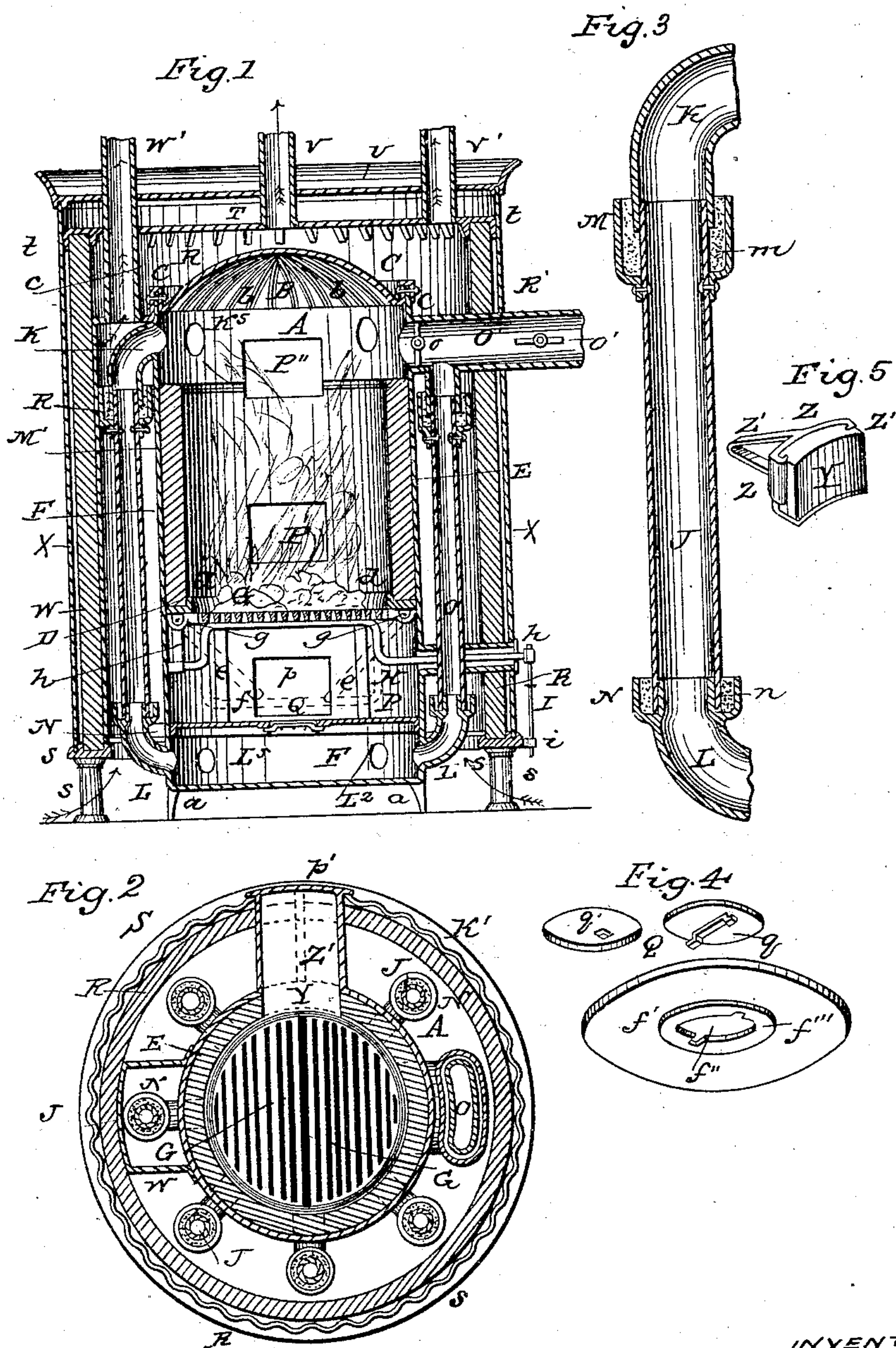


P. MARTIN.
Hot Air Furnace.

No. 61,223.

Patented Jan'y 15, 1867.



WITNESSES
J. H. Layman
A. G. Webber

INVENTOR
P. Martin
By *[Signature]*
Attorneys

United States Patent Office.

PETER MARTIN, OF CINCINNATI, OHIO.

Letters Patent No. 61,223, dated January 15, 1867.

HOT-AIR FURNACE.

The Schedule referred to in these Letters Patent and making part of the same.

TO WHOM IT MAY CONCERN:

Be it known that I, PETER MARTIN, of Cincinnati, Hamilton county, Ohio, have invented certain new and useful improvements in Warm-Air Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

My invention relates to that class of furnaces which are employed for heating air for warming and ventilating dwellings, &c., and my improvements consist in constructing the apparatus in such a manner that it will give out the greatest amount of heat, with the least consumption of fuel, and the furnace is so arranged that it can be cleaned or repaired without tearing it apart. In the accompanying drawings—

Figure 1 is a vertical section of a warm-air furnace, embodying my improvement.

Figure 2 is a horizontal section taken at the line X X in fig. 1.

