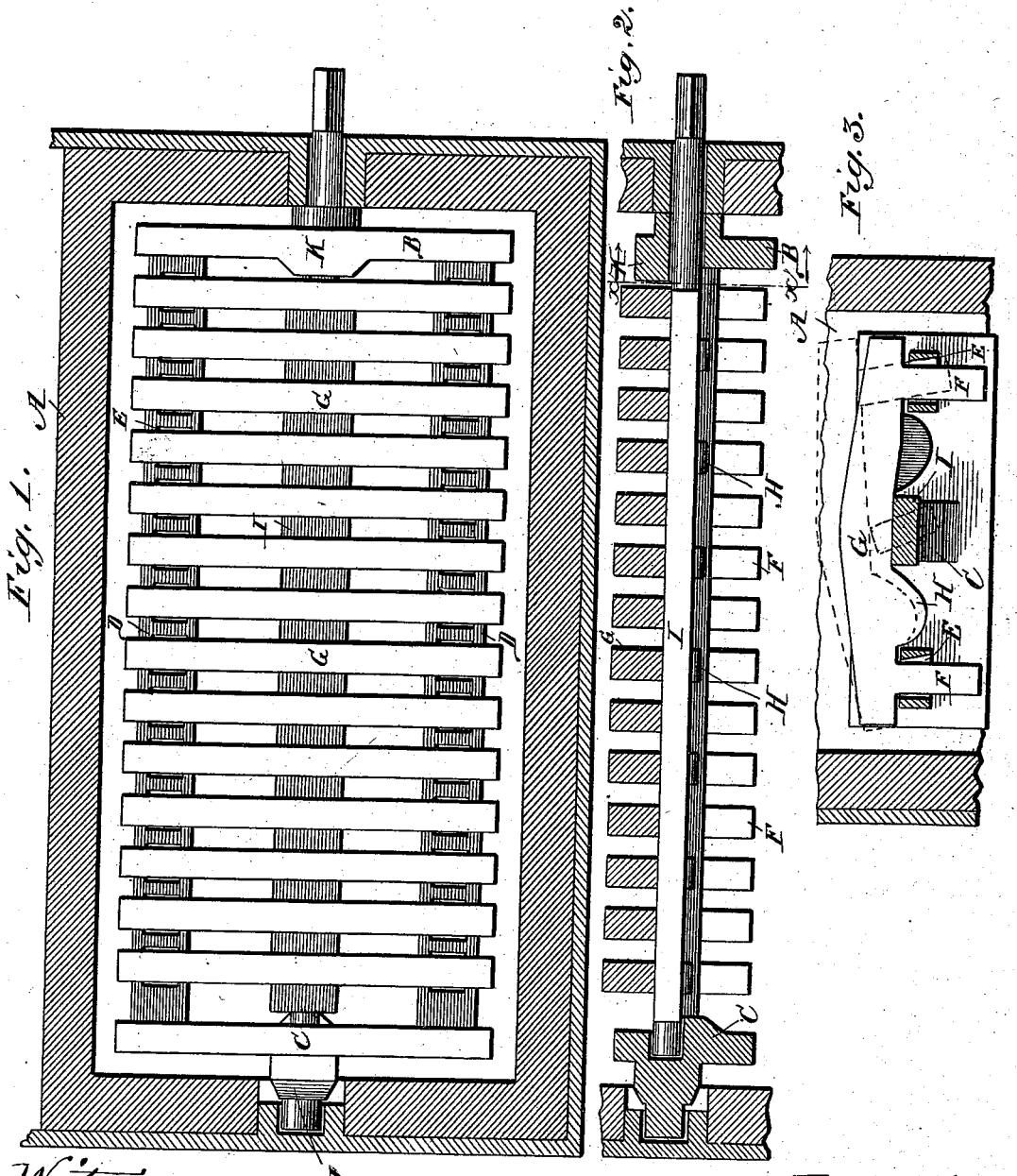
(No Model.)

3 Sheets—Sheet 1.

# A. C. MORTON.

## GRATE.

No. 382,720. Patented May 15, 1888.

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(No Model.) 3 Sheets—Sheet 2.

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## GRATE.

No. 382,720. Patented May 15, 1888.

Fig. 5.

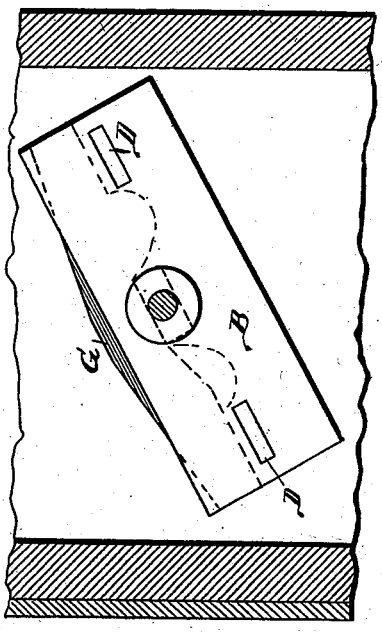



Fig. 4.

