No. 894,856. PATENTED AUG. 4, 1908.

J. S. ROAKE.

BOILER FURNACE.

APPLICATION FILED APR. 27, 1907.

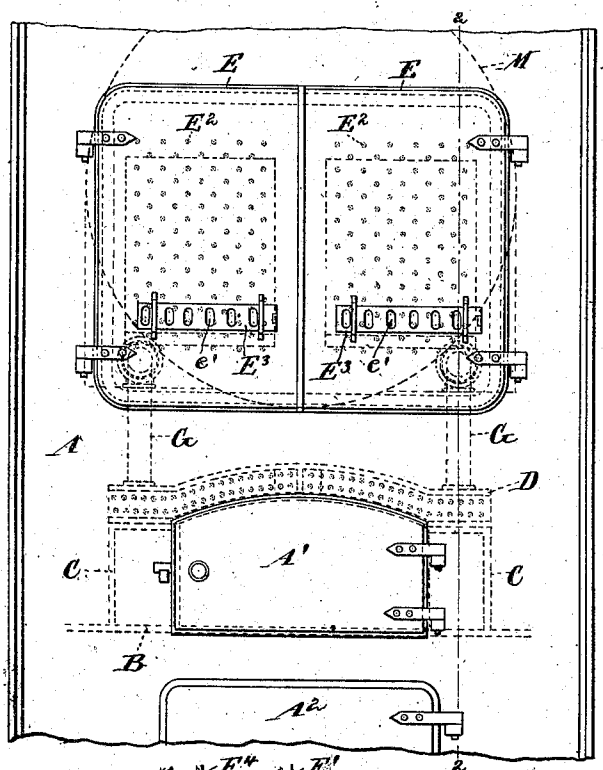


Fig. 1.

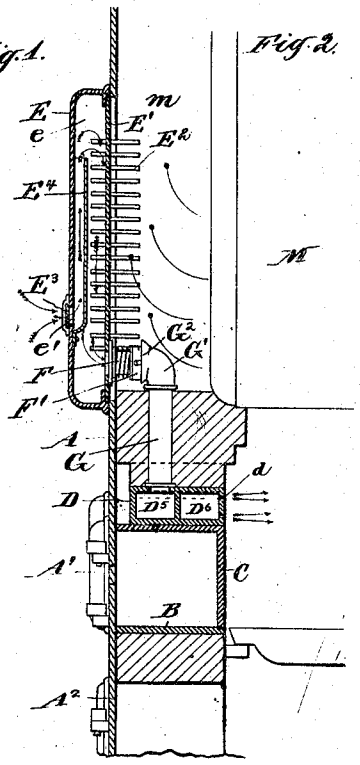


Fig. 2.

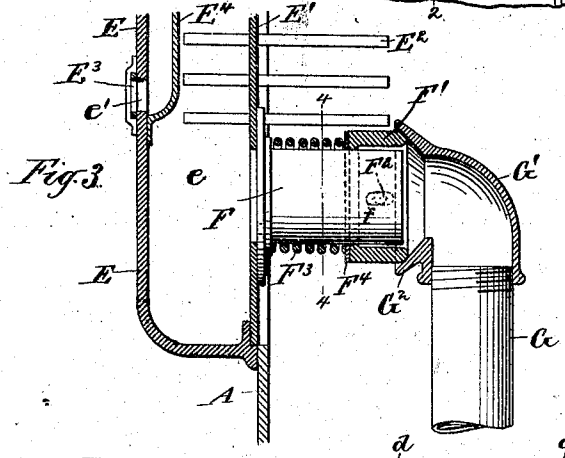


Fig. 3.

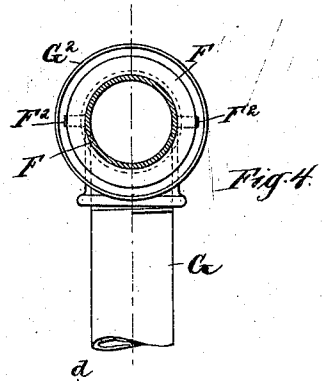


Fig. 4.