Figure 3 is a longitudinal section of one of the pipes which conduct the fire and smoke from the furnace to the smoke-chamber.

Figure 4 is a perspective view showing the under side of the partition between the smoke-chamber and the ash-pit, the door which belongs to the partition being detached.

Figure 5 is a perspective view of the removable slab or tile which is occasionally used for closing the lower door of the fire-chamber.

A represents a cylindrical fire-chamber, either of cast or sheet iron. The bottom of this chamber is elevated a slight distance above the floor of the room in which the furnace is placed, by means of feet *a a*. The upper end of the fire-chamber A is closed by a detachable crown-plate, B. I prefer that said crown-plate should consist of a single piece of sheet metal struck up in a suitable die into a parti-spherical form, and in order to give increased stiffness to the crown-plate it should be provided with a series of radial corrugations, *b b*. The detachable crown-plate is connected to the fire-chamber by bolts, *c*, which pass through both of these members, and also through the recurved sides of an annular cap, C, thus making a secure joint, through which no gas or smoke can escape, and yet permitting the removal of the crown-plate B by simply unscrewing the nuts from the bolts *c*. Placed within the sheet-metal fire-chamber A is an annular casting, D, and this casting serves as a foundation for the fire-brick E, with which the chamber A is lined almost to its upper end. Said casting D is provided with a flange, *d*, which retains the bottoms of the fire-bricks securely in their proper position. The fire-brick lining E serves to protect the sheet-metal chamber from the intense heat of the incandescent fuel, and thus preserves the chamber from burning out, and also prevents the air from being "burnt" by coming in contact with highly-heated metallic surfaces. This casting D is supported on legs, *e e'*, whose lower ends rest upon the horizontal partition, *f*, which divides the smoke-chamber from the ash-pit. The grate is composed of two sections, G G', pivoted at *g g'* to the lugs which project from the under side of the casting D, and when in a state of rest the grates are held in a horizontal position by the rock-shaft H, whose outer end plays within the tube *h*, whilst its inner end has a journal bearing within the hanger *h'*, which depends from the casting D. The outer end of the rock-shaft H is adapted to receive a bar, I, by which said shaft is vibrated, and the grates G G' can be securely held in a horizontal position by inserting one end of this rod in an aperture in the lug *i*, thus preventing the vibration of said rock-shaft. This provision of the divided and pivoted grates G G', and the rock-shaft H, enables the operator to rattle the cinders and ashes through the grates by simply vibrating the rock-shaft either to the right or left. The grates being pivoted to casting D, renders it an impossibility for them to be inverted and burnt out, as is often the case where a single grate is operated by a spindle passing through the centre. It is immaterial whether the rock-shaft is vibrated to either the right or left, or whether it is made to perform a complete revolution, as the grates cannot be inverted. The position of this rock-shaft when entirely reversed is shown by the dotted red lines in fig. 1. The fire, smoke, and other products of combustion, escape from the fire-chamber A, by means of a series of removable pipes, J J' J'' J''', &c., which are arranged concentrically around the outside of said chamber; these pipes conduct the fire and smoke into a smoke-chamber, F, formed at the lower end of chamber A, by the insertion of a partition *f*. The pipes J J', &c., are rendered capable of being removed at any time by the following devices: The fire and smoke-chambers are provided respectively with elbows, K K', &c., L L', &c., which may be formed out of sheet metal, or cast with the cylinder A. The upper portions of the pipes J J', &c., slip into the open or lower ends of the elbows K K', whilst the lower portions of said pipes J J' enclose the open and upper ends of the elbows L L', which com-

