

E. CARD.  
Grate.

No. 220,464.

Patented Oct. 14, 1879.

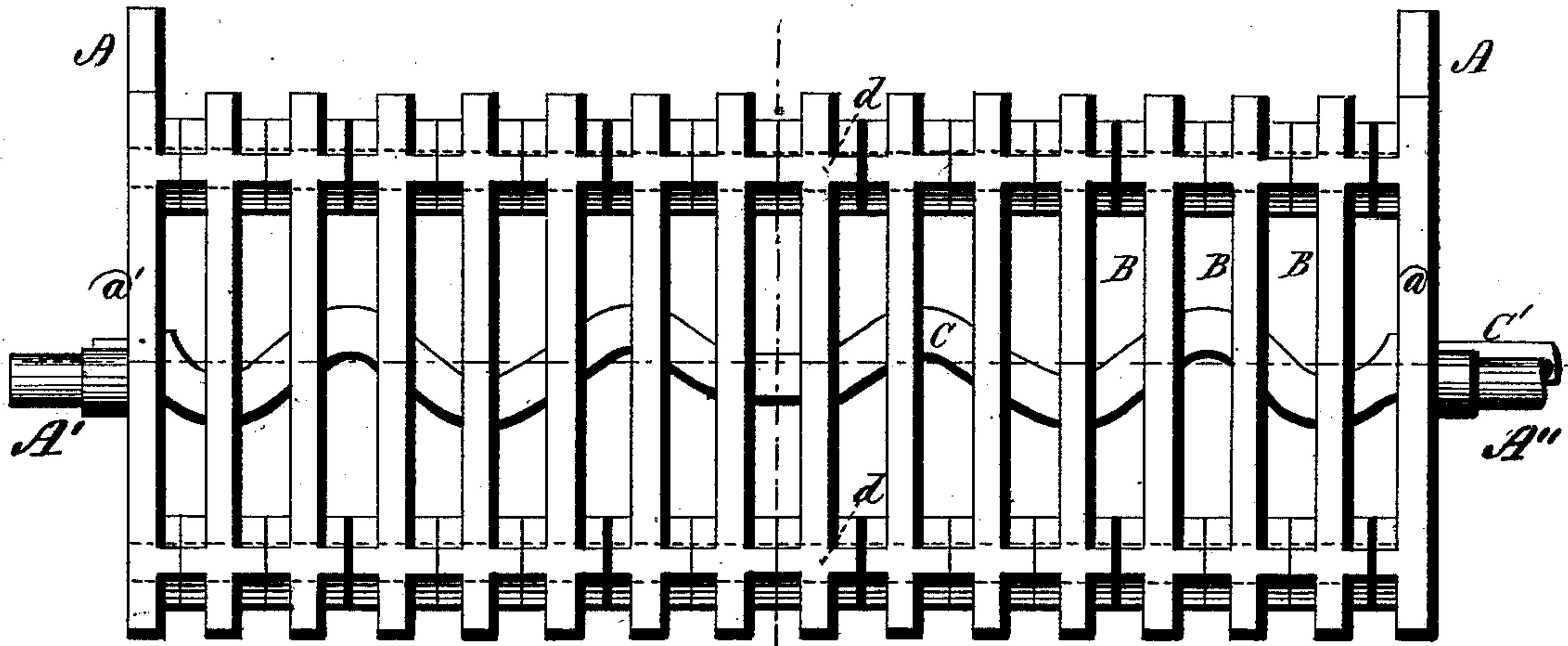


FIG. 1.

