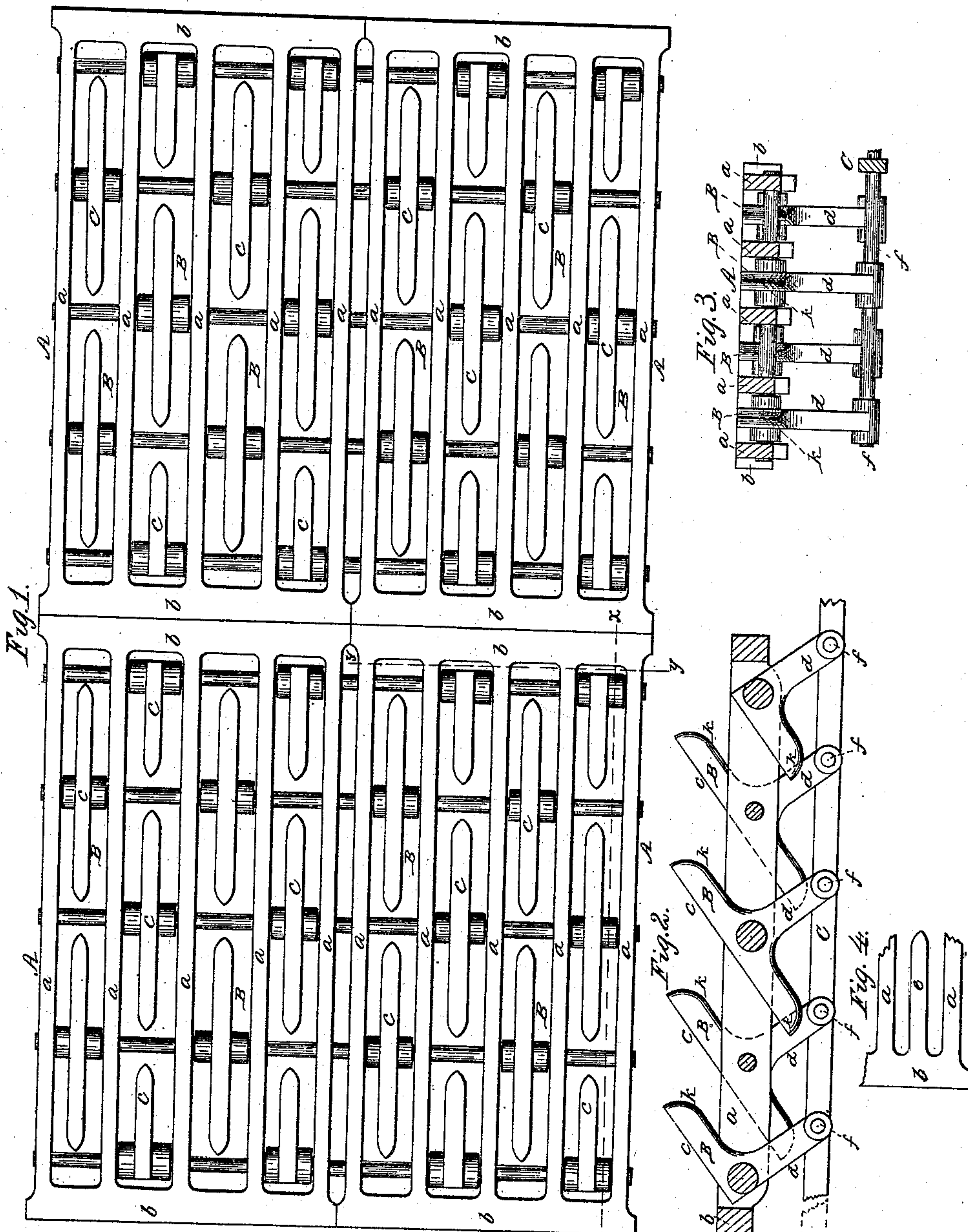


(No Model.)

B. S. NIEBELL.
FURNACE GRATE.

No. 270,100.

Patented Jan. 2, 1883.



Witnesses:

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UNITED STATES PATENT OFFICE.

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FURNACE-GRATE.

SPECIFICATION forming part of Letters Patent No. 270,100, dated January 2, 1883.

Application filed November 23, 1882. (No model.)

To all whom it may concern:

Be it known that I, BERNHARD S. NIEBELL, of Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain
5 new and useful Improvements in Furnace-Grates, and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification,
10 in which—

Figure 1 is a top plan view of a furnace-grate constructed in accordance with my invention. Fig. 2 is a longitudinal vertical section of the same, taken on the line *x x* of Fig. 1. Fig. 3 is a cross-sectional view taken on the line *y y* of Fig. 1, and Fig. 4 is a detail view of a modification.

Similar letters of reference in the several figures denote the same parts.

20 My invention relates to that class of furnace-grates in which the rigid bars of the grate are alternated with movable rocking sections which operate to stir and break up the fuel on the grate and keep it free of ashes, clinkers,
25 and other obstructions to proper combustion; and my invention consists in certain novel improvements, which I will first describe and then point out particularly in the claims at the end of this specification.

