G. CHILSON.

Hot Air Furnace.

No. 4,133. Patented Aug. 4, 1845.

Fig. 3

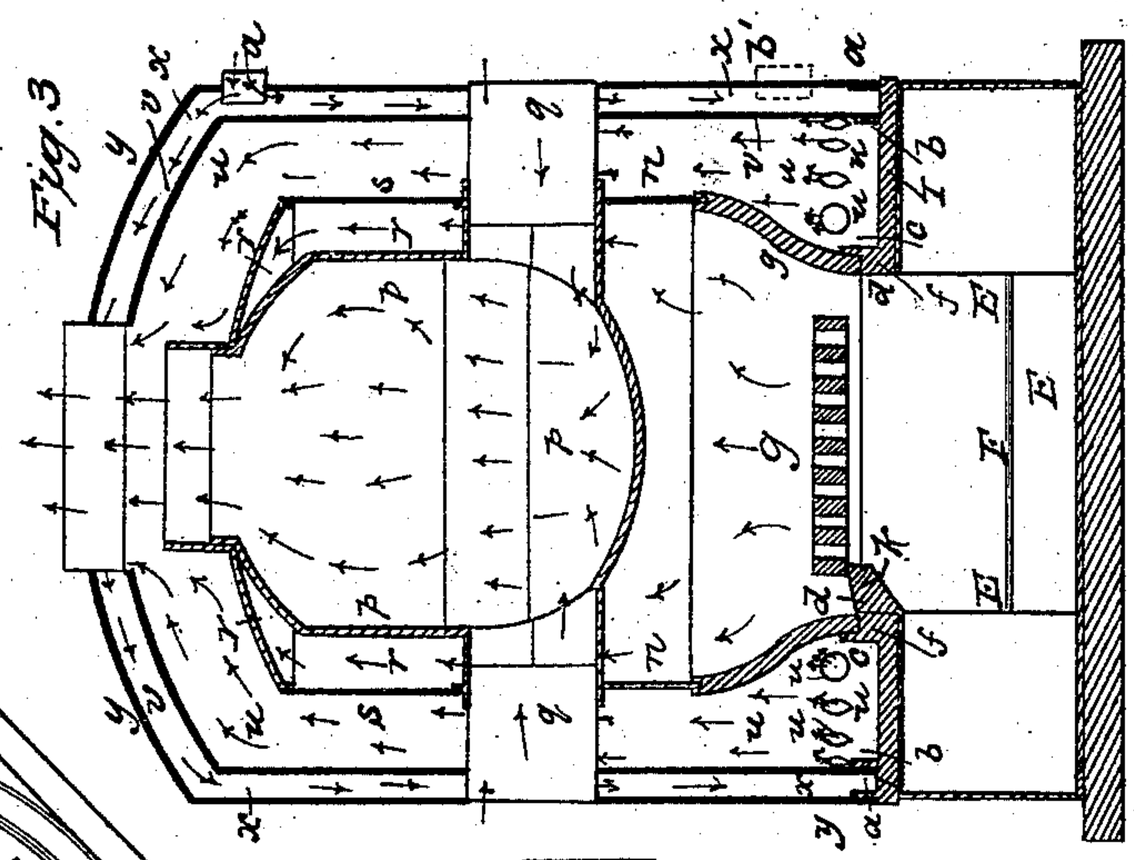


Fig. 2

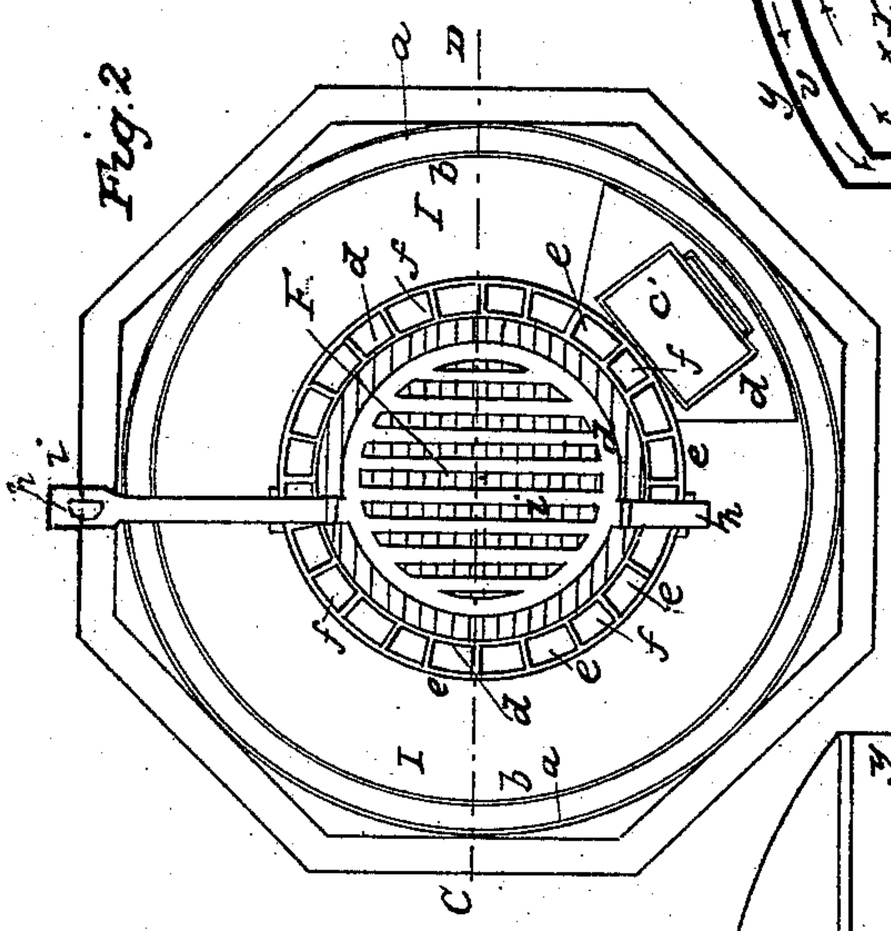


Fig. 4

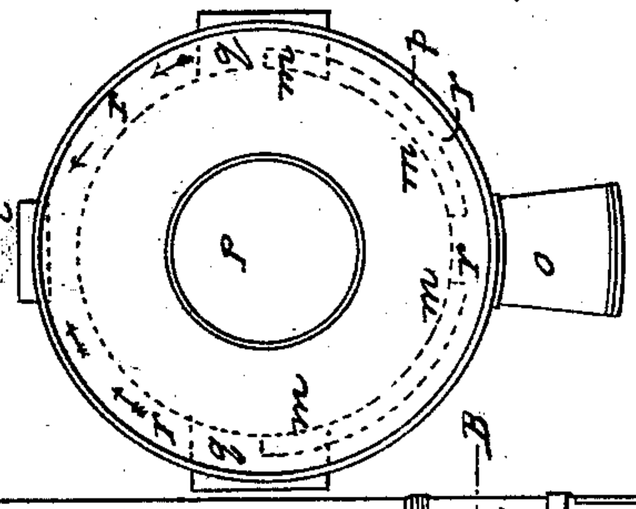
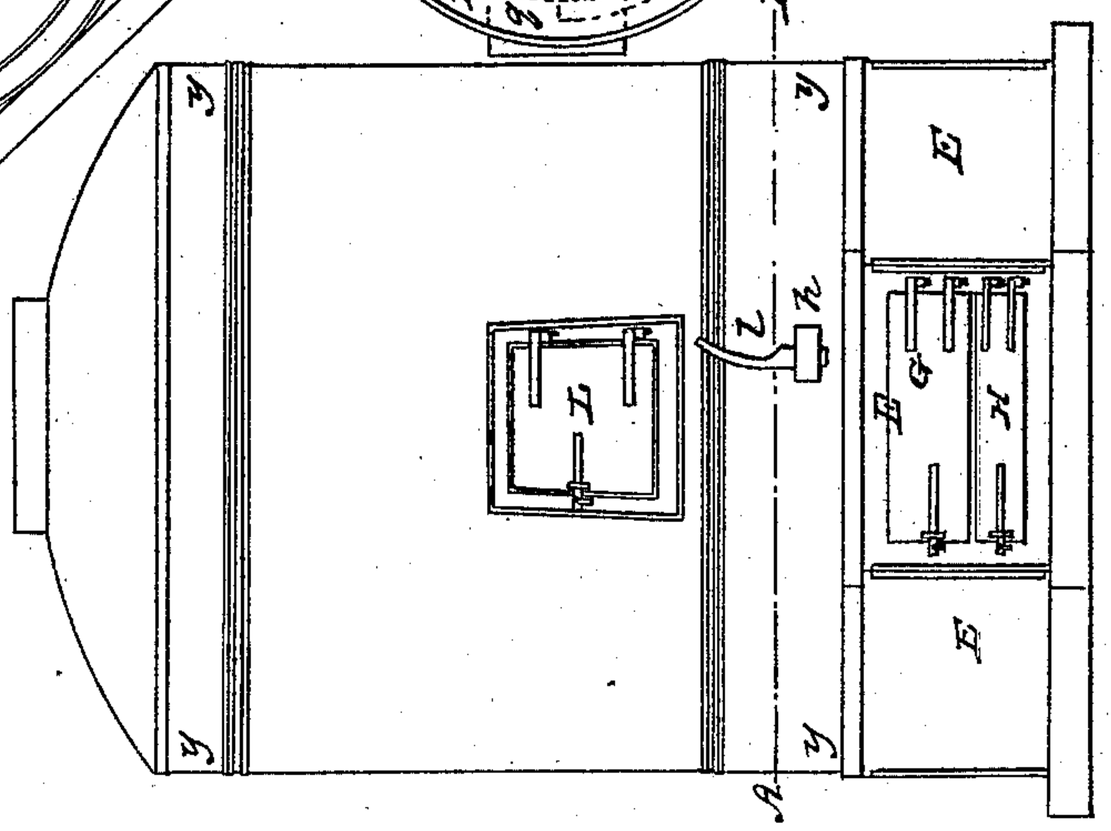


Fig. 1



UNITED STATES PATENT OFFICE.

GARDNER CHILSON, OF BOSTON, MASSACHUSETTS.

HOT-AIR FURNACE.

Specification of Letters Patent No. 4,133, dated August 4, 1845; Antedated February 4, 1845.

To all whom it may concern:

Be it known that I, GARDNER CHILSON, of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Hot-Air Furnaces for Heating Buildings, &c.; and that the following description, taken in connection with the accompanying drawings, hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvements, by which my invention may be distinguished from others of a similar class, together with such parts or combinations as I claim and desire to have secured to me by Letters Patent.

