J. H. CAHILL.

Hot Air Furnace.

No. 17,022. Patented April 14, 1857.

Fig. 1,

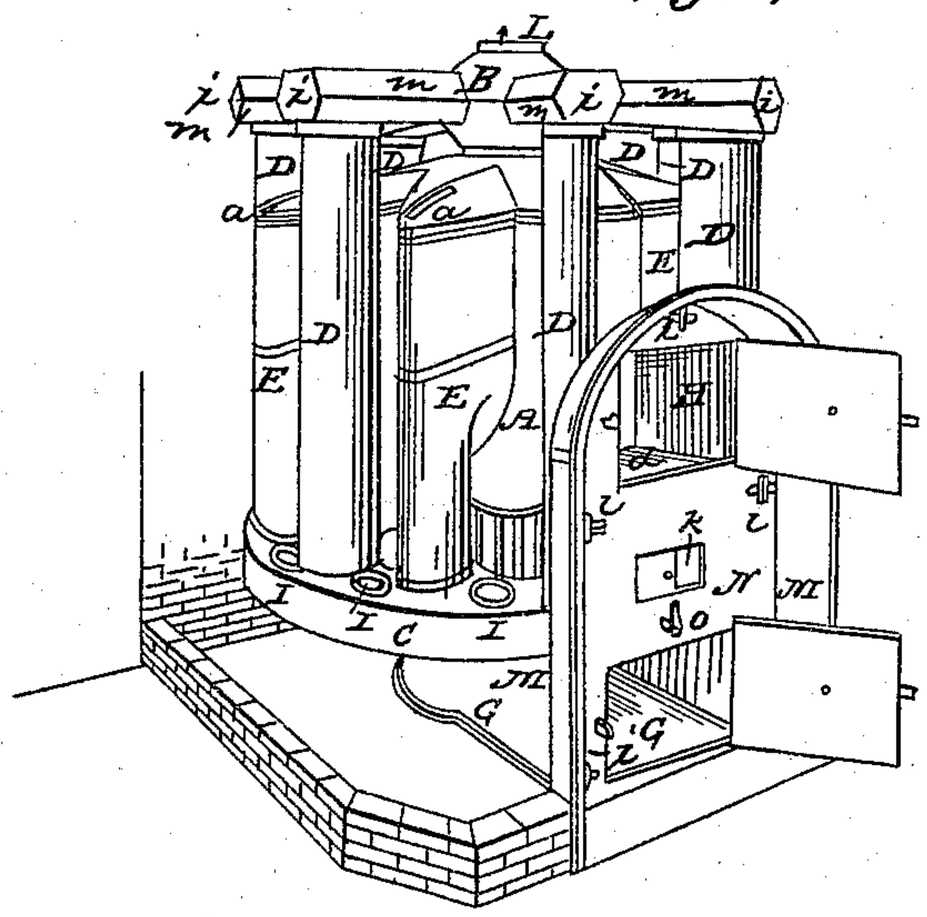


Fig. 2.

