W. RANDALL.

Grate Bar.

No. 86,862. Patented Feb. 9, 1869.

Fig. 1.

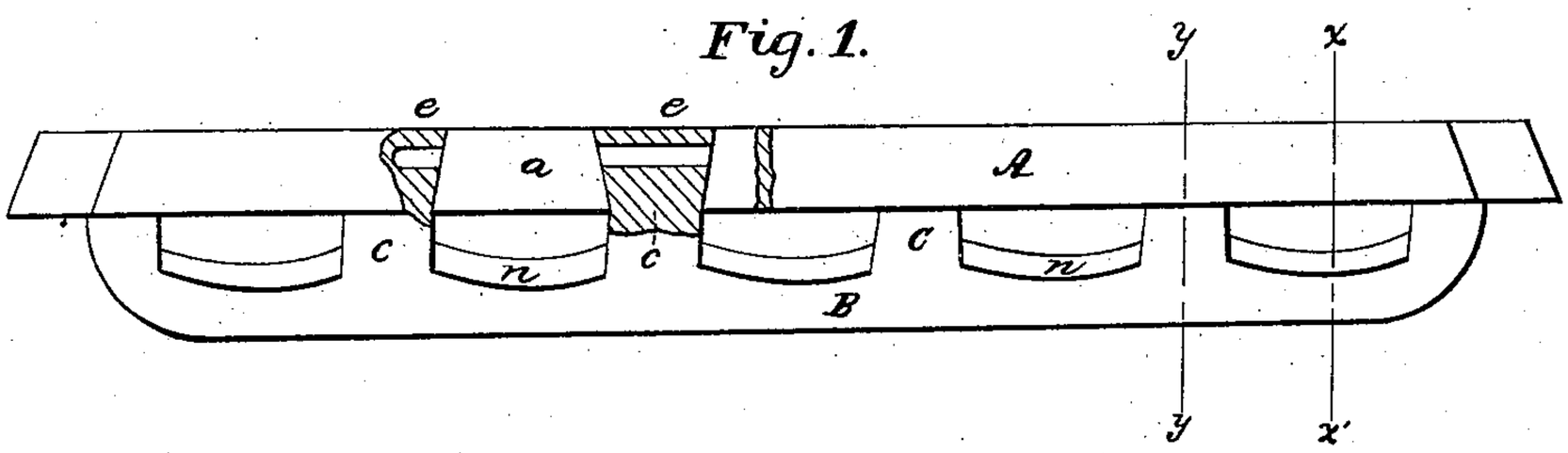


Fig. 2.

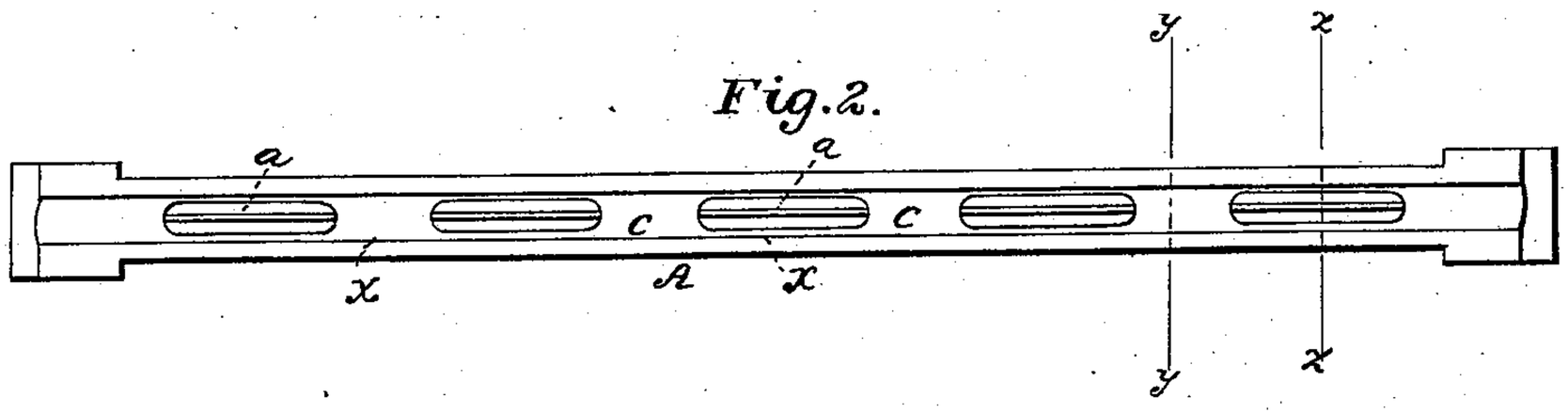


Fig. 3.

