A. O. DENIO.

GRATE-BARS.

No. 192,744. Patented July 3, 1877.

FIG. 1.

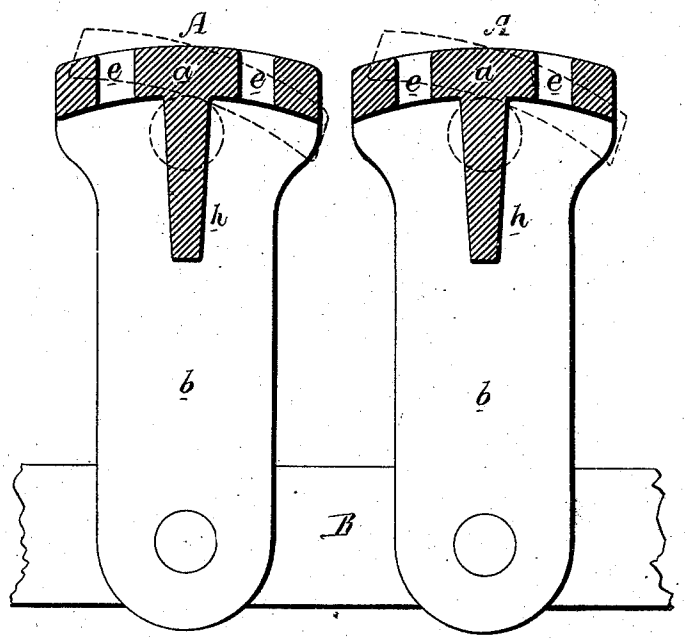


FIG. 2.

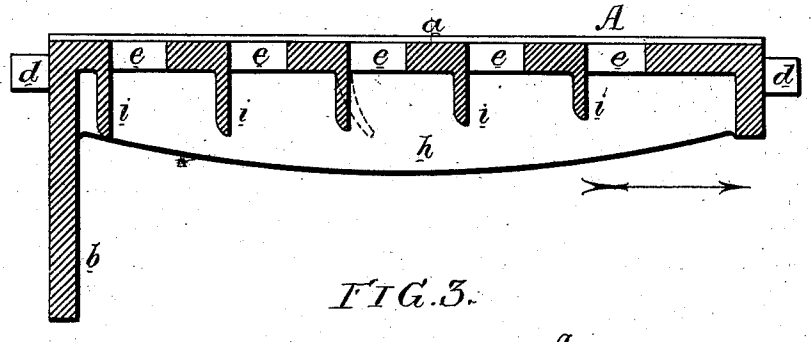
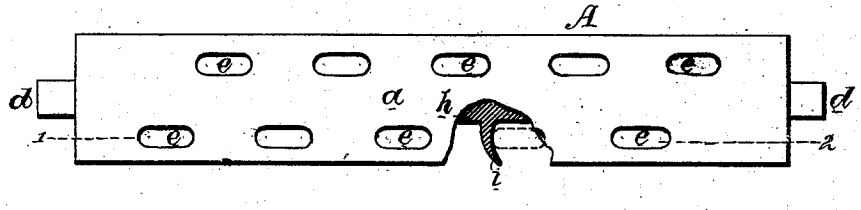


FIG. 3.



Witnesses, Harry Smith
Thomas N. Ilvain

Inventor.
Asa O. Denio
by his Attys
Howson and Son.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ASA O. DENIO, OF WILMINGTON, DELAWARE.

IMPROVEMENT IN GRATE-BARS.

Specification forming part of Letters Patent No. **192,744**, dated July 3, 1877; application filed April 9, 1874.

To all whom it may concern:

Be it known that I, ASA O. DENIO, of Wilmington, county of New Castle, State of Delaware, have invented certain Improvements in Grate-Bars, of which the following is a specification:

The object of my invention is to effect the thorough combustion of fuel in furnaces by means of grate-bars A, having openings *e* and vanes *i*, combined with trunnions or journals *d*, which permit the bars to be rocked for clearing the openings for the passage of air directed to them by the vanes, the said bar being constructed, as described hereinafter, and as illustrated in the vertical section, Figure 1, longitudinal section, Fig. 2, and plan view, Fig. 3, of the accompanying drawings.

Each bar A is, in the present instance, rounded transversely at the top *a;* but, if desired, it may be straight, and has at each end a journal or trunnion, *d*, adapted to a bearing in the furnace, to which the bars are applied.

At one end of each bar, and forming part of the same, is a pendent arm, *b*, the arms of the series of bars being connected together by a rod, B, to be operated by the attendant engineer through the medium of such appliances as the character of the boiler may suggest.

In the top *a* of the bar are two rows of elongated openings *e*, one row on each side of the strengthening-web *h*, and at one end of each opening a deflector, *i*, is cast on the bar, as shown in Figs. 2 and 3.

Supposing the bars to be hung to the furnace of a locomotive-boiler, moving in the direction of the arrow, Fig. 2, the deflectors must necessarily act as vanes, and direct forcible currents of air upward through the openings *e*, as well as upward between the bars, thus insuring a thorough combustion of fuel, providing the said openings are maintained clear of obstructions by rocking the bars at intervals.

The deflectors may, if desired, be inclined or curved, as shown by dotted lines. When the bars are used in connection with stationary boilers or furnaces they should be so arranged that the vanes will be opposed to the air entering the ash-pit for supporting combustion, or to a blast introduced into the ash-pit.

I neither claim the deflectors *i* nor grate-bars provided with trunnions, so that they may be rocked in the bearings; but

I claim as my invention—

The within-described bar, having the central longitudinal web *h*, longitudinal openings *e* in the top, and on each side of the web-vanes *i*, projecting from each side of the latter, and trunnions *d* at the ends of the bar, all constructed as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ASA O. DENIO.

Witnesses:

A. H. P. BARR,

JAMES MARTIN, Jr.