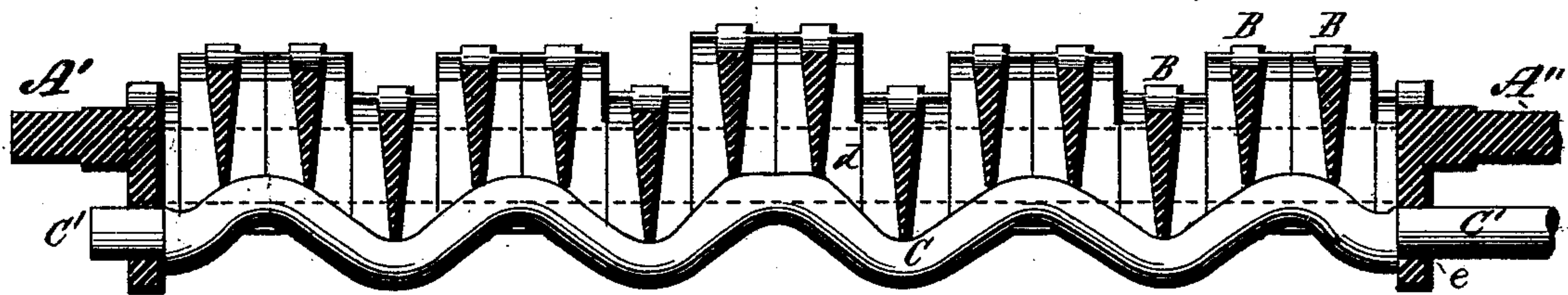


FIG. 2.

