No. 732,359. PATENTED JUNE 30, 1903.

J. J. LEACH.

BOILER FURNACE.

APPLICATION FILED AUG. 26, 1902.

NO MODEL.

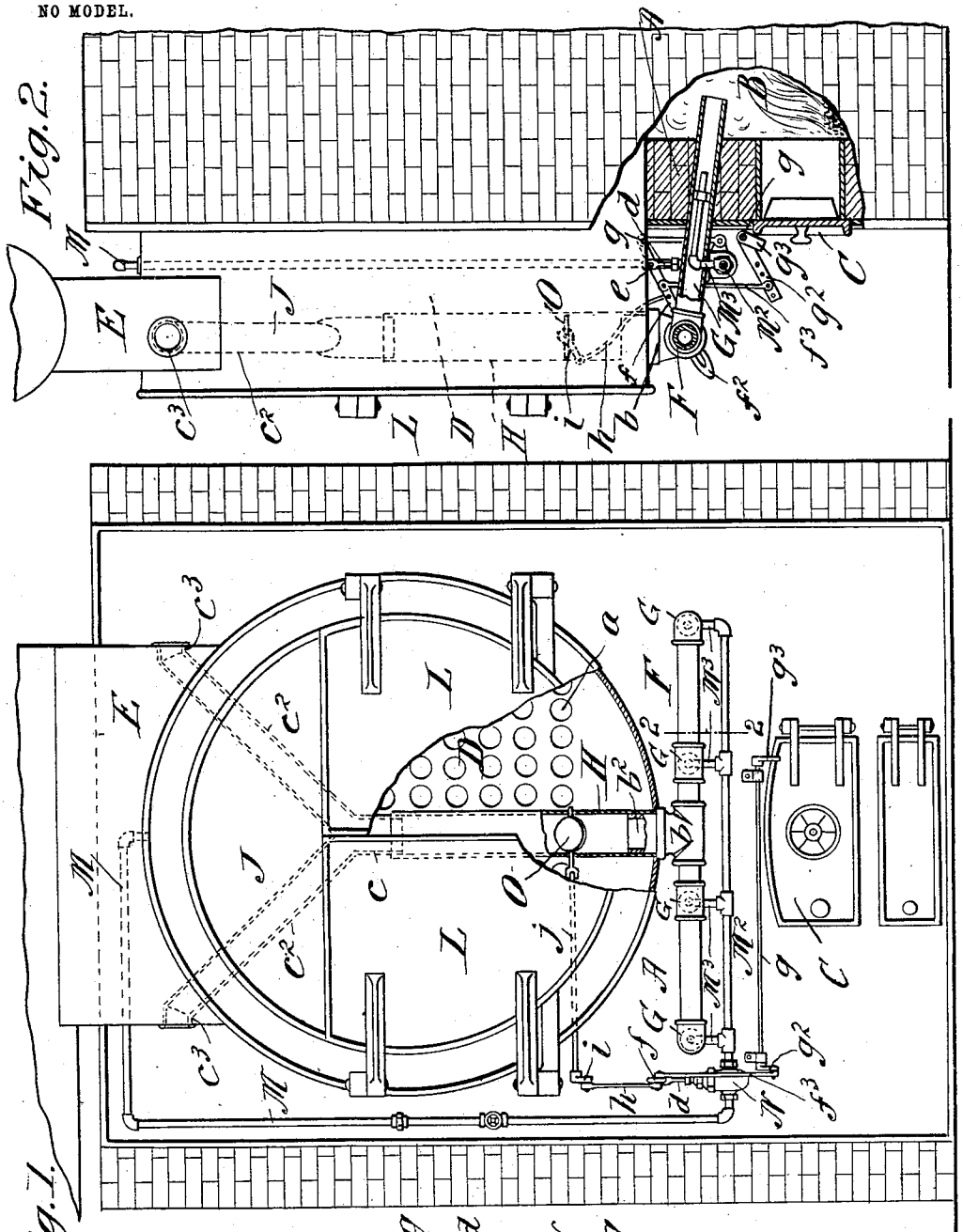

Fig. 2.

