

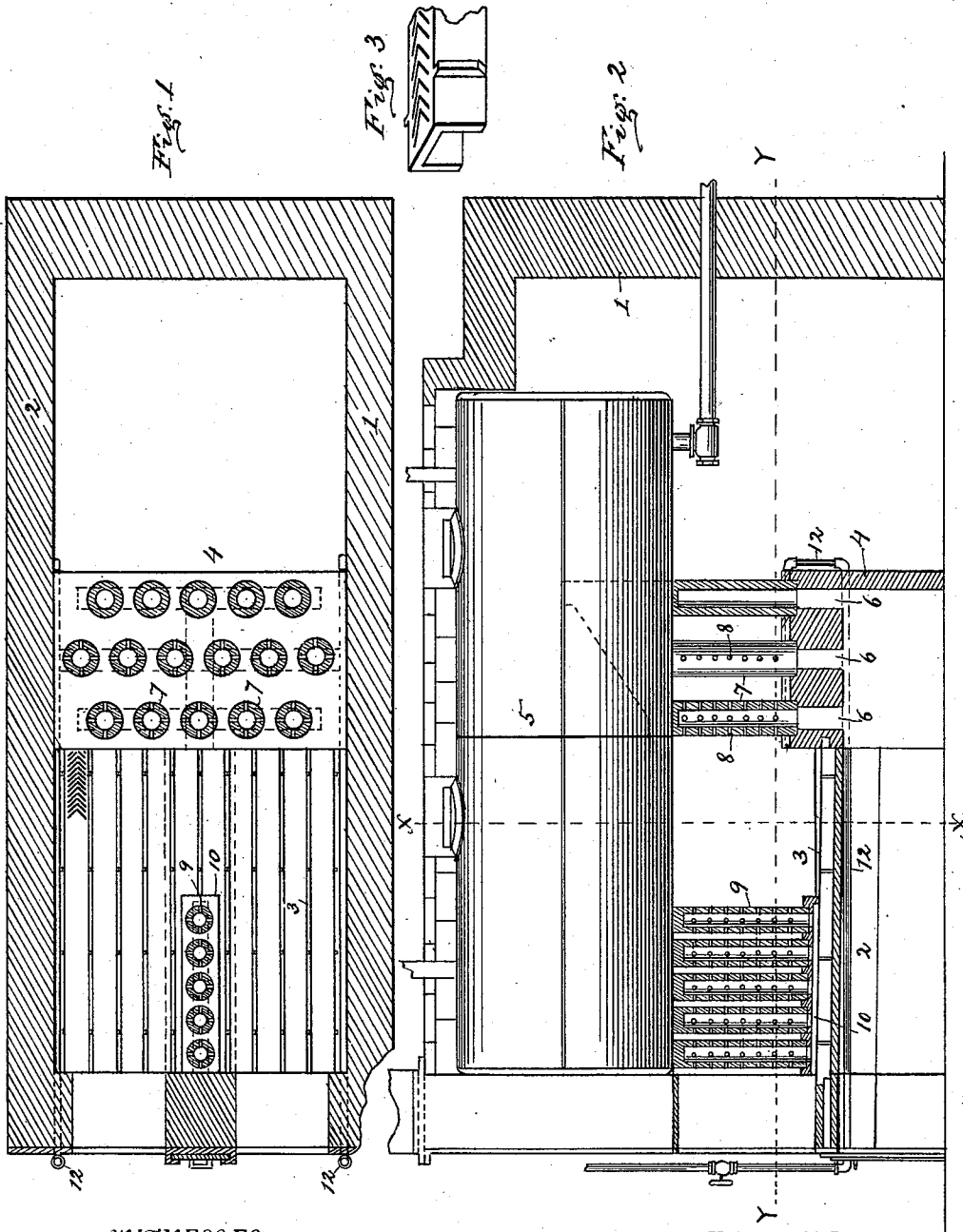
(No Model.)

2 Sheets—Sheet 1.

H. H. EVERHARD.
STEAM BOILER FURNACE.

No. 568,752.

Patented Oct. 6, 1896.



