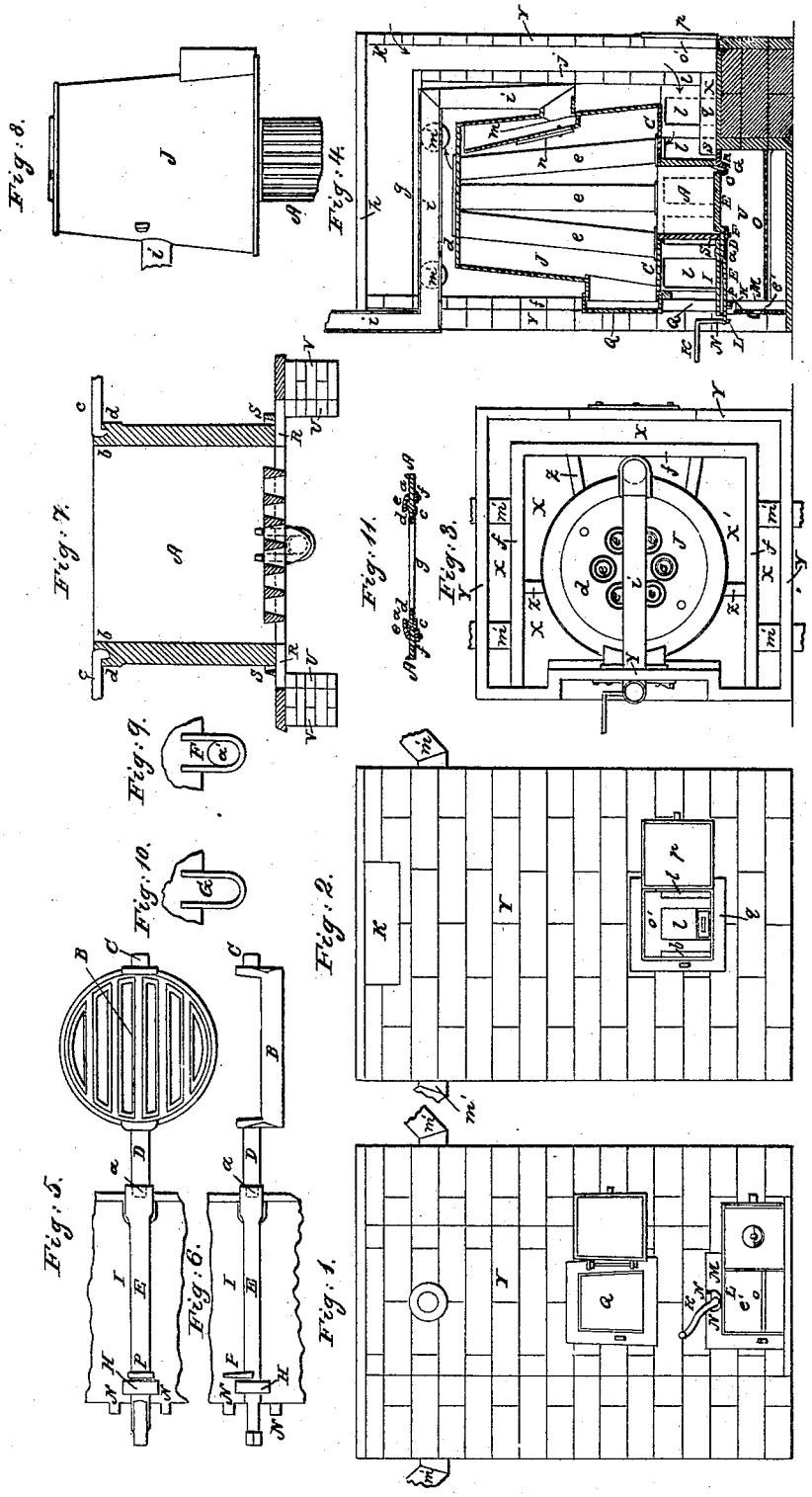
J. A. PAGE.

Hot Air Furnace.

No. 2,269. Patented Sept. 25, 1841.



UNITED STATES PATENT OFFICE.

JOHN A. PAGE, OF BOSTON, MASSACHUSETTS.

