

(No Model.)

2 Sheets—Sheet 1.

H. KORTEN. STEAM BOILER FURNACE.

No. 543,739.

Patented July 30, 1895.

Fig. 1.

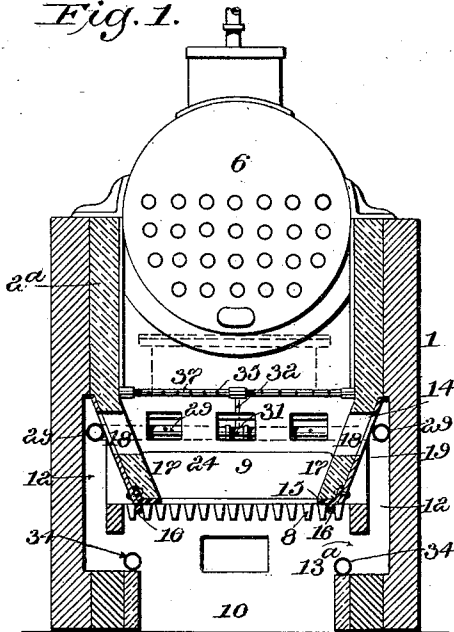


Fig. 2.

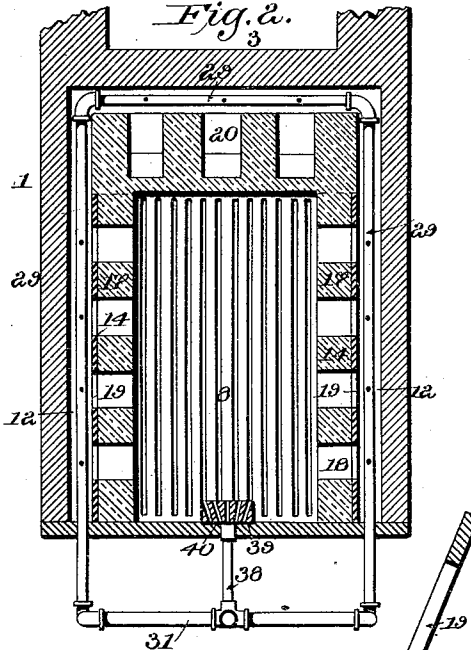


Fig. 4.

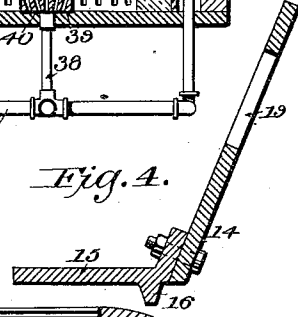
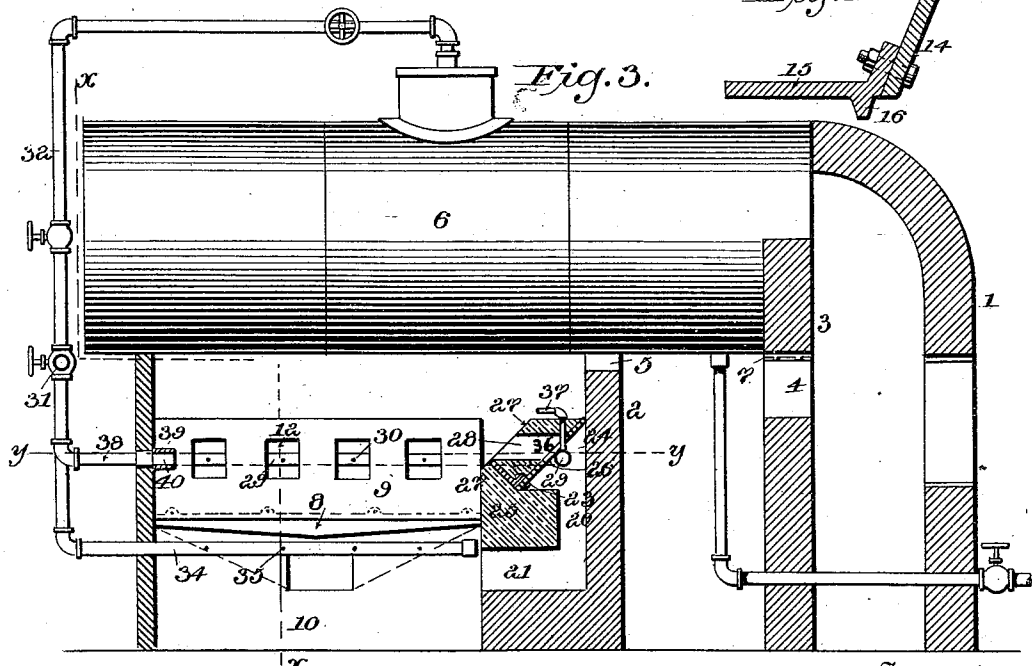


Fig. 3.



