

(No Model.)

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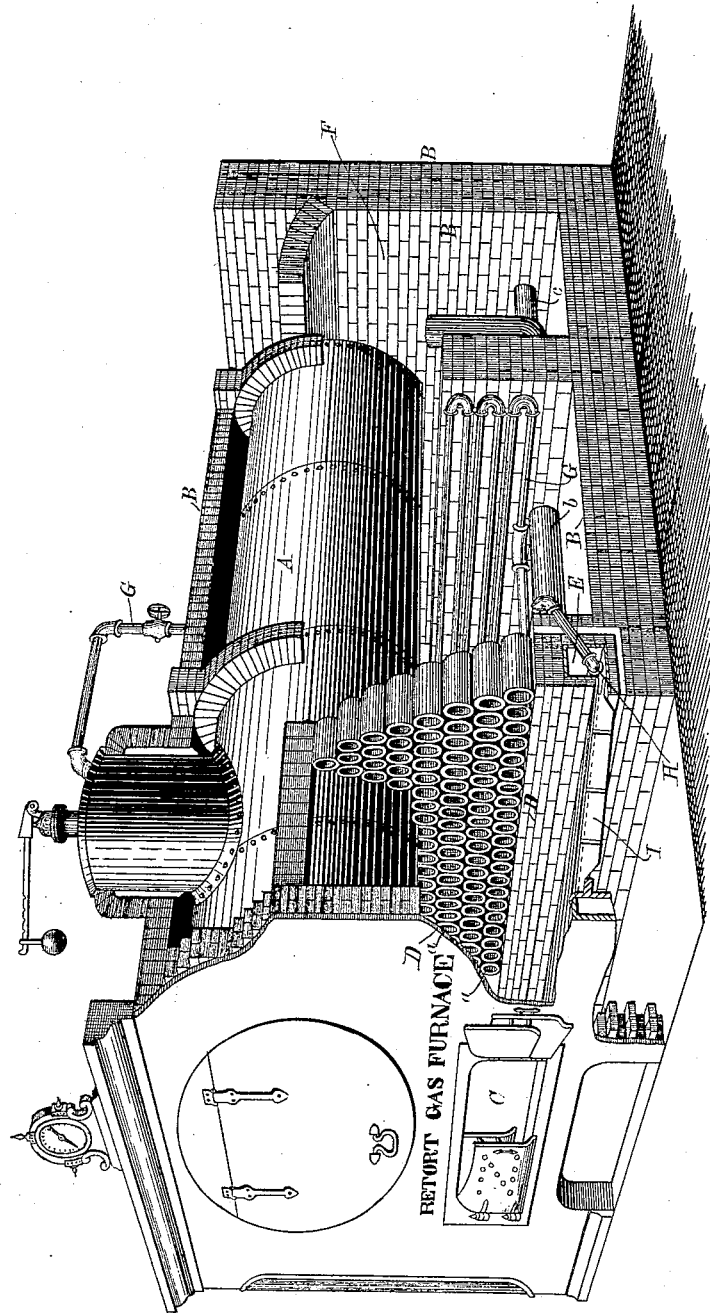
R. R. ZELL.

BOILER FURNACE AND ATTACHMENT.

No. 266,249.

Patented Oct. 17, 1882.

—FIG I—



—WITNESSES—

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(No Model.)

