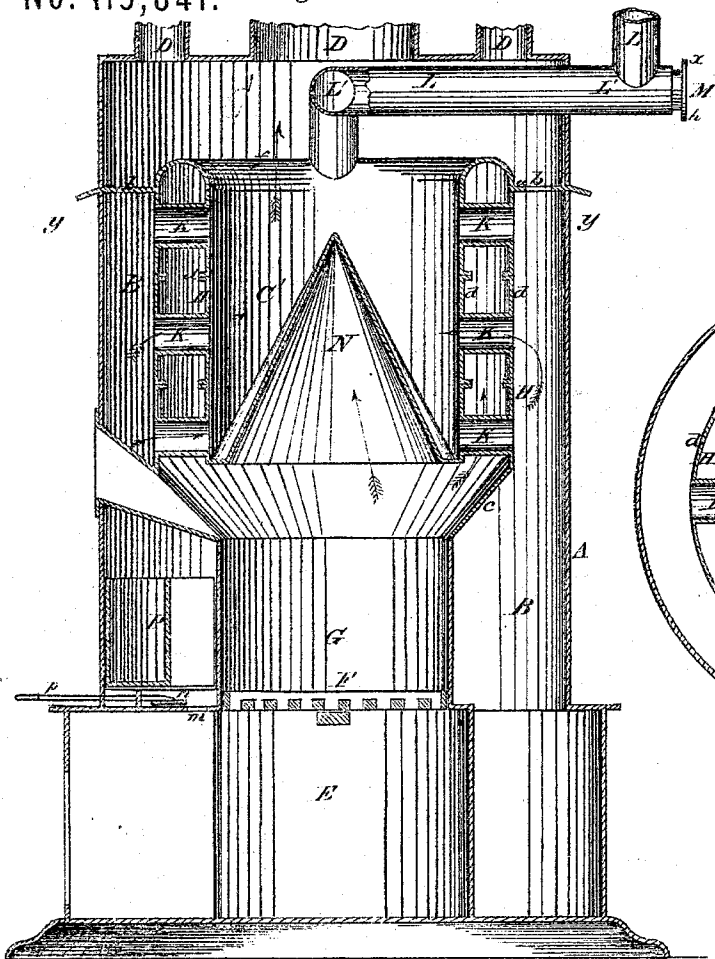


W. B. GEDDES.

Improvement in Hot-Air Furnaces.

No. 115,841. *Fig. 1.*

Patented June 13, 1871.



Furnace.

Fig. 3.

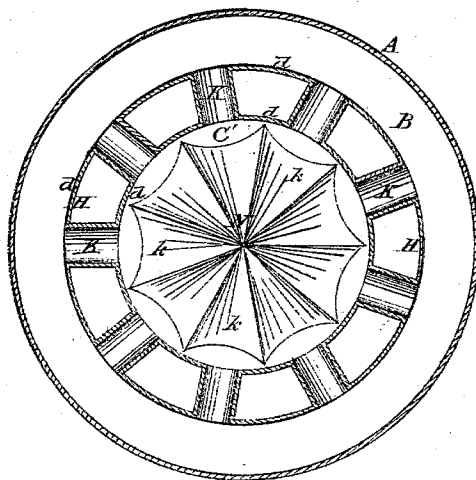


Fig. 4.