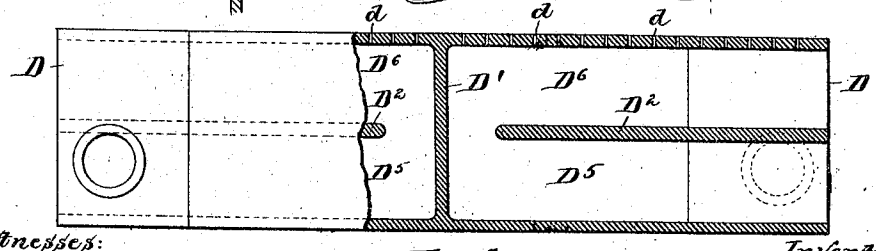


Fig. 5.

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UNITED STATES PATENT OFFICE.

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JOHN S. ROAKE, OF NEW YORK, N. Y.

BOILER-FURNACE.

No. 894,856. Specification of Letters Patent. Patented Aug. 4, 1908.

Application filed April 27, 1907. Serial No. 370,554.

To all whom it may concern:

Be it known that I, JOHN S. ROAKE, a citizen of the United States, residing in the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Boiler-Furnaces, of which the following is a specification.

The invention relates to furnaces for steam-generators, and more particularly to means for supplying heated air to such furnaces.

The object of the invention is to provide simple, efficient and economical means for heating air and delivering it to the furnace, preferably above the fire, to increase combustion and reduce the volume of smoke.

In a patent to me dated Sept. 27, 1904, No. 770,984, is shown a hollow arch and cheek-pieces or jambs with provisions for heating air by traversing it through these parts and then delivering it through the rear face of the arch to the fire-space.

In the present invention the air is preheated by the hot products of combustion at the front end of the boiler before entering the hollow arch. The preheating means is preferably a chamber in the front-connection door with provisions for increasing the conduction of heat thereto from the gases in the front-connection, and an arrangement of passages from the chamber to the fixed hollow arch, which permits the door to be opened and closed as required.

The invention consists in certain novel features and details of construction by which the above objects are attained, to be hereinafter described.

The accompanying drawings form a part of this specification and show the invention as it has been carried out.

Figure 1 is an elevation of a boiler-front having my improved heating means. Fig. 2 is a vertical section taken on the line 2—2 in Fig. 1, showing the boiler-front and adjacent portions of the boiler and furnace, partly in elevation. Fig. 3 is a corresponding section on a larger scale, showing a portion of one of the front-connection doors and preheating chamber therein, and the connections leading from the latter. Fig. 4 is a vertical section on the line 4—4 in the preceding figure. Fig. 5 is a plan view, partly in horizontal section, showing the hollow arch.

Similar letters of reference indicate the same parts in all the figures.

The boiler-front is marked A and has a furnace-door A^1 and ash-pit door A^2 as usual.

B is the dead-plate, C C cheek-pieces or jambs thereon, and D is a hollow casting or arch resting at the ends on the cheek-pieces and carrying masonry on which the front end of the boiler M is supported, leaving the usual front-connection or space *m* for the gases flowing from the boiler tubes. On the boiler-front and opening into this space are the front-connection doors E E swelled as shown and each closed at the back by a plate E^1 thus producing a hollow door or inclosed chamber *e*. Each plate E^1 is provided with a multiplicity of pins or short rods E^2 set therein and projecting into the space *m* at the rear and into the chamber *e* at the front, serving to conduct heat from the latter to the former. Air is admitted to the chamber through openings e^1 near the bottom of the door, controlled by dampers E^3, and is led upwardly by a baffle-plate E^4 attached to the inner face of the door below the openings e^1, forming a wide pocket or channel open at the upper end.

Secured to each plate E^1 near the bottom is a tube or nipple F extending rearwardly and received in the funnel-mouth G^2 of an elbow G^1 on a vertical pipe G extending downwardly through the brickwork to the hollow arch D. The arch has a transverse central partition D^1 and longitudinal partitions D^2 D^2 extending from the ends nearly to the partition D^1, forming with the latter two longitudinal passages D^5 D^6 on each side of the central partition, as shown in Fig. 5.

