(No Model.)

F. S. SAVAGE.

FURNACE FOR STEAM BOILERS.

No. 306,646. Patented Oct. 14, 1884.

Fig 1.

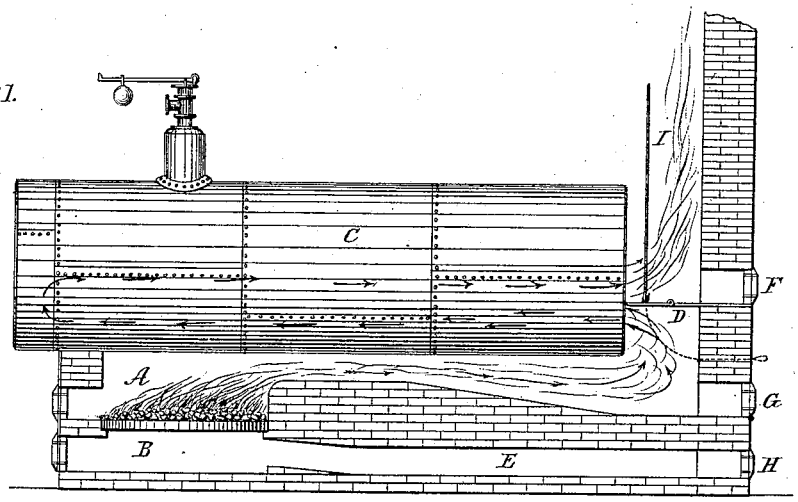


Fig. 2.

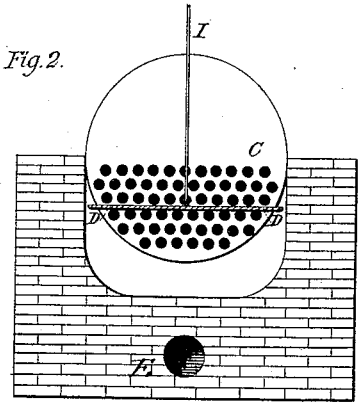


Fig 3.

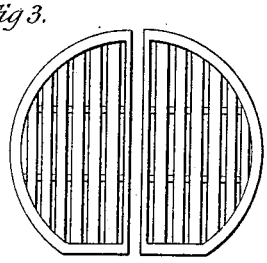


Fig. 4.

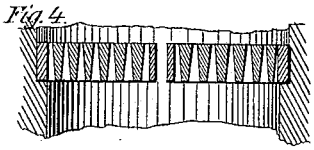
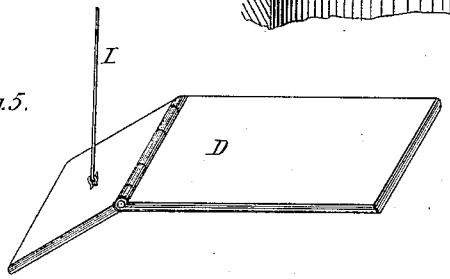


Fig. 5.



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UNITED STATES PATENT OFFICE.

FREDERICK S. SAVAGE, OF TURNER'S FALLS, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO ROBERT B. CAMPBELL, OF SAME PLACE.

FURNACE FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 306,646, dated October 14, 1884.

Application filed May 13, 1884. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK S. SAVAGE, a citizen of the United States, residing at Turner's Falls, in the county of Franklin and Commonwealth of Massachusetts, have invented a new and useful Improvement in Furnaces for Steam-Boilers, of which the following is a true and full specification.

Furnaces for heating horizontal boilers are usually made square or oblong, with rectangular sides and corners. The grate-bars, of whatever form, are usually made running longitudinally from the front of the fire-box, resting on a frame or on brick-work, and between the outside bars and the side of the fire-wall is a space usually as wide as that between the bars of the grate. Through this outside space the heated flame rushes with much intensity, the result of which is to melt or fuse the coal which lies against the fire-brick of the wall, forming a slag or clinker, which so absolutely combines with the brick as to form a solid mass, partly filling the sides of the fire-box, and seriously interfering with its full use and the complete combustion of the coal. So serious is this evil that I have been obliged to draw the fire from a furnace and to cut out and replace from fifty to sixty fire-brick at much expense and great delay of business. By my invention I avoid this trouble and improve the draft, intensify the heat, and increase its effective working-power.

