

A. R. LEGGETT.
FURNACE.

APPLICATION FILED JULY 23, 1910.

1,062,483.

Patented May 20, 1913

4 SHEETS—SHEET 1.

Fig. 2.

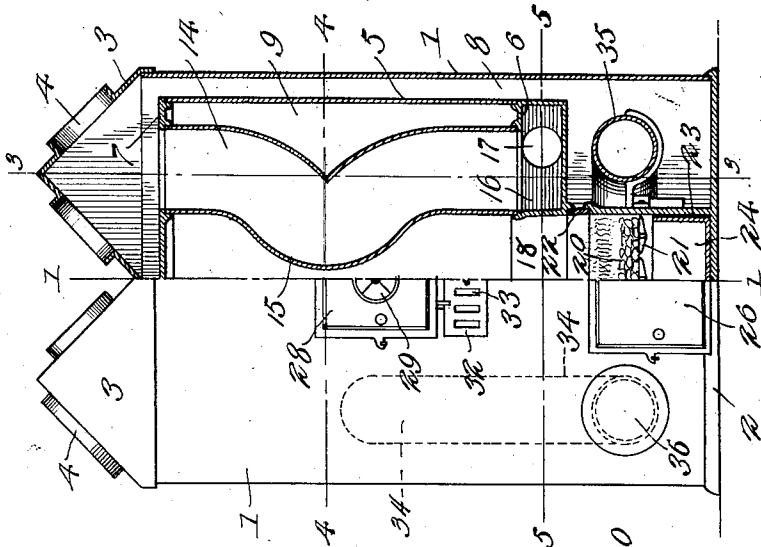
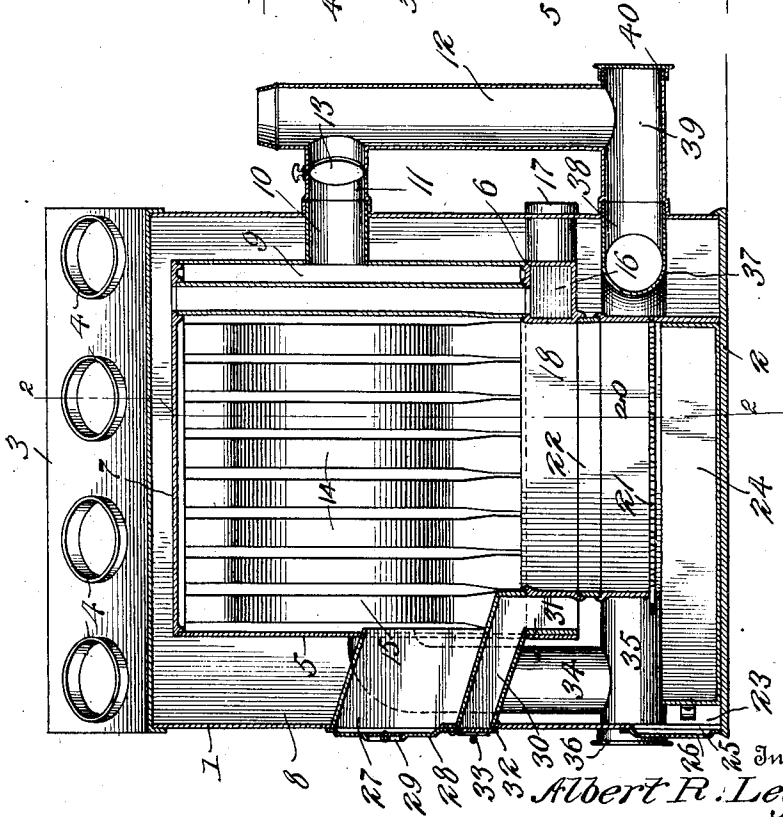


Fig. 1.



Witnesses

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4 SHEETS—SHEET 2.

