(No Model.)

F. DOYLE & G. W. CARSON.

FURNACE.

No. 368,460. Patented Aug. 16, 1887.

Fig. 1.

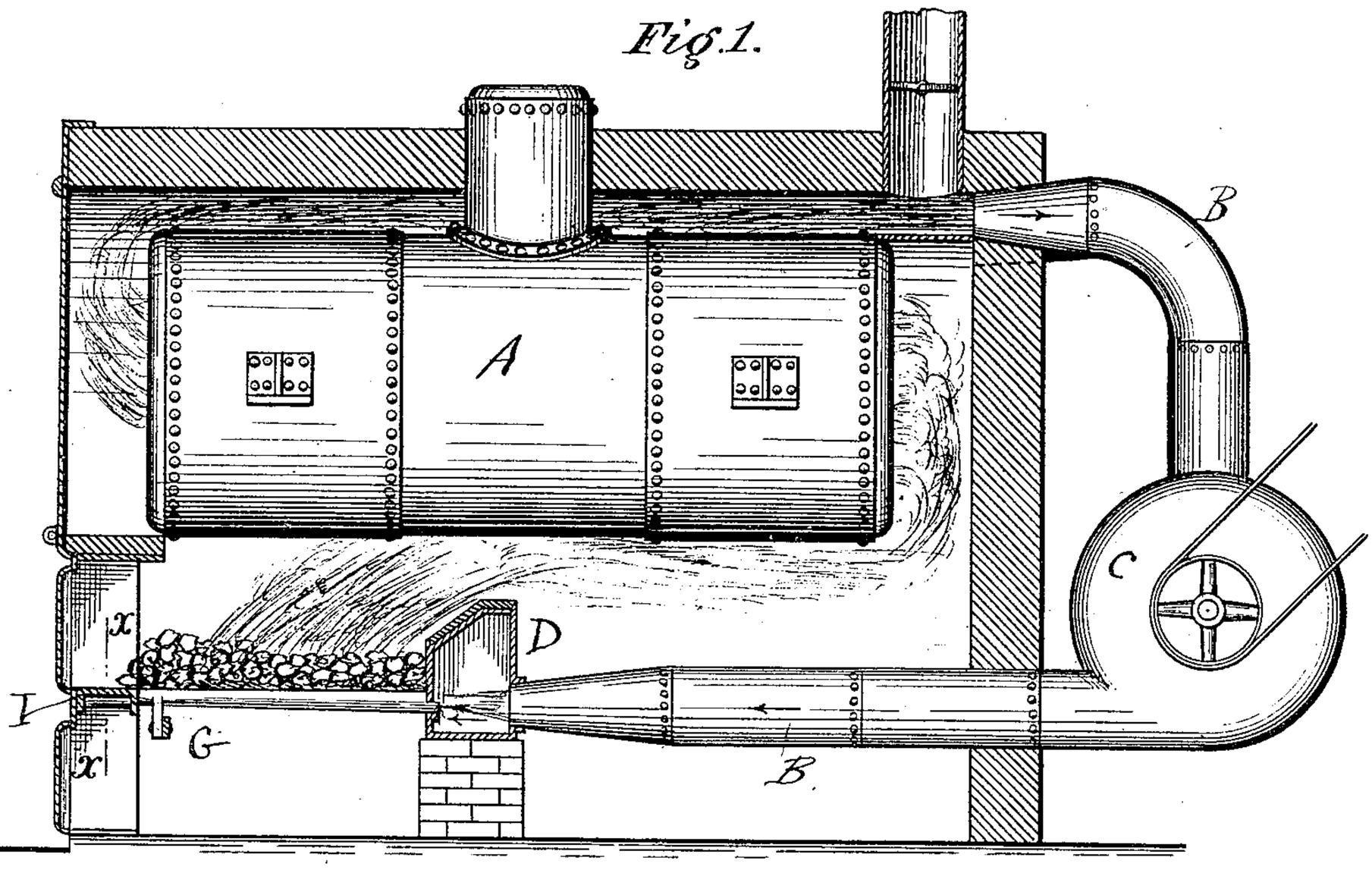


Fig. 2.

