

(No Model.)

3 Sheets—Sheet 1.

C. A. LARSON.
HOT AIR FURNACE.

No. 499,926.

Patented June 20, 1893.

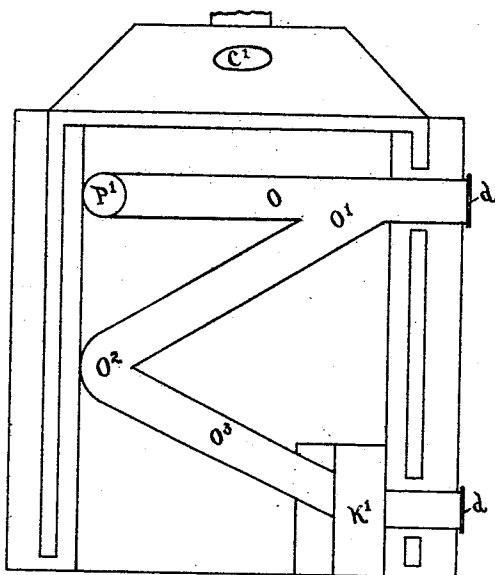


FIG. 3.

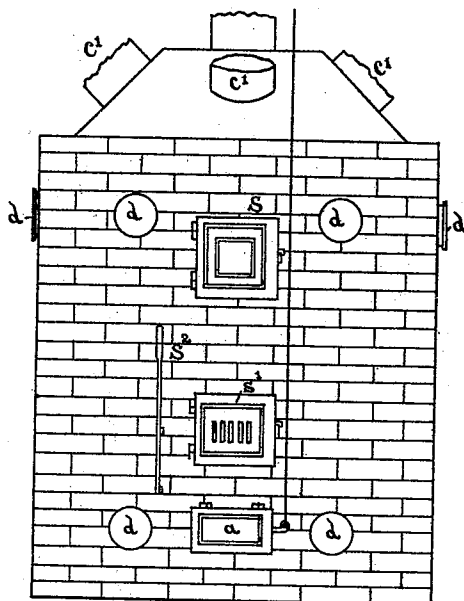


FIG. 1.

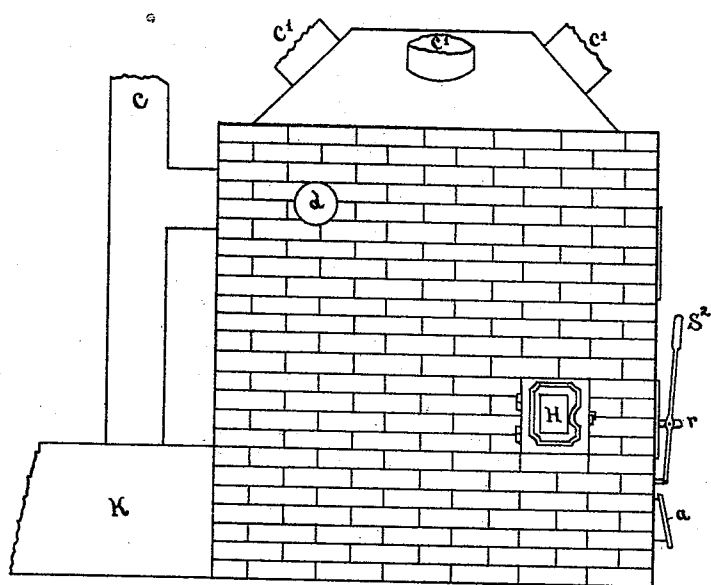


FIG. 2.

WITNESSES:

Ernest J. Lees

J. A. Blondel

INVENTOR

per C. A. Larson,
Gardner Middelkauff,
ATTORNEYS.

