(No Model.) 3 Sheets—Sheet 1.

L. M. WOODCOCK.

GRATE.

No. 384,409. Patented June 12, 1888.

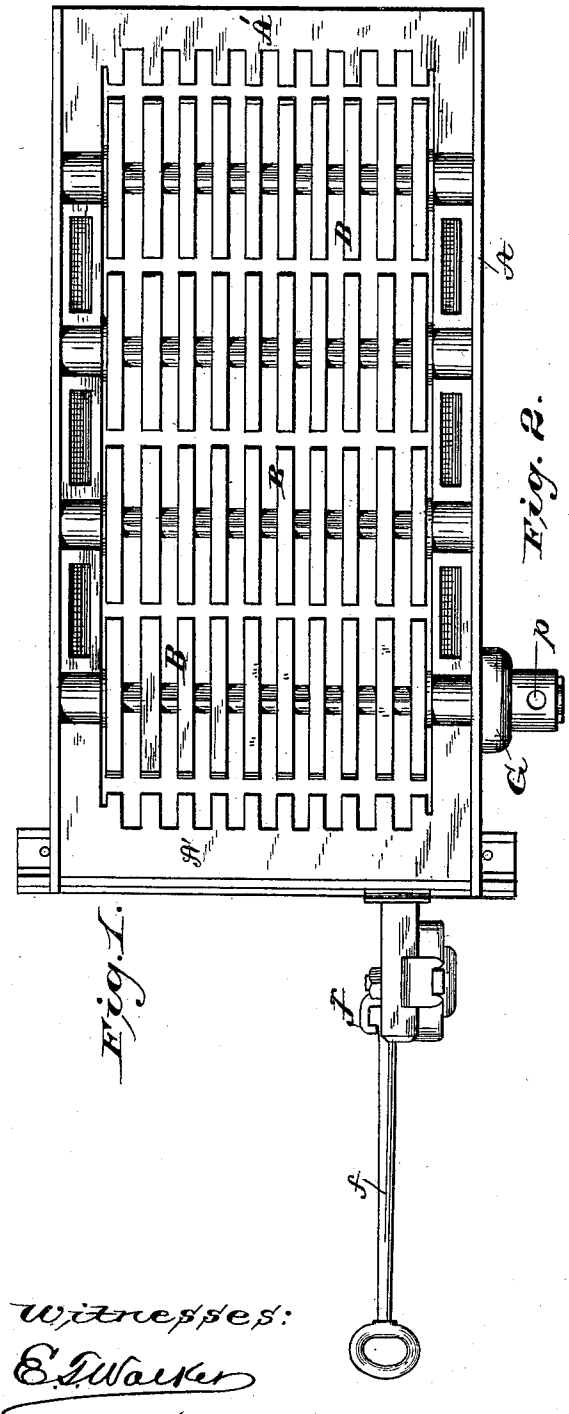


Fig. 1.

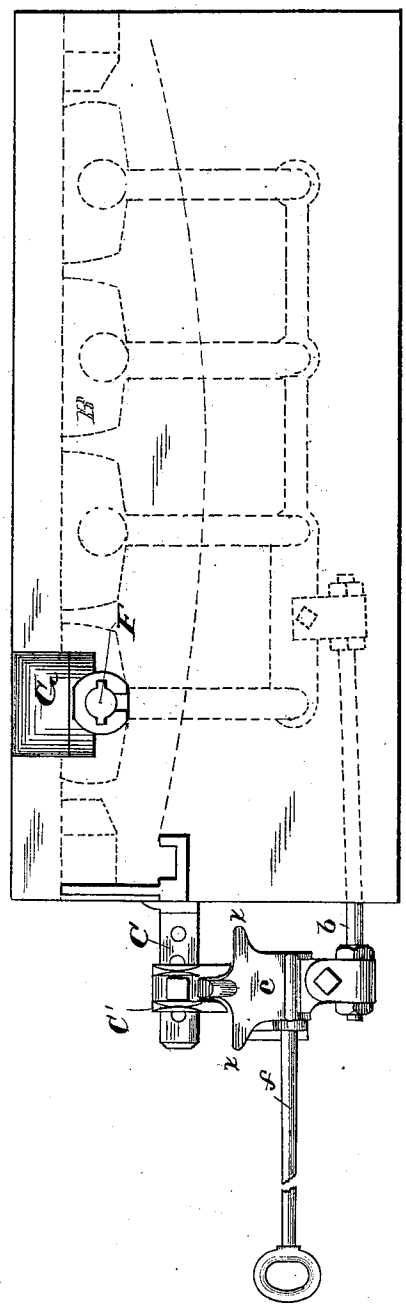


Fig. 2.

