(No Model.)

JOHN ZERR, JOSEPH ZERR & FRANCIS ZERR.

BOILER FURNACE.

No. 336,370. Patented Feb. 16, 1886.

Fig. 1

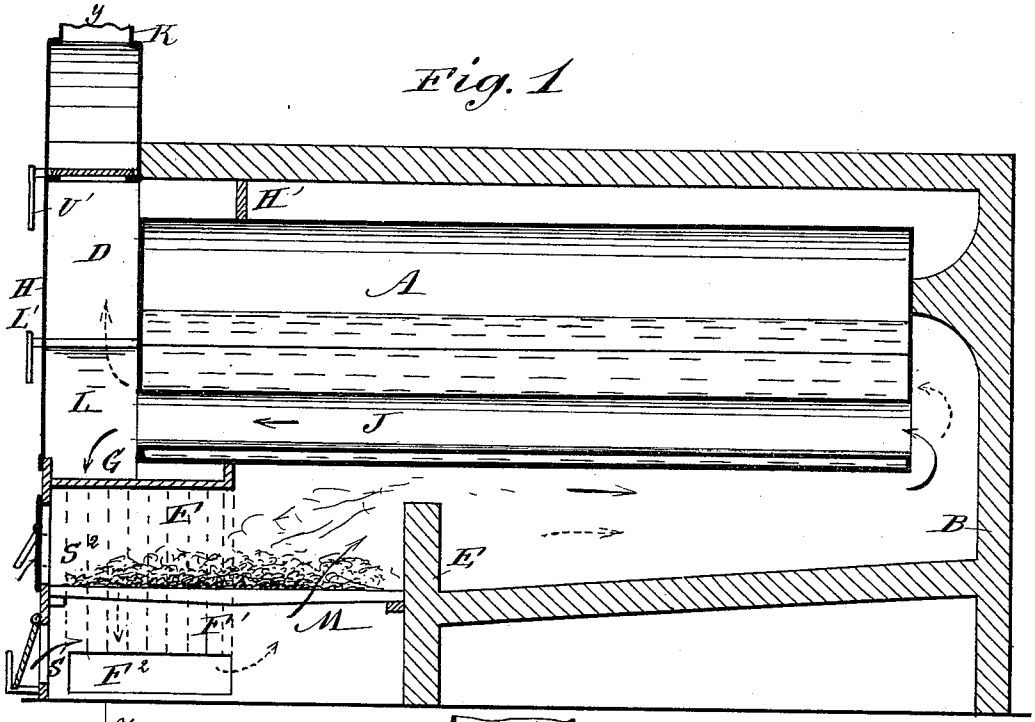


Fig. 3

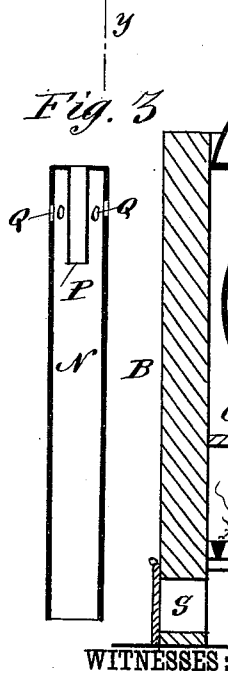
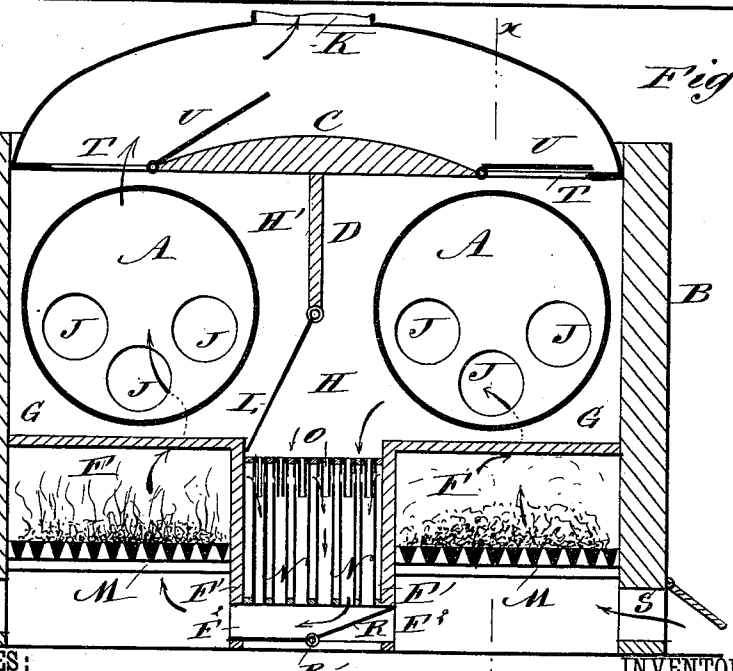


Fig. 2



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UNITED STATES PATENT OFFICE.

JOHN ZERR, JOSEPH ZERR, AND FRANCIS ZERR, OF KEOKUK, IOWA.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 336,370, dated February 16, 1886.

Application filed May 27, 1885. Serial No. 166,867. (No model.)

To all whom it may concern:

Be it known that we, JOHN ZERR, JOSEPH ZERR, and FRANCIS ZERR, all of Keokuk, in the county of Lee and State of Iowa, have invented a new and Improved Boiler-Furnace, of which the following is a full, clear, and exact description.

