No. 608,215. Patented Aug. 2, 1898.

D. NORTON & S. NEEMES.

GRATE.

(Application filed June 19, 1897.)

(No Model.)

Fig. 1.

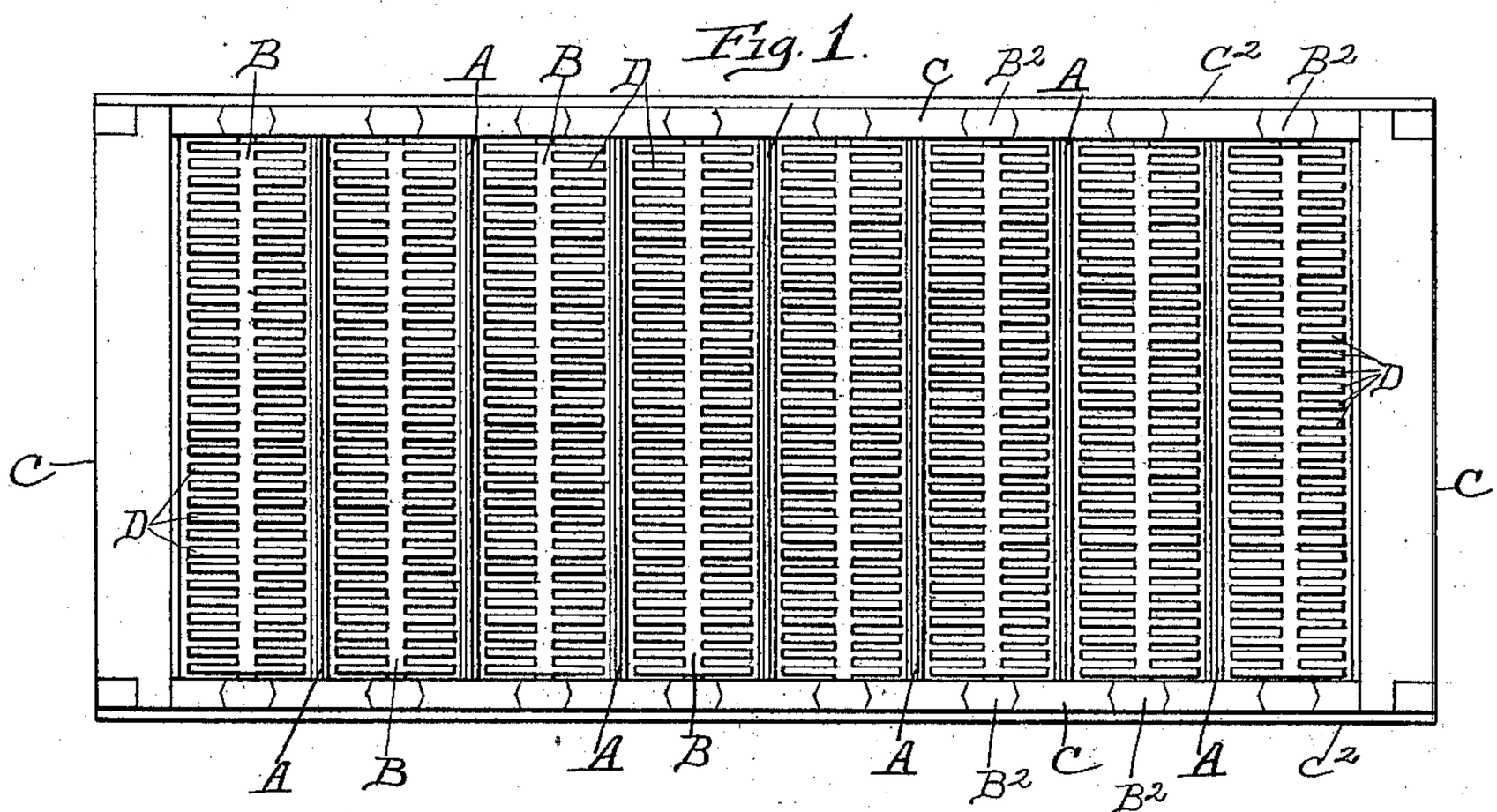


Fig. 2.