Witnesses:
E. F. Walker
S. R. Whitaker.

Inventor.
Leonard M. Woodcock.
By his attys
Whitaker & Prest.

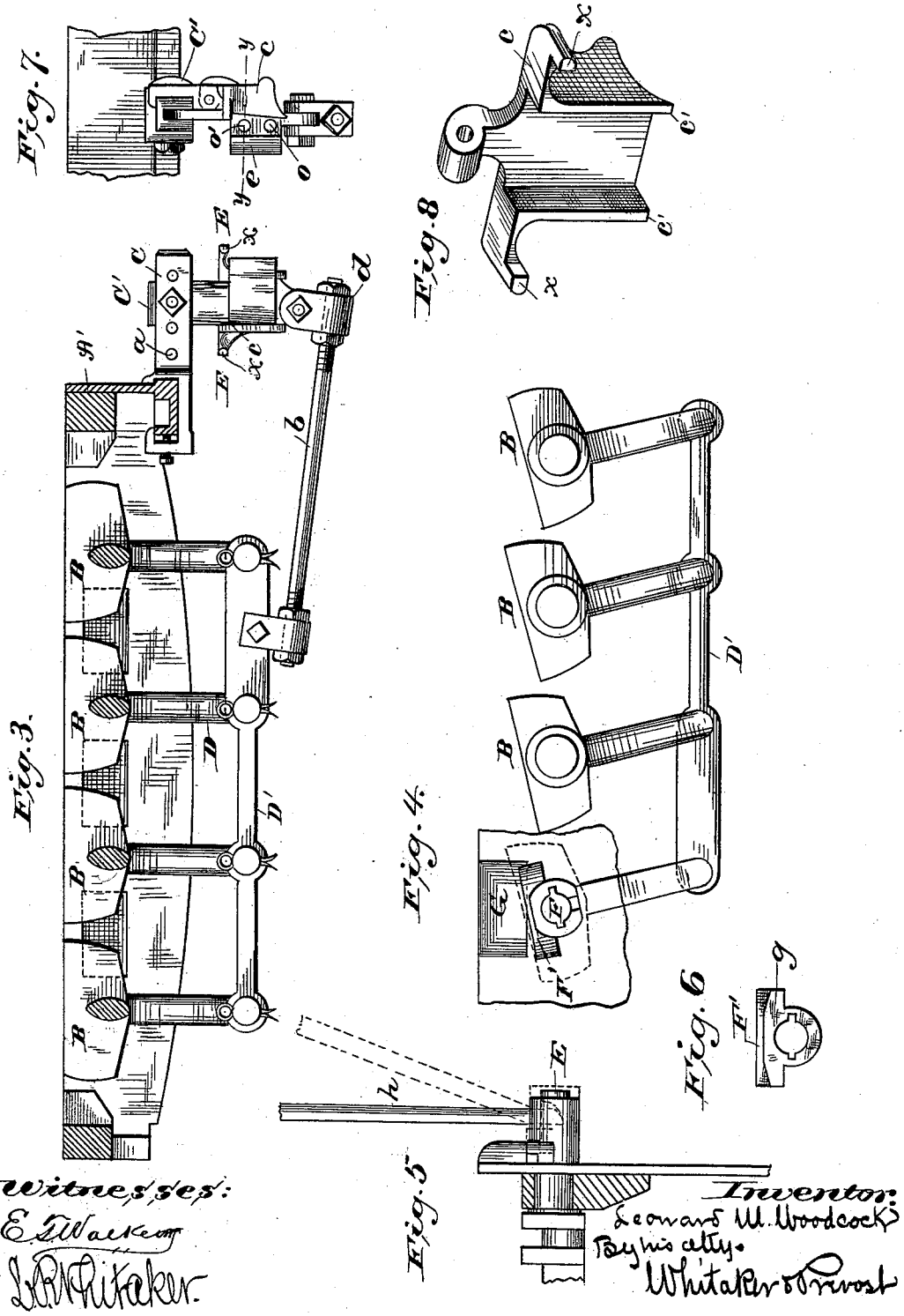
N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 2.

