2 Sheets—Sheet 1

J. M. CRAWFORD.

Grate.

No. 218,238. **Patented Aug. 5, 1879.**

Fig. 1

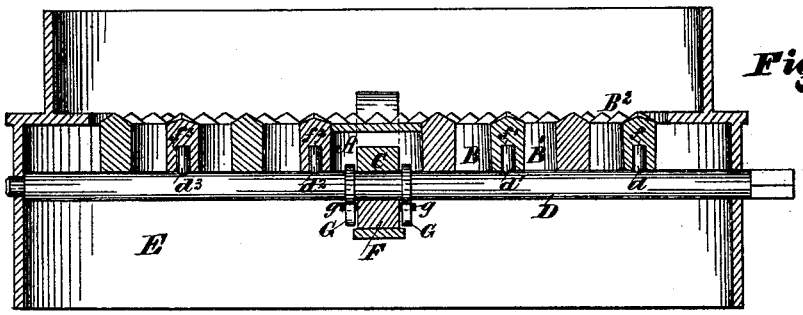


Fig. 2

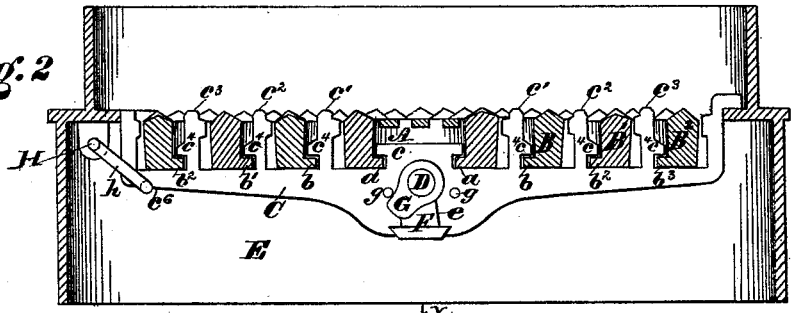
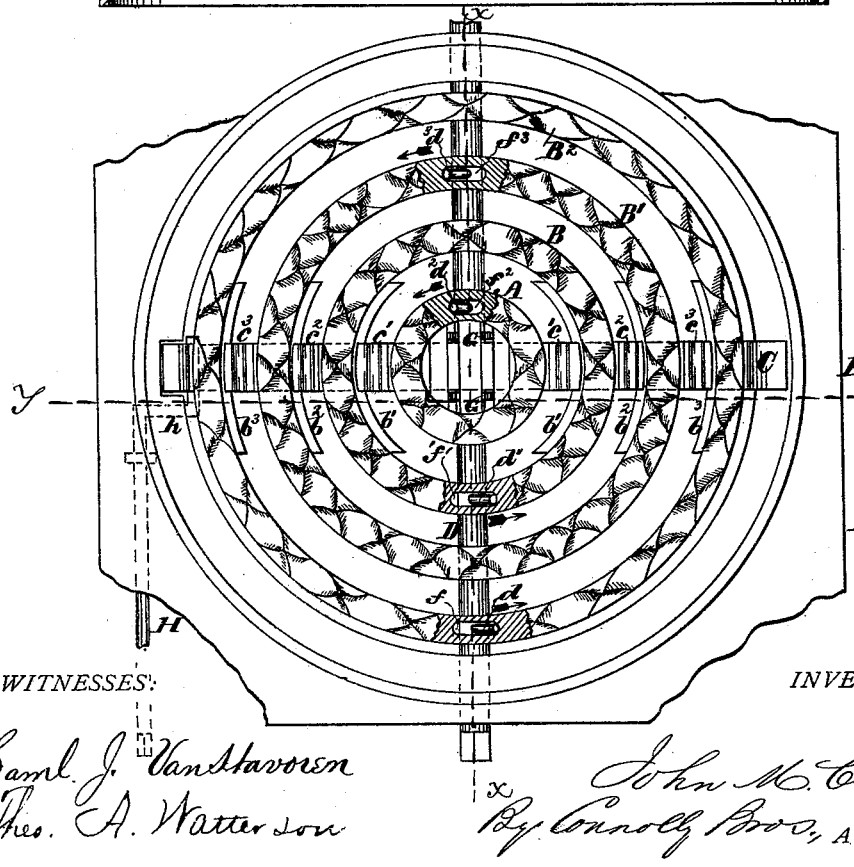


Fig. 3



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Thos. A. Watterson

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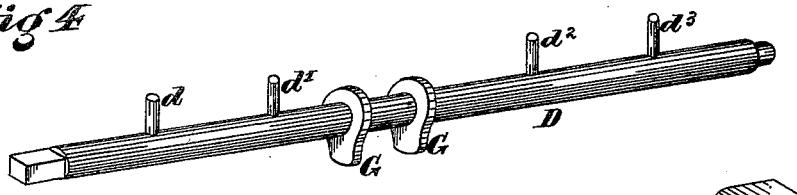
2 Sheets—Sheet 2.

