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PATENTED AUG. 27, 1907.

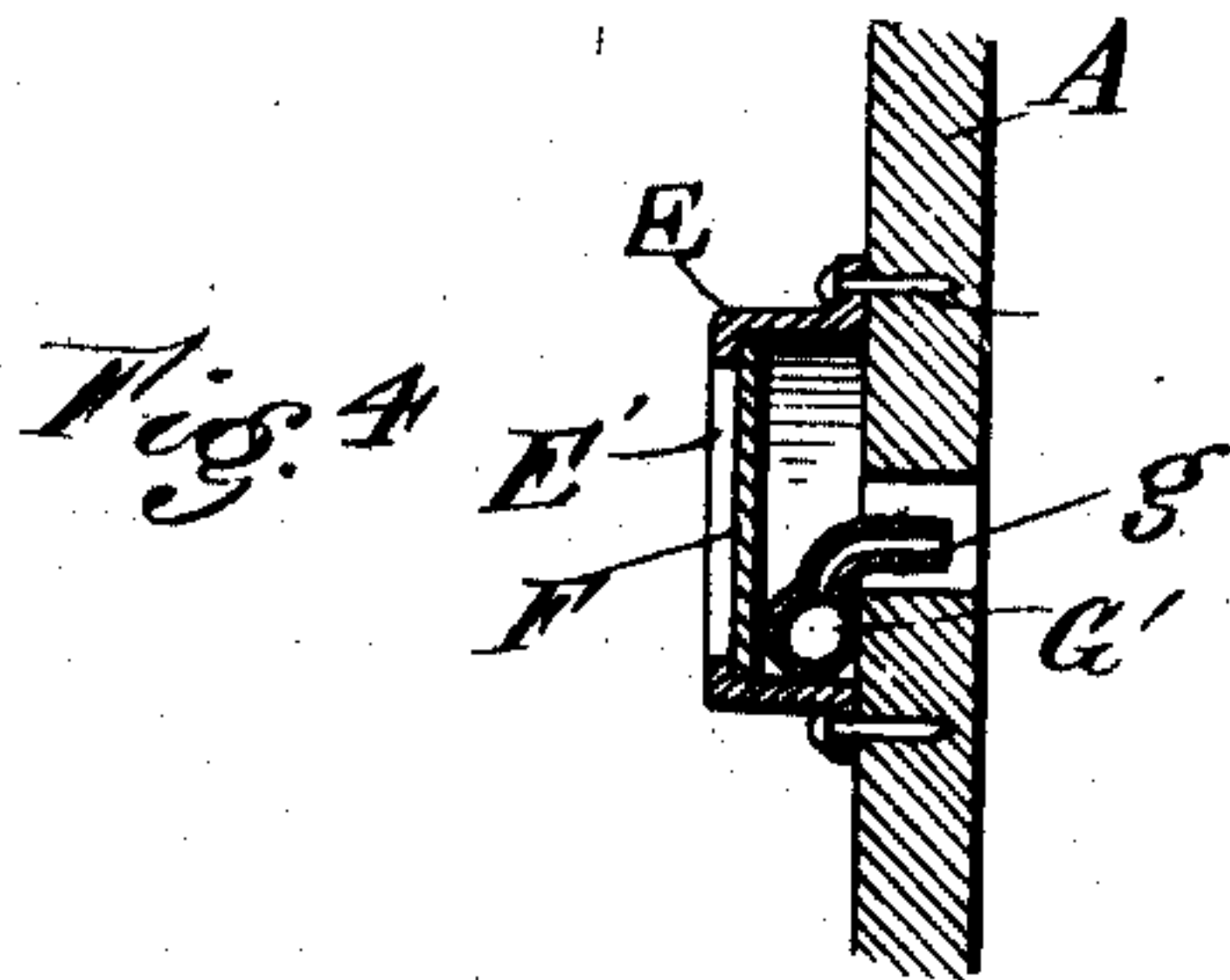
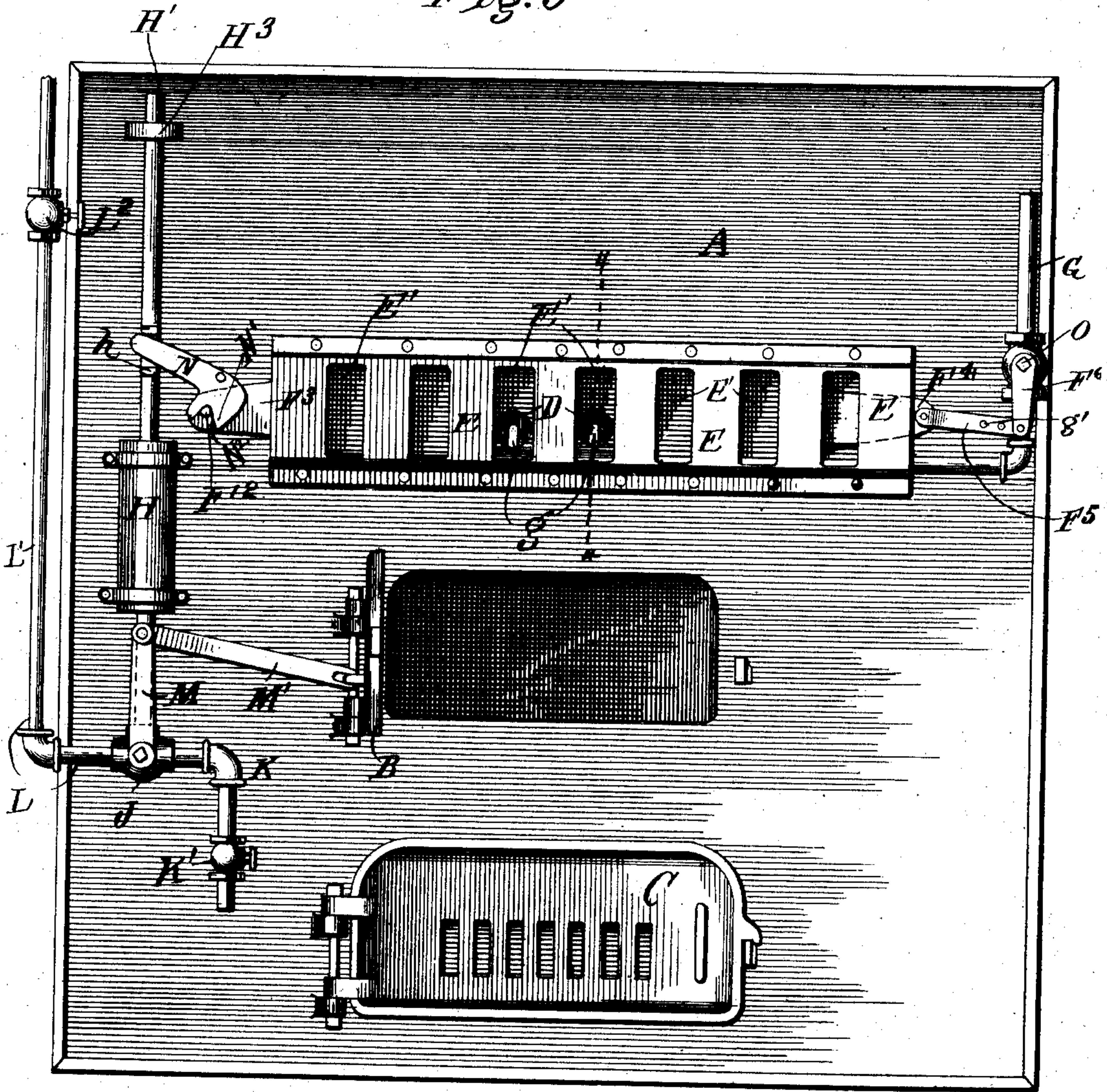
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FURNACE ATTACHMENT.