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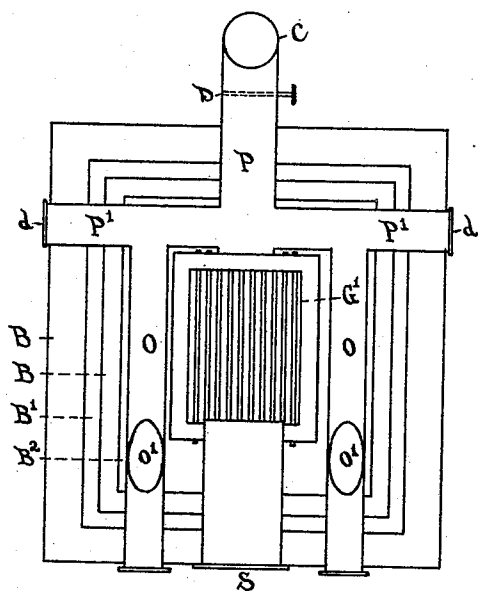


FIG. 5.

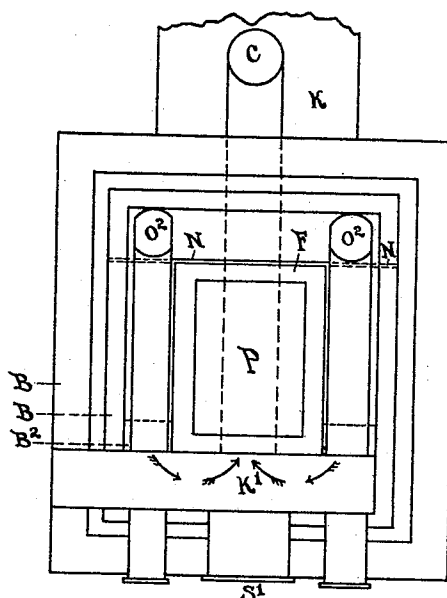


FIG. 6.

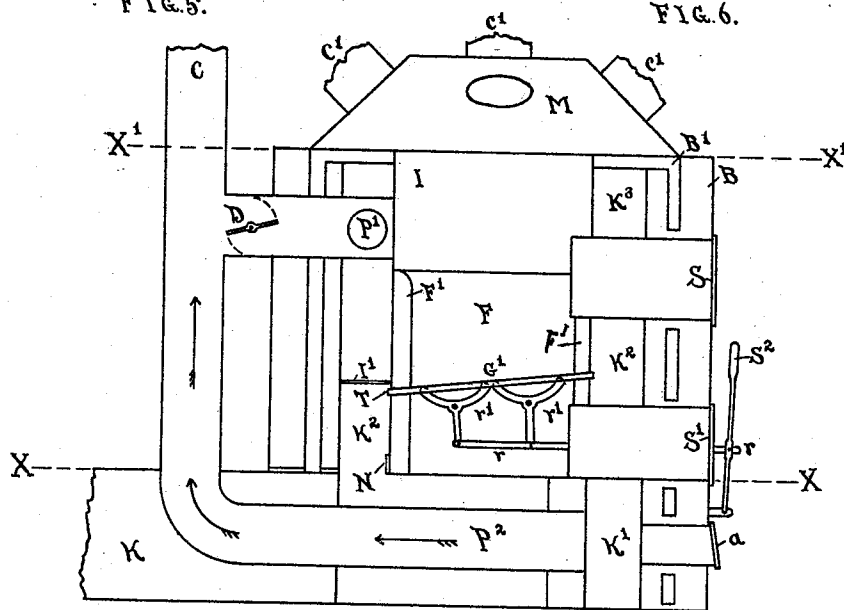


FIG. 4.

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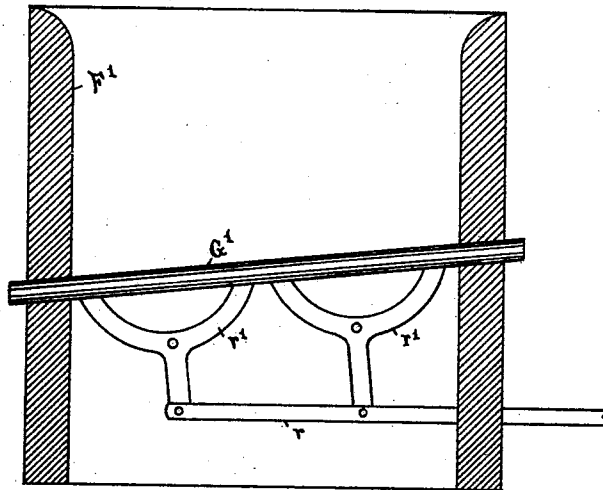


FIG. 7.

