

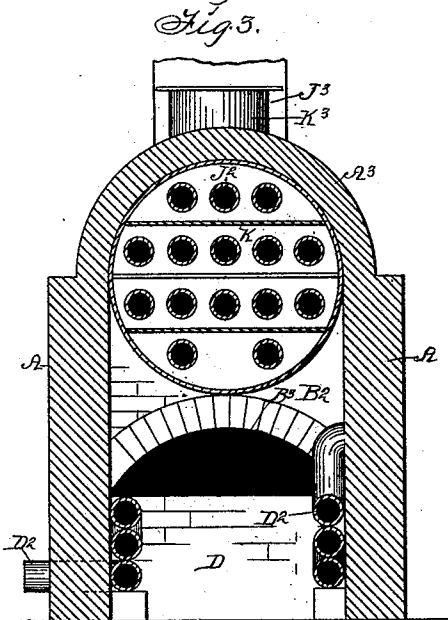
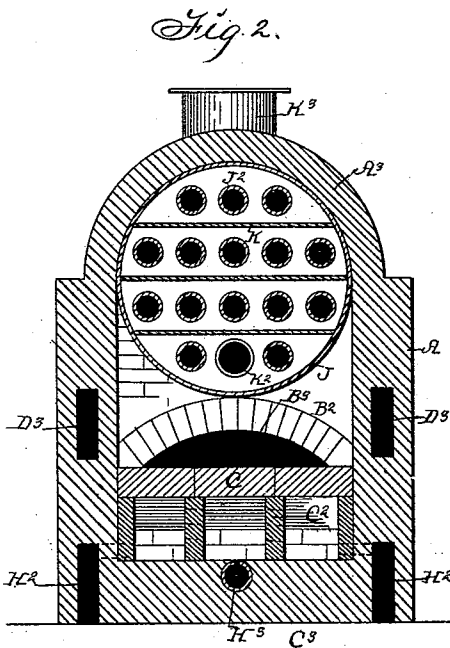
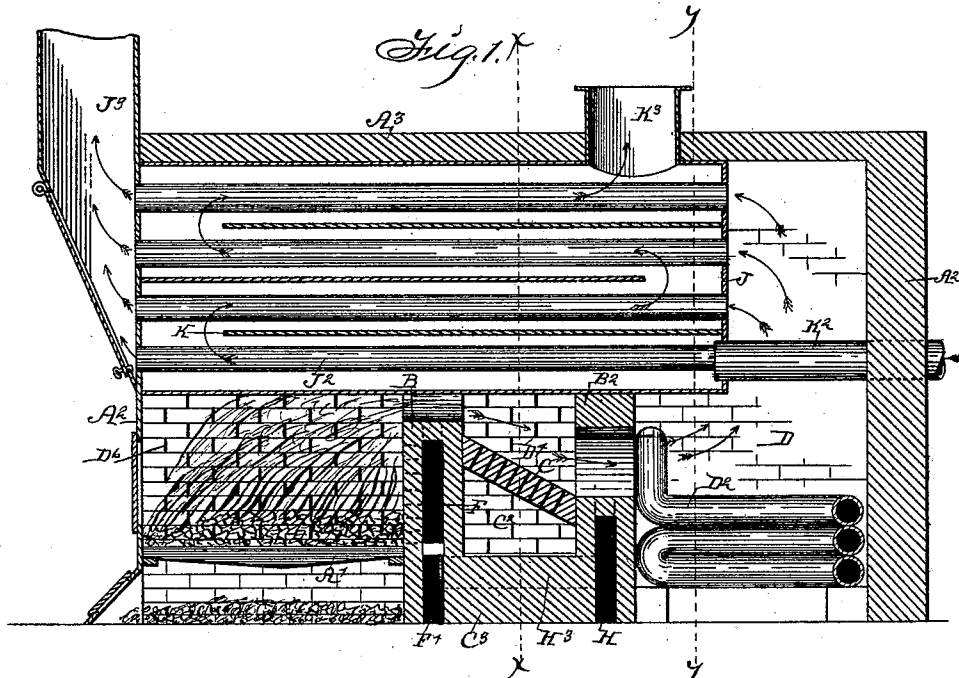
(No Model.)

2 Sheets—Sheet 1.

J. W. WILKINSON.
FURNACE.

No. 496,806.

Patented May 2, 1893.