My first improvement consists in a peculiar formation of the top plate of the ash pit or rather that part of it on which the fire pot rests or is supported, the object of said improvement being to prevent the tendency or communication of the intense heat in the fire pot to the said plate and the great liability of its cracking or destroying the same by its expansive power.

My second improvement consists in forming the fire pot or lower part of the fire chamber in shape and capacity somewhat similar to a common wash-basin and more shallow (but wider at the top), than they have heretofore been made, the fire pots in common use being cylinders, of some considerable depth. The object of this improvement is to expose a greater surface of burning fuel to the hot air chambers about the fire pot, and to keep the fuel more effectually ignited than it can be where there is great depth to the same.

My third improvement consists in arranging a hot air chamber directly over the burning fuel in the fire pot, so that the flames &c from the fuel may come in contact with the exterior of the bottom of the said chamber, said bottom being of a globular or bulbous shape so as to spread the flames about the periphery or exterior surface of this central hot air chamber. The cold air is conducted into this chamber on each side and about on a level with the upper side of the bottom of the same, and by being so introduced disturbs and spreads the hot air in the chamber causing it thereby to impart heat to the periphery of the same which radiates it to other apartments; the cold air also by being thus received becomes suddenly or quickly rarified and heated and rushes out at the top of the chamber (before the oxygen in the same is destroyed), meeting on its way heated air from other chambers which will be described in the sequel, the arrangements for which will suggest some claim or claims to combinations.

