

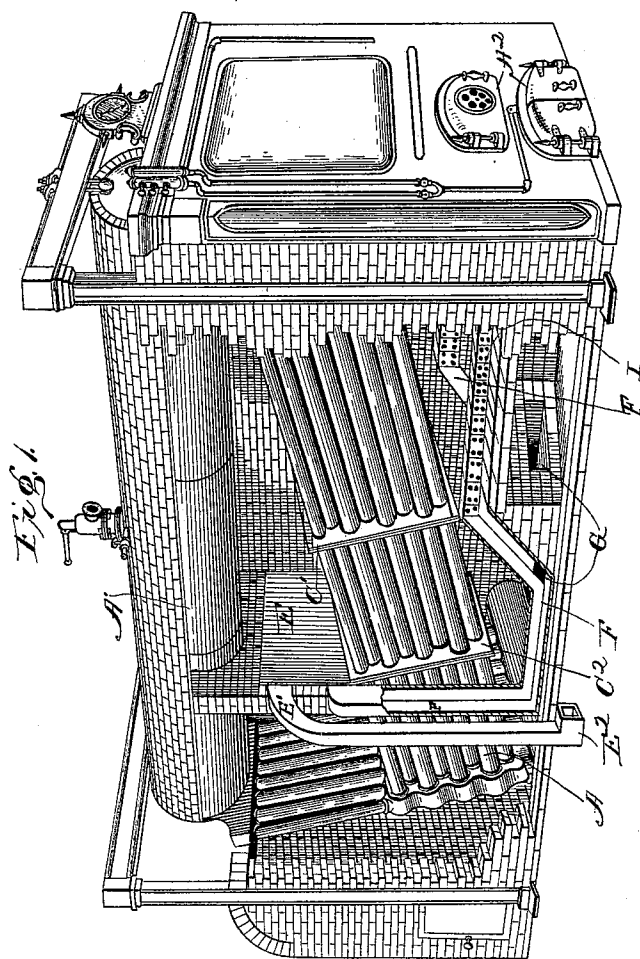
(No Model.)

2 Sheets—Sheet 1.

D. S. RICHARDSON.
BOILER FURNACE.

No. 544,323.

Patented Aug. 13, 1895.



Witnesses:

J. M. Fowler Jr.
Alex. Stewart.

Inventor:

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His Attorneys.

(No Model.)

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Fig. 4.

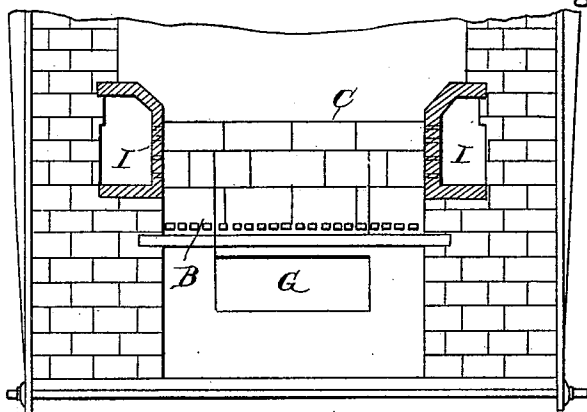


Fig. 3.