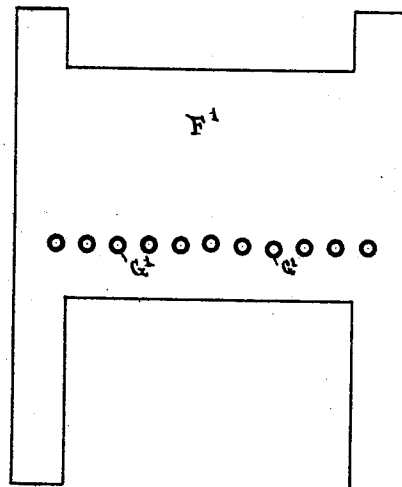


FIG. 8.

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UNITED STATES PATENT OFFICE.

CARL AUGUST LARSON, OF SIOUX CITY, IOWA.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 499,926, dated June 20, 1893.

Application filed January 16, 1893. Serial No. 458,577. (No model.)

To all whom it may concern:

Be it known that I, CARL AUGUST LARSON, a citizen of the United States, residing at Sioux City, in the county of Woodbury and State of Iowa, have invented certain new and useful Improvements in Hot-Air Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention has reference to hot air furnaces. Its object is to provide a furnace that may be simply and cheaply constructed, and which will accomplish most efficient results, and at the same time consume a minimum quantity of fuel. A further object is to provide a furnace that will produce a superior draft and utilize almost the entire product of combustion before the smoke passes into the chimney. My furnace also provides a construction by means of which the cold air is thoroughly heated before it passes into the dome, whence it is conducted to the rooms above. These results are attained by a novel arrangement of the smoke flues with reference to the cold air draft and also by a novel construction of the grate with reference to the cold air chamber.

My invention therefore consists in the novel construction, arrangement and combination of the parts, as will be hereinafter fully described and particularly pointed out in the claims.

I have fully and clearly illustrated my invention in the accompanying drawings, wherein like parts are designated by similar letters of reference, in which—

Figure 1. is a front view of my furnace in elevation, incased in brick masonry. Fig. 2 is a side view of the same in elevation. Fig. 3. is a vertical section on the left of the fire box, showing the route of the smoke flues in the smoke chamber. Fig. 4. is a vertical section through the center of the furnace, showing the cold air shaft, and cold air chamber, and the tubular construction of one of the grate-bars. Fig. 5. is a cross-sectional view, with the dome of the furnace cut away, on line X' X' Fig. 4, looking down upon smoke

flues and grate. Fig. 6. shows a cross sectional view on line X X of Fig. 4, showing the smoke pipe, centrally located and passing through the cold air shaft. Fig. 7 is a sectional view of fire grate showing tubular grate bars and clinker bars and shaft. Fig. 8 is a front view of grate frame showing tubular grate bars.

Referring now to the illustrations in detail: C represents the pipe leading to the chimney, in the usual manner.

K designates the cold air duct and is located above the cellar floor. C' C' are hot air pipes leading from the dome M to the rooms to be heated.

d d designates dampers; S the stove door and box through which the furnace is fed; S' the door and box through which the ashes are removed; H the door through which the hot water pan is filled; A, a door at the bottom through which the furnace is cleaned and which also provides a check draft; S² the shaker lever and r the shaker rod.

B B represent the mason work surrounding the furnace and supporting the fire box; B', an open air space between the masonry, by means of which the cold air is excluded and the hot air retained, and all the heat produced utilized without any great effect upon the furnace room.

F' designates the fire brick and F the fire box; I the iron frame of the fire box.