L. M. WOODCOCK.

GRATE.

No. 384,409. Patented June 12, 1888.



Witnesses:
E. F. Wallace
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(No Model.) 3 Sheets—Sheet 3.

L. M. WOODCOCK.

GRATE.

No. 384,409. Patented June 12. 1888.

Fig. 9.

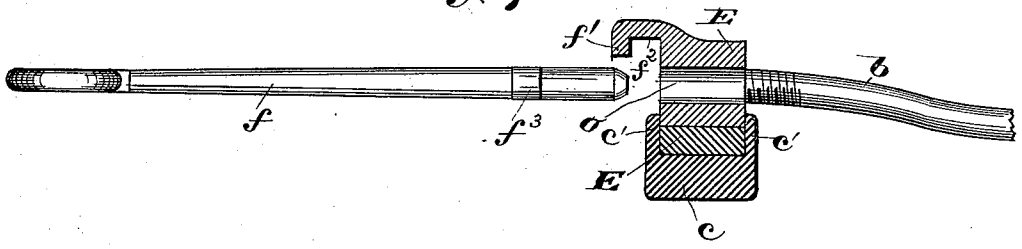


Fig. 10

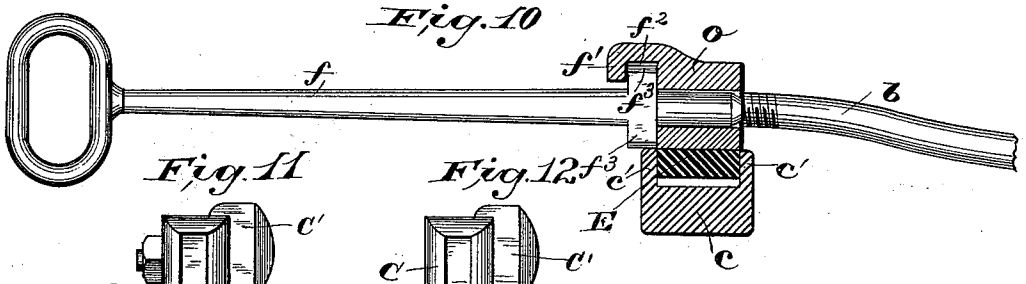


Fig. 11

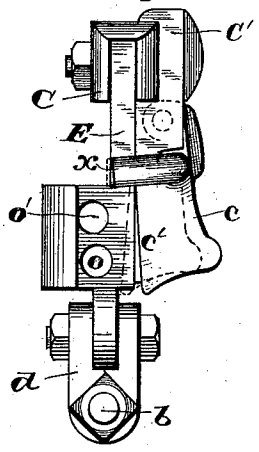
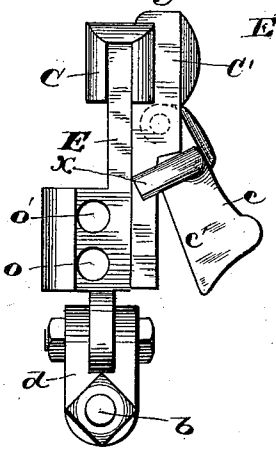


Fig. 12



Witnesses:
E. F. Wales.
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UNITED STATES PATENT OFFICE.

LEONARD M. WOODCOCK, OF AUBURN, NEW YORK.

GRATE.

SPECIFICATION forming part of Letters Patent No. 384,409, dated June 12, 1888.

Application filed June 14, 1887. Serial No. 241,266. (No model.)

