(No Model.) 2 Sheets—Sheet 1.

M. O'GORMAN.

HEATER, FURNACE, &c.

No. 486,121. Patented Nov. 15, 1892.

Fig. 1.

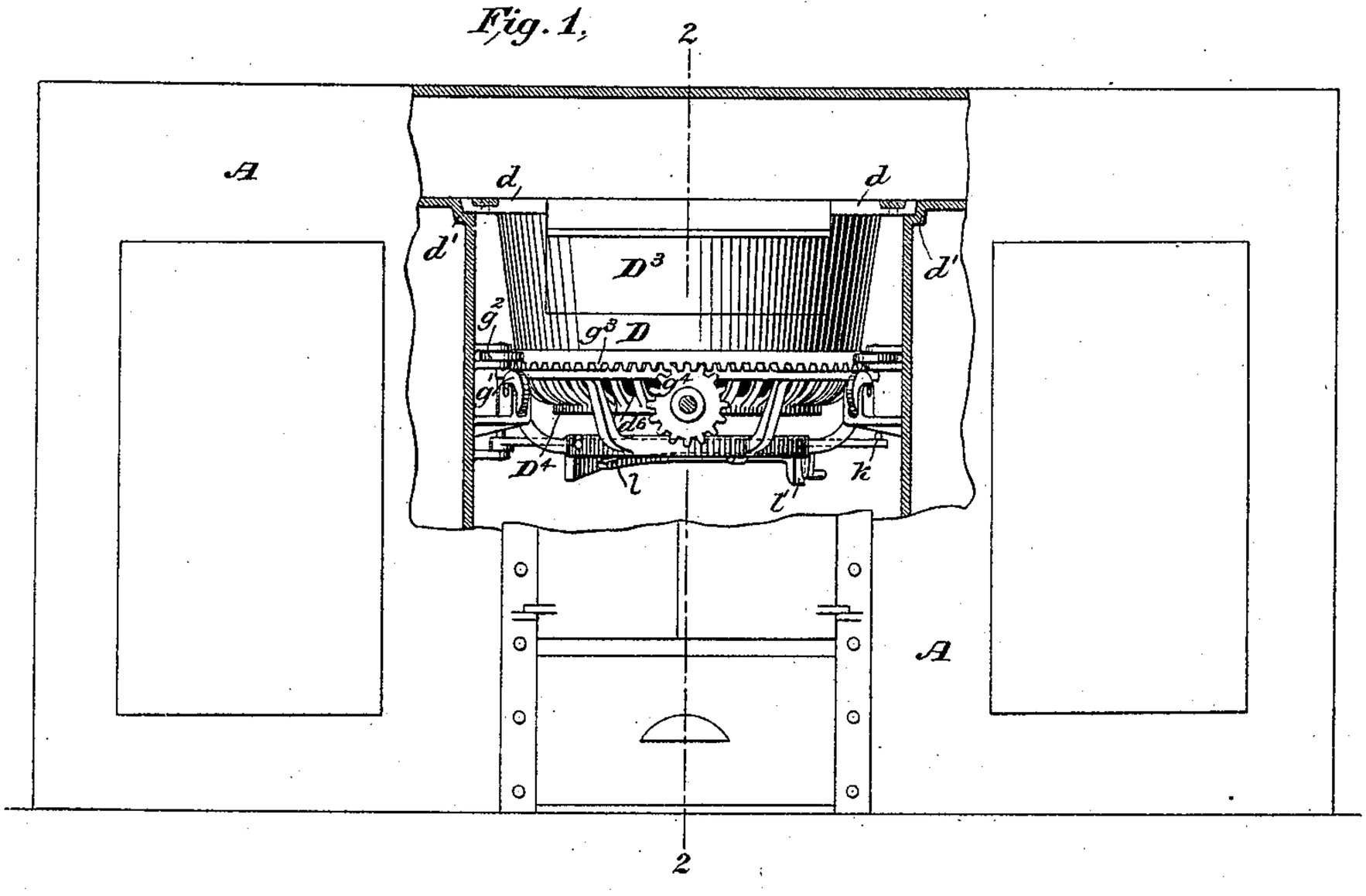


Fig. 2.