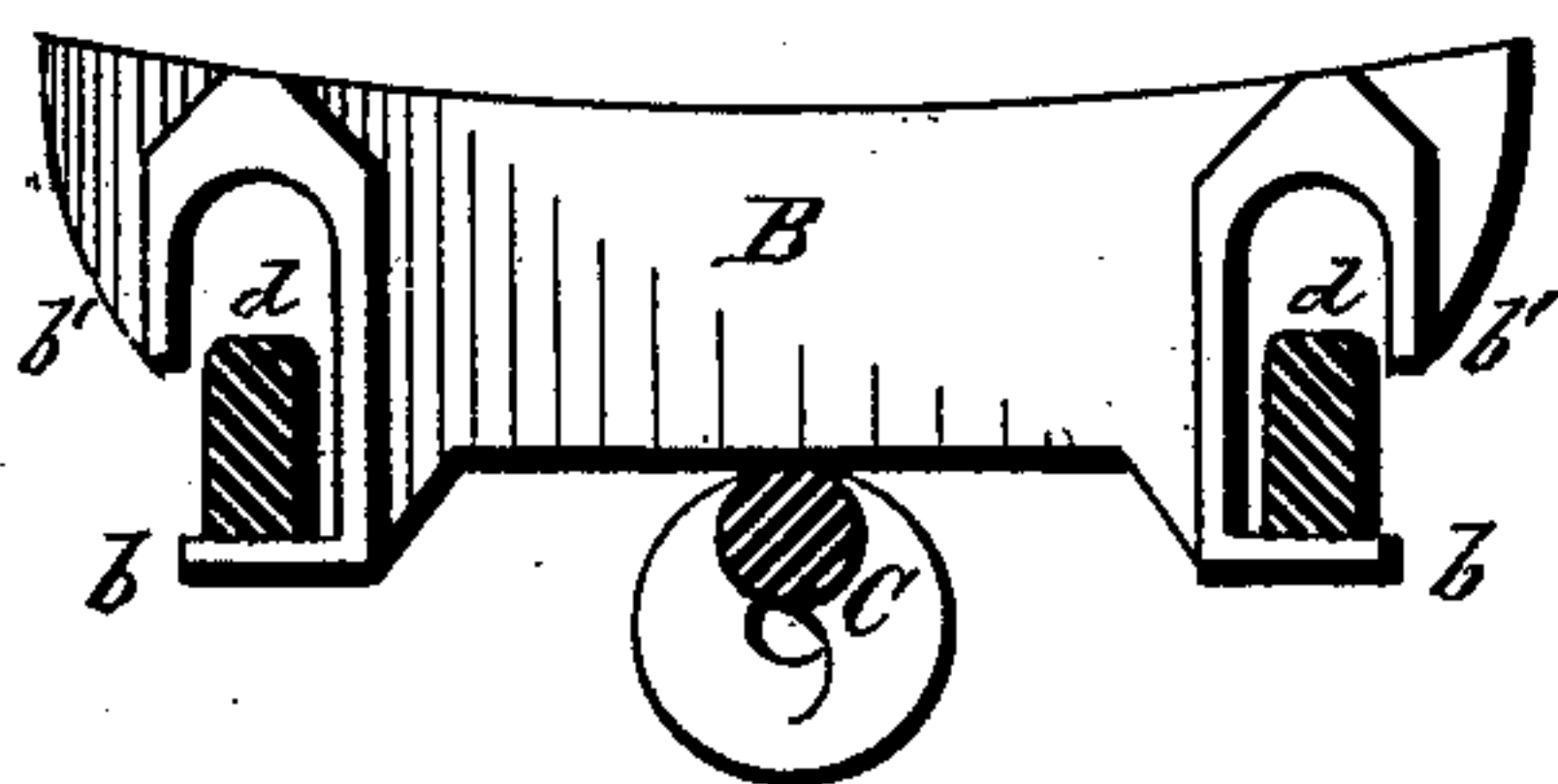


FIG. 3.

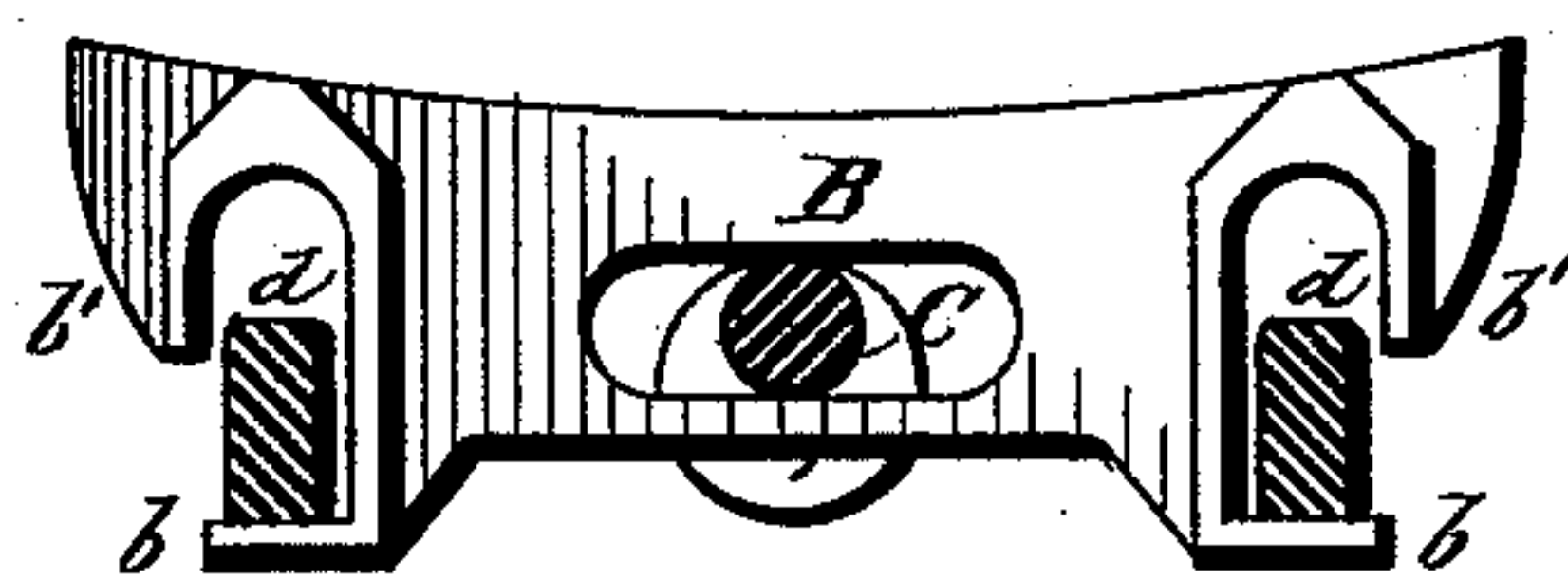


FIG. 4.