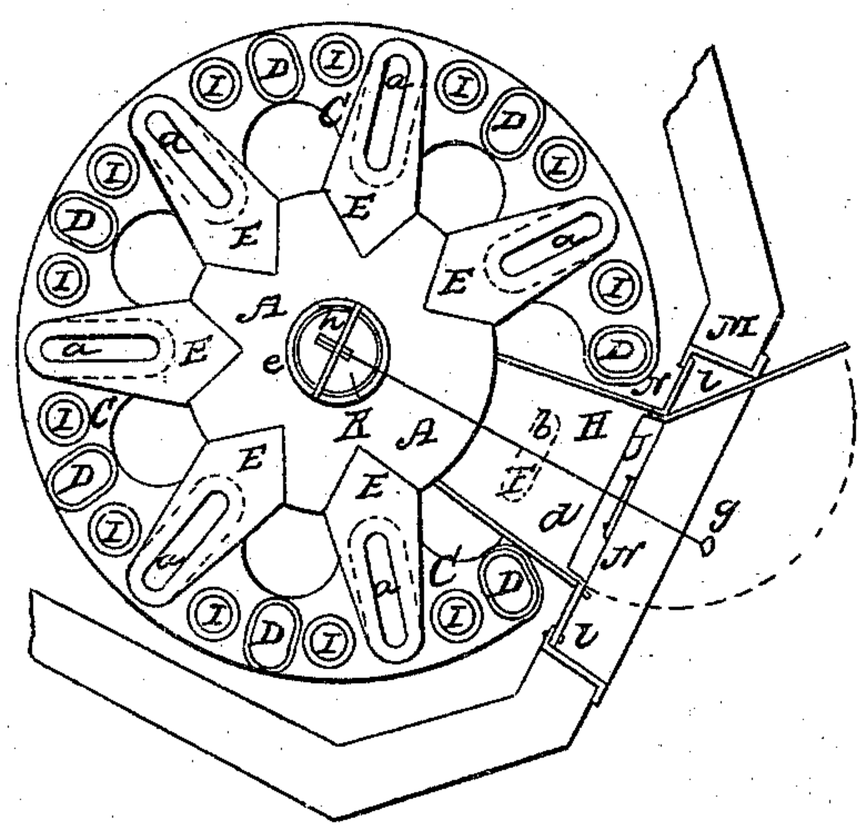
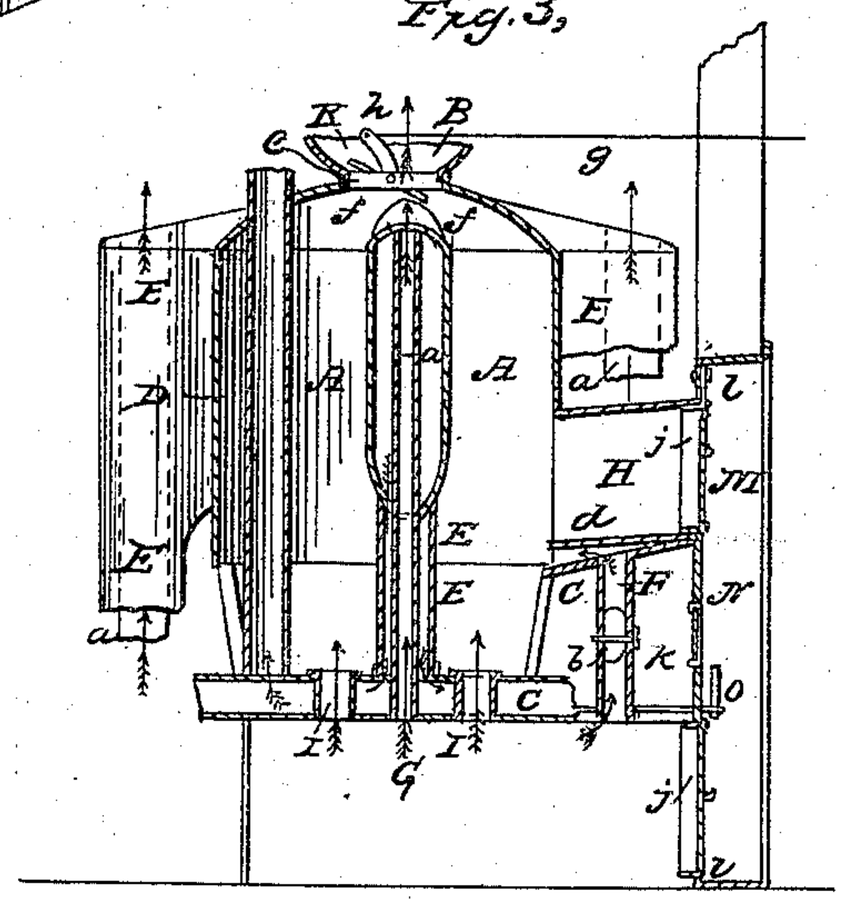


Fig. 3,



WITNESSES

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IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **17,022**, dated April 14, 1857.

To all whom it may concern:

Be it known that I, JOHN H. CAHILL, of the city of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Hot-Air 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, in which—

Figure 1 is a perspective view; Fig. 2, a plan view, the upper radiator being removed; and Fig. 3, a vertical longitudinal section of part of the same, like letters indicating the same parts when on the different figures.

The nature of my invention consists in a peculiar mode of constructing, arranging, and combining with open tubes a series of clean-out holes in the bottom radiator, so as to afford greater facilities for removing therefrom dust and ashes, and also allow air to pass up through the same.

Referring to the drawings, A is the central or main cylinder and fire-chamber; B, the top radiator; C, the bottom radiator. These two radiators are connected together by the upward gas-flues D D.

E E are the downward gas-flues. These flues connect laterally with the central chamber A above the fire, then project downward, branching off from the central chamber, and connect with the lower radiator C, the down flues E and the up flues D alternating in position around the center chamber A. Each of the down flues E contains an air-flue *a*, open at each end, the lower end passing through the bottom radiator and the upper end opening through the flue into the open space above.

F is the dust-flue, forming a communicating passage from the ash-pit G through an inclined plate *c* and beneath the lower usual plate *d* of the fuel-way H to the interior of the central chamber A just above the fire-cylinder, the inclined plate *c* and the plate *d* joining closely together at an acute angle on the inner side, near the bottom of the door of the fuel-way, as shown in the drawings. Within this flue F there is placed a valve *b* for closing or opening the flue as occasion may require.

