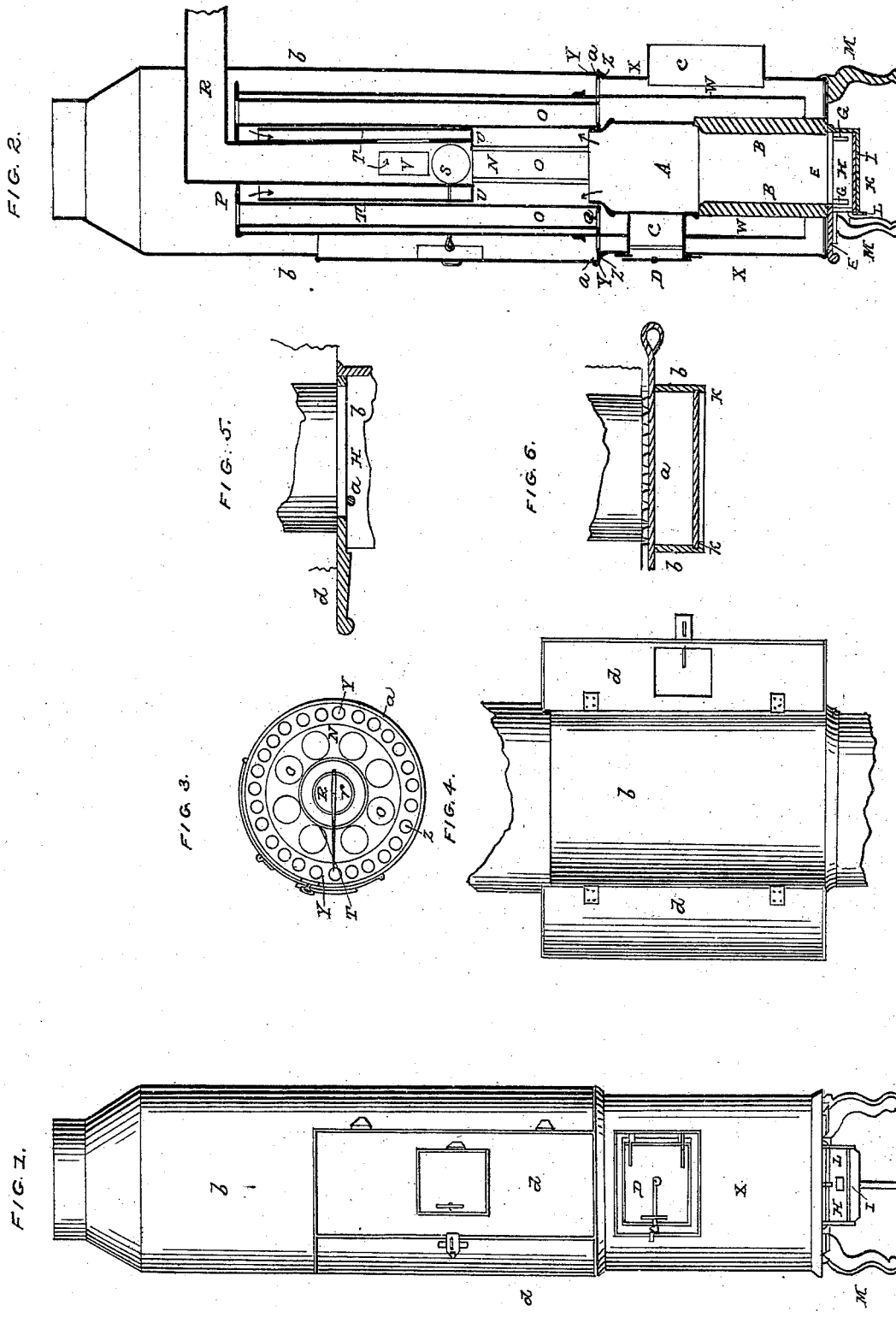


O. PACKARD.
Hot Air Furnace.

No. 2,483.

Patented March 9, 1842.



UNITED STATES PATENT OFFICE.

OTIS PACKARD, OF ROXBURY, MASSACHUSETTS.

APPARATUS FOR HEATING BUILDINGS.

Specification of Letters Patent No. 2,483, dated March 9, 1842.

To all whom it may concern:

Be it known that I, OTIS PACKARD, of Roxbury, in the county of Norfolk, in the State of Massachusetts, have invented a new and useful Improvement in Apparatus for Heating the Apartments of Buildings, of which the following is a full, and exact description, reference being therein had to the accompanying drawings, which taken in connection therewith form my specification.