CONSTRUCTION OF FURNACES FOR HEATING AIR AND WARMING APARTMENTS.

Specification of Letters Patent No. 2,269, dated September 25, 1841.

To all whom it may concern:

Be it known that I, JOHN A. PAGE, of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Hot-Air Furnaces for Warming the Apartments of Buildings, and that the following is a full and exact description of the same, reference being had to the accompanying drawings, which will be hereinafter described and which, taken in connection herewith, form my specification, setting forth the principles of my improvements, by which thus may be distinguished from others of a like character and such parts or combinations of the same as I claim to be my invention and for which I solicit an exclusive privilege for fourteen years to be secured to me by Letters Patent.

Of the drawings above mentioned Figure 1, is intended to represent a front elevation of my improved hot air furnace; Fig. 2, a rear elevation; Fig. 3, a top view, the upper plates or coverings being removed so as to exhibit the internal arrangement of the several parts. Fig. 4, is a vertical and central section; Fig. 5, a view of the underside of the grate and its turning shaft. Fig. 6 is a side elevation of the same, exhibiting the grate as inverted from its usual vertical position. Fig. 7 is a vertical section of the cylinder taken at right angles to that shown by Fig. 4, and Fig. 8 an external elevation of the radiator and the parts on which it rests.

The fuel is burned in a cylindrical cast iron vessel A, Figs. 4, 7, 8, suitably luted or lined with soapstone or fire brick, if necessary, and having a grate B, Figs. 4, 5, 6, 7, arranged in the bottom of the same. The grate is of circular form, and rests and turns on gudgeons C, D, depressed somewhat beneath its upper surface as seen in Fig. 4. It will be perceived that the gudgeon D is somewhat longer than the gudgeon C, and has a square tenon *a*, formed thereon to enter into a corresponding mortise in the end of the turning shaft E. When the grate is inserted in the pot A, the gudgeon D is first passed from the inside of the pot through an aperture in a stud F projecting down from the pot, which aperture is somewhat elongated perpendicularly, as seen at *a'* in Fig. 9, so as to permit the grate to be dropped into a horizontal position with its gudgeon C resting in a bearing in another and opposite stud G, Figs. 4, 10. The shaft E is supported and turns in a bearing or stud H, attached to the lower side of metallic plate I, Figs. 4, 5, 6. A common crank handle *k* is fixed on the outer end of the shaft E, and directly in the rear of this crank and between the same and the ash door frame M, a sliding button L, Figs. 1, and 4, is placed on the shaft so as to be moved a short distance back and forth upon the same. When the grate is brought up into a horizontal position, the button L is pressed back until it is carried underneath two projections N, N, Figs. 1, 4, 5, 6, and therefore by means of the same the grate is held in said position. That part of the shaft E, over which the button moves, is formed square or rectangular in its cross section, and a corresponding aperture is cut through the button—the same being arranged in this manner for the purpose of preventing the button from turning upon the shaft. The upper edge of the button should be situated at about one quarter of an inch from the lower edges of the projections N, N, in order to allow the grate, when the button is pressed under the projections, to be shaken or slightly vibrated in its bearings by the hand applied to the crank, by which operation the ashes may be caused to fall, through or between its bars, into the ash pit below the grate, and the same may be at any time, accomplished when the ash and fire doors are closed, so that no ashes or dirt can escape into the apartment in which the furnace is placed, which, it will be perceived, is a great desideratum and improvement. When it is desirable to free the grate from coal or cinders, the button is to be drawn forward toward the handle, until it passes by the projections N, N, when, by applying the hand to the handle the grate may be turned up perpendicular, and thus cause all the coal thereon to fall from the same upon the ash grate O, Fig. 4, below. A stop P, Figs. 4, 5, 6, is cast upon the shaft E, which, coming in contact with the under side of the plate I, when the grate is perpendicular, prevents it being turned farther on its journals. From the above it will be seen that when it becomes necessary to renew the grate, by reason of the action of the fire thereon, it can be easily accomplished, by passing the arm through the fire door opening Q, into the pot A and lifting or removing the grate therefrom without disturbing

or destroying the brickwork or any of the surrounding parts, and afterward inserting a new grate as before described.

