M. T. BALDWIN.

Heating-Drum, Stove and Furnace.

No. 211,687. Patented Jan. 28, 1879.

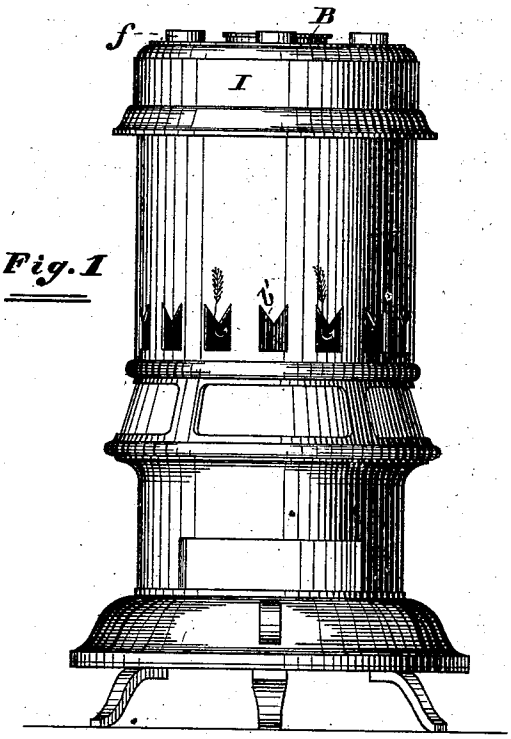

Fig. 1

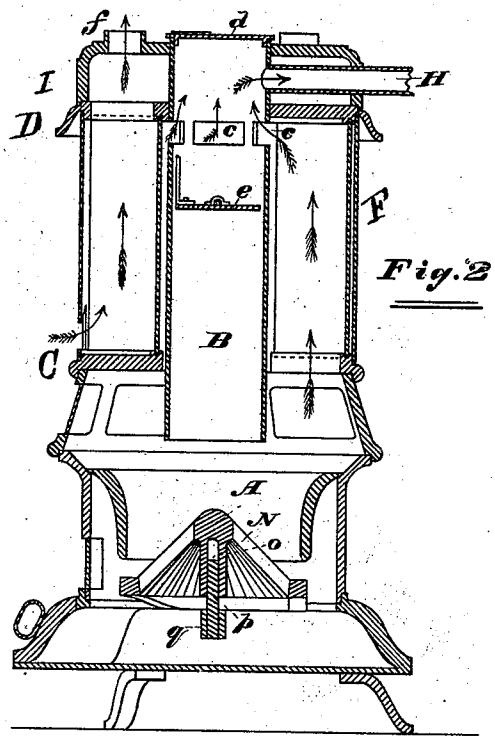

Fig. 2

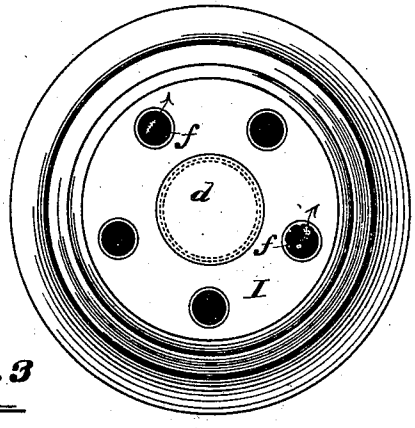

Fig. 3

Attest:

W. F. Baker

C. L. Baldwin

INVENTOR:

Myron T. Baldwin,

By R. Dyrenforth,

Attorney.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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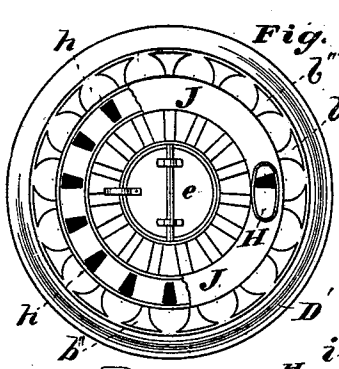

Fig. 7.

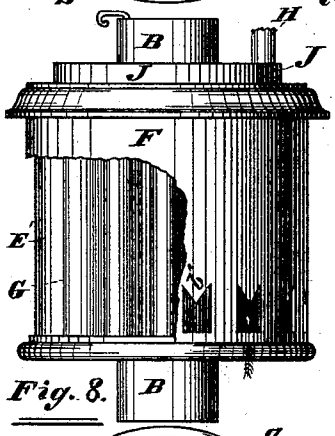

Fig. 8.

