W. F. BEECHER.

Hot-Air Furnace.

No. 217,723. Patented July 22, 1879.

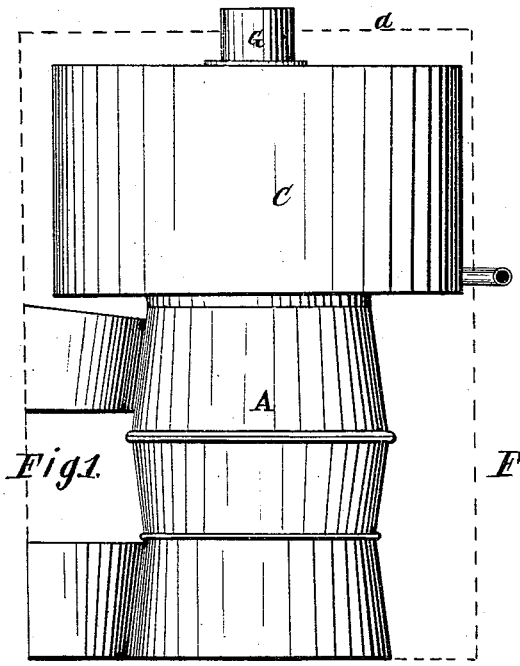


Fig. 1.

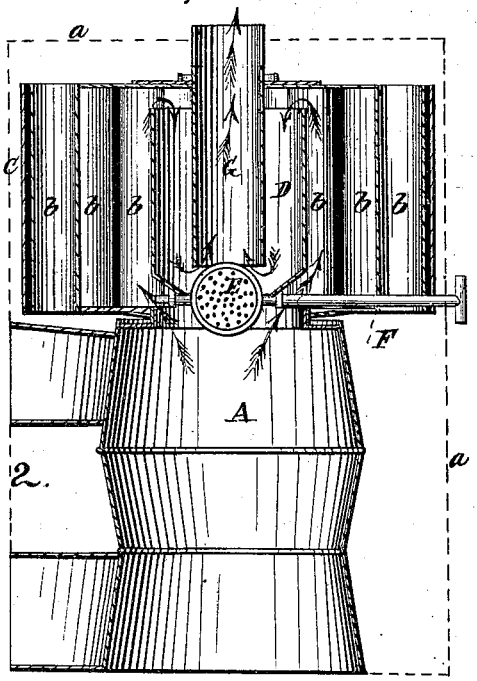


Fig. 2.

Fig. 3.

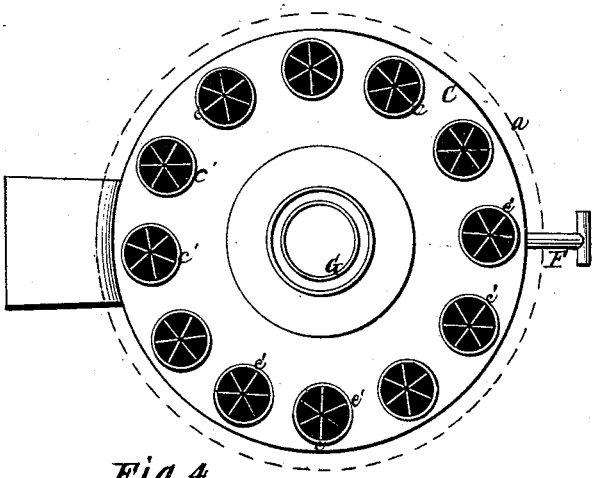
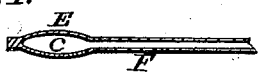


Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM F. BEECHER, OF CLEVELAND, OHIO.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **217,723**, dated July 22, 1879; application filed December 13, 1878.

To all whom it may concern:

Be it known that I, WILLIAM F. BEECHER, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and Improved Furnace for Buildings; and I do hereby declare that the following is a full, clear, and complete description thereof, reference being had to the accompanying drawings, making a part of the same.

The nature of this invention relates to improvements in that class of hot-air furnaces in which an air-heating and radiating furnace is combined—that is to say, furnaces which are provided with air-heating pipes in close contact with the fire-chamber, and so arranged as to take cold air in at the lower part thereof and discharge heated air from the upper part.

A full and complete description of the improvements above alluded to and of the application of the same to the furnace are substantially as follows, in which—

Figure 1 is an outside view of the furnace and air-heating chamber. Fig. 2 is a transverse vertical section. Fig. 3 is a plan view, and Fig. 4 a sectional view of the damper and rod. The dotted line around each of the figures indicates the external shell or case of the furnace.

