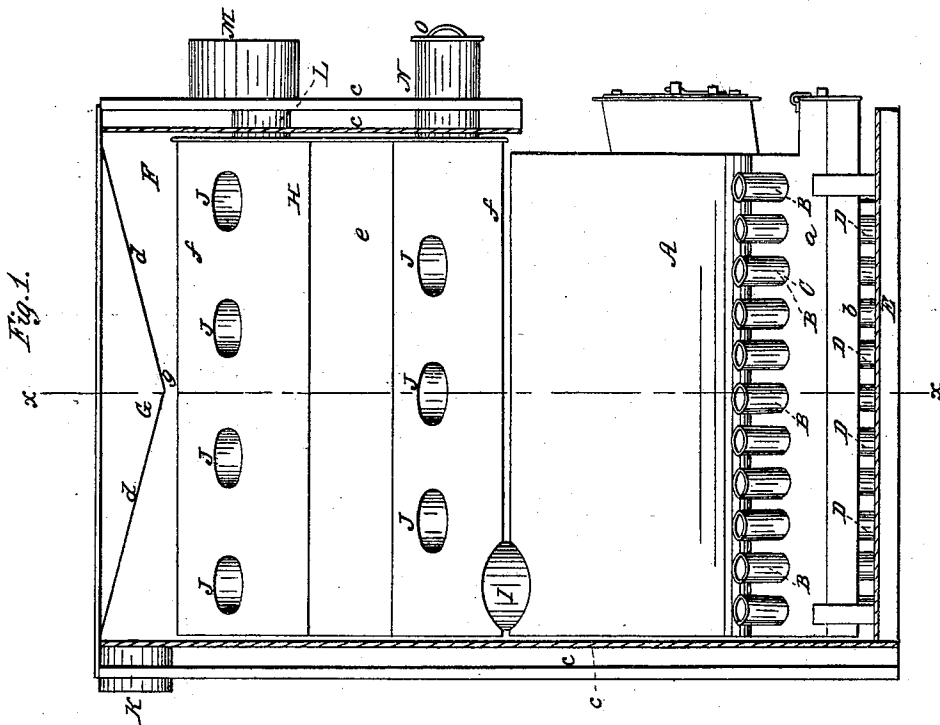
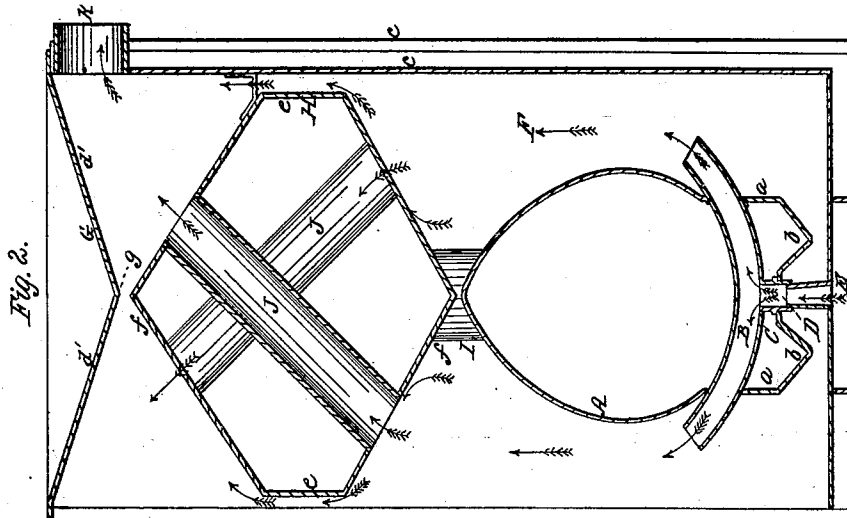


W. H. HARRIS.
Air Heating Furnace.

No. 40,033.

Patented Sept. 22, 1863.



Witnesses:
J. Coombs
W. Reed

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UNITED STATES PATENT OFFICE.

WILLIAM H. HARRIS, OF GRAND RAPIDS, MICHIGAN.

IMPROVEMENT IN AIR-HEATING FURNACES.

Specification forming part of Letters Patent No. 40,033, dated September 22, 1863.