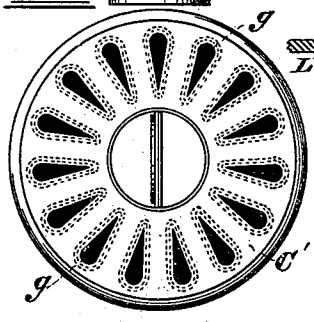

Fig. 9.

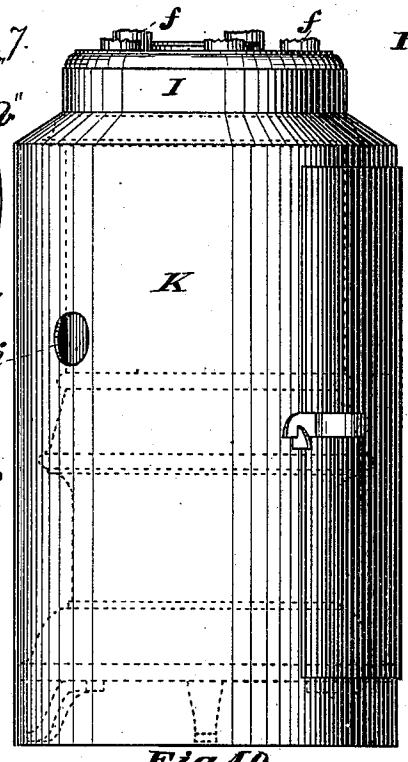

Fig. 10.

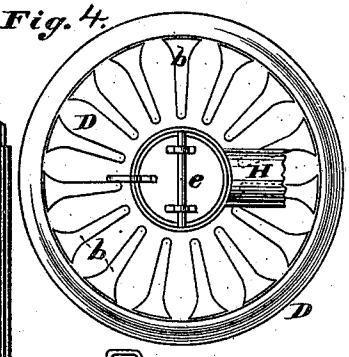

Fig. 4.

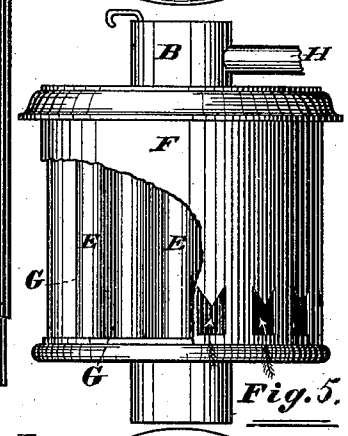

Fig. 5.

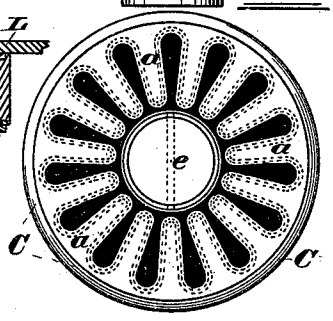

Fig. 6.

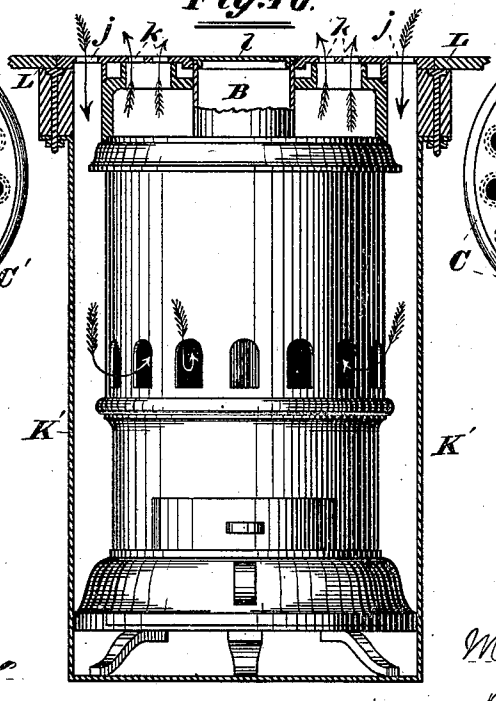

Fig. 11.

Attest:

W. F. Baker

C. L. Baldwin

INVENTOR:

Myron T. Baldwin,

By R. G. Dyrenforth,

Attorney.

N. PETERS. PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

MYRON T. BALDWIN, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN HEATING DRUMS, STOVES, AND FURNACES.

Specification forming part of Letters Patent No. **211,687**, dated January 28, 1879; application filed December 14, 1877.

