E. H. DOYLE.

AIR HEATING FURNACE.

No. 188,729. Patented March 27, 1877.

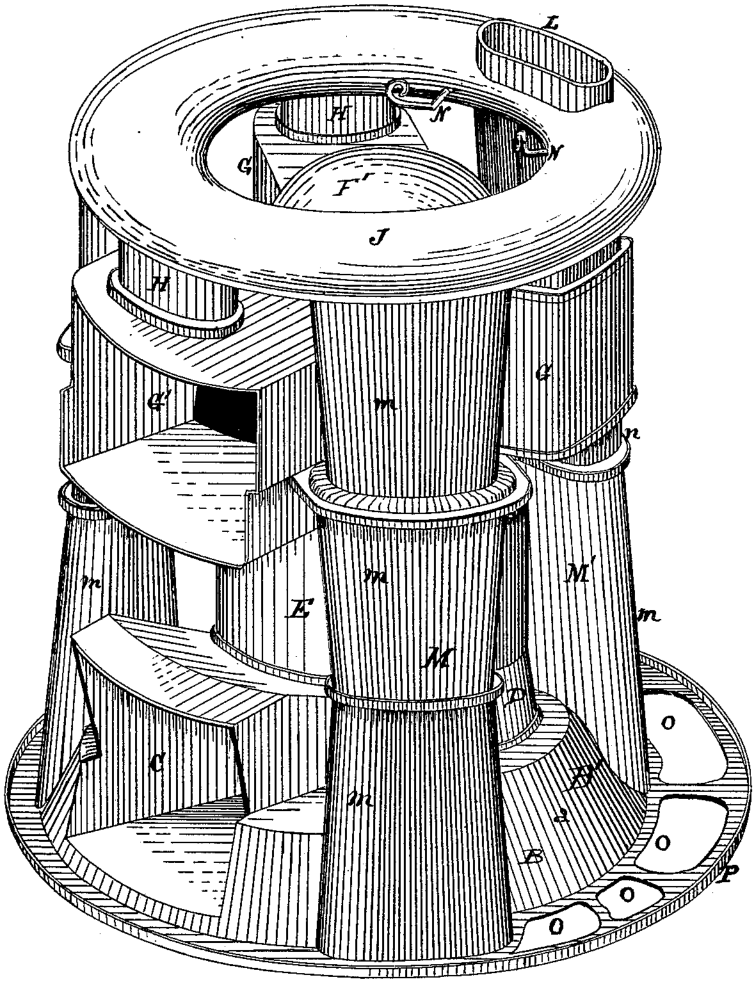

Fig. 1.

Witnesses. { Chas. J. Erwick
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Edward H. Doyle
by his Attorney Alex. Selkirk
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3 Sheets—Sheet 2.

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Fig. 2.

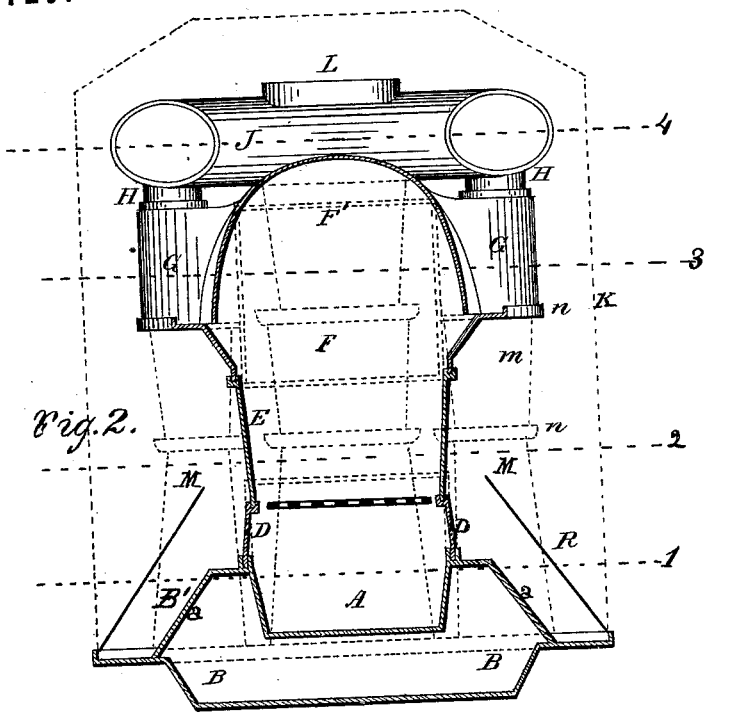

Fig. 3.