To all whom it may concern:

Be it known that I, LEONARD M. WOODCOCK, a citizen of the United States, residing at Auburn, in the county of Cayuga and State of New York, have invented certain new and useful Improvements in Grates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to furnace-grates; and it consists of certain improved constructions which greatly facilitate the shaking and dumping of the same.

The following specification and claims, reference being had to the annexed drawings, fully disclose my invention.

In the drawings, Figure 1 is a plan view. Fig. 2 is a side elevation. Figs. 3 and 4 are side elevations of the grate-bars and connecting devices. Figs. 5, 6, 7, and 8 are detail views of different parts of my invention. Fig. 9 is a sectional view on line *y y*, Fig. 7, showing the position of the parts when the grate-bars are locked. Fig. 10 is a like sectional view, with the shaker *f* in position for shaking the grate and holding back the lock. Fig. 11 is a front view of the shaking-lever and lock, the latter being in position to limit the movement of the grate-bars. Fig. 12 is a similar view, but with the lock retracted to allow the grate to be dumped.

Similar letters of reference indicate identical parts throughout.

The construction of the frame A and the arrangement of the grate-bars B B is substantially the same as the construction and arrangement of the corresponding parts in my United States Patent No. 359,120. The frame shown is of rectangular form, and the grate-bars are journaled therein in the manner shown in said patent. Each grate-bar has a downwardly-depending arm, D, and said arms are connected to a connecting-bar, D′, so that such bars move in unison to shake the grate for the removal of ashes or cinders or for dumping the same.

To the front of the frame A is secured a bracket, C, provided with openings *a*. Firmly secured to this bracket is a casting, C′. These parts are similar to the corresponding parts in my said patent. To the bracket C is pivoted the arm E, which in its normal position lies against the face of the casting C′. The lower end of this arm is connected by a rod, *b*, with the connecting-bar D′. These parts are also similar to the like parts of my patent hereinbefore referred to.

To the side of the casting C′, opposite the arm E, is pivoted the lock *c*. (Best shown in Fig. 8.) This lock has flanges *c′ c′*, which extend on either side of the lower portion of the casting C′, and also on either side of the arm E, and the same is brought into a vertical position against the face of the casting, all as shown in my former patent. In addition to these locking-flanges, the lock *c* is provided near its upper end with arms extending outwardly on each side. These arms at their outer extremities are provided with lugs *x x*, as shown in the drawings.

The arm E is provided at its lower end with the lug *f′* and the groove f^2, and the shaker is provided on opposite sides with lugs f^3. The arm E is also provided with two openings, *o o′*, to receive the end of the shaker.

It will be seen that when the parts are in the normal position, as shown in Figs. 3 and 9, the arm E and the grate-bars are locked in position and are prevented from accidental displacement.

When it is desired to agitate the grate-bars, the shaker *f* is inserted in one of the openings *o o′* and turned until one of the lugs f^3 enters the groove f^2 and engages the lug *f′*, and the other lug of the shaker raises the lock *c* by bearing against the inner face of the outer flange, *c′*, until the hanging arm E is released and can be moved back and forth to agitate the the grate bars. The movement of these bars is limited and the grate kept from tipping too much by the arm E coming in contact with the lugs *x x*. When it is desired to tip the grate to dump it, the lock *c* is retracted until the lugs *x x* can no longer engage the arm E, but allow it to swing past. This lever E and its support can be located either inside of the ash-pit or can be located outside of the same and outside of the furnace, as preferred. The two openings *o o′* are for the purpose of adapting the device to different boiler-fronts.

Instead of the device shown and described,

I can use that best seen in Fig. 4. A grate-bar is provided with an extension, F, which I prefer to provide with two splines, but which may be polygonal or of any form so as to allow the sleeve F', which is made to fit it, to have an independent longitudinal movement, but will rotate with it. The inner face of the sleeve F' is shown in Fig. 6, a portion being cut away and the remaining edge, *g*, being slightly rounded.