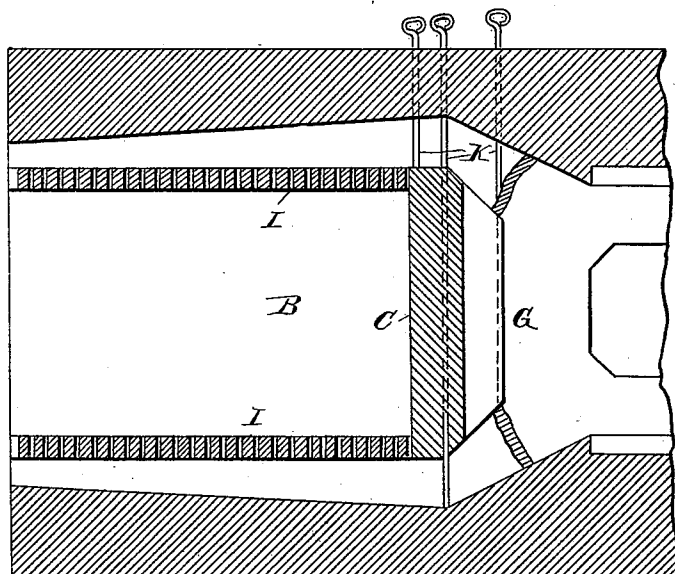
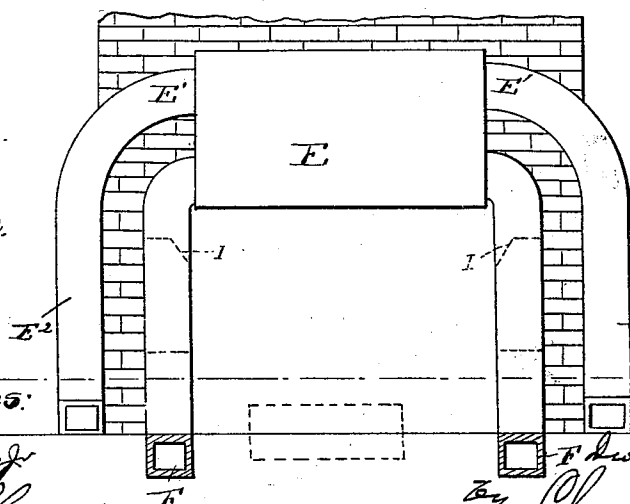


Fig. 2.



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UNITED STATES PATENT OFFICE.

DWIGHT S. RICHARDSON, OF BROOKLYN, NEW YORK.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 544,323, dated August 13, 1895.

Application filed June 1, 1895. Serial No. 551,406. (No model.)

To all whom it may concern:

Be it known that I, DWIGHT S. RICHARDSON, of Brooklyn, in the county of Kings and State of New York, 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 same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in steam-boiler furnaces, and has for its object to provide a construction wherein air may be fed to the fire, either above or below the grate, or both, heated to a temperature which will insure its instantaneous and perfect commingling with the gaseous products from the fuel, whereby the same are consumed more perfectly and consequently generate the greatest amount of heat. Air for this purpose should be heated to a temperature of at least 800°, and while this in a broad sense has been heretofore accomplished, in my present invention I have aimed to provide a construction for accomplishing these results which is adapted for use in connection with a tubular boiler or boiler of a tubular character, such as is ordinarily set down close over the fire-pot with spaces for the circulation of the products of combustion around and between the tubes, as, for instance, in the well-known Babcock and Wilcox boiler.

The invention consists in certain novel details of construction and combinations and arrangements of parts, to be hereinafter described, and pointed out particularly in the appended claims.

Referring to the accompanying drawings, Figure 1 is a sectional perspective view of a tubular boiler and furnace embodying my invention. Fig. 2 is a vertical section showing the arrangement of the inlet and exit pipes of the heating-chamber. Fig. 3 is a horizontal section through the fire-pot; and Fig. 4 is a vertical section through the same, the tubes of the boiler being omitted in these views.

Like letters of reference in the several figures indicate the same parts.

In said drawings, the letter A indicates the tubes of an ordinary tubular boiler, which, as usual, are set in an inclined position over the

fire-pot B and beneath a horizontal drum or cylindrical portion A', with which the tubes communicate at each end.

The fire and ash pit doors A² are preferably constructed so as to close air-tight, in order that the whole of the air supplied for combustion may be drawn through the air-heating appliances; but while this is preferable it is not essential, as a certain amount of cold air may be admitted, and in some constructions of boiler-setting it may be found convenient to make some provision for this purpose.

In rear of the fire-pot there is the usual bridge-wall C, from the top of which, in the construction shown, the baffle-plate C' extends up around the tubes so as to cause the heated products of combustion to pass up around the outside of them and over the baffle-plate C', thence under a second baffle-plate C² and up through between the tubes for the third time to the stack, &c.

The second baffle-plate is usually provided with a continuation, or a brick setting or depending wall is provided above the same, to divide off the combustion-chamber and cause the products to follow the course outlined. This setting or partition wall acts as a deflector for the products of combustion, and being at the top of the combustion-chamber it is in position to be heated to a very high degree. As the heat from the products at this point is not otherwise utilized, I now propose to locate my air-heating chamber here—namely, above the tubes. I preferably form the air-heating chamber into the deflector, thus utilizing the chamber for a double purpose; but it will be understood that the deflector may be supplemental to the wall or inserted in front of the wall without departing from the spirit of my invention.

