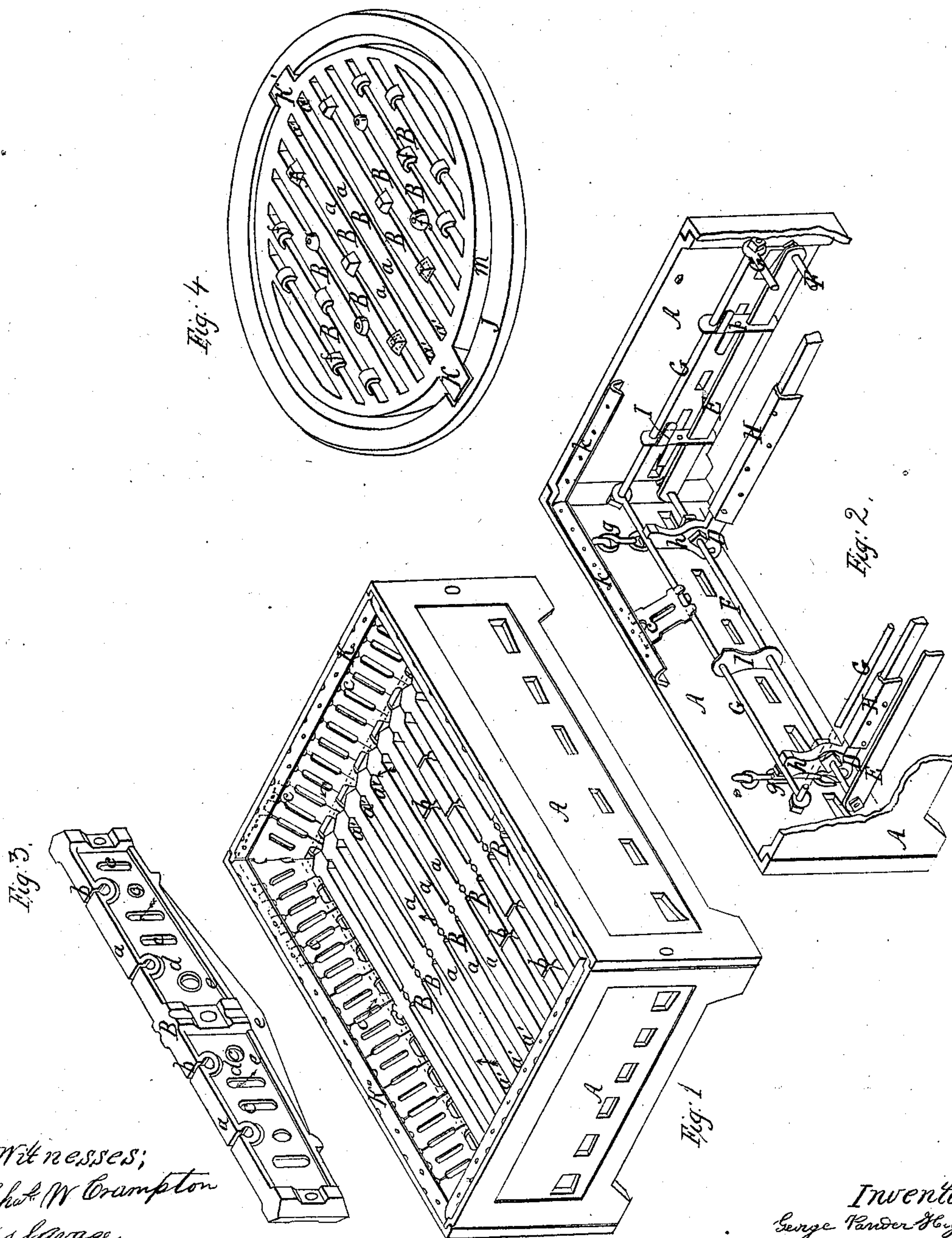


*G. Vander Heyden,
Furnace Grate.*

N^o 40,781.

Patented Dec. 1, 1863.



