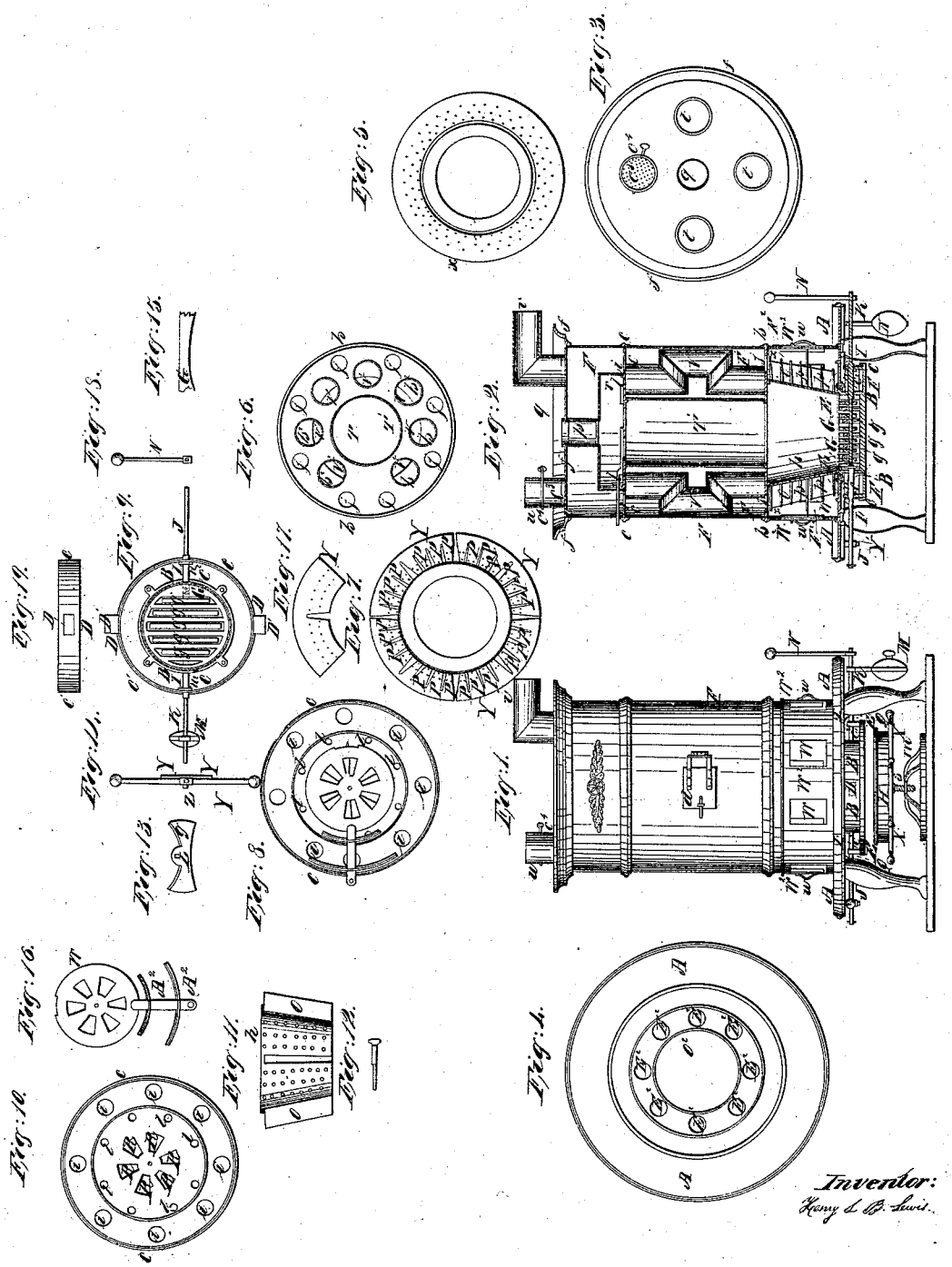
H. L. B. Lewis,

Hot-Air Furnace.

No. 4,198. Patented Sep. 19, 1845.