In said description I have set forth the principles of my improvements, by which they may be distinguished from others of like character, together with such parts as I consider new and claim to be my invention, and for which I solicit Letters Patent.

Figure 1, of the drawings represents a front elevation of the stove or furnace. Fig. 2, is a vertical cross section of the same.

The fire pot or receptacle for the fuel is represented in Fig. 2, at A. It consists of a close cylindrical vessel of cast, wrought, or sheet iron or other suitable material, having its sides properly luted or lined with soapstone or fire brick B B. The fuel is introduced into the furnace through an opening or passage way C, which may be closed by a door D, and in these respects the fire pot does not essentially differ from those in most other furnaces of this description. The grate E on which the fuel rests is arranged under the furnace in such manner as to be drawn forward and pushed back at pleasure, by the application of the hand to a stud F. It is sustained on suitable ledges G, cast or otherwise affixed on each of the inner and opposite sides of the ash box H. The ash box is a rectangular or other proper shaped chamber fitted to the bottom of the apparatus, below the grate and has its bottom plate I, so adapted to the sides, that it may be drawn out and pushed back, similar to the grate as before described. For this purpose the bottom plate rests and is supported on a suitable ledge K, applied to each of the sides and one end of the ash box.

The front of the ash box may be closed by a movable plate L, which is simply placed against the open end of the box, and rests on the projecting part of its bottom, or small hinged doors may be substituted for the same if preferable.

The whole apparatus rests on any suitable number of legs or supports M M.

Directly over and above the fire pot, the radiator N is placed, the fire pot opening into and communicating with the interior of the same. This radiator consists of a hollow cylinder, of suitable length, arranged vertically and having a series of tubes *o, o, o* &c. disposed about its interior circumference and extending from, (and suitably fitted to), its top P, to the bottom Q as seen in the drawing, said top and bottom having a circular opening through each at the extremities of the tubes to permit the passage of the external air through the tubes.

The smoke and other products of combustion from the furnace are carried off, through the flue pipe R which is inserted through the center of the top plate of the radiator, and extends down through the center part of the radiator about two-thirds of its height as seen in the drawing.

A valve or damper S, is arranged in the lower end of the smoke pipe, with its handle or turning rod extending through the external casing of the radiator. Above the top of the radiator, the smoke pipe is bent at right angles and may be continued from thence to the discharging flue. That portion of the smoke pipe within the radiator is surrounded by a cylindrical casing T T Fig. 2, said casing having a diameter which shall admit of its external surface resting in contact or nearly so with the pipes *o, o, o*. The lower end of the casing T T, is in the same horizontal plane with the lower end of the smoke pipe, the circular space between the two being closed at bottom by a suitable plate U, U, Fig. 2. The upper end of the casing T terminates at some distance from the top plate of the radiator as seen in the drawing so as to leave the circular space between the casing and smoke flue open at top. A series of vertical elongated openings V, V, V, is formed through the sides of the smoke flue just above the damper or valve, so that when the valve is closed the smoke from the furnace takes a direction, (as denoted by the arrows in the drawing), upward between the casing T and the sides of the radiator, (thus circulating around the exterior surface of the tubes *o, o, o*), and passes over the top of the casing T, thence downward through the circular space between the casing T and the smoke flue and escapes into the smoke flue R, through the openings V, V, V. If the

smoke pipe was merely connected to the top of the radiator, with its mouth opening into the radiator without extending below the top of it the smoke and hot air from the furnace would not circulate so freely about the pipes, as it does with the above described arrangement of such flue and other parts but would ascend from the furnace and be carried off without the desired contact with the pipes, thus losing much heat which might otherwise be saved.

The exterior of the furnace, from the bottom of the radiator downwards to within a short distance of the bottom plate of the apparatus, is surrounded by a circular partition or casing W, W, of planished tin, or other metal having a bright reflecting surface. The diameter of this circular casing is about equal to the diameter of the radiator, and this casing is surrounded by another case of sheet iron or other suitable material X X which forms the outer casing of the apparatus extending from the bottom plate upward to about the height of the fire pot as seen in the drawing.

The space between the casings W, and X is closed at top by the circular ring plate Y Y through which a series of small circular holes or openings Z, Z, is formed throughout said plate. A top view of the plate Y with the openings is represented in Fig. 3, which is a horizontal section of the whole apparatus, taken through the radiator just above the valve or damper. The plate Y has a circular ledge *a a* projecting above its upper surface as seen in Figs. 2, 3, over which a jacket *b, b*, of tinned iron, or other suitable material having a polished surface is shut or arranged, said jacket *b b* inclosing the entire radiator and extending upward some distance above its top where said jacket may be suitably covered and have pipes inserted in its upper part, for the conveyance of the heated air to the different apartments to be warmed, or it may connect directly with the apartment over the same, or may be otherwise arranged so as to distribute hot air in any convenient manner.

