place 6. By this means the smoke and gases are consumed as they pass through the live fire, the heating capacity of the furnace is largely increased and a material saving of fuel is effected.

The return smoke flues may be provided at convenient points with hand holes 24, for cleaning purposes, and also, if desired, to admit air to mingle with the smoke.

By arranging the return smoke flues so that they cross each other at the rear end of the furnace structure, I materially simplify the construction of the apparatus and by causing the products of combustion to descend through the return smoke flues I entirely avoid the necessity of employing exhaust fans to promote the circulation so that the cost of manufacture and the cost of running are reduced.

The location of the two independent flues 14 and 15 at the rear end wall of the furnace structure, renders it possible to economically construct these flues, while the products of combustion pass to the said flues directly at the rear extremity of the furnace, thereby avoiding the necessity of a forward travel of the products of combustion to enable them to enter crossing flues located at or near the center of the furnace. Where the flues cross at the center of the furnace, it is necessary to employ an expanded smoke-chamber at the rear of the furnace, and consequently the crossing flues must absorb the smoke by a back action which is very objectionable in a boiler furnace. By my construction I avoid the use of the expanded smoke chamber at the rear of the furnace and by locating the flues in juxtaposition to the smoke arch, a continuous draft is created direct from the extreme rear end of the furnace to the ash pits. This continuous draft is advantageous and is a substantially different thing from absorption of the smoke by a backward action to flues at the center of the furnace.

In my invention the valve plates 16 and 17 are fixed at one edge to the rock shafts and

are so located that when in one position they fill or close the openings at the lower end of the smoke arch 5, and when in another position they close directly against the upper ends of the flues 14 and 15, whereby the passage of the products of combustion is either direct to the smoke arch or direct to the return flues.

It will be observed that the dampers and the return smoke flues are all located wholly below the boiler and in this respect my invention possesses simplicity of construction and is advantageous.

In the drawings I have illustrated one of the flues as entering the rear end of the ash pit and the other flue as extending horizontally through one side wall of the furnace structure and opening into the other ash pit at one side thereof. It will be obvious that both flues can be extended longitudinally through the side walls of the furnace structure, or both flues can directly enter the rear ends of the ash pits without materially altering the character of my invention.

Having thus described my invention, what I claim is—

1. The combination with a furnace structure having twin fire places separated by a partition and a rear smoke arch provided with bottom openings to communicate directly with the said fire places, of a pair of return smoke flues crossing each other at the extreme rear portion of the furnace structure in juxtaposition to the smoke arch and each leading downward from the rear end of one fire place to the ash pit of the other fire place, and valves for the said flues, which in one position close the bottom openings of the smoke arch and in another position close against the upper ends of the crossing flues, so that a continuous draft is created direct from the rear end of the furnace to the ash pits and smoke arch in contradistinction to absorbing the smoke by a backward action, substantially as described.

2. The combination with a furnace structure having twin fire places, a hollow partition forming a water space and extending into the ash pits to separate the twin fire places from each other, and a rear smoke arch provided with bottom openings to communicate directly with said fire places, of a pair of return smoke flues crossing each other at the rear of the furnace structure and each leading downward from the rear end of one fire place to the ash pit of the other fire place, and valves for said flues which in one position close the bottom openings of the smoke arch and in another position close against the upper ends of the exterior smoke flues, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

CHAUNCEY W. MILLS. [L. S.]

Witnesses:

WM. H. FARRAND,  
WM. E. CRAIB.