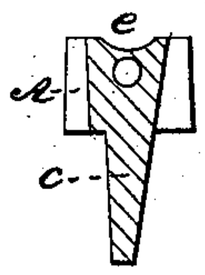
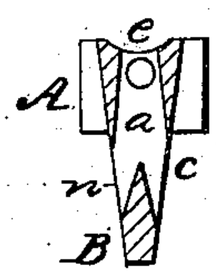


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM RANDALL, OF SALEM, MASSACHUSETTS.

IMPROVEMENT IN GRATE-BARS.

Specification forming part of Letters Patent No. **86,862,** dated February 9, 1869.

To all whom it may concern:

Be it known that I, WILLIAM RANDALL, of Salem, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Grate-Bars; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, and to the letters of reference marked thereon, like letters indicating like parts wherever they occur.

To enable others skilled in the art to construct and use my invention, I will proceed to describe it.

My invention consists in a novel construction of a grate-bar for use in furnaces, whereby the air is allowed free access to the burning fuel over the entire surface of the grate, the clogging of the bars more fully prevented, and the bar rendered less liable to be burned out.

Figure 1 is a side elevation of a bar, with a portion broken away to show the interior. Fig. 2 is a top-plan view. Fig. 3 is a transverse vertical section, taken on the line *y y* of Figs. 1 and 2. Fig. 4 is a similar view, taken on the line *z z*, Figs. 1 and 2.

My improved bar is made of cast-iron; and consists of an upper or main portion, A, which is made straight, of any required length, and nearly rectangular in cross-section, with a groove or concavity extending along its upper surface, as represented in Figs. 2 and 3. Through this part A a series of vertical openings or air-passages; *a*, is formed, as shown in Figs. 2 and 4, which passages are wider at bottom than at the top, as represented in Fig. 4. Between these passages *a* a series of solid portions, *c*, is left, which extend down some distance below the lower side of the part A, where they are united to a second part or bar, B, which extends the entire length of the bar, with the exception of a short space at each end, as represented in Fig. 1. Through each of these solid portions *c* a hole or air-passage, *e*, extends longitudinally, as shown in Fig. 1, where the side of the part A is broken away, these longitudinal passages *e* thus connecting the vertical passages *a* all through the bar.

The upper edge of the lower part, B, is beveled between each of the connecting parts *c*, as represented at *n* in Figs. 1 and 4, thus forming a comparatively thin or narrow edge, upon which the ashes and clinker that may fall through the passages *a* cannot lodge or accumulate to choke up the air-passages. By this means, also, the lower portion of the passages *a* on each side of B is enlarged, so as to facilitate the discharge of the ashes, &c., from above.

The part B, being thus constructed and united to the part A by the necks or solid portions *c*, serves to brace the upper portion, A, and prevents it from bending or warping vertically when hot, the whole thus forming, as it were, a trussed or braced bar.

By this method of constructing a grate-bar it will be seen that a very free admission of air from below is permitted, the air rushing up through the spaces A, as well as between the adjoining bars, over the whole surface of the grate, and is thus thoroughly distributed and brought into immediate contact with the burning fuel over its whole surface. By this means, also, the air is brought into contact with a large amount of the surface of the bar, by which two beneficial objects are accomplished at the same time: First, the bar is cooled and prevented from burning out as rapidly as it otherwise would; and, second, the cold air is heated by its contact with the surface of the hot bar as it passes through the openings *a* and along the passages *e*, and is thereby in a better condition for supporting combustion.

As the fuel is consumed, the ashes and débris produced discharge themselves through the passages *a* and between the bars, the peculiar form of the passages *a* permitting anything that will enter them from above to pass out freely below.

Experiments have demonstrated the fact that a grate composed of bars constructed on this plan will last longer, clear itself better, and consume the fuel more economically than those heretofore in use.

I am aware that perforated bars have before been used in grates of various kinds, and therefore I do not claim such irrespective of my special plan of construction; but,

Having thus described my invention, what I claim is—

A grate-bar consisting of the parts A and B, constructed and united as herein described, with the air-passages *a* and *e*, arranged in the manner set forth.

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Witnesses:

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