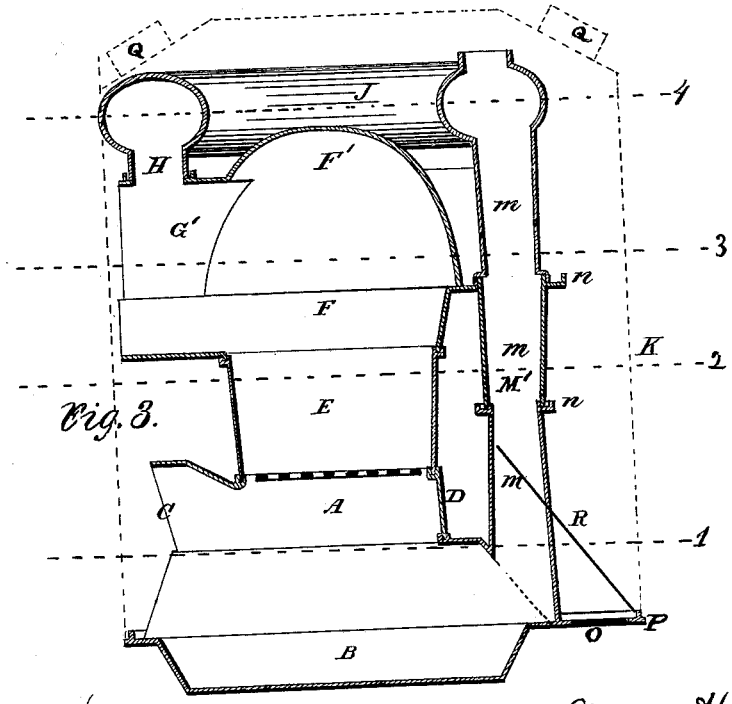

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Fig. 4.

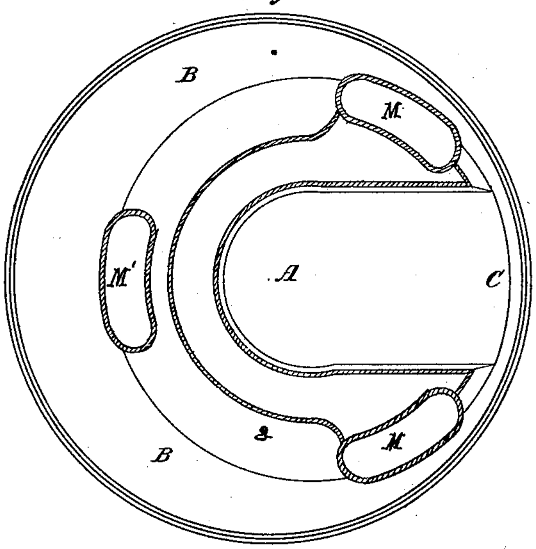


Fig. 5.

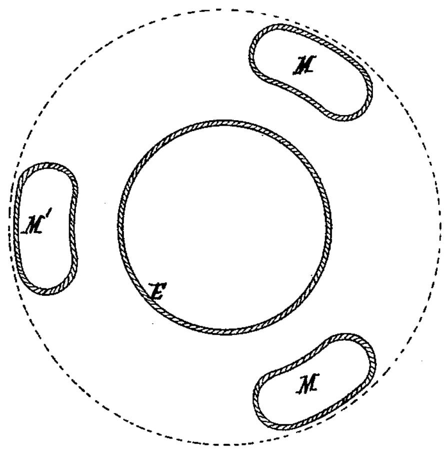


Fig. 6.

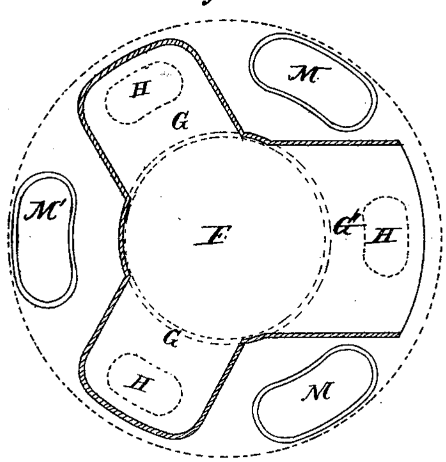
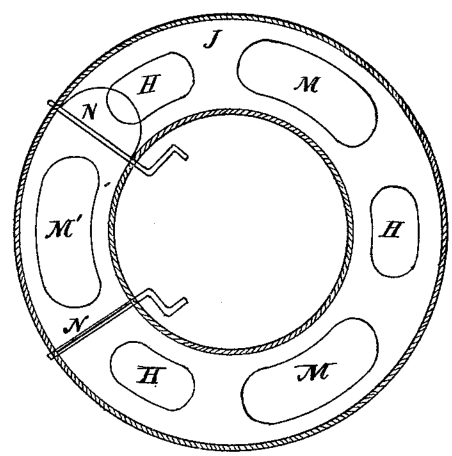


Fig. 7.



