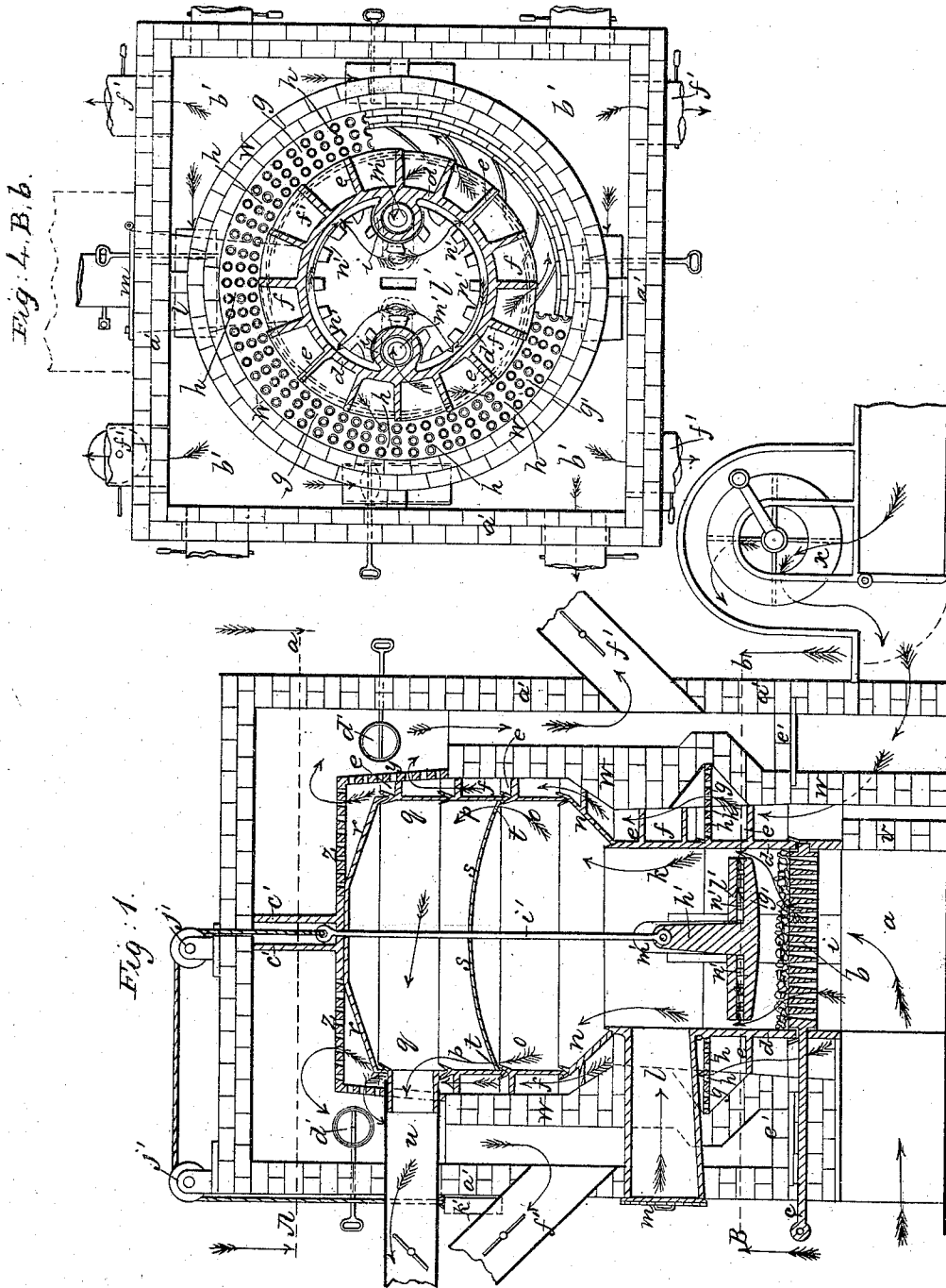


P. SWEENEY.
Hot-Air Furnace.

2 Sheets—Sheet 1.

No. 11,278.

Patented July 11, 1854.



UNITED STATES PATENT OFFICE.

PETER SWEENEY, OF BUFFALO, NEW YORK.

HOT-AIR FURNACE.

Specification of Letters Patent No. 11,278, dated July 11, 1854.

To all whom it may concern:

Be it known that I, PETER SWEENEY, of Buffalo, New York, have invented certain new and useful Improvements in Hot-Air Furnaces for Heating Buildings, some of which improvements are applicable to other furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making
10 part of this specification, in which—

Figure 1, is a vertical section taken through the center of the furnace; Fig. 2, an elevation of the hot air flues surrounding the fire chamber and representing the outer
15 surrounding walls and other parts of the furnace, and especially part of the fire chamber in section and at right angles to Fig. 1; Figs. 3 and 4, horizontal sections taken at the lines A, a, and B, b, of Fig. 1, and looking in the direction of the arrows; Fig. 5, the fire pot and appendages in perspective and partly in section.

The same letters indicate like parts in all the figures.