Hot products of combustion entering the front-connection *m* strike the rear face of the plate E^1 and the pins E^2, the heat absorbed by these parts is conducted to the interior of the preheating chamber *e* and radiated therein. Air entering the openings e^1 moves upwardly between the baffle-plate E^4 and front plate of the door which are at a fairly high temperature and then downwardly between the baffle-plate and the hot pins and rear plate E^1 of the door, absorbing heat in its traverse to the nipple F whence it flows through the pipe G to the front passage D^5 in the arch and after traversing the hot interior of the latter is delivered in jets through apertures *d* from the rear passage D^6 to the interior of the furnace. The air thus presented at high temperature is favorably conditioned for rapid combination with the furnace gases and insures complete combustion with a con-

sequent absence of smoke. The natural draft of the furnace is sufficient to induce the flow of air but it will be understood that the invention will serve with forced draft; under either condition the volume of air may be controlled and regulated by the dampers E^3.

In order to form a close but separable joint between the nipple F and elbow G^1 and also to permit the doors E E on which the nipples are mounted to be opened and closed, a sleeve F^1 is loosely mounted on the projecting end of the nipple and arranged to slide telescopically thereon, guided and limited in its movement by pins F^2 in longitudinal slots *f*. The sleeve is forced rearwardly by a spring F^3 encircling the nipple and abutting at one end against a ring F^4 next the sleeve and at the other against the plate E^1. Thus constructed the sleeve is yieldingly forced into contact with the funnel-mouth G^3 when the door is closed, and a sufficiently close joint produced.

Modifications may be made in the forms and proportions of the parts without departing from the invention. The connections from the preheating chamber to the arch may be varied and also the passages in the chamber and arch.

Other forms of controlling means may be substituted for the dampers E^3, and the separable joint may be differently located and constructed.

Although I have described the invention as adapted to heat air to be delivered through the arch, it will be understood that the heated air may be otherwise introduced to the furnace either above or below the fire, and with or without further heating.

I claim:—

1. In a furnace, a hollow front-connection door, the interior of said door constructed to serve as an air heating chamber, said door having air inlet openings for supplying air to said chamber, means for controlling the flow of air through said openings, a discharge nipple on said door, a hollow arch having apertures leading to the interior of the furnace, a stationary pipe leading to the interior of said arch, and a funnel-mouth on said pipe arranged to receive said nipple and with the latter to form a separably jointed passage from said chamber to the interior of said arch.

2. In a furnace, a hollow front-connection door, the interior of said door constructed to serve as an air heating chamber, said door having air inlet openings through the front plate of said door, a damper controlling said openings, a discharge nipple on the rear plate of said door, a hollow arch having apertures leading to the furnace, a stationary pipe leading to the interior of said arch, and a yielding separable connection between said nipple and pipe.

3. In a furnace, a hollow front-connection door, the interior of which serves as an air heating chamber, a baffle plate secured to the inner front wall of said door, and pins extending laterally from the rear plate of the door in opposite directions and into the passage between the baffle plate and said rear plate, said rear plate having a discharge opening near its lower end, a pipe leading to the furnace, and a movable member interposed between the discharge opening and said pipe to form a close but separable joint with the latter.

4. In a furnace, a hollow front-connection door, the interior of said door constructed to serve as an air heating chamber, said door having air inlet openings, a discharge nipple in said door, a hollow arch having apertures leading into the furnace, a stationary pipe leading to the interior of said arch, a funnel-mouth on said pipe, a sleeve on said nipple arranged to be received in said funnel-mouth, and a spring arranged to force said sleeve into yielding contact with said funnel-mouth.

In testimony that I claim the invention above set forth I affix my signature, in presence of two witnesses.

JOHN S. ROAKE.

Witnesses:
CHARLES R. SEARLE,
F. E. ECCARDT.