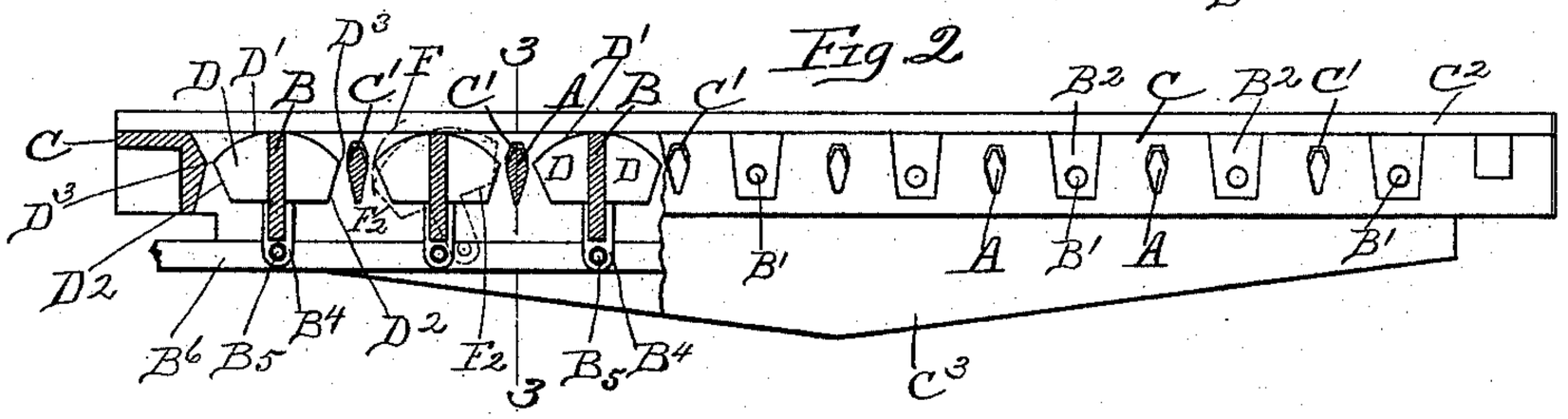


Fig. 3.

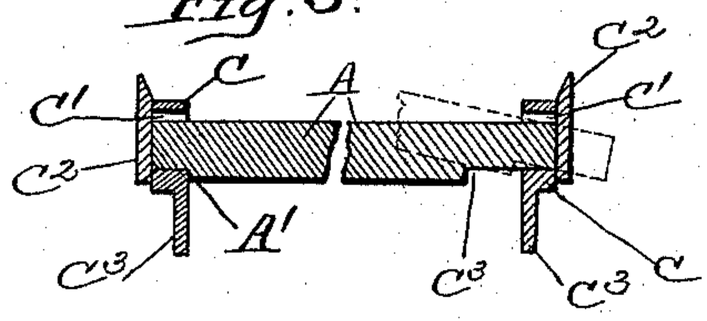
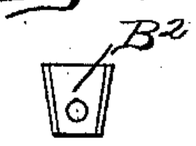


Fig. 4.



Witnesses:
J. G. Curtis.
H. E. Curtis

Inventors:
Daniel Norton,
and Spencer Neemes,
By Mosher & Curtis
Attys.

UNITED STATES PATENT OFFICE.

DANIEL NORTON AND SPENCER NEEMES, OF TROY, NEW YORK.

GRATE.

SPECIFICATION forming part of Letters Patent No. 608,215, dated August 2, 1898.

Application filed June 19, 1897. Serial No. 641,431. (No model.)

To all whom it may concern:

Be it known that we, DANIEL NORTON and SPENCER NEEMES, citizens of the United States, residing at Troy, county of Rensselaer, and State of New York, have invented certain new and useful Improvements in Grates, of which the following is a specification.

The invention relates to such improvements; and it consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings and the letters of reference marked thereon, which form a part of this specification.

Similar letters refer to similar parts in the several figures.