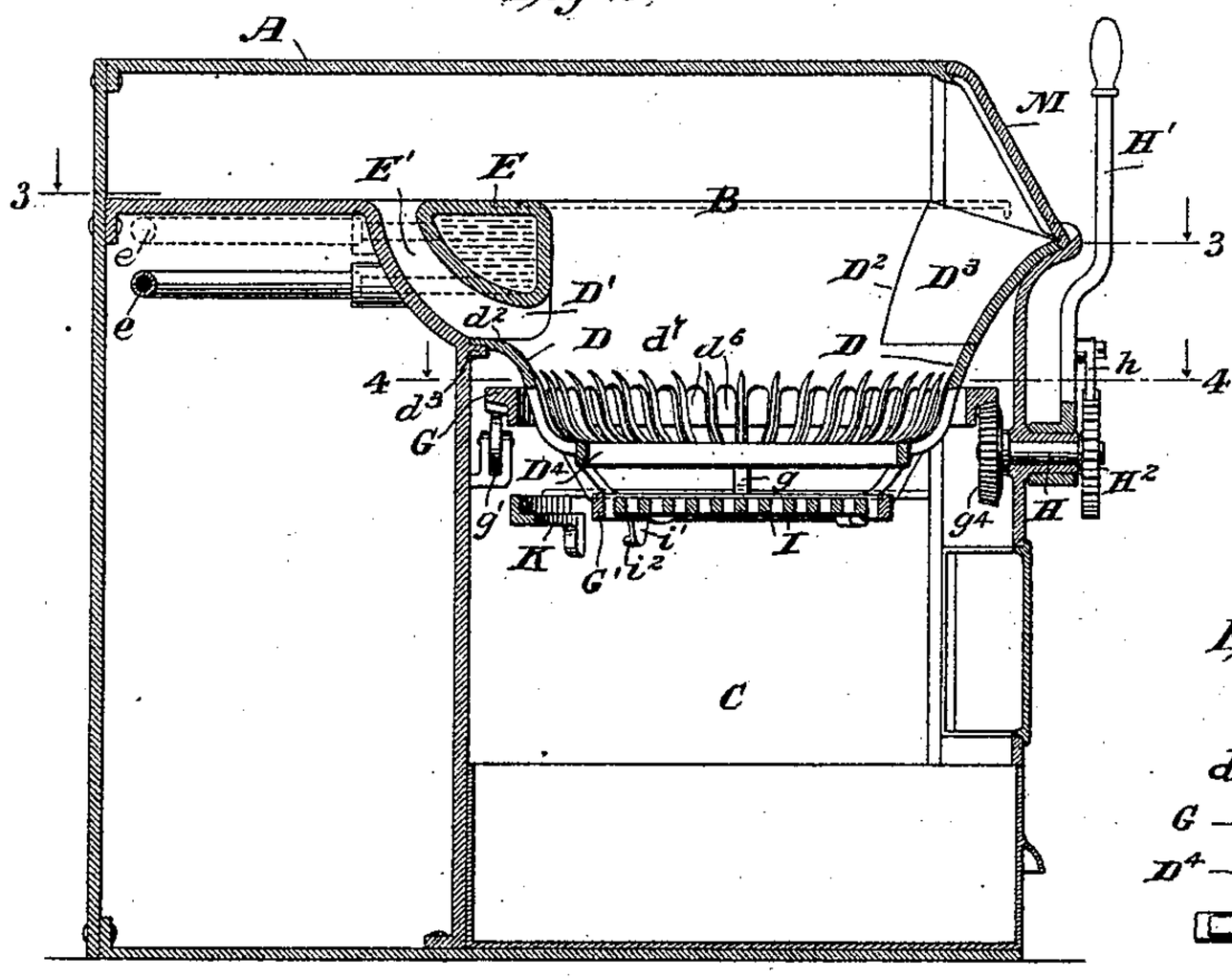


Fig. 6.

