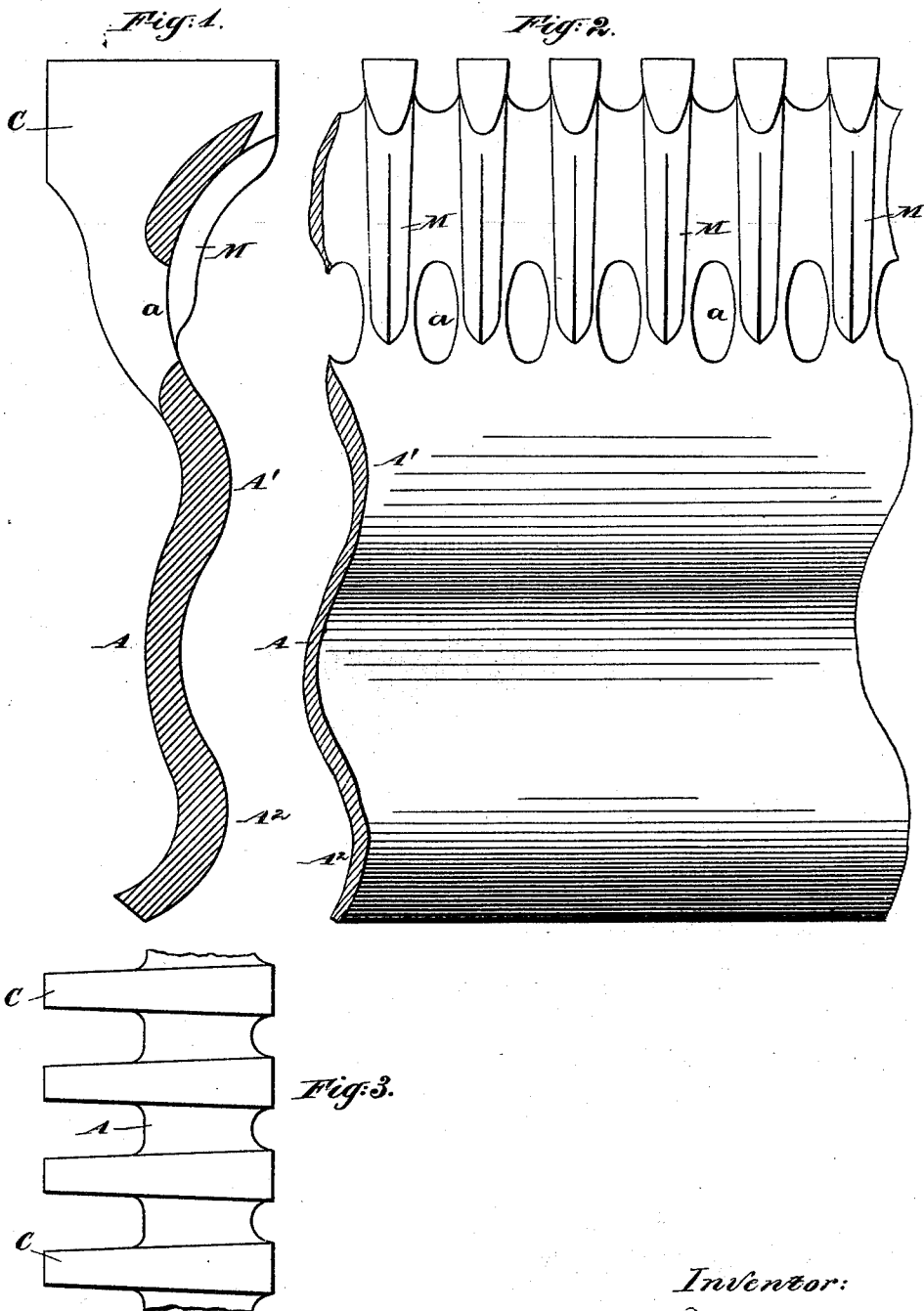


(No Model.)

E. GIBSON.  
GRATE BAR.

No. 509,523.

Patented Nov. 28, 1893.



Witnesses:  
Charles R. Searle  
H. A. Johnstone.

Inventor:  
Edward Gibson  
by his attorney  
Thomas Drew Peterson

# UNITED STATES PATENT OFFICE.

EDWARD GIBSON, OF JERSEY CITY, NEW JERSEY.