APPLICATION FILED MAY 23, 1906.

2 SHEETS—SHEET 2.

Fig. 3



WITNESSES

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# UNITED STATES PATENT OFFICE.

JESSE R. MOLER AND RALPH G. MOSER, OF DENVER, COLORADO.

## FURNACE ATTACHMENT.

No. 864,666.

Specification of Letters Patent.

Patented Aug. 27, 1907.

Application filed May 23, 1906. Serial No. 318,324.

*To all whom it may concern:*

Be it known that we, JESSE R. MOLER and RALPH G. MOSER, citizens of the United States, and residents of Denver, in the county of Denver and State of Colorado, have made certain new and useful Improvements in Furnace Attachments, of which the following is a specification.

Our invention relates to improvements in furnaces and has for its object prevention of smoke when the furnace is charged with fuel by admitting air and steam into the fire box.

Our invention consists in certain novel features of construction, arrangement and combination of parts as will be hereinafter fully described and pointed out in the claims, reference being had to the accompanying drawing, in which

Figure 1 is a front view of a furnace with our attachments showing the parts when not in operation. Fig. 2 is a horizontal section taken on line 2—2 of Fig. 1. Fig. 3 is a front view of the furnace with the parts of our improvement in operative position. Fig. 4 is a section on line 4—4 of Fig. 3.

