

G. H. MILLER.
Hot-Air Furnaces.

No. 140,523.

Patented July 1, 1873.

Fig. 1.

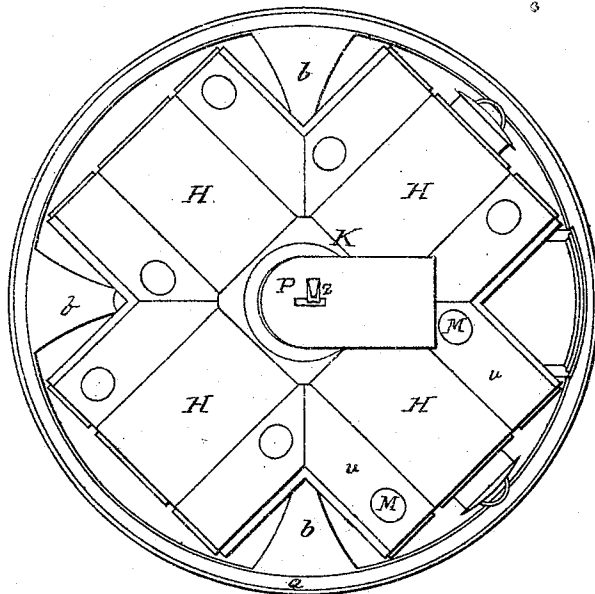
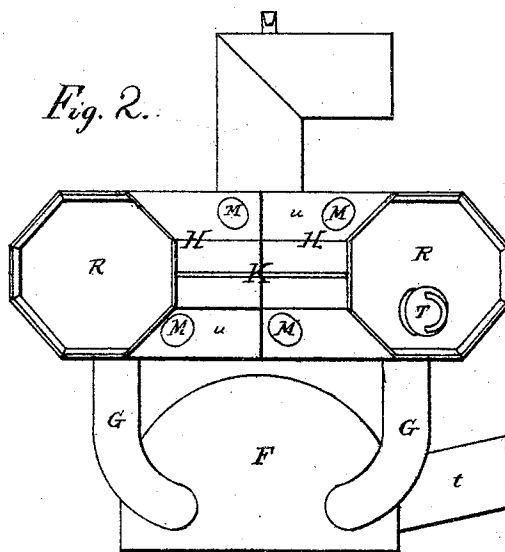


Fig. 2.



Witnesses.
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E. A. Bates

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Fig. 3.

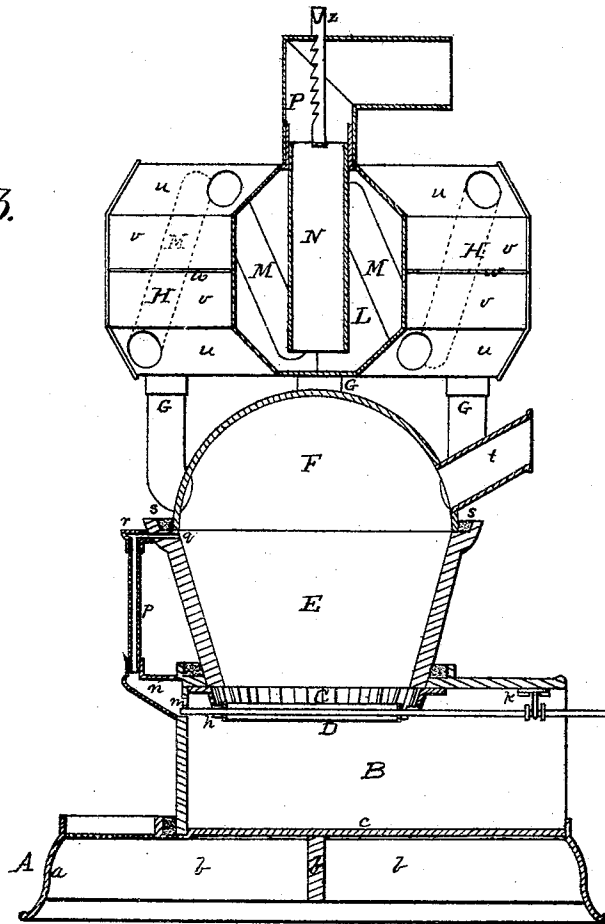
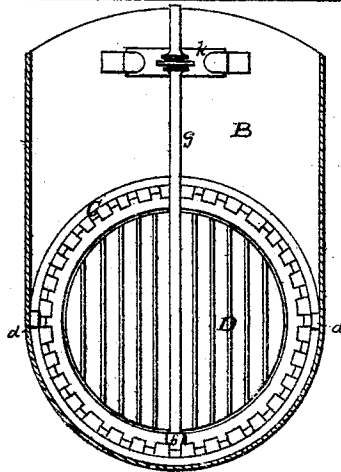


Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE H. MILLER, OF LEAVENWORTH, KANSAS.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **140,523**, dated July 1, 1873; application filed May 31, 1873.