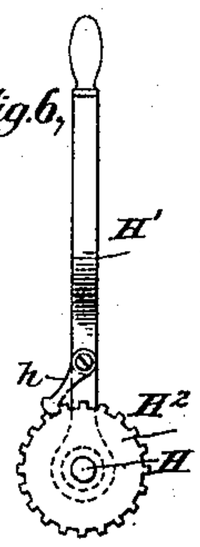
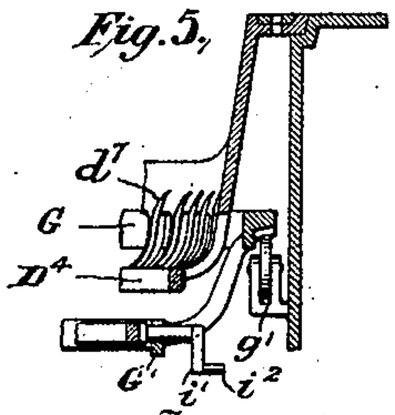


Fig. 5.



Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

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HEATER, FURNACE, &c.

No. 486,121. Patented Nov. 15, 1892.

Fig. 3.

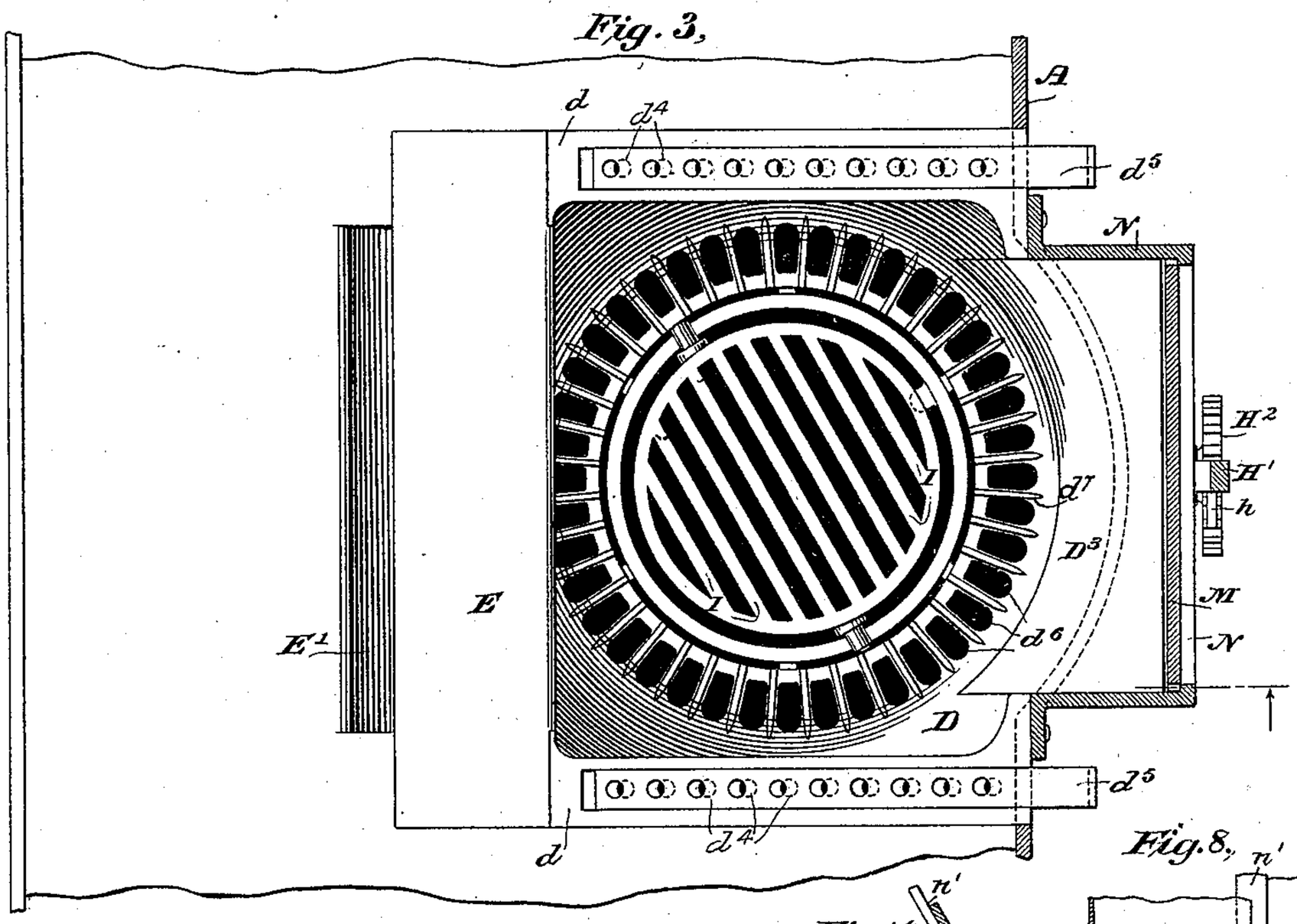


Fig. 8.

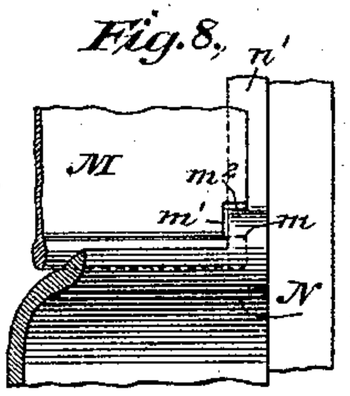


Fig. 7.

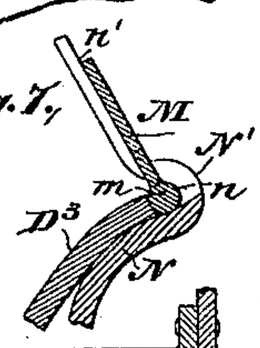


Fig. 4.