In the drawing is represented a furnace A which may be of any suitable type having the fire door B and the ash pit door C. Above the fire door a horizontal row of holes D is made in the front fire wall and attached to the outer face of the front wall is a box E, the front wall of which is pierced with the vertical slots or openings E' at suitable intervals corresponding in number and position to the holes D. A slide or damper F fits within the box E against the front wall thereof and has a series of slots F' corresponding to those E' of box E.

A steam pipe G extending from the steam space of the boiler is located at one side of the furnace and has a horizontal extension G' which extends into the box E and has at suitable intervals the jet tubes g which extend through the holes D in the front wall of the furnace and into the fire box thereof, said steam pipe G' being located back of the slide F as shown in Fig. 2. Located to one side of the furnace (preferably the door hinge side) is a vertical cylinder H in which slides a piston H' which is secured at the lower end of rod H<sup>2</sup> which extends upwardly through the upper head of the cylinder and carries near its upper end a weight H<sup>3</sup>. In the lower end of the cylinder H is fitted a pipe I which is fitted at its lower end into a valve casing J in which is fitted a turning plug J'. Extending horizontally from this valve casing to the right and left are the branch pipes K and L, the pipe K having a downward bend and a globe valve K' therein. The pipe L extends to the left and is provided with an elbow connecting it to a vertical pipe L' which is connected with a suitable water supply, and is provided with a globe valve L<sup>2</sup> to control the flow of water from said supply. The turning plug J' which is provided with a two-way passage has an extension at its inner end to which is rigidly

attached one end of bar M, the other end of said bar being pivotally connected to one end of a rod M' universally joined to the fire door adjacent to its hinged end.

Movably engaging the piston rod H<sup>2</sup> at a suitable point above the upper cylinder head, is a lever N which is pivoted near its opposite end to the front wall of the furnace. This end of the lever N has a head N' having an inverted V-shaped notch N<sup>2</sup> which fits over a pin F<sup>2</sup> on the extension F<sup>3</sup> of the slide F and works on it with a cam action. The other end of slide F has an extension F<sup>4</sup> to which is pivotally connected one end of a strap bar F<sup>5</sup>, the other end of bar F<sup>5</sup> being pivotally connected to the end of a lever F<sup>6</sup> rigidly secured to the valve stem of the valve O which is fitted in steam pipe G and controls the admission of steam to the horizontal pipe G'. The strap bar F<sup>5</sup> is provided with a series of holes g' by means of which the point of attachment of lever F<sup>6</sup> may be varied and thus the quantity of steam admitted to pipe G' be regulated.

When the fire door B is opened to charge the furnace, the rod M' will be carried to the left and swing the lever M to the left turning plug J' so that water from the source of supply will flow into the cylinder H and force piston H' and piston rod H<sup>2</sup> upwardly. As the piston rod is connected to the slide or damper F by the lever N, said slide will be drawn to the left uncovering the holes D cut through the front of the fire box and also uncovering the openings E' in the box E, said movement of the damper F establishing communication between the holes D and the openings E', to admit air draft into the furnace. This movement also, through the valve F<sup>5</sup> and lever F<sup>6</sup>, opens the valve O in the steam pipe and admits steam to the pipe G' and through the jet nozzles g through the draft holes D into the furnace. The admission of the steam in jets causes a forced suction draft of air into the fire box.

When the fire door is closed, the water supply is cut off and the two-way valve J' permits the water in the cylinder H to drain off through cock K' and the weight H<sup>3</sup> forces the piston and rod downwardly, and through the movements of their connections with the slide or damper F closes the draft holes in the box E and at the same time shuts off the supply of steam, the time for this operation being adjusted by the water cock K' placed on the exhaust pipes. In this way, the fireman can adjust the device so as to give that amount of air and steam necessary to completely consume the free carbon. This upper current of air and steam which commingles with the lower current coming through the grate thereby prevents the escape of free carbon. Coincident with the prevention of the escape of free carbon, the consumption of the additional gases which are also retained in the fire box increase the efficiency of the coal, thereby lessening its consumption in relation to the units of heat generated.

It will be noticed that by the construction shown



that the air and steam are injected into the furnace through the same opening and at the same time, and that also that this admission of air and steam through the same opening produces a forced draft at the time  
 5 air is most needed in the furnace. Furthermore, the air is heated by its contact with the steam and is thoroughly mixed with the combustible gases in the furnace before they are cooled by contact with the boiler. Being thus mixed with the combustible gases which  
 10 require air to make a perfect combustion, a more perfect combustion results.