Inventor:
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UNITED STATES PATENT OFFICE.

H. L. B. LEWIS, OF NEW YORK, N. Y.

PORTABLE HOT-AIR FURNACE.

Specification of Letters Patent No. 4,198, dated September 19, 1845.

To all whom it may concern:

Be it known that I, HENRY L. B. LEWIS, of the city and State of New York, have invented a new and Improved Portable Hot-Air Furnace; and I do hereby declare that the following is a full and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification.

To enable others to make and use my invention I will proceed to describe its construction and operation.

The hot air furnace F is of a cylindrical shape, resting upon a base A which is supported by 4 legs, 15 inches in height. The diameter of the furnace is about 25 inches and its height from the base is 50 inches. See Figures 1 and 2.

The base plate A, A, Figs. 1 and 2 is 3 feet in diameter; in its center there is a circular opening O^2 in Fig. 4 of 14 inches diameter directly below and attached to it by bolts is a circular rim B, B. See Figs. 1, 2, 9 of the same dimensions as the opening in the base plate A, A, and at the bottom of the rim B, B, there is a flange E of about 4 inches projection. Around the rim B, B, is a circular rim C′ C′ encircling a chamber C^2, C^2, with two openings D, D. See Figs. 9 and 19, to admit cold air through a pipe D′ leading from the outside of the building in which the furnace stands in Fig. 1 this rim C′ is omitted, its position is shown by dotted lines at Q. The sides of the said circular plate of the chamber C, C, rest upon the flange E, E, Figs. 1 and 2 and the upper edges come close against the underside of the base plates A, A, Figs. 1 and 2. In the base plate A are small holes E^2 E^2, Fig. 4, for the passage of the cold air out of the apartment C^2, C^2, into the chamber F^2, which surrounds the combustion cylinder *h* for the purpose of being heated, care being always taken that no more cold air pass than can be made sufficiently hot.

The grate G is held to its place by two rods K and J, one of which J is passed through an eye I cast upon the flange E, thence through the rim B, into a thick part of the circular rim of the grate G where it is made fast, by a rivet. The other rod K is passed through a similar eye I cast upon the opposite side of the flange E, and through the rim B, and passes under the bars of the grate G into the opposite side of the rim of the grate, where it meets with the end of the rod J, against which it works. This meeting of the rods J and K in the thick part of the rim of the grate, acquires an effect in strength equal to that which would be obtained by an undivided rod. To prevent the rods J and K from being drawn apart, a pin *n* is passed through each of them close to the inside of the eyes I, I. The bars of the grate are straight upon their upper surface and concave below as shown in Fig. 15. This form of the bars affords a way for the rod K to pass under them. Upon the rod K are strung five bars *g*, *g*, &c., Fig. 9, within the spaces of the grate bars. The mode of stringing the bars is by passing the rod K through a square hole in each bar *g* similar to L, Fig. 13, where the form of the bars is shown. Upon the outward end of the rod K is a lever or handle N by which the bars *g*, *g*, &c., of the agitator are made to rock. Suspended from the rod K is a weight M Figs. 1, 2 and 9, for the purpose of keeping the bars *g*, *g*, &c., of the agitator horizontal. The rod J which projects outside of the chamber C, C, is square and upon it is slid a cross bar, Fig. 14, eighteen inches long, which has a corresponding square hole in its center. This cross bar is made to slide closely under the base plate A, A, with a bearing Y, Y, Fig. 14 of several inches so as to be able at all times to keep the fire grate, which is riveted to the end of the rod J in a level position. It is also constructed with a projection Z upon its lower side, so as to insure the right side of the grate being uppermost.

Immediately underneath the bars of the fire grate is a circular ash pan, H Fig. 1. The ash pan rests upon a plate X which has a rim around its edge. The plate X is supported upon its center by a screw *s* which revolves vertically in a plate *m* of iron which may be made fast or not to the floor.