The object of our invention is to provide a new and improved furnace, in which the smoke, gases, and other products of combustion are fully consumed and thoroughly utilized.

The invention consists in the construction and combination of parts and details, as will be fully set forth and described hereinafter, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal sectional elevation of a boiler provided with our improved fire-place on the line *x x*, Fig. 2. Fig. 2 is a cross-sectional elevation of the same on the line *y y*, Fig. 1. Fig. 3 is a longitudinal sectional elevation of one of the tubes for mixing the smoke and air.

The two boilers A are held in the walls B of brick, and above the space between the same the arched top C is built, from which a partition, D, projects downward between the boilers and parallel with the same. Below each boiler and in front of the bridge-wall E a fire-box, F, is formed, which is provided with a top, G, above which top the smoke box H is formed, into which the boiler-flues J or tubes lead, the smoke-box being connected with the pipe K, connected with the smoke-stack. A gate, L, is hinged at the lower edge of the partition D, and has a key, L′, for turning it, the said gate being so hinged that its free edges can be swung against the top edge of the inner side wall, F′, of either fire-box F. Each fire-box F has a grate, M, and in the space between the fire-boxes a series of vertical tubes, N, are held, the upper closed ends being held in a plate, O, between the walls F′, and into the upper end of each tube N a short tube, P, open at both ends, projects from the plate O. Each tube N has a series of apertures, Q, near the upper end. The lower ends of the tubes N are open, and a short distance above two swinging gates, R, mounted rigidly on a rod, R′, parallel with the longitudinal axes of the boilers and midway between the walls F′. The gates R are at an angle to each other, and when one rests against the top of an opening, F^2, in the lower part of one wall F′ the other is horizontal and rests on the bottom edge of the other opening.

S are the draft-openings for the fire-boxes, S′ the ash-pit openings, and S^2 fire-box openings, all provided with suitable doors.

The top of the smoke-box is provided with two openings, T, which can be closed by gates U, having rods and handles U′ for adjusting them.

The furnace is adjusted and worked as follows: A fire is first started on one grate—for instance, on the left-hand grate—the smoke and other products of combustion passing from the left-hand fire-box under the left-hand boiler to the rear through the flues of the same into the smoke-box and the pipe K, the left-hand gate U being raised. When the coals are in full glow, a fire is started in the right-hand grate. The left-hand gate U is closed. The gate L is swung against the top edge of the left-hand fire-box wall F′ and the left-hand gate R swung up against the top edge of the opening F^2 in the right-hand partition F′. The products of combustion from the fire on the right-hand grate pass under the right-hand boiler to the rear through the flues to the front, but cannot pass from the smoke-box into the pipe K, as the right-hand gate U is closed. They are forced to pass down through the tubes P into the tubes N, where they mix with air admitted into said tubes N through the apertures Q, are deflected by the right-hand raised gate R, and conducted under the left-hand grate M, pass through the burning fuel on the same and are consumed, the gases passing under the left-hand boiler A, through the flues of the same, up through the smoke-box, and into the smoke-stack.

All smoke, cinders, and combustible gases are consumed in passing through the fire, and only the non-combustible gases pass off.

When fresh fuel is to be placed on the left-hand grate, the gate L is swung to the right, the left-hand gate R is raised and the right-hand gate R lowered, and the right-hand gate

U raised and the left-hand gate U lowered, thus compelling the products of combustion of the fire on the left-hand grate to pass through the fire on the right-hand grate in the same manner as set forth above.

One fire-place always consumes the products of combustion of the other. The above-described furnace or fire-place can also be used otherwise, as its use is not limited to boilers.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. The combination, with two fire-boxes closed at the top and sides, of a smoke-box above the two fire-boxes, a partition in the smoke-box, which partition divides the smoke-box into two compartments, and a hinged door or gate in said partition, substantially as herein shown and described.

2. The combination, with two fire-boxes closed at the top and sides, of a smoke-box above them, and a gate between the fire-boxes and within the smoke-box, substantially as herein shown and described.

3. The combination, with two fire-boxes and a smoke-box above them, which smoke-box has two openings in its top, of a gate for each opening, and a gate in the smoke-box and between the two fire-boxes, substantially as herein shown and described.

4. The combination, with two fire-boxes, of a smoke-box above them, which smoke-box has two openings in its top, gates for closing said openings, a gate between the fire-boxes, and smoke-conducting tubes between the two fire-boxes, substantially as herein shown and described.

5. The combination, with two fire-boxes, of a smoke-box having two openings provided with gates, a gate between the fuel-boxes, smoke-mixing tubes between the fire-boxes, and gates below the mixing-tubes, substantially as herein shown and described.

6. The combination, with two fuel places, of the tubes N between them, which tubes N have apertures Q, the tubes P, projecting down into the tubes N at the upper ends, and the gate L between the fire-boxes, substantially as herein shown and described.

7. The combination, with the fire-boxes F, having openings F^2 in the lower parts, of their inner side walls, F′, the tubes N between the fire-boxes, the gate L above the tubes, and the gates R, held at an angle to each other on a rod, R′, below the tubes N, substantially as herein shown and described.

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Witnesses:
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