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UNITED STATES PATENT OFFICE.

GEORGE VANDER HEYDEN, OF TROY, NEW YORK.

IMPROVEMENT IN GRATES FOR STOVES AND FURNACES.

Specification forming part of Letters Patent No. 40,781, dated December 1, 1863.

To all whom it may concern:

Be it known that I, GEORGE VANDER HEYDEN, of the city of Troy, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements on Furnace-Grates and Furnace-Bars; and I do hereby declare that the following is a full, and exact description of the same, reference being had to the annexed isometrical perspective drawings, and to the letters of reference marked thereon, making part of this specification, in which—

Figure 1 is a view of the improved grate-bars as duly arranged in the fire-box of a furnace for use. Fig. 2 is a view of a furnace-box with the grate-bars removed. In order to show the manner of constructing and arranging the oscillating frame upon which the grate-bars ride, one side and end only of the frame is shown. The other side and end is constructed in the same manner. Fig. 3 is a detached view of one of the grate-bars, showing the manner of constructing the face of the bar in two or more sections; and Fig. 4 shows the manner of connecting grate-bars by hollow bridges or ties.

The same letters refer to like parts in each of the figures.

The nature of my invention consists in so constructing the face sides of a series of fire-grate bars that they shall have, respectively, graduated tapering forms, and such a degree of taper form of face is given, respectively, to the bars of the series as to produce, respectively, graduated air-draft spaces between the bars of said series, when they are duly arranged in a fire-box for use, the degree of taper being greatest on the central bars of the series, less on the bars adjacent to the central bars, and least on the end or side bars of the series, in the manner substantially and for the purposes as hereinafter fully described and shown; and it also consists in arranging, in combination with the improved bars above described, vertical or inclined auxiliary side grates or bars, in the manner substantially as hereinafter shown and described; and it also consists in the manner of connecting two or more fire grate bars by means of hollow or perforated bridges or ties, in the manner as hereinafter fully shown; and it also consists in the combination of certain mechanical parts, applied within the fire-box of furnaces, for the purpose of forming a

frame for holding the grate-bars of the furnace, in the manner as hereinafter described and shown.

The construction of my improvements is as follows: The face sides *a a a* of the series of fire-grate bars *B B B B B*, as seen in Fig. 1, are so proportioned that the width of face shall gradually taper or decrease from about (more or less) the central parts of the bar toward its ends in the manner as shown, and the width of face-surface being so graduated relatively to each bar of the series, or to each set of bars of the series, that the degree of taper shall be greatest on the central bars of the series, less on the bars adjacent to the central bars, and least on the end or side bars of the graduated series. The extreme side bars used with this graduated series of bars have no taper form of face. This manner of constructing fire grate bars allows them, when duly arranged in the fire-box for use, to present the largest spaces for air-draft to the burning fuel at the ends and sides of the fire-grate, and from thence the air spaces gradually decrease inward to the central parts of the fire-grate, where the air-spaces become the least; and further, this manner of constructing a fire-grate so proportions the admission of air-draft to the fire that the combustion of the fuel is made equal and more perfect over the whole grate, the defective combustion heretofore had at the sides of fire-grates is removed, and the too rapid combustion at the central parts of the old form of grate is checked, and the result is an even more perfect combustion of the fuel over the entire grate surface.

For some furnace-boxes, owing to the arrangement of the exit-flue, I have constructed the faces of the central series of fire-bars so as to taper from front to near the back end, so as to obtain the greatest air spaces at the front and front sides of the grate, and the least at or near the back side, and obtained the same good results therefrom, as the principle of constructing the grate-bars with respectively graduated tapering forms or faces is still used.

Fig. 3 is a detached view of one of the grate-bars, and shows the manner of forming the face of the bar into two or more sections by means of slots *b b*, extending across and into its face to the opening at its bottom, as shown,

thus separating the face of the bar into sections.