Witnesses. Chas. J. Selkirk
Henry Binley

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UNITED STATES PATENT OFFICE.

EDWARD H. DOYLE, OF ALBANY, NEW YORK.

IMPROVEMENT IN AIR-HEATING FURNACES.

Specification forming part of Letters Patent No. **188,729**, dated March 27, 1877; application filed November 2, 1875.

To all whom it may concern:

Be it known that I, EDWARD H. DOYLE, of the city and county of Albany, State of New York, have invented certain Improvements in Air-Heating Furnaces; and I do hereby declare that the following is a description thereof, reference being had to the accompanying drawings, in three sheets, forming a part of this specification, in which—

Figure 1 is a perspective view of the heater embodying the improvements in this invention. Fig. 2 is a sectional elevation taken from side to side, as at lines 1 in Figs. 4, 5, 6, and 7. Fig. 3 is a sectional elevation taken from front to rear, as at lines No. 2 in Figs. 4, 5, 6, and 7. Fig. 4 is a horizontal sectional view taken at line No. 1 in Figs. 2 and 3. Fig. 5 is a horizontal sectional view taken at line No. 2 in Figs. 2 and 3. Fig. 6 is a horizontal sectional view taken at line No. 3 in Figs. 2 and 3. Fig. 7 is a horizontal sectional view taken at line No. 4 in Figs. 2 and 3.

My invention relates to furnaces for heating air for warming rooms; and consists in the several combinations of parts or elements hereinafter described, which are intended to operate more effectually with the heated gases generated in the process of the combustion of the fuel, to highly heat a great area of surface of heat-radiating plates distributed variously between the extreme upper and lower portions of the heater, and cause the cold air admitted within the walls of the outer casing to pass over all the said extensively-heated surfaces of plates, in such a manner as to have its temperature gradually raised in its passage upward from its point of entrance to its exit.

The object of this invention is to render all portions of the heater inclosed within the outer wall of the air-space or chamber capable of acting with the air, so that the base and front portions of the heater may be made to contribute to warm the same, as well as the rear and the upper portions.

To enable others skilled in the art to make and use my invention, I will proceed to describe it in reference to the drawings, and letters of reference marked thereon, the same letters indicating like parts.

In the drawings, A represents the ash-chamber. B B are flues located within the base of the furnace, and surrounding the lower portions of the ash-chamber, and also occupying the space below the bottom of the ash-pit, as shown in Fig. 2. The outer walls B′ of the flue B B are made with an incline, as shown in Fig. 2.

C is the front opening to the ash-chamber, and is closed by a door, as is the practice of the trade. D is an annular plate, setting in a sand-pocket recess cast with the upper base-plate, and forms a section of the walls of the ash-chamber. E is the fire-pot, supported from the upper edge of plate D from a sand-pocket, and is provided with a grate. F is the combustion-chamber proper, made preferably flaring in its sides from its base outward toward the top, and is seated in a sand-pocket. F′ is the dome of said combustion-chamber, made with a hemispherical form, and intended to supplement the combustion-chamber F in both its capacity and extent of radiating-surface.

G G and G′ are chambers extending outward from the periphery of the dome F′, and between the base and apex of same, as shown in Figs. 2 and 3, with the mouth of each chamber opening to the dome, as shown in Fig. 6. The said chambers themselves are relatively situated with each other as at the points of a triangle. The chamber G′, situated in front, is provided with a door, through which coals may be passed into the furnace.

H H are short flues located at the tops of chambers G G G′, and leading from the same to the ring-chamber J, which ring-chamber is situated above a line with the top of the dome, or nearly so, and directly over the chambers G G G′, as shown in Figs. 2 and 3. Made with said ring-chamber, at its rear, is the exit L, intended to connect with the smoke-pipe.

M M are descending flues, located forward of the rear half of the furnace, and between the chambers G G and G′, as shown in Figs. 1 and

6, and lead from the lower side of the ring-chamber J into the base-flues B B, as shown in Figs. 1 and 2. The said flues are made in sections *m m*, for convenience in casting, and set in sand-pockets *n*.

