(No Model.) 2 Sheets—Sheet 1.

C. P. WHITE.

FIRE GRATE.

No. 342,410. Patented May 25, 1886.

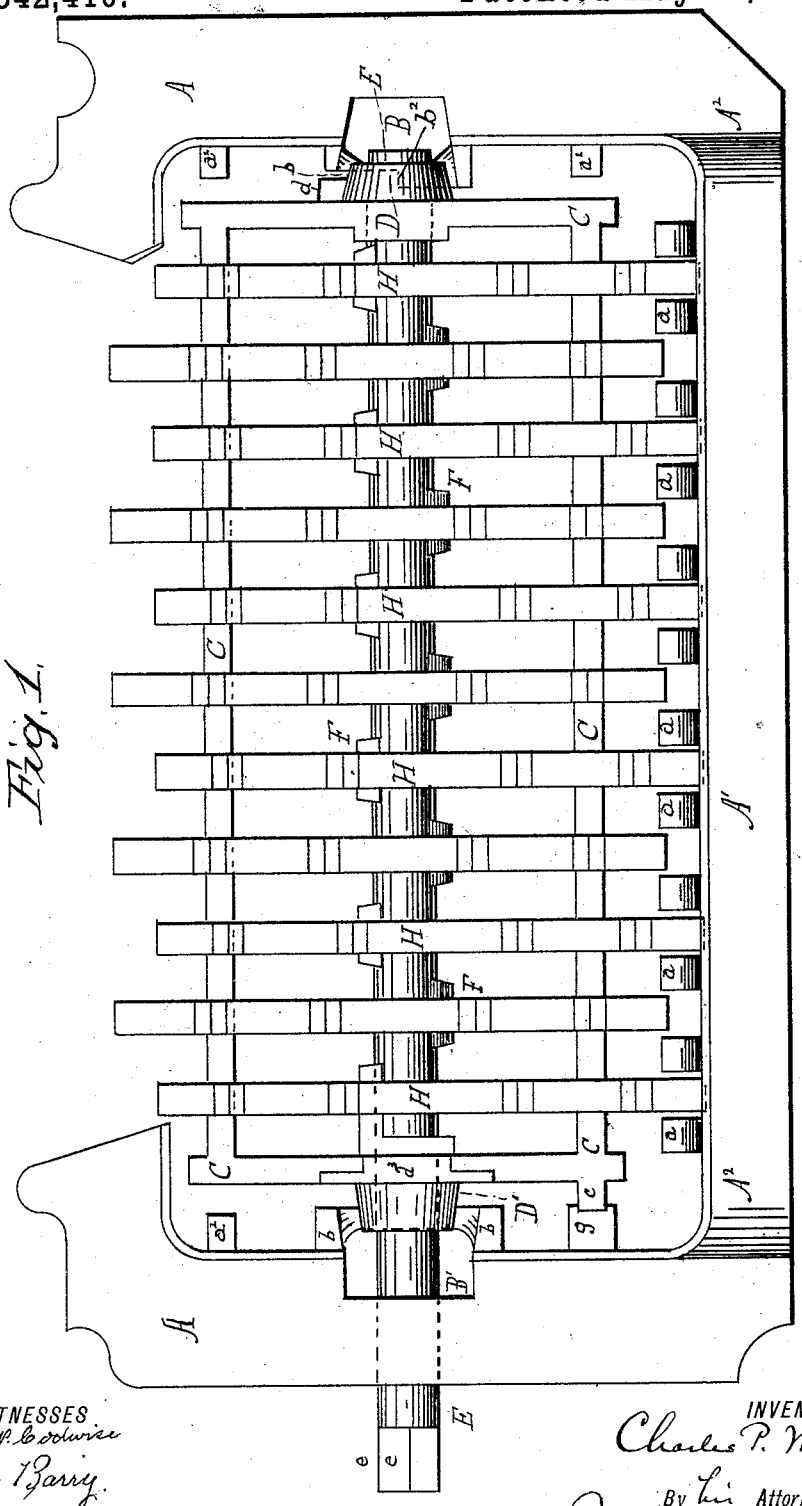


Fig. 1.