To all whom it may concern:

Be it known that I, WILLIAM H. HARRIS, of Grand Rapids, in the county of Kent and State of Michigan, have invented a new and Improved Air-Heating Furnace; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side view of my invention; Fig. 2, a transverse vertical section of the same, taken in the line *x x*, Fig. 1.

Similar letters of reference indicate corresponding parts in the two figures.

This invention consists in a novel construction and arrangement of a fire-grate, drum, and air-heating chamber, as hereinafter fully shown and described, whereby it is believed that several advantages are obtained over the furnaces hitherto used.

To enable those skilled in the art to fully understand and construct my invention, I will proceed to describe it.

A represents the furnace, which may be constructed of heavy boiler-iron, and of any suitable dimensions. The furnace in its transverse section is of oval form or egg-shape, as shown clearly in Fig. 2, it being widest at its lower part and gradually decreasing in width toward its top or upper end. The grate of the furnace is composed of a series of transverse curved tubes, B, which are placed parallel with each other, with spaces of equal width between them to admit of the escape of ashes into the ash-box C, which is directly below the grate and is formed of two parallel sides, *a a*, and a bottom having two longitudinal gutters or troughs, *b b*, which are shown in Fig. 2. The tubes B, at their centers, have pendent branch tubes D attached, which extend down through the elevated portion of the bottom of the ash-box between the two gutters or troughs *b b*, and communicate with a cold-air passage, E, and the ends of the tubes B project through the sides of the ash-box and communicate with an air-heating chamber, F, which is formed by double walls *c c*, of masonry or sheet metal the top G being formed of a single plate of metal, swaged or bent so as to leave four inclined surfaces, *d d d' d'*.

H is a drum, which may be constructed of

heavy sheet metal, and of a length equal to that of the furnace A. The sides *e e* of the drum are formed of narrow, vertical, and parallel plates, and the top and bottom plates, *f f*, are of double-inclined form, each inclined surface being at an angle of about forty-five degrees, the surfaces of the top plate projecting upward and those of the bottom plate projecting downward, as shown clearly in Fig. 2. The furnace A, at its back part, communicates with the back part of the drum H by means of a short pipe, I, and within the drum there are placed a series of inclined tubes, J, the ends of which communicate with the air-heating chamber F by passing through the inclined surfaces of the top and bottom plates of the drum.

The top plate, G, has its inclined surfaces projecting downward from its sides toward its center, where they meet in a point, *g*, said point being in a vertical line with the angles formed by the junction of the inclined surfaces of the top and bottom plates, *f f*, of the drum H.

K represents hot-air conducting-pipes, which communicate with the upper part of the air-heating chamber F, and conduct the heated air to the desired compartments. L is the smoke-pipe, which projects from one end of the drum H, and is encompassed by a pipe, M, which conducts off the heated air from the space between the walls *c c* of the chamber F. N is a pipe which projects from the lower part of the drum H at one end and is provided with a stopper, O. This pipe admits of the drum being cleaned with facility.

The operation is as follows: When a fire is built in the furnace A, the products of combustion pass up through the pipe I into the drum H, and through said drum into the pipe L, which leads into the flue. The cold air enters the passage E, passes up through the branch tubes D into the curved tubes B, which form the fire-grate, and from thence into the chamber F. The curved sides of the furnace A form a free or unobstructed passage for the ascending air to the lower ends of the tubes J, through which it passes to the upper part of the chamber F, and is deflected by the inclined surfaces *d d d' d'* to the hot-air-conveying pipes P.

By this arrangement it will be seen that the air, while passing up through the chamber

F, is not obstructed by any angles or prominences, and at the same time the air will become properly heated in consequence of being subjected to a large heating-surface, portions of which—to wit, the tubes B of the fire-grate, and the exterior of the furnace—are in direct contact with the fire, and radiate a great deal of heat, which is absorbed by the air. The drum H also radiates considerable heat, and also the tubes J. The red arrows in Fig. 2 show clearly the passage of the air through F. Having thus described my invention, what

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

The arrangement and combination of the curved tubes B, forming the fire-grate of the furnace, cold-air passages E, air-heating chamber F, drum H, provided with the tubes J, and the furnace A, as herein fully shown and described.

WILLIAM H. HARRIS.

Witnesses:

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