## GRATE-BAR.

**SPECIFICATION** forming part of Letters Patent No. 509,523, dated November 28, 1893.

Application filed January 25, 1893. Serial No. 459,638. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD GIBSON, a citizen of the United States, residing in Jersey City, in the county of Hudson, in the State of New Jersey, have invented a certain new and useful Improvement in Grate-Bars, of which the following is a specification.

I have in Letters Patent to me, dated December 1, 1891, No. 464,185, set forth a construction of grate with provisions for moving the alternate sections. I will describe my present invention as applied to that construction.

The several grate bars are of liberal depth, say about seven inches. The metal of each is waved or corrugated to give great stiffness longitudinally, with moderate thickness of metal. The top is notched or toothed on the side which overhangs. The corrugations are thickened on the opposite side. There is a difficulty in the liability of the metal to warp transversely,—in the vertical direction. My present invention contributes to avoid this evil. I provide a number of apertures through the bars, one for each tooth. The currents of air moving through them, which is certain to obtain in practice from the inequalities in the density at different points in the layer of fuel on the grate, contribute to the coolness of the metal and the durability of the bars under all ordinary conditions. I produce vertical ribs extending up and down transversely of the corrugations, putting a rib between each aperture and the next. These ribs by stiffening the bars vertically co-act with the apertures which reduce the conduction of heat downward and greatly diminish the tendency of the bar to warp vertically without materially increasing the tendency of the bar to warp longitudinally.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention.

Figure 1 is a vertical section. Fig. 2 is a side elevation, and Fig. 3 is a plan view.

Similar letters of reference indicate corresponding parts in all the figures.

As in the patent of 1891, referred to, each bar has a notched upper surface and a deep depending longitudinal flange or web A extending from end to end, corrugated longitudinally, as indicated by A', A<sup>2</sup>. The corrugations strengthen the bars and prevent their warping longitudinally. This corrugated web is located at the mid-width of the bar. The top of the bar is wider, and is notched. The metal which overhangs on each side is formed with teeth C, the roots of which extend down, as shown. I provide apertures *a* in the corrugated web near the top, lying between the roots of the teeth, one aperture for each tooth. These allow the air to circulate freely from one side to the other of the bars. The movement of air through these apertures carries away the heat and keeps the bars cool.

M, M, are vertical ribs, formed in the casting on the side opposite to the teeth, extending up and down, and flowing into the surface of the web in the vicinity of the apertures *a*. These ribs are V-shaped in cross-section. They add but little to the weight of the bars, but contribute greatly to the stiffness vertically, and greatly prolong the lifetime of the bars, especially when the furnace is subjected to hard firing.

The corrugations or waves A', A<sup>2</sup>, which present their swelled or rounded faces to the right in Fig. 1, are thicker than the intermediate portion of the web which presents its swelled or rounded face to the left in that figure. The thickening of the parts A', A<sup>2</sup>, gives greatly increased strength and stiffness by counteracting the tendency to side warping. It is well known that repeated heating and cooling tends to permanently lengthen grate-bars. I have observed a tendency in bars having the upper surfaces toothed on one side to curl longitudinally in the direction to close the teeth together. I believe this effect is due to difference in the temperature by the contact of the glowing fuel with the toothed upper surface of the bar, the side which is toothed being more cooled by the ascending currents of air, and consequently being less expanded by the repeated heatings and coolings. My bar, though there are slight indentations on the opposite edge of the top, is toothed mainly on one side, the left side in Fig. 1. There is consequently a tendency to expansion on the right side. The thickening

of the corrugations A', A<sup>2</sup>, below on the right side counteracts this tendency and keeps the bar straight for a much longer period than would otherwise result.

- 5 Modifications may be made without departing from the principle or sacrificing the advantages of the invention. There may be more than two corrugations, A', A<sup>2</sup>, or one corrugation may serve. There may be a less  
10 number of the apertures *a*. Part of the vertical ribs M may be omitted and only those retained which correspond to alternate teeth.

I claim as my invention—

- 15 1. A grate having the top notched across to divide the surface into transverse ridges which project on one side, forming teeth C, and provided with ribs M extending up and

down in the plane of the said teeth and on the opposite side of the grate bar, and having a deep web A', A<sup>2</sup>, corrugated longitudinally 20 and perforated, all substantially as herein specified.

2. A grate-bar, having the top toothed on one edge, as indicated by C, and having a deep web corrugated longitudinally, with the 25 corrugations A', A<sup>2</sup>, on the side opposite to the teeth, thickened, as herein specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

EDWARD GIBSON.

Witnesses:

CHARLES R. SEARLE,  
H. A. JOHNSTONE.