Figure 1 of the drawings is a top plan view of our improved grate, detached. Fig. 2 is a side view in elevation of the same with one end partly broken away and shown in vertical section on a plane cutting the bars transversely. Fig. 3 is a vertical section taken on the broken line 3 3 in Fig. 2. Fig. 4 is a side elevation of a bearing-box which supports one end of a rocking grate-bar.

Our invention relates to that class of grates which employ rocking bars.

Referring to the drawings, the stationary grate-bars are indicated by the letter A and the rocking bars by the letter B. These bars all have end supports in the rectangular frame C. The stationary bars are preferably wedge-shaped on their lower side, as seen in cross-section in Fig. 2, and have their ends inserted in openings C′ in the frame, which openings are tapered downwardly to receive and fit the ends of the bars. Longitudinal movement of the bars in their bearings C′ may be prevented by means of the side plates C^2, extending along the sides of the grate-frame and upon which the opposite ends of the bars abut.

The stationary bars are preferably cut away at their inserted ends, as shown, one of such ends being cut away for a considerable distance, as at C^3, whereby such end when the locking-plate C^2 on that side of the frame has been removed can be projected a sufficient distance through its bearing-aperture C′ to permit the other end of the bar to be entirely withdrawn from its bearing-aperture on the opposite side of the frame, whereupon the bar can be inclined upwardly, as indicated by dotted lines in Fig. 3, and withdrawn from the grate. Such a construction, while effectually preventing the escape of the stationary bars in use, affords a convenient means for the insertion and removal of such bars for repairs and renewal.

The rocking bars are severally provided on each end with a trunnion B′, which has its bearing in a detachable box B^2, which dovetails in an opening or recess in the upper edge of the side of the frame adapted to receive and fit the box, the sides of the frame being provided with depending strengthening-flanges C^3.

The rocking bars are severally provided with a double series of oppositely-projecting teeth D. These teeth are preferably rounded or curved on their upper surfaces D′ and are undercut on their projecting ends to form thereon the beveled surfaces D^2 and the cutting edges D^3 at the intersection of the rounded and beveled surfaces. The cutting edges extend nearly to the stationary bars and, together with the trunnions of the rocking bars, are in the same plane with the stationary bars, the cutting edges being located a short distance above the axes of movement of the rocking bars and so that a rocking movement of the bars will cause the cutting edges to move to and fro along the sides of the stationary bars without contact therewith, as indicated by the curved dotted line F in Fig. 2, which indicates the line of movement of the cutting edge. The dotted lines F^2 show a relative position of the teeth after a rocking movement has been imparted to a rocking bar. We are thus able to crush or shear off a portion of any clinker or other solid object which may be interposed between a stationary bar and the cutting edge of a rocking-bar tooth and force the crushed or sheared-off portion down between the bars beneath the grate, which prevents the grate from becoming clogged to render the rocking bars inoperative, as would be the result if the teeth were only movable toward and from and not past or along the side of a stationary bar.

By having the stationary bars in alternate order and parallel with the rocking bars the rocking-bar teeth afford the only support for the contents of the furnace in the interven-

ing spaces between the stationary bars, which reduces the stationary support to a minimum and affords a minimum resistance to the gravitation of clinkers and other foreign substances down to a position between the teeth and stationary bars where they can be sheared and ground to pieces which will pass through the grate.

By having the ends of the teeth undercut or beveled, as shown, ample clearance is afforded for the sheared-off portion of a clinker to pass down below the grate. We are thus able by rocking the movable bars to wholly clean the grate and force all the clinkers, ashes, lumps of coal, and foreign substances down beneath the grate.

Any well-known means may be employed for communicating rocking movements to the movable bars.

We have shown each rocking bar provided with a depending lug B^4, which is pivoted at B^5 to a common rod B^6, broken away at one end. By imparting to this rod a reciprocating movement a rocking movement will be imparted to each rocking bar.

We do not wish to be limited to any specific form in the construction of the various parts, the essential feature of our invention being the combination, with a rocking bar having a series of transversely-projecting curved teeth, of a stationary or resistance bar parallel with the rocking bar, so as to provide only shear-cutting supports along the entire side of the resistance-bar, and means for causing clinkers and other solid products of combustion to gravitate toward the cutting edges.