In the accompanying drawings, illustrating my invention and forming part of this specification, Figure 1 is a longitudinal section. Fig. 2 is a transverse section showing the end of the boiler. Fig. 3 is a plan of the grate. Fig. 4 shows a transverse section of the same, and Fig. 5 is a perspective view of the plate D.

The fire-box A, as well as the ash-pit B, is circular in form, by which, with the other parts of the invention, the draft is directed toward the center of the grate, tending to a more thorough combustion of the coal. The grate is circular, preferably cast in two sections longitudinally through the center, for convenience in putting it in place through the furnace-door. The outside rim of the grate, two inches or more in width, sits on a shoulder of the brick-work below, and makes a close joint all round to prevent the air from drawing up outside against the fire-brick with which the fire-box is lined, and therefore prevents the coal from melting and clinkering on the brick—a most important feature. The grate-bars may be cast separately and set in the rim; but the circular rim is most essential. Under the boiler, and extending back for a suitable distance—say four or five feet from the rear of the fire-box, from which point it is enlarged to the furnace-wall—is the flue through which, by a direct draft, the smoke and heated air pass in contact with the whole length of the boiler. This flue is rounded on the sides and bottom to facilitate the draft, and is enlarged toward the rear end to admit of entrance for clearing the soot and ashes and to make repairs. The boiler C is represented as of the ordinary construction, about half filled from the bottom with tubes, as usual. At the rear end of the boiler, about midway between the rows of tubes, I place a thick iron plate, D, let into the brick-work, extending to the end of the boiler, filling up the space for the purpose of cutting off and deflecting the heat into the lower rows of tubes, through which it passes to the front end of the boiler, returning to the rear end of the boiler through the upper rows of tubes and up the chimney. By this means, in forcing the passage of hot air under the boiler once and through the boiler twice, I succeed in getting a greater diffusion of the heat and its more thorough exhaustion and a more entire expenditure of its effect than by the ordinary way of simply passing it once through the tubes. The plate D is hinged at about its middle, the front part touching the boiler being made to drop down, and again to be raised to a level against the boiler, where it meets a shoulder on the end of the boiler, forming a tight joint. This plate is raised or lowered by a rod attached to it, controlled by the fireman. It is lowered to give a direct draft when starting the fire, and is then raised, sending the heat through the boiler. Additional force is given to the draft under the fire by a back draft, E, which extends from the outside of the wall back of the boiler under the brick wall sustaining the boiler, and, rising under the grate, discharges a volume of air, giving an additional force to the draft by meeting the draft coming in from

the front of the ash-pit. The effect of this is to cause a strong current upward, giving additional force to the draft, increasing the fire, and giving, of course, increased efficiency to the boiler. I intend to have this flue tubular—say of a ten-inch tile—it being an established fact that air, smoke, vapor, or any fluid passes with greater facility through a round flue or pipe than through a square one, and a circular fire-box will give a better draft than a square one, where the four corners do not naturally admit a free circulation or perfect combustion.

F is a door in the back wall for clearing out the upper tubes of the boilers.

G is a door or man-hole for clearing out the lower tubes and flue, and to admit a man for repairs, when necessary.

H is the draft-hole closed with sliding ports, to regulate the amount of air to be admitted through the tubular flue into the fire-box.

I is the rod by which the hinged plate may be moved.

I claim—

The combination, with the boiler, boiler-flues, and furnace of a steam-engine, of the hinged plate D, part of which is permanently fixed in the furnace-wall and a part movable within close proximity to the boiler-flues, as and for the purpose set forth.

FREDERICK S. SAVAGE.

Witnesses:
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