(No Model.) 2 Sheets—Sheet 1.

B. F. WARREN.

GRATE.

No. 356,433. Patented Jan. 18, 1887.

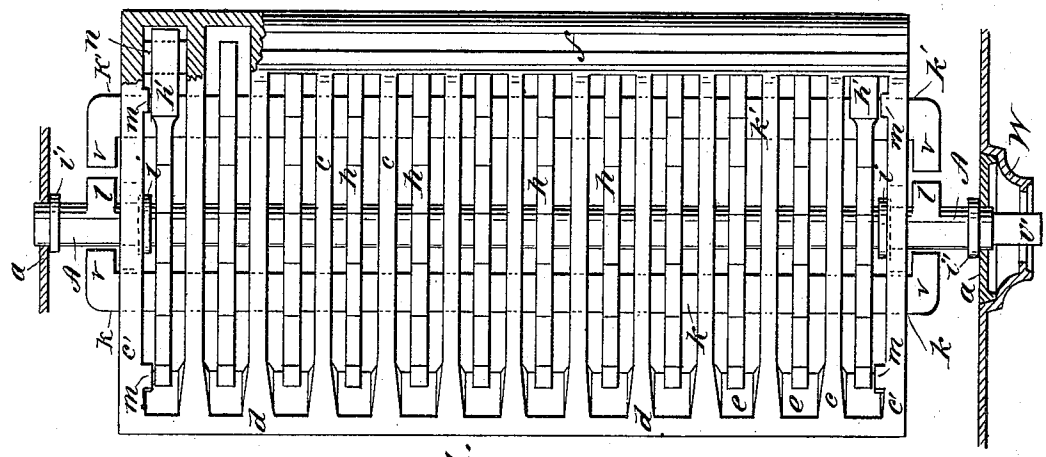


Fig. 1.

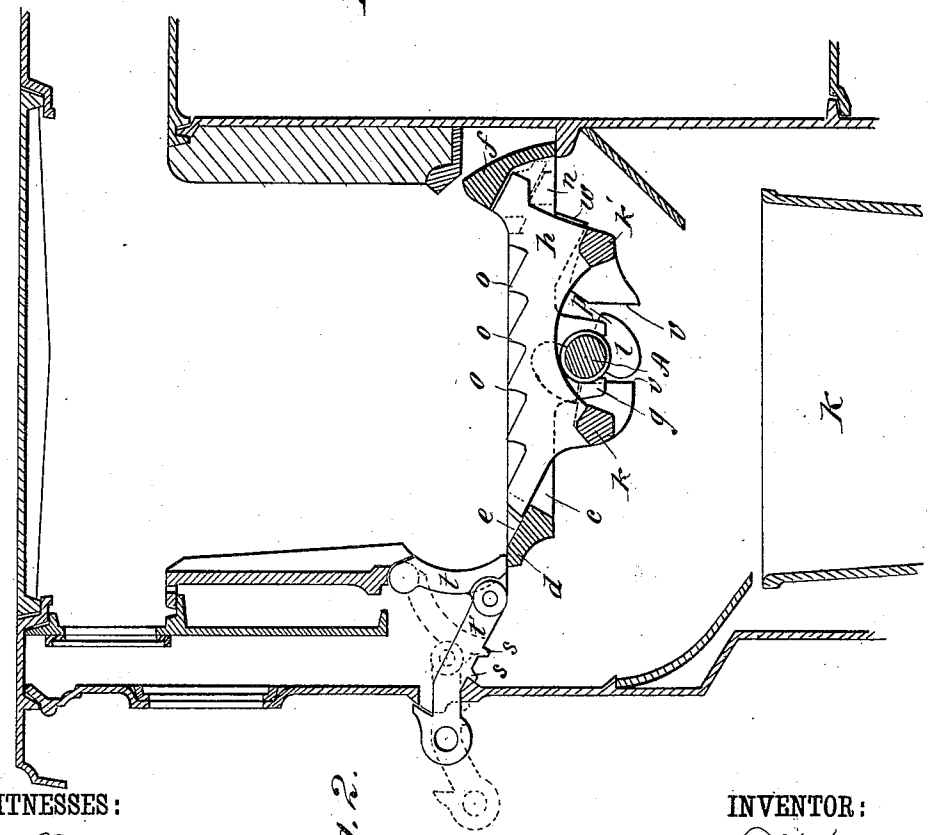


Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

B. F. WARREN.

GRATE.

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Fig. 3.