Witnesses
Arthur Ashby
W. Thorne

Inventor
Henry Kortten
 by *A. Deane & Son*
 his Attorneys

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2 Sheets—Sheet 2.

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Fig. 5.

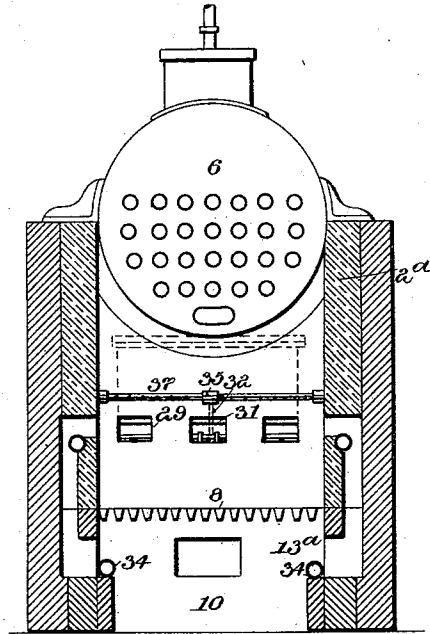


Fig. 6.

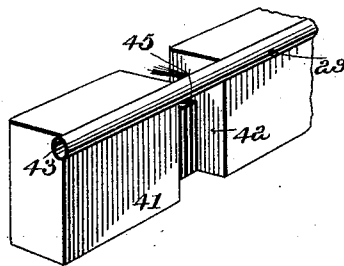
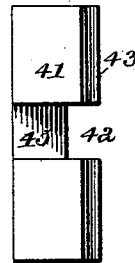


Fig. 7.



Witnesses
Arthur Ashley
Edw. Case

Inventor
 Henry Korten
 by *R. Kenneth*
 his Attorney

UNITED STATES PATENT OFFICE.

HENRY KORTEN, OF BURLINGTON, IOWA.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 543,739, dated July 30, 1895.

Application filed October 22, 1894. Serial No. 526,619. (No model.)

To all whom it may concern:

Be it known that I, HENRY KORTEN, a citizen of the United States, residing at Burlington, in the county of Des Moines and State of Iowa, have invented certain new and useful Improvements in Steam-Boiler Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in furnaces for steam-boilers in which superheated steam, heated air, or both, are injected into the fuel in the fire-box, thus aiding in promoting combustion.

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

In the accompanying drawings, Figure 1 is a cross-sectional view on the line *x x*, Fig. 3, of a steam-boiler furnace constructed in accordance with my invention, looking toward the rear. Fig. 2 is a horizontal section of a portion of the furnace on the line *y y*, Fig. 3. Fig. 3 is a central longitudinal section. Fig. 4 is a detail sectional view, on an enlarged scale, of one of the inner plates for the injecting-chambers. Fig. 5 is a sectional view similar to Fig. 1, showing a modified construction. Figs. 6 and 7 are detail perspective and plan views, respectively, of one of the tiles in the modified construction.

In the said drawings the reference-numeral 1 designates the furnace walls or casing, made of brick, as usual, and provided with a bridge-wall 2, a fire-lining 2^a, and a second or supplemental bridge-wall 3, with openings 4 and 5 between their upper ends and the boiler 6, a metal plate 7 extending across the secondary bridge-wall, which aids in supporting the boiler.

The numeral 8 designates the grate-bars, 9 the fuel-chamber, and 10 the ash-pits, which chambers are to be provided with doors, as usual. The fire-lining of the furnace at the sides and rear above the grate is removed and angle-plates substituted therefor. The fire-lining is also removed below the grate, forming a passage-way 13, communicating with the ash-pit at the sides by openings 13^a.

These plates consist of two plates 14 and 15, bolted together, as seen in Fig. 4, at an obtuse angle, and the lower plate 15 provided on its under side with lugs 16, which engage between the grate-bars and hold the same in place. When in position, as seen in Fig. 1, the plate 15 occupies a horizontal position, while the plate 14 is inclined, so that the chambers 12, formed by the plates and furnace-walls, will be triangular in shape. These plates are provided with a fire-lining 17 of fire-brick or other refractory material, having a series of ports or opening 18 therein, which register similar ports or openings 19 in the plates 14. The object of inclining said plates 14 is to prevent the lining from falling into the fire-box, and also to economize in space. The said injecting-chambers communicate with a similar chamber 20, in bridge-wall 2, having a port or opening 21 leading to the ash-pit. At the upper end of said chamber the bridge-wall is cut away and an angle-plate 23 placed at the front thereof. This angle-plate consists of plates 24 and 25, similarly bolted together and similar to plates 14 and 15, in all respects, except that they are set at a right angle to each other and the lugs 16 dispensed with, they being formed with ports or openings 26 and a fire-lining 27, with corresponding ports 28. The plate 24 is inclined, as seen in Fig. 1, and the opening in the bridge-wall is correspondingly inclined to permit plate 25 to properly seat thereon.