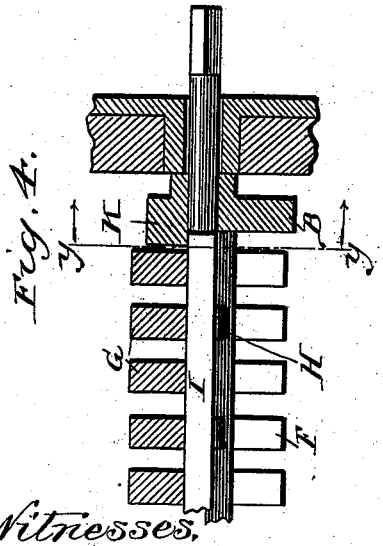



Fig. 7.

Fig. 9.

Fig. 11.

Fig. 6.

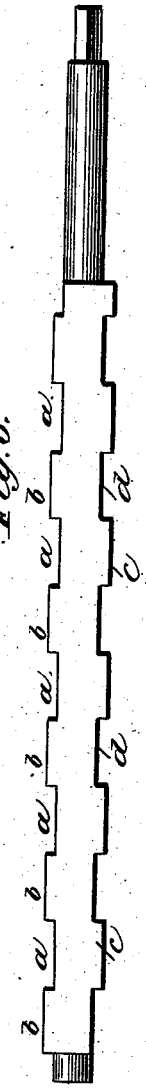



Fig. 8.

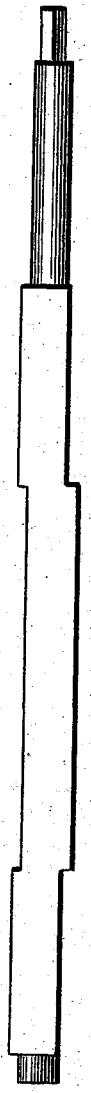
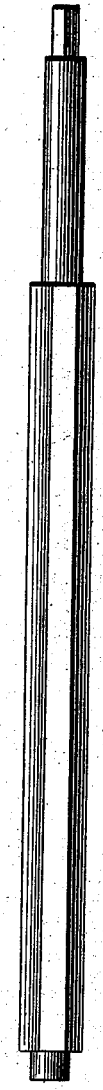


Fig. 10.



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(No Model.) 3 Sheets—Sheet 3.

# A. C. MORTON.

## GRATE.

No. 382,720. Patented May 15, 1888.

Fig. 12.

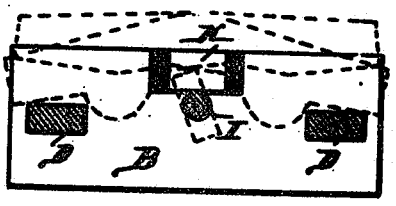
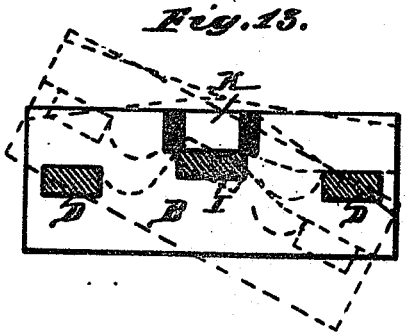



Fig. 13.

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# UNITED STATES PATENT OFFICE.

ABNER C. MORTON, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FOURTH TO SAMUEL G. MORTON, OF SAME PLACE.

## GRATE.

SPECIFICATION forming part of Letters Patent No. 382,720, dated May 15, 1888.

Application filed October 19, 1886. Serial No. 216,634. (No model.)

*To all whom it may concern:*

Be it known that I, ABNER C. MORTON, a citizen of the United States, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Grates, of which the following is a specification.

This invention relates to improvements in grates especially adapted for cooking and heating stoves, but which is also adapted for furnaces of various kinds, and which grates have heretofore been made in a single piece and reciprocated to shake out the ashes and oscillated to dump both the coal and ashes, while in others the grate has been made in sections with a series of rigidly-connected grate-bars in each section, and reciprocated to shake out the ashes, and the section oscillated in opposite directions for a like purpose or to dump both coal and ashes.

In the construction of grates above referred to the shaking operation is not only laborious and disagreeably noisy, but frequently unsuccessful, because of coal and clinkers clogging the space between the grate-bars to such an extent as not only to be difficult of removal, but effectually prevent the discharge of the ashes without resorting to the dumping operation, and consequently putting out the fire.