J. M. CRAWFORD.

Grate.

No. 218,238. Patented Aug. 5, 1879.

Fig 4



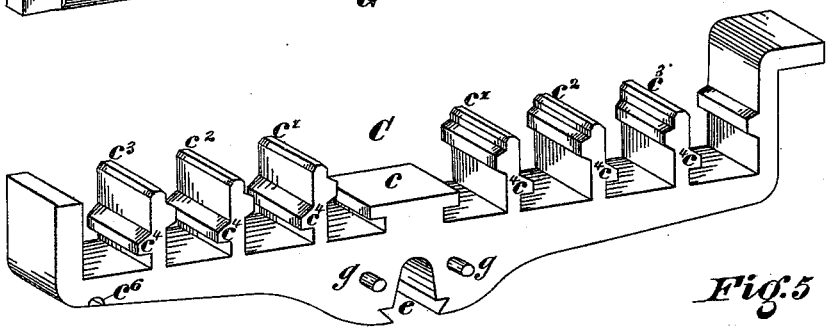


Fig.5

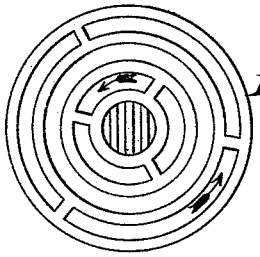


Fig.9

Fig.6

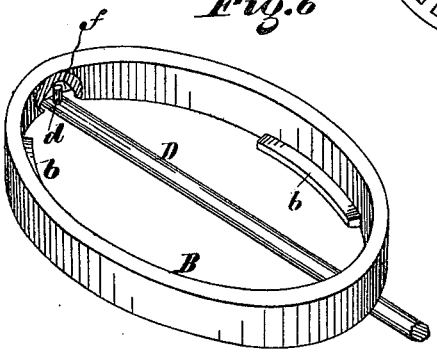
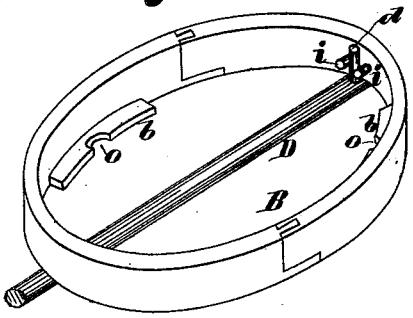


Fig.7



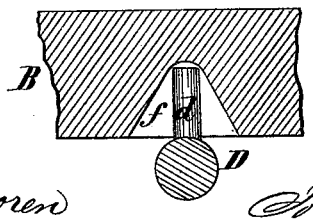


Fig.8

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UNITED STATES PATENT OFFICE.

JOHN M. CRAWFORD, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN GRATES.

Specification forming part of Letters Patent No. **218,238**, dated August 5, 1879; application filed April 15, 1879.

To all whom it may concern:

Be it known that I, JOHN M. CRAWFORD, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a longitudinal vertical section on the line *x x*, Fig. 3; Fig. 2, a like view on line *y y*, Fig. 3. Fig. 3 is a plan. Figs. 4, 5, and 6 are perspective details; Fig. 8, sectional detail; and Figs. 7 and 9 are, respectively, a perspective and plan of modification of my invention.

My invention consists of a shaking fire-grate, composed of a series of independent circular sections, combined with and operated by a single rock-shaft in such a manner that said sections will be moved alternately in opposite concentric directions.

Referring to the accompanying drawings, A represents a central section of a grate, and B B^1 B^2 independent circular grate bars or rings surrounding the same. C is a bearing-bar supporting the center A and sections B B^1 B^2, said bar having posts *c* c^1 c^2 c^3, which separate said center and sections from each other and keep them their proper relative distances apart. The posts c^1 c^2 c^3 are formed with lugs c^4 c^4 c^4, which fit over flanges *a b* b^1 b^2 b^3 on the center A and rings B B^1 B^2.