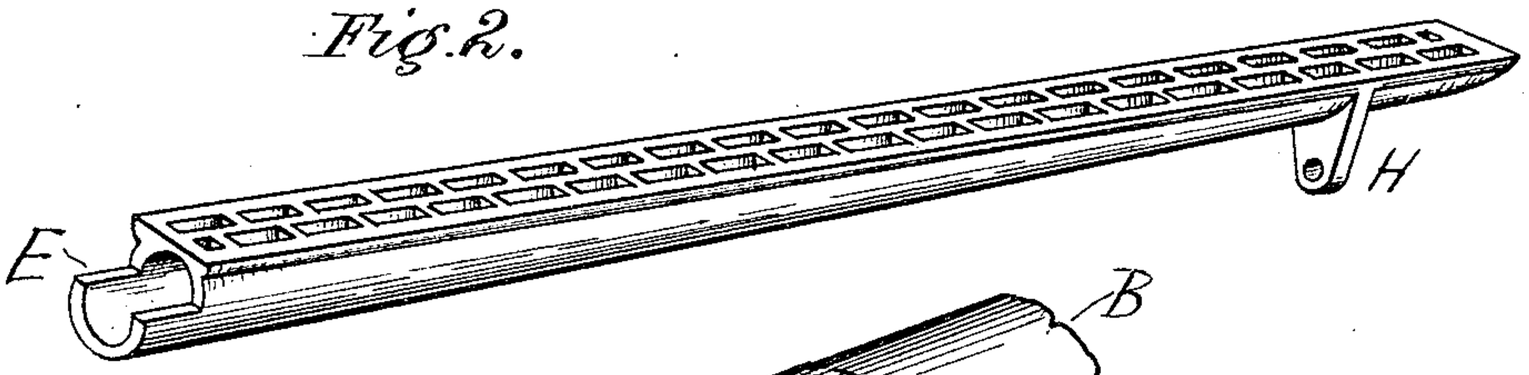
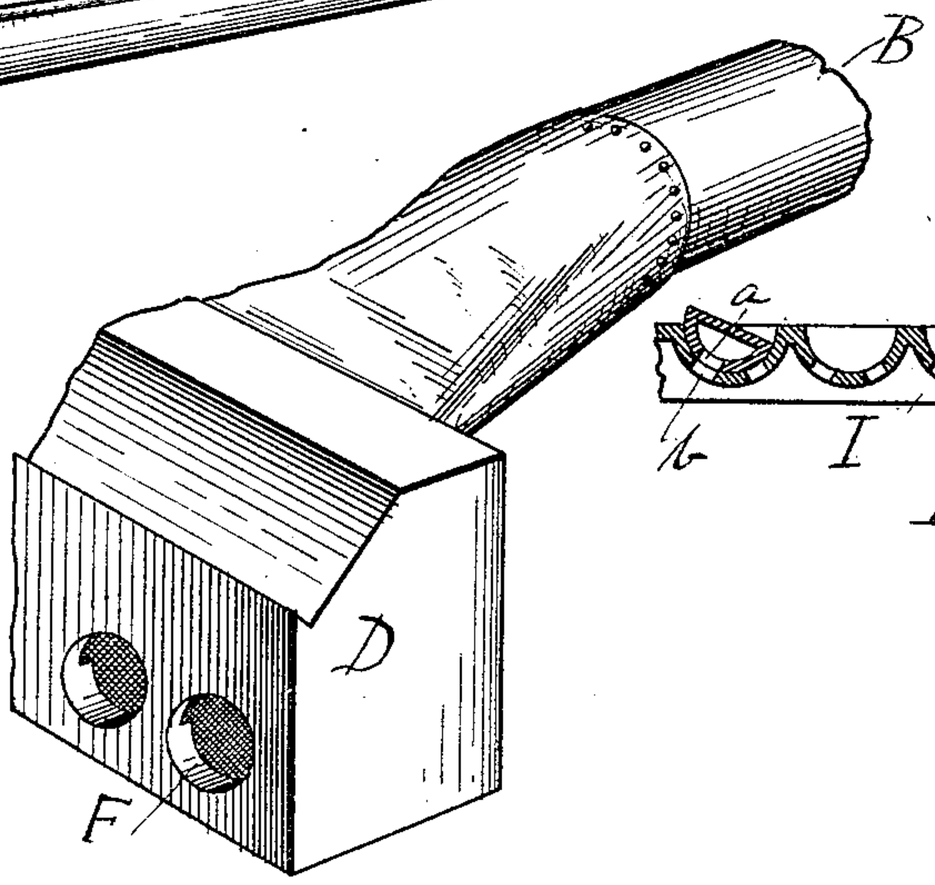


Fig. 3.



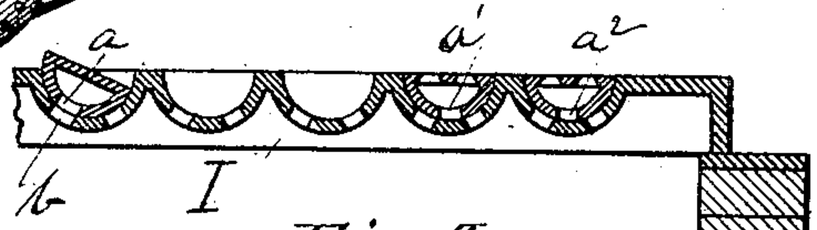


Fig. 4.

Witnesses.
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UNITED STATES PATENT OFFICE.

FRANK DOYLE AND GEORGE W. CARSON, OF CHICAGO, ILLINOIS; SAID DOYLE ASSIGNOR TO LEM M. THOMAS, OF SAME PLACE.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 368,460, dated August 16, 1887.

Application filed December 30, 1886. Serial No. 223,045. (No model.)

To all whom it may concern:

Be it known that we, FRANK DOYLE and GEORGE W. CARSON, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Furnaces, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to furnaces in which the grate-bars are made hollow, in order that the smoke and other products of combustion may be forced back through the fuel, in order that the smoke may be consumed as far as possible. Any of the products of combustion which remain unconsumed may be carried off by the chimney in the usual manner. The circulation through the hollow grate-bars may be kept up by means of a fan connected with the pipe leading from the rear of the boiler to the hollow bridge-wall or a steam-jet or any other device.

