

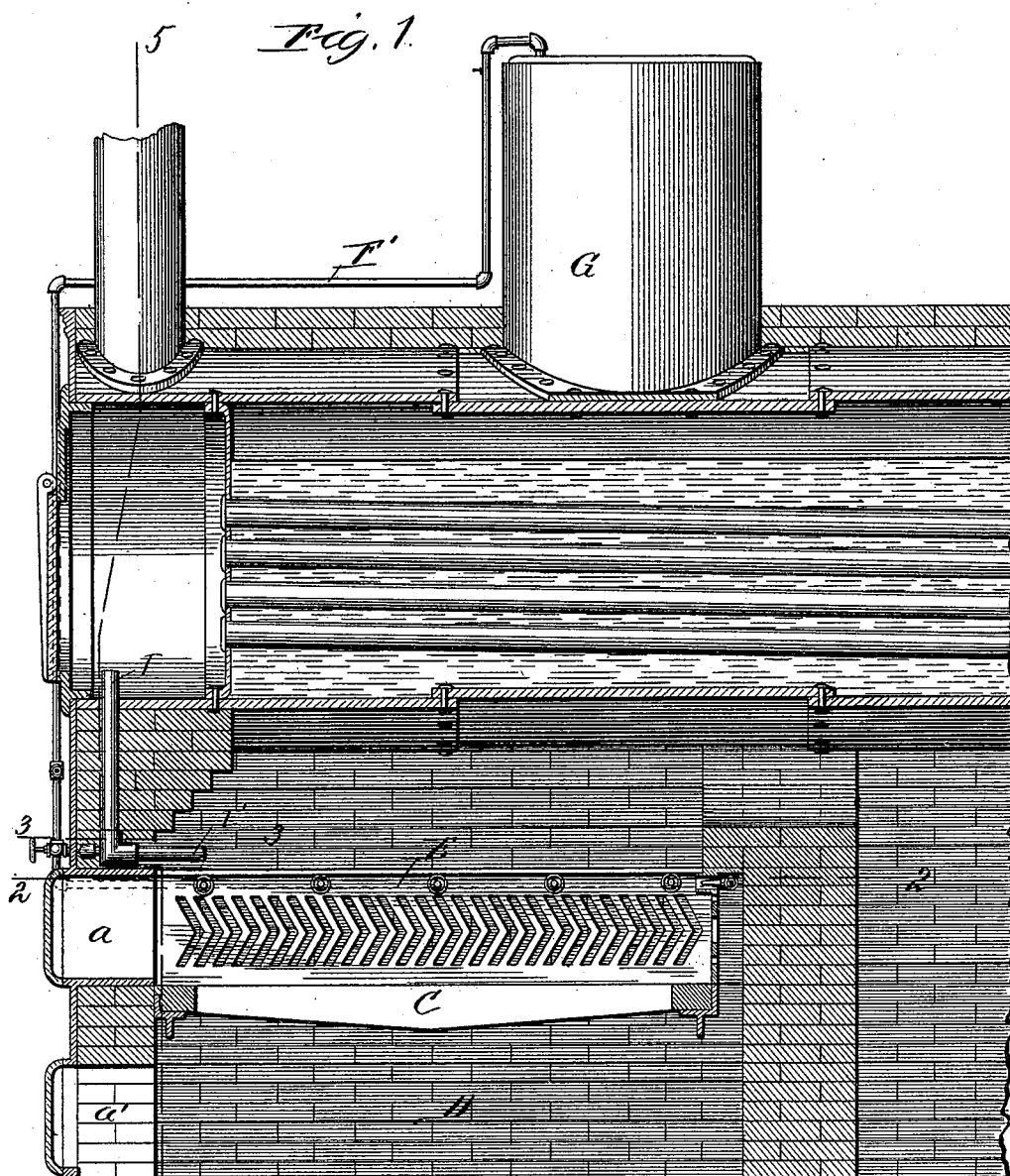
(No Model.)

3 Sheets—Sheet 1.

C. E. WALKER.
SMOKE CONSUMING FURNACE.

No. 491,931.