30 Referring to the accompanying drawings, A A represent a series of stationary sections, preferably four or more in number, of which the grate is in part composed. Each of these sections preferably consists of longitudinal bars
35 *a* and cross-bars *b*, all formed in a single casting, and the several sections are fitted together so as to extend over the bottom of the furnace from wall to wall, as shown.

In the spaces between the bars of the stationary grate-sections I arrange a series of
40 rockers or agitators, B. These rockers B are preferably of T shape, as shown, their upper horizontal portions, *c*, lying normally flush with the top of the stationary grate-sections, while their depending portion *d* extends down
45 and is secured to a suitable connecting-bar, C.

Heretofore in grates of this class the rockers or agitators have either been mounted on separate shafts extending transversely of the furnace below the grate and supported by the furnace-walls, or else the stationary bars have been

provided with "snugs" formed upon and laterally projecting from said bars, and the rockers have been mounted upon said snugs. The disadvantage of the grates of the first class is, 55 that if the shafts or the rockers become slightly warped, the rockers cannot be made to pass between the stationary bars with any facility, thus seriously interfering with the operation of the grate, while the disadvantage of the 60 grate of the second class is, that when it is desirable from any cause to remove one or more of the rockers, the whole grate, or a whole section thereof, has to be pulled out before the result can be effected, because the snugs on 65 the stationary bars are rigidly attached to said bars and the rockers cannot be removed without taking out the bars and then separating them. To obviate the objections to these prior forms of grates, I, in my present structure, mount my rockers upon removable rods 70 or bolts extending transversely through perforations in the stationary grate-bars, and by this means I am enabled to support the cross-rods at short intervals, and thus obviate the 75 difficulty of warping, while at the same time, by the removability of the rods, render it feasible to take out one or any number of rockers without disturbing at all the stationary sections. By preference I also arrange the 80 rockers so as to break joints—that is to say, I locate the rockers upon a given cross bolt or shaft in every other space, the rockers on the next shaft projecting into the intervening spaces, as shown in Fig. 1. 85

Those rockers which are located at the end of the furnace are made half T-shape, as shown in Fig. 2; but in cases where, from the structure of the furnace, there would not be room enough at the end to permit of the motion of a 90 rocker, the stationary grate-section may be provided with an inwardly-projecting supplemental bar, *e*, as shown in Fig. 4. The lower ends of the rockers on each cross-bolt are connected to each other by a cross-bolt, *f*, and the 95 latter in turn are attached to the connecting rod or rods C, attached to the operating-handle H. By operating the handle H back and forth the ends of the rockers are projected alternately above the stationary grate-bars and 100 operate to disturb the material supported over the whole area of the furnace, effectually break-

ing up and removing ashes, cinders, &c., and keeping the fire well supplied with air throughout the furnace-bed. To assist in the breaking up of accumulations on the grate, I preferably form knife-edges *k* on the under side of the rocker-tops, as shown in Figs. 2 and 3, and when the rockers are worked these knife-edges cut through such accumulations and rapidly remove them.

10 My grate is especially adapted to furnaces which burn culm or fine coal, and I find by practice that for such uses it is desirable to make the open spaces between the stationary bars of the grate and the rockers about equal 15 to the thickness of the said rockers and stationary bars—that is to say, where the rockers and bars are each three-eighths inch wide I leave a three-eighths inch space.

20 Where larger fuel is burned the relative widths of the bar and space can be altered to suit circumstances.

I am aware that prior to my invention furnace-grates have been made consisting of rocking sections mounted upon cross-shafts, with 25 the bars of the sections projecting into the spaces between the bars on the adjoining sections; but in such grates no stationary grate-bars are employed, and when the rocking sections are rocked large openings are formed, 30 through which the unconsumed material is liable to drop into the ash-pit below. In my invention, by the employment of rocking sections breaking joints with the bars of the ad-

joining sections, in connection with stationary grate-bars, not only is the mass on the grate 35 enabled to be disturbed throughout when the rocking sections are oscillated, but while such disturbance is taking place the body of the mass is supported by the stationary grate-sections, thus preventing the formation of open- 40 ings large enough to permit the unconsumed material to pass into the ash-pit.

Having thus described my invention I claim as new—

1. A furnace-grate consisting of stationary 45 grate-bars and alternating rocking sections arranged in the spaces between the stationary bars and so as to break joints with each other, substantially as described.

2. In a furnace-grate, the combination, with 50 stationary grate-bars, of rockers whose upper faces lie normally flush with the upper faces of the stationary bars, mounted upon removable cross rods or bolts, passed transversely through perforations in the stationary bars, 55 substantially as described, for the purpose specified.

3. In a furnace-grate, the combination, with the stationary grate-bars, of the pivoted rockers having the knife-edges on their under side, 60 substantially as described, for the purpose specified.

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Witnesses:

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