The manner of using these two new improvements, grate and agitator, is first, by sliding the crossbar Y Fig. 14 along the rod J, until the former is brought, underneath the base plate A, A, Figs. 1 and 2. This operation keeps the grate in a level position. The weight, M on the rod K is also for the purpose of keeping the agitator level and in its proper place between the bars of the grate. The handle N, on the rod K, is used to rock the agitator so as to keep up combustion by freeing the coal of ashes. To

more effectually empty the grate, the cross bar Fig. 14 is moved along the rod J, from underneath the base plate A, A, and by turning it, the grate is made to revolve with ease around the agitator, while at the same time the agitator is made to rock within the grate with the same freedom. The shape of the bars of the grate and agitator is such as to insure a free motion to the agitator at all times, and in no instance is it interrupted or clogged by coal, clinkers or ashes.

Previous to the operation of turning over the grate to free it from ashes and cinders, the ash pan H is raised up to the underside of the flanges E, E, by turning with the handles, the iron plate X. By this operation the dust is prevented from entering the apartment in which the furnace is placed. To remove the ash pan with its load of ashes and cinders, the plate X is lowered, by turning it upon its screw, until sufficient room is made to remove it.

The combustion cylinder *h*, Figs. 2 and 11, which rests over the center of the opening of the base plate A, A, Fig. 2, has cast upon its circumference, eight or more vertical radii O, O, Figs. 11, 7 and 2 at equal distances apart and projecting about 3 inches. Between each of these radii O, O, Fig. 11 there are a number of projecting spikes *p*, *p* &c, Figs. 7, 11, 2 and 12. These spikes are cast upon the combustion cylinder, and the following is the mode of construction. First, the pattern of the combustion cylinder is prepared, and around its exterior surface where the spikes *p*, *p*, &c Fig. 7 are to project, several rows of small holes three-eighths of an inch diameter must be drilled. When the pattern Fig. 11, is imbedded in the sand previous to the operation of casting, the core is taken out, and a suitable instrument similar to Fig. 12, $2\frac{1}{2}$ inches long and $\frac{1}{4}$ inch diameter is taken by the hand, and put through each of the holes, leaving a corresponding impression in the sand. The pattern being removed from the sand, the core is returned to its place, and after the usual arrangements the casting is made. The instrument Fig. 12 may be round or of any other shape which may be desired for the form of the projecting spikes. The advantages to be derived from the use of these radii and spikes upon the exterior of the combustion cylinder is an increase of radiating surface with small weight of metal, and giving additional strength to the cylinder.

Upon top of combustion cylinder rests the second circular plate *b*, *b*, (Figs. 2 and 6,) 25 inches diameter, and connected with the base plate A A by a sheet iron rim having eight large vertical openings (W, W, &c Figs. 1 and 2) say 8 by 4 inches. Outside of this rim is placed a jacket W^2 having handles *w* and made with corresponding openings that by a circular sliding movement of the jacket, the chamber surrounding the combustion cylinder may be opened or closed as required. The advantage of having these openings in the rim and the corresponding perforated jacket is, that when they are inclosed an increase of heat escapes into the room in which the hot air furnace stands.

It may be remarked that in some cases, when the hot air furnace is used, the apartment in which it is placed, is not required to be heated; the effect desired being to communicate the hot air to adjoining apartments. In such cases I dispense with aforesaid perforated rim and jacket and substitute for them a circular rim of that kind of material which will give the least amount of radiating influence. Underneath the second plate *b* is placed a collar *x* Figs. 2 and 5 upon the combustion cylinder of sheet iron, perforated with a great number of small holes, to allow the hot air to escape into the apartment next above. This arrangement is to prevent the hot air escaping too rapidly, before it is sufficiently heated. Between the collar *x* and base plate A A about midway of the cylinder in space F^2 there is placed another collar *y* or division made of 4 sections of sheet iron. (See Figs. 17 and 7.) In this collar or division there are a great number of small holes perforated in it near to the combustion cylinder. This latter division is to cause the air below to pass through the collar near to the cylinder.