Patented Feb. 14, 1893.



Witnesses
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Fig. 2.

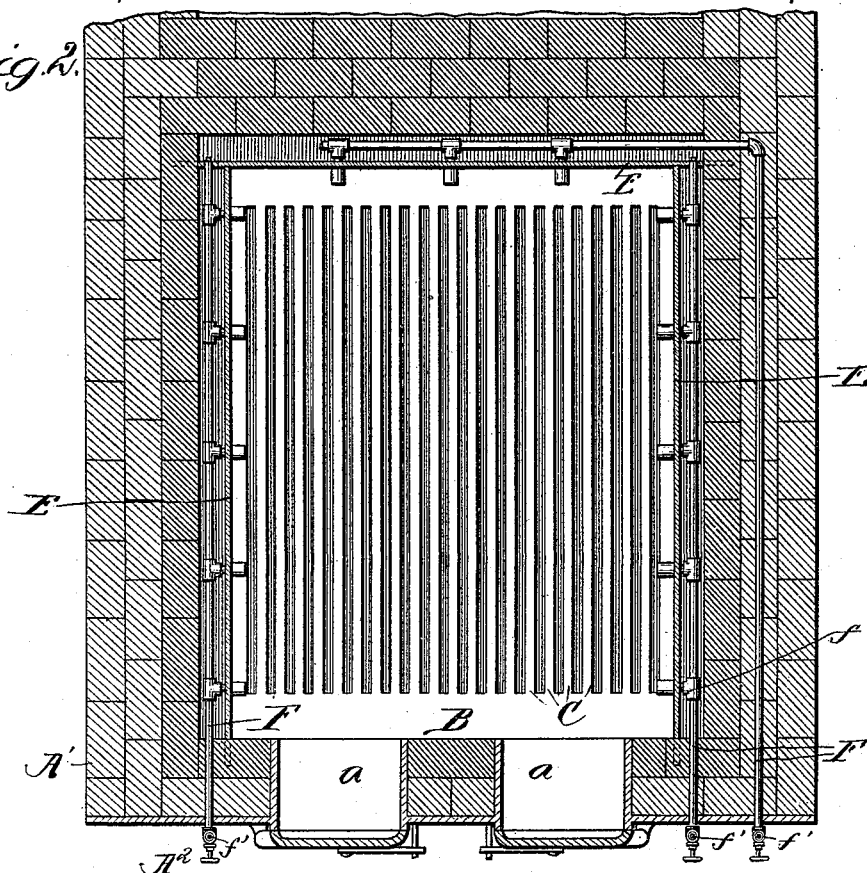


Fig. 3.

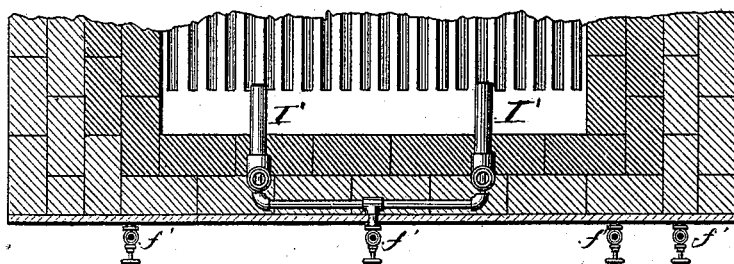


Fig. 4.

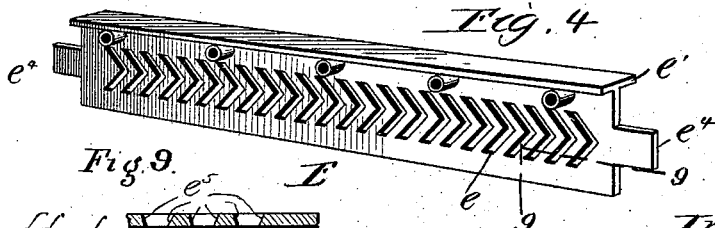


Fig. 5.



