(No Model.)

J. R. ALEXANDER.

DOOR FOR BOILER FURNACES.

No. 436,555. Patented Sept. 16, 1890.

FIG. 1.

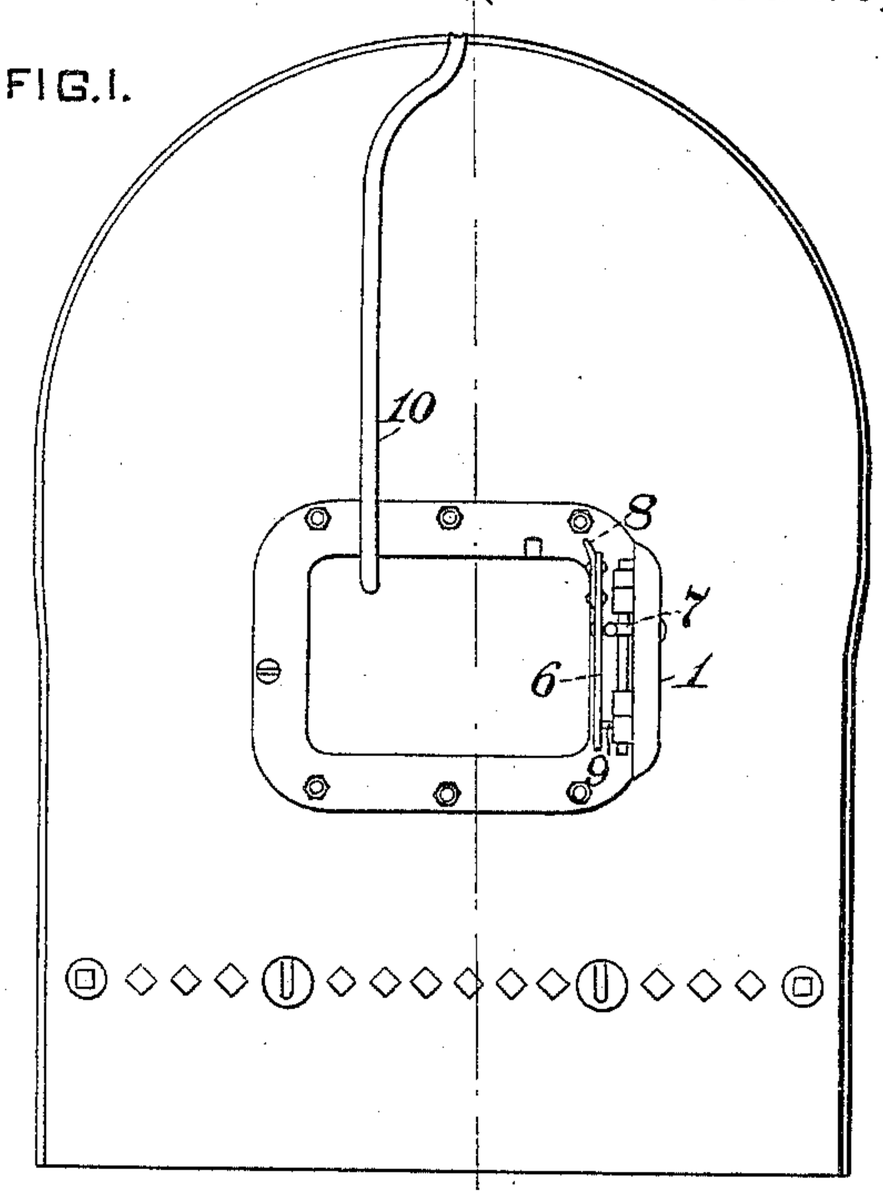


FIG. 2.

