2 Sheets--Sheet 1.

J. WARMINGTON & J. FORRESTER.

Grate.

No. 165,279. Patented July 6, 1875.

Fig. 3.

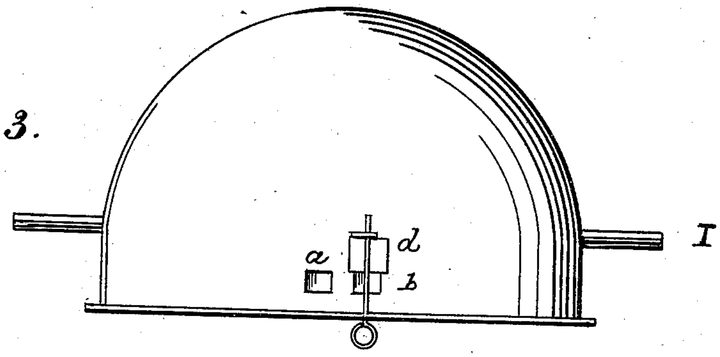


Fig. 1.

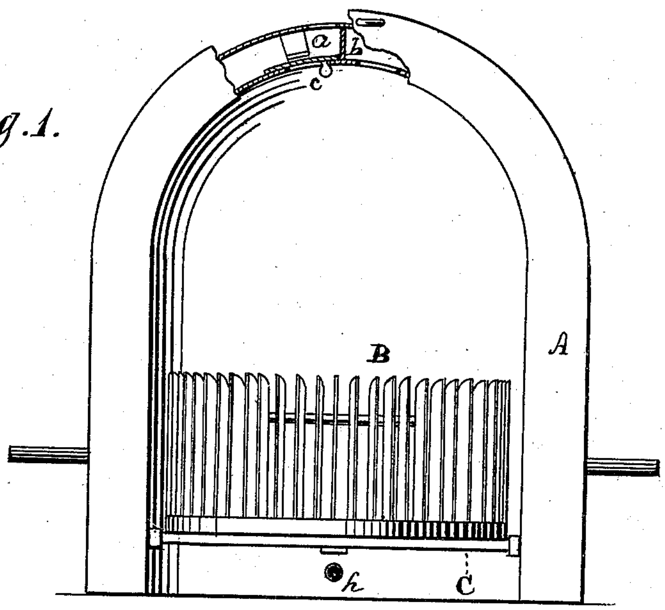
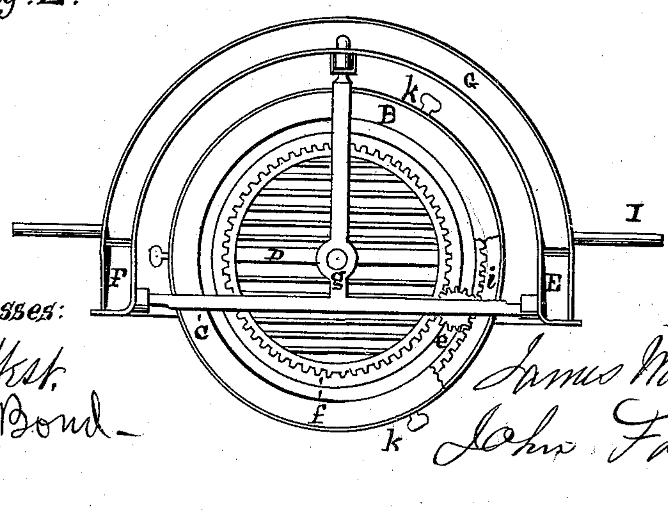


Fig. 2.



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Grate.

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Fig. 4.

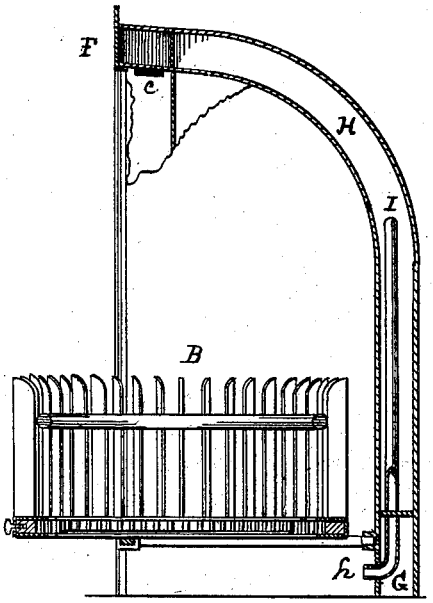


Fig. 5.

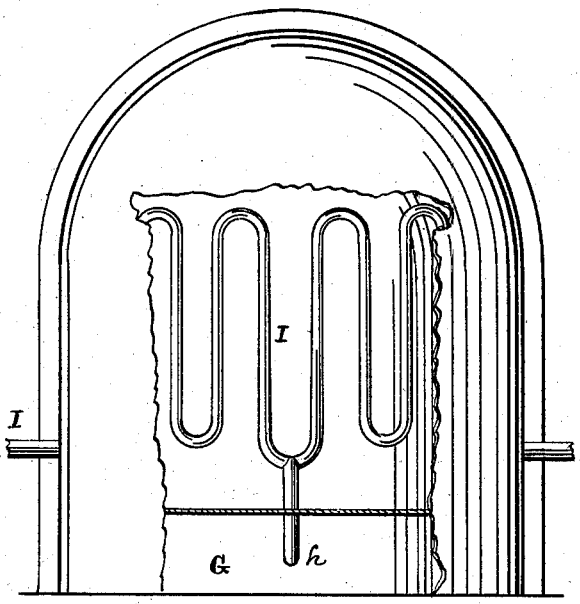
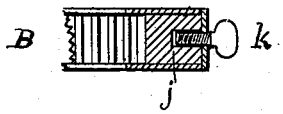


Fig. 6.