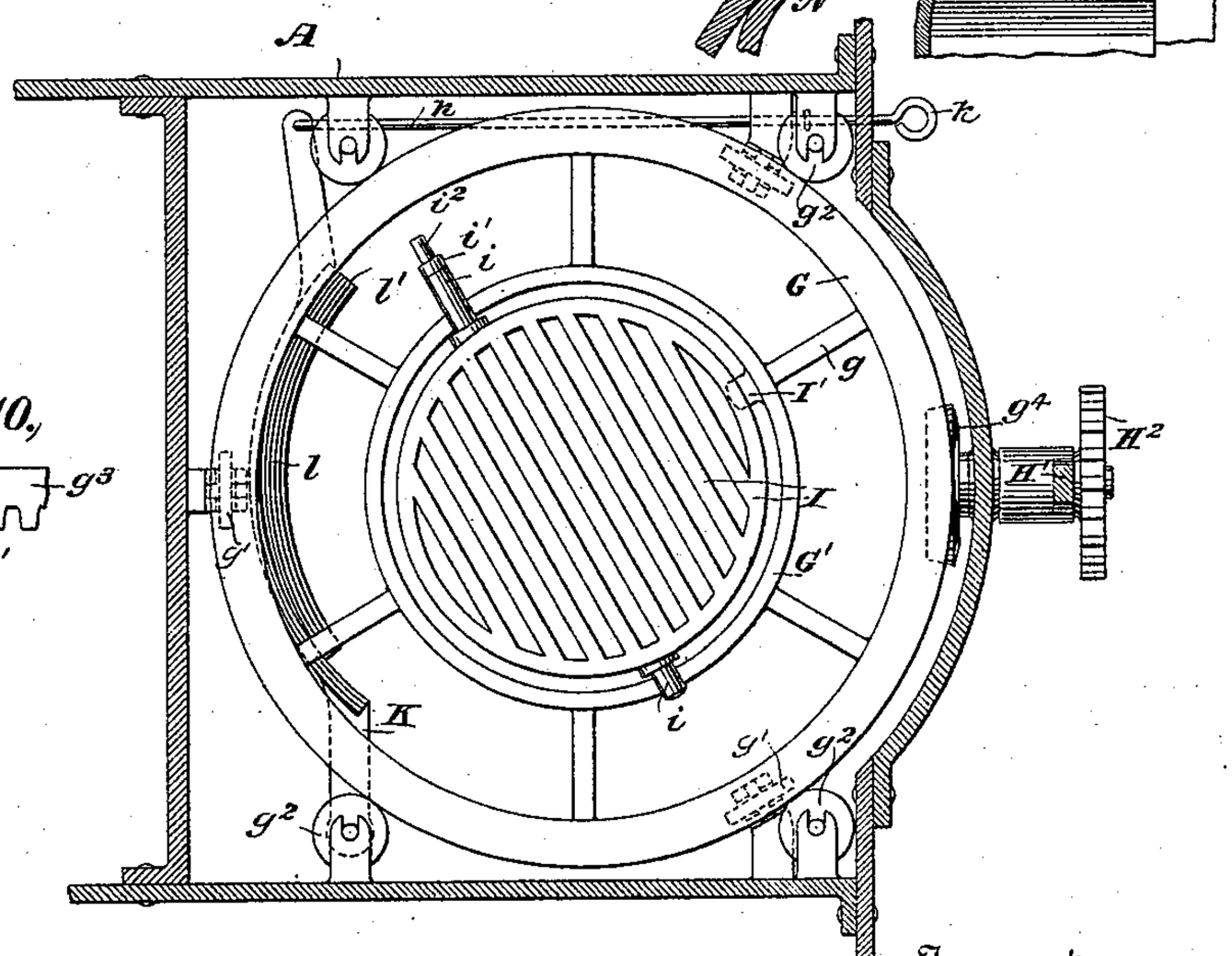


Fig. 9.

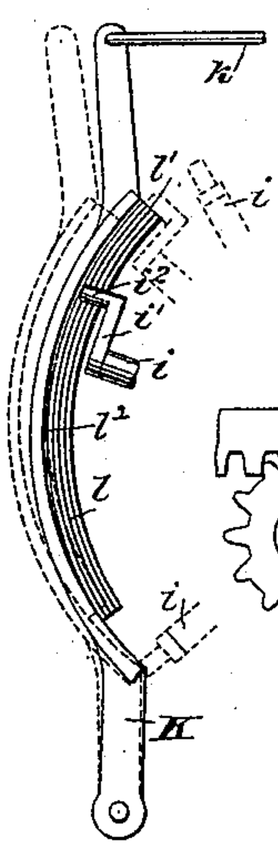
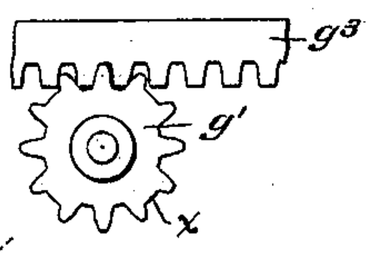


Fig. 10.



Witnesses

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Inventor

Michael O'Gorman

By his Attorneys

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UNITED STATES PATENT OFFICE.

MICHAEL O'GORMAN, OF JERSEY CITY, NEW JERSEY.

HEATER, FURNACE, &c.

SPECIFICATION forming part of Letters Patent No. 486,121, dated November 15, 1892.

Application filed December 4, 1890. Serial No. 373,561. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL O'GORMAN, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Heaters, Furnaces, &c., of which the following is a specification.

The invention relates to a grate capable of being rotated continuously or progressively in either direction and automatically dumped during rotation when desired, the mounting of such a grate in a rotatable frame or holder, a fire-pot open at the bottom and beneath which the rotatable frame or grate-holder is arranged, the pot being, by preference, formed with radially-disposed slots extending upwardly from its lower annular rim and the grate-holder being preferably of a skeleton structure, means for imparting a vertical vibratory motion to the grate during rotation, and means for admitting heated air to the top of the fire.

I am aware that, broadly, a progressively-revolving grate is old, and I do not claim such subject-matter.