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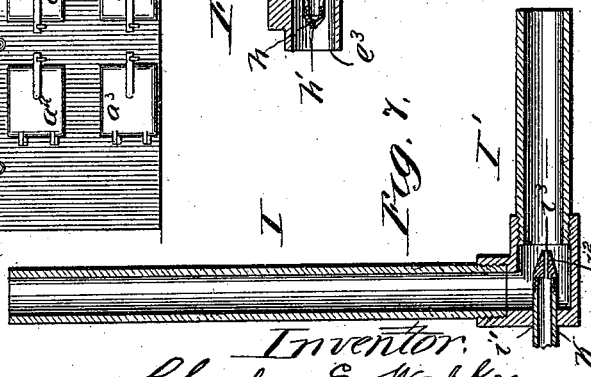
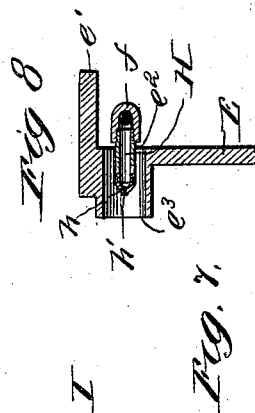
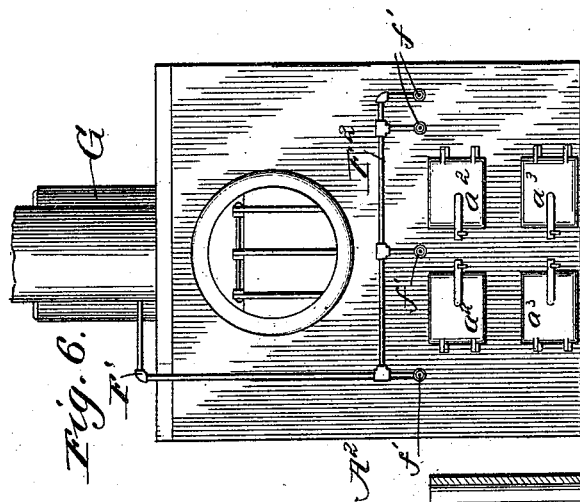
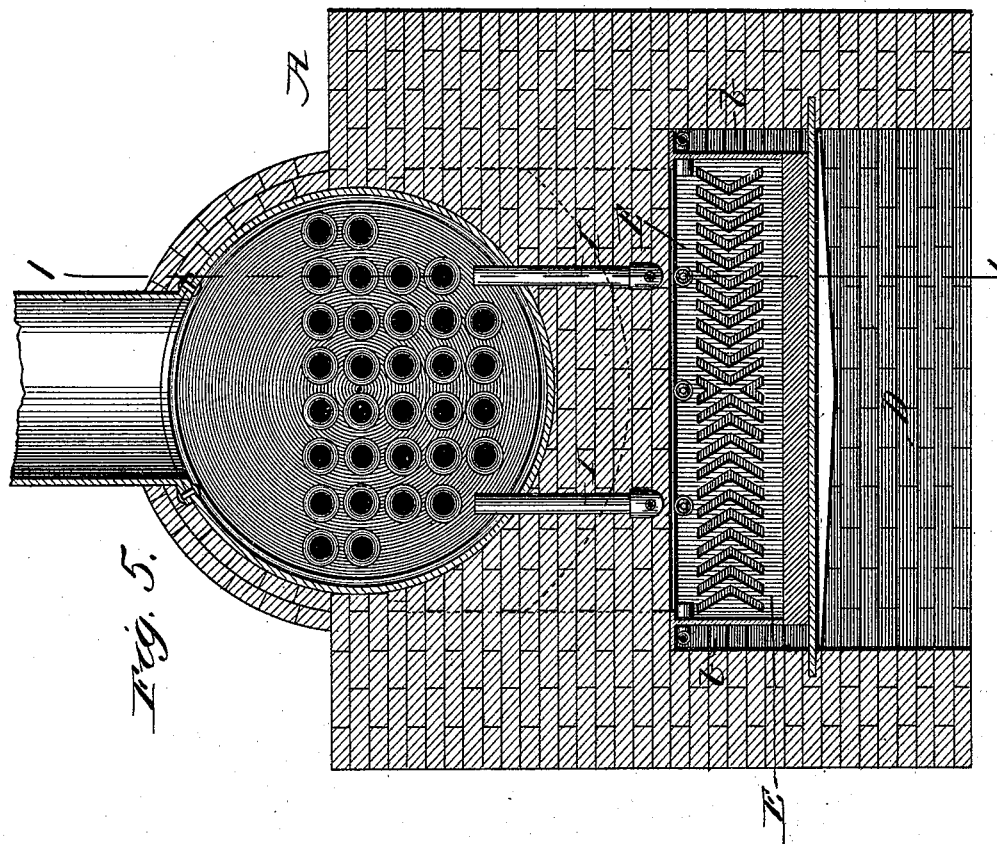
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UNITED STATES PATENT OFFICE.