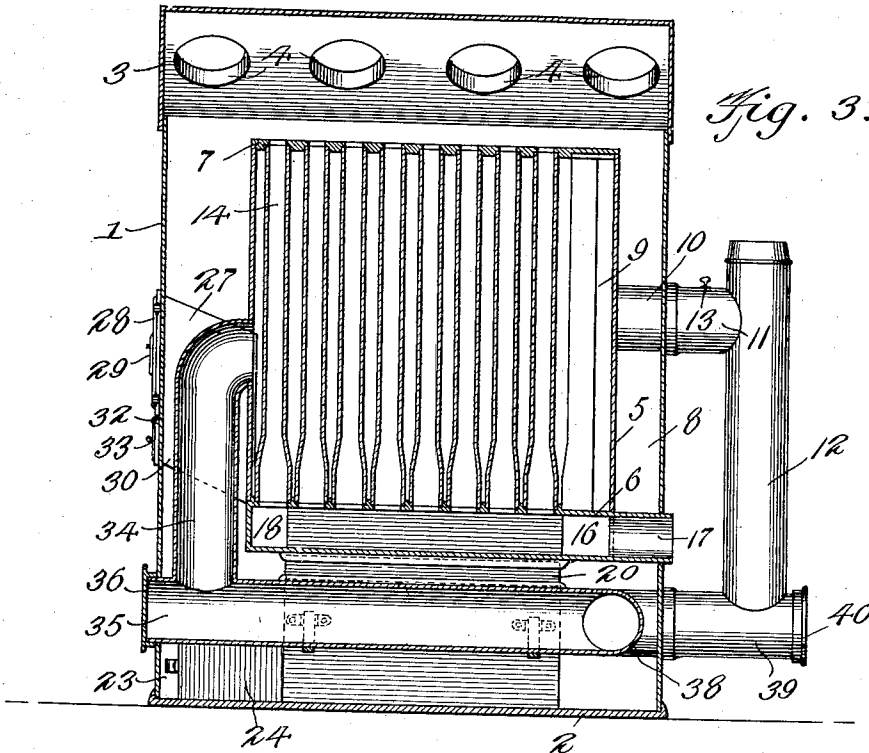
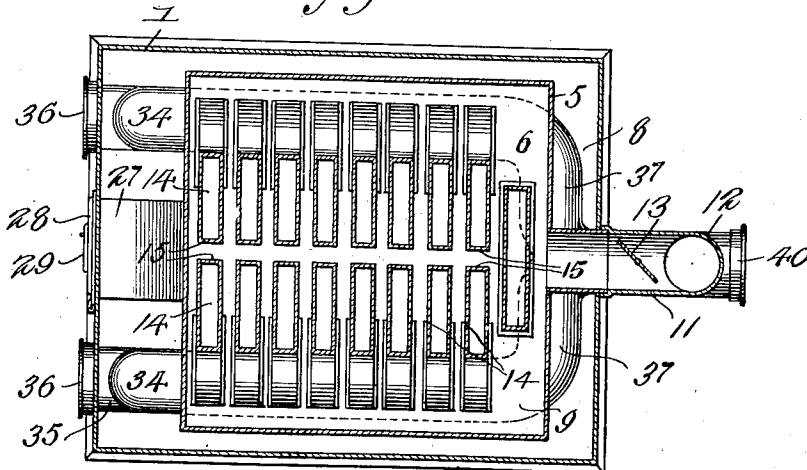


Fig. 3.

Fig. 4.



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4 SHEETS—SHEET 3.

Fig. 5.