An opening *c*, of suitable size, is formed through the exterior casing X X on the opposite side of the same to that on which the fire door D, is placed. The external air enters the heating apparatus through this opening, to which it is conveyed by pipes suitably arranged or in any convenient manner according to circumstances. Thence it passes between the casings W, X, circulating throughout the space inclosed between them; thence passes under the lower edge of the casing W and impinges against the whole outer surface of the fire pot, from thence passing through the tubes *o, o, o*, of the radiator, and thence to the apartments to be warmed.

A certain portion of the air which enters

the opening *c* passes directly through the openings Z Z of the plate Y and circulates around the exterior of the radiator or between it and the jacket surrounding it, and thus it will be perceived that by surrounding the radiator with a reflecting jacket of tinned iron, and causing a current of cold air to pass or circulate between them, the exterior of the radiator imparts heat to this current as it ascends, while the reflective power of the inner surface of the jacket, and the continual supply of cold air, prevents the jacket from being heated, so as by radiation, to heat to an injurious degree the apartment or room in which the apparatus is placed. That portion of the air which comes in contact with the exterior of the fire-pot and the interior surfaces of the tubes of the radiator becomes very much heated, and as it rushes out of the top of said tubes into the upper part of the reflecting jacket, it becomes mixed with the current of air which ascends on the exterior of the radiator, and is reduced to the requisite temperature to be conveyed into the different apartments.

The casing W W, being formed of tinned iron or other suitable metal, having polished or reflecting surfaces, prevents the lower or exterior casing of the apparatus from being heated to too great a degree, and thus by a very simple arrangement I am enabled to produce a "non-radiating apparatus" or one whose outer surface exposed to the air of the apartment will not heat that air to any injurious degree.

In order that the jacket *b b* may be removed with facility, so as to get at the radiator in order to repair the same, or to remove it, the lower part of the jacket for about one half of its height and for a portion of its circumference, rather less than an arc of one hundred and eighty degrees is composed of doors *d, d*, Fig. 4, (wherein they are represented open), which may be closed together when the jacket is in place, but whenever it is necessary to remove the jacket, the doors are opened and the jacket lifted until it may be removed laterally, the radiator passing through the opening of the doors. This arrangement of the jacket becomes necessary, as the generality of rooms in which hot air stoves of this description are placed are so low that the apparatus reaches very nearly to the ceiling and if some arrangement of the above kind is not employed it would be attended with much trouble to set up or remove the parts composing the apparatus.

The grate represented in Fig. 2, may be supported as exhibited in Figs. 5, 6, (the first being a vertical section, the same as exhibited by Fig. 2, while the latter figure is a vertical section taken at right angles to the first), upon a rod *a*, which is passed

through the sides *b, b*, of the ash-box directly beneath the front or near the front of the grate. The grate may be slid over said rod into place and will there be supported by said rod at the front, and will be further sustained by its arm *d*, bearing upward against the bottom plate of the furnace. Should the coals or cinders at any time prevent the withdrawal of the grate, on removal of the rod *a* the same may be at once effected.

Having thus described my improvements I shall claim—

1. Extending the smoke or discharge flue into the central part of the tubular radiator, and otherwise arranging it with a valve or damper at its lower end and with orifices above said damper and combining and surrounding said flue with the cylindrical or other proper shaped casing which is connected to the flue at its lower end and extends upward to within a short distance of the top of the radiator, the whole being constructed substantially in manner as above described and for the purpose of causing the hot air smoke and other products of combustion arising from the fire pot to more freely circulate about the upper exterior surfaces of the tubes of the radiator as herein before set forth.

2. Also surrounding the fire pot and radiator

by the above described combined arrangement of casings, by which the cold air is taken in at the side of the furnace, through an elongated opening, and a portion of said cold air caused, more perfectly than in most hot air furnaces, to circulate in contact with the exterior casings, by which they are rendered in a great measure nonradiating, while the remainder of the air passes in contact with the fire-pot and through the radiator, the whole being constructed substantially as above set forth.

3. Also the mode of constructing the reflecting jacket or upper casing with doors, by which it may be easily removed, at any time from the rest of the apparatus, for the purpose before mentioned.

4. Also supporting the grate on a cylindrical rod passed through the sides of the ash box substantially in manner and for the purpose described.

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

OTIS PACKARD.

Witnesses:

R. H. EDDY,
EZRA LINCOLN, Jr.