I are the "clean-out" holes and short open tubes fitted thereto gas-tight, so that when in place air may pass upward through them and the hot gas around them within the flue C, and so that when the flues or radiator C require cleaning the tubes I may be easily lifted out, thus admitting the hand within the radiator on both sides of the gas-flues D and E.

K is the damper-valve, which is fitted so as to turn on its axis within a short cylinder or ring *e*, which is placed on end so as to rest upon a flange *f* and within the neck which connects the upper radiator with the crown of the central cylinder, the diameter of the valve-ring being such as to allow of its being introduced through the main flue-opening above. The valve is operated at pleasure by means of a rod *g*, which passes from the outside through the front wall and connects with the valve arm or lever *h*.

The upper radiator B is composed of a central piece adapted for uniting with the neck of the central chamber A, and also with the main flue L above and with the series of radiating flues *m*, which project horizontally and radially therefrom and over the upper ends of the upward flues D and connecting therewith, so as to afford a separate and independent flue to the center, and to the main gas-flue L for each of the upward flues D, as shown in the drawings. The outer ends *i* of these radial flues may be each fitted with a movable end, as a stopper, which can be drawn out, so as to allow the removal of the dust or ashes which from time to time may accumulate therein.

M is the large iron frame fixed to the wall and fitted with a movable plate N, containing openings fitted around with flanges *j*, which project a short distance within the fuel-way and ash-pit chamber, and also having a small opening *k*, fitted with a sliding door and giving access to the handle of the ash-flue valve *b*. This plate N is made to fit easily within the frame M and is secured thereto and in place by means of hinges or by means of slots and turn-buttons *l*, as shown in the drawings, so that it may be readily taken out, and thus afford convenient entrance at any time to the interior of the hot-air chamber.

The ash-chamber, fire-cylinder, and grate are constructed and arranged in the usual manner, and all the parts of the furnace, as described, are made of cast-iron and the

whole inclosed within a brick hot-air chamber constructed in the usual manner.

The operation of my invention is as follows: When a fire is started in the cylinder, the smoke and gas pass directly upward through the main flue L, as usual, and when the fuel is completely ignited the damper K is closed, when the hot products of combustion pass through the flues E down into the bottom radiator C, thence upward through the vertical flues D and horizontal radial flues *m* to the center of the upper radiator B, above the damper K, and thence directly upward through the main flue L to the chimney, as shown by the red arrows in the drawings, while at the same time the fresh air constantly admitted from the outside through proper openings in the brick wall absorbs the heat radiated from the outer surfaces of the radiators B and C, the flues D and E, and the central cylinder A, and also from the interior surfaces of the air-flues *a* and tubes I on its passage upward to the outlet, as shown by the black arrows. When the ashes need to be shaken out of the fire, the dust-flue valve *b* is opened through the door *k* and the grate agitated by means of the hand-lever O, as usual, when the dust is carried up by the draft through the dust-flue F and beneath the fuel-way plate *d* to the interior of the central cylinder above the fire, and thence into the main flue, the damper K being previously opened.

It will be perceived that there are several advantages peculiar to my invention: First, the upward flues D, being each a separate and distinct communicating flue with the center of the upper radiator, (by means of the radial flues *m*,) produce a more perfect equalization in the draft through each and the radiation of heat therefrom than as heretofore constructed; second, the air-flues *a*, being open at each end and within the downflues E, increase materially and conveniently the radiating-surfaces of the downflues; third, the construction and arrangement of the clean-out holes I and the short air-tubes therein aid materially in the increase of effective radiating-surface, while they at all times afford ready access to the interior of the lower radiator for the removal of the dust and ashes; fourth, the dust-flue F as arranged and combined is a perfect preventive against the escape of dust, ashes, or gas from the mouth of the ash-chamber into the cellar—a nuisance never before effectually prevented—and, fifth, the manway afforded by means of the movable plate N, with its stationary frame M, is a new and important feature in my improvement of the hot-air furnace which is attended with many advantages, as it affords access to the interior of the furnace at any time without the necessity of tearing down the walls, as heretofore, to make repairs of the furnace.

Having thus described the construction and operation of my invention and pointed out facts showing its utility and superior advantages, I proceed to state that I do not claim, generally, making a hot-air furnace surrounded with radiating-flues combined with a central chamber having a damper for causing direct and indirect draft through the furnace, as such arrangements are common and well known; but

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

The clean-out holes I in the lower radiator C, in combination with the short stopper-tubes fitting adjustably within the same and opening through the lower plate of the said radiator, substantially and for the purposes as described and set forth.

JOHN H. CAHILL.

Witnesses:

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