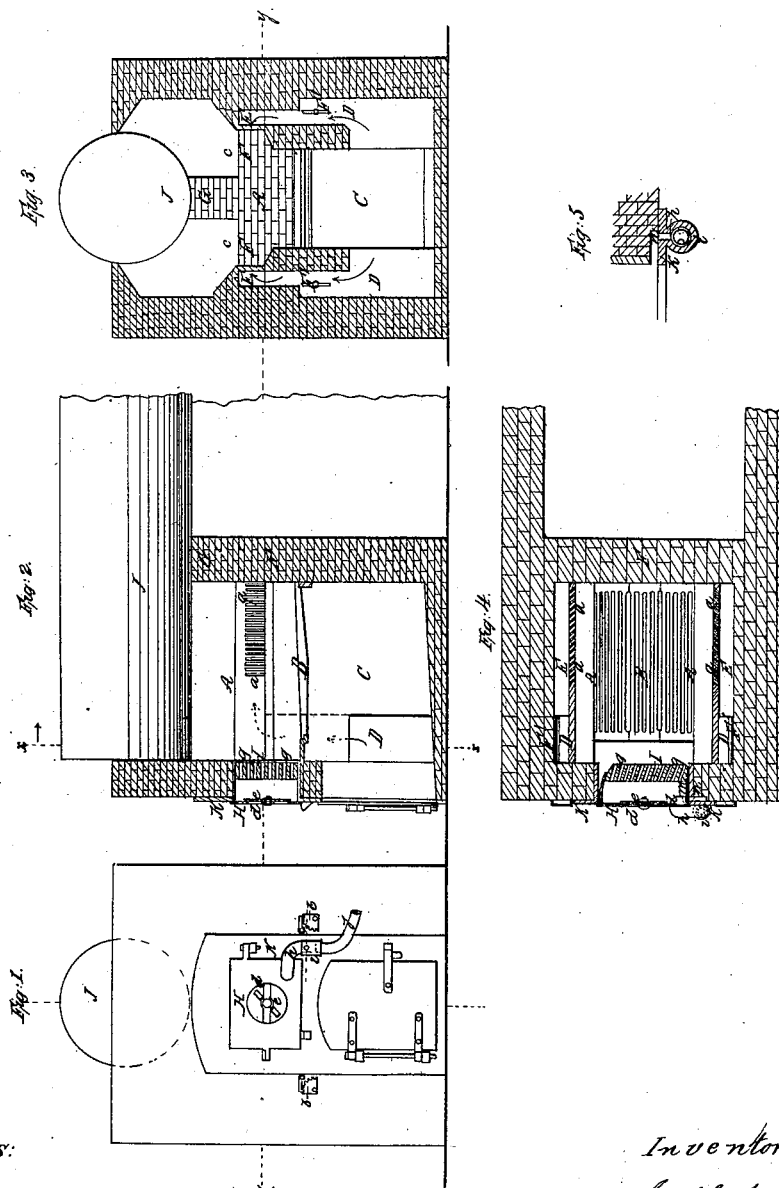


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J. A. MILLER.
BOILER FURNACE.



Witnesses:
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BOILER-FURNACE.

Specification forming part of Letters Patent No. 47,118, dated April 4, 1865.

To all whom it may concern:

Be it known that I, JOSEPH A. MILLER, of No. 200 Broadway, in the city, county, and State of New York, have invented certain new and useful Improvements in Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a front view of a steam-boiler furnace constructed according to my invention. Fig. 2 is a central longitudinal vertical section of the same. Fig. 3 is a transverse section of the same in the plane indicated by the line *x x* in Fig. 2. Fig. 4 is a horizontal section of the same in the plane indicated by the line *y y* in Figs. 1, 2, and 3. Fig. 5 is a horizontal section of part of the door frame and of the lower hinge of the fire-door.

Similar letters of reference indicate corresponding parts in the several figures.

One part of my invention consists in a novel system of air ducts, passages, and slits or orifices at the sides of a steam-boiler or other furnace for the admission of air from the ash-pit to the fire-chamber above the fuel to supply the hot gases rising from the fuel with the necessary oxygen to effect their perfect combustion.

Another part of my invention consists in the employment, in combination with a system of slits or orifices for admitting air through the sides of the fire-chamber of a furnace, of a bridge-wall with a central pier and openings at the sides for the purpose of turning the gases rising from the fuel toward the sides of the furnace, and thereby obtaining a more perfect mixture of the hot gases rising from the fuel with the air admitted through the afore-said slits or orifices.