To all whom it may concern:

Be it known that I, MYRON T. BALDWIN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Heating Drums, Stoves, and Furnaces; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, of which—

Figure 1 is a side elevation of my stove; Fig. 2, a vertical central section through Fig. 1; Fig. 3, a plan view of the top of the stove or cap whence the hot air escapes; Figs. 4, 5, 6, 7, 8, and 9, views illustrating the leading feature of my invention (viz., the construction of the fire and air flues) in two forms; Fig. 10, the stove inclosed within a furnace-jacket for heating buildings; and Fig. 11, the stove inclosed within a furnace-jacket in the form of a direct register, the whole standing in a room or basement below the room to be heated, and communicating with the latter through the floor.

The object of my invention is to take advantage of the full heating powers of any given quantity of fuel; and it consists, first, and chiefly, in the arranging of radial flues around a central point, or, in other words, surrounding a central line or a central feeder with radial flues of a flattened or wedge-shaped form, communicating with the fire-box at their lower ends, and at their upper ends communicating with the draft-flue, whereby the hot products of combustion, on their way to the chimney, are distributed through these separate flues; secondly, in surrounding these radial flues with a cylindrical jacket, whereby the spaces between the radial flues are inclosed and become air-flues, into which air is allowed free ingress at the base and egress at the top; thirdly, in the specific construction and arrangement of the flues, with their attendant devices, hereinafter described; and, fourthly, in the means by which I adapt my stove to furnace purposes for distributing the hot air to different apartments, all as hereinafter more fully set forth.

The flues may be formed in either of two ways. The first, to which I give preference as being the more convenient and economical, is that shown in Figs. 4, 5, and 6, and the second that represented in Figs. 7, 8, and 9. I shall proceed to describe these in their order, together with their several and various accessory appliances, and also the modes of application under different conditions.

In the drawings, A is the fire-box, and B the feeding-shaft leading to the same. C is a metal rim immediately surmounting the fire-box, and provided with re-entrant flanges *a a*. D is a plate surmounting the flues, and provided with radial openings *b b*. E E are the fire-flues, formed of one continuous sheet of metal, bent or fluted so as to conform closely to the flanges *a*, as indicated by the dotted lines, Fig. 6, to which they are secured by any suitable means. The tops of the flues so formed are covered by the plate D, the radial openings *b* being over the openings between the flanges *a a*.

F is the cylindrical jacket incasing the whole, and inclosing the spaces G G between the fire-flues, which thereby become air-flues, closed at their bottoms by the flanges *a*, but open at their tops through the openings *b* in the plate D. Openings *b' b'* at the base of the cylinder F admit air to these flues.

The shaft B extends, as shown, above the tops of the fire-flues which surround it, and openings *c* in the said shaft, just below the upper termini of the flues, permit the escape of the products of combustion to the pipe H, leading to the chimney.

The top of the shaft B is closed by means of the lid *d*, and at a point below the openings *c* is a damper, *e*, operated from above, and designed to be opened only for the admission of coal, the purpose of this damper being to prevent the escape of the products of combustion otherwise than by way of the fire-flues.

If it is desired that the stove shall heat more than one apartment, pipes may lead from one or more of the openings *f f* in the cap I (which surmounts the stove, and into which all the heated air passes) to adjoining apartments; otherwise—that is, if designed only to heat the room in which it stands—the cap need not be of the form shown, but may consist of open ornamental work.

The other construction (shown in Figs. 7, 8, and 9) is as follows: C' is a plate taking the place of the plate C, and having radial openings *g g*, of the form shown. Superposed over

these openings are the fire-flues E′, which, in this case, instead of being formed out of one continuous sheet, are separate and distinct from one another.

D′ is the plate surmounting the flues, and which here, besides the radial openings *b″* over the air-flues, has other and smaller openings, *h*, over the fire-flues, leading into an annular connecting-flue, J, from which last the pipe H passes instead of from the shaft B, as before.

The radial openings *b″* over the air-flues are not continuous, but terminate at each side of the connecting-flue J. Thus the openings over the air-flues are altogether without, and those over the fire-flues altogether within, that part of the plate D′ which is covered by the connecting-flue J, as shown in Fig. 7—that is, the fire-flues are open only beneath the connecting-flue J, and the air-flues closed only at that point.

As before, the flues are incased within the jacket F, having openings at its base for the admission of air to the flues G.

It is obvious that where no central shaft or feeder is employed the flues may all meet at the center, and this construction is to be preferred where the drum does not form a part of the stove itself, but is connected to the stove-pipe in a room above.

