(No Model.)

F. J. ST. JOHN.

GRATE BAR.

No. 515,847. Patented Mar. 6, 1894.

Fig. 1.

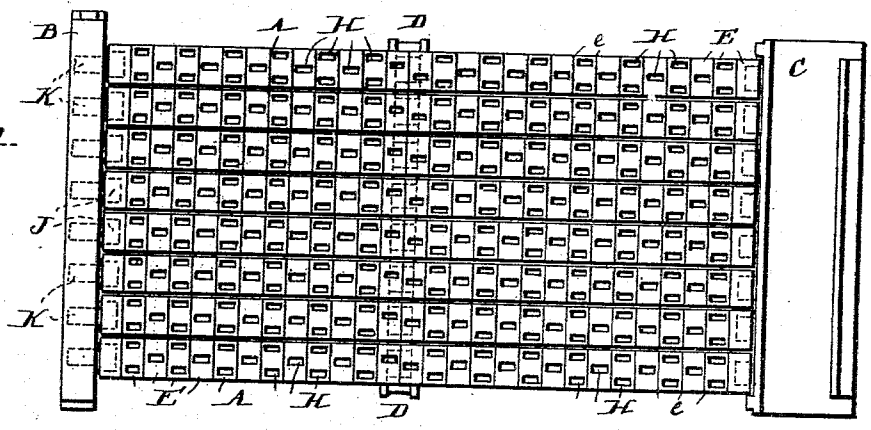


Fig. 2.

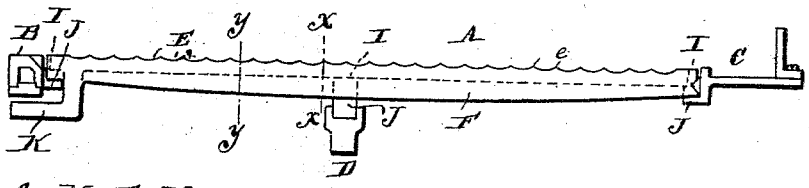


Fig. 3.

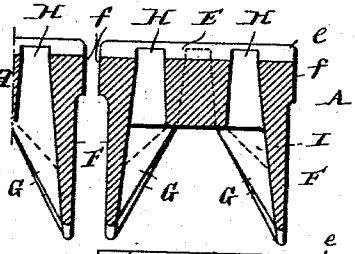


Fig. 4.

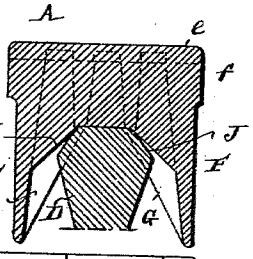


Fig. 5.

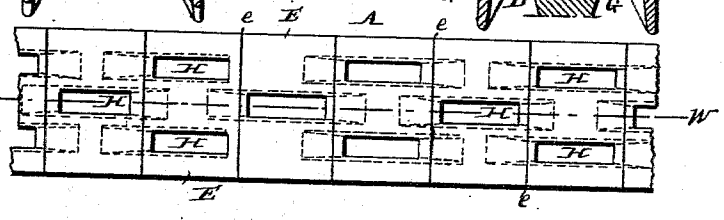


Fig. 6.

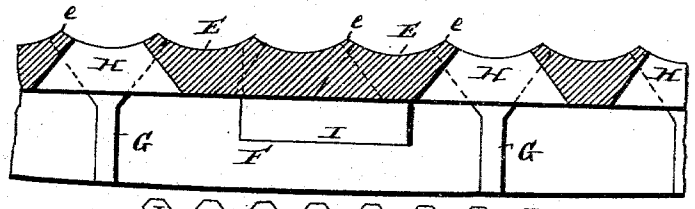


Fig. 7.

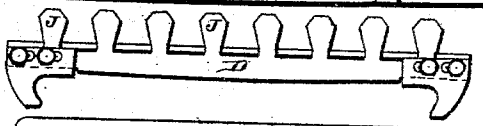
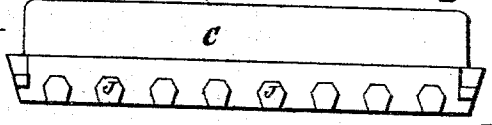


Fig. 8.



Witnesses:
Jesse B. Heller
H. C. Mothersill

Inventor.
Frank J. St. John
By
Attorney.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FRANK JAY ST. JOHN, OF PHILADELPHIA, PENNSYLVANIA.

GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 515,847, dated March 6, 1894.

Application filed June 23, 1893. Serial No. 478,570. (No model.)

To all whom it may concern:

Be it known that I, FRANK JAY ST. JOHN, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Grate-Bars, of which the following is a specification.

My invention has reference to grate bars and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

My improvement comprehends certain features in the construction of shaking grate bars adapted to steam boiler work more particularly, whereby they may be made of great length and by the impartation of a rocking motion be operated at the center as well as at the ends to secure the combined rocking and transverse shifting movement capable of breaking down the clinkers and cleaning the grate of ash and cinders.