Another part of my invention relates to the employment of a hollow box fire-door, having its inner screen of fire-brick or other material perforated for the admission to the fire of air received through a valve or opening in the front of the door; and this part of my invention consists in such an oblique arrangement of the said perforations in the inner screen that the radiant heat from the fire is prevented from striking directly through the said perforations upon the outer portion of the door, which is thereby kept comparatively cool.

My invention consists, finally, in furnishing the fire door with a hollow hinge, through which, when the door is open, there is a communication from a blower or other means of obtaining a current of air to openings so provided in the door or fire-front of the furnace, or in both, for discharging a sheet or sheets of cool air across the doorway, and thereby protecting the fireman from the heat of the fire.

To enable others skilled in the art to construct and apply my invention, I will proceed to describe with reference to the drawings.

A is the fire-chamber of the furnace. B is the grate, and C is the ash pit. On each side of the ash-pit, at the front part thereof, there is the opening of a duct, D, which leads upward to a horizontal passage, E, extending along the interior of the side wall of the fire-chamber, at some distance above the grate, and communicating with the fire-chamber through vertical slits *a a* in the bricks of the said wall. The air admitted to the furnace all passes through the grate and fuel in the usual manner, while a portion passes through the ducts D and passages E, and is admitted above the fuel in jets through the slits *a a*, and thereby mixed with the hot gases rising from the fuel in such manner as to bring into intimate and thorough admixture with the said gases the necessary oxygen to produce their perfect combustion. The said slits *a a* resemble louver-openings, having an inward horizontal inclination or obliquity toward the fire-bridge F and rear of the fire-chamber, as shown in Fig. 4, to give a freer entrance for the gases, which is thereby encouraged by the draft. Dampers or valves *F'* are provided in the ducts D to regulate the admission of air above the fuel, and these dampers are operated by sector-plates *b'*, or their equivalents, outside of the front of the furnace. The bridge F is made with a central pier, G, which extends up to the bottom of the boiler J or top of the fire-chamber, so that the openings *c c*, Fig. 3, for the passage of the flame and heated gaseous products of combustion over the said wall are at the sides of the furnace and the gases rising from the fuel and seeking an outlet from the fire-chamber are turned toward the side walls, and thereby brought into more intimate admixture with the air entering through the slits *a a*.

H I is the fire-door, which is of box form or

hollow, the front H being of iron and the back or inner screen of fire-brick. There is provided in the front H an opening, *d*, and a valve, *e*, for regulating the admission of air through the said opening to be supplied to the fire-chamber above the fuel through perforations *g g* in the back or inner screen, I. These perforations are not parallel with the length of the furnace, but have a lateral obliquity, as shown in Fig. 4, so that while they allow a free passage of air to the fire-chamber they prevent the radiant heat of the fire from passing directly through them and striking the front H. In this way not only is the loss of heat by radiation from the door prevented, but the front of the door and its valve *e* are kept so cool that they can be handled without inconvenience. The pintle *h* of the lower hinge of the fire-door and the stationary socket *i*, which is attached to the fire-front K or door-frame, are both made hollow, and the said socket *i* has connected with it a pipe, *j*, from a blowing apparatus. The hollow pintle *h* communicates with an air duct, *l*, Fig. 4, within the angle of the door next the hinge, and in the side of the door next the hinge there is a vertical slit, *m*, for the exit of air from the duct *l*. The socket *i* communicates with a vertical passage, *n*, in the fire-front at the side of the doorway. The pintle *h* and socket *i* are made with openings substantially like those of a cock, so arranged that when the door is shut the said openings are closed, but that when the door is open the said passages are open also, and the air admitted through the pipe *j* to the socket *i* is discharged from the slit *m* and passage *n*, in thin sheets right across the open doorway, thus forming a

screen of cold air between the fire and the fireman and protecting the firemen from the heat of the fire.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The slits or openings *a a*, in combination with the horizontal passages E in the side walls of the fire chamber, and with the ducts D in communication with the ash-pit, substantially as and for the purpose herein specified.

2. Giving the openings *a a* an inward horizontal inclination toward the bridge-wall or rear of the fire-chamber, substantially as and for the purpose herein specified.

3. The pier G and side openings, *c c*, over the bridge, in combination with a system of slits or openings, *a a*, for the admission of air through the side walls of the fire-chamber, substantially as and for the purpose herein specified.

4. The laterally-oblique arrangement of the perforations *g g* in the back or inner screen, I, of the fire-door, substantially as and for the purpose herein specified.

5. The hollow hinge *h i*, in combination with one or more openings, *m n*, in the door or fire-front, and with a pipe, *j*, for the introduction of air from a blowing apparatus, whereby a current or currents of cold air are discharged in thin sheets across the open doorway, substantially as and for the purpose herein specified.

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Witnesses:

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