WITNESSES

Geo. H. Allen

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INVENTOR

Henry H. Everhard

By W. K. Miller
Attorney

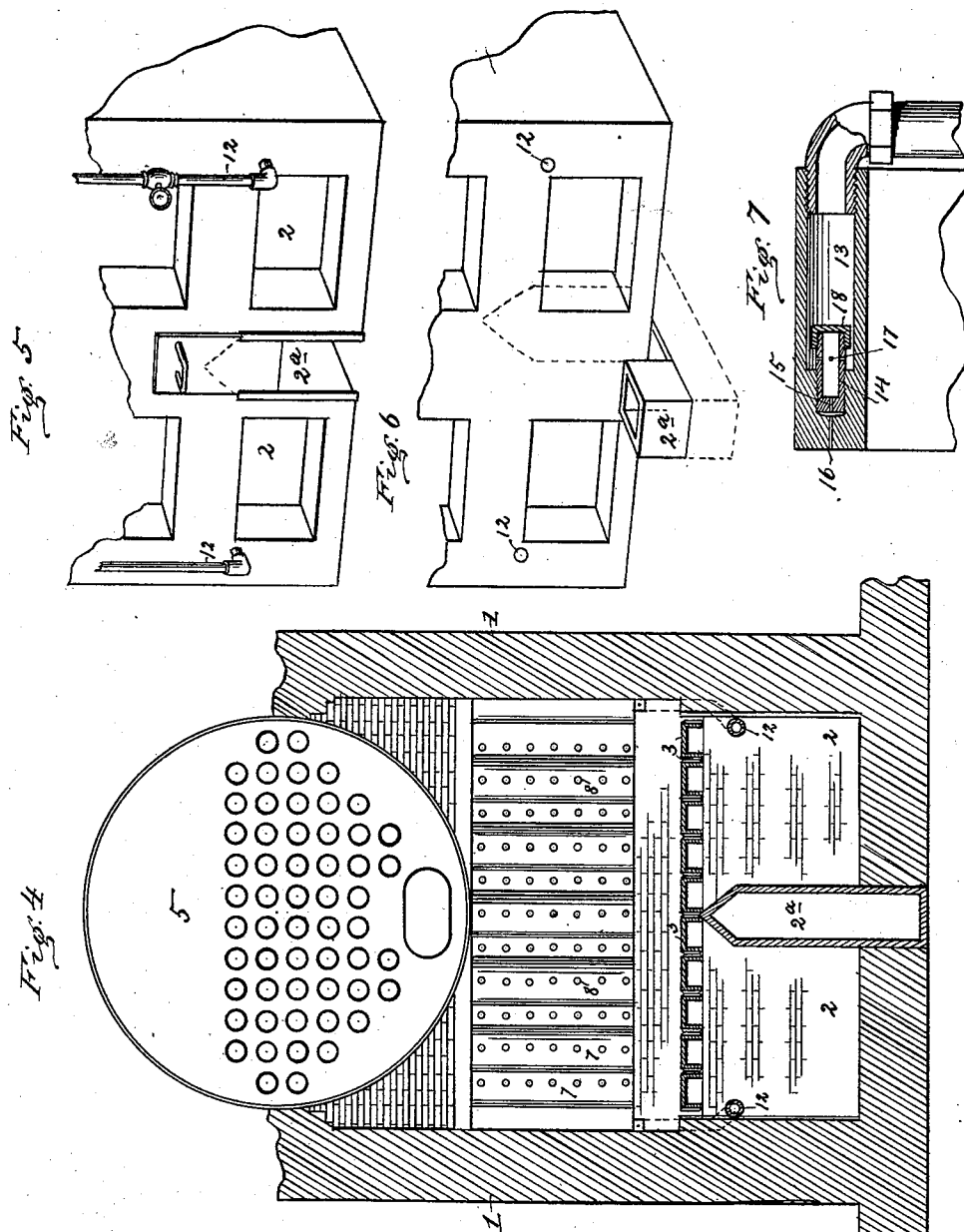
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UNITED STATES PATENT OFFICE.

HENRY H. EVERHARD, OF MASSILLON, OHIO.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 568,752, dated October 6, 1896.

Application filed October 30, 1895. Serial No. 567,384. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. EVERHARD, a citizen of the United States, and a resident of Massillon, county of Stark, State of Ohio, have invented a new and useful Improvement in Steam-Boiler Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification.

My invention relates to improvements in steam-boiler furnaces; and its object is to provide an improved construction of the same whereby the fuel is entirely consumed, thus effecting a great saving in operating the furnace.

This invention consists in the novel construction and combination of parts herein-after fully described and claimed.

In the accompanying drawings, Figure 1 is a horizontal sectional view of a steam-boiler furnace constructed in accordance with my invention. Fig. 2 is a longitudinal section of the same. Fig. 3 is a detail view of the grate-bars. Fig. 4 is a transverse section on the line *xx*, Fig. 2. Fig. 5 is a detail perspective view showing the air-tube dividing the ash-pit into two sections or chambers. Fig. 6 is a similar view showing how the same may be applied to ordinary boilers. Fig. 7 is a sectional view showing the steam-injector.

