A. D. Puffer,

Furnace-Grate Bar.

No. 46,939. Patented Mar. 21, 1865.

Fig. 1

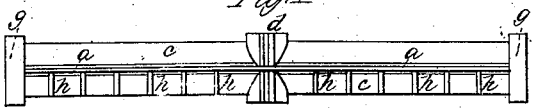


Fig. 2

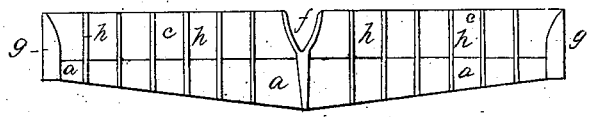


Fig. 3

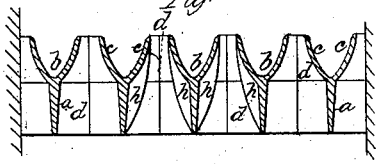
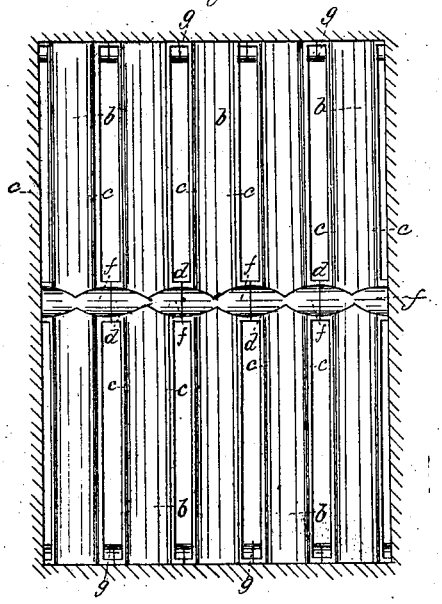


Fig. 4



Witnesses:
F. Gould.
N. C. Lombard.

Inventor.
A. D. Puffer.
by his Atty.
W. B. Crosby.

UNITED STATES PATENT OFFICE.

A. D. PUFFER, OF SOMERVILLE, MASSACHUSETTS.

IMPROVEMENT IN GRATE-BARS.

Specification forming part of Letters Patent No. **46,939**, dated March 21, 1865.

To all whom it may concern:

Be it known that I, A. D. PUFFER, of Somerville, in the county of Middlesex, in the State of Massachusetts, have invented certain new and useful Improvements in Grate-Bars; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

Of said drawings, Figure 1 represents a reverse plan of a single grate-bar embodying my invention; Fig. 2, a side view thereof; Fig. 3, a cross-sectional view of an assemblage of several bars similar to that shown in Figs. 1 and 2, and Fig. 4 is a top plan of the bars shown in Fig. 3.

The object of my invention is to obtain a durable grate-bar with the least weight of metal and at a minimum of cost, and in the peculiarities of construction herein shown and described by which I obtain this desirable object my invention consists.

A grate-bar made in accordance with my invention has a central web, which is very thin and deep in proportion to the length of the bar, and which bifurcates at from one-half to two-thirds of the entire depth of the bar from the bottom thereof at the middle of its length, both sides spreading apart, so as to form a deep U or arched shaped trough open at the top and extending the whole length of the bar, the upper edges of the trough being thinned away or sharpened toward the sides thereof. This conformation effects several things, all of which conduce to the durability of the bar. First, the trough is to be filled with ashes or other suitable good and cheap non-conductor of heat, so that but little or no contact can be had between the bars and the incandescent fuel which they support above them; second, the tops of the bars being formed into blunt edges instead of leaving considerable surfaces, said edges are kept cool, even though the hot fuel rests thereupon by reason of the passage of the air along the sides of the grate and in contact with the top edges thereof; third, the presence of the ashes in the troughs and the slight metallic surface for the hot fuel prevents formation and accumulation of "clinkers" upon the grates.

a in the drawings represents the central web; *b*, the fork where the web divides into two branches or sides, *c c*. When the bars are long, and are therefore liable to side deflection consequent upon the pressure of the fuel, the bars, as usual, have projections on their sides in the middle of their length, by which each of the series of bars is made to touch and support that next adjacent on either side; but to avoid having at such places any considerable surface of metal for the fuel to rest upon for the reasons before set forth, I make in these projections a cross-groove, *f*, communicating with the long groove formed in each bar by its sides *c c*. The pieces *g* at each end of each bar which, with the projections *d*, serve to keep the grates at proper intervals apart are beveled off at their tops, as best seen in Fig. 2, for the same purpose that the edges of the sides *c* are beveled or brought nearly to an edge.

The grate-bar, as already described, may be further improved by the addition thereunto of the stay-pieces *h*, which are light, thin projections which brace the parts *c* and *a* and increase the strength and rigidity of the grate-bar in a much greater proportion than they add to its weight. Indeed, the material entering into them may be deducted from the grate, which will then be stronger than if said material had been otherwise disposed throughout the grate and the pieces *h* had been omitted; but these pieces *h* have another function than that of adding to the strength of the grate-bar. It is to keep the bar cool by increase of its radiating-surface, and consequently to heat the air which maintains combustion as it passes through the grate to the fuel.

In Fig. 3 the middle grate-bar is shown as provided with these braces *h* on each side, while other bars are shown as having them on one side only, and still others without the braces.

Though in the drawings each grate-bar is represented as a single casting complete in itself, it will be understood that such bars may be cast united into sets of several bars, and also that when desirable two or more parts for contact, like *d*, may be located along the length of the bar.

Each side *c* of each bar is made with a curvature in cross-section, as seen in the drawings, so that by the union of the two parts *c* at their lower edges they form a reversed arch,

and this construction has a manifest advantage over a recessed bar made without such curvature of the sides, as this arching form conduces to the greatest possible resistance of the bar from pressure above the grate.

I am aware that bars have been made with grooves or recesses for containing ashes or other non-conducting material, and that such bars have been made of a V shape with straight or flat sides, and also with square or rectangularly-shaped recesses; also, that such bars have sometimes had cross-grooves in the lateral extensions or connections thereof; but my construction embodies further improvements upon the recessed bar and upon these last-named peculiarities of construction, which improvements add very materially to the strength and duration of the bar. The arched form of the sides or walls of the recess prevents rupture either from weight or heat. The sharpening or beveling the upper edges of the sides *c* prevents adhesion of the coal, and the lateral radiators *h*, by exposing a large surface to the contact of the cool air rising through the grate, not only serve to strengthen the bar, but conduce to keep the whole surface of the bar comparatively unaffected by the heat from the incandescent fuel resting upon the grate.

I claim—

1. In a recessed bar the reversed arched form given to the bifurcated portion thereof, for the purpose described.

2. Sharpening or beveling the surfaces of the bar upon which the coal is supported into thin edges, for the purpose set forth.

3. The radiating braces *h*, substantially as shown and described.

A. D. PUFFER.

Witnesses:
J. B. CROSBY,
FRANCIS GOULD.