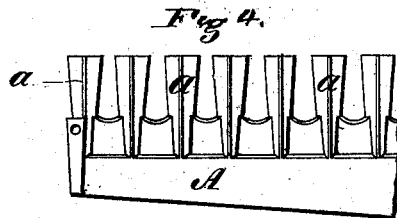
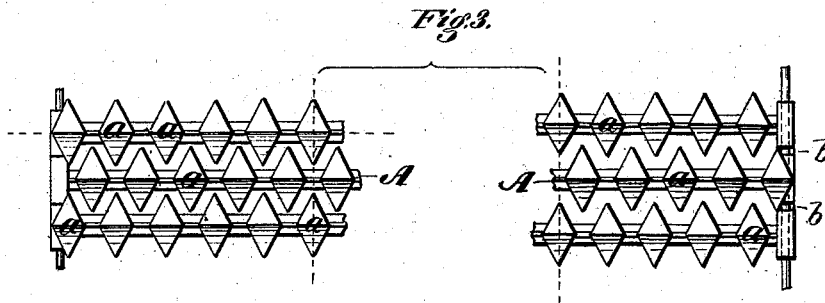
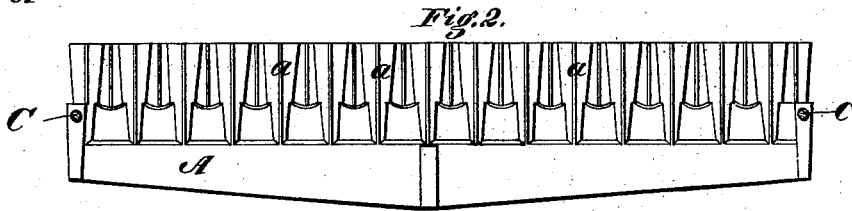
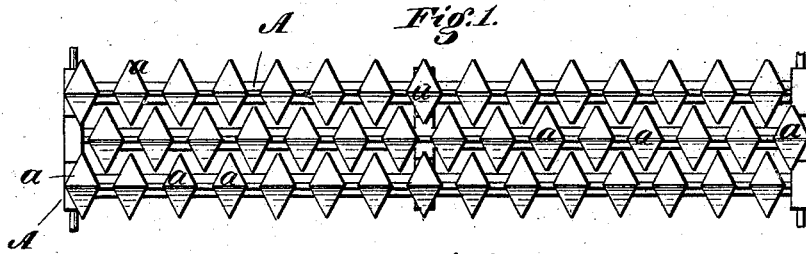


J. R. KELLY.  
GRATE-BAR.

No. 193,093.

Patented July 17, 1877.



*Witnesses:*  
*Donn A. Twitchell*  
*Will H. Dodge*

*Inventor:*  
*John R. Kelly*  
*By his attys.*  
*Dodgeton*

# UNITED STATES PATENT OFFICE.

JOHN R. KELLY, OF SPRINGFIELD, OHIO, ASSIGNOR OF ONE-HALF HIS RIGHT  
TO P. P. MAST AND C. O. GARDINER, OF SAME PLACE.

## IMPROVEMENT IN GRATE-BARS.

Specification forming part of Letters Patent No. **193,093**, dated July 17, 1877; application filed  
May 21, 1877.

*To all whom it may concern:*

Be it known that I, JOHN R. KELLY, of Springfield, in the county of Clarke and State of Ohio, have invented certain Improvements in Grate-Bars, of which the following is a specification:

My invention relates to improvements in that class of grate-bars which have upwardly-projecting studs to sustain the fuel and distribute the air thereto, and its object is to admit of the air-spaces being increased or diminished in size uniformly in all directions, in order to adapt the grate for coarse or fine fuel, as required; and to this end the invention consists in making the studs of a diamond shape, or similar quadrantal form, and arranging them with their axes standing one in line with and the other at right angles to the bars, as shown.

Figure 1 represents a top plan view of my grate; Fig. 2, a side elevation of the same; Fig. 3, two plan views of the grate, one showing it adjusted for fine and the other for coarse fuel; Fig. 4, a side elevation of one of the bars.

A represents the web or body of the bars, and *a* the upwardly-projecting studs, cast upon the outer edges of the web. As shown in the drawings, the studs are each made of a diamond shape in horizontal section, and of decreasing size from the top downward, in order to permit the free escape of cinders falling between them.

The studs are arranged upon the bars cornerwise, in such position that the two opposite overhanging corners or angles of each stud are in the same transverse line; or, in other words, they stand in such position that two horizontal lines drawn through the two axes or greatest diameter of either stud, would stand, one in line with and the other at right angles to the web or bar, as indicated by the dotted lines in Fig. 3.

The studs are made of such size that their corners overhang the sides of the web considerably, and are located at such points on the webs that when the latter are placed in position, side by side, the overhanging corners or angles on one bar or web enter between those

of the next bar, as shown in the drawing, so that the surface of the grate presents a series of uniform diagonal or oblique air-spaces between the studs. Owing to the peculiar shape and arrangement of the studs, changing the distance between them enlarges or diminishes the air-spaces uniformly, so that by simply adjusting the bars the grate may be adapted for coarse or fine fuel, as required. In practice I prefer to unite the series of bars in each grate by means of bolts C, through their ends, and to maintain the proper distance between them by means of washers *b*, slipped upon the bolts—washers being introduced or removed as required; but any other arrangement may be used to facilitate the adjustment.

I am aware that grate-bars have been made with inclined overlapping diamond-shaped faces on the upper edge, and that a series of such bars have been arranged to reciprocate endwise past one another, but they differ from my invention in that the faces have no air-spaces between them; that they do not present continuous air-spaces of uniform width, and that they are not arranged to admit of the air-spaces being varied uniformly in size.

Having thus described my invention, what I claim is—

1. The combination, substantially as shown and described, of the series of grate-bars A, each bar having on its top a series of upright quadrangular studs, *a*, arranged with their transverse axes at right angles to the bar, and the series of bars arranged with the studs of each opposite the spaces of the next, as set forth.

2. The series of parallel laterally-adjustable bars A, having the series of quadrangular studs arranged diagonally thereon, in the manner shown and described, and for the purposes set forth.

3. In combination with the bars, having the studs constructed and arranged as shown, the bolts C and washers *b*.

JOHN R. KELLY.

Witnesses:

J. B. CHRISTIE,  
T. J. KIRK-PATRICK.