We are aware that rocking bars having rows of oppositely-projecting fingers have been used in grates in connection with a stationary support, but they were not provided with shear-cutting edges and adapted to coöperate with each other to feed the clinkers down to the cutting edges and slice off and force down through the grate successive portions to quickly clear the grate of clinkers and other solid products of combustion. In our improved grate there is a separate independent cutting edge on each projecting tooth at the junction of its curved and beveled surfaces that coöperates with a resisting-support consisting of the stationary bars, which may be termed "resistance-bars" to distinguish their coöperative function in relation to the rocking bars. Furthermore, the teeth are short, which not only gives them more advantageous leverage and power, but permits a greater rocking movement of the rocking bars without projecting the ends of the teeth up into the fire to disturb the partially-consumed coal; also, the stationary or resistance bars have their upper surfaces lower than the upper surfaces of the teeth and tapered transversely, so that the clinkers gravitate to the lower surface on the bars and will tip on the thin tapered edge toward the uplifted teeth either on one side or the other or alternately on both sides to be engaged by the cutting edge of a descending tooth as the bar is rocked, and as a further aid to the operation the oppositely-projecting teeth on a rocking bar are connected in pairs, a tooth on one side with the opposite tooth on the other side of the bar by a raised and rounded web which has an upper or top surface forming an unbroken curve from the cutting edge of a tooth on one side of a bar to the cutting edge of the opposite tooth on the other side of the bar, whereby the highest upper surfaces of the rocking-bar teeth do not change appreciably in height or materially in position relatively to the resistance-bars when the toothed bar is rocked, so that the maximum degree of rotation can be safely imparted to the rocking bars without disturbing the fire, either by direct contact or by forcing clinkers up into it. The longitudinally-rounded form of the teeth permits them to be rocked without materially changing the form of the clinker-receiving channels along the resistance-bars, and as the cutting edges of the teeth move upward during their rocking movement they slide along beneath superimposed clinkers without materially disturbing their position; but on their downward movement these cutting edges engage the clinkers and force them against the resistance-bars. The movements of the rocking bars, therefore, always tend to urge the clinkers or other solid products of combustion down into one of the oppositely-located channels against the resistance-bars, from which they are forced by the shearing process down through the grate, as before explained.

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

1. In a grate, the combination with a series of rocking bars, of a corresponding series of resistance-bars, with the individual members of one series alternating with those of the other series and parallel therewith, and the axes of the rocking bars in approximately the same plane with the resistance-bars, a series of teeth projecting laterally from each of the two opposite sides of the several rocking bars almost to the neighboring resistance-bars and having their upper surfaces in a plane higher than the plane occupied by the upper surfaces of the resistance-bars and curved downwardly toward the resistance-bars, and means for rocking the toothed bars whereby the points of the teeth can be moved toward, from and along the side of a resistance-bar without being projected above the general level of the upper grate-surface, substantially as described.

2. In a grate, the combination with a resistance-bar tapered transversely on its upper side surfaces and beveled transversely on its lower side surfaces, of a rocking bar having its axis of movement in approximately the same horizontal plane with the resistance-bar, a series of teeth projecting from the rocking bar approximately to the resistance-bar, having the upper surface of the several teeth curved and the projecting end surfaces un-

dercut or beveled, and means for rocking the toothed bar, whereby a cutting edge formed at the junction of the curved and beveled surfaces of a tooth is adapted to coöperate with a resisting edge at the junction of the upper and lower beveled surfaces on the resistance-bar, substantially as described.

3. In a grate, the combination with a pair of rocking bars provided each with a row of teeth projecting horizontally toward the other bar, having the teeth severally curved on their upper surfaces, of a resistance-bar beveled or tapered transversely on its upper side surfaces and coöperatingly interposed between the rocking bars but with its uppermost surface on a lower plane than the uppermost surface of the teeth, whereby a clinker-receiving channel is formed on the opposite sides of the interposed bar between the tapered bar and the curved teeth of the rocking bars, substantially as described.

In testimony whereof we have hereunto set our hands this 11th day of June, 1897.

DANIEL NORTON.
SPENCER NEEMES.

Witnesses:
FRANK C. CURTIS,
JOHN A. MACDONALD.