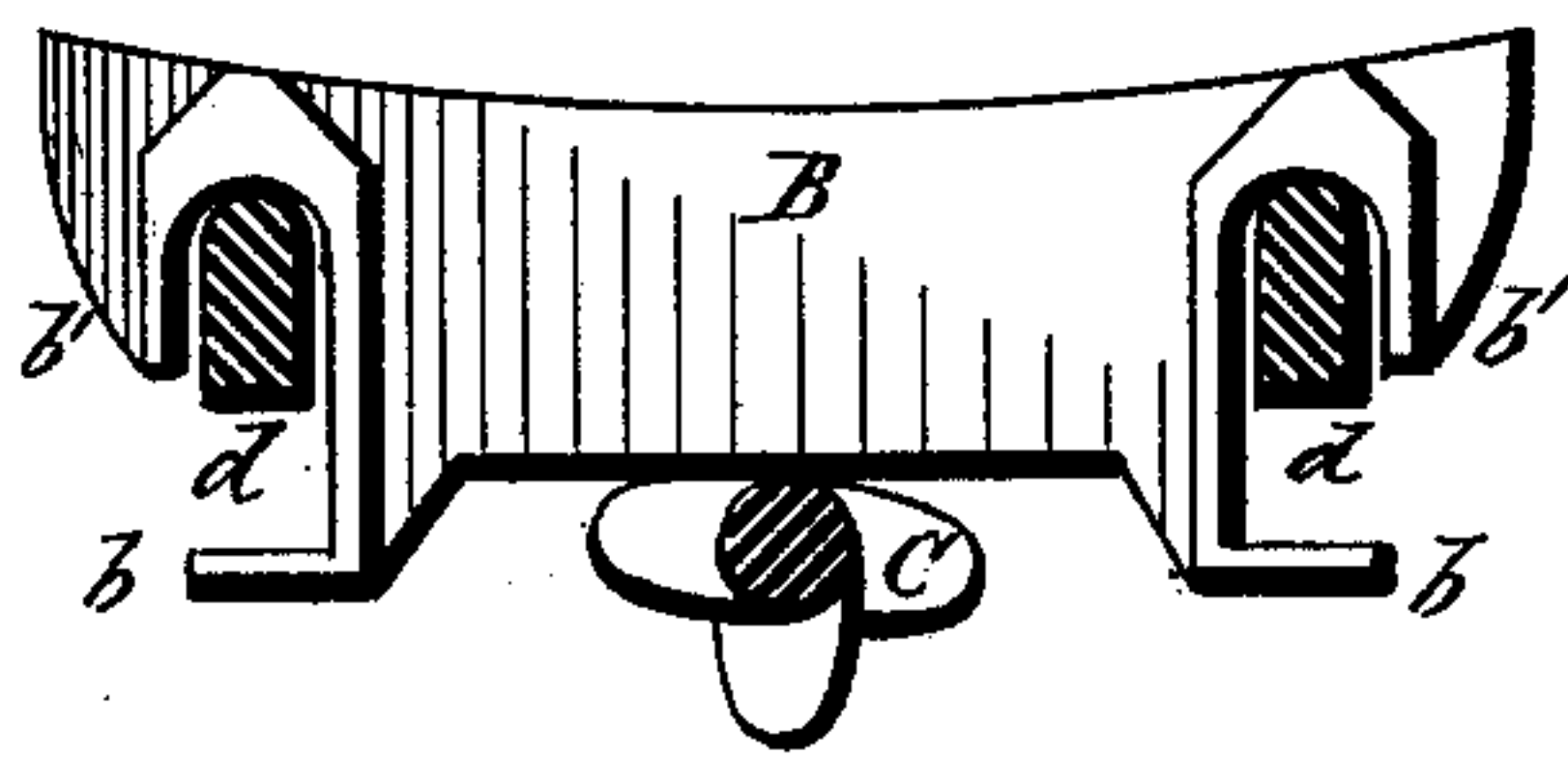


FIG. 5.

WITNESSES.

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EDWARD CARD, OF PAWTUCKET, RHODE ISLAND.

