

(No Model.)

R. NEWTON.
Grate.

No. 233,003.

Patented Oct. 5, 1880.

Fig. 1.

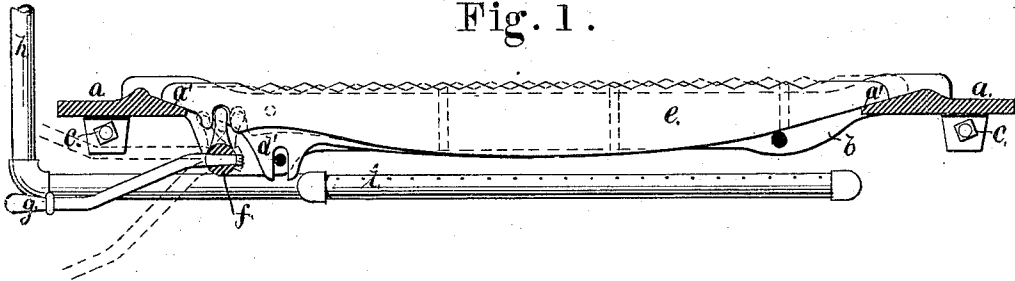


Fig. 2.

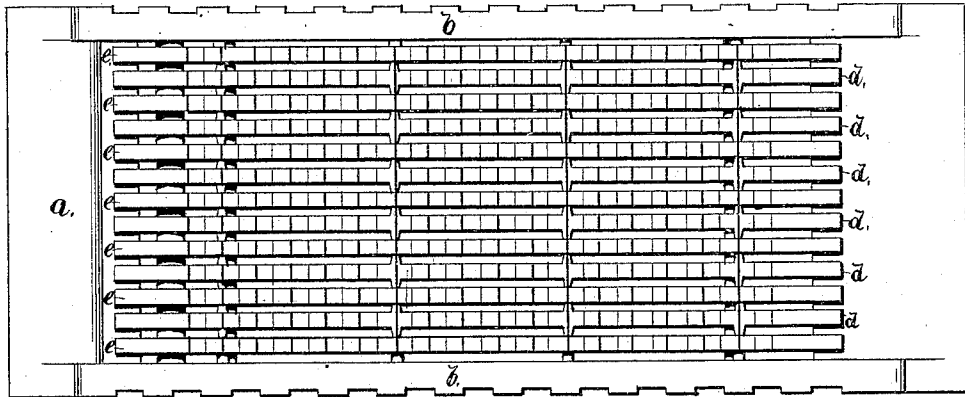


Fig. 3.

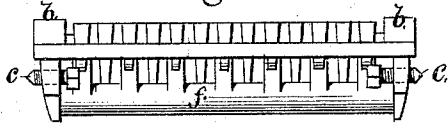


Fig. 4.

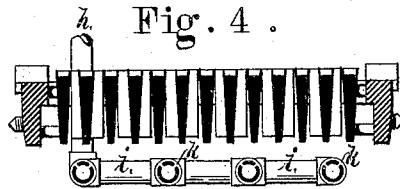
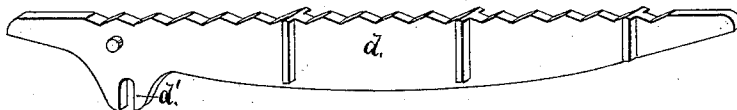


Fig. 5.



WITNESSES:

Louis A. ...
Joseph A. Miller, Jr.

INVENTOR:

Robert Newton.
by Joseph A. Miller,
att'y

UNITED STATES PATENT OFFICE.

ROBERT NEWTON, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO BARNARD COLLINGHAM, OF SAME PLACE.

GRATE.

SPECIFICATION forming part of Letters Patent No. 233,003, dated October 5, 1880.

Application filed May 12, 1880. (No model.)

To all whom it may concern:

Be it known that I, ROBERT NEWTON, of the city and county of Providence, and State of Rhode Island, have invented a new and useful Improvement in Grates; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to an improvement in grates adapted for use in steam-generators; and it consists in the peculiar construction of a frame and a series of alternate fixed and reciprocating grate-bars, as will be more fully set forth hereinafter.

Figure 1 is a longitudinal view, showing the grate-bars resting on a dead-plate at each end and means for operating every alternate bar. I have also shown in this figure the well-known arrangement of steam-pipes beneath the grate. Fig. 2 is a top view of the grate, showing the frame with the dead-plates on which the bars are supported. Fig. 3 is an end view of the grate, showing the screws by which the frame is supported. Fig. 4 is a cross-section of the grate, showing also an arrangement of steam-jets. Fig. 5 is a perspective view of one of the stationary grate-bars.