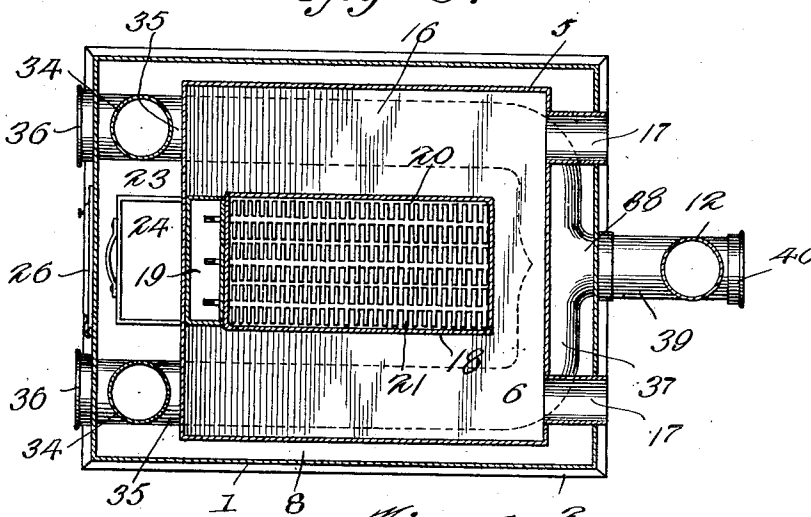
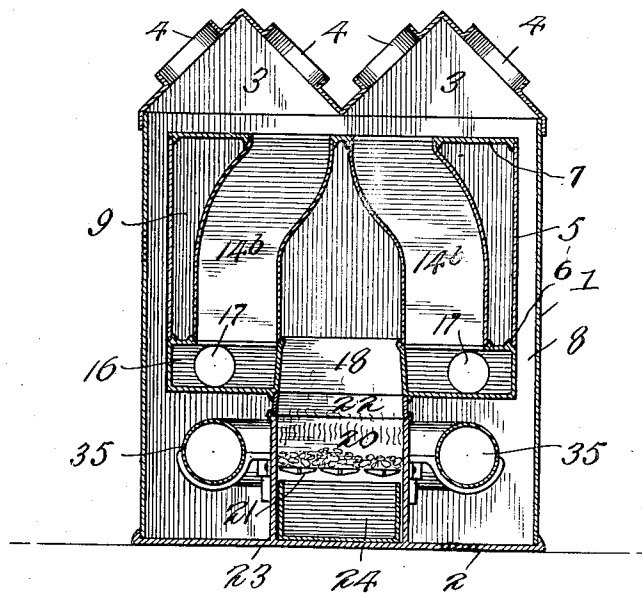


Fig. 6.



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4 SHEETS—SHEET 4.

Fig. 7.

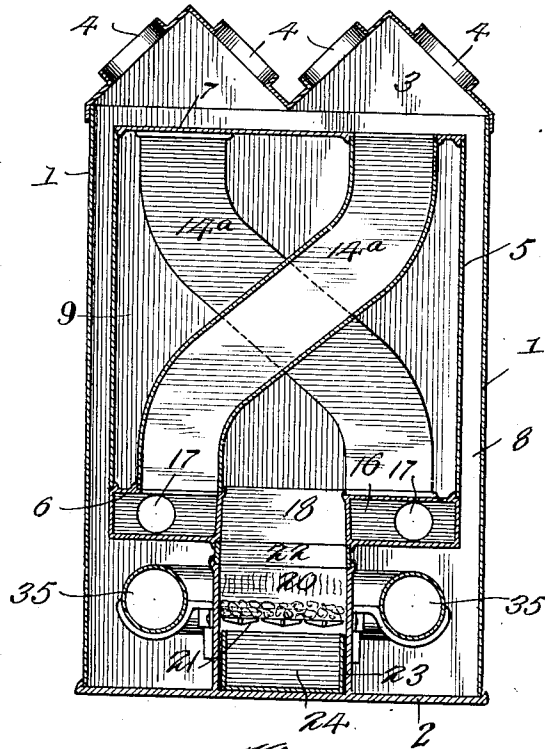
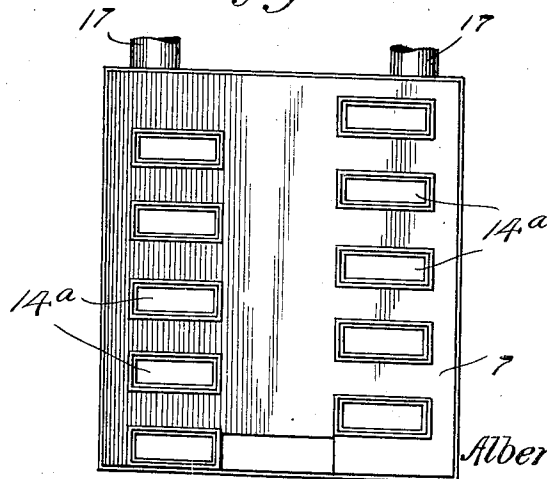


Fig. 8.



Witnesses

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UNITED STATES PATENT OFFICE.

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FURNACE.

1,062,483.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALBERT R. LEGGETT, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented new and useful Improvements in Furnaces, of which the following is a specification.