The second chamber F′ between the second and third circular plates *b*, *b* and *c*, *c* Fig. 2 is over the last named space F^2 surrounding the combustion cylinder. It is inclosed by a circular rim F of sheet iron, and is also a hot air chamber. This chamber, however, is not so hot as the one in which the combustion cylinder is placed. The second plate *b* Fig. 6 has a hole T in its center of 10 inches diameter, see Fig. 6, with a flange around it to receive the end of a pipe T′ Figs. 2 and 6 made of very heavy sheet iron,—around this pipe are arranged 7 four inch pipes or tubes made with elbows V V &c Figs. 2, and 6, having about two thirds of their lower ends closed and one third open—the closing of said $\frac{2}{3}$rds being effected by the portions of the plate *b* over which the pipes are placed, so as to communicate by a similar opening in the aforesaid second plate *b* with the interior of the combustion cylinder as at V′ Fig. 6 thus giving a circulation of smoke and heat through these 7 pipes, direct from the fire and with the aid of the 10 inch pipe, T heating the air as it passes up through the eight openings *j* near the circumference of second plate *b* Fig. 6 from the hot air apartment F^2 below. The center pipe T and the 7 surrounding pipes V may be con-

sidered as chimnies to the combustion cylinder. To give greater radiating surface the form of the 7 pipes V V &c is made to cause the gas from the cylinder to pass through them in an indirect manner,—this is done by making each pipe with 4 elbows, thus the circulation of the gas is partially checked, giving out more caloric to the surrounding air.

In the chamber F′ between the 2nd and 3d plates *b*, *b* and *c*, *c* in Fig. 2, a common shoot or feeder is placed, with its mouth projecting over the center of the combustion cylinder for conveying the fuel thereto covered by the door *d*, Fig. 1. The feeder is of cast iron, having a door *d* Fig. 1, 7 by 9 inches inlaid handsomely with mica.

The third plate *c c* Figs. 2, 8 and 10 forming the upper part of second apartment is made of the same diameter as the second plate, and has 6 openings in lieu of one for the passage of the smoke. Upon these six openings is placed a plate w^2 of cast iron similar to that shown in Fig. 16 with corresponding openings. To this plate is attached a handle A^2 A^2 Fig. 16,—by moving this handle which turns the plate horizontally, the openings in the 3d plate *c* may be kept open or closed as the case may require. Should the six openings R R &c Fig. 10, be closed, a slow draft, will be kept up through the small openings *l* of the 7 four inch pipes.

To concentrate the smoke ascending through the center pipe and the 7 surrounding pipes or chimnies a receiver *r* Fig. 2 of sheet iron is placed over these openings, within the upper chamber of the furnace. Around this receiver in the third plate *c*, there are eight openings *i* corresponding with the eight openings *j* in the 2d plate, each 2 inches diameter to admit the passage of the heated air from the two lower hot air apartments, into this chamber ready for distribution to the apartments in the dwelling requiring warmth. In the center of the top of this receiver *r* is the commencement of the smoke pipe *p* which passes up through an opening *q* in the center of the fourth or top plate *f* (see Fig. 3). Around this smoke pipe are 4 eight inch openings *t* for the distribution of hot air.

A vaporizing vessel may be placed in the hot air chamber F^3 to moisten the air.

C^3, Fig. 2 is a cap perforated with a number of small holes. The use of this cap is to prevent the escape of all the hot air through the pipe *u* when placed vertically over it and to divert the remainder of the hot air into pipes *v* laid horizontally or angularly. The same thing may be effected by a revolving perforated ramper such as that shown at c^4 Figs. 2 and 3.

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

1. The grate and agitator; the bars of the latter working with freedom between the bars of the former in such a manner as to free the coal of ashes so as to insure active combustion.

2. Also the arrangement of the collars *x* *y* containing a number of holes in combination with the combustion cylinder and zig zag smoke pipes V, V, for the purpose of preventing the too rapid escape of air into the apartment next above before it is sufficiently heated.

3. Likewise the arrangement of plate *b*, in combination with the combustion cylinder *h* and smoke pipes V, V, as described.

4. And also the arrangement of plate *c* containing the register C^2 for regulating the draft through the coal in combination with the register C^2 and smoke pipes V and combustion cylinder.

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Witnesses:

WM. H. JENNISON,

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