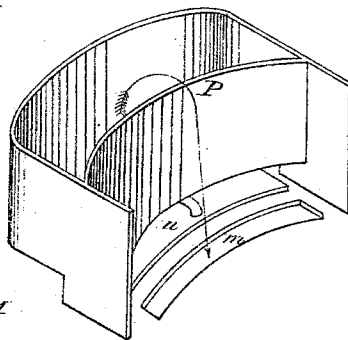
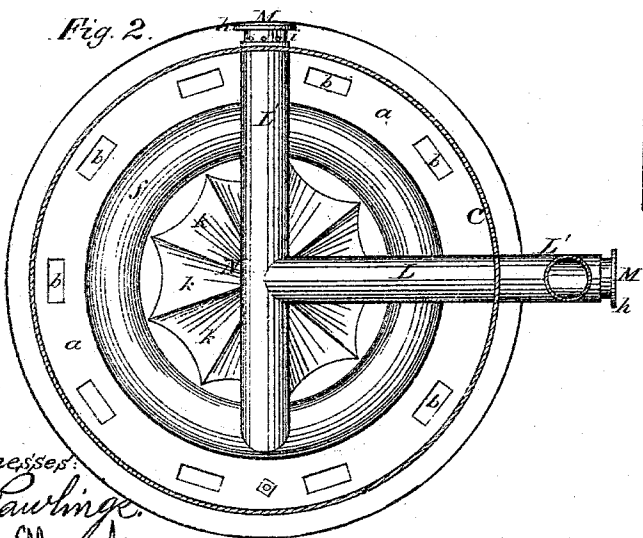


Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM B. GEDDES, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. 115,841, dated June 13, 1871.

To all whom it may concern:

Be it known that I, WILLIAM B. GEDDES, of the city of Rochester, county of Monroe and State of New York, have invented a certain new and useful Improvement in Furnaces and Stoves, of which the following is a specification:

Nature of the Invention.

My invention consists in the construction of a heating furnace or stove, as hereinafter described, whereby the air is passed from the exterior heating-chamber inward through the thimbles of a hollow drum to an inner chamber, and thence to the dome, where it is distributed, the said drum forming within its walls the flue-space for the passage of the products of combustion. It also consists in an arrangement for introducing steam, both to the fire to aid the combustion, and to the heated air, for impregnating the same with moisture; and it furthermore consists in the special arrangement of parts, as hereinafter described.

General Description.

In the drawing, Figure 1 is a central vertical section of my improved furnace; Fig. 2, a cross-section in the plane of line *x x*, Fig. 1; Fig. 3, a similar section in the plane of line *y y*, Fig. 1; Fig. 4, a perspective view of the water-pan and connecting parts detached.

This furnace may be made either portable or stationary, as may be desirable. The drawing shows the portable form.

A represents the outer cylinder, which incloses the hot-air chamber B. C represents the dome, from which the hot air is drawn to different apartments by exit-pipes D D D. A diaphragm, *a*, separates the hot-air chamber from the dome. This diaphragm is provided with openings or passages *b b b*, whose object will presently be described. E represents the ash-pit; F, the grate; and G, the fire-pot. These parts are of ordinary construction. H represents the heating-drum or sheet, which rests upon the top of the fire-pot and forms a continuation of the fire-place. It is made enlarged, as shown, so as to get a greater heating capacity, and the connection with the fire-pot is made by a funnel-shaped rim, *c*. The drum is constructed of separate rings resting one on top of another, and with separate walls *d d*, which leave a clear flue-space between for

the passage of the products of combustion. Each ring of the drum has a series of radial thimbles or pipes, K, cast therein, opening from the outer chamber B to the inner one, C', which is simply the interior of the drum, and communicates with dome-chamber C. These several series of thimbles alternate in position, so as to "break joint" vertically, by which means the heat-currents from the combustion are broken in their course and equally distributed through the whole flue-space. The top of the drum surrounding the heat-chamber is made arching or convex on top, as shown at *f*. From one side of this arch rises the smoke-pipe L, which passes out through the dome, and then is carried to the chimney in any desired manner. With the smoke-pipe is connected two right-angled arms of pipe, L' L', situated within the dome, but opening outside. In the open ends of these arms are situated thimbles M M, having closed heads *h h*, which, when closed up tight, stop the arms, so as to insure an active draught. When drawn out to a suitable degree, register-holes *i i* in the thimbles are exposed, which allow a passage of cold air to deaden the draught. When the thimbles are removed entirely, they allow a free passage of a poker or other device inward to clear the flues of ashes, which are thus thrown down into the flue-space of the drum, which is self-clearing. This arrangement of the pipe-arms L' L' is for governing the draught and clearing the pipe of ashes. Directly over the fire-pot and opening into the drum-chamber C' is situated a cone, N. This cone is hollow and open at its bottom to allow the entrance of heat from the fire, which, passing inward and circling around, finally returns and passes up the flue-space of the drum. The sides of this cone within the drum-chamber are made in concave segments *k k*, which come just opposite the lower thimbles K K, and thus serve to deflect the air-currents upward in a straight line to the top, where they become thoroughly commingled and rise in an equalized state to the dome-chamber above.

