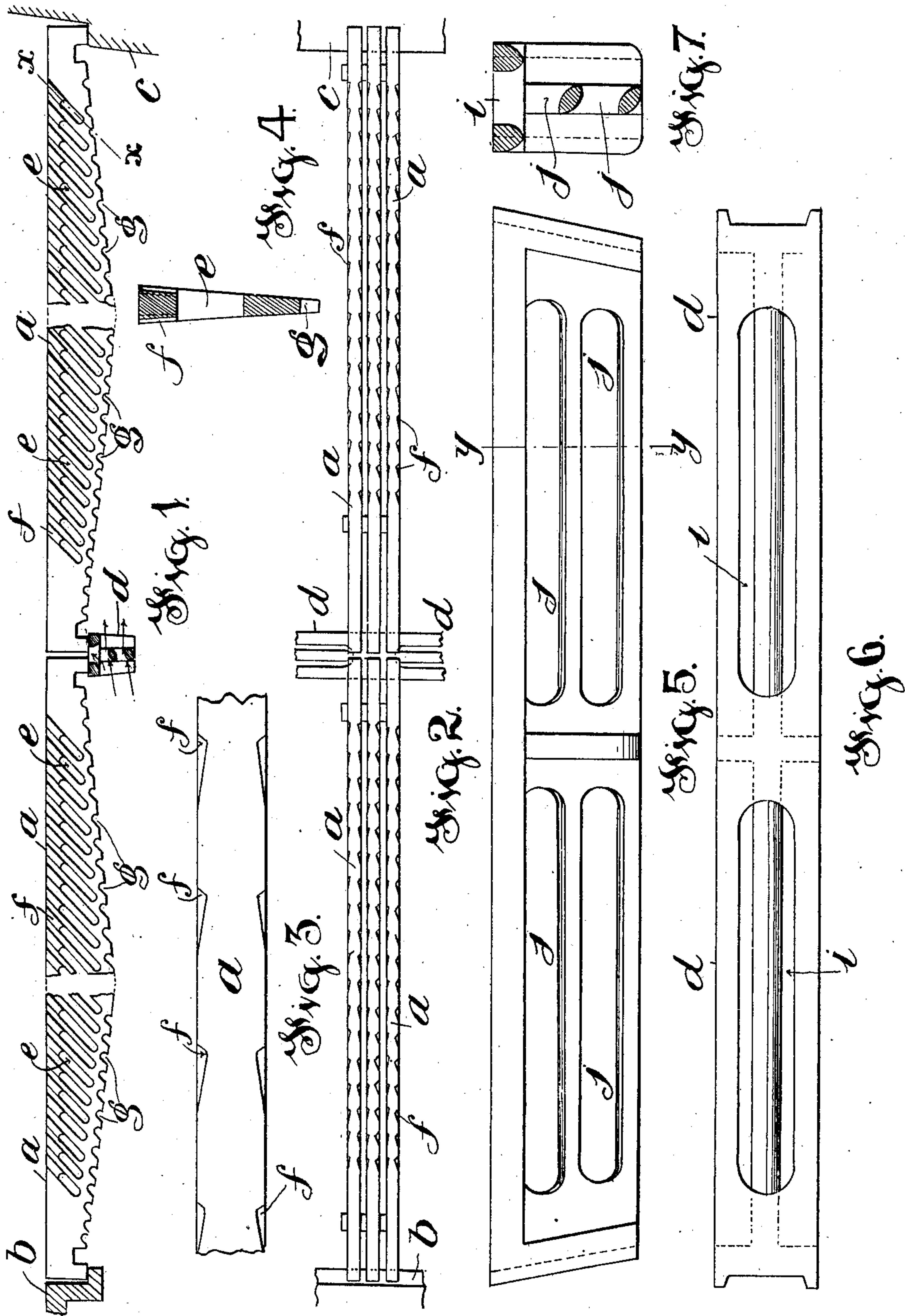


No. 830,625.

PATENTED SEPT. 11, 1906.

J. TURNER.  
FURNACE GRATE.

APPLICATION FILED SEPT. 19, 1904.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

JAMES TURNER, OF BLACKBURN, ENGLAND.

## FURNACE-GRATE.

No. 830,625.

Specification of Letters Patent.

Patented Sept. 11, 1906.

Application filed September 19, 1904. Serial No. 225,109.

*To all whom it may concern:*

Be it known that I, JAMES TURNER, a subject of the King of Great Britain and Ireland, and a resident of Blackburn, England, have  
5 invented certain new and useful Improvements in Furnace-Grates, of which the following is a specification.

This invention has for its object to provide a form of grate for steam-boiler furnaces  
10 whereby the air for combustion which passes through the grate is more evenly distributed, whereby the life of the grate is greatly prolonged, and whereby combustion is caused to be more uniform over all parts of the grate  
15 than heretofore.