CHARLES E. WALKER, OF CHICAGO, ILLINOIS.

SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 491,931, dated February 14, 1893.

Application filed April 2, 1892. Serial No. 427,507. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. WALKER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

This invention relates to new and useful improvements in smoke consuming and preventing attachments, for boilers, stoves, kilns and other furnaces, and it consists in certain peculiarities of the construction and the novel arrangement and operation of the various parts thereof, as will be hereinafter more fully set forth and specifically claimed.

The objects of my invention are first, to provide such attachments which shall be strong and durable, simple and inexpensive in construction, and application, and may be readily applied to almost any kind of furnace; and second, attachments whereby the emission of smoke is abated, and which shall in their operation be automatic, noiseless, and effective.

In order to enable others skilled in the art to which my invention pertains to make and use the same, I will now proceed to describe it referring to the accompanying drawings.

In which:

Figure 1, is a longitudinal sectional view, taken on line 1, 1, of Fig. 5, showing a boiler furnace, and a portion of the boiler, and my attachments in position. Fig. 2, is a horizontal sectional view, taken on line 2, 2, of Fig. 1. Fig. 3, is a fragmental horizontal sectional view, taken on line 3, 3, of Fig. 1, of a portion of the front of the furnace. Fig. 4, is a perspective view of one of my side bars. Fig. 5, is a vertical sectional view, taken on line 5, 5, of Fig. 1. Fig. 6, is a view in front elevation. Fig. 7, is a sectional view of a portion of one of my carbon or gas siphons. Fig. 8, is a cross-section of one of the side bars, and its steam injector, and Fig. 9, is a horizontal cross-section of a portion of one of the bars, taken on line 9, 9, of Fig. 4, showing the bevel of the slots.

Similar letters refer to like parts throughout the different views of the drawings.

A, represents the wall upon which the boiler rests, and within which is constructed the fur-

nace, or fuel compartment B, which may be of any size, and form, but usually rectangular, as shown in Fig. 2, of the drawings, and, is provided at its bottom with grate-bars C, upon which rests the coal, or other fuel. Beneath the grate-bars, is the ash-pit D, which may be of any ordinary form and construction.

Through the front wall A', of the external wall A, and the front plate A², is formed a number of openings *a*, and *a'*, for the admission and withdrawal of fuel and ashes respectively, which I provide with doors *a*², and *a*³.

Within the compartment B, and on each side thereof, and at either or both ends thereof, is placed and secured in a horizontal position, side bars E, which are formed as shown in Fig. 4, with a number of slots *e*, which may be made angular as shown, or vertical, but on account of the additional open space attained by the angularly formed slots, I prefer said construction. The top of each of these bars is formed with a flange *e'*, upon which the stone or brick composing the walls of the furnace, may be placed as is clearly seen in Fig. 5. Beneath said flange, at proper points thereunder, and between it and the upper portion of the slots *e*, is formed a number of openings *e*², which are preferably provided on the side of the side-bar E, adjacent to the fire, with annular flanges or tubes *e*³, which tubes have their ends open. By reference to the drawings it will be seen that the side-bars E, are substantially "T" shaped in cross-section, or more properly speaking are in the form in cross-section of an inverted "L." Each end of these bars may be provided with a projection *e*⁴, which will rest when the bar is in position, on the transverse support for the same. As is clearly shown in Figs. 1, and 5, of the drawings, these bars when placed in position in the compartment B, will be so placed, that their lower edges will be about flush with the upper surface of the grate-bars C, and that the flanges *e'*, on the upper portion of said bars, will hold them a distance from the inner sides of their parallel walls, thus forming an open space *b*, from the bottom to the top of each of the bars, and the full length thereof. Within these open spaces *b*, and at the upper portion thereof, is placed in a horizontal position, steam pipes F, which