To all whom it may concern:

Be it known that I, GEORGE H. MILLER, of Leavenworth, in the county of Leavenworth and State of Kansas, have invented a new and valuable Improvement in Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a plan view of my furnace. Fig. 2 is a side elevation of the same. Fig. 3 is a sectional view. Fig. 4 is a detail view.

This invention has relation to furnaces for heating air; and it consists in the construction and novel arrangement of the crucial radiator, having its arms extending horizontally and radially from the center thereof, just above the highest portion of the fire-pot, dome, or crown-sheet, and in connection therewith, of the oblique air-pipes through the arms of the radiator or drum, and the telescopic or tubular damper, whereby the draft is not only regulated, but the heated products of combustion, entering the arms of the drum near their outer ends, are made to traverse every part of each arm of the drum before ascending the smoke-pipe, rising from the center of said drum or radiator. This invention also consists in the removable sliding basket-grate, and in connection therewith of the rotary or dumping bottom-grate. And, finally, in the arrangement of the air-pipe at the rear of the fire-pot, connecting the cavity of the ash-pit, just under the grate, with the cavity of the fire-pot just over the coal-bed, for the purpose of rarefying the air for the consumption of the gas. The object of these improvements is to provide a domestic furnace of compact form and economical construction, efficient in action, and easily cleaned. The radial construction of the radiator or drum is adapted to utilize the space above the circular fire-pot, which is preferred in domestic use, in the most complete manner producing, with such a fire-pot, results at once economical and satisfactory.

In the accompanying drawings, the letter A designates a raised base or platform, consisting of a circular rim, *a*, provided with the diametrically-crossing strengthening-ribs *b*, whose lower edges are designed usually to be slightly above the floor of the chamber on which the rim *a* rests, said ribs supporting the lower plate *c* of the ash-pit B. In this manner free passage is made for the air of the chamber under the warm ash-pit. The rim *a* of the base is about equal in diameter to the drum or radiator above the fire-pot. The side-walls of the ash-pit have their lower edges resting on the plate *c*, which is preferably flanged around its edge to form a sand-joint. To the walls of the ash-pit are secured lugs or ledges *d*, for the flange *e* of the sliding basket-grate C to rest upon. The basket-grate is usually constructed with the upright bars forming the side wall, said bars slanting a little outward. A circular opening is made in its base for the reception of the dumping or bottom grate D, having an operating-shaft, *g*, secured to it diametrically from front to rear, and extending forward out to the mouth of the ash-pit. This shaft *g* is journaled at its inner end in the seat *h*, secured to the base of the basket-grate, and at its outer end, near the mouth of the ash-pit, is provided with a loose or separable bracket journal-seat, *k*, adapted to engage with the lugs or rests *l* of the ash-pit wall, in such a manner that its attachment to said wall will not interfere with its operation in drawing out the sliding basket-grate to the mouth of the ash-pit. Through the rear wall of the ash-pit an opening, *m*, is made, and an external hollow boss, *n*, attached to the outside of said wall for connection with a section, *p*, of gas-pipe, designed to carry up warm air from the ash-pit into the fire-pot above the coal-bed, an opening, *q*, being made at this point through the wall of the fire-pot, and a hollow boss, *r*, attached externally to said wall for connection with the upper end of the pipe-section *p*. Suitable flanges having been constructed around the large opening above the grate, in the upper wall of the ash-pit, to form a sand-joint, the lower edge of the fire-pot wall E is arranged to rest therein, its

