No. 657,131. Patented Sept. 4, 1900.

C. OLSTED.

HOT AIR FURNACE.

(Application filed Sept. 20, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

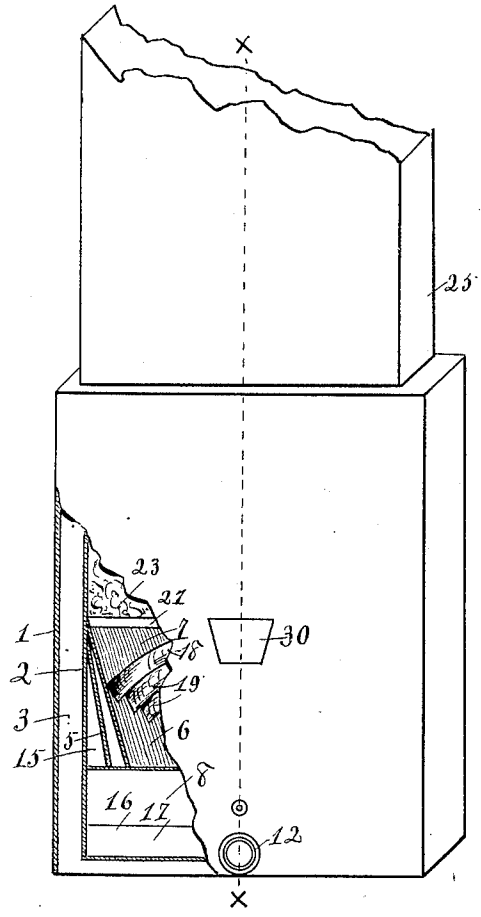
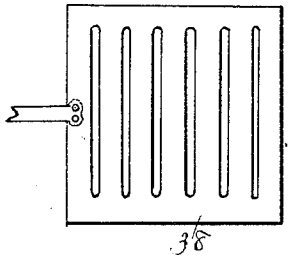


Fig. 6



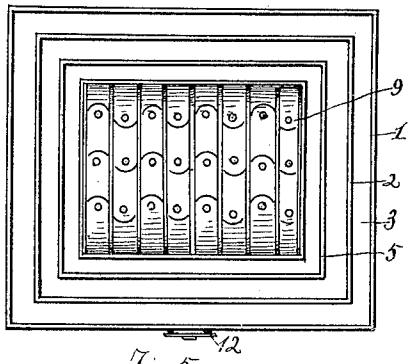


Fig. 5

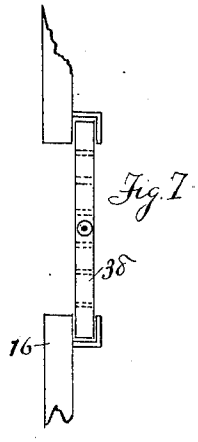


Fig. 7

WITNESSES

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No. 657,131. Patented Sept. 4, 1900.

C. OLSTED.

HOT AIR FURNACE.

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(No Model.) 2 Sheets—Sheet 2.

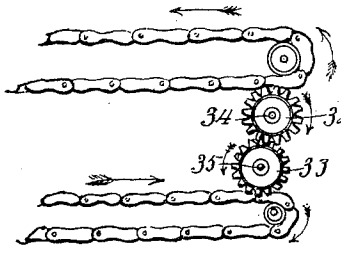


Fig 3

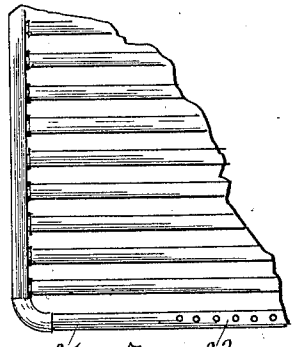


Fig 4

Fig 2

WITNESSES

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UNITED STATES PATENT OFFICE.

CHRISTIAN OLSTED, OF LAWRENCE, KANSAS.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 657,131, dated September 4, 1900.