WITNESSES
Geo. A. P. Codwise
H. E. Barry.

INVENTOR
Charles P. White
By his Attorney
Wm. B. A. Dowse

(No Model.) 2 Sheets—Sheet 2.

C. P. WHITE.

FIRE GRATE.

No. 342,410. Patented May 25, 1886.

Fig. 2.

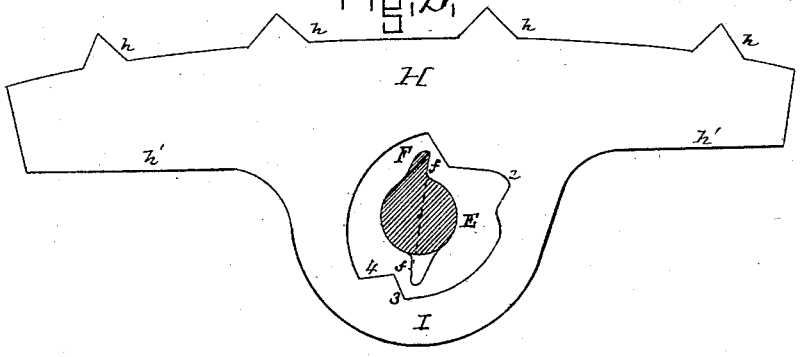


Fig. 3.

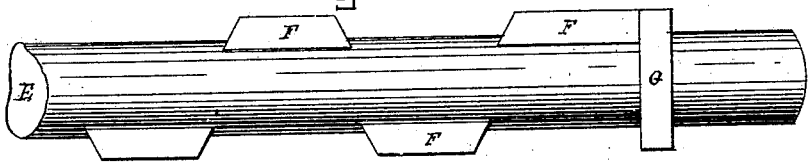


Fig. 4.

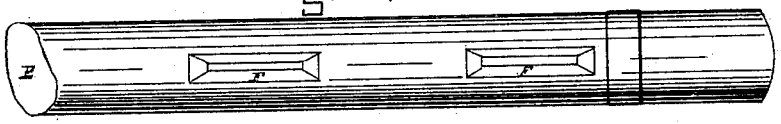


Fig. 5.

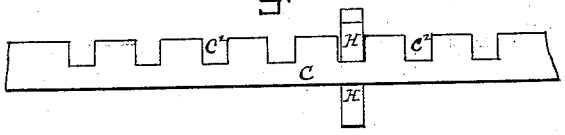
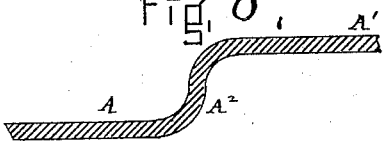


Fig. 6.



WITNESSES

Wm. G. Button

Geo. H. Somebody.

INVENTOR

Chas. P. White

By his Attorney

Wm. B. H. Dowse

UNITED STATES PATENT OFFICE.

CHARLES P. WHITE, OF TAUNTON, MASSACHUSETTS.

FIRE-GRATE.

SPECIFICATION forming part of Letters Patent No. 342,410, dated May 25, 1886.

Application filed January 26, 1885. Serial No. 153,946. (No model.)

To all whom it may concern:

Be it known that I, CHARLES P. WHITE, of Taunton, in the county of Bristol, Commonwealth of Massachusetts, have invented certain new and useful Improvements in Fire-Grates, of which the following, taken in connection with the drawings forming a part of this specification, is a full and complete description.

The object of my invention is to produce a fire-grate for general use that, by the simple rotation of a crank in one direction, will rake the fire, and by a part turn in the reverse direction, when required, dump the fire, another part turn in the first-mentioned direction relifting the grate again.

The motion of the grate-bars is entirely horizontal, (there is no rising and falling motion,) and the fire is held entirely above the grate frame-work.