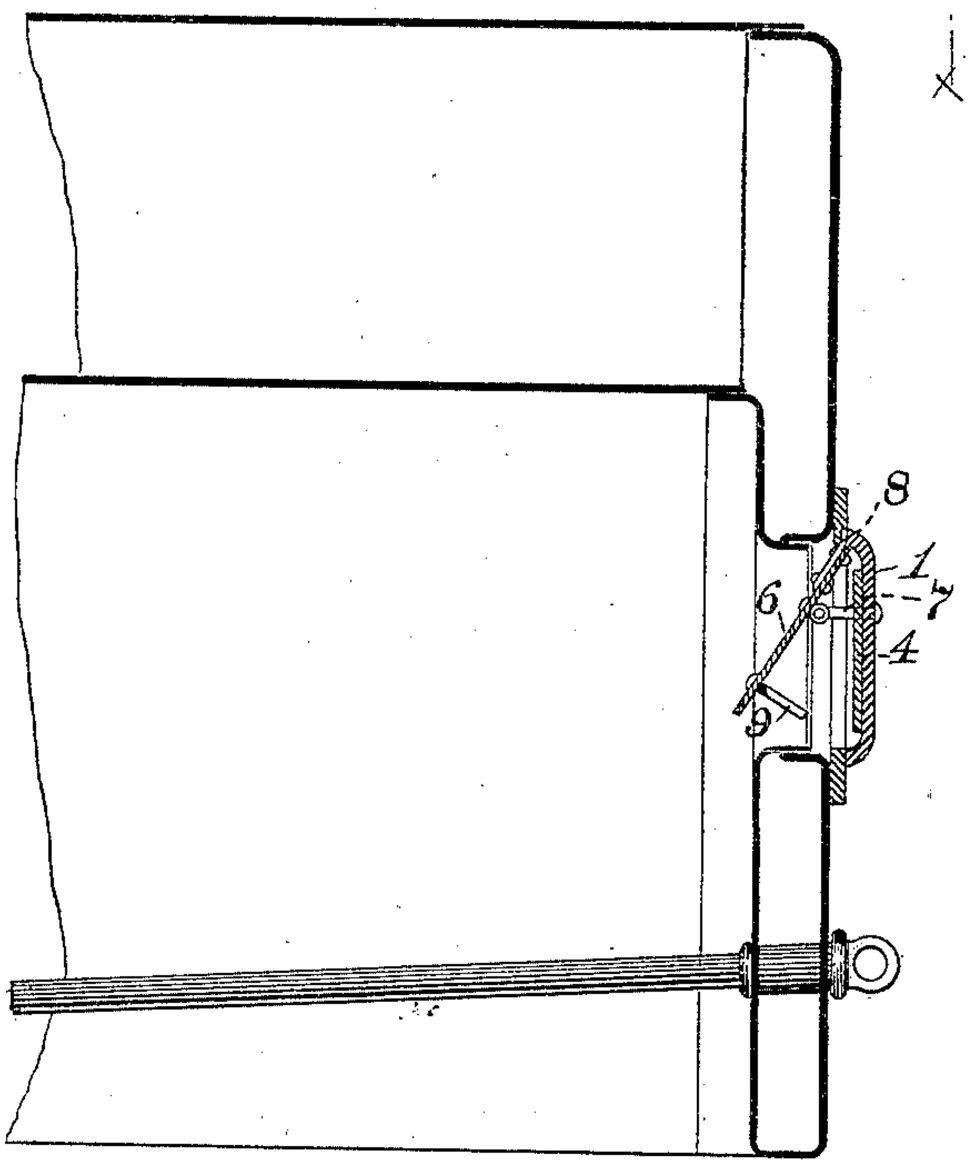


FIG. 3.

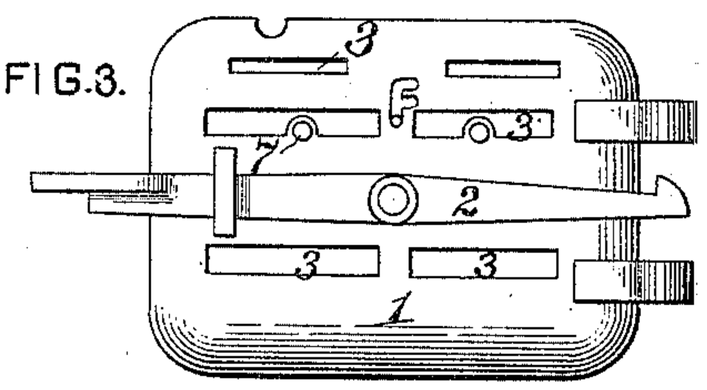


FIG. 4.