In the said drawings, the reference-numeral 1 designates the walls of the furnace; 2, the ash-pit; 3, the grate-bars; 4, the bridge-wall, and 5 the boiler.

Located centrally in the ash-pit is a horizontal air-tube 2^a, extending from the front of the furnace to the bridge-wall, where it communicates with ducts 6, leading to a series of vertical tubes 7, the lower ends of which are open and the upper ends closed and the two front rows formed with perforations 8. These tubes are staggered or arranged to break joints with each other, as shown in Fig. 1. Upon the top of these tubes there is placed a tile covering, and the space between the same and the boiler is then bricked up, forming a deflecting-wall which directs the heated gases which ascend to the top and rear of the fire-chamber down and through the staggered tubes.

Located in the front of the fire-chamber is a series of vertical tubes 9, arranged in a hori-

zontal line, the upper ends of which are closed and abut against the boiler, while the lower ends are open and rest upon a base 10, seated on the grate-bars.

The numeral 12 designates two pipes, one at each side of the furnace, connected with the boiler and passing backward to and beyond the bridge-wall and bent forwardly and provided with an apertured block 13, by which steam or compressed air may be injected into the fire-chamber forward and over the fuel. Located in this block is a short tube 14, having an aperture 15, alined with an aperture 16 in the said block. This tube is formed with perforations 17 and provided with a cap 18, and its object is to retard the flow of steam or compressed air and cause it to become highly heated and sprayed. Instead of being connected with the boiler the pipes 12 may be connected with an air supply.

The operation is as follows: After the furnace has been thoroughly heated and the grate-surface covered with red-hot coals then the firing of the two sides of the grate-surface (divided by the air-tube in the ash-pit) will be carried on alternately. The fresh fuel is put on one side, and the ash-pit door of that side closed. The ash-pit door of the other side is open, and the current of air will rush rapidly through that side of the grate and fill the spaces between the vertical pipes, and in its passage will become intensely heated, and at this point will be furnished with the requisite volumes of fresh-heated air necessary to consume all the gases and the suspended carbon. While this operation is going on, the still chamber on the opposite side will be slowly filled with gas and smoke evolved from the fresh fuel on the hot bed of coals, and on that side the steam or compressed-air jet has been turned on, blowing the heated gas and smoke forward toward the furnace-door, and as the draft on the other side rises through the grate-bars and takes its oblique and upward course back toward the vertical pipes there is left in the front side of the furnace a triangular still chamber which the smoke and heated gases from the still side of the furnace, propelled forward by the steam or compressed-air current, will enter on their way through the spaces between the vertical line of pipes resting upon the upper grate-

surface and just inside the boiler-front. They will then join the volume of flame running back through the furnace, and the gases not ignited in the front of furnace will be consumed by the time they pass the staggered rows of pipes in the back end, and at certain intervals this operation will be reversed.

Having thus fully described my invention, what I claim is—

10 1. In a steam-boiler furnace, the combination with the undivided fire-chamber, the grate-bars, and the horizontal air-tube dividing the ash-pit into two chambers, of the steam or compressed-air-jet pipes alternately
15 communicating with the fire-chamber, substantially as described.

2. In a steam-boiler furnace, the combination with the steam or compressed-air-injecting pipe, and the perforated block secured thereto, of the perforated tube and cap, sub-
20 stantially as described.

3. In a steam-boiler furnace, the combination with the grate-bars, the series of vertical perforated tubes supported thereby, and the
25 horizontal air-tube dividing the ash-pit into two chambers, of the bridge-wall formed with ducts, the perforated vertical pipes connected therewith, and the steam or compressed-air-

jet pipes for alternately injecting superheated steam into the fire-chamber, above the grate-bars, substantially as described. 30

4. In a steam-boiler furnace, the combination of the steam-injecting pipe, with the perforated block, and means within said block for retarding the flow of steam therethrough
35 whereby the steam may be superheated and sprayed forward and over the fuel, substantially as described and for the purpose set forth.

5. The combination in a steam-generator
40 furnace, of the divided ash-pit, the grate-bars, the series of vertical tubes between the bridge-wall and the deflecting-wall, the steam or compressed-air jet disposed to direct the
45 steam or compressed air forwardly over the fresh fuel to the front of the fire-chamber and back over the incandescent fuel on the opposite side of the fire-chamber, substantially as set forth.

In testimony whereof I have hereunto set
50 my hand this 24th day of October, A. D. 1895.

HENRY H. EVERHARD.

Witnesses:

BURT A. MILLER,
W. K. MILLER.