municate with the smoke-chamber F. Each of the pipes J J', &c., has secured to it near its upper end a collar M, of somewhat larger diameter than the elbow K, in order to leave an annular space between the two, and said space is filled with fire-clay, sand, or some suitable cement, as shown at *m* in fig. 3. The lower elbows L L', &c., are provided with flanges, N, and the spaces between said flanges and the outsides of the lower ends of the pipes J J' are also filled with any suitable material, as at *n*. It will be seen that by simply removing the cement *m n* the pipes J J', &c., can be shoved up so as to liberate them from the elbows L L'. After this the pipes are moved to one side, and then withdrawn from the upper elbows K K', thus permitting them to be taken out of the furnace in a few minutes, and without unbolting or cutting away any part of the heater. The smoke passes from smoke-chamber F by means of the pipe O, into the pipe O', which communicates with the chimney flue, and the pipe O is connected to the smoke-chamber, and also to the pipe O' in the same manner that the pipes J J' are attached to the fire and smoke-chambers, and the pipe O' is provided with the two dampers *o o'*, the first or inner of which when opened permits the fire and smoke to pass direct into the chimney flue, as is generally done when the fire is first lighted in the furnace, whilst the outer damper, *o'*, regulates the draught when the fire is making a complete circuit through the pipes J J'. The partition *f* which separates the smoke-chamber F from the ash-pit P is provided with a door, Q, which occupies a pit or depression *f'* in said partition, and the under side of this door has attached to it a bar, *q*, whose ends being passed through the openings *f'' f'''*, and the door being partially rotated in a horizontal plane, secures the door from any accidental displacement, when the cinders are drawn out of the ash-pit, and as the upper surface of said door is flush with the top of the partition, it presents no obstruction to the scraper or shovel. The upper side of the door has a small cavity in it, across which is placed a rod, *q'*, similar to those in stove lids, and by inserting a poker under said rod the door can be rotated until the ends of the bar *q* are brought opposite the openings *f'' f'''*, when the door can be lifted out, thereby permitting the smoke-chamber to be cleared of any soot or ashes which may have accumulated in it. The ash-pit P has a door, *p*, and the fire-chamber A has a lower fire-door, *p'*, and an upper one, *p''*. For all ordinary purposes the furnace is supplied with fuel through the lower one *p'*; but when it is desired to have the fire burn for a long time without the trouble of replenishing it with fuel, the lower door may be temporarily closed by the insertion of the removable slab, shown at fig. 5, and the furnace can then be filled as high as the upper door *p''*, and when thus filled, the fire will burn for a week or more without requiring any attention. The fire-chamber A, pipes J J', &c., and their accompanying elbows, are all contained within a chamber, R, which may be constructed of brick or tile, and this chamber is surrounded with a jacket, R', of corrugated sheet metal. The chamber R and jacket R' rest upon an annular bed-plate, S, which is supported by feet, *s s*, and the cold air enters between said feet, as shown by the blue arrows. The feet *s s* may be omitted, and the bed-plate S may rest upon a brick wall having suitable openings for the admission of cold air. The upper end of the chamber R is surmounted by a cap-plate, T, having a marginal flange, *t*, which embraces the outer side of said wall. *t' t'*, &c., are a series of studs projecting from the cap-plate T, and bearing against the inner side of the chamber wall. The corrugated sheet-metal jacket R' extends some distance above the outer brick wall, and enters suitable flanges on the covering-plate U. This plate U may be provided with an ornamental cornice. A water-tank can be placed between the two plates T and U so as to impart a slight degree of moisture to the warm air as it ascends from the heater and passes out through the pipes V V'. The removable slab with which the lower doorway *p'* of the fire-chamber may be closed when required, is shown at fig. 5, and it consists of a slab, Y, of fire-brick, tile, stone, or any other suitable material, attached to a metallic back, Z, by means of flanges *z z'* which enter grooves in the side of said slab. Projecting from the rear of the back Z is an arm, Z', which when the slab is placed in the lower passage to the fire-chamber, bears against the inside of the door *p'*, and thus retains the slab in its proper position, as clearly shown by the dotted red lines in fig. 2, and as the inner side of this slab has a concave face, a continuous and uniform fire-brick surface is exposed to the action of the burning fuel at the bottom of the fire-chamber.

The operation of my warm-air furnace is as follows: The two dampers *o o'* are first opened, and after the fire in the furnace has become thoroughly ignited, the damper *o* is closed, thus compelling the fire and smoke to make a complete circuit through the elbows K L, pipes J O, and smoke-chamber F, and as the cold air which enters at the bottom of the apparatus is brought in contact with these heated parts it becomes warmed, and ascending within the chamber R, it then passes into the delivery pipes V V', and through these it may be conducted into any room in the house. Instead of having the wall R form one entire chamber, from which the hot air is distributed, it may be divided into a number of smaller chambers by enclosing one or more of the pipes J with a jacket, W, in which case a pipe, W', would be employed for conducting the hot air away from said enclosed chamber, and the pipe W' would have no connection with any other hot-air chamber. By thus enclosing one or more of the pipes J with the jacket W, and furnishing it with an independent exit pipe W', the hot air can be forced through said pipe W' into the most elevated and farthest room in the house. For if an attempt were made to heat a large house by drawing the supply of air from the single hot-air chamber R, it would be found that the rooms nearest the heater would be uncomfortably hot, whilst the most distant ones would not be warmed in the least. The provision of the lower and upper fire doors *p' p''*, so as to admit of using a small or an extra large amount of fuel, is another advantage peculiar to my heater; the lower door *p'* being used in spring and fall, or when only a limited amount of heat is required, the furnace being filled at the upper door *p''* in the cold weather of mid-winter.

I claim herein as new, and of my invention—

1. The arrangement of the fire-chamber A, the ash-pit F, the series of descending flues J J J, leading from the top of the fire-chamber to the ash-pit, and the ascending flue O, leading directly into the discharge-flue O', all as herein described and for the purposes set forth.

2. The combination of the elbows K L, collars M, and flanges N, with the fire-place A, ash-pit F, and flues J and O, as and for the purposes explained.

3. The combination of the supporting crank H, lever I, and divided grate G G', all constructed and arranged to operate as described.

4. I claim surmounting the fire-chamber of a hot-air furnace with an arched and corrugated sheet-metal crown-plate B b, as herein set forth.

5. In combination with the elements of the first claim, I also claim the door Q, and its accessories when located as described and operating for the purpose set forth.

6. The sliding shutter Y Z Z', constructed and employed as and for the purposes set forth.

In testimony of which invention I hereunto set my hand.

PETER MARTIN.

Witnesses:

GEO. H. KNIGHT,

JAMES H. LAYMAN.