(No Model.)

J. ALVES.

Furnace for Steam Boilers.

No. 238,546. **Patented March 8, 1881.**

FIG. 1.

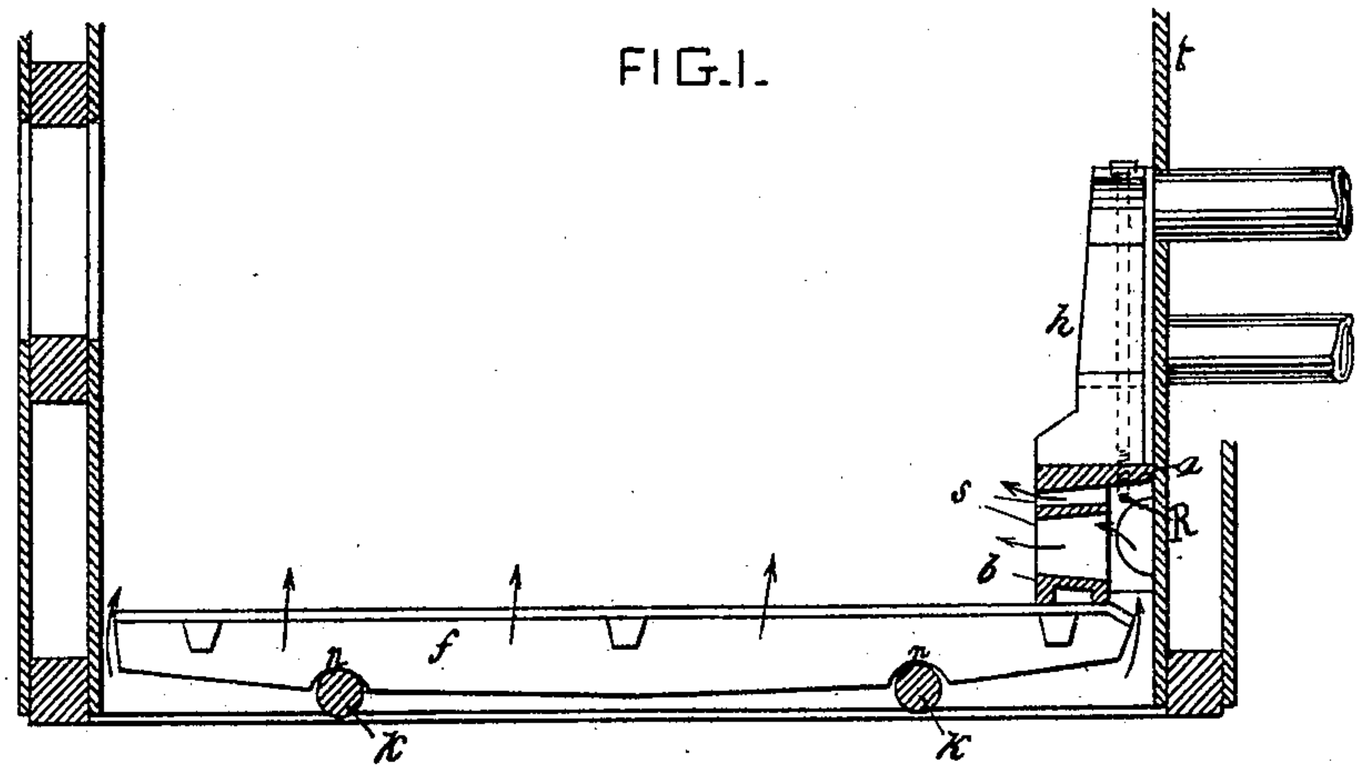


FIG. 2.