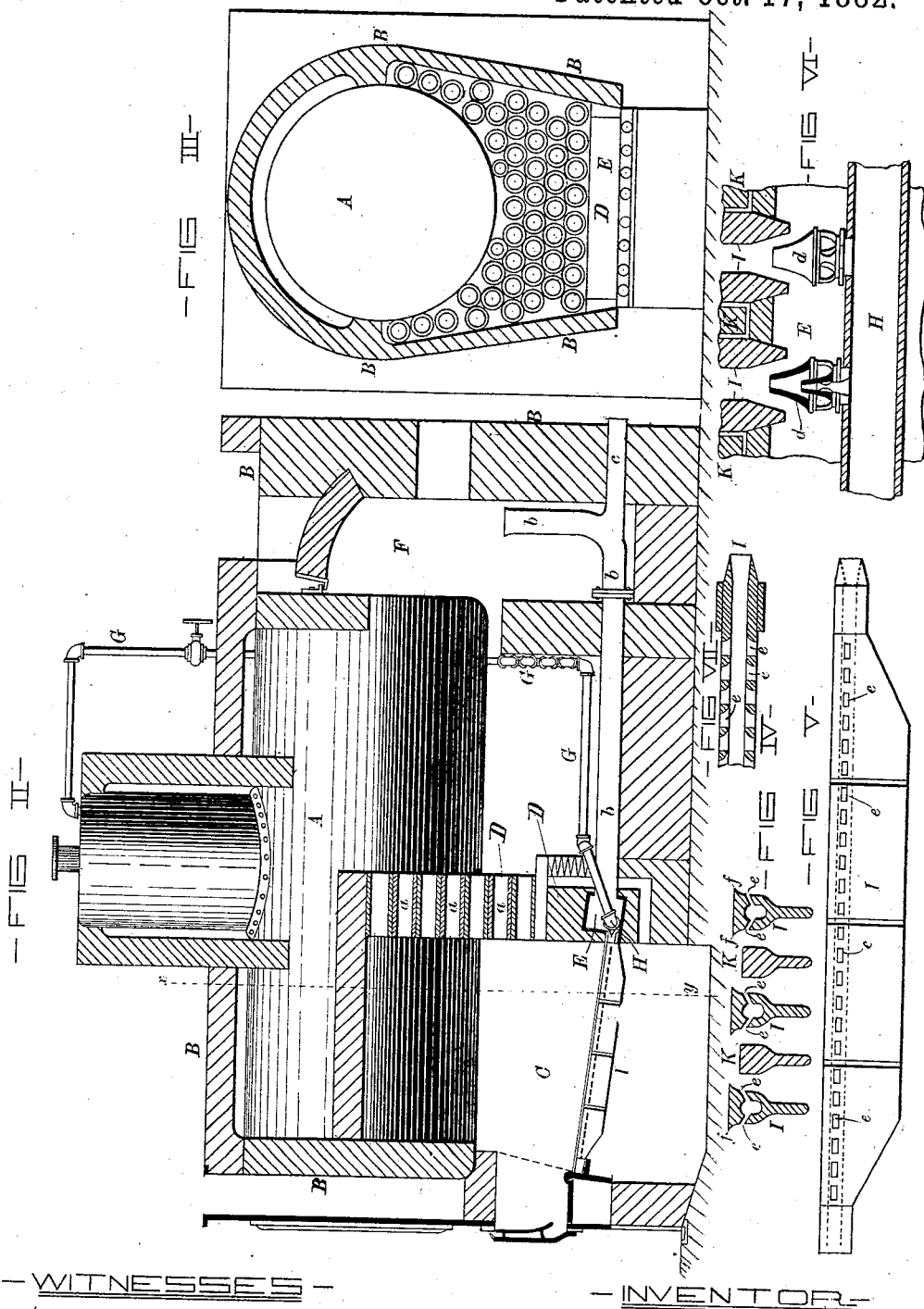
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Paul Fisher
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- INVENTOR -

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UNITED STATES PATENT OFFICE.

ROBERT R. ZELL, OF BALTIMORE, MARYLAND.

BOILER FURNACE AND ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 266,249, dated October 17, 1882.

Application filed June 19, 1882. (No model.)

To all whom it may concern:

Be it known that I, ROBERT R. ZELL, of the city of Baltimore and State of Maryland, have invented certain Improvements in Boiler-Furnaces and their Attachments, of which the following is the specification.

The object of this invention is to effect a more thorough consumption of the products of imperfect combustion of fuel in a furnace than is usually obtained by means of existing devices.

The said invention, briefly stated, consists in novel apparatus which is combined with the boiler and brick-work which surrounds it, whereby the products of imperfect combustion of fuel is taken from the rear end of the boiler, combined with atmospheric air, and forced by means of jets of superheated steam to the spaces between the grate-bars, and thence through the burning fuel supported thereon.

In the further description of my invention which follows, reference is made to the accompanying drawings, forming a part hereof, and in which—

Figure I is a partly-sectional view of a boiler provided with my improvements, the same being shown in perspective. Fig. II is a longitudinal section of the invention. Fig. III is a cross-section of Fig. I, taken on the dotted line *xy*. Figs. IV, V, VI, and VII are views of parts of the invention on an enlarged scale.

Similar letters of reference indicate similar parts in all the views.

A is the boiler, inclosed within and by the walls B B. The boiler here shown is fired exteriorly, the products of combustion returning through tubes or flues to the front, where they escape to a flue or chimney.