The figures of the accompanying plate of drawings represent my improved furnace.

Figure 1, is a front elevation of the furnace. Fig. 2, is a horizontal section taken in the plane of the line A B Fig. 1, it being a plan of the lower part of the furnace with the fire pot and all above it removed. Fig. 3, is a transverse vertical section taken in the plane of the line C D Fig. 2.

E E, E Figs. 1, and 3, is the ash pit which may be made of brickwork or of iron plates firmly fastened together, and may be of an octagonal form as shown in the drawings or of any other shape. This ash pit is divided into two apartments, one above the other, by means of a sifting grating F which separates the ashes from the pieces of coal which drop through from the fire pot. Each apartment is provided with an iron door properly fitted as shown at G, H Fig. 1.

I I Figs. 1 2 and 3 is the top plate of the ash pit which should be made of cast iron and sufficiently strong and thick to sustain the weight of the superincumbent parts; it is formed with a circular hole in the center of sufficient size to accommodate the grate of the fire pot. On the top of this plate are cast the several circular rims *a a b b*, on each of which casings to be hereinafter described are fitted. There are also two other rims *c c c*, *d d d* (see Fig. 2) cast on said plate I I the space between which is divided into cells *e*, *e*, *e*, *e*, &c by the cross bars or partitions *f*, *f*, *f*, *f*, &c., on the upper edges of which the bottom of the fire pot *g g* rests and is supported. These cells or spaces are filled with sand, soap-stone dust or some other non-conducting substance or powder which prevents the intense heat of the fire-pot from being communicated to the plate I I and thereby cracking or injuring the same.

The grate used in my improved furnace is constructed substantially on the principle of that described in the schedule annexed to a patent granted to me for "a new construction of the grates of stoves" said patent being dated the 11th day of September

A. D. 1841. The journals *h*, *h*, of the grate *i* are arranged eccentrically, or on one side of the diameter of the grate, said journals being supported in suitable bearings as shown in Fig. 3, in which they turn. The heavier side of the said grate rests on the top of a lip or stud *k* projecting from the periphery of the circular hole in the top plate I I of the ash pit. The grate is cleared in the manner described in the aforesaid schedule and patent by means of a lever *l* inserted in a hole in one journal of the grate.

g g g Fig. 3 is the fire pot or that part of the chamber which contains the fuel the bottom or lower edge of which rests as before described on the tops of the cells *e e e* and cross partitions *f*, *f*, *f*. The shape of the fire pot is as hereinbefore suggested like that of an ordinary wash-basin as shown in section in Fig. 2. It may be curved or swelled outward at the top so as to make the same capacity or space, as other firepots have, by greater width and less depth, by which arrangement the fuel is kept more easily and generally ignited, and a greater surface of burning coals is presented to the parts to be heated. The upper edge of the fire pot is grooved out or formed with a proper channel into which the lower edge of the top part *n n* of the fire chamber rests or is fitted. This part *n n* is made cylindrical and is formed as well as the lower part of cast iron, a passage or avenue *o* being formed in it, (which extends to the front of the furnace) for the introduction of the fuel, and said avenue having a door L Fig. 1.

p p p, &c., Figs. 3 and 4, is the inner or central hot air chamber the body of which is cylindrical, the top and bottom being bulbous or of a somewhat globular shape and the whole being made in three or more parts (properly connected together), to allow for the expansion and contraction of the same consequent to the varieties of heat to which they are exposed, the several parts being made of sheet or cast iron as their position and exposure to the heat would suggest. This chamber is suspended directly over the burning fuel in the fire pot by means of the cold air pipes *q*, *q* on each side of the same which rest firmly in proper bearings cut out of the top part *n n* of the fire chamber. The hot air-chamber *p p p*, is somewhat less in diameter than the greatest diameter of the fire-chamber so as to leave a smoke space or flue *r r r r*, between the exterior of said hot air chamber and the interior of the cylindrical casings *n n*, and *s s* as shown in Fig. 3, and in Fig. 4, partially by dotted lines, said figure being a plan of the fire pot and parts resting on the same detached from the rest of the furnace. Partitions or flanges *m* , *m*, *m m* may be arranged in this smoke chamber or flue *r r r r* in any position to cause the smoke &c. to travel in any desired direction, in order to secure all the heat that can be derived from the same before it passes out at the discharge pipe *t*. The passage of the smoke is indicated by black arrows in Fig. 3.