In the drawings, Figure 1 is a horizontal plan view of the entire grate. Fig. 2 is a side elevation of one of the grate-bars, showing also a section of the shaft. Fig. 3 is a side elevation of shaft, showing face of lugs. Fig. 4 is an end elevation of same shaft, showing end of lugs. Fig. 5 is a side elevation of a portion of one of the sides of the grate-frame, showing one grate-bar in place. Fig. 6 is a vertical section of the outer frame or grate-rest, A A^2 A', Fig. 1.

A is the outer frame or grate-rest, open at the back, and having its front portion, A', raised about an inch above the rest of the frame by curves, as at A^2. Small fingers *a* project from this front portion of the frame. Between the grate-bars other small projections, a^2, are attached at the ends; but the projection *g* is bent below the level of the frame and projects far enough to act as a rest for the end *c* of the grate-frame, to prevent its being depressed at the front below the horizontal. At each end of this grate-rest or outer frame are journal boxes or bearings B B, placed sufficiently below the level of the frame to allow the shaft E to pass under it. The bearing B has a notch, *b*, cut in it, leaving a stop, b^2, which operates to prevent the grate-frame being turned beyond the perpendicular when dumped.

The inner frame or grate-frame is simply rectangular, the bars at front and back being notched with square openings c^2, as shown in Fig. 5, in which the grate-bars H rest. At the ends of this frame are hollow slightly-conical journals D and D'. D is cast on and forms a part of the frame C. It has a small lug, *d*, which is so placed as to abut against the shoulder b^2 of the bearing B and prevent further turning of the frame in that direction. The hollow journal D' is made in halves, the upper half forming part of a movable piece, d^3, which is secured to the frame C by screws screwed into holes. When this piece is removed it leaves an open slot, *s*, through which the shaft E may be inserted. The shaft E is a cylindrical rod having cast upon it, at intervals corresponding to the distance apart of the grate-bars, lugs F. Every alternate lug is upon the opposite side of the shaft. One side of each lug is straight and radial, or nearly so, the other face being curved and slopes, so as to give the lug greater breadth at the base than the top. This is shown at *f f'* in Fig. 2.

There are lugs G on the shaft E at each end, just outside the grate-frame C, to prevent the shaft sliding longitudinally in the frame. These lugs are preferably placed upon the upper and under side of the shaft, so as to allow the shaft to be inserted into its bearing on the frame C through the slot filled by the pieces d^3, and of the grate-bars being easily strung upon it. A square end, *e*, is made upon one outer end of the shaft E, to which a crank can be attached to operate the grate.

The grate-bars H, as shown, consist of a straight or slightly-curved flat bar set edgewise, with a circular expansion, I, below, in which is an approximately circular hollow cam having the four acting faces indicated at 1, 2, 3, and 4 of Fig. 2.

Acting face 1 is to drive the bar from left to right when acted upon by a lug attached to shaft E. 2 is a locking-notch to right the grate after dumping. 3, when acted upon by a lug of the shaft, moves the grate-bar in the reverse, direction, and 4 acts to dump the grate, when, by turning the crank in the reverse direction, the rear or curved face of one of the lugs is brought against it. On the top of the grate-bars are projecting points, which may be of any number or shape, and which act by keeping hold of the coal, so that the fire is more thoroughly shaken.

The operation of my invention is as follows: The crank-handle is attached to the square