The numeral 29 designates a superheated steam or hot-air pipe located in said injecting-chambers 12 and 20, formed at points intermediate the ports or openings leading to the fire-box, with apertures 30, through which steam, mixed with hot air, which enters the injecting-chambers from the ash-pit, is injected into the fire-box. The ends of this pipe are connected with a horizontal pipe 31, which, in turn, is connected with a pipe 32 leading to the steam-dome or other part of the boiler. In the lower part of the injecting-chambers is located a similar pipe 34, having jet-openings 35, and connected with pipe 29. In the rear injecting-chamber is a vertical pipe 36, communicating with the upper pipe 31, and is connected with a hori-

zontal pipe 37, having jet-apertures therein for directing the steam directly into the fire-box toward the front thereof. These pipes 34 and 37 may be dispensed with in small furnaces.

5 At the front of the furnace above the grate is a pipe 38, communicating with pipe 31, having a head 39, provided with a number of radial openings or steam-passages 40.

10 The different doors in the ash-pit are to be provided with suitable dampers or valves and operating-rods whenever necessary, and the jet-pipes at proper points are provided with suitable stop-cocks.

15 The operation will be readily understood. Steam from the boiler will be supplied to the jet-pipes and superheated therein and will issue in jets and be injected above the burning fuel, thus greatly aiding in effecting complete combustion.

20 Instead of employing steam, air may be injected into the fuel, in which case the pipe is disconnected from the steam-dome and connected with a suitable blower.

25 The holes in the side jet-pipes are drilled so as to point slightly backward, while those in the rear pipe point directly forward, as such I have found to give the most satisfactory results.

30 In the modification shown in Fig. 5 the inclined side plates are removed and a section of the fire-lining removed and tiles of a peculiar construction substituted therefor. These tiles (shown in Figs. 6 and 7), consist of
35 rectangular blocks 41, of fire-clay or terracotta, having a vertical recess 42, a horizontal groove 43 at the rear upper edge, in which the pipe 23 is located, and a recess 45 on top communicating with the recess 42 and forming a port for the escape of steam from said
40 pipe. The vertical recess 42 communicates with the port leading to the ash-pit.

In the constructions above described the jets in the pipes are set at different angles,
45 so that there is produced a thorough commingling of the gases of combustion with the gases formed by the steam from the jets and the air drawn in through the ports. These jets crossing and recrossing each other produce
50 conflicting currents, causing the whole volume of gas, steam, air, and smoke to be thrown

into violent commotion, producing complete mixing and perfect combustion.

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

55 1. The combination in a steam boiler furnace having injecting chambers in the side and bridge walls, of the jet pipe located in said chambers, the angle plate, having ports therein, located on the bridge wall and the
60 fire lining supported thereby, the angle plates at each side of the furnace located above the grate and provided with fire linings and ports, and the lugs formed integral with the horizontal portions of said plates and adapted
65 to engage between the grate bars, substantially as described.

2. The combination in a steam boiler furnace having injecting chambers in the side and bridge walls, and communicating with
70 the fire box and ash pit, of the upper and lower jet pipes located in said chambers, the vertical pipe located in the rear injecting chamber, connected with the lower jet pipe, the horizontal pipe at the upper end thereof,
75 the inclined angle plate at the rear of the fire box, the fire lining supported thereby having ports communicating with the fire box and the injecting chamber in the bridge wall, the angle plates at the sides of the fire
80 box, having ports therein and provided with a fire lining, and the lugs on the under side of the horizontal portion of said side angle plates and formed integral therewith, substantially as described.

3. The combination in a steam boiler furnace, having ports in the sides leading to the ash pit, of the tiles located in the sides of the furnace above the grate formed with a
90 horizontal recess in their upper ends, a rear vertical recess communicating therewith and with the port leading to the ash pit, and a groove in the upper rear edge, the pipes located in said groove and in the ash pit, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY KORTEN.

Witnesses:

GEORGE S. BAILY,
J. D. GORMAN.