Rigidly attached to the frame A is the projection G, so located that when the sleeve F' is placed upon the extension F and moved close to the frame the lower face of the projection G will be immediately over and in contact with the upper face of the said sleeve, and these parts being in this position, it will be seen that the grate-bars cannot be moved. In order to agitate the grate-bars, the sleeve F' is retracted until the projection G is over the rounded or reduced portion *g*, which is somewhat lower than the upper face of the sleeve. In this position the bar may be turned until the projection G comes in contact with the extremities of the edge *g*. All of the grate-bars, being connected, are affected by the movement of one, and are therefore oscillated equally with the one provided with the extension and sleeve. When it is necessary to empty the grate, the sleeve is retracted until entirely free from the projection G, when the bars may be readily tipped to any extent.

Any desirable means may be employed to move the sleeve back and forth upon the extension or to rotate the grate-bar; but I prefer to use a shaker, *h*, one end of which fits in the opening *p* of the sleeve and passes on into an opening in the extension F. The latter opening is smallest at its lower extremity; hence if the shaker is inserted and then inclined to the position indicated in dotted lines, Fig. 5, the sleeve is moved out of contact with the projection G, and the grate may then be shaken. By moving the shaker into a vertical position again the grate-bars remain fixed.

The grate-bars are the same in form as those shown in my said former patent, the lugs of the bars being placed opposite to each other and having their opposing faces of arc form. These lugs are of greater extent horizontally than vertically, and so long as the lugs are opposed to each other the space between them is not increased, and there is no grinding action on the materials supported by the grate. When it is desired to dump the grate, the grate-bars are moved so that the ends of the adjacent lugs pass each other, forming dumping spaces between the bars. The stops for the shaking devices are so located that the ends of the opposing lugs of the bars cannot pass each other. These stops limit the movement of the shaking devices, so as to prevent the accidental dumping of the grate when shaking it to remove ashes, &c. They also, by preventing the ends from passing each other, prevent any grinding action upon the coal.

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

1. The combination, with a supporting-frame and oscillating grate-bars connected for joint movement, of a lock for a movable part connected with said bars, the said lock being provided with stops located in the path of said movable part when unlocked, whereby the movement of said bars when unlocked is limited, substantially as described.

2. The combination, with a supporting-frame and oscillating grate-bars connected for joint movement, of a lock for a movable part connected with said bars, the said lock being provided with stops located in the path of the movable part when unlocked, said movable part and said stops being the one movable in relation to the other, whereby the movement of the bars for raking the fire when unlocked is limited and the limitation removed for dumping the grate, substantially as described.

3. The combination, with a supporting-frame and oscillating grate-bars connected for joint movement, and a lever connected with said grate-bars and moving with them, of a hinged plate provided with stops normally in the path of said lever, the pivots of said lever and plate being at right angles to each other, whereby the movement of the said lever and grate-bars is limited in the operation of raking the fire, and the stops made removable by swinging the plate outward to effect the dumping of the grate, substantially as described.

4. The combination, with a supporting-frame and oscillating grate-bars having opposing narrow lateral projections provided with curved ends, securing a uniform space between the ends of said projections, the said bars being connected for joint movement, of stops located in the path of a movable part connected with said bars and holding said bars from entirely passing each other, whereby the movement of the grate-bars for raking the fire is limited to such a movement as will preserve the uniform distance between the grate-bars, substantially as described.

5. The combination, with a supporting-frame and oscillating grate-bars having opposing lateral projections provided with curved ends, securing a uniform space between the ends of said projections, said bars being connected for joint movement, of a lever connected with said bars and moving with them, a hinged locking-plate provided with stops normally in the path of the said lever, but at a short distance from each side of the same, whereby the grate-bars are locked, when desired, and the movement of the same for raking the fire is limited to preserve the uniform distance between the grate-bars, and the removal of the stops will permit the projections of the bars to be turned to such a position as to increase the space between the bars, substantially as described.

6. The combination, with a supporting-

frame and oscillating grate-bars connected for joint movement, of a lever connected with said grate-bars and moving with them, a hinged plate provided with locking projections and stops, and an actuating bar or key with projections for engaging the lever and locking projections of the plate, whereby the movement of the lever and grate-bars is limited in raking the fire and locked when the actuating-bar is removed, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LEONARD M. WOODCOCK.

Witnesses:
CHAS. O'BRIEN,
CHARLES E. KERR.