Besides the objections above set forth, a flaw in or injury to any one of the grate-bars destroys the entire grate or entire section as a commercial article, or renders the grate or section unfit for further service, as the case may be.

The objects of this invention are not only to avoid the objections above named, but to promote an effective discharge of the ashes from the grate-bars and to provide not only for shaking one or more of the grate-bars independently of all the others, but in an opposite direction to the others, and to have every grate-bar independently removable from the supports and the shaking devices, whereby an injured grate-bar may be removed without disturbing any of the others.

A further object is to have the several parts of the grate separately cast and readily attachable or detachable, so as to reduce the cost of casting and expense of repairs, and substitution of parts for repairs, and for varying the operation of shaking the several grate-bars, all as hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 represents a plan view of a grate-bar embodying my invention; Fig. 2, a central longitudinal section thereof, showing the central rock-bar in elevation; Fig. 3, a transverse vertical section of the same; Fig. 4, a detail longitudinal section showing the rock-bar slid back in position for dumping the grate; Fig. 5, a transverse section of the fire-box, showing the grate partially dumped in end elevation; Figs. 6, 7, 8, 9, 10, and 11, detail views of modified forms of the rock or shake bar; Fig. 12, a detail section through the grate-frame on line *x x*, Fig. 2; and Fig. 13 a similar view on line *y y*, Fig. 4.

Similar letters of reference indicate the same parts in the several figures of the drawings.

Referring by letter to the accompanying drawings, A indicates the fire-box of a stove, provided with the usual lining of fire-brick, in which is located the grate composed of the end bars, B C, extending transversely across the fire-box at the ends thereof, and connected by the longitudinal side bars, D D, which are preferable cast separate from said end bars, to which they are secured by mortising or in any other well-known and convenient manner to render them easily detachable. In these bars are formed a series of perforations, E, extending nearly the entire length thereof and at regular distances apart, through which perforations project lugs F F, depending from the under side of the grate-bars G, one near each end of each bar projecting through the perforations of each side bar a sufficient distance to permit a considerable vertical play of the grate-bars without the lugs becoming disengaged from the perforations. To one side the center of each bar has cast therewith or otherwise rigidly secured thereto a weight or thickened portion, H, and the bars are so arranged in the grate that the weighted ends of the grate-bars come upon alternate sides of the grate—that is to say, every other bar has its weighted end upon the same side.

Passing centrally and longitudinally from end to end of the stove beneath the grate-bars

is a rock or shake bar, I, preferably having the shape of a parallelogram in cross-section and provided with an end bearing in the end bar C of the grate, which latter in turn has a stud, J, cast thereon, constituting a pivot bearing, it being loosely journaled in a suitable socket formed in the end wall of the stove, the end bearing of the rock-bar, however, being sufficiently long to permit an endwise movement of the said bar independent of the end bar and without becoming disengaged therefrom. The opposite end of the shake-bar beyond the grate-bars is circular in cross-section and passes loosely through the end bar B, supporting the same, and through the wall of the stove to the outside, where its end is squared for reception of the usual shaker or crank-handle employed for shaking or dumping the grate.

The end bar B has provided thereon immediately above the rock-bar a lug, K, projecting longitudinally toward the first grate bar, the under side of which lug is flat or plane and works over the cylindrical end portion of the rock-bar, when the latter is in its normal position, so as to permit a free rotation of said bar independent of the grate. When, however, the rock-bar is shifted longitudinally or axially in its bearing toward the end bar B, the squared portion of the rock-bar will be moved so as to underlie and bear against said lug, thereby preventing a rotation of the rock-bar independent of the grate, and any rotation of said bar when so adjusted will be communicated to the grate and cause the same to tilt to a corresponding degree.

In practice, when the rock-bar is oscillated it assumes the position shown in dotted lines, Fig. 3, the grate-bars at this time being supported upon the edge thereof; but instead of rising clear of the side bars in the same relative position as when at rest—that is to say, in a horizontal position—the weighted end of each grate-bar will be held down by reason of the excess of weight on that side of the center, while the opposite end will rise to a corresponding height, thus causing the grate-bar to assume the inclined position shown by dotted lines in the same figure; hence it will be seen that as the weighted ends of the levers come on alternately-opposite sides of the center of the grate the grate-bars will assume alternately-opposite inclined positions, causing the ends thereof to project up into the cinders and effectually release the ashes therefrom, thereby precipitating them into the ash-pit.