Witnesses: *W. J. Laukey.*
J. Ralph Orwig. } Inventor: *Joseph W. Wilkinson,*
By Thomas G. Orwig, Attorney.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

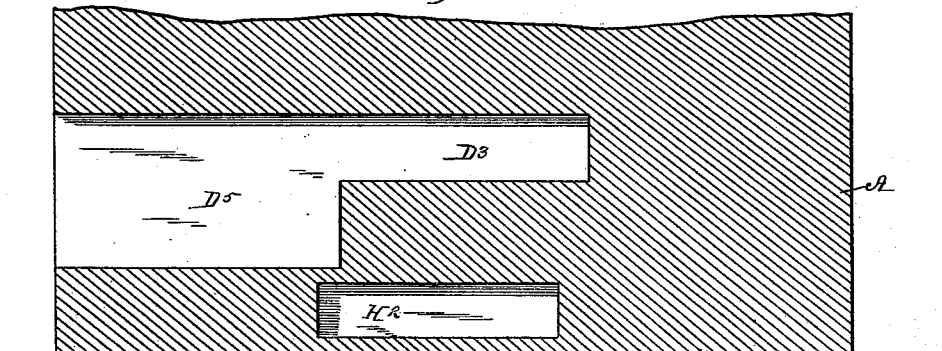


Fig. 5.

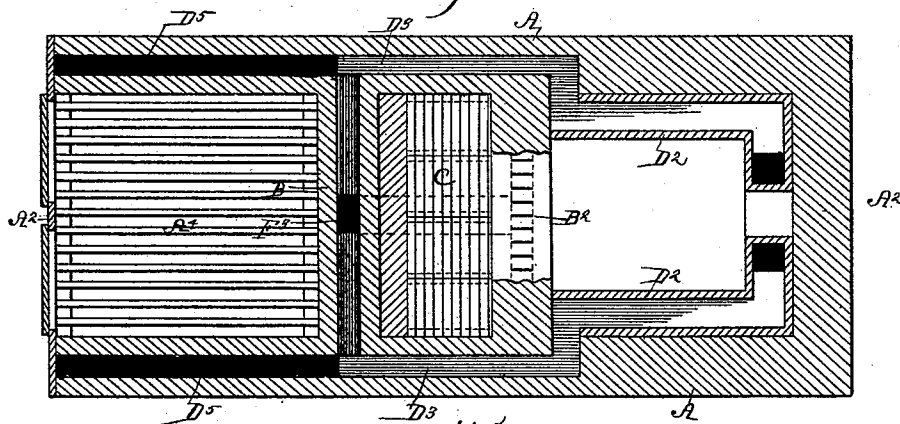
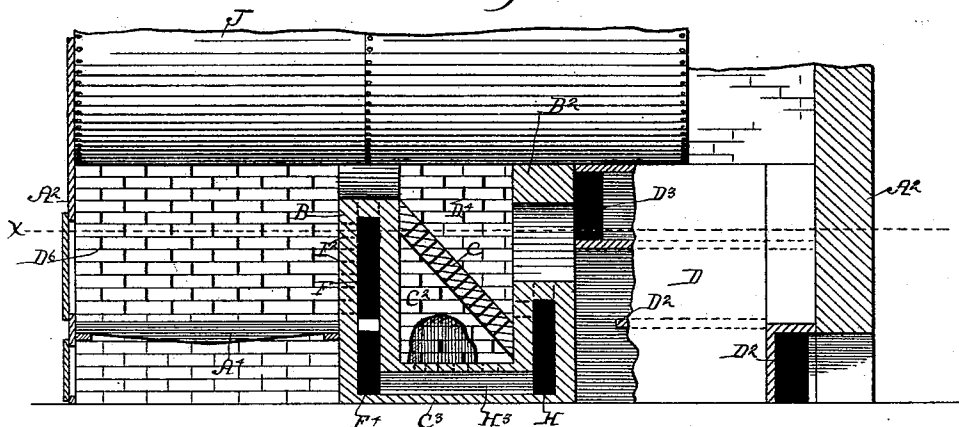


Fig. b.



Witnesses:
W. J. Laukey.
J. Ralph Drwing. }

Inventor: Joseph W. Wilkinson,
By Thomas G. Drwig, Attorney,

UNITED STATES PATENT OFFICE.

JOSEPH W. WILKINSON, OF DES MOINES, IOWA, ASSIGNOR TO ROBERT
DEMPSTER, OF SAME PLACE.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 496,806, dated May 2, 1893.

Application filed January 13, 1893. Serial No. 458,264. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. WILKINSON, a citizen of the United States of America, residing at Des Moines, in the county of Polk and State of Iowa, have invented a Furnace, of which the following is a specification.