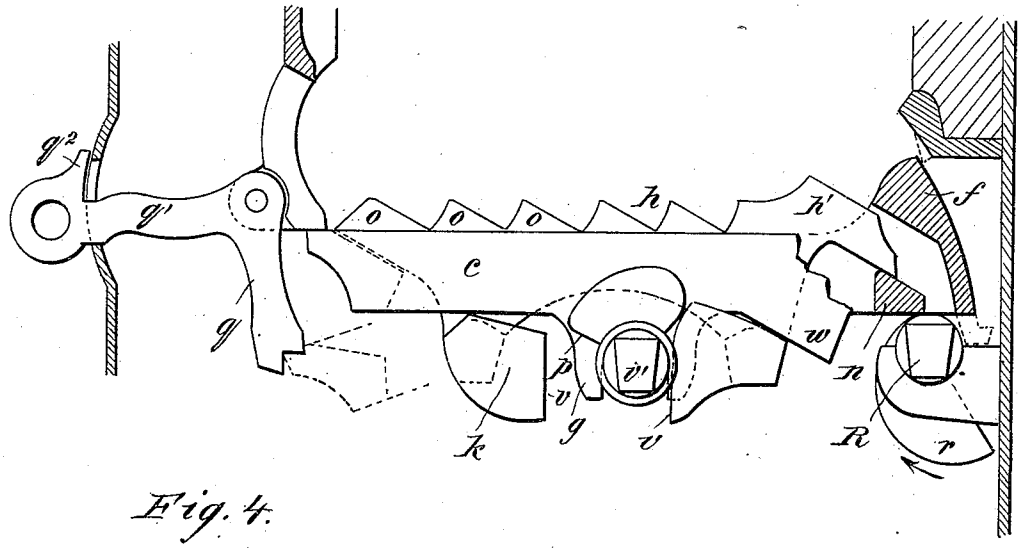


Fig. 4.

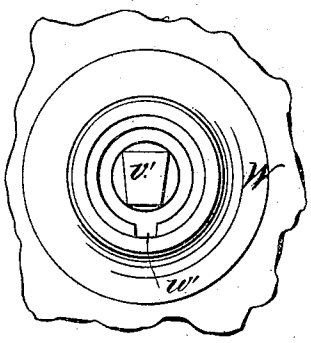


Fig. 5.

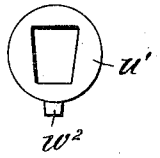
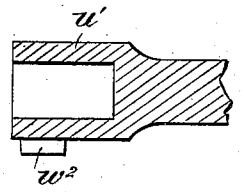


Fig. 6.



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UNITED STATES PATENT OFFICE.

BENJAMIN F. WARREN, OF BOSTON, MASSACHUSETTS.

GRATE.

SPECIFICATION forming part of Letters Patent No. 356,433, dated January 18, 1887.

Application filed August 3, 1885. Serial No. 173,402. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. WARREN, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and Improved Grate, of which the following is a full, clear, and exact description.

This invention relates to the construction of fire-grates; and its object is to provide for the rapid discharge of ashes from the fire, and also for the discharge of the clinker or larger débris with the least possible waste of fuel and without the usual shower of dust about the room.

In the drawings the invention is illustrated as it is applied to the ordinary range-stove; but it will of course be understood that the invention is equally applicable to other forms of stoves that are made with square or rectangular fire-boxes.

The invention consists of a grate composed of an outer stationary part having beveled seats on its front and rear bars, and an inner part provided with front and rear inclined guiding-surfaces, teeth on its upper surface, and cam-bearing arms at its end, the said cam-arms being adapted to be engaged by cams on a supporting-shaft.

The invention further consists in an arrangement for tilting the grate to discharge the larger débris, and in certain details of construction and combinations of parts, as will be hereinafter described, and specifically pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of my improved form of grate. Fig. 2 is a vertical sectional view of the same, showing the grate as mounted in a stove. Fig. 3 is an enlarged view of a modified form of construction; and Figs. 4, 5, and 6 illustrate certain details of construction, as will be hereinafter fully explained.

The grate is made up of two series of parallel transverse bars, *c* and *h*, that are carried by a cam-shaft, A, which rests in bearings *a a*, formed in the walls of the stove, collars *i' i'* being formed on the shaft just inside its bearing-points.

The main series of bars in the grate B are shown at *c c*, and these bars are cast so that their forward ends are united by a bar, *d*, which, between each of the bars *c*, is beveled downward from the forward edge, as shown at *e e*. The bar or plate *f*, which serves to unite the rear ends of the bars *c c*, is curved so that its rear face is about concentric to the center of the cam-shaft A. The end bars of the series *c c* are marked *c' c'*, and each is provided with a forked lug, *g*, which straddles the shaft A, the parts being held in longitudinal position by collars *i i*, that are cast upon the shaft A.

The bars *h h* are cast with two connecting-bars, *k k'*, the ends of which bars *k k'* project beyond the bars *c' c'*, and are there turned inward to present cam-bearing faces *v v* toward the cams *l l*, carried by the shaft A. The bars *h h* are placed between the bars *c c*, and their forward ends are beveled off to rest upon the beveled surfaces *e e*. The rear ends of the outer bars, *h' h'*, are beveled at the same angle as the forward ends of all of the bars *h h'*, and this beveled projection rests in an opening formed between the under side of the bar *f* and a lug, *n*, that projects from the bars *c'* to the next bar, *c*.