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UNITED STATES PATENT OFFICE

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IMPROVEMENT IN GRATES.

Specification forming part of Letters Patent No. **165,279**, dated July 6, 1875; application filed June 11, 1875.

To all whom it may concern:

Be it known that we, JAMES WARMINGTON and JOHN FORRESTER, of the city of Chicago, Cook county, State of Illinois, have invented new and useful Improvements in Grates, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a front view; Fig. 2, a bottom view; Fig. 3, a top view; Fig. 4, a vertical section; Fig. 5, a back view with a portion cut away to show the air-pipe; and Fig. 6, a detail in section, showing the mode of holding the revolving basket in place.

The nature of our invention consists in providing an open grate with a rotary furnace or fire-pot, having its sides and bottom revolving in opposite directions, in providing the back with revertible flues and an air pipe or heater, and in the several combinations hereinafter set forth and claimed.

In the drawings, A represents the grate; B, the vertical portion or sides of the furnace; C, the supporting cross-bar; D, the bottom; E, F, and G, the flues; H, the air-space; I, the air-pipe; *a b*, flues or openings; *c d*, the dampers; *e*, a gear-wheel; *f*, the gear-teeth on the revolving bottom; *g*, the pivot; *h*, the opening into the air pipe or space; *i*, the gear-teeth on the revolving sides of the furnace; *j*, groove in the outer edge of the revolving basket of the grate; *k*, set-screws.

The casing or walls A of the grate may be made of metal, fire-brick, or other suitable material, as may be found most convenient for the location in which it is to be placed. They are made double and provided with flues E F G, and an air-space between them, a suitable cross bar or bars being located near the bottom, as shown at Fig. 1, upon which the revolving grate is placed. This grate is made to come within from one to two inches of the back sides, so as to leave an air-space between them. The grate is made vertical, as shown, and on its bottom is provided with gear-teeth *i*. A gear or cog wheel is placed on the shaft C, which engages with the teeth *i*, and also with the teeth *f* on the revolving bottom D, so that when the grate is shaken the sides or basket B will move in an opposite direction from the bottom D. The flues E F are made against the face of the outer case, as shown, and are connected at the bottom or near the hearth by a horizontal flue, G. The space between the horizontal flue and the upright flues is filled with a coil of pipe, I, for the purpose of heating air. The air is taken into the pipe beneath the grate, at *h*, which, as shown, is a simple opening, but may be, if desired, extended to the front or side of the ash-pit by a section of pipe, so as to avoid taking up ashes. The outer end or ends of the pipe, for the purpose of distributing hot air, may be extended around the same room or upward into another room, as desired. By leaving a space between the grate and the back of the case the combustion of the fuel is perfect on that side which heats the back, so as to heat the air. We thus utilize what otherwise would be waste heat. To keep the basket or vertical sides B of the grate in place, and prevent its being raised up, a groove, *j*, is made in the outer edge of the bottom thereof, into which the set-screws *k* fit, as shown at Fig. 5.

In kindling the fire, or in putting on fresh coal, the dampers *c d* are both opened, which permits a straight ascension of the products of combustion into the chimney. When the heavy smoke has passed off, the damper *c* is drawn over the flue *a* on the under side, which causes the heated products to pass through the flue *b;* the damper *d* is then drawn, which causes the heated products to descend the flue F, pass around through the flue G, and then ascend through the flue E, and out into the chimney at the upper opening of the flue *a*, which gives a base heat, and also an additional heat to the air-chamber H, and also gives us the benefit of the revertible flue and air-heating space with an open fire-grate.

The grate, as shown, is designed to occupy the place of an ordinary open grate or fire-place, and when in this position, as before stated, the back, with its flues, may be made of brick or other suitable material, as well as of cast-iron. When made of cast-iron, however, this furnace or grate, and backing, may be used as a stove or heater without being set in mason-work, by applying to it a metal base with suitable supporting-legs, and an ordinary stove-pipe over the flues *a b*, and it will

also be obvious that the pipe I, for the heating and discharge of the hot air, may be brought out at the top or other point, as well as at the sides, as shown.

What we claim as new is as follows:

1. The combination, in a grate, of the vertical section B and horizontal section D with the spurs or teeth *f i* and wheel *e*, substantially as and for the purposes specified.

2. The flues E F G and openings *a b*, in combination with the dampers *c d* and grate, substantially as and for the purpose herein described.

3. The flues E F G and heating-space H, in combination with the grate and the air-heating pipe I, all constructed and arranged as and for the purpose herein specified.

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