It will of course be understood that the weight of the coals in the fire-box serves to maintain the grate as a whole in its normal horizontal position, the rock-bar turning loosely on its bearings therein, and therefore having no leverage upon the grate as a whole, but simply upon the grate-bars. When, however, it is desired to tilt or dump the grate as a whole, it is only necessary to draw the rock-bar out longitudinally—that is to say, with an endwise movement until the squared portion thereof lies under the lug K on the end bar B—when the oscillations of the rock-bar will be imparted to the grate as a whole, the rock-bar at this time being prevented from any oscillation whatever independent of the grate as a whole, and cannot therefore shake the grate-bars until shoved back into its normal position.

During the dumping operation the stud J and the forward end of the rock-bar constitute the pivot-bearing of the grate, being suitably journaled in the walls of the stove, as herein-before explained.

To avoid an unnecessary length of perforations in the side bars of the grate otherwise necessary to permit the shaking or oscillating the grate-bars, I bevel or chamfer out the end walls of said perforations, as shown in Fig. 3, beveling from the top of the perforation downwardly at an angle corresponding to the greatest degree of inclination assumed by the lugs F of the grate-bars during their oscillation, so that the openings at the top may be of just sufficient size to permit the passage of the lugs and still allow the free oscillation of the grate-bars.

In a grate constructed as herein described various movements of the grate-bars can be accomplished, according to the character of the fire box or furnace in which the grate is located, by means of the rock-bar upon which the grate-bars are dependent for their individual movements, for while the operation and manner of dumping the grate is the same in all cases, the part operating upon the grate-bars may vary materially. For instance, if the rock-bar, instead of being plain on its side or elevating edges, is notched at every other grate-bar on alternately-opposite sides, as shown in Figs. 6 and 7, when oscillated in one direction the grate-bars corresponding to these notches *a a* will not be affected, while the bars corresponding to the projection *b b* will be oscillated in the usual manner; but when the rock-bar is turned in the opposite direction the grate-bars corresponding to the notches *a*, which had previously stood still, will now be oscillated by the projections *c*, while the alternate bars will be undisturbed because of the notches *d* on that side corresponding therewith. Thus every other grate-bar only may be operated by a single oscillation of the rock-bar, and the alternate grate-bars operated by the oscillation of the rock-bar in the opposite direction; or the rock-bar may be notched, as shown in Figs. 8 and 9, in which case the most of the middle bars will be operated at one oscillation, while several of the grate-bars at each end of the grate will be simultaneously operated by the oscillation of the rock-bar in the opposite direction.

Still another form of rock-bar is illustrated in Figs. 10 and 11, in which the said bar, instead of having the outlines of a parallelogram in cross-section, has substantially a hexagonal outline, whereby all of the grate-bars are op-

erated simultaneously, the weighted ends thereof giving a sufficiently irregular movement to said bars to insure the thorough separation of the ashes from the fire.

A grate constructed in accordance with my invention has its commercial value as such materially enhanced by the facility with which repairs thereto can be made, which not only do not detract from its usefulness and value, but in reality render the injured grate as good as new, for not only the grate-bars, but any other part of the grate, either end, side, or rock bar, can be removed and a new corresponding part substituted, these parts being all cast separately and readily attachable or detachable.

Although I find it to be more economical and satisfactory to cast a pivot for the grate upon the end bar C, this pivot might be dispensed with and the end of the rock-bar passed loosely through the said end bar and projected into a socket in the wall of the fire-box, and thus provide the necessary pivot.

In conclusion I may state that in addition to the foregoing advantages the effective discharge of the ashes from the grate-bars is accomplished, and the bars so arranged that one or more may be shaken independently of all the others and in opposite directions, or any one of the grate-bars may be removed without disturbing any of the others; and it will be observed that in the operation of shaking the grate, if desirable, the rock-bar may, instead of being rocked or oscillated, be rotated in either direction, the result being the same in both cases, the said bar being designated as a "rock-bar" merely for convenience of description and clearness of illustration.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The grate-frame composed of side and end bars, said side bars being provided with a series of perforations, in combination with a series of grate-bars having lugs projecting into said perforations, whereby said grate-bars may be bodily elevated or have either end elevated without disconnection from the frame or displacement relative to each other, and any grate-bar be removable from the frame without disturbing the others, substantially as described.

2. A grate-frame, in combination with a series of removable grate-bars and a separate rock-bar underlying said grate-bars at their centers, said bars being weighted at a point between the rock-bar and one end thereof, substantially as and for the purpose described.

3. A grate-frame composed of side and end bars, the side bars being provided with a series of perforations, a series of grate-bars supported by said frame, and lugs on said bars engaging the perforations in said side bars, in combination with a rock-bar underlying and engaging said grate-bars about the center of length thereof, and weights secured to said grate-bars intermediate the center and one end thereof, substantially as described.

ABNER C. MORTON.

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