G represents the grate, and G' one of the grate bars, which in my furnace is stationary and for the purpose of procuring the better draft should be placed at an angle with the horizontal plane of the furnace.

r' r' are clinker bars attached to the shaker rod, and located between the tubular grate bars.

I' represents an iron shield which cuts off the cold air chamber K², from the upper part of the furnace, and is located just above the grate.

P' represents a smoke flue passing from right to left on the same plane with pipe P, which leads directly into the chimney, and into which the smoke passes upon leaving the fire box. On either side of the fire box and on the same plane, two parallel smoke flues extend from the pipe P' toward the front of the furnace. These pipes are provided at

their outer ends with dampers $d d$, and are intersected at $o' o'$ by the upper arms of two V shaped smoke flues $o^3 o^3$, one on either side of furnace, curved at $o^2 o^2$, which open below
 5 into a smoke chamber K' , closed above and extending from side to side on the same level with the cold air shaft.

K^3 is a hot air chamber, into which the tubular grate bars open, closed just below the
 10 grate bars, and extending on both sides of the feed box into the dome, M.

D represents a large damper which may be made to open or close the pipe P. By this damper the draft may be made to pass immediately out the chimney, or down through the smoke flues into the smoke chamber as desired.
 15

B^2 designates a small open space through which a small quantity of cold air may pass from the cold air duct, and which also contain pipes o and o^3 , which heat the cold air before it reaches the dome.
 20

N N are the iron frames which support the fire box upon the brick foundation. P^2 is a smoke pipe leading from the middle of the smoke chamber K' , back through the cold air duct K, into the chimney C.
 25

The operation of my invention is as follows. When the fire is just starting and a strong quick draft is desired, damper D is left open and the smoke and gas pass out of the pipe P into the chimney. When a good fire is created and it is desired to use the greatest possible quantity of heat, damper D is closed.
 30 The cold air enters the furnace through shaft K, and enters cold air chamber K^2 . Here it strikes against shield I' , and is forced through the open ends of the grate bars T, of the grate bars $G' G'$, where it is thoroughly heated, and the motion of the heat greatly accelerated.
 35 This swift current of hot air passes into chamber K^3 , and up into the dome, whence it passes through the hot air pipes $C' C'$ to the rooms above. In the meantime the smoke and gaseous products pass into pipes P' , then
 45

to the front through flues $o o$, down through flues $o^3 o^3$ into the smoke chamber K' . The smoke, diffusing heat through pipes o and o^3 , now passes along pipe P through the cold air duct into pipe C' and out through the chimney. 50
 Pipe P^2 becomes heated and communicates its heat to the cold air in shaft K. The cold air in K, and the hot air in pipe P, proceeding in opposite directions, communicate to each other a greater velocity. The surplus 55
 heat from the smoke and gas, are utilized in heating the cold air as it passes over pipe P^2 , flues $o o$ and $o^3 o^3$, and through the grate into the dome.

By reference to the construction of my furnace it will be seen that but a small portion of it is constructed of iron of any kind. Aside from the doors and boxes, the iron fire box, flues and grate, the furnace may be constructed entirely of brick. This material renders 60
 the construction very simple, durable and cheap.

Having thus fully and clearly described my invention, what I claim as new, and desire to secure by Letters Patent, is—
 70

1. In a hot air furnace, the double furnace frame, fire box, and stationary tubular grate, cross flue P' , horizontal flues $o o$, V shaped flues $o^3 o^3$, smoke chamber K' , and smoke pipes P^2 and C, in combination with a cold air duct 75
 and cold air chamber, substantially as specified.

2. In a hot air furnace, with double frame, fire box, dome, cold air shaft and cold air chamber, the combination of flues P' , $o o$, $o^3 o^3$, 80
 smoke chamber K' , and pipes P^2 and C, with the tubular grate G, passing from a cold air chamber K^2 , to hot air chamber K^3 , substantially as specified.

In testimony whereof I affix my signature in 85
 presence of two witnesses.

CARL AUGUST LARSON.

Witnesses:

L. S. PEARSON,

OSCAR MIDDLEKAUFF.