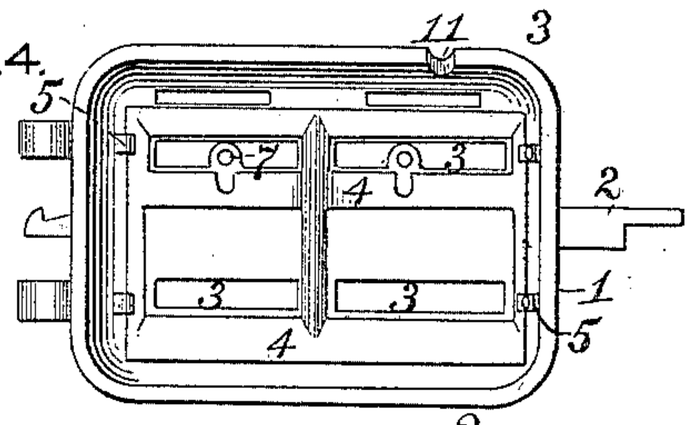
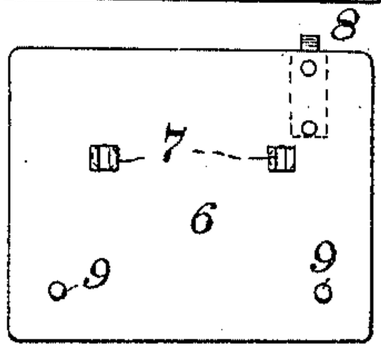


FIG. 5.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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DOOR FOR BOILER-FURNACES.

SPECIFICATION forming part of Letters Patent No. 436,555, dated September 16, 1890.

Application filed May 8, 1890. Serial No. 351,001. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. ALEXANDER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Doors for Boiler-Furnaces, of which improvements the following is a specification.

The invention described herein relates to certain improvements in furnaces for locomotives and other boilers, and has for its object a construction of door for such furnaces whereby currents of air or air and steam may be directed toward and caused to commingle with the gaseous products of combustion in said furnace, for the purpose of effecting a more thorough or complete combustion of such products.

In general terms the invention consists in the combination, with a furnace-door, of a plate adapted, when the door is closed, to direct currents of air or air and steam, entering through or at one or more sides of the door toward and into the flame and gaseous products of combustion at or above the surface of the fuel in the furnace.

In the accompanying drawings, forming a part of this specification, Fig. 1 is an end elevation of a locomotive-boiler, the door having my invention applied thereto being shown in an open position. Fig. 2 is a sectional view, the plane of section being indicated by the line *x x*, Fig. 1, the door being shown in a closed position. Fig. 3 is a detailed view on an enlarged scale, showing the front of the door. Fig. 4 is a similar view of the rear side of the door, and Fig. 5 is a detail view of the deflecting-plate.

The boiler and furnace are of the usual or any suitable construction, and the door 1 is hinged to the boiler in the usual manner, and is provided with a lever 2, pivoted thereto, and adapted to hold the door in an open or closed position.

Through the door I form a series of openings 3, and regulate the flow of air therethrough by means of a sliding plate 4, arranged in suitable guides 5 on the rear side of the door. This plate is provided with slots, as shown in Fig. 4, arranged to register with the slots or openings 3 in the door when the slide is at the lower limit of its movement, and with blank spaces adapted to cover the openings 3 to a greater or less extent when the slide is raised.