25 My invention consists in making the apparatus for the supply of air to consume the combustible gases, movable and adjustable within the fire pot or chamber, so that its position may be adjusted and shifted to the varying change and condition of the fuel. And my invention also consists in making the air supplying apparatus in two parts; the one a plate suspended from above
30 and next the fire, and the other resting thereon, the chamber for the passage of the air being made in one or both of them, the object of the two parts being to facilitate repairs, and to prevent breaking by unequal expansion, the lower plate being exposed to a more intense heat than the upper one; and my invention finally consists in dividing the hot air chamber into two or more compartments, with communicating apertures governed by dampers, each compartment being connected with a separate
45 part of the building, so that each part of the building may receive its due share of heated air whatever may be its distance from the furnace, and the heated air of all the compartments may be thrown into any part of the building at pleasure, thus affording a better and more effectual means of controlling the heat than by any other known plan.

55 In the accompanying drawings *a* represents the ash pit and *b* the grate, which may

be of any suitable construction, although I prefer what is known as the "turning grate" hung on journals, one of which journals *c*, extends through to the outside of the wall as
60 a handle to shake out and discharge the cinders. This grate is fitted to the inside of the lower end of the fire pot, *d*, which is of cylindrical form, and which I prefer to make of cast iron, although it may be made of
65 fire clay or other refractory substance. It is provided with radial flanches *e*, on its periphery which wind around as represented in the drawings to form the hot-air flues or passages *f*, and it is also provided with a
70 horizontal flanch *g*, at the upper outside edge pierced with numerous small holes *h*, and as it extends across the hot-air flues *f*, the air to be heated in its passage through the flues must pass through these holes and
75 is thereby minutely divided and heated by contact with the metal surface of the holes which are kept heated by conduction, the flanch being cast with, or attached to, and making part of the fire pot. Inside of the
80 fire pot and connected with its inner periphery, are two vertical tubes *i*, *j*, open at top and extending through and below the grate and thence running out, each in opposite directions into pipes *k*, *l*, for supplying air
85 for the combustion of the gases. The tubes *i*, *j*, are cast with and make part of the fire pot, which on the outside is provided with radial flanches to form the hot air flues, which will be, in a great measure, prevented
90 from burning out, as the surplus heat will be conducted off rapidly by the fire pot and the flue flanches. The upper end of this fire pot is formed to receive an upper section *k*, which is a continuation of the fire pot, and
95 like it provided with flue flanches *e*, and also provided with a horizontal feeding tube or passage *l*, extending through the surrounding wall and furnished with a door *m*, outside through which the grate is supplied
100 with fuel. On the top of this extension is fitted a conical or funnel shaped ring *n*, for the purpose of spreading out or enlarging the fire pot or chamber, and above this are fitted a series of cylindrical rings *o*, *p*, and
105 *q*, properly fitted to each other, the upper edge of one being grooved or flanch to form a suitable seat for the lower edge of the one next above it. And finally, the roof or top plate *r* is fitted into the upper edge
110 of the upper ring *q*. All these rings are formed with radial and helical flanches *e*, in

continuation of those on the lower part to form the continuation of the hot air flues to the top. The flanches *e*, above the first and second sections of the fire pot project less than they do on the first and second parts in the proportion of the increased diameter so as to have the capacity of the hot air flues the same or nearly the same all the way up. At about the middle of the height of the enlarged part there is a diaphragm or false dome *s*, with holes *t*, near the periphery for the purpose of deflecting the flame toward the periphery, and thus concentrate the heat where it is most required for heating the air which passes through the flues. The upper ring *q* is formed with an aperture for the discharge of the products of combustion into the exit pipe *u*.

The fire pot is placed upon a base wall *v* of brick or stone which surrounds the ash pit, and a second wall *w* is built up around and in close contact with the outer edges of the flue flanches *e*, so as to complete the hot air flues, there being suitable apertures in this wall near the bottom for the passage of cold air into the hot-air flues. The cold air can be supplied by a draft from outdoors, or, if desired, by a rotary fan blower *x*, or any other suitable blowing apparatus.

The wall *w*, extends up to about the level of the lower edge of the upper ring *q*, and above this the flues are surrounded by a perforated ring *y*, connected with a perforated top plate *z*, the perforations in which are slightly conical, and all the heated air from the hot air flues must pass through these perforations. This I have found gives an increased impetus to the current of air which causes it to circulate more freely and rapidly, and further into apartments to be heated than by any other known plan. The wall *w* is surrounded by an outer wall *a'*, or masonry, which extends above the entire furnace, inclosing it all around and on top leaving a space which is divided into any desired number of hot air chambers *b'*, by means of iron or other partitions *c'*, each partition having a hole governed by a damper *d'*, so that all or any desired number of hot air chambers can be made to communicate.

The inner and the outer walls are connected near the bottom by a horizontal partition *l'*, to separate the hot air chamber *b'* above from the passages below through which cold air is supplied to the hot air flues. The space between the outer wall and the furnace answers the double purpose of hot air chambers and economizers of heat as it effectually prevents heat from being radiated into the apartment.