Application filed September 20, 1899. Serial No. 731,046. (No model.)

To all whom it may concern:

Be it known that I, CHRISTIAN OLSTED, of Lawrence, in the county of Douglas, in the State of Kansas, have invented certain new and useful Improvements in Hot-Air Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which are made a part of this specification.

My invention relates to improvements in hot-air furnaces of the class used in heating residences, hotels, office buildings, and the like; and my invention consists in certain features of novelty hereinafter described, and pointed out in the claims.

Figure 1 represents an isometric view, partly in cross-section, of a heating-furnace embodying my improvements, the grate not being shown. Fig. 2 represents a vertical cross-section on the line X X of Fig. 1; Fig. 3, a detail view showing the means for operating the grate. Fig. 4 represents a detail view of a portion of the steam-pipes. Fig. 5 represents a horizontal section on the line Y Y of Fig. 1. Fig. 6 represents a detail view of the damper-plate between the cold and hot air chamber. Fig. 7 represents a detail view showing the arrangement for carrying said damper upon the upper plate of the cold-air chamber.

Similar numerals refer to similar parts throughout the several views.

1 represents the outer or furnace wall, between which and the outer casing 2 of the heater is provided a chamber 3, surrounding the heater and in which the air is heated for heating the building and thence carried by the hot-air pipes 4 to the service-pipes (not shown) for distribution.

Within the outer casing 2 of the heater is mounted an inner casing 5, forming a fuel and combustion chamber and an ash-pit 8. Said fuel and combustion chamber constitutes a single chamber in the lower portion 6 of which, below the draft-openings 14, the fuel is carried upon the grate 9, and in the upper portion 7, above said draft-openings, the combustion of the gases generated from the fuel takes place. In the bottom of the fuel-chamber is mounted a grate 9, preferably a traveling grate, as shown, and immediately thereunder and in the ash-pit a second like-traveling grate 10, the travel of which is in the opposite direction, said grates being so arranged that as the upper grate travels from front to rear of the fuel-chamber to carry the fuel across the same the lower grate travels from rear to front to carry the ashes to the front of the casing and dump them down the chute 11, whence they may be removed through the door 12 in the furnace-wall. Immediately above and surrounding the fuel said inner casing may be lined with fire-brick 13 or other like material to form the fire-bowl, and at a distance above the grate sufficient to admit the necessary amount of fuel on the grate thereunder are provided the draft-openings 14 through the casing and its lining for the admission of air from the hot-air chamber 15 to sustain and carry on combustion. Said hot-air chamber 15 is formed between said inner casing and the outer casing and inner or upper plate 16 of the double bottom 17, formed in the outer casing, and completely surrounds the combustion-chamber, the fire-bowl, and the ash-pit, and the air therein becomes highly heated from the fuel and combustion chamber. Below said draft-openings said inner casing, as to its sides and as to its bottom, which is the bottom of the ash-pit, is imperforate. The casing forming the chute 11 is also imperforate, and the door 12 is to be closed air-tight, so that no cold air and no air except the highly-heated air from the hot-air chamber is admitted to the fuel and combustion chambers, and this highly-heated air passing into the combustion-chamber over and above the fuel and there uniting with the fuel gases generated from the fuel in the air-tight receptacle or retort formed by the imperforate casing below said draft-openings, conditions are obtained most favorable to complete combustion. In this will be recognized the principle embodied and the retort action obtained in my heating-stove, Letters Patent for which were issued to me June 20, 1899, No. 627,136.

Extending diagonally downward and backward across the combustion-chamber is arranged a plate 18, mounted upon said inner casing, and on said plate is mounted a series of baffle-plates 19, extending at an angle over and within the action of the burning fuel-gases. The burning gases beating against

said baffle-plates are thrown back upon the fuel and the gases arising therefrom and the work of combustion thereby greatly facilitated. A space 20 is provided between the plate 18 and the rear casing of the chamber, and the burning gases and combustion products passing successively under the baffle-plates pass through this opening and on, as will be further seen.