M′ is the ascending flue, leading from the base-flues B B, from the rear of the furnace, to the ring-chamber J above, and directly to the exit L. N N are dampers placed in the ring-chamber at points between the rear flues H H and the ascending flue M′ and exit L above.

Surrounding the base of the furnace is the rim P, Figs. 2, 3, and 4, provided with openings O O, for admission of air from below to the air-heating chamber above. Set over the said openings and the inclined wall B′ of the flues B, and extending in an inclined manner from the outer edge of rim P toward the fire-pot E is the deflecting-hood R R, which deflecting-hood stops, at its upper end, at a short distance from the base of the wall of said fire-pot, sufficient to afford an ample space for the passage of the air received through the openings O O, and from the space between the said deflecting-hood and the inclined wall B′ of the base-flues B B to the air-heating space inclosed by the casing K, surrounding the several parts of the furnace.

The manner in which the several parts of this improved furnace operates is as follows: When the dampers N N in the ring-chamber J are turned to open communication of flues H H H to the exit L, the hot gaseous products of combustion will be drawn from the combustion-chamber F to the dome F′; thence into the supplementary chambers G G G′, and from them, through flues H, into the ring-chamber J above, when they may pass back to the exit L, to escape to the smoke-pipe.

In moderately cold weather, this manner of circulation of the hot gases is advised, as only the walls of the upper portions of the furnace are heated to effect a warming of the air within the casing K.

When the dampers N N are closed, the hot gaseous products of combustion pass from the combustion-chamber F into the dome F′, and thence into the supplementary chambers G G G′, and from them into the ring-chamber J through flues H, and from thence be drawn down the descending flue M M into the base-flues B B, to circulate therein, and then pass from the rear of the said base-flues up the ascending flue M′ to the exit L. This manner of circulation is intended to be used in very cold weather, as the walls of the descending and ascending flues, and also the outer inclined walls of the base-flues, may become highly heated by the hot gases circulating in the same, to operate as radiating-surfaces to effect a warming of the air moving over the said walls.

The air admitted within the casing K to be warmed passes from a low point near the floor through the openings O O, and over the inclined wall B′ of the base-flues B, and between the said inclined wall and the deflecting-hood R, and is thrown or directed toward the walls of the fire-pot F, to be discharged into the air-heating chamber above at a point nigh said fire-pot, to rise in a vertical line with the heated flaring sides of the combustion-chamber, and the heated walls of the chambers G G and ring-chamber J, while portions of the air may also be made to pass up along the heated vertical side walls of the descending and ascending flues M M and M′.

When the dampers N N are turned to produce a revertible draft into and from the base, through flues M M, B B, and M′, the areas of heating-surfaces for operating with the air are greatly increased over that heretofore had in air-heating furnaces having no arrangement of flues for conducting the hot gases into the base, as in this improved furnace.

It may be readily seen that by means of the deflecting-hood and the inclined wall of the base-flues, when the draft is reverted into the base to heat the said inclined wall of said base-flues, the air may be partially heated and expanded before it arrives at its point of discharge at the fire-pot into the air-receiving space inclosed by the casing K; and that, at the said point of discharge, the current of air may be more highly stimulated and expanded than it would be were the air permitted to rise vertically from the openings O O into the air-heating chamber above, as heretofore practiced; and that after the air has passed into the air-heating chamber above, it may be more highly heated by passing between the heated surfaces of the walls of flues M M′ and fire-pot and the chambers G G′, and between the heated walls of the dome and ring-chamber.

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

1. The combination, with the base-flues B, having inclined walls B′, and openings O O in the base-rim, of the deflecting-hood R, substantially as and for the purpose set forth.

2. In an air-heating furnace having descending, ascending, and base flues and dampers for a revertible draft, the combination of the inclined wall B′ and deflecting-hood R, inclining over said inclined wall, substantially as and for the purpose set forth.

3. In an air-heating furnace, the combination, with the ring-chamber J above the dome, flues B in the base, of descending flues M M, situated forward of the rear half of the furnace proper, and ascending flue M′, situated at the rear, substantially as and for the purpose set forth.

4. In an air-heating furnace, the combination, with the combustion-chamber F, dome F′, and chambers G G G′, having their mouths opening to the said dome, of the flues H H H, ring-chamber J, and exit L, substantially as and for the purpose set forth.

5. In an air-heating furnace, the combination, with the combustion-chamber F, dome F′, chambers G G G′, flues H, and ring-chamber J, of the descending flues M, base-flues B, ascending flue M′, and dampers N, substantially as and for the purpose set forth.

EDWARD H. DOYLE.

Witnesses:
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ALEX. SELKIRK.