My invention also comprehends certain specific improvements in the details of construction which will be fully described when referring to the drawings, in which—

Figure 1 is a plan view of a fire grate embodying my invention. Fig. 2 is a side elevation of same. Fig. 3 is a cross section of a portion of the grate bars on line *y—y* of Fig. 2. Fig. 4 is a cross section of the grate bar and upper part of the center bearer adjacent to the line *x—x* of Fig. 2. Fig. 5 is a plan view of the middle portion of one of the grate bars. Fig. 6 is a longitudinal section on line *w—w* of Fig. 5. Fig. 7 is a front elevation of the center bearer bar; and Fig. 8 is an elevation of the front and rear bearer bars.

The grate is made up of a series of parallel grate bars A supported at each end by bearer bars B and C, and also preferably at the middle as by a central bearer bar D.

The bar A is made flat on its top transversely considered but is formed with a series of transverse grooves E which meet to form transverse edges *e* excellently adapted to support the coal and permit the ready admission of air to it during combustion, and also to act at the corners as knives for breaking down cinders or clinkers when rocked to clean the fires. The cross section of the bar is essentially of inverted U shape, the sides being preferably at right angles to the top, and projecting downward to form girder webs F, F. The upper edges of these webs are preferably thickened as at *f* so as to give more clearance at the lower part between adjacent bars to insure easy clearance of ash and cinders, and also to form a liberal passage for air for combustion, or in other words forming a funnel shape whereby it causes the air to ascend with greater force.

Opening downward through the curved upper surfaces or grooves E are numerous apertures H of larger diameter at the bottom, where they open between the webs F, than at the top, as is necessary for self clearance. These apertures are preferably so disposed that two parallel apertures come in one groove and one in the next and so on. This properly distributes the air through the grate.

The grate is reinforced or strengthened by a series of transverse corner ribs G on the under or inner part of the bar which perform the dual purpose of strengthening the top of the bar and also its webs, and at the same time do not interfere with the air passage running longitudinally between the webs which materially acts to equalize the air supply to the apertures and also to increase in a given time the hot air actually delivered to the fire. The under side of the bar at front, rear, and center is formed with bearings I, polygonal in cross section having three or more flat surfaces arranged at an angle to each other and adapted to front, rear, and center bearer bars B, C, and D, respectively, which have projections J formed in cross section to approximately fit the polygonal shaped bearings I. The front and rear bearer bars have their projections J extending laterally from vertical transverse bars or plates, while the center bearer bar D has its bearer projections J extended upwardly between the webs of the bars. These projections J are preferably of greater transverse width at the top than at the bottom so as to permit free rocking of the webs of the bars in the spaces between adjacent bearers J. It is evident that in those cases where the bar is short, as in small furnaces, the center bearing and bearer bar may be omitted. The forward end of the bar is provided with a crank arm K connecting with the body of the bar just back of the front bearing I and so as to extend forward below

the front bearer bar A, whereby the several bars may be independently rocked. I have, after a most extensive use and thorough practical test of these improved bars, found that not only do they enable a clean and bright fire to be maintained, but entail less labor on the stoker than with any bars which my experience has brought to my notice.

The advantages in the employment of the center bearer are most important, as prior to the use of this part of my improvement, I found great difficulty in the case of long bars from sagging or breaking down altogether when overheated and overloaded. The sagging was very injurious in that it prevented the proper rocking of the bars and the maintenance of a clear and clean fire by the proper breaking down and removal of clinkers. Furthermore, by the use of the straight transverse top to form right angled edges at the sides I am enabled to positively cut or break the clinkers by allowing them to lie against the side face of the adjacent bar and forcing the sharp corner of the edge *e* through them.

While I prefer the construction shown, the minor details may be somewhat modified without departing from my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a combined grate bar and bearer, the combination of a grate bar A, having depending side webs and an internal inverted U shaped polygonal bearing surface consisting of a central flat bearing surface and adjacent angular bearing surfaces, with a bearer bar provided with an upwardly projecting bearer J having a flat upper face adapted to the flat central bearing surface of the grate bar and inclining side faces adapted to the angular bearing surfaces of the grate bar adjacent to the middle flat bearing face thereof, the lower portion of the bearer being of decreasing width so as not to obstruct the depending side webs of the grate bar when the grate bar is rocked on the bearing faces.

2. In a combined grate bar and bearer the combination of a grate bar A, having depending side webs and an internal inverted U shaped polygonal bearing surface consisting of a central flat bearing face and adjacent angular bearing faces, with a bearer bar provided with a projecting tetragonal bearer, the distance between the two upper angles thereof being less than the distance between the two lower angles, and the body of the bearer below the two lower angles being of decreasing width.

3. A grate bar having an upper surface grooved to form a series of transverse ridges *e*, and straight longitudinal sides at substantially right angles to the said upper surface to form with the ends of the transverse ridges *e* sharp cutting points along the sides of the bar, and having the lower portions of the straight longitudinal sides offset, as at F, to form enlarged spaces below said sharp cutting points.

4. A grate bar of inverted U shaped cross section having a series of openings in its upper surface and provided with internal polygonal shaped bearing faces and internal inclined corner ribs G, independent of the bearing faces and located at intervals in the length of the bar.

In testimony of which invention I have hereunto set my hand.

FRANK JAY ST. JOHN.

Witnesses:

ERNEST HOWARD HUNTER,

C. M. DIETTERICH.