Our invention relates more particularly to the construction of the grate-bars and the manner of supporting the same.

Our invention also consists in providing vents in the lower sides of the grate-bars, which are opened when the bars are rocked to one side or the other, so that any ashes that may have accumulated in the hollow bars may be blown out.

In the drawings, which are illustrative of our invention, Figure 1 is side view, partially in section, of a furnace provided with our invention. Fig. 2 is a perspective view, in detail, of one of the grate-bars. Fig. 3 is a perspective view showing the hollow bridge-wall and the bearings for the rear ends or journals of the grate-bars. Fig. 4 is a sectional view on line *x x* of Fig. 1, showing the manner of supporting the bars in front and the vents which are opened when the bars are rocked.

Like parts are represented by similar letters of reference throughout the different figures.

The boiler A we have shown somewhat shorter than is usual for convenience of illustration. The boiler is placed above the fire and the flame is drawn through the flues toward the front, and thence back over the boiler and thence, as indicated by the arrows, through the pipe B, which connects with the hollow bridge-wall. A fan, C, which is driven by any suitable motive power, serves to keep up the circulation.

We have shown no chimney-flue, though in practice we have found it desirable to connect the rear of the furnace with the chimney in the usual manner for the purpose of carrying off gases that are not combustible.

It will be seen that the pipe B connects with the hollow bridge-wall D. The bridge-wall D we preferably construct of cast-iron, the upper portion thereof being preferably protected by fire-brick.

The journals E of the different bars are of the form shown in Fig. 2, the upper portion being removed, so that there may be as large an opening as possible from each bar into the hollow bridge-wall. These openings are made oblong, and the bearings F, provided in the hollow bridge-wall, are made to correspond with the journals E. The different bars are connected together by the rod G, pivoted to the lugs H. By reciprocating this rod back and forth by means of suitable lever mechanism the bars are rocked or turned back and forth, as desired, in their bearings.

In Fig. 4 we have shown one of the bars thus turned, so that its vent *a* is brought opposite the opening *b*, provided in the front rest, I. When the bar is rocked in the opposite direction, said vent *a* will be brought opposite opening *b*. The vents *a'* and *a²* of the bars in Fig. 4 are shown in their normal position, closed. It will thus be seen that the vents *a*, *a'*, and *a²* of the different bars will remain closed as long as the bars are left in their normal position; but on rocking the bars either in one direction or the other these vents will be opened and the ashes which may have accumulated in the bars will be blown out.

As shown in Figs. 2 and 4, the bars are perforated at the top, so that the heated air and products of combustion forced in by the fan may be blown through the fuel. These perforations are smaller at the top than at the bottom, as shown in Fig. 4, so that the ashes can drop through freely. By thus constructing and mounting the bars and providing

vents for blowing out the ashes we are enabled to afford ample room for the introduction of the hot air and smoke below the fuel, while any ashes that may have accumulated may be readily blown out by simply rocking the bars either in one direction or the other.

It is evident that one opening, *b*, only might be provided in the front rest for each of the bars, in which case the vent would be opened only on rocking the bars in one direction.

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

1. The combination, with the hollow perforated grate-bars, each provided with a journal, E, at the rear and a vent upon the lower side near the front end thereof, of the hollow bridge-wall provided with bearings corresponding to said journals and the front rest provided with openings, the fan or blower, and means for rocking the bars, substantially as and for the purpose specified.

2. In a furnace, the combination, with the hollow bridge wall or chamber connected with the rear and upper portion of the furnace, of a fan for forcing the smoke into said chamber, perforated grate-bars connected with said chamber, and vents in the lower sides of said bars, said vents being normally closed, but opened when the bars are rocked, whereby the ashes may be blown out, substantially as and for the purpose specified.

3. The hollow grate-bars provided with perforations smaller at the top than at the bottom, the journals E, cut away, as described, at the upper sides thereof, said bars being provided with normally-closed vents, in combination with the front rest and the hollow bridge-wall and the blower, substantially as described.

4. A hollow grate-bar provided with the journal E, cut away, as shown and described, and a bearing in the hollow bridge-wall of a furnace corresponding to said journal, substantially as described.

5. The combination, with the rocking hollow grate-bar, of a rest, a vent in the bar which is made to correspond with an opening in the rest when the bar is rocked, and a blowing device, as described.

6. The combination, with the hollow bridge-wall, with which the hollow rocking grate-bars are connected by journals E, resting upon the bearings F, of a pipe, B, connected with said bridge-wall, and the fan or blower for forcing the smoke through said pipe into said bridge-wall and thence out through the openings in the hollow grate-bars, substantially as described.

In witness whereof we hereunto subscribe our names this 18th day of December, A. D. 1886.

FRANK DOYLE.
GEORGE W. CARSON.

Witnesses:
GEORGE P. BARTON,
WM. M. GILLER.