The lower part of the central hot air chamber *p p p*, should be made of cast iron to withstand the intense heat to which it is exposed, and the bulbous or globular shape of the bottom spreads the flame &c. about the sides of the chamber and also brings it nearer to or in contact with the interior surface of the cylinder *n n* and casing *s s* the heat from which is radiated or forms hot air in the chamber *u u u u*. The bulbous shape of the top of this chamber conducts or guides the hot air out or causes it to converge in a direction toward the month of the chamber instead of rebounding as it would if said top were flat.

The cold air is introduced into the inner or central hot air chamber *p p p* through the pipes *q*, *q*, as shown by the blue arrows in Fig. 3, and coming in about on a level with the upper surface of the bottom of the chamber spreads and disturbs the hot air in the chamber and becomes itself suddenly rarified and heated and both rush out in the direction indicated by the red arrows in Fig. 3. The hot air formed in and coming from the chamber *p p p* as above described meets and commingles with the hot air from the secondary hot air chamber *u u u u* (as shown by the red arrows), said chamber being formed by the concentric sheet iron casing *v v v v*, Fig. 3, around the fire chamber &c. said casing fitting at the bottom over the rim *b b* before mentioned as on the top plate I I of the ash pit.

The cold air is introduced to the chamber *u u u u* through circular holes *w w w w*, &c., in the bottom of the casing *v v v* which communicate with the cold air chamber *x x x* formed by the exterior casing *y y y y* of the furnace which is concentric with that denoted by *v v v v* and shuts over the rim *a a* on the plate I I. The cold air is received into the chamber *x x x x* through the pipe *a′* and passes in the several directions indicated by the blue arrows.

Should the casing *v v v v* be dispensed with and the whole space between the casing *y y y y* and the fire chamber and parts above and connected to the same formed into one hot air chamber the cold air should be conducted in at the bottom of the same through the pipe *b′* shown by dotted lines in Fig. 3.

It will be evident that the casings *v v v v* and *y y y y* may be made of sheet or cast iron or of brick if desired, proper spaces being left for the introduction of the cold air.

Water may be introduced for evaporation in the hot air chamber *u u u u* in a vessel *c′*

which rests upon a proper standard *d'* placed on the plate I I, proper openings or doors being formed in the casings *v v v v* and *y y y y* for the introduction of the vessel.

Having thus described my improvements in hot air furnaces I shall state my claims as follows:

I do not claim simply making the top of the fire chamber dome formed, nor do I claim the combination of an outer and inner hot air chamber; but

What I do claim as my invention is—

1. Connecting the cylinder of the fire chamber with the central hot air chamber by means of a dome formed top in combination with the outer hot air chamber provided with a dome formed top and discharging the hot air through the middle thereof, whereby the air of the inner and outer chambers is more effectually brought into contact with the heated surfaces than in any other arrangement heretofore known.

2. I also claim making the cast iron top plate of the ash pit with cells filled with non-conducting substances for the bottom of the fire pot to rest on, and thus prevent the said plate, beyond these cells where it forms the bottom of the air chamber, or chambers, which surrounds the fire pot, from being cracked by the heat which would otherwise be conducted from the fire pot to this plate, as described.

In testimony that the foregoing is a true description of my said invention and improvement I have hereto set my signature this first day of August, in the year eighteen hundred and forty-four.

GARDNER CHILSON.

Witnesses:

E. LINCOLN, Jr.,

BENJ. C. PIPER.