end *e* of shaft E, and is turned from left to right, rotating the shaft and carrying one series of lugs to act upon the cam-faces 1 of the grate-bars, moving them forward in a horizontal direction from left to right, while the alternate grate-bars are, by means of the alternate lugs at that time on the lower side of the shaft, acting against the faces 3 of the grate-bars, moved in the opposite direction, or from right to left. As the motion of the crank is continued, the same lug which acted on face 1 and moved the bar from left to right comes in contact with face 3 and moves the bar back, or from right to left, while, at the same time, the alternate grate-bars, by the other series of lugs on the shaft, is moved back from left to right by the lug coming in contact in its motion with face 1. In other words, the two acting faces 1 and 3 of the hollow cams are so constructed in relation to the shaft and its alternate series of lugs that on rotating the shaft from left to right all the lugs on the upper side of the shaft press against face 1 of their corresponding grate-bars, forcing the grate-bars forward by a sliding motion in their groove. Simultaneously the lugs on the under side of the shaft press against face 3 of the cams of their corresponding grate-bars, forcing them forward by a sliding motion in the opposite direction. The next half-turn of the shaft brings the lugs that were at the top to the bottom, and of course, the lugs on the bottom to the top of the shaft, so that the motion of the bars is reversed, and the crank being turned with a continuous rotary motion in one direction, from left to right, an alternate reciprocating motion of the grate-bars is produced. This motion can be continued as long as required, the crank being rotated continuously from left to right. The points upon the upper surface of the grate-bars keep hold of the coal, and the motion of the bars being in opposite direction in every alternate bar at the same time the fire is thoroughly shaken up, this action closely resembling that of hand-raking. When it is wished to dump the fire, the crank is turned one-quarter turn in the opposite direction from the direction used to rake the fire. The locked or curved face of the lugs presses against the faces 4 of the cams in the grate-bars. These faces are so constructed that the lugs cannot possibly get past, and thus the whole grate is carried with the motion of the crank and the fire dumped. The grate is prevented from passing the vertical by a shoulder, b^2, on the lower part of the bearing B. To right the grate, the handle is turned from left to right. The lugs uppermost at the time catch in the locking-notches 2, and the grate is brought to the horizontal position. The lugs can then slip by and the continuous rotation proceed as before, when required.

Among the many advantages of this improved grate are the ease and facility with which the fire is shaken, the motion of the bars keeping the coal in motion and very quickly freeing the fire from ashes; that the the grate can be shaken, dumped, and thrown back into position without removing the crank from the shaft; its durability, the fire being held above the frame-work of the grate and resting entirely upon the movable bars, which are entirely free to expand and contract, and are thus less liable to warp or get out of place; that it can be adapted to any class of fire-bed grate or grate-rest without any change whatever in the mechanism by which it is operated, all that is necessary to adapt it to the shape of any particular grate-rest being a change supply in the length of the grate-bars.

What I claim is—

1. In a fire-grate, a grate-bar frame, and a shaft provided with alternately-opposite lugs, in combination with grate-bars having therein holes provided with nearly-vertical cam-faces, whereby by turning said shaft a reciprocating motion is given to the alternate grate-bars on the same level in opposite directions at the same time, substantially as described.

2. In a fire-grate, an outer frame, a grate-bar frame, and a shaft provided with alternately-opposite lugs, in combination with grate-bars each having therein a hole provided with nearly-horizontal cam-faces above and below the said shaft, whereby the grate-bars are turned to a vertical position, substantially as described.

3. In a fire-grate, an outer frame, a grate-bar frame, and a shaft provided with alternately-opposite lugs, in combination with grate-bars each having therein a hole provided with a locking-notch, whereby the grate-bars are turned from a vertical position to a horizontal position, substantially as described.

4. In a fire-grate, an outer frame, a grate-bar frame, and a shaft provided with alternately-opposite lugs, in combination with grate-bars each having therein a hole provided with substantially horizontal cam-faces, substantially vertical cam-faces, and a locking-notch, whereby, from revolving the shaft in one direction, the grate-frame is thrown from a horizontal to a vertical position, then by reversing the motion of the shaft the grate-frame is brought to its original horizontal normal position, and by continuing the motion of the shaft in the last direction a reciprocating motion is given to the grate-bars, substantially as described.

5. A fire-grate composed of an outer grate-frame, A, provided with stops b^2 g, the grate-bar frame C, provided with a lug, D, grate-bars each having therein a hole provided with cam-faces and a locking-notch, in combination with a shaft, E, provided with alternately-opposite lugs, all arranged substantially as described.

In witness whereof I have hereunto set my hand.

CHARLES P. WHITE.

Witnesses:

WM. B. H. DOWSE,

H. E. BARRY.