C is the furnace and D the bridge-wall, a large portion of which is constructed of short hollow blocks *a*, of terra-cotta, fire-brick, or other refractory material. The blocks are preferably cylindrical in form, as shown in the drawings; but they may be of any other shape without affecting the nature of the invention.

E is a box extending transversely of the furnace and inclosed within the solid portion of the bridge-wall D. To the rear side of this box is attached a pipe, *b*, which extends to the back connection, F, where it is turned upward. A branch, *c*, connects the pipe *b* with the outer air, and it may be provided with a damper or valve, if desired.

A steam-pipe, G, leads from the steam-space of the boiler to a pipe, H, inclosed in and running longitudinally of the box E. A portion of the pipe G under the boiler is formed into a gang in order that the steam in passing to the pipe H may be superheated.

I and K K are respectively hollow and solid grate-bars, the former having conical ends which fit into similar-shaped apertures in the box E. Fig. IV is a cross-sectional view of several of the bars I and K, showing their relative positions, and Fig. VI is a sectional plan of a part of the box E, showing how the bars enter the same. The pipe H is provided with a series of nozzles, *d*, (shown on an enlarged scale in Fig. VI,) which are arranged opposite to each of the hollow bars I. These bars have lateral apertures or slots, *e*, which are protected against the entrance thereto of ashes by a projecting edge, *f*, (shown in Fig. IV.) The slots *e* are inclined upward at an angle of, say, forty-five degrees, in order that the blast will strike above the edge of the intermediate solid bars K, (see Fig. IV,) and the metal is cut away at the end of each slot next to the inlet end of the bar, as shown in Fig. VII, so that the air, gases, &c., will readily escape through the said slots instead of passing with force to the end of the bars.

In the operation of this invention a jet of superheated steam is projected into each of the hollow bars I, and carries with it a mixture of gases and other products of imperfect combustion from the back connection through the pipe *b*, and atmospheric air through the branch *c*. A proper proportion of the products of imperfect combustion and air may be effected by means of valves, dampers, or other equivalent devices which are not shown in the drawings. The mixture of steam, gases, &c., forced into the hollow grate-bars I, as before described, is projected through the lateral slots *e* to the body of burning coal on the bars, and carries with it air from the ash-pit, which is always open. The movement of gases, air, &c., is indicated by arrows in the various figures.

It will be understood that by means of this invention the products of imperfect combustion are reheated in passing through the bridge-wall, then commingled with superheated steam and air, and then returned to the furnace in a condition for immediate ignition. In employ-

ing an independent jet for each hollow grate-bar a uniformity of pressure throughout the whole body of coal is attained, which would be impossible with any other construction.

5 I claim as my invention—

1. In combination with a box adapted as a bridge-wall or a part of a bridge-wall, having a series of openings therein in communication with its interior, a system of hollow grate-bars adapted to fit in the said openings, the said bars being closed at their upper and lower faces and provided with lateral exit-apertures and apparatus for introducing air to the interior of the said bridge-wall box, substantially as and for the purpose specified.

2. A box adapted as a bridge-wall or a part of a bridge-wall having a series of lateral apertures extending from its interior to receive the ends of hollow grate-bars, a steam-pipe with nozzles opposite to the said opening, substantially as and for the purpose specified.

3. A box adapted as a bridge-wall or a part of a bridge-wall and having a series of lateral apertures extending from its interior, and a system of hollow grate-bars connected with the said apertures, combined with a steam-pipe

having nozzles opposite to the said apertures, the said nozzles being removed from contact with the wall of the box and the said lateral apertures to form an exit-passage for the contents of the said box and an entrance-channel to the said hollow bars, substantially as and for the purpose specified.

4. In combination with a box adapted as a bridge-wall or a part of a bridge-wall and in communication with a system of hollow grate-bars having lateral exit-apertures, a supply-pipe extending to a point under the boiler in the rear of the bridge-wall, substantially as and for the purpose specified.

5. In combination with a box adapted as a bridge-wall or a part of a bridge-wall and in communication with a system of hollow grate-bars having lateral exit-apertures, a supply-pipe extending to a point under the boiler in the rear of the bridge-wall, and a branch leading to the outer air, substantially as and for the purpose specified.

ROBERT R. ZELL.

Witnesses:

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JOHN WILLIAMS.