In the accompanying drawings, Figure 1 is a front elevation, partly broken away and in section, of a range embodying my improvements. Fig. 2 is a transverse section therethrough on the line 2 2 of Fig. 1. Fig. 3 is a horizontal section on the line 3 3 of Fig. 2; Fig. 4, a lower horizontal section on the line 4 4 of Fig. 2; Fig. 5, a detail sectional view indicating the fire-pot, the grate-holder, and the dumping-crank carried by the grate. Fig. 6 is a detail view showing the toothed wheel, pawl, and handle for effecting the revolution of the grate; Fig. 7, an enlarged sectional detail view indicating the hinge of the door and the adjacent parts of the casing and fire-box; Fig. 8, another detail view of the same matter. Fig. 9 is a detail view of the grate-dumping devices, showing their relation while the grate is being dumped and indicating in dotted lines the position of the dumping device after the grate has forced it back, become disengaged therefrom, and returned to its normal position. Fig. 10 is a detail view indicating the teeth on the rim of the grate-holder and a gear of peculiar construction engaging it to produce a vertical vibration of the grate-holder and grate.

The invention is shown as applied to a cooking-range.

A indicates any suitable and ordinary casing or shell of a range, within which B is the combustion-chamber and C the ash-pit. The fire-pot D, which may be of irregular cross-section, approximately square, as indicated by Fig. 3, at the top and gradually brought to a round section at the bottom, is in the construction illustrated formed with a horizontal flange *d* on opposite sides of the upper edge, by which it is suspended from a suitable seat *d'*, formed in the frame of the stove, as indicated, or otherwise. This form of fire-pot gives at the top a rectangular fire-space, and its round form at the bottom is favorable to perfect combustion and the ready removal of ashes and cinder by the manipulation of the grate. At the rear the fire-pot is cut away at its upper edge, as indicated at D', for the accommodation of a water-back E, that is arranged transversely across the back of the fire-pot and has a passage-way or flue E' for products of combustion beneath and around it, as shown in Fig. 2.

e e indicate the inlet and outlet pipes of the water-back. The upper part of the fuel may be in contact with the front wall of the water-back, and products of combustion also pass across its top.

At D' the fire-pot may have a curved or flanged edge d^2, resting in a seat d^3, formed in the frame or casing. At the front the fire-pot is cut away, as indicated at D^2, and a front piece or section D^3 is fitted therein. The front of the section D^3 is preferably curved outwardly and rests upon a correspondingly-curved part of the front wall or casing of the range. The door to the fuel-chamber is located at this point and is mounted and hinged as hereinafter described. The section D^3 is made separate and removable from the fire-pot to permit of its being replaced in the event of its burning out. Dampers and flues for regulating the direction and utilization of the heat and products of combustion will of course be suitably placed.

The flange *d* that suspends the fire-pot on

each side is formed with a series of perforations d^4, that may be opened or closed by the endwise motion of a correspondingly-perforated plate d^5, projecting at the front of the stove to one side of the door, as shown in Figs. 2 and 3. By the manipulation of these plates heated air is admitted from the ash-pit and the space surrounding the fire-pot to the top of the fire. The air confined in the space surrounding the fire-pot when the apertures d^4 are closed is a good non-conductor of heat, and becoming heated, as it does when it is admitted to the top of the fire, a perfect combustion of smoke and gases is insured. The apertures d^4 may be so regulated that air in such small quantity passes through them that there is always a body of confined hot air surrounding the lower portion of the fire-pot. The lower end or bottom of the fire-pot terminates in an annular ring D^4, preferably approximately equal to or larger than the grate in diameter, and the walls of the pot are preferably formed with radial slots d^6, extending from the annular rim upwardly, and with ribs d^7 on the inside. The grate-holder is arranged beneath and may, as shown, surround the lower end of the fire-pot, though not in contact therewith, and consists of an upper ring G, a lower ring G′, and arms g, connecting the two rings, thus giving an open-work or skeleton structure. The upper ring G rests upon bearings formed by a series of vertical rollers g', upon which the under face of the ring rests, and a series of horizontal rollers g^2, that bear against the periphery of the ring. The under face of the ring is formed with teeth g^3, with which gears a pinion g^4 on a shaft H, mounted in a bearing in the casing of the stove. A hand-lever H′, mounted concentrically with reference to the shaft H, carries a pawl h, that engages the teeth of a wheel H^2 on the end of the shaft H. By the vibration of the handle H′ the grate may be rotated step by step, and by throwing the pawl over to the other side the grate may be revolved in the opposite direction. Of course a crank might be applied to the shaft H. The construction shown is convenient and is capable of being applied where there would not be room for a crank.