D is a rock-shaft having bearings in the base E of a stove, furnace, or other fire-chamber. Said shaft is arranged at right angles to the bearing-bar C, the latter passing through it, and forms the support for the center A and rings B B^1 B^2. Said shaft is formed or provided with pins or studs *d* d^1 d^2 d^3, which enter slots or kerfs *f* f^1 f^2 f^3, formed on the under sides of the sections A B B^1 B^2. These pins *d* d^1 d^2 d^3 and slots *f* f^1 f^2 f^3 are on opposite sides, alternately, of the same center *x*, so that when the shaft D is rocked in either direction, the sections A B B^1 B^2 will be simultaneously moved in opposite concentric directions alternately, as indicated by arrows.

The bearing-bar C, and shaft D are secured as follows: A slot or notch, *e*, is cut in the under side of said bar, which is then passed down over the shaft D, and held there by a key, F, or other fastening.

G G are dogs on the shaft, and *g g* pins or studs on the bar C, to limit the vibration of said dogs and the rocking of said shaft.

When it is desired to dump the grate, the shaft D is rocked sufficiently to cause the dogs G G on each side to meet and press down one of the studs *g*, causing the bar C and sections A B B^1 B^2 to move with said shaft, and thereby to dump the grate. To prevent dumping when not required, a rock-shaft, H, with winch *h*, engages, as shown, with a notch, c^6, on the under side of the bar C. To release the grate from engagement with said winch, the shaft H is duly rocked by means of a key or handle.

Many or few of the sections B B^1 may be used, and the same patterns may be employed for various sized grates, the number of rings employed being reduced or increased as necessity or occasion demands.

The rings B B^1, &c., may be made in two or more sections, fitted together by dovetail, mortise-and-tenon, or any equivalent joint, and the flanges may be notched, as shown at *o*, Fig. 7, whereby said sections may be inserted and removed when the grate has been set in position.

The posts c^1, &c., may have lugs on only one side, and these may be flush with or below the tops of said posts.

In lieu of the slots *f* f^1, &c., studs or lugs *i i*, as shown in Fig. 7, may be cast on the rings or sections, between which the pins *d* d^1 d^2 d^3 will pass.

If desired, the rings B B^1 may be caused to move in pairs in different directions alternately, as shown in Fig. 9, instead of singly, as already described.

I am aware that there is no novelty in, broadly, a rotary grate, or a grate in which a portion or section may be rotated independently of the balance.

My improvements relate to a grate in which are arranged a series of concentric sections or rings, which may be rotated or oscillated in opposite directions alternately.

What I claim as my invention is—

1. A grate composed of a series of independent concentric bars or rings adapted, substantially as set forth, to be simultaneously oscillated, a part in one direction and a part in the other.

2. A grate composed of a series of independent circular sections, combined with a rock-shaft, substantially as described, whereby said sections may be caused to move simultaneously, a part in one direction and a part in the other, as set forth.

3. The rock-shaft D, having pins or studs d d^1 d^2 d^3 at unequal distances, and on opposite sides alternately, from the middle of said shaft, substantially as and for the purpose set forth.

4. The bearing-bar C, having posts c c^1 c^2 c^3, with lugs c^4 c^4 c^4 c^4, substantially as and for the purpose set forth.

5. The combination of independent circular sections A B, &c., adapted to move alternately in opposite directions, and having slots f f^1, &c., with a shaft, D, having pins or studs d d^1, &c., said pins or studs entering said slots or studs on opposite sides of and at unequal distances from a common center, x, substantially as shown and set forth.

6. The independent sections A B, &c., having flanges a b, &c., in combination with bar C, having posts c c^1, &c., with lugs c^4 c^4, substantially as shown and described.

7. The combination, with rock-shaft D, having dogs G G, of bearing-bar C, having studs or stops g g, substantially as shown and described.

8. The combination of grate A B, &c., composed of independent circular sections, bearing-bar C, and rock-shaft D, substantially as shown and described.

9. The combination of bar C, shaft D, and key E, substantially as shown and described.

10. The combination, with bearing-bar C and rock-shaft D, of shaft H, with winch h, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 8th day of April, 1879.

JOHN M. CRAWFORD.

Witnesses:
S. J. VAN STAVOREN,
CHAS. F. VAN HORN.