The next improvement consists, in so arranging the fire pot and parts supporting the same, as to permit it to be taken away without removing the radiator, whenever the pot is destroyed by the fire or becomes injured by any other cause. For this purpose the fire pot is supported on a square iron plate R, Figs. 4, 7, which has a circular aperture through the same, of a diameter, corresponding with that of the interior of the pot, and directly over this aperture this pot is placed and kept in position, by a circular lip S, cast upon the upper surface of the plate and extending around the fire pot.

The plate R, as well as another plate of metal I, Fig. 4, situated directly in front of it, and both together forming the top covering of the ash pit, rests upon two thin brick walls U, U, Figs. 4, 7, lining the brick sides V V, Fig. 7, of the ash pit. The whole interior of the furnace or space between the exterior wall Y, with the exception of the ash pit is floored over on a level with the top-surface of the plates R, I, with a slab X, Figs. 3, 4, 7, of any suitable stone, upon the upper surface of which, small brick walls Z Z Z, Fig. 3, are built up to the level, or about the level of the top of the fire pot. These walls serve to support the radiator J, which rests immediately thereon—or instead of these walls it may be supported on columns or feet resting upon the bottom X. The radiator J is a hollow cast iron frustum of a cone, resting centrally and directly over the fire pot A as seen in Fig. 4. A part, *b*, *b*, Fig. 7, of the fire pot projects through the bottom *c c* of the radiator, to the level of the upper surface of the same, the bottom of the radiator resting upon a shoulder *d d* cast around the fire pot as seen in Fig. 7. Therefore, whenever it becomes necessary to insert a new fire pot, it is only necessary to take down the brick lining U U, of the walls V V of the ash pit, the bricks of which can be removed through the ash pit opening, *e'*, Figs. 1, 4, when both or either of the plates R and I, together with the fire pot, can be easily withdrawn and a new pot or plate substituted without deranging the exterior brickwork or the radiator. On making the proper disposition of the several parts, and rebuilding the walls U U, the whole process of removing of the fire pot and substitution of another or one of the plates R, I, is thus completed.

The next improvement consists in the arrangement and construction of the radiator, by which a very great saving in fuel over furnaces in general is effected. The radiator J as before mentioned, in its exterior form, is a hollow frustum of a cone, having a series of six or more or less large pipes *e e e*, &c., Figs. 3, 4, extending from the bottom plate *c*, to the top plate *d*, all standing inclined, or so that their lower ends may be arranged about the iron fire pot A at equal distances apart, and their upper ends inserted in or attached to the top plate *d*, as close together as possible. The whole of this radiator is inclosed in a chamber, formed by a brick wall *f f*, erected on the floor X and covered over on the top, somewhat above the radiator, by a plate of metal or a stone slab *g*, Fig. 4. Another brick wall Y, constituting the exterior casing of the furnace, is built about the wall *f* generally on three of its sides, at about six or nine inches, more or less, from the same. This latter is covered over with a slab of stone *h*, Fig. 4. The tubes *e e e* &c., open directly at both ends into the inner or hot air chamber in which the radiator is placed. The fire pot is filled with the fuel through a door way Q, Figs. 1, 4, opening into the radiator as seen in Fig. 4, and the smoke from the fire is carried off through a bent pipe *i*, inserted in the back of the radiator, extending upward and over the top of the same in the hot air chamber, thence through the front wall of the furnace to the discharging flue, wherever the same may be situated. The cold air enters the furnace through an opening *k*, Figs. 1, 4, in the back of the same near the top, thence passes downward in the space between the walls *f* and Y, thence, through any sufficient number of openings *l*, *l*, Figs. 2, 4, pierced through the sides of the inner wall *f*, thence, circulates upward around the exterior surface of the radiator through the several pipes *e*, *e*, *e*, and thence, is conducted to the several apartments through flues or pipes *m'*, *m'*, *m'*, *m'*, Figs. 1, 2, 3, 4, extending from the hot air chamber through the two walls *f* and Y. The pipes *e*, *e*, *e*, by their inclination are exposed on their outer surface to the direct action of the flame and heat, proceeding from the fuel, in the fire pot A as the flame circulates around the same. From their peculiar arrangement, they are not liable to become heated to redness, like those in any other furnace, thereby injuring the air passing through them and rendering it unfit for respiration. The mouth of the exit pipe *i* is covered by an inclined partition *m* which extends across the back of the radiator a few inches below and from the mouth of the pipe, and upward to within a short distance of the top of the radiator as seen in Fig. 4. This partition has a rectangular sliding door or valve *n*, fitted over an opening *c* through the said partition, directly in front of the mouth of the smoke pipe. When the fire is first kindled, the sliding door *n* should be elevated, so as to cause the smoke to pass off directly through the opening *o* into the smoke pipe. But after the coal is sufficiently ignited, the valve *n* should be