Referring now specifically to Fig. 1, it will be seen that I have formed a hollow metal deflector E over the baffle-plate C², the deflector being in the form of a rectangular box with air-intakes E' preferably opening in at each end and preferably having conduits E² extending down to a point below the level of the grate, in order that there may be no reverse action when the fire or ash pit doors are open for firing up or feeding fuel. In addition to the intakes E the elevated hollow deflector is

provided with exit-pipes F leading down on each side, preferably to the bottom of the combustion-chamber, thence forward, where they are adapted to discharge either into the fire-pot or ash-pit, or both.

The central discharge-opening G leads into the ash-pit, while the side discharges extend along each side of the fire-pot, Figs. 3 and 4, where they open out through perforated partitions I into the fire-pot itself. These side discharges preferably taper down from rear to front in order that there may be a uniform discharge of the heated air throughout the whole length of the fire-pot, and both the side and central discharges are provided with dampers K, by which the heated air may be directed to any one or cut off from one or all of the discharges, as desired. Obviously in some settings the whole of the heated air may be discharged into the ash-pit or into the fire-pot, but in practice it is found that the best results are attained by discharging a portion above and a portion below the grate.

The location of the deflecting air-heating chamber above the tubes of the boiler insures its receiving the hottest of the products of combustion and insures the air passing through it being heated to a degree which will cause it to instantly commingle with the products of combustion in the fire-box, promoting said combustion instead of deadening the same, as is the case where air is admitted below 800°.

In practice it is found that the air discharged over the surface of the fire distributes itself horizontally over the entire surface, causing a uniform combustion of the fuel and preventing the formation of black smoke at any point. Where a complete combustion of the products from the fuel takes place there is no black smoke formed, and consequently little or no waste from the fuel.

Having thus described my invention, what I claim as new is—

1. In a steam boiler furnace, the combination with the tubular boiler of the elevated deflector for causing the products of combustion to circulate through between the tubes, an air intake for said deflector and an exit from said hollow deflector extending to and discharging into the fire box; substantially as described.

2. In a steam boiler furnace, the combination with the tubular boiler of the elevated hollow deflector for causing the products of combustion to circulate through between the tubes, an air intake for said deflector with an exit extending to and discharging into the ash pit; substantially as described.

3. In a steam boiler furnace, the combination with the tubular boiler of the elevated hollow deflector for causing the products of combustion to circulate through between the tubes, an air intake for said deflector with an exit discharge both into the ash pit and fire box; substantially as described.

4. In a steam boiler furnace, the combination with the tubular boiler of the hollow deflector located above the tubes for causing the products of combustion to pass down through between the tubes, air inlets for said deflector extending down below the level of the surface of the fire, air exits from said deflector extending forward to the fire box and foraminous partitions through which the heated air is discharged; substantially as described.

5. In a steam boiler furnace, the combination with the tubular boiler, and the baffle plate for causing the products of combustion to pass up through between said tubes, of the hollow deflector for causing the products to pass through between the tubes, located above and in rear of the baffle plate, air inlets for said hollow deflector extending down below the level of the surface of the fire, air exits for said deflector leading forward to the fire box with discharge openings; substantially as described.

6. In a steam boiler furnace, the combination with the tubular boiler, the baffle plates for causing the circulation of the products of combustion through between the tubes, of the hollow deflector forming a continuation of one of said baffle plates at the top of the tubes, air inlets for said deflector and air exits leading therefrom forward to the pipe box with discharge openings; substantially as described.

7. In a steam boiler furnace, the combination with the tubular boiler of an air heater located above and transversely of said tubes at a point intermediate the ends of the tubes, air intakes for said heater and air exits therefrom leading forward to the fire box with discharge openings; substantially as described.

8. In a steam boiler furnace, the combination with the inclined tubular boiler having baffle plates for causing the circulation of products of combustion through between the tubes of an air heater located above and transversely of said tubes in the path traversed by the products of combustion, air intakes for said heater and air exits therefrom leading down and forward to the fire box, and discharge openings; substantially as described.

9. In a steam boiler furnace, the combination with the inclined tubular boiler and the baffle plates causing the products of combustion to circulate through between said tubes, of the air heater located above one of the baffle plates and transversely of the tubes, air intakes for said heater extending down below the level of the surface of the fire and air exits for said heater extending forward to the fire box with discharge openings; substantially as described.

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