This invention consists of a furnace, which has a large area of heat radiating surfaces for heating a large volume of air and which is adapted for high or low ceilings, and has a top or cover so constructed as to allow of an increased number of flue vents in a compact space with heat receiving and distributing chambers therein for this purpose.

In the accompanying drawings similar reference numerals refer to similar parts in which,

Figure 1 is a central vertical front-to-rear section through the furnace, taken on the plane indicated by the line 1—1 of Fig. 2. Fig. 2 is a view, showing one-half of the furnace in front elevation and the remaining half in vertical transverse section taken on the plane indicated by the line 2—2 of Fig. 1. Fig. 3 is a vertical front-to-rear section, taken on the plane indicated by the line 3—3 of Fig. 2. Fig. 4 is a horizontal section, taken on the plane indicated by the line 4—4 of Fig. 2. Fig. 5 is a horizontal section taken on the plane indicated by the line 5—5 of Fig. 2. Fig. 6 is a central vertical transverse section, showing a reduced size of furnace for shallow rooms or cellars. Fig. 7 is a similar view, showing a modified form of construction in which the air heating tubes are crossed. Fig. 8 is a top plan view of the inner casing illustrated in Fig. 7, showing the arrangement of the tube receiving openings in the upper tube deck or header.

In carrying my invention into practice, I provide a furnace having outer and inner casings, the one forming a chamber for the circulation of the air to be heated and the other a chamber for the circulation of the products of combustion prior to their discharge, the heat radiated from the inner casing being taken up by the air circulating in the outer casing and through a series of tubes or conductors extending through the inner casing, thereby producing a large area of heating surface to heat the air efficiently without heating it to an objectionably high degree.

The outer casing comprises a shell 1, a

bottom 2 and a top 3, the latter being substantially of inverted W-form or gable-roof form to provide a series of surfaces for the arrangement of collars 4 to which the air conducting pipes, (not shown), leading to the various rooms or apartments are connected, the described construction enabling a comparatively large number of conducting pipes to be connected with the furnace.

The inner casing comprises a shell 5, a bottom 6 and a top 7, said casing being of relatively smaller size than the outer casing to provide within the latter a space or chamber 8 in which the air, after being partially heated, circulates before its discharge through the conducting pipes.

The inner casing forms a space or chamber 9 for the circulation of the products of combustion before their discharge, which chamber is wholly closed against communication with the air circulating chamber 8. The shell 5 is provided at its rear with an outlet flue 10 for the direct discharge of the products of combustion, which flue is connected by a collar 11 with a vertical smoke pipe 12 adapted for connection at its upper end with a final flue leading to the chimney. A damper 13 is arranged in the collar or connection 11 for regulating the discharge of the products of combustion and entirely cutting off the outlet of the same through the flue 10.

Arranged within the inner casing are oppositely disposed series of air conducting tubes 14 arranged on opposite sides of the longitudinal center of said casing, said tubes being formed with substantially central inwardly offset or arcuately curved portions 15 to retard the upward flow of the air to a determined extent to insure of its being heated to a desired degree. The upper ends of these tubes fit within suitable receiving openings in the wall 7, which forms an upper flue-supporting deck or header, while the lower ends of the tubes fit within suitable receiving openings in the wall 6, which forms a lower flue-supporting deck or header.

The lower deck or header 6 comprises a hollow casting forming an air distributing chamber 16 of approximately oblong rectangular form, which chamber is provided at its rear with air inlet tubes 17 extending to the exterior through the outer casing. At its center the lower header is provided with a vertically disposed oblong rectangu-