are connected to a supply pipe F', which connects with the steam dome G, or any other convenient point of the boiler, and receives steam therefrom. Each of the pipes F, are provided at points to correspond with the openings e^2 , on the bar E, with "T" joints f , or other suitable connections, into which is secured nipples or injectors H, the free end of which is formed conical in shape as at h , and is provided with an opening or bore h' , of slight length, through which the steam is discharged, by reason of the length of the bore, in a solid volume.

As shown in Fig. 6, the supply pipe F', has connected to its lower portion an auxiliary supply pipe F², to which the pipes F, are connected in any desired manner, and have their supplies of steam regulated by means of valves f' .

It will be seen and understood by reference to Figs. 1, and 8, that the nipples or injectors H, which fit in the openings e^2 , and extend into the flanges or tubes e^3 , do not entirely fill the spaces of said openings and tubes, but are so placed and secured, that there will be a space between the outer surface of the nipple or injector, and the inner surface or cavity of the openings e^2 , and flanges or tubes e^3 ; and also that the conical end h , of the nipple extends only partially through the tube e^3 . It will therefore be understood, that when the steam is admitted to the pipes F, through the pipes F' and its auxiliary pipe F², it will be discharged through the nipple H, with great force over the surface of the fire, and that said discharge of steam will create in the space, between the cavity of the openings e^2 , and tubes or flanges e^3 , a vacuum, through which the air will pass, and intermingle with the steam and furnace gases. It is also obvious that by the aforesaid discharge of the steam, the draft of air passing through the slots of the bar E, will be greatly augmented.

While I have shown the bar E, provided with annular flanges or tubes e^3 , around the openings e^2 , on the side adjacent to the fire, yet it is evident, that I may omit the said flanges or tubes, and by forming a bar of greater thickness, when the openings e^2 , would be of greater depth, that I may omit the flanges e^3 ; but on account of economy, in the amount of material used, in the construction of the bar E, I prefer to construct it as shown with the annular flanges.

I may sometimes construct the bars E, without the openings e^2 , and annular flanges e^3 , but with the slots e , and flange e' , and place them as before stated, when there will be a natural and unaided drift of air, over the burning fuel, in which case the pipes F, of course are not required.

In the drawings I have shown the fuel compartment B, provided with a bar E, at each side and the rear end, but I do not desire to limit myself to so place the bars, as I may use a bar at each side only, or at each side, and at one or both ends of the fuel compartment,

as the requirements of the furnace may demand.

In the event that three bars are used, I may place the pipe F, leading and supplying steam to the nipples or jets of the rear bar, either in the side of the furnace wall, as shown in Fig. 2, or may extend said pipe horizontally, within one of the open spaces b , on the outside of the furnace wall, and then connect said pipe with the openings e^2 , in the rear bar.

In order to prevent the escapement of any unconsumed particles of carbon, which may pass through the flues of the boiler, I place at the front of the furnace, and preferably within the front wall A', thereof, a number of pipes I, which extend in a vertical position to a suitable point within the breeching of the boiler, and form at their lower end an elbow, with an inwardly extending arm or discharge pipe I', which passes through the wall A', and extends slightly into the compartment B. As shown in Fig. 7, the elbow of the pipe I, is provided with an opening i , in alignment with the discharge pipe I', and has secured in said opening a nipple or jet K, which is connected with a steam supply pipe, and has its inner end formed conical, as at i^2 , and provided with an opening or bore i^3 , of uniform size, which opening extends in the conical end i^2 . By admitting the steam from the supply pipe F', to the nipple K, it will be discharged there through into the hollow of the pipe I', which operation will create a vacuum, and cause the smoke or unconsumed particles of carbon, to be drawn into the upper end of the pipe I, and be discharged over the fire through the pipe I', when the said particles will be intermixed with the steam, air, and furnace gases, and be consumed.