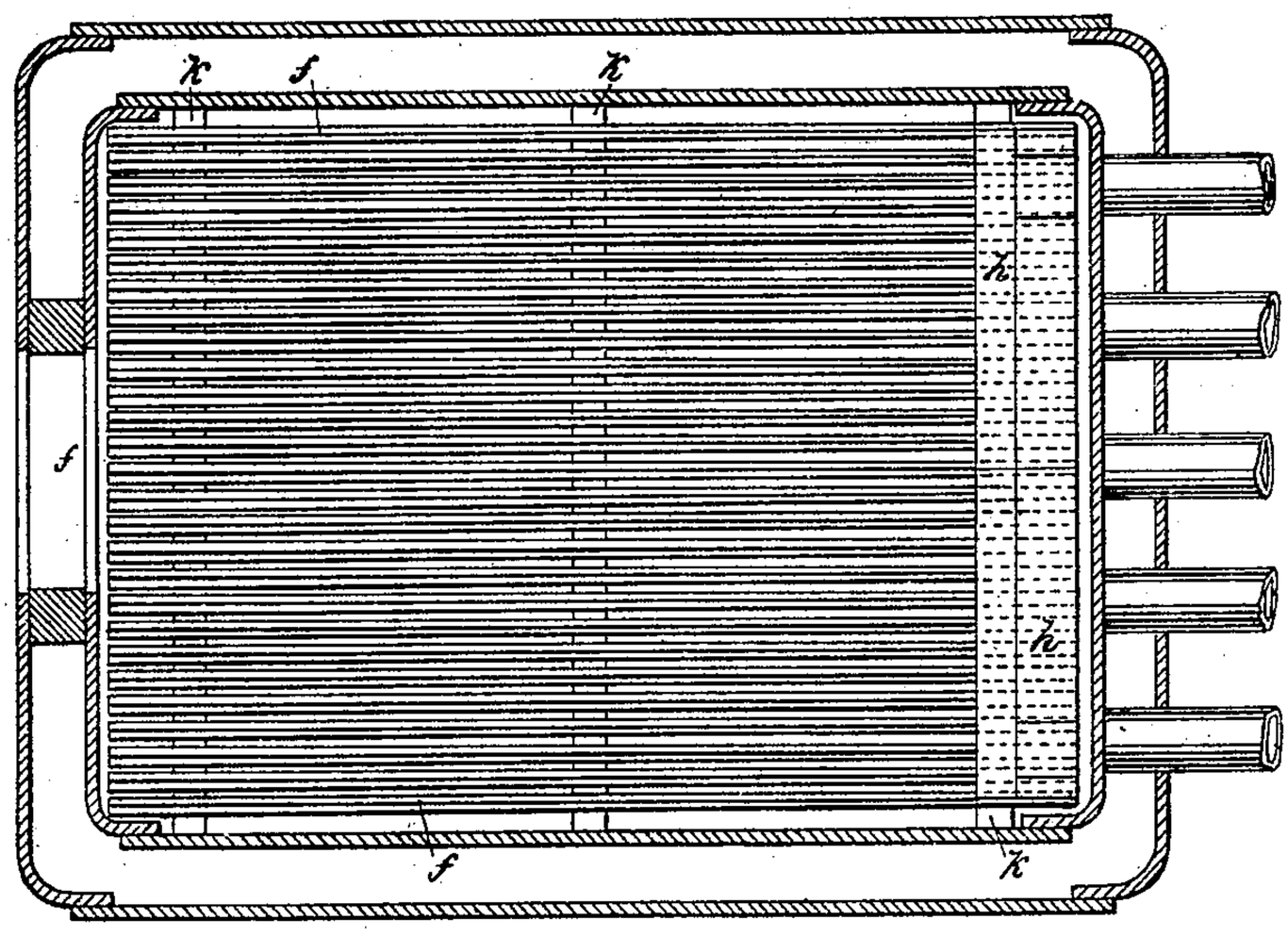
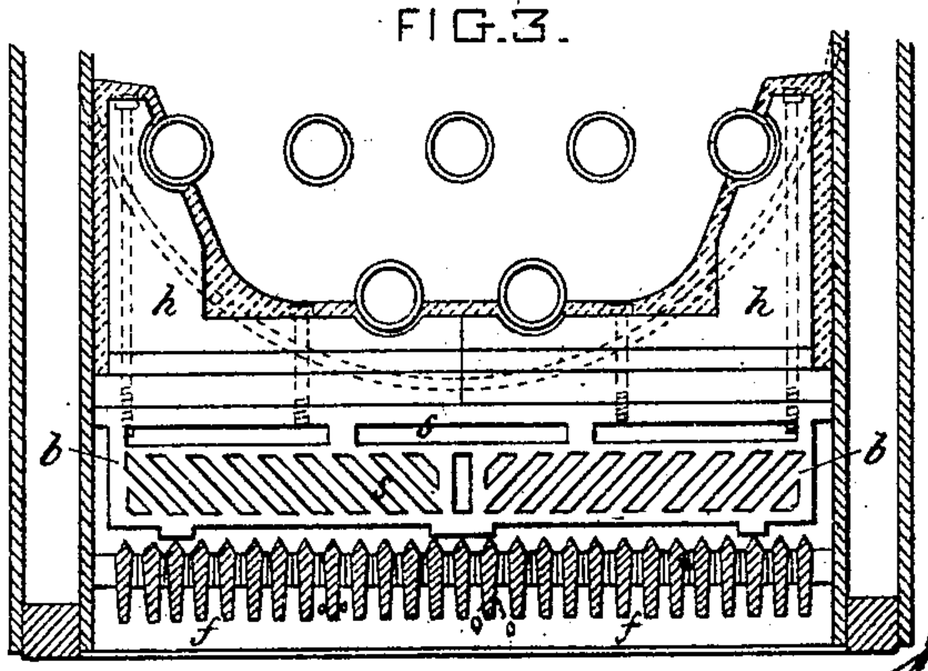


FIG. 3.