The object of this improvement is to allow the face of the bar, always the most affected by the heat, and expanding more than the other parts of the bar, to expand into these slots, thereby correcting that tendency of the bar to deflect or warp upward in its central parts, or warp laterally. The main body *d* or web of the bar is constructed with openings *c c c* through the bar, and with flanges *e e e* at the bottom of the bar, for the purpose of gaining lightness with strength, and assisting to prevent deflection of the grate-bar by heat, and also secure a more free circulation of air through and around the grate-bars, thus keeping the bars cooler and heating the draft-air hotter before reaching the fire than is attained by the old form of solid fire-grate bar.

A A, Figs. 1 and 2, represent the fire-box of a furnace. D D, Fig. 2, are cross-bars, upon which ride the grate-bars. B B B in Fig. 2, part of one side and end of the frame for holding the grate-bars, is not all shown; but the side and end not fully shown is constructed precisely like the side and end that is shown. Each end of the cross-bars D D is provided with arms *h h*. The cross-bars are kept in position to each other by the rods F F, passing through them, and at the ends of these rods are arranged auxiliary cross-bars E E, held in position by screws and nuts. This frame is suspended within the fire-box by means of hooks or chains *g g*, as shown, or their equivalents, so as to allow the grate a sufficient oscillating motion, when cleaning the fires, to assist in freeing the grate-bars from ashes and clinkers. Upon the tops of the arms *h h* are placed the saddle-bars G G G G, and secured in position by the tie-plates I I. Upon these saddle-bars ride the auxiliary inclined grates or bars C C C. H H are cap-plates upon the cross bars. This manner of arranging and supporting the auxiliary inclined fire-bars C C in combination with the horizontal fire-bars B B B, as described, admits of easy removal of worn-out bars, and their replacement by new bars, without disturbing the sound bars of the grate.

Fig. 4 shows the method of uniting two or more fire-grate bars by means of hollow or perforated bridges or ties *f f f*, cast upon the faces of the bars, substantially as shown, for the purpose of connecting two or more grate-bars without injuriously deflecting the air-draft between the grate bars. Fig. 4 also shows the grate as arranged so as to have its surface in eccentric position within and relative to the frame J, for the purpose of obtaining a greater air-draft space at the front be-

tween the grate and frame and the least at the back between the grate and frame.

k k k k are perforated bars for the purpose of holding the auxiliary grate-bars C C in position, as shown.

I am aware that fire grate bars have been heretofore connected by solid bridges between the bars and not rising above the face of the bars. Therefore I lay no claim to such manner of connecting fire-grate bars; and further, in relation to the oscillating frame, as before described, for holding the fire-grate bars B B and C C, its construction and arrangement is such as to admit of a free oscillating motion in all horizontal directions and in any direction necessary to aid in freeing the grate from ashes and clinkers.

Having fully described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. A series of fire-grate bars, B B B B, when the face sides of said series of bars are constructed in respectively graduated tapering forms, and such a degree of taper form of face being given respectively to the bars of the series as to produce, when the bars are properly arranged for use, respectively graduated air-draft spaces between the bars of said series, in the manner substantially as herein described and shown, and for the purposes specified.

2. In combination with the series of fire-grate bars B B B B, as herein described, the use of inclined auxiliary fire-grate bars C C C C, so arranged in reference to the bars B B B B as to be easily detached from said bars without disturbing the same, when necessary to renew a bar or bars, in the manner as herein shown and set forth.

3. The manner of uniting two or more fire-grate bars by means of the hollow or perforated bridges or ties *f f f*, cast upon the faces of the bars, in the manner and for the purpose substantially as herein shown and described.

4. The combination of the cross-bars D D, the auxiliary cross-bars E E, the rods F F, the saddle-rods G G G G, and the tie-plates I I I I, when arranged and suspended within the fire box of a furnace by means of chains or hooks, or their equivalents, in the manner substantially as herein shown, and for the purpose set forth.

5. In combination with the inclined auxiliary fire-grate bars C C C C, the perforated bars *k k k k*, for the purposes as herein shown.

GEORGE VANDER HEYDEN.

Witnesses:

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