Fig. 1.

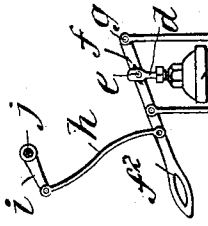

Fig. 3.

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No. 732,359. Patented June 30, 1903.

UNITED STATES PATENT OFFICE.

JOHN J. LEACH, OF SPRINGFIELD, MASSACHUSETTS.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 732,359, dated June 30, 1903.

Application filed August 26, 1902. Serial No. 121,116. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. LEACH, a citizen of the United States of America, and a resident of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Boiler-Furnaces, of which the following is a full, clear, and exact description.

This invention relates to improvements in fuel-economizing and smoke-reducing apparatuses in which there is employed means for introducing steam and heated air into the combustion-chamber of the boiler-furnace.

The improvements relate to a peculiar arrangement of the air-conduit in its connection with the air-heating chamber in the boiler-setting and the fire-chamber therebelow, and to provisions whereby a portion of the air-conduit may be removed for the purpose of cleaning out the chamber in the boiler-front through which this conduit extends, and to the combination and arrangement in the apparatus of a pipe for carrying live steam from the boiler into the combustion-chamber, a valve in said steam-pipe, and means for automatically opening this valve when the furnace-door is opened for the introduction of coal into the furnace, the closing of the furnace-door being without effect upon the steam-valve, which is to be closed manually as occasion may require, and these improvements consist in the constructions, arrangements, and combinations of parts, all substantially as hereinafter described in connection with the accompanying drawings and set forth in the claims.

In the drawings, Figure 1 is a front elevation. Fig. 2 is a side elevation and partial vertical section on line 2 2. Fig. 3 is a view in detail of the steam-valve and the operating devices therefor.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings, A represents the front wall of the furnace B, having the door C hinged, as usual, and D represents the boiler-furnace, having the flues *a a*, which are understood as extending from the rear to the front, having connection at the rear with the combustion-chamber of the furnace and opening forwardly into the air-chamber D, at the top of which is a dome or stack E, having connection with the chimney, all as common and well known.

Arranged horizontally along the front of the furnace is a comparatively large pipe F, having branches G, which extend rearwardly with a slight downward inclination through the front wall of the furnace-chamber and into such chamber, and to said pipe is connected a coupling *b*, which extends upwardly through the lower wall of the aforesaid chamber D and has a sleeve-like connection made therewith by the pipe-section H, which at its upper end has a sleeve-like connection with the median branch or member *c* of a Y-shaped air-pipe J, outwardly and downwardly diverging members c^2 c^2 thereof terminating in the short horizontal tubular portions c^3 c^3, which are fitted rotatably in alinement in the opposite walls of the stack E.

It is apparent that the air coming in from the opposite side of the stack through the Y-shaped conduit J and the extension H and continuing through the horizontal pipe F for distribution to and through the plurality of the branches G will enter the fire-chamber in a heated condition to improve the conditions for combustion of the fuel in the furnace.

Inasmuch as at times it is desirable to open the hinged doors L L, which constitute the front of the chamber D, for the purpose of cleaning out such chamber and the flues and in order that the pipe-section H may not constitute an impediment to the cleaning operations, such section is temporarily removed, as may be done by sliding it upwardly on the branch *c* of the Y-shaped conduit *j* forwardly on its alined members c^3 c^3, which constitute hinges therefor, whereupon the pipe-section H may be slid downwardly forwardly and laid aside until after the cleaning operation.