The object of my invention is to provide simple, cheap and durable means whereby pure air in a superheated state may be made to commingle with the products of combustion in a more thorough manner than has heretofore been accomplished and at the proper point within the furnace to thereby consume all of the black smoke, soot and volatile gases.

With this end in view my invention consists in certain details in the construction, arrangement and combination of bridge walls, superheating, pipes, air-chambers, &c., as hereinafter fully set forth, pointed out in my claims and illustrated in the accompanying drawings, in which:

Figure 1 is a vertical longitudinal sectional view of the complete furnace. Fig. 2 is a transverse sectional view of the same, through the line $x-x$ of Fig. 1, looking rearwardly. Fig. 3 is a vertical transverse sectional view of the same through the line $y-y$ of Fig. 1, obtained by looking forwardly. Fig. 4 is a vertical longitudinal sectional view of one of the side walls. Fig. 5 is a horizontal sectional view through the line $x-x$ of Fig. 6. Fig. 6 is a vertical longitudinal sectional view through the furnace in which several modifications over Fig. 1 are shown.

Referring to the accompanying drawings, the reference letter A is used to designate the side walls of the furnace, A² the end walls and A³ the top, all of which are preferably constructed of birch in the usual manner.

A⁴ is a grate in the combustion chamber of the furnace.

B designates a bridge wall in the rear of the grate over which all of the products of combustion must pass before reaching the flue.

B² is a second bridge wall located some distance in the rear of the first having an arched opening B³ through which the products of combustion must pass.

C designates an inclined perforated wall

extending from the top of the front bridge wall B to the rear bridge wall B². This wall is supported upon the perforated upright walls C² which rest upon a suitable base C³. In the rear of this second bridge wall C is a superheating chamber D within which is coiled a superheating pipe D² which communicates with the outside atmosphere through the furnace walls.

D³ designate air chambers one of which is located in each side wall of the furnace, said air chambers being in direct communication with the superheating coils D², and extended forwardly to a point opposite the forward bridge wall, the inner sides of said chambers are perforated at D⁴ to discharge the heated air into the space between the front and back bridge walls, D⁵ designates like air chambers in the forward portion of the side walls extending along that portion of the side walls in contact with the combustion chamber, perforations D⁶ are made to provide communication between said air chambers D⁵ and the combustion chamber.

F designates an air chamber formed in the top portion of the forward bridge wall extending from one side wall to the other and communicating with the air chambers D³ in the side walls.

F² designate perforations in the front face of the bridge wall.

F³ is an opening in the bottom of the air chamber F leading to a like chamber F⁴ beneath it.

H designates an air chamber in the interior of the rear bridge wall. This chamber is made to communicate with the chamber F⁴ in the forward bridge wall by the air passages H² formed in the side walls and also the air passage H³ leading from the central portion of the air chamber F⁴ to the chamber H. This latter air-passage H³ is allowed to discharge part of its contents upwardly through perforations in its top into the space between the bridge walls. It will thus be seen that by this arrangement of pipes, air chambers, &c., pure atmospheric air is drawn from the outside of the furnace through pipes coiled within a superheating coil, conducted from thence to an air chamber in the forward bridge wall in close proximity to the combustion chamber

where its heat is increased, a certain quantity of air is also admitted into the combustion chamber through the perforations in the side walls, the superheated air is then discharged into a long narrow passage through which the products of combustion must pass.

In practical use the discharge of superheated air from four directions to one common center, that is from both side walls, from the front face of the bridge wall and from the top of said bridge wall to a point directly above the grate where the combustion takes place, will produce a diversity of currents of superheated air which retains the products of combustion directly above the hottest portion of the fire upon the grate and supplies the proper amount of air thereto at the point to produce the best results in the consuming of smoke, soot, &c., and the function of the rear bridge wall and the inclined wall is to prevent the products of combustion from passing to the flue before they have been subjected to the requisite amount of heat and commingled with sufficient air, this they accomplish in the following manner. It will be obvious that the rear arched bridge wall will prevent the products of combustion from passing directly to the flue along the bottom of the boiler or radiating drum, and compel the same to pass in close proximity to the inclined wall. As the heat is increased upon the grate it will be obvious that by reason of the increased draft the products of combustion would be forced over the forward bridge wall prematurely; to counterbalance this tendency the said inclined wall is provided and as the fire upon the grate becomes hotter the air within the hollow interior of the forward bridge wall is heated to a greater degree and by means of its expansion a current of air is forced upwardly, through the inclined wall, of sufficient strength to check the passage of the products of combustion at all times and as the force of this current of air is proportionate to the amount of heat within the combustion chamber the exact amount of air is supplied to the fire at all times.