Immediately over the combustion-chamber there is mounted on the outer casing a series of connected tubes or pipes 21, provided on their upper sides with the small jet-openings, as shown at 22 in Fig. 4. Upon the grate formed by said pipes or tubes 21 is provided a quantity of asbestos or like refractory material 23 in lumps of such size as to leave interstices of considerable size between them. Said heater is provided with a discharge-pipe 24 for carrying away the non-combustible gases and other waste products of combustion arising above the asbestos bed 23. Upon the furnace-wall and surrounding said discharge-pipe 24 is mounted a water-reservoir 25, the water in which is heated and steam generated therefrom from the heat of the heater. Steam from said reservoir passes down through the steam-pipe 26 to a steam-coil 27, arranged in the combustion-chamber, where it is subjected to and superheated by the intense heat of the burning gases, and thence passing to the steam-pipes 21 issues from the jet-openings 22 into the bed of asbestos, and there uniting with the still unconsumed gases and air that have passed the plate 18 heat is produced in said asbestos bed of such intensity that substantially all the combustible products will be consumed, very little thereof escaping in passage through the asbestos, and thus a practically-smokeless furnace is obtained. Said water-reservoir is provided with an inlet-cap 28 for filling the reservoir and a gage 29 for observing the amount of water therein.

The fuel is introduced into the fuel-chamber through the feed-door 30 and down the inclined feed-chute 31, the travel of the grate constantly carrying the fuel back in a thin body or layer over the grate. The grates are operated to travel in opposite directions, as shown in Fig. 3, by means of meshing gear 32 33 on the shafts 34 35, mounted on the casing, one of which operates one of the grates and at the same time operates the other gear-wheel to cause the other grate to travel in the opposite direction; but the construction and operation of the traveling grate being familiar further detail is not needed.

The double bottom 17 forms an auxiliary hot-air chamber, in which the air entering through the draft-openings 36 is to a very considerable degree heated and thence passes through the draft-openings 37 in the upper plate 16, controlled by the damper 38, into the hot-air chamber above.

The cold air for circulation is admitted to the heating-chamber of the furnace around the heat through the cold-air box 39 in the usual manner, and as heated is carried by the hot-air-distributing pipes for distribution.

By the construction and arrangement above described a heating-furnace is obtained of very great heating capacity, very economical in the consumption of fuel, and in which the combustion is complete and without smoke.

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

1. A hot-air furnace comprising in combination, a heater consisting of a fuel and combustion chamber provided with draft-openings at a distance from the bottom, and an ash-pit under and communicating with the fuel-chamber having an imperforate bottom, an air-tight ash-chute communicating with the ash-pit, for removal of the ashes therefrom, a grate mounted under the fuel-chamber and arranged to convey the fuel therein, and a grate mounted in the ash-pit and arranged to convey the ashes to the ash-chute, means for operating said grates in opposite directions, a hot-air chamber surrounding said fuel and combustion chamber and ash-pit and communicating with said combustion-chamber through said draft-openings, a cold-air chamber under said hot-air chamber communicating therewith through suitable dampered draft-openings, and an air-heating chamber surrounding said heater and provided with a connected cold-air box and distribution-pipes, substantially as set forth.

2. In a heating-furnace a heater consisting of the combination of a fuel and combustion chamber provided with draft-openings at a distance from its bottom, an ash-pit having imperforate sides and bottom under said fuel-chamber, an ash-chute having imperforate sides communicating with said ash-pit for the removal of the ashes therefrom, a grate mounted under the fuel-chamber and arranged to convey the fuel across the same, a grate mounted in the ash-pit and arranged to convey the ashes to the ash-chute, a series of baffle-plates mounted diagonally across the fuel and combustion chamber, a hot-air chamber surrounding said fuel and combustion chamber and ash-pit, and communicating with said combustion-chamber through said draft-openings, and a cold-air chamber under said hot-air chamber, and communicating therewith through dampered draft-openings, substantially as set forth.