The lower part of each hot air chamber *b'*, is provided with a hot air pipe *f'*, which extends to, and supplies any desired part or section of a building to be heated. The

furnace should be constructed with as many separate air chambers *b'* as there are separate sections of the building to be heated, so that each section however distant from the furnace, will receive a due proportion of heated air. And if desired, the heated air from any number of chambers can be directed to any section of the building by opening the dampers in the partitions. This arrangement avoids the serious inconvenience experienced in furnaces as heretofore constructed of having the hot air concentrated in the apartments nearest the furnace, for heated air will pass out of the most direct, and shortest passage, hence the nearest apartment will receive all, or nearly all, while the most distant will receive little or none. This difficulty is not avoided, but only modified in a very slight degree, by registers in the apartments, for if the registers in the nearest apartment be closed, the heated air will still run into and accumulate in the pipe or flue leading to the nearest apartment and the reflux only will go to the next nearest apartment. But by my improvement, each apartment or section of a building being connected with a separate chamber, must receive its due proportion of heated air whatever may be its distance from the furnace, and if one hot air chamber be not sufficient, two or more can be connected by opening the connecting dampers in the partitions, and closing the dampers in the discharge pipes leading to other apartments or sections of the building.

Above the fire in the grate there is a plate *g'*, of less size than the horizontal section of the fire pot, leaving the required space for the passage of the flame and the gaseous products of combustion. This plate has a stem *h'*, at top by which it is suspended by a bolt to a rod *i'*, which is in turn suspended to a chain passing through the top of the furnace and the roof of the outer wall thence over two pulleys *j'*, *j'*, and having a counterpoise *k'*, suspended to its other end outside of the outer wall. This weight should be sufficient to balance the plate and its appendages so that its position, relatively to the charge of coal in the grate can be adjusted at pleasure. Above this plate there is another plate *l'* with a hole in the center to fit onto the stem *h'*. Its under surface is formed with channels *n'*, *n'*, opening at equal distances apart at the periphery and communicating with two bent tubes *m'*, *m'*, which extend up from the upper plate and then turn down and fit closely, but freely, in the vertical tubes *i*, *i*, inside of the fire pot. The air which enters through the pipes *j*, *j*, passes up the tubes *i*, *i*, into the bent tubes *m'*, *m'*, and thence through the channels *n'*, *n'*, and discharge in small jets, after having been highly heated, all around the edge of the plate into the narrow pas-

sage for the products of combustion between the edge of the plate and the fire pot, thus mingling with and supplying oxygen to the combustible gases evolved from the fuel, while in a highly heated state and in the best condition to inflame. This produces a large body of flame which spreads in the upper part of the fire chamber, and which is deflected by the diaphragm or false dome toward the drum or cylinder impinging on the surface thereof to give the required heat. After passing through the apertures around near the edge of the diaphragm, the flame again spreads out in the chamber above, and finally escapes through the exit pipe to the chimney.

The position of the plate with its air channels, relatively to the charge of coal on the grate can be regulated at pleasure by moving the counterpoise weight outside so as to discharge the jets of air at the best point to insure the combustion of the combustible gases evolved from the fuel. As the air for this apparatus is not supplied to it through the ash pit, there will be no danger of choking the channels or passages with ashes and other solid impurities.

The advantages of having the apparatus, for the supply of air to the combustible gases, made as above described, in two parts, is that the upper plate simply resting on the lower plate will not be so liable to be warped and cracked by exposure to heat and unequal expansion, and as the lower plate is exposed to the most intense heat and will be the first to receive injury, it can be readily removed and replaced by simply disconnecting it from the suspension rod and chain and letting it drop down through the bottom of the fire pot, by first taking out the grate, and returning it or substituting another. And in addition to all this it affords ready means of cleaning out the channels by simply lifting up the upper plate. This apparatus, can, however, be made in

any other manner which will supply air for the combustion of the gases as they pass between it and the fire pot, and be adjustable to any desired position relatively to the charge of fuel.

It will be obvious that this mode of supplying air to consume the combustible gases, is applicable to other furnaces or fire chambers as well as to hot air furnaces, and therefore I do not wish to limit myself to the application of such apparatus to hot air furnaces alone. Nor do I wish to limit myself to the helical form of the hot air flues around the fire chamber although this form will present the greatest amount of heating surface in a given space. And finally, I do not wish to be understood as limiting myself to the use of all the above described improvements in connection, although in my judgment, the best results will be obtained by such connected use.

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

1. Making such air supplying apparatus movable and adjustable within the fire pot or chamber, substantially as specified, for the purpose of adapting it to the varying height and condition of the charge of fuel to effect the economic combustion thereof as specified.

2. And I also claim making such air supplying apparatus in two parts, substantially as specified and for the purpose specified.

3. And finally, I claim dividing the hot air chamber into two or more compartments by partitions provided with apertures governed by dampers or valves substantially as specified for the purpose of regulating the supply of air to separate parts of a building as circumstances may require, as set forth.

PETER SWEENEY.

Witnesses:

WM. H. BISHOP,

CHAS. W. BAMBURG.