M represents a pipe for carrying live steam from the boiler into and through the various air-pipe branches G G, this pipe M having a connection with the horizontal pipe-section M^2, ranging under the air-pipe branch F, and from such section M^2 the vertical pipe branches M^3 extend upwardly through the lower wall of and into the branches G G and are extended therein toward the fire-chamber,

the diameter of these steam-pipe branches M^3 being much less than that of the air-pipe branches G.

N represents a valve in the steam-pipe M, the same having an operating steam or spindle *d*, with which is connected at *e* the intermediate portion of a lever *f*, the extremity of said lever being fulcrumed at *g* on a suitable supporting-bracket, said lever *f* having a handle extension f^2. The said lever *f* has by the link f^3 a connection with a cranked member g^2 of a rock-shaft *g*, ranging horizontally along the front wall of the furnace-chamber, being mounted in suitable bracket-lugs for its rotational movement and having adjacent the door C of the furnace a crank or lug g^3, the arrangement of which is such that when the furnace-door is swung open to permit the throwing into the furnace of coal the door will through contact with said lug swing the latter and rock the shaft *g* and cause the opening of the steam-valve N, so that concurrently with the renewing of the coal-supply in the furnace there will be the introduction into the furnace of jets of steam, which will have the effect of reducing or allaying the smoke, and in order that the air-draft into the furnace-chamber through the conduits J, H, F, and G may be temporarily established when the furnace-door is opened such door, through the steam-valve-operating connections and supplementary connections, operates a damper O in the air-conduit H, such supplementary connections consisting of a link *h*, extending from the aforementioned lever *f* to connection with a crank-arm *i* on the rock-shaft *j*, which is in alinement with and practically an extension of the journals of the damper.

While from the foregoing it is apparent that the action of opening the furnace-door automatically opens the steam-valve and concurrently opens the damper O, the action of closing the furnace-door is non-effective to return the valve and damper to their normal positions, for it is desirable that the conditions automatically established when the furnace-door is opened to introduce fuel may continue for some little time after the furnace-door is closed, as the attendant may determine, it being left to him to seasonably operate the lever f^2 by hand, to close the steam-valve, and close the damper in the air-conduit when he perceives that conditions have become such as render the cessation of the steam-ingress and the cessation of the heated-air ingress into the furnace-chamber desirable.

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

1. In an apparatus of the character described, the combination with the furnace-chamber and the boiler, having at its front a chamber receiving the products of combustion, of a Y-shaped conduit J located in said chamber, the divergent branches $c^2 c^2$ of which terminate in the alined tubular extensions c^3 c^3 which are fitted for rotation on a common horizontal axis in the opposite walls of the aforesaid chamber, the pipe-section F at the front of the furnace, below said chamber having branches extending into the furnace-chamber and having the upwardly-extended branch member b^2 and the pipe-section H having a sleeve-like fit upon the branch b^2 and upon the median member *c* of the Y-shaped conduit, J, so that said section H may be slid upwardly off from said branch b^2, so that the conduit J, and section H, may be swung on the pivot members $c^3 c^3$ and so that said section H may thereupon be temporarily disengaged from its connections for the purpose explained.

2. In an apparatus of the character described, the combination with the boiler and its furnace having a door, of the air-pipe leading from the outer air into the furnace-chamber and a damper in said air-pipe having an operating-shaft *j* with a crank member *i*, the steam-pipe leading from the boiler and entering the portion of the air-pipe which is directed into the furnace-chamber having a normally closed valve N provided with a stem *e*, the rock-shaft *g* having the crank-lug g^3 adjacent the furnace-door, and having the crank member g^2 the lever *f* connected to the valve-stem and connections between the crank member g^2 and said lever, and between said lever and the crank member *i*, whereby the opening of the furnace-door causes the opening of both the steam-pipe valve and the air-pipe damper substantially as described and shown.

Signed by me, at Springfield, Massachusetts, in the presence of two subscribing witnesses.

JOHN J. LEACH.

Witnesses:
WM. S. BELLOWS,
ANNIE V. LEAHY.