3. In a heating-furnace, the combination with a heater consisting of an outer casing forming the body of the heater and provided with a pipe for conveying away the waste products of combustion, and an inner casing forming a fuel and combustion chamber having an imperforate bottom and provided with draft-openings at a distance from its bottom, of a water-reservoir mounted upon and arranged to be heated by the heater, a steam-coil arranged in the combustion-chamber, a

pipe communicating with said reservoir and with said steam-coil, a series of pipes having jet-openings in their upper sides mounted in said outer casing and arranged to form a grating over said combustion-chamber, and communicating with said steam-coil, and a bed of refractory material in lumps carried on said grating, substantially as set forth.

4. In a heating-furnace the combination with a heater consisting of an outer casing forming the body of the heater and provided with a pipe for conveying away the waste products of combustion, and an inner casing forming a fuel and combustion chamber having an imperforate bottom and provided with draft-openings at a distance from its bottom, of a water-reservoir mounted upon and arranged to be heated by the heater, a steam-coil arranged in said combustion-chamber, a pipe communicating with said steam-coil and with said reservoir, a series of pipes having jet-openings in their upper sides mounted in said outer casing and arranged to form a grating over said combustion-chamber, and communicating with said steam-coil, a bed of refractory material in lumps carried on said grating, and a hot-air chamber surrounding said heater having an inlet for the cold air, and pipes for the distribution of heated air therefrom, substantially as set forth.

5. In a heater for a hot-air furnace, an outer casing forming the body of the heater and provided with a pipe for conveying away the waste products of combustion, an inner casing forming a fuel and combustion chamber and provided with draft-openings at a distance from the bottom, an ash-pit formed also by said inner casing and having imperforate sides and bottom, a grate mounted in said inner casing below said draft-openings, a series of water-pipes having jet-openings mounted in said outer casing and forming a grating over said combustion-chamber and a bed of refractory material in lumps carried upon said grating, substantially as set forth.

6. In a heater for a hot-air furnace, an outer casing forming the body of the heater, and provided with a pipe for conveying away the waste products of combustion, an inner casing forming a fuel and combustion chamber and provided with draft-openings at a distance from the bottom, an ash-pit formed also by said inner casing and having imperforate sides and bottom, a grate mounted in said inner casing below said draft-openings, a plate mounted upon said inner casing and extending across said combustion-chamber, and a series of baffle-plates mounted upon said plate; substantially as set forth.

7. In a heater for a hot-air furnace, an outer casing forming the body of the heater, an inner casing forming the fuel and combustion chamber and provided with draft-openings at a distance from the bottom, an ash-pit formed also by said inner casing and having imperforate sides and bottom, a plate mounted upon said inner casing and extending across the combustion-chamber, a series of baffle-plates mounted upon said plate, a series of water-pipes having jet-openings mounted in said outer casing and forming a grating over said fuel and combustion chamber, and a bed of refractory material in lumps carried upon said grating, substantially as set forth.

8. In a heater for a hot-air furnace the combination with an inner casing forming a fuel and combustion chamber having an imperforate bottom and provided with draft-openings at a distance from its bottom, an outer casing forming with said inner casing a hot-air chamber surrounding said fuel and combustion chamber and communicating therewith through said draft-openings, and a series of baffle-plates mounted upon said inner casing and extending across said fuel and combustion chamber, of series of pipes having jet-openings in their upper sides mounted within said outer casing and arranged to form a grating over said combustion-chamber, a steam-coil arranged in said combustion-chamber communicating with said pipes, a water-reservoir mounted over said heater and arranged to be heated therefrom, a pipe communicating with said reservoir and with said steam-coil, and an air-chamber surrounding said heater, arranged to be heated therefrom and provided with a cold-air inlet and pipes for distributing the heated air therefrom, substantially as set forth.

CHRISTIAN OLSTED.

Witnesses:
ALBERT BENJAMIN NYE,
CHARLES SUMNER FINCH.