When it is desired to employ the stove purely as a furnace for heating a house by means of registers, in which case it is usual to place the stove in some out-of-the-way apartment not itself requiring to be heated, I use the device shown in Fig. 10. Here the stove is inclosed nearly or quite to the top within the jacket K, which has apertures *i* through it for the admission of air. The advantage hereby gained is that the heat radiating from the stove is carried back into the flues by the inrushing air, which last itself becomes warmed by impinging against the hot surface of the stove before it enters the air-flues. Thus nearly all the heat which would otherwise be lost is utilized in raising to a still higher temperature the air which is conveyed to the desired points.

When standing in large halls—as in churches, schools, theaters, &c.—the furnace-jacket K may still be employed with advantage. In this case I provide the jacket with openings leading into the room itself, but capable of being closed at will, and likewise with other openings, also capable of being closed at will, communicating by means of tubes with the outside air.

While the room to be heated is unoccupied, the air, being pure, is drawn from within the hall by opening the ports first hereinbefore named and closing the others; but when the room is filled by breathing persons, and the atmosphere, consequently, becomes impure, the interior supply is shut off and connection opened with the outer air.

In adapting my flues to the heating of large halls, theaters, churches, and the like, however, I often adopt what is a practical equivalent of the furnace-jacket K, but modified to suit the circumstances, the whole, as shown in Fig. 11, standing in an apartment immediately beneath. In this figure L represents the floor of the room to be warmed, and K′ the cold-air jacket, reaching to and bolted to the same. The cold air is supplied from the interior of the hall above through a grated annular opening, *j*, in the floor. A second grated annular opening, *k*, admits the heated air to the interior of the hall after the manner of a register, and a circular opening, provided with a lid, *l*, and directly above the feeder, permits the charging with coal. Thus air is continually drawn from the floor of the hall and circulated back, heated, into the interior again, while no space within the hall is taken up. Provision may be made with this form as well as with the other for receiving the air from the outside instead of from within the hall for ventilating purposes.

I apply substantially this same principle to the heating of cars. In this case, where there is, of course, no lower apartment in which the heater and jacket may stand, I construct both of great strength and bolt them firmly to the floor of the car underneath the same, from which they thus project downward or depend. By having the heater and jacket strongly constructed, and firmly secured in position in this manner, all danger of fire in the event of the overturning of the car or other accident is averted, for it is manifestly impossible for the fire to find its way to the wood-work unless breakage occurs.

As I have said before, the leading feature of my invention consists in the radial flattened fire-flues and intervening air-flues, and to these all the remaining features hereinbefore described are subordinate, being in the main designed to aid in the application of the flues under different conditions.

It is obvious that by means of the fire-flues, particularly when constructed, in the manner first described, of fluted sheet-iron, an enormous relative heating-surface is obtained, and this heating-surface nearly encompassing, as it does, the air-flues, great volumes of heated air are continually poured forth into the room. A little calculation will serve to demonstrate that in a very brief period every cubic foot of air in an ordinary-sized room will be drawn through the flues and returned, heated by actual contact with the surfaces of the fire-flues, into the room.

I am aware that radial smoke flues or pockets have been used in drums; and I am also aware that in furnaces the walls of the combustion-chamber above the fire-pot have been indented or corrugated, said construction affording adjacent vertical passages for air and smoke; but I am not aware that air and smoke flues having the form and location herein set forth are old.

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

1. A stove or furnace in which the fire-box

is surmounted by radial flues of a flattened or wedge-shaped form, co-extensive in length, and extending laterally from the magazine or central shaft to the periphery, each alternate flue communicating at one end with the fire-box and with the chimney at the other, the intervening flues communicating with the air at both ends, substantially as described, whereby one half of the said radial flues are rendered fire-flues, through which the products of combustion pass on their way to the chimney, and the remaining half air-flues interposed between the fire-flues, as set forth.

2. In combination with the radial fire-flues, extending laterally from the magazine or central shaft to the periphery, the jacket F, inclosing the intervening recesses, and having openings at its base for the admission of air to the latter, substantially as described.

3. The combination, with the fire-box of a stove, of the radial fire-flues E, extending laterally from the magazine or central shaft to the periphery, open at the bottom and closed at the top, radial air-flues G, communicating with the exterior air near the bottom and at the top, central shaft B, having the described openings *c*, and smoke-flue H, substantially as described.

4. The heater embracing the radial and alternate fire and air-flues hereinbefore described, in combination with the cap I, pipes *f*, and furnace-jacket K, having openings *i*, substantially as described, for the purpose set forth.

MYRON T. BALDWIN.

In presence of—
C. S. BALDWIN,
A. J. SAWYER.