To that end my invention consists, essentially, in the employment of fire-bars having a series of grooves or recesses in their opposite sides, which grooves or recesses are by  
20 preference parallel to each other and lie at an angle of about forty-five degrees with the upper surface of the bar and which are of such a shape as to cause the air impinging against them to be directed upward through the fuel.

The invention also consists in the employment of a bearer for the abutting ends of the bars, which is made with openings or slots in  
25 such manner as to allow the air to pass through the bearer instead of having to pass under or above it, thereby keeping the bearer and the bars at that point cool and the fire bright.

Heretofore with the ordinary solid bearer the air has been baffled and has caused the  
35 fire to burn out the bars at points a little in front of and behind the bearer; but with the bearer perforated, as aforesaid, the air is not baffled, but passes in even quantities to all parts of the grate. On account of the solid  
40 character of the bearer it has also caused the fire to be dead at the point where the bars meet; but with the bearer perforated and air capable of passing up through it an even fire is maintained at all points.

Upon the accompanying drawings, Figure  
45 1 illustrates a longitudinal section of a part of a furnace, the grate-bars being shown in elevation; and Fig. 2, a plan, in part, of the improved furnace-grate. Fig. 3 illustrates a  
50 plan, to a larger scale, of a portion of one of the grate-bars, while Fig. 4 illustrates a cross-section of one of the bars on line *x x*. (See Fig. 1.) Fig. 5 illustrates a side, or front, view, and Fig. 6 a plan, of the improved  
55 bearer to a larger scale, while Fig. 7 illustrates a transverse section on line *y y*. (See Fig. 5.)

As shown, the grate is composed of two sets of bars *a a*, supported at the front end of the furnace by the usual dead-plate *b*, by the fire-bridge *c* at the rear end of the furnace, 60 and by the improved bearer *d* at the center. In each grate-bar are by preference a number of parallel slots *e*, arranged diagonally, and in each side face of each bar are grooves  
65 *f*, preferably of the shape transversely shown in Fig. 3. The said slots and grooves lie at an angle of about forty-five degrees to the top of the bar, the slots terminating at points near to the top and bottom edges of the bar and the grooves opening into the said slots at  
70 one end and at the other end to the top edge of the bar. By means of such slots and grooves the bars are kept much cooler than the ordinary bars, and by means of the grooves the air for combustion is divided up  
75 into a number of streams and directed up through the fuel in regular and even quantities, the length and angle of the grooves serving to give the air a prolonged traverse, and thereby heat the air on the one hand and cool  
80 the bars on the other, besides adding to the even combustion of the fuel on the grate. Each bar is also formed with a series of transverse notches or recesses *g* along its lower edge, each recess being inclined rearwardly, 85 so that its edges shall tend to break up the air-currents.

While the grooves and slots are effective along the major portion of each bar, they do not keep the bars cool at the ends where the  
90 two sets of bars abut, the ordinary solid bearer tending to close up the grooves. Therefore to allow air to pass through the spaces between the bars at all points we employ a bearer, such as *d*, (see Figs. 5, 6, and 7,) 95 which is preferably of T-section, with slots *i* in its upper horizontal member and slots *j* in its vertical member, so that the air instead of being baffled and having to pass below the bearer and bring about the rapid burning out  
100 of the bars, as aforesaid, can pass through the bearer and up through the spaces between the bar ends, as shown by the arrows in Fig. 1. In such manner the bars are kept cool at  
105 all points, their lifetime and that of the bearer is greatly increased, and the combustion of the fuel rendered uniform for all parts of the grate, so much so that a considerable saving of the fuel is effected. To cause the  
110 bearer to have a tendency to deflect the air upward, the sides of the slots *j* may be beveled upward. (See Fig. 7.) While prefer-



ring the section of bearer shown, it will be understood that any other section may be used, provided it allows the air to pass through it in the same or a like manner to that shown  
5 in the drawings.

What I claim is—

In a steam-boiler furnace, a grate comprising in combination two sets of fire-bars, each bar of each set having a series of trans-  
10 verse elongated slits in its web with the major axis of each slot at an angle of about forty-five degrees with the upper face of the bar, and each bar also having a series of inclined grooves in each face of its web opening into  
15 the slots at one end and on the top edge of

the bar at the other end, and a bearer for supporting the adjoining ends of the two sets of fire-bars, said bearer being of T cross-section and having longitudinal openings in the vertical and horizontal parts, the openings in  
20 the said horizontal parts being adapted to supply air between the two sets of fire-bars, substantially as and for the purposes set forth.

In witness whereof I have hereunto set  
my hand in the presence of two witnesses.

JAMES TURNER.

Witnesses:

WALTER GUNN,  
JOHN CAMP.