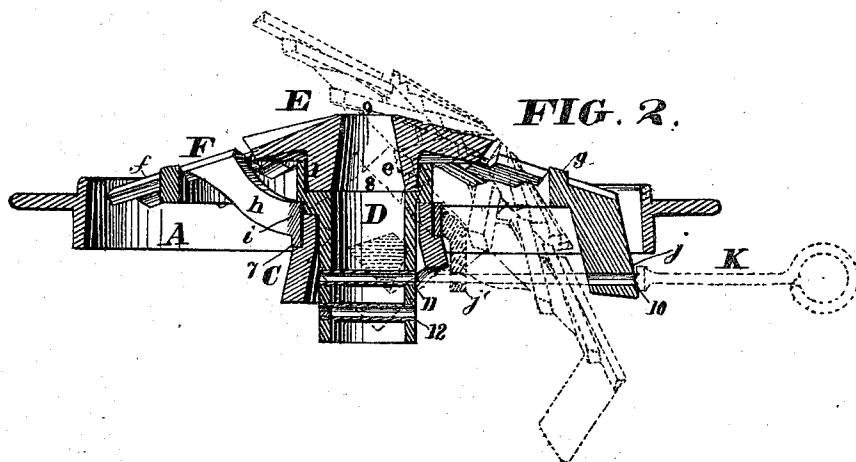
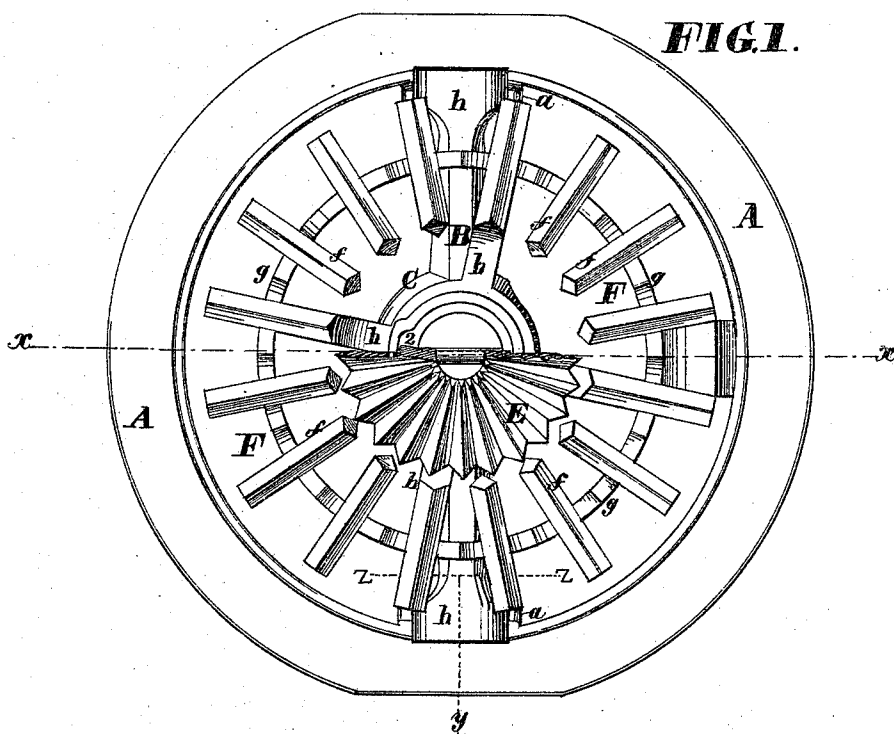


J. J. RICHARDSON.

Grates for Stoves and Furnaces.

No. 141,891.

Patented August 19, 1873.



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FIG. 6.

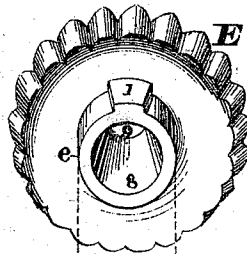


FIG. 7.

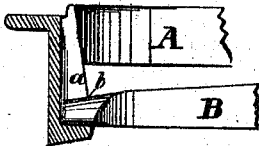


FIG. 5.

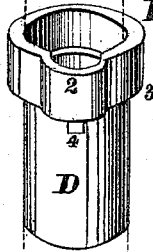


FIG. 8.



FIG. 4.

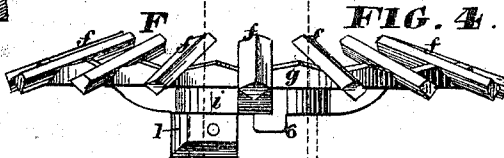
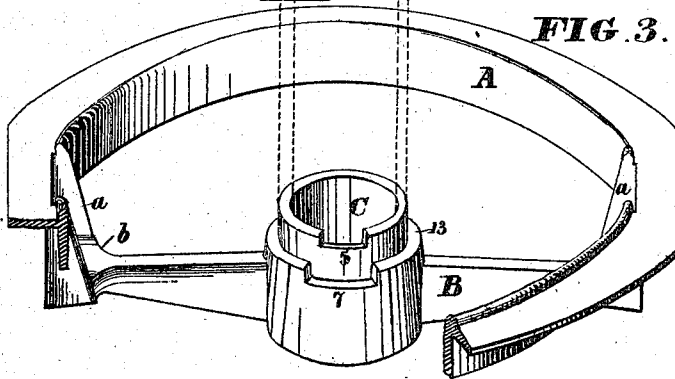


FIG. 3.



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UNITED STATES PATENT OFFICE.

JEREMIAH J. RICHARDSON, OF BOOKLYN, NEW YORK.

IMPROVEMENT IN GRATES FOR STOVES AND FURNACES.

