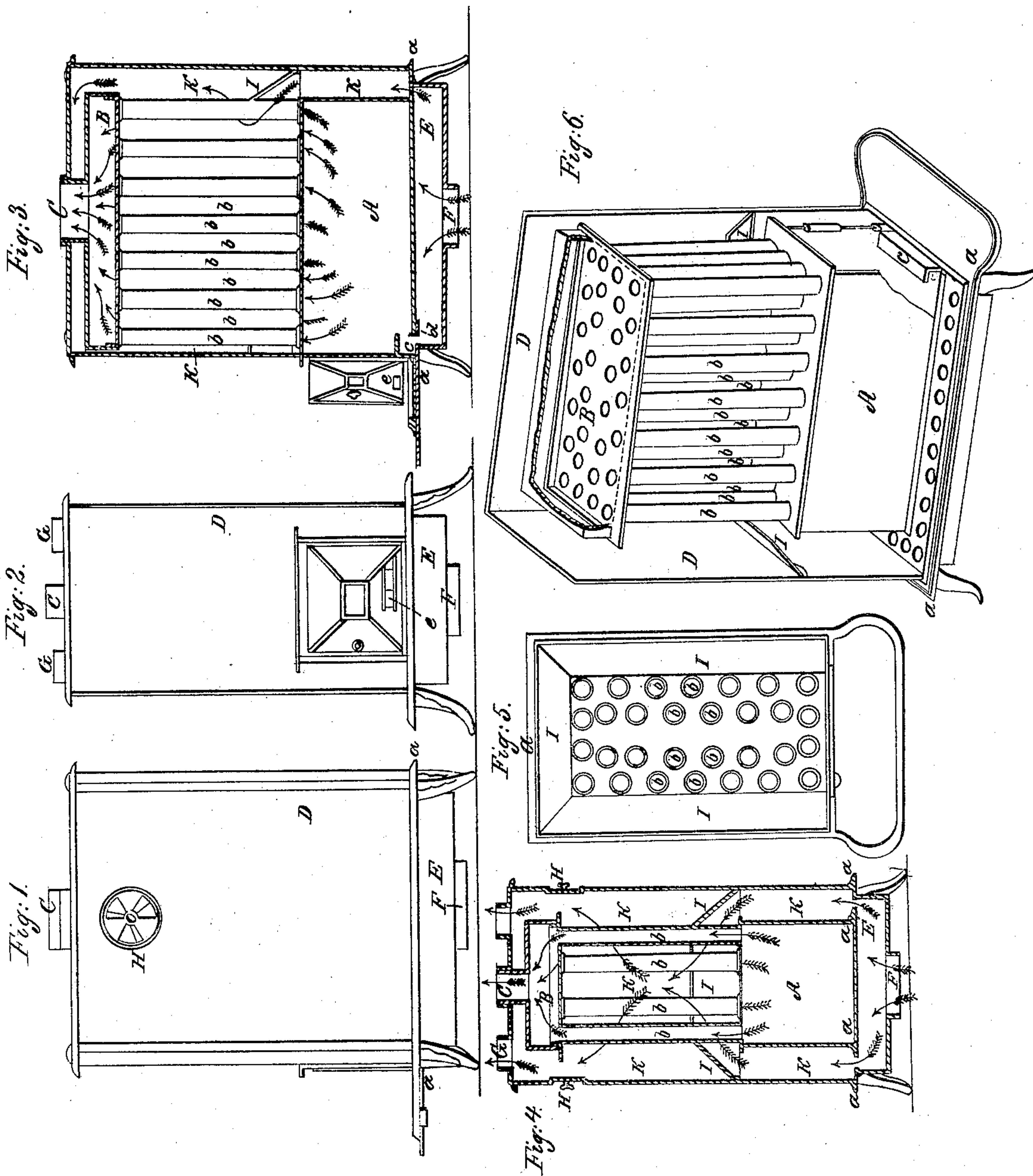


S. GATES.
Hot-Air Furnace.

No. 9,444.

Patented Dec. 7, 1852.



UNITED STATES PATENT OFFICE.

STEPHEN GATES, OF ALBION, NEW YORK.

HOT-AIR FURNACE.

Specification of Letters Patent No. 9,444, dated December 7, 1852.

To all whom it may concern:

Be it known that I, STEPHEN GATES, of Albion, in the county of Orleans and State of New York, have invented a new and Improved Furnace for Warming Dwellings; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1, is a side elevation of the furnace. Fig. 2, is a front elevation of ditto. Fig. 3 is a longitudinal vertical section of ditto taken through the center. Fig. 4 is a transverse section of ditto taken through the center. Fig. 5 is a horizontal section of ditto taken above the fire chamber. Fig. 6 is a perspective view of ditto with one side and front end off.

Similar letters of reference indicate corresponding parts in each of the several figures.

The nature of my invention consists in the mode in which a series of flues are arranged over the fire chamber, by which each flue is made to act as a deflector of the air in its passage on the other flues to the open space over the center of the fire chamber, and from thence upward and outward in the same manner to the open space between the flues and case. The fire and smoke in the fire chamber passes through the series of flues into the smoke chamber, and from thence into the smoke pipe. The fire chamber flues and smoke chamber are inclosed within a case forming the heating or rarefying chamber. A cold air chamber is placed underneath the fire and heating chamber communicating with the heating chamber by means of perforations in the hearth or bottom. A cold air pipe is opened into the cold air chamber, the outer end of which communicates with the open air on the outside of the building.