In order to prevent an excessive longitudinal play of the parts, the bars *c' c'* are formed with lugs *m m*. The bars *h h'* are toothed on top, as shown at *o*, and when reciprocated by turning the cam-shaft A will slide up and down on their beveled seats and agitate the lower part of the fire, so that all fine ashes will drop down into the ash-pan K, while the clinkers will be caught by the forward edge of the teeth *o* and carried to the front of the grate, from which position they may be discharged by reversing the direction of the crank-handle fixed on the cam-shaft A so as bring the flat face *p* of the cams *l* upon the upper sides of the projecting ends of the bars *k*. When the parts are in the position described, which is indicated in dotted lines in Fig. 2, a continued rotation of the shaft A will move the grate to the position shown in dotted lines in Fig. 3, when the grate will be caught and held by the catch-arm *q*, after which the shaft A can at once be rotated in the opposite direction to complete the raking of the grate.

The catch-arm *q* is in the form of a bell-crank lever, and is pivoted to one of the front grate-bars, the horizontal arm *q'* projecting

through a slot formed in the front wall of the stove, which slot is long enough to allow the arm q' to spring up when catch-arm q is forced out by the depression of the grate; but in order that the dust may not escape I form the arm q' with an upwardly-projecting flange, q^2, that covers the slot through which the arm q' projects. Another way of tilting the grate is also shown in Fig. 3, which consists in a cam-shaft, R, located at the rear of the grate and carrying a cam or cams, as r, which bear upon the under side of the grate bars and lift that side of the grate bodily when the shaft R is turned in the direction of the arrow.

In Fig. 2 I illustrate a construction by which the clinkers may be discharged without tilting the grate. In this case the lower part, t, of the front grate is pivotally connected to the upper part, and a manipulating-bar, t', which extends through the front of the stove, is pivotally connected to the lower end of the part t. This manipulating-bar t' is formed with two locking-lugs s s, so that the attachment will be securely held when placed in the position shown either in the full or dotted lines in the figure referred to.

When the series of front grate-bars marked t is pulled out to the position shown in dotted lines, a continued reciprocation of the bars h h will carry all clinker and larger débris to the front of the grate, and such débris will drop into the pan K. The bars c c are formed with downwardly-projecting beveled lugs w w, which bear on the ends of the bars k', and thus help to keep the reciprocating bars h in position.

In order that the position of the grate-bars may be determined from an inspection of the shaft A, the projection v' thereon, upon which the crank-handle w' fits, is of irregular shape, and to insure the return of the bars to the proper position the projection v' is surrounded by the casing W, formed with a central circular opening about the projection v', in which opening there is a slot, w', with which the lug w^2 on the crank-handle must be brought in register in order to put on or remove the handle.

I am aware that grates composed of two parts, one of which is supported by the other, and adapted to be reciprocated by a cam-shaft, is old, and I therefore do not claim such invention.

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

1. A grate consisting of an outer stationary part having beveled seats on its front and rear bars, and an inner part provided with front and rear inclined guiding-surfaces, teeth on its upper surface, and cam-bearing arms, in combination with a shaft having cams for engaging the cams of the inner part, substantially as herein shown and described.

2. The combination, with a shaft provided with cams at its ends, of a grate consisting of an outer and inner section, each formed of longitudinal and transverse bars, the inner section being supported by and within the outer section, and provided with cams on its longitudinal bars for engaging the cams of the shaft, substantially as herein shown and described.

3. The combination, with a cam-shaft, of a grate consisting of an outer and inner section, each composed of longitudinal and transverse bars, the outer section being provided with beveled seats, and the inner section supported within the outer section upon the said beveled seats, and provided with cams engaging the cams of the shaft to cause the said inner section to slide up and down on its beveled seats, substantially as herein shown and described.

4. The combination, with a grate, of a movable section in the front grate-bars and a manipulating-arm extending through the front of the stove, and provided with a flange for closing the opening through which the said arm projects, substantially as described.

5. The combination, with a grate, of a hinged section, t, in the front grate-bars, and the arm t', pivoted to said section and projecting through the front of the stove, and provided with the flange q^2 and lugs s, substantially as herein shown and described.

6. The combination, with the shaft A and its cams l, of the bars h h', formed with the bars k k', having cam-bearing faces, and the bars c c' d f, the bars c c' being provided with the lugs g and the beveled lugs n, and the bar f with the bridges n, substantially as described.

7. The combination, with stationary grate-bars formed with beveled connecting-webs e e, back bar or plate, f, lugs or bridges n n, and forked lugs g, of reciprocating raking-bars that are operated by the cams l l on the cam-shaft A, and said cams and cam-shaft, substantially as described.

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Witnesses:
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