upper edge being also suitably flanged at *s*, to form a sand-joint with the edge of the dome or crown sheet *F* of the fire-pot. The dome is high and well arched. It is provided in front with a coal-chute, *t*, and with four bent pipes, *G*, at the opposite ends of diameters crossing each other at right angles, and near the base of the dome. The pipes *G* extend outward and vertically upward, to support the arms or radial chambers *H* of the radiator, being connected to the under side of said chambers near their outer ends. It is apparent that these pipes *G* are radially arranged with reference to the drum, although bent upward, as above mentioned, until their outer ends are nearly or quite on a level with the summit of the dome, or sufficiently high to receive the couplings of the radiator. *K* indicates the radiator, crucial in form, the arms or radial chambers *H* being horizontally extended outward from the central chamber *L*, which is located immediately above the summit of the dome, in such a manner that its axial line will coincide with that of the fire-pot. The radiator, in order that it may be light, and thus easily supported by the radial conducting-tubes of the dome, is preferably of sheet metal. The form of the radiator may be described as two centrally and horizontally intersecting prisms of equal length, said prisms being preferably octagonal and at right angles with each other. Therefore the arms or radial chambers *H* will have each two vertical and two horizontal walls and four oblique walls. Oblique air-tubes *M* pass through each radial chamber *H* crosswise of each other, connecting, respectively, the upper and lower oblique walls *u* of opposite sides. The increase of radiating-surface by means of these inner pipes is very nearly equal to the external prismatic surface. Although the circular form may be used in this radiator, the prismatic is preferred, as currents are created thereby in the rising heated air, in various directions, preventing, as it were, a thin sheet of heated air from occupying the radiating-surface continuously. With the same object in view, the joint flanges *v* of the radiator are constructed horizontally along the vertical walls *v*. The currents of heated air ascending by these radiating-walls *v* are thus broken. From the center of the upper wall of this central chamber *L* of the radiator rises the smoke-pipe *P*, provided with an internal sliding tube, *N*, extending downward into said central chamber, and designed to be moved up or down by means of an operating-rod, *z*, to regulate the passage of the heated products of combustion. The operating-rod should be provided with notches or other devices for fixing the adjustment. The damper-tube *N* should be long enough to nearly or quite reach the floor of the radiator.

The end walls *R* of the radial chambers *H* are provided in their lower portions with the

cleaning-apertures, having suitable caps *T*. The end walls *R* should be made with flanges, so that they can be removed at intervals when a more thorough cleaning out of the drum is required.

This furnace is designed mainly for soft or bituminous coal, but will work with hard coal equally well. Its operation is as follows: Fire having been kindled in the fire-pot, the gas therein formed is consumed, warm air from the ash-pit being introduced for this purpose into the fire-pot above the coal-bed. Cold-air currents, passing under, around, and about the fire-pot and ash-pit in the furnace-chamber, become heated, and rise around the radiator, between its arms *H*, and through the oblique pipes *M*, thereby becoming rapidly heated for transmission through suitable pipes from the furnace-chamber in the ordinary manner. The summit or hottest part of the dome, being immediately below the middle of the chamber *L*, serves to reheat the products of combustion at this point which have been conducted by the elbow-tubes *G* into the outer ends of the radial chambers *H*. At the same time, the tubular damper *N* having been adjusted downward, the currents of the products of combustion are carried over the oblique pipes and in contact with the walls of the radiator, until, partially cooling, they descend toward the center of the chamber *L*, are reheated, and rise at once through the sliding tube and smoke-pipe.

The operating-rod of the sliding tube may be extended upward from the furnace-chamber into the dwelling portion of the house, where it may be manipulated for the regulation of the furnace-draft, the tube being raised when the fire is too low and let down when the heat is too great.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A radiator having the radial chambers *H* and the central chamber *L* axially arranged over the center of the fire-pot, substantially as specified.

2. The radiator, having air-tubes *M* passing through its radial chambers *H*, smoke-inlets at the ends of said chambers, the central vertical smoke-outlet pipe, and the tubular damper or extension tube, substantially as specified.

3. The combination, with a radiator having a central smoke-pipe, of a fire-pot dome axially arranged below said radiator and the tubes *G*, connecting the base of said dome with the radial chambers of said radiator, substantially as specified.

4. The combination, with a removable or sliding basket-grate and a connected rotating or dumping grate, of the operating-rod and the removable journal-seat bracket, substantially as specified.

5. The horizontally-sliding or removable basket-grate and the removable rotating or

dumping bottom grate journaled at the rear of said basket-grate and at the front of the ash-pit, substantially as specified.

6. The combination, with a radiator having chambers H, the central chamber L, and a vertical smoke-pipe, of the vertical cylindrical damper-tube sliding in said smoke-pipe, and long enough to extend to the floor of said radiator, substantially as specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

GEO. H. MILLER.

Witnesses :

D. D. KANE,

GEORGE E. UPHAM.