Specification forming part of Letters Patent No. **141,891**, dated August 19, 1873; application filed March 3, 1873.

To all whom it may concern:

Be it known that I, JEREMIAH J. RICHARDSON, of Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Grates for Stoves and Furnaces, of which the following is a specification:

My improved grate is made in conical form of two or more concentric parts capable of either independent or simultaneous vibratory movement about their common vertical axis. The outer annular portion is made up of triangular bars cast upon a rim connected by radial struts or spokes to a central supporting ring, the divergence of the radial bars forming large apertures on the outside of the grate. The conical grate-center is made with a solid face, and radial ribs and an aperture in or around the center. This grate-center is connected either permanently or otherwise with a hollow center pivot, by means of which the said grate-center is shaken in a horizontal plane. The entire grate is supported on a bridge-piece capable of tipping forward when required for dumping.

In the accompanying drawings, Figure 1 is a plan or top view of a furnace-grate, illustrating my invention, with one-half the grate-center removed. Fig. 2 is a vertical section of the same on the line *x x*, Fig. 1. Fig. 3 is a perspective view of the supporting-ring and the bridge-piece which rests therein to receive the vertical pivot of the grate. Fig. 4 is a perspective view of the annular grate. Fig. 5 is a perspective view of the hollow center pivot. Fig. 6 is a perspective view of the grate-center from the under side. Fig. 7 is a vertical section of a portion of the supporting-ring on the line *y*, Fig. 1, showing one end of the bridge. Fig. 8 is a vertical section of the same on the line *z z*, Fig. 1.

The supporting-ring *A* may rest on the base of the furnace or stove in any customary manner. It is constructed with lugs or bearing-sockets *a a* for the reception of the ends *b b* of the bridge *B*, which ends are made flat to afford a steady bearing to the grate, while permitting it to tip forward for dumping. In the center of the bridge *B* is formed a socket, *C*, for the reception of the hollow vertical pivot *D* of the conical grate-center *E*, which latter

may either be cast in one piece with its pivot, or may be formed with a neck, *e*, adapted to fit within the top of the hollow pivot, and to derive a vibratory movement through the medium of a projection, *1*, on the neck *e*, occupying a recess, *2*. The hollow pivot *D* is formed with a shoulder, *3*, to rest on the upper edge of the socket *C* of the bridge, and projecting downward from this shoulder is a stud, *4*, playing in a recess, *5*, in the edge of said socket, so as to limit the vibratory movement. *F* is the conical annular or outer grate, formed of a number of slanting radial bars, *f*, projecting from a ring, *g*, and supported by struts *h* from a central ring, *i*, which surrounds the upper end of the socket *C*, and rests upon a shoulder, *13*. A stud, *6*, projects downward from the central ring *i* into a notch or recess, *7*, so as to limit the vibratory movement of the annular grate. The parts *f g h i*, constituting the annular grate *F*, may, together with the lug *j*, by which the said grate is shaken, be cast in one piece of iron. The annular grate *F* and grate-center *E* form, together, a continuous cone, as represented in Fig. 2. The grate-center *E* has an opening, *8*, communicating with that of the hollow center pivot *D*, and converging upward to a small aperture, *9*, at the top. The said grate-center has a solid face with radial ribs, and may have bars extending from it, if desired. An aperture, *10*, is formed in the lug *j* to receive the bar *K*, (see dotted lines in Fig. 2,) and a tubular socket, *11*, is formed in the hollow pivot *D* in line with the aperture *10* to receive the end of the said bar when the grate-center is to be shaken together with the annular grate *F*. For shaking the grate-center alone, a second tubular socket, *12*, is provided, into which the end of the shaking-bar may be inserted without passing through the lug *j*. A second lug may project downward from the central ring *i* of the annular grate, as illustrated at *j'* in Fig. 2, to afford a better purchase for the shaking-bar when operating on the annular grate alone. The bars *f* are preferably made of approximately triangular form, angular at bottom and slightly convex at top, in their transverse section.

The lug *j*, by resting upward against the ring *A*, prevents the grate tipping backward;

but it may be tipped forward for dumping, as shown in dotted lines in Fig. 2.

The conical form of the grate is very advantageous to the combustion of fuel and to the distribution of heat. By making the said grate in two concentric parts capable of independent movement, the weight of the coal is so divided that either part can be shaken with comparative ease. The separate shaking is also highly advantageous in detaching and cutting up all clinker and slate which may form on the grate, so that a bright fire may be kept up for an indefinite period. The central duct, formed by the hollow pivot D and the opening 8, causes a constant current of air to prevent the burning out or melting down of the parts. The central part of the grate, being made solid, with only a contracted air-space, causes the main part of the air to support combustion to pass through the enlarged spaces in the outer part of the grate, throwing the heated gases and flame outward against the sides of the fire-pot—an effect which is aided by the conical form of the grate.

I am aware that conical grates have before been made in concentric sections capable of independent shaking movement. This, therefore, I do not claim.

The following is claimed as new:

1. The conical grate-center E, solid-faced and radially-ribbed, and having a central aperture, *e*, as set forth.

2. The combination, with the perforated grate-center E, of the hollow center pivot D, adapted to communicate shaking motion to the said grate-center, and to conduct air to the aperture therein, as explained.

3. The combination of the supporting-bridge B, with flat ends resting on suitable seats *a a* in the ring A, and with a central socket, the grate E F pivoted to the said bridge, and the rest *j* to permit the tipping of the grate forward for dumping, but prevent it tipping backward, all substantially as set forth.

4. The compound grate constructed, as herein described, with a ribbed center, E, and with an annular external portion, F, constructed with angular bars, the said parts being adapted for either independent or simultaneous shaking, and for dumping in connection, all substantially as described.

J. J. RICHARDSON.

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