In the drawings, *a a* represent two dead-plates placed at the front and rear of the furnace. On these dead-plates the grate-bars rest. The portion *a'*, on which the grate-bars rest, as well as the ends of the grate-bars, are beveled so that the bars rest on an inclined plane.

b b are two side frames, which are secured to the dead-plates, and which form, with the dead-plates, the frame in which the grate-bars are supported and operated. The side frames, *b b*, have their outer edge serrated, so that air can pass between the frames *b b* and the sides of the furnace.

c c are screw-bolts threaded into the side frames, *b b*, so that they can be adjusted to project more or less from the sides. Strips of metal are secured in the fire-box of a steam-boiler, or plates are laid into the walls of a furnace, and on these the screw-bolts rest, so as to support the frame and the grate, and

allow the same to expand and contract freely by the variation of the heat to which they are subjected.

d d are the alternate fixed grates, provided with distance-pieces, by which the desired air-space between the grate-bars is maintained. These grate-bars *d* are provided with a slotted projection, *d'*, forming a fork, into which a bar or rod is placed, so that all the fixed bars are held in their proper position, but free to expand and contract. The top edge is serrated, having flat angular ridges, as is plainly shown in Fig. 5.

e e are the reciprocating grate-bars placed between the stationary bars *d d*. They also rest on the beveled surface of the plates *a a*, and are provided on one end with a forked projection, into which short levers formed on the rock-shaft enter, so that by the partial oscillation of the rock-shaft *f* the grates *e e* are reciprocated. The grates *e e* are provided with a serrated edge, like the edge on the bar shown in Fig. 5, and as the ends of the bars are beveled it will be apparent that when they are reciprocated they will rise on one end and descend on the other, alternately, at each reciprocation. They will therefore break up any cinders and lift the coal on the grate, and thus loosen the ashes and riddle the same through the grate until the fire is clear and bright, allowing the air to pass freely to and through the fuel.

g is a bar constructed so as to be inserted into the rock-shaft *f*, and extending outside the furnace, whereby considerable leverage power are secured, and the heaviest fire can be readily cleaned without opening the fire-door, and allowing a large quantity of cold air to pass over the fire and through the steam-generator, as is now the case when the fire is cleaned by means of the slice-bar, which causes a very large loss in heat and steam, and consequently fuel.

To prevent the heating of the bars, to improve the combustion, and accelerate the draft or supply of oxygen to the fire, I may make use of the well-known expedient of steam-jets beneath the grate; and to this end I connect the pipe *h* with the steam and place a valve in the pipe, so as to control the admission of

steam. I connect the steam-pipe *h* with a number of smaller pipes, *i i*, placed horizontally under the grate and in close proximity to the same. The pipes *i i*, I perforate with fine holes *k k*, placed, preferably, at an angle of ninety degrees, or thereabout.

When steam is admitted the same will rush, with a velocity proportioned to the pressure, out of these fine holes, and carrying large quantities of air with it will impinge upon the grate-bars and be forced into the bed of incandescent fuel, furnishing a large quantity of air mixed with steam and vastly increasing the combustion. A small quantity of steam will thus at all times improve the combustion, but will be found of particularly great value after the fire has been cleaned by the shaking out of the ashes and the breaking up of the cinders. The quantity of steam should therefore be greater after the shaking, and less or none during the intervals, as may be found best and most convenient.

As all the bars are loose, new bars may be readily substituted for worn bars; and as they are supported in a fixed frame, free to expand and contract, this grate can be placed into any steam-generator or other furnace without disturbing the sides or walls of the same.

Having thus described my invention, I claim

as new and desire to secure by Letters Patent—

1. In a grate, the dead-plates *a*, having beveled faces *a'*, and the side bars, *b*, constituting therewith a frame, in combination with fixed bars *d* and movable bars *e*, having beveled ends and supported or resting upon the beveled dead-plates, substantially as and for the purpose described.

2. The combination, with the plates *a a* and the sides *b b*, arranged to support a set of grate-bars, of the screw-bolts *c c*, constructed to support the frame and allow the same to expand and contract, as described.

3. In a grate, the inclined faced dead-plates *a* and the side bars, *b*, forming therewith a frame, in combination with a series of fixed bars, *d*, having forked ends *d'*, a rod placed in said forked ends to connect the bars, a series of movable bars, *e*, a rock-shaft, *f*, connected therewith, and an outwardly-extended handle, *g*, to operate said rock-shaft from without the furnace to reciprocate the bars *e*, substantially as and for the purpose described.

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