As the steam jets do not enter the furnace proper, or fire box, but are rather in the wall, being in the center of a larger hole through which the air and steam  
 15 enter the furnace together, the velocity of the steam causes a forced draft of air to enter through the larger opening. The amount of air and steam desired to make a perfect combustion can be independently regulated by the adjustment of the various parts of the de-  
 20 vice. The cylinder H acts both as a fluid pressure motor and as a dashpot, and the single two-way cock J' acts as an inlet and an outlet.

By attaching our mechanism to the boiler front instead of to the door, it is not subject to jar and strain  
 25 when the door is opened and closed.

Our device becomes operative as soon as the fire door is opened, and may be cut out of operation when so desired.

The lugs or projections *h* on the rod H' engage the  
 30 free end of lever N to cause it to swing on its pivot, when said rod moves up or down.

We claim:

1. In a boiler furnace having a pivoted fire door, the front wall of said furnace having a series of openings therethrough, a series of steam jets projecting into said  
 35 openings, a boxing disposed over said openings and having a corresponding series of openings, a damper plate slidably mounted in said boxing and also provided with a corresponding series of openings, a cylinder carrying a piston  
 40 rod projecting from the said cylinder, said piston rod operatively connected with one end of the slidable damper plate, means connecting the opposite end of said damper plate with the valve of a steam supply, said cylinder having a connection with a liquid supply pipe a valve in said  
 45 pipe and controlling the same, and means connecting the fire door with said valve, whereby opening and closing the fire door will admit and discharge liquid to and from the cylinder to move the piston and thereby cause the admission of a forced mixed draft of air and steam to the charge  
 50 of the furnace and shut off the same.

2. In a boiler furnace, the front wall of which is pierced by a series of openings, a damper plate slidably disposed over said openings and having a corresponding series of openings therethrough, a steam pipe disposed along the  
 55 front wall of the furnace and provided with jets projecting into said openings in the front wall, said steam pipe con-

nected at one end to the steam space of the furnace, a valve in said steam pipe operatively connected to one end of the damper plate, a cylinder located adjacent to the opposite end of the damper plate, a piston in said cylinder, a lever connecting said piston with the damper plate, a liquid supply pipe connected with the lower end of said cylinder, a two-way cock in said liquid supply pipe, a fire door pivotally hung to the front wall of the furnace, and connections between said door and the two-way cock whereby opening of the door will operate said valve to admit liquid below the piston and raise the same to cause a sliding movement of the damper plate to open the steam valve and also uncover the openings in the front wall of the furnace to permit a forced mixed draft of air and steam to be delivered to the charge of the furnace.

3. In a boiler furnace the front wall of which is pierced by a series of openings, a boxing disposed over said openings said boxing being provided with a corresponding series of openings a damper plate provided with a corresponding series of openings, said damper plate slidably mounted in said boxing, a steam pipe within said boxing and connected at one end to the steam space of the furnace, a valve in said steam pipe operatively connected to one end of the damper, a cylinder located adjacent to the opposite end of the damper, a piston in said cylinder, a lever connecting said piston with the damper, a liquid supply pipe connected with the lower end of said cylinder, a two-way cock in said liquid supply pipe, a fire door pivotally hung to the front wall of the furnace, and connections between said door and the two-way cock whereby opening of the door will operate said valve to admit liquid below the piston and raise the same to cause a sliding motion of the damper to open the steam valve and also the openings in the boxing, permitting a forced mixed draft of air and steam to be delivered to the charge of the furnace.

4. In a boiler furnace the front wall of which is provided with a horizontal series of openings or holes, a series of steam jet tubes located in said openings, a pipe from which said jet tubes project and connect with the steam space of the furnace, a valve in said pipe, a boxing secured to the front wall of the furnace over the aforesaid openings, said boxing having a corresponding series of openings, a damper slidably fitted in said boxing in front of said jet tubes and having a corresponding series of openings, a lever connection between one end of said damper and the valve in the steam pipe, a vertical cylinder secured to the face of the furnace adjacent to the opposite end of the damper, a piston and piston rod in said cylinder, a lever connection between the piston rod and the adjacent end of the damper, a pipe leading from below the piston to a suitable liquid supply pipe, a two-way cock interposed in the pipe leading from the cylinder to the liquid supply pipe, a lever rigidly connected with said two-way cock, a rod pivotally connected at one end to the free end of said lever, and a fire door hinged to the front wall of the furnace, and flexibly connected to the rod which is pivotally connected to the liquid valve lever.

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Witnesses:

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