The grate I, which may be of ordinary construction, is pivoted on trunnions i, formed thereon out of line with its center in the lower ring G′ of the grate-holder, and tends by gravity to remain in a horizontal position, being supported by a stop I′ on the ring G.

The dumping of the grate may be effected in the following manner: An arm K, pivoted at one end, is arranged transversely behind the grate-holder, and its free end is connected with an endwise-moving rod k, extending through the front of the stove, by means of which the bar may be moved toward or from the grate-holder. That part of the bar K immediately opposite the rear of the grate-holder is curved and is formed with a horizontal ledge l. At one end of this ledge is a vertical face l', of sufficient depth to accomplish the following operation: One of the grate-trunnions is provided with a crank-arm i', having on the end a transverse projection or pin i^2. When the bar K is drawn forward and the grate revolved, the pin i^2 strikes the shoulder or face l' and the grate is tilted until the projection i^2 rides up on the horizontal ledge l, and the grate is held in this position until the projection runs off the ledge. A vertical wall or face l^2 at the rear of the ledge l is curved eccentrically to the center of rotation, and as the grate is revolved the end of the projection i^2 gradually pushes the bar K back until finally the projection runs off the ledge and the bar is pushed back out of the way. The face l^2 extends beyond the ledge l and is of sufficient depth to engage the end of the projection i^2 until the bar has been forced entirely back. This operation is fully indicated in Fig. 9.

By the general organization shown air may be admitted to the bottom, sides, and top of the fire and produce perfect combustion. By employing a revolving grate in connection with a fire-pot, substantially as illustrated, I am enabled to thoroughly sift out the ashes and to consume all the combustible matter in the grate without the formation of wasteful clinkers. By employing a grate-holder instead of applying the rotating devices directly to the grate I am enabled to locate them at a point removed from the hotter portions of the fire, and they therefore not only wear longer, but operate more satisfactorily, and of course the grate may be renewed when required without disturbing any of the other parts.

As the grate-holder is located above the lower end of the fire-pot, it is out of the way of ashes and hot coals, and hence is not apt to get clogged, and therefore lasts longer and works better.

The slots in the fire-pot serve not only to admit air to the sides of the fire, but also operate to hold the mass of fuel at its surface against rotation when the grate supporting its base is revolved. The ribs or projections d^7 also act in the same manner, and it is optional whether I use the ribs alone or the slots alone, or both; but in any event I prefer to use the slots, because the sides of the mass of fuel are then fully exposed to the air and more perfect combustion is insured. The rotation or horizontal movement of the grate serves, therefore, to disturb the fuel, to change the relations of the lumps to each other, and to insure access of air to and through the entire mass, and complete combustion of all the fuel results; but so far as part of the invention is concerned the fire-pot may be without ribs or perforations.

If the vertical rollers g' are plain-faced rollers and run upon the teeth on the under side of the ring, there will be a slight vertical vibration of the grate due to the uneven sur-

face of the ring; but I may give a more positive vertical vibration to the grate to assist in thoroughly discharging the ashes. This may be done as shown in Fig. 10. One or more of the rollers g' may be toothed and engage the rack on the ring G. The spaces between the teeth of the roller are of unequal depth, as shown at x, some being sufficiently shallow to lift the ring and in this way impart to it a vertical vibration during rotation.

By the revolution of the grate and the action of the slotted fire-pot, while the mass of fuel to a great extent is prevented from revolving with the grate, there is sufficient movement to agitate, roll, or turn over the coal on the exterior of the mass and expose all sides of the lumps to the air. A practically-perfect combustion results from this action, combined with the general agitation of the fuel and admission of air at the bottom sides and top. A uniformly-good fire can be maintained and the formation of clinkers is avoided. There is therefore a marked economy of fuel, and a continuous fire may be maintained for an indefinite time. As all the operations are effected without opening the door of the ash-pit, no ashes escape into the room.