closed so as to cause the smoke to pass over the top of the partition *m* or through the small space between it and the top plate of the radiator, thence downward, in rear of the partition and through the smoke pipe to the discharging flue. The object of the partition *m* is to retain the heat within the radiator, and in order more effectually to do the same, whenever requisite or desirable, I place a small valve or damper in the opening over the top of the partition, which may diminish the same at pleasure—the said valve to be operated by a rod passing from the same, through the furnace or in any other convenient manner.

An opening *o'* (of sufficient size to admit a pan of water *q*, Figs. 2, 4,) is made through the back wall of the furnace. This opening is closed by a door *p*, and the water pan extends through one of the openings *l*, Figs. 2, 4 in the wall *f*, and abuts against the exterior surface of the fire pot, or terminates in the vicinity of the same. As the water in the pan becomes heated, it evaporates, and becoming mixed with the warm air, is carried with it into the small apartments.

Another of my improvements is represented in Fig. 11 which represents a vertical section of the bottom plate of the radiator. The said improvement consists in casting the bottom A A of the radiator, with a large circular aperture *a a* having a flange or projecting lip *c c*, around the circumference of the same and on the lower surface of the plate as seen in the drawing. This flange serves to sustain a circular plate *d d*, which is inserted and confined therein by screws *e e*, passing through the plate A, and nuts *f f*, under the same, or in any other convenient manner. A circular aperture *g*, in the center of the plate *d d*, is intended to receive the top of the fire pot as before described and if it becomes necessary to substitute a large fire pot, another plate *d d*, with an aperture corresponding to the size of the fire pot can be easily adapted to the radiator. Therefore by the above arrangement a fire pot of any size can be easily affixed to the radiator.

Having thus described my improvements in hot air furnaces I shall claim—

1. The sliding button, applied on the crank shaft, in combination with the projections above the button, the same being for the objects and purposes above specified.

2. Also, the mode of constructing the base sustaining the fire pot of the furnace, by making it in separate parts supported on temporary walls, or contrivances of a like character, built inside of the main walls of the ash pit, by means of which arrangement the fire pot or either of the plates can be easily removed at any time and others substituted without disturbing the radiator or materially disarranging any of the adjacent parts.

3. I also claim the manner in which I have arranged the air tubes of the radiator, over the furnace, by placing their lower extremities around the edge of the fire pot, and inclining them so that they shall converge toward each other at their upper ends, or where they enter the plate of the radiator.

4. Also combining said pipes, so arranged, with an exterior hollow conical-frustum shaped casing, surrounding the same; by which mode of arranging the air tubes and casing the fire is enabled to act more equally over their surfaces than in the arrangements now existing in which said tubes are placed perpendicularly over the furnace and inclosed by a hollow cylinder; the whole being substantially as above described.

5. I also claim the partition with its sliding valve and opening, combined with the radiator and arranged in the rear of the same, in front of the entrance of the smoke pipe, and extending upward to within a short distance from the top of the radiator, its object being the retention of heat; all as described.

6. I also claim, the method herein above described, of constructing the lower or bottom plate of the radiator, with a movable plate *d d*, Fig. 9, confined thereto by screws and nuts, by which arrangement a fire pot of a different diameter can be easily substituted, in the place of the one removed, by changing the movable plate for another having a circular aperture adapted to said fire pot.

In testimony that the above is a true description of my said invention and improvements I have hereto set my signature this twenty eighth day of May in the year eighteen hundred and forty-one.

JOHN A. PAGE.

Witnesses:
R. H. EDDY,
EZRA LINCOLN, Jr.