## IMPROVEMENT IN GRATES.

Specification forming part of Letters Patent No. **220,464**, dated October 14, 1879; application filed June 12, 1879.

*To all whom it may concern:*

Be it known that I, EDWARD CARD, of Pawtucket, in the State of Rhode Island, have invented an Improvement in Grates, of which the following is a specification.

The nature of my invention consists in a dumping stove-grate composed of independently-moving grate-bars loosely secured to the dumping-frame, and arranged to move up and down freely at both ends, being operated in their up-and-down movement by means of differential cams.

Figure 1 is a plan view of the grate, showing the parallel grate-bars and the dumping-frame to which they are attached. Fig. 2 is a longitudinal section of the same. Fig. 3 is a transverse section. Fig. 4 is a transverse section, showing a modification of the grate-bar. Fig. 5 is a transverse section, showing a modification of the cam.

In the drawings, A A is the dumping-frame, arranged to turn upon the trunnions A' A'', and to which the grate-bars B B are loosely secured, so that both ends of the bars may be free to partake of an up-and-down movement, to be imparted to them independently of each other by means of the cam-shaft C'. The cam C is located at or near the middle of the grate-bars B B, and may be conveniently made in the form of a spiral-shaped rod; but a revolving or vibrating cam of any other suitable form may be used in like manner to move the grate-bars B B independently of each other.

The bars B B are so arranged that an up-and-down movement will be imparted to both ends of the same from the centrally-arranged cam C, and are provided with lips *b b*, serving to prevent the removal of the grate-bar from the dumping-frame when the grate is turned down for the purpose of dumping the coal and ashes, and, with hooks *b' b'*, serving to prevent the ashes from entering at the ends of the bars into the space above the connecting-rods *d d* of the dumping-frame, so as to obstruct the movement of the bars, and also to protect the connecting-rods *d d* from the action of the fire, so as prevent them from warping.

In constructing my improved grate, I preferably cast the end *a* of the dumping-frame and the longitudinal connecting-rods *d d* in one

piece, and then, after placing the bars B B side by side upon the rods *d d*, and inserting the end of the cam-shaft C' into the drilled hole *e*, I attach the end *a'* by means of pins or otherwise. I make the spiral cam C with both a right and left hand turn, in order to balance its action upon the several grate-bars, and it may also be made to pass through slots formed in the bars, as shown in Fig. 4, so that both the upward and downward movement may be controlled in a positive manner.

The operation of this improved grate is such that the action of the cam C serves to elevate and depress the individual grate-bars alternately, and thus to thoroughly shake and stir the coals and ashes; and a dumping-grate made in this manner may be speedily repaired by simply placing new single grate-bars upon the rods *d d*.

Grate-bars made independent of the frame are also less liable to warp than when cast in one piece.

The action of the grate is such that all parts of the fire are operated upon at the same time, and there are no corders or other points where the ashes can collect and remain unacted upon. The ashes will therefore be thoroughly sifted from the coal, which will in all cases come out bright and clear.

Instead of the spiral cam C, a series of cams, as shown in Fig. 5, may be arranged upon the cam-shaft, so that when in one position the grate-bars may rest in the same horizontal plane, and the opening at the ends of the grate-bars may be made of such vertical height that in case one end of the grate-bar becomes temporarily obstructed by coal or cinders the other end may continue its movement, and thus relieve the cam from extra strain, the same cam, when arranged at or near the middle of the grate-bar, being able to operate either one or both ends of the bar, as circumstances may require.

I claim as my invention—

1. The pivoted dumping-frame A, in combination with the bars B B, having both ends loosely and similarly connected to the rods *d d*, and operated to rise and fall independently of each other by means of cams arranged differentially, and also connected to the dump-

ing-frame, so that the whole combination may be turned to dump the coal and ashes without disturbing the parts in their relation to each other.

2. The independent grate-bars B B and dumping-frame A, in combination with a cam, C, arranged for operation at or near the middle of the bars.

3. The spiral-shaped cam C, combined with the independently-moving grate-bars.

EDWARD CARD.

Witnesses:

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