The door M, which is hinged at the bottom, is formed with trunnions m, and its edges are recessed at m' next to the trunnions. The front casting N, forming the frame of the door, has bearings or seats n n for the door-trunnions and is curved at the angle N', in an arc of which the axes of said bearings are the center. The trunnions m are slipped into the sockets or bearings n behind the projections n' n', and in the swinging of the door the edges m^2, formed by the recesses m', travel around the curved portion N' of the casting. No special hinge is therefore required, and the door may readily be slipped into position and removed when desired. The edge of the removable front section D^3 of the fire-pot serves to hold the door in position. The door may therefore be put in place after the main body of the fire-pot has been set and may be removed at any time by first lifting out the removable section D^3 of the fire-pot.

I claim as my invention—

1. The combination, substantially as set forth, of the rotatable grate-holder or frame, the grate pivoted therein, the dumping arm or crank on the grate, and grate-dumping devices acting on the crank to automatically dump the grate during its rotation.

2. The combination, substantially as set forth, of the rotatable grate, the dumping arm or crank thereon, and the hinged arm K, adapted to be brought into the path of the dumping-arm and having the ledge l and vertical face l^2.

3. The combination, substantially as set forth, of a rotatable grate-holder mounted to revolve continuously in one direction, means operatively connected with the grate-holder and adapted to effect the rotary movement of the grate, a grate supported in the grate-holder, and devices constructed and arranged to impart to the grate-holder a vertical vibration while it is rotating.

4. The combination, substantially as set forth, of a rotatable grate-holder provided with an annular series of teeth, a dumping-grate carried by the grate-holder, vertical and horizontal rollers forming the bearings and guides for the grate-holder, a pinion engaging the teeth of the grate-holder, and means for operating the pinion.

5. The combination, substantially as set forth, of the rotatable grate-holder having teeth thereon, a pinion engaging the teeth to rotate the holder, a toothed wheel also engaging the teeth and having alternate shallow and deep spaces between its teeth to impart a vertical vibration to the holder, and means for rotating the pinion.

6. The combination, substantially as set forth, of the open-bottom fire-pot, a grate-holder surrounding the fire-pot and located above its lower end out of the way of ashes and hot coals, a grate suspended from the grate-holder and arranged beneath the open bottom of the fire-pot, and means operatively connected with the grate-holder for rotating it through one or more revolutions.

7. The combination of the open-bottom fire-pot, an annular grate-holder arranged above the lower end of the fire-pot out of the way of ashes and hot coals, a grate suspended in the holder and arranged beneath the open bottom of the fire-pot, and means for rotating the grate-holder through one or more revolutions.

8. The combination, substantially as set forth, of the stove-casing, the open-bottom fire-pot, the rotatable grate-holder arranged at the bottom thereof, the grate carried by the grate-holder and arranged beneath the open bottom of the fire-pot, means for rotating the grate-holder, and means for automatically dumping the grate during its revolution.

9. The combination, substantially as set forth, of the stove-casing, the open-bottom fire-pot, the rotatable grate-holder arranged above the lower end of the fire-pot, the grate suspended in the grate-holder and arranged beneath the open bottom of the fire-pot, mechanism for rotating the grate-holder, and devices constructed and arranged to automatically dump the grate during its rotation.

10. The combination, substantially as set forth, of the casing, the fire-pot, a grate arranged therein with an air-space between the casing and pot, the ash-pit arranged beneath the fire-pot and grate and in open communication with the air-space between the pot and casing, air passages or inlets between the space above the fire-pot and the top of the air-space between the pot and casing, and devices constructed and arranged to regulate

said air-passages, whereby hot air from the ash-pit and space between the casing and fire-pot may be admitted in regulated quantity to the top of the fire.

11. The combination, substantially as set forth, of the front plate or casting N, the casing having the bearings or sockets n and projections n', the door M, having trunnions m and notches or recesses m' in its edges for the purpose described, a fire-pot, the removable section thereof that holds the door in place, and a grate.

In testimony whereof I have hereunto subscribed my name.

MICHAEL O'GORMAN.

Witnesses:

FRANK S. OBER,

EDWARD C. DAVIDSON.