lar wall forming a combustion chamber 18, and in advance of said chamber is formed with a heat receiving chamber 19. The fire-box 20 of the furnace is arranged below the combustion chamber 18 and is suitably supported in position, said box containing a fuel supporting grate 21 of any preferred construction, but preferably formed in the ordinary manner of pivoted grate bars adapted to be oscillated from a horizontal to a vertical position for the purpose of dumping the contents of the fire-box. A connecting ring or annulus 22 is arranged between the fire-box and combustion chamber, and is removably fitted in position for ready renewal when occasion requires. The fire-box and combustion chamber so formed preferably taper upwardly to a slight degree to prevent the deposit of ashes within the combustion chamber and to cause any ashes which may be contained therein to slide downward into the fire-box for discharge through the grate. The fire-box 20 and ash-pit 23 are suitably partitioned from the space or chamber 8 and the ash-pit is of proper form to receive an ash-pan 24 normally arranged to catch the dropping ashes and removable through an opening 25 in the front wall of the shell 1, which opening is adapted to be closed by a suitable construction of ash-pit door 26. By this construction the parts of the furnace may be conveniently assembled and disassembled for repairs or replacement or for taking down the furnace, as will be readily understood. Fuel is supplied to the grate through a feed mouth or passage 27 closed against communication with the chamber 8 and extending from the front of the outer casing to the interior of the inner casing at a point above the front of the combustion chamber. This feed mouth is adapted to be closed by a door 28 having draft openings therein controlled by a rotary damper 29, through which air may be admitted to combine with the smoke and gases rising from the grate under some conditions to facilitate their consumption. The bottom of the feed mouth is formed and closed by a downwardly and inwardly inclined air induction or feed flue 30 having a depending portion 31 which fits within the receiving opening 19 in the header 6 and opens at its lower end below said header for the supplemental feed of air to the ash-pit and upward through the grate. This air is heated on its passage to the grate, thus preventing chilling of the grate or particles of fuel and the consequent formation of clinkers. The flue is provided at its entrance end with a pivoted door 32 having openings therein controlled by a draft slide 33, whereby the quantity of air supplied to the fire-box may be conveniently controlled.

Communicating at their upper ends with

the front of the chamber 9 are vertical down-draft flues 34 connected at their lower ends with horizontal flues 35 arranged on opposite sides of the center of the base of the chamber 8 and extending into the ash-pit. The said horizontal flues have their front ends extending to the exterior at the front of the furnace and provided with closure or clean-out caps 36 and have their rear ends connected at the rear of the furnace by a union 37 from which leads an indirect outlet flue 38 extending through the rear wall of the outer casing and communicating through a branch connection 39 with the lower end of the smoke pipe 12, the outer end of said connection being provided with a closure or clean-out cap 40.

Whenever it is desired to retard the discharge of the products of combustion to increase their range of travel through the furnace and to heat the air to a higher degree, the damper 13 in the direct outlet branch 11 may be closed, as a result of which the products will flow through the vertical downdrafts 34 to the horizontal flues 35 and finally out into the smoke pipe 12. Upon the removal of the caps 36 and 40 the horizontal draft flues 35 may be cleaned of any soot deposited therein.

It will be seen from the foregoing description, taken in connection with the drawings, that the furnace provides a large area of heating surface for the effective heating of a comparatively large volume of air, which will accordingly be heated to a lesser degree than in an ordinary hot air furnace, and that a greater volume of mildly heated air will be supplied, giving warmth and comfort to the rooms or apartments of the dwelling without parching the air and depriving it of its oxygen. It will also be seen that the degree to which the air is heated may be regulated by using either the direct or indirect outlet for the products, so that the action of the furnace may be varied according to variations in climatic conditions at different times.

In Figs. 7 and 8 of the drawings, I have shown a modification in which the air conducting tubes 14^a are crossed to give a still larger area of heating surface, the receiving openings therefor in the top and bottom headers being staggered in arrangement to provide for their proper disposition, as will be readily understood.

In Fig. 6 of the drawings, I have shown another modification in which the air conducting tubes 14^b are of approximately half the length of the conducting tubes 14 and formed in effect of half sections thereof, providing comparatively short tubes which may be employed when it is required to make the furnace relatively short to fit within a low-ceilinged room or shallow cellar. In other respects the construction of the furnace is

the same except as to the shortening of the inner and outer casings, as will be readily understood.

5 Having thus described my invention, I claim:—

10 In a device of the character described, the combination of an outer casing, an inner casing, said inner casing provided with a horizontal header at its lower portion, two
15 sets of vertical air heating tubes communicating at their lower ends with said header and extending through said inner casing, and a cover for said outer casing having the form of two gable roofs, arranged side by side and forming hot air receiving and dis-

tributing chambers with which said sets of air heating tubes respectively communicate, each roof being formed with air discharge openings in each of its sides, the meeting edges of said roofs tending to maintain the body of air heated by one set of tubes separated from the body of air heated by the other set of tubes.

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

ALBERT R. LEGGETT.

Witnesses:

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