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UNITED STATES PATENT OFFICE.

JOHN ALVES, OF DUNEDIN, NEW ZEALAND.

FURNACE FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 238,546, dated March 8, 1881.

Application filed November 8, 1880. (No model.)

To all whom it may concern.

Be it known that I, JOHN ALVES, of Dunedin, New Zealand, have invented certain new and useful Improvements in Furnaces for Steam-Boilers and other purposes, of which the following is a specification.

My invention relates to the furnaces of locomotive or other steam boilers; and it consists in the peculiar construction and arrangement of the parts, as hereinafter more fully set forth.

Figure 1 of the drawings annexed gives a longitudinal section of the fire-box of a locomotive-boiler provided with my improvements. Fig. 2 is a sectional plan thereof, and Fig. 3 is a cross-section in front of the fire-bridge and tube-sheet.

As illustrated, *f f* indicates the grate or fire bars, which are supported in the usual manner on the cross bearing-bars *k k*, and preferably incline, as is commonly the case, toward the tube-sheet *t* of the boiler—being, say, two inches lower at this end than at the front end.

At the back of the fire-box is arranged a fire-bridge, *h b s*, of peculiar construction. This bridge is supported on the back ends of the grate-bars, and rests against the tube-sheet. The lower part, *b*, is preferably formed of cast-iron; but it may also be formed of fire-brick, and is perforated with a number of air-slots, *s*, while the upper part, *h*, which is imperforate, is preferably made of fire-brick, in two sections of L shape, the horns of which rise on each side of the tube-sheet, as shown best in Fig. 3. The slots *s* of the lower part are made preferably in the manner shown, commencing with a vertical slot at the center, followed by a parallel series of oblique slots on either side thereof, inclining in opposite directions, with wide horizontal slots over the same, as illustrated. The slotted part of the bridge-casting is set out from the tube-sheet, leaving an air-chamber, R, between the two, which communicates with the air-chamber or ash-pit below the grate, while a flange, *a*, projects from the top of the casting over the air-space and closes against the tube-sheet, and the fire-brick sections *h h* rest upon this flanged top, being secured thereto by bolts passing through molded holes in the brick and screwing into tapped holes in the casting, as seen best in Figs. 1 and 3. Fire-clay is packed between the meeting ends of the brick sections *h h*, also between the outer edges of the same and the fire-box, as well as between the face of the tube-sheet and the back of the sections, and also over the top edges of the sections, covering the bolt-heads therein, the clay being there neatly beveled off, as shown in Figs. 1 and 3, so that the juncture of the said parts is rendered sufficiently air-tight and the heads of the said bolts protected from the intensity of the flame.

The grate-bars are set out from both the ends and sides of the fire-box, as shown, so that a good volume of air can freely rise up between the same and along the sides of the fire-box, to render the flame more energetic on the sides of the fire-box, and in the upper part thereof, securing a more even distribution of the heat over the walls of the fire-box.

I have found in practice that locomotives fitted with my improvement show from twenty to forty more pounds of steam on inclines than when fitted with the ordinary grates; and I find that with any kind of coal, and in any grate, even in common stoves, a much greater heating effect is obtained by the use of the beveled-edged grate-bars than is the case with common bars.

If desired, the hollow and slotted part of the fire-bridge may be continued all around the sides of the fire-box, but for most furnaces this will not be necessary. The feature which I consider particularly novel in this bridge is the hollow slotted lower part, arranged and operating as described, the form and arrangement of the slots therein, and also the form and arrangement of the upper part of the bridge, which rests against the tube-sheet and rises on either side thereof, around the outline of the series of tubes therein.

To rake the grate I provide a poker or rake having serrated teeth on its raking-face to fit on and between the beveled edges of the grate-bars, and thus effectually rake the grate, when required.

It will be observed that the lugs on the sides of the grate-bars, which serve to keep them separated at the proper distance, lie below the beveled edges of the bar, so as not to interfere with the action of the serrated rake, as will be readily understood.

What I claim as my invention is—

1. The combination, with the grate-bars *f f*, set out from the tube-sheet to leave an air-passage between them, of the fire-bridge supported by the grate-bars and consisting of the lower part, *b*, provided with a vertical and inclined and horizontal slots, *s*, and flange *a*, surmounting the air-chamber R, and the imperforate upper part, *h*, secured to the lower part, *b*, substantially as described, and for the purpose set forth.

2. The fire-bridge herein described, consisting of the lower part, *b*, provided with a vertical and inclined and horizontal slots *s*, and flange *a*, surmounting the air-chamber R, and imperforate upper part, *h*, and bolted to the lower part, *b*, the whole being supported on the ends of the grate-bars, substantially as described, and for the purpose set forth.

JOHN ALVES.

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