J designates a cylindrical radiating drum extending longitudinally of the furnace from the front to a point near the rear end thereof.

J² designate tubes extending longitudinally of the radiator from its rear end to the flue J³ at the forward end of the furnace through which the products of combustion must pass.

K designate horizontal partitions in the drum J the first one extending from the rear end to a point near the forward end and the second one from the forward end to a point near the rear end and so on.

K² designates a pipe leading from the outside atmosphere to the interior of the drum J and K³ a pipe at the top of the drum leading upwardly therefrom.

In the practical operation of my radiating drum, pure atmospheric air is drawn into the drum and there brought into contact with the heated tubes J² through which the heated

products of combustion are passing. The air is made to circulate backwardly and forwardly in constant contact with these heated tubes and finally circulated upwardly through the pipe K³.

In the modification shown in Figs. 5 and 6 all of the air passages, superheating, tubes, &c., are built of brick and the second or rear bridge wall is shown to extend above the inclined wall C and provided with perforations to allow the superheated air to be discharged into the products of combustion passing thereover in different directions as required to produce a diversity of currents and thoroughly commingle the superheated air with the products of combustion.

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

1. In a furnace the combination of the following elements, to wit; a hollow bridge wall in the rear of the combustion chamber, a second hollow bridge wall some distance in the rear of the first, a superheating coil in the rear of the second bridge wall communicating with the outside atmosphere an air chamber in each side wall to connect the superheating coil with the first hollow bridge wall, perforations in the said side walls leading from said air chamber to the space between the bridge walls, an air passage connecting the forward and rear hollow bridge walls perforations in the top of said passage to discharge upwardly and perforations in the top of the rear bridge wall.

2. In a furnace the combination of the following elements to wit: a hollow bridge wall in the rear of the combustion chamber a second hollow bridge wall some distance in the rear of the first, a perforated wall inclined downwardly from the front bridge wall to the rear one a superheating coil in the rear of the second bridge wall communicating with the outside atmosphere, air passages connecting the superheating coil with the hollow interior of the forward bridge wall, air passages connecting the hollow interior of the forward bridge wall with the hollow interior of the rear bridge wall, perforations leading from said air passage to the space beneath the aforesaid inclined wall, and perforations leading from the hollow interior of the rear bridge wall upwardly.

3. In a furnace, the combination of the following elements to wit: a hollow bridge wall in the rear of the combustion chamber, perforations in the forward face of said bridge wall, a second hollow bridge wall in the rear of the first, perforations in the top of the rear bridge wall, a perforated wall inclined downward from the forward bridge wall to the rear one, a superheating coil in the rear of the rear bridge wall, communicating with the outside atmosphere, air passages in the side walls of the furnace leading from the superheating coil to the hollow interior of the forward bridge wall, perforations in the side walls lead-

ing from said air passages to the space between the bridge walls above the inclined wall, and air passages leading from the hollow interior of the forward bridge wall to the hollow interior of the rear bridge wall and perforations in said passages leading to the space beneath the inclined wall.

4. In a furnace the combination of the following elements, to wit: a hollow bridge wall in the rear of the combustion chamber, a horizontal partition in said hollow interior and an opening in the central portion of the bottom thereof perforations in the forward face of said bridge wall, a second hollow bridge wall in the rear of the first, perforations leading from its hollow interior upwardly, a superheating coil in the rear of the second bridge wall communicating with the outside atmosphere, air chambers in the side walls of the furnace leading from the superheating coil to the forward portion of the furnace, perforations in said side walls, as set forth, openings leading from the hollow interior of the side walls to the hollow interior of the front bridge wall, an air passage leading from the center and bottom of the forward bridge wall to the center of the rear one perforations in the top

of said air passage leading to a point beneath the inclined wall and air passages in the side walls leading from the forward to the rear bridge walls and perforations in said passages leading to a space beneath the inclined wall, all substantially as set forth.

5. In a furnace, the combination of the following elements, to wit; a suitable grate, a hollow bridge wall in the rear of the grate, an arched bridge wall in the rear of forward bridge wall, a superheating coil in the rear of the rear bridge wall communicating with the outside atmosphere, hollow perforated walls at the sides of the grate, perforations leading from the hollow interior of the forward bridge wall forwardly and inwardly, air passages leading from the said superheating coil to the said hollow side walls and the hollow bridge wall and air passages leading from the hollow bridge wall to discharge upwardly between the front and rear bridge walls for the purposes stated.

JOSEPH W. WILKINSON.

Witnesses:

J. RALPH ORWIG,
THOMAS G. ORWIG.