In some instances I will simply use the bar E, arranged and operated as above set forth, and may not employ the carbon or siphon pipes I, but when an inferior quality of coal or fuel be used, and there is consequently a large quantity of it which is unconsumed, and produces dense volumes of smoke, I will use the siphon or carbon pipes, and I have found that when the bars E, are constructed without openings e^2 , and flanges e^3 , and the steam pipes F, are dispensed with, that the carbon or siphon pipes I, are auxiliary, and may be used.

While I have shown in the drawings, two of these pipes only, yet I may employ any number which may be necessary, without departing from my invention.

In Fig. 9, I have shown a portion of one of my bars, illustrating the manner of beveling the outer surfaces of the slots, which is done to prevent "clinkers," or pieces of coal, or other substance becoming fastened therein, for it is evident that if the slots are formed with a bevel e^5 , as shown, that the obstacles will pass through the same, of their own accord, or can be readily removed by pressing them through the narrower portion of the slots, into the beveled portion.

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

1. In smoke consuming attachments for furnaces, the combination of a furnace, with a number of slotted bars E, having the openings e^2 , and annular flanges or tubes e^3 , around said openings, and placed as set forth, and the steam pipes F, having the nipples or jets H, adapted to discharge steam through the openings e^2 , and tubes e^3 , in the bars E, substantially as set forth.

2. In smoke consuming attachments for furnaces, the combination of a number of bars, having the angular slots e , the openings e^2 , and annular flanges or tubes e^3 , around said openings, and the flange e' , said bars being placed as set forth, and the steam pipes F, having the nipples or jets H, adapted to discharge steam through the openings e^2 , and tubes e^3 , in the bars E, substantially as described.

3. In smoke consuming attachments for furnaces, the combination of a furnace, with a number of slotted bars E, having the openings e^2 , and annular flanges or tubes e^3 , around said openings and the flange e' , said bars being placed as set forth, and the steam pipes F, having the nipples or jets H, having the bore h' , adapted to discharge steam through the openings e^2 , and tubes e^3 , in the bars E, substantially as described.

4. In smoke consuming attachments for furnaces, the combination of a furnace, with a number of slotted bars E, having the openings e^2 , and annular flanges e^3 , around said openings, and the flanges e' , said bars being placed as set forth, and the steam pipes F,

having the nipples H, having the bore h' , adapted to discharge steam through the openings e^2 , and flanges or tubes e^3 , in the bars E, the carbon or siphon pipes I, having the discharge pipes I', and elbows at their lower portions, and the nipples or injectors K, adapted to discharge steam through the pipes I', substantially as set forth.

5. In smoke consuming attachments for furnaces, the combination of a furnace, with a number of bars E, having angular and beveled slots, the openings e^2 , and flanges e' said bars being placed as set forth, and the pipes F, having the nipples H, having the bore h' , adapted to discharge steam through the openings e^2 , in the bars E, the carbon or siphon pipes I, having the discharge pipes I', and elbows at their lower portions, and the nipples or injectors K, having the bore i^3 , adapted to receive and discharge steam through the pipes I', all constructed, arranged and operating substantially as shown and for the purpose set forth.

6. In smoke consuming attachments for furnaces, the combination of a furnace, with two or more bars E, having a series of beveled angular slots, the openings e^2 , and annular flanges e^3 , around said openings, and the flanges e' , said bars being placed as set forth, and the steam pipes F, having the nipples or jets H, having the bores h' , adapted to discharge steam through the openings e^2 , and flanges or tubes e^3 around the openings e^2 , in the bars E, substantially as set forth.

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