In order to prevent the air from passing directly through the fire-box and into the tubes or flues a deflecting-plate 6 is attached to the rear or inner side of the door and at such an angle thereto that the air entering through the openings 3 will be deflected downwardly past the inner edge of the water-leg and upon the flame at or near the surface of the fuel. As in most cases the door will not open back much farther than to a plane perpendicular to the faces of the boiler, as shown in Fig. 1, the deflecting-plate 6, if immovably attached at an angle, as shown, to the door would interfere with charging the coal into the fire-box, it is preferred to hinge or pivot the plate to the door in such a manner that when the door is open the plate will assume a position parallel therewith, as shown in Fig. 1. To this end the plate is pivotally attached to studs or bolts 7, secured to the door, as shown in Figs. 2 and 4, the point of attachment of the plate to the studs being somewhat above the center of the plate, so that the latter will, when free to move—*i. e.*, when the door is open—swing down into practical parallelism with the door.

In order to bring the plate into the desired angular position when the door is closed a pin 8 is so attached to the upper edge of the plate as to engage the edge of the opening into the fire-box, as shown in Fig. 2. Thus it will be seen by hinging the plate as described and providing it with a finger for engaging the side of the opening in the fire-box, the plate will be automatically moved out of the way when the door is opened and then shifted or turned to the required angular position when the door is closed.

While not essential to the successful operation of the deflecting-plate it is preferred to provide a stop-pin 9 on the deflecting-plate, to hold the plate in proper position when the door is opened.

When this invention is applied to locomotive-boilers the violent and rapid exhaust of the steam when the engine is running will in most cases draw the air into the fire-box in sufficient volumes and with the desired rapidity.

In order to provide for the introduction of

air when the engine is stationary or when the invention is applied to stationary boilers, a pipe 10, connected to the boiler or to a suitable air-supply, as the air-brake reservoir, is so arranged as regards its free end that air or steam will be directed into the space between the deflecting-plate and the door when the latter is closed. The air or steam blast will draw the air in through the door, and by contact with the deflecting-plate the air will be properly directed into the fire-box. As the pipe 10 is preferably arranged, as shown in Fig. 1, along the end of the boiler and over the edge of the opening into the fire-box, a notch 11 is cut in the edge of the door, so as to permit of its closing tightly.

I am aware that it is old to arrange a scoop-like plate on the doors of furnaces, said plate being attached to a shaft mounted in bearings on the outer face of the door and controlled in its movements by a cam-plate attached to the boiler, as shown in Patent No. 329,603. Such a construction requires an entire change in the doors now employed, and, further, the deflecting-plate projects at such an angle from the door when open as to interfere with charging in the coal, the doors of locomotive-boiler furnaces having a movement very little more than ninety degrees. In my improvement the deflecting-plate can be readily attached to the doors now in use, and when the door is open hang practically parallel therewith, and will not, therefore, in any way interfere with firing.

I am also aware that it is old to admit steam into boiler-furnaces through the door thereof; but in the constructions with which I am acquainted the steam enters in a direction parallel with and in the same plane as the boiler-tubes, and hence being subjected to a powerful draft will pass directly into such tubes without materially aiding combustion in the furnace.

I claim herein as my invention—

1. The combination of a door for boiler-furnaces, provided with openings for the passage of air, a sliding plate or damper to regulate the flow of air, and a plate connected to and arranged at an angle to the door for properly directing the air into the furnace, substantially as set forth.

2. The combination of a door for boiler-furnaces, a plate attached at an angle to the door, and a pipe arranged to direct a blast of air or steam into the space between the door and plate, the inclination of the latter being such as to direct the air or steam into the fire-box at an angle to the axes of the boiler-flues, substantially as set forth.

3. The combination of a door for boiler-furnaces, provided with openings for the passage of air, a plate of smaller dimensions than the door and pivotally attached to the door, said plate being adapted to hang practically parallel with the door when open and to be turned to an angular position with relation to the door on closing the latter, substantially as set forth.

4. The combination of a door for boiler-furnaces, provided with openings for the passage of air, a plate pivotally attached to the door and provided with a finger adapted to engage the edge of the opening in the furnace and shift the plate to an angular position when the door is closed, substantially as set forth.

5. The combination of a door for boiler-furnaces, provided with openings for the passage of air, a plate so pivoted to the door that when free to move will hang practically parallel with the door, and provided with a finger adapted to engage the edge of the opening in the furnace and shift the plate to an angular position when the door is closed, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOHN R. ALEXANDER.

Witnesses:

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