Like letters of reference refer to like parts in the several views.

In the drawings, A represents the furnace or fire-place, which is or may be like those in ordinary use. To the top of the fire place or pot is secured a drum, C, having an open relation to the fire-place. Centrally within the drum is a cylinder, D, Fig. 2, the bottom of which is dishing and provided with a central opening directly over the fire-place. To the said opening is fitted a damper, E, operated from the outside by a stem, F. Said stem is a tube open to the outside, and also open into the chamber of the damper, which is hollow. The lower face of the damper is perforated with holes, as seen in Fig. 2, which represent the damper as open, so that the perforated side thereof may be seen. It will be observed that the cylinder is not so high as the drum, there being a space between the upper end of the cylinder and top of the drum, for a purpose presently shown. Within the said cylinder is secured a flue, G, the lower end of which opens directly over the damper, but is above it far enough to allow the same to be turned or opened, as shown in the drawings. The upper end of the flue extends through the top of the drum, and also through the shell, (indicated by the dotted line *a*,) whereby the furnace is inclosed. Between the drum and the cylinder is arranged an annular series of air tubes or flues, *b b*, which may be more or less in number. Said air-flues pass through the top and bottom of the drum C, and therefore have an open relation to the inside of the shell *a*, which shell, by an opening or openings, has a direct communication with the outside for the admission of air to the air-flues *b b*. The air-flues alluded to are divided into sections longitudinally by walls or partition-plates *c'*, Fig. 3, thereby forming in each air-flue a number of passages for the ascent of the air through them.

The practical operation of the above-described furnace is as follows: The heat, smoke, and gases from the furnace or fire-place pass therefrom directly into the drum C when the damper is closed, thereby shutting the mouth of the cylinder D. The course of the heat, smoke, &c., through the drum C, thence to the outside of the furnace, is indicated by the arrows in Fig. 2, by which it will be seen that the heat and smoke circulate about in the drum C, around among the air-flues, thereby heating them, and also consequently the air passing up within. The heat and smoke pass from the drum down through the cylinder D, thence upward through the smoke-flue G to the chimney, as indicated by the arrows. It will be seen that this course of the heat, smoke, &c., is not direct, but is retarded by its indirectness in the drum among the air-flues, thereby heating them to a high degree, and the air is consequently discharged from them into the room more or less heated, as the condition of the fire may be.

In consequence of the large heating-surface afforded by the series of air-flues and the plates dividing said flues longitudinally, as above described, the air circulating through them is readily heated, thereby heating a larger volume of air, and at less expense, than is the

result of the ordinary furnaces, at the same time allowing ample means of escape for the smoke, &c.

In the event a stronger draft is needed, in consequence of a low condition of the fire, the damper E is then opened, as shown in Fig. 2, thereby allowing a more direct draft upward through the flue G, and at the same time permitting a current or currents of air to the furnace directly above the fire through the perforated damper. The presence of the fresh air at this place and time facilitates the combustion of the smoke and gases from the fire, which causes a more complete consumption of the fuel.

The air is admitted to and through the perforated damper referred to through the tubular damper-rod F, by which means fresh air is constantly passing through the passage *a* in the rod to the chamber *c*, Fig. 4, of the damper E, one side of which is provided with openings or perforations, as seen in Fig. 2, while the other side presents an entire plain surface, between which sides is formed the chamber *c*. The tubular rod F is firmly attached to the damper, and the tube or opening therein is in open communication with said chamber; hence a more perfect combustion of the fuel and gas is obtained than in the ordinary way, and at the same time the current of air to the damper through the rod prevents rapid destruction thereof by the heat of the furnace.

As above said, the furnace is inclosed by a shell. (Indicated by the broken lines *a*.) Said shell may consist of sheet metal, or it may be built up around the furnace with brick, in the usual way, providing in either case openings for the admission of air to the air-flues.

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

1. The air-heating flues *b b*, having the longitudinal radial plates therein for increasing the heating capacity of said pipes, and inclosed within the drum, in combination with the cylinders D, having converging sides at the bottom, and flue G, all substantially as and for the purpose set forth.

2. The perforated damper having a chamber within it, and provided with a tubular damper-rod in open relation with said chamber, in combination with the combustion-chamber and exit-flue of the furnace, substantially as and for the purpose set forth.

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