When the furnace is in operation the cold air from without the building passes through the cold air pipe into the cold air chamber, and from thence through the perforations in the hearth into the heating chamber around the fire chamber, and in its passage upward comes in contact with the deflecting plate and is driven among the flues, and is deflected in every direction among and against the flues coming in contact with every part of the heating surface—imbibing heat therefrom, (and thoroughly

heating the air) the air passes from the heating chamber into the hot air conducting pipes into the different rooms to be warmed.

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

A, Figs. 3 and 4 is a fire chamber placed upon a hearth or bottom (*a a*) somewhat longer and broader than the fire chamber, so as to receive the outside case D. The hearth (*a a*) see Fig. 6 is perforated with holes outside of the fire chamber A, and inside of case D, so as to cause an equal distribution of cold air around the fire chamber except the front (*b b*) represents flues or pipes arranged upon the top of the fire chamber so as to break points as represented in Fig. 5 other rows may be added in this order if desired leaving an open space over the center of the fire chamber, forming a part of the heating chamber *k*. The flues lead from the fire chamber into the smoke chamber, into which the smoke pipe C is inserted.

D, is a case which completely incloses the fire chamber flues and smoke chamber, resting upon the hearth or bottom (*a a*) near its outer edge; and forming the inclosure of the heating or rarefying chamber K.

I, is a deflecting plate, the lower edge of which is attached to the inner side of case D, in a line with the top of the fire chamber, and placed obliquely, the other edge resting against the flues, the deflecting plate may extend around the flues, or on two sides and back end as the construction of the fire chamber may require.

G G, Figs. 2 and 4 are hot air pipes inserted into the top of case D, these pipes convey the hot air from the heating chamber K into the different apartments intended to be warmed.

H, Fig. 1 is a register in case D, for the purpose of allowing the hot air to pass into the room in which the stove or furnace is placed. There is another register on the other side of case D, see Fig. 3 this register is designed to be opened into another adjoining room to be warmed by it.

E, is a cold air chamber placed underneath the hearth or bottom (*a a*) to receive the cold air.

F, is a cold air pipe, communicating with the cold air chamber, the outer end of said pipe communicates with the open air on the outside of the building.

(*c*) Fig. 3 is a small opening in the hearth

(a a) leading from the cold air chamber into the fire chamber. This is the draft hole to feed the fire. This opening has a slide (d) which works over it, by the operation of which, the requisite amount of air may be admitted into the fire chamber to feed the fire. There is also a small opening in the fire chamber door for a draft hole to feed the fire.

10 The use of each part will be presently shown.

Fire being kindled in the fire chamber A the fire and smoke ascend through the flues or pipes into the smoke chamber, and from 15 thence into the smoke pipe. In this arrangement of the flues the fire is divided into a great number of small columns, and comes in contact with the surface of the fire chamber flues and smoke chamber in its passage 20 through the different parts, imparting its heat thereto, and allowing the air as it were to circulate in the midst of the fire. The air around the outside of the different parts of the fire apartments becomes heated and 25 expanded, and from its levity seeks its equilibrium through the hot air conducting pipes, the cold air rushes in to supply its place.

It will be seen that the cold air is first taken 30 from the outside of the building through the cold air conducting pipe into the cold air chamber, and from thence through the perforations in the hearth, into the heating chamber in passing up it comes in contact 35 with the deflecting plate I, and is deflected or thrown through the open spaces between the flues wrapping and deflecting from one flue to the other to the open space over the center of the fire chamber, and from thence 40 it is forced above the deflecting plate, and in the same manner in its outward passage being deflected to the open space between the flues and case. Thus the air in rapid succession changes its position, causing each 45 particle of air to come in contact with a heated surface taking up its legitimate portion of heat and conveys it through the hot air conducting pipes and registers into the different apartments or rooms to be warmed.

50 The red arrows in Figs. 3 and 4 show the direction of the fire and smoke in its passage from the fire chamber through the flues, smoke chamber and smoke pipe. The black arrows show the direction of the air in its

passage through the cold air pipe, and from 55 thence through the furnace and hot air pipes and registers.

By this arrangement of the different parts of the furnace there are several important advantages secured: 60

First. From the unusually large amount of fire surface presented to the direct current of air without the possibility of an eddy, thereby appropriating a much larger amount of the heat generated in the fire 65 chamber to use.

Second. The air being partially heated in the cold air chamber, and imbibing heat in its passage excluding the cold air from the flues. Consequently no condensation is produced in the fire flues, a more perfect combustion is thereby produced, making the furnace a great fuel saver, and yielding a much purer heat. 70

Third. By this arrangement, the furnace 75 can be reduced in size to the convenience of the parlor sitting room or halls, and retain all the elegance of the parlor stove, and yet possess all the advantages of the furnace. This is one of the most important advantages 80 secured by this arrangement.

When wood is employed for fuel the slide (d) should cover the opening (c) air being supplied through a small opening (e) through the fire chamber door, but when 85 coal is used air should be admitted through the opening (c) the draft through the opening (c) is too great or intense for wood, and should only be used when coal is employed for fuel. 90

Having thus described my invention, I will state that I do not claim the employment of a series of upright tubes or flues over a fire chamber for the purpose of heating air, nor do I claim the use of deflecting 95 plates simply as such, but

I do claim the combination of the deflecting plates with the system of upright flues directly over the fire chamber, when such flues are arranged in the manner set 100 forth so that each flue of itself shall act as a deflector and insure a complete circulation through the whole system substantially in the manner described.

STEPHEN GATES.

Witnesses:

WM. GREENOUGH,
TOLMIE CAMPBELL.