One great merit of my invention consists in the before-described construction of the drum, whereby the cold air is made to pass through the thimbles K K into an interior chamber. The air becomes partially heated in the outer chamber B—in fact, as much so as it does in

ordinary furnaces, which depend entirely upon the radiation outwardly from a common cylinder. This partially-heated air then passes inward through thimbles K, where it receives the benefit from the heat passing through the flue-space of the drum and encircling the thimbles. On its discharge inward it receives the radiation from the inner walls of the drum, and also from the central cone; and in rising it surrounds the arch *f* and the smoke-pipe which is inclosed in the dome.

By this arrangement I can attain a much higher degree of heat with a given capacity of furnace than in ordinary devices which simply depend upon the radiation of an outer cylinder, or an outer cylinder with a system of pipes; since, in my case, the radiating surfaces are all in large bodies, and the air, in passing over them in the indirect circuit described, extracts the maximum of heat in the shortest time. The action of the air is so rapid that it cannot become burned, as it would if moving in small and obstructed bodies.

I am aware of no heating-furnace in which the air is thus passed inward through a tubular drum to an inner chamber intermediate with the outer chamber or dome. There is, in this connection, an advantage in the employment of the passages *b b* from the outer chamber to the dome, which allow the escape upward of any excess of the heated air in the chamber B, thus relieving it, and, at the same time, tempering the heated air in the upper chamber by reason of its lower grade of heat. This allows a constant movement of the air, and prevents any deadening that might occur in the upper part of the chamber B were the same closed.

I locate in the front part of chamber B, surrounding the fire-pot, a water-basin or tank, P, which constantly contains a body of water, which is evaporated or raised in the form of steam. Below this basin is made a passage, *m*, through the top of the ash-pit near the grate. This passage is covered by a register-slide, *n*, whose stem *p* extends out within reach of the operator. This arrangement accomplishes a double effect, viz., the steam rises to a certain extent through chamber B and thus moistens the heated air, and a portion is drawn downward through passage *m* and passes into

the fire, thereby assisting in the combustion by a union of its inflammable gases with the flame.

I am aware that water-basins are common in furnaces simply for moistening the air; but, so far as I am aware, they have never before been combined with a passage and register-slide in proximity, by which the excess of steam may be drawn into the fire to assist the burning, being at the same time graduated in its action by the closing, more or less, of the register. The hot air from the chamber B also enters with the steam to support the combustion, being much more effective than cold air from the outside.

It will be seen that this same principle of the heating-drum and connecting parts may be applied to stoves as well as furnaces, in which case the drum is surrounded with the outer cylinder A in the same manner, thereby forming chamber B, which supplies the partially-heated air to the drum.

Claims.

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

1. The drum H, constructed of a series of rings formed with the walls *d d* and pipes *k k*, in combination with the air-passages *b b*, dome C, exit-pipes D, shell-cone N, and fire-pot G, the several parts being constructed and arranged to operate as herein set forth.

2. The shell-cone N, dome C, air-passages *b b*, stove-pipe L, with arms *L' L'* and thimbles M M, arranged and operating in connection with the drum H, composed of the series of rings provided with the walls *d d*, pipes *k k*, and drum resting upon the fire-pot G, and forming a continuation of the fire-space, substantially as set forth.

3. The water-basin P, arranged within the front part of the chamber B surrounding the fire-pot G, operating in connection with the passage *m* in the top of the ash-pit E, said opening *m* being opened and closed by the slide *n* and stem *p*, as herein shown and described.

WILLIAM B. GEDDES.

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