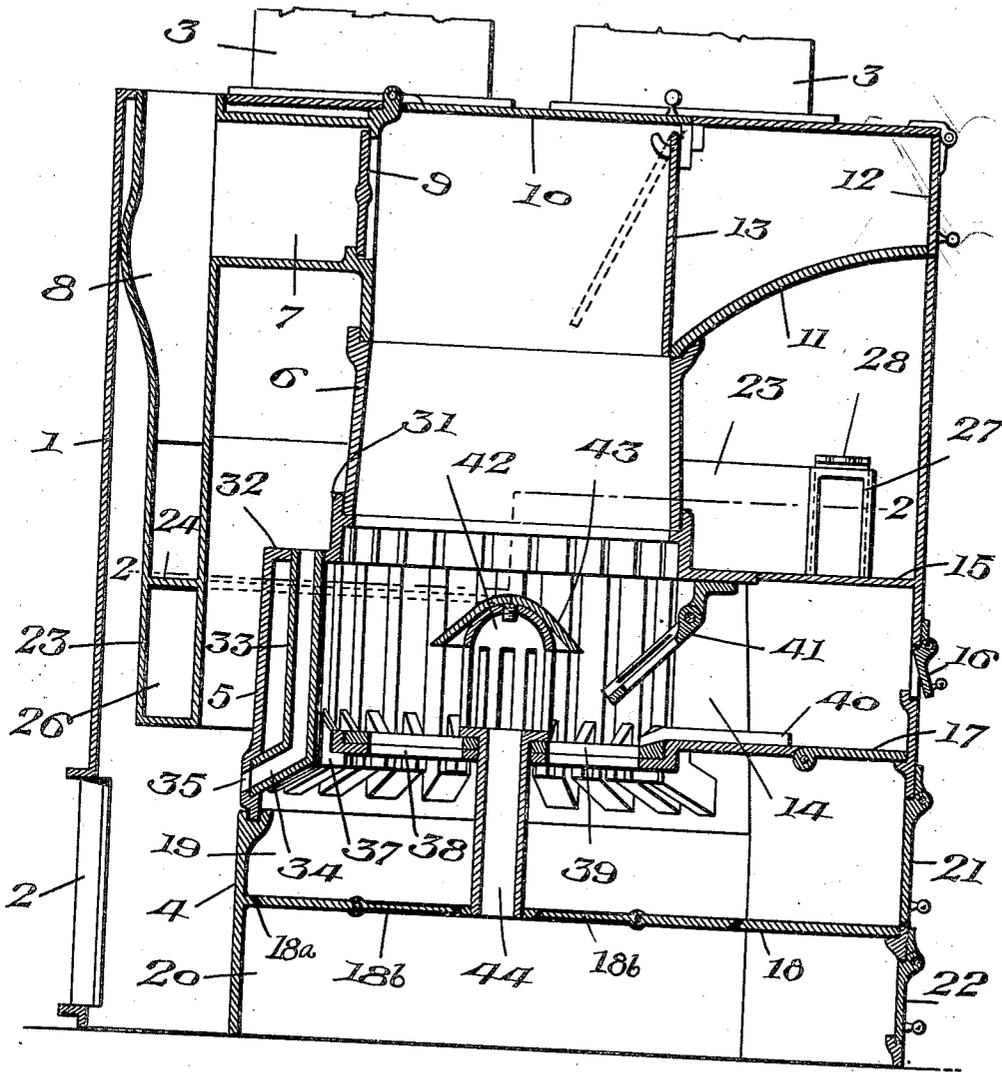


1,437,451.

T. C. SEBRING.
HOT AIR HEATER.
APPLICATION FILED APR. 8, 1919.

Patented Dec. 5, 1922.
2 SHEETS—SHEET 1.

Fig. 1.



WITNESS:

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INVENTOR.

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UNITED STATES PATENT OFFICE.

THEOSIS C. SEBRING, OF BLISSFIELD, MICHIGAN.

HOT-AIR HEATER.

Application filed April 8, 1919. Serial No. 288,517.

To all whom it may concern:

Be it known that I, THEOSIS C. SEBRING, a citizen of the United States, residing at Blissfield, in the county of Lenawee and State of Michigan, have invented certain new and useful Improvements in Hot-Air Heaters; and I do hereby 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.

The present invention relates to stoves and furnaces, and particularly to hot air heaters, it being the object of the invention to provide an air heating furnace of novel and improved construction with provision made for the passage of air radially from the center of the fire pot to and out through the periphery of walls thereof, to provide for thorough, steady and efficient combustion of the fuel and maximum heat, and to consume all soot, gases and smoke after a bed of coals has formed.

A further object is the provision of a novel hollow tube side grate for the fire pot, to enhance the heating of the air, and to overcome the burning out of the sides of the fire pot.

The invention also resides in other features of construction, and in the construction and arrangement of the component elements.

With the foregoing and other objects in view which will be apparent as the description proceeds, the invention resides in the construction and arrangement of parts hereinafter described and claimed, it being understood that changes can be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a vertical median section of the furnace embodying the present improvements.

Figure 2 is a fragmentary section taken on the line 2—2 of Figure 1.

Figure 3 is a fragmentary elevation looking from the interior of the fire pot and showing several of the grate tubes, portions being shown in section.

Figure 4 is a section on the line 4—4 of Figure 2.

Figure 5 is a diametrical section of a modified form of air inlet dome for the fire pot.

The structure is enclosed or housed by a suitable casing or jacket 1 provided with a lower fresh air inlet 2, and its upper air inlets 3 to convey the heated air to the rooms of the buildings. Mounted on the foundation or floor is a base 4 comprising an arcuate wall located centrally within the casing 1 and supporting the arcuate or annular wall of the fire pot 5 which has its lower edge seated on the upper edge of the base 4. The fire pot 5 in turn supports the fuel magazine or chamber 6, which may be of any suitable form, and this extends upwardly to the top of the casing centrally thereof. The fuel magazine or chamber 6 is provided near the upper end thereof with an outlet 7 for the products of combustion leading to the vertical flue 8 in the casing at the rear of the magazine and opening upwardly through the top of the casing for connection with the chimney. The damper or valve 9 is mounted within the outlet 7 to normally close the same, and permitting said outlet to be opened when an updraft is desired from the fire pot up through the magazine containing the coal or other fuel. The top of the casing has a fuel door 10 over the magazine, permitting fuel to be dumped downwardly into the magazine, and said magazine also has a laterally extending chute 11 leading to a fuel door 12 in the front wall of the casing, and permitting the fuel to be delivered into the magazine through said chute, which is more convenient than lifting the fuel over the casing. A valve 13 is suspended from the top of the casing at the inner end of the chute, to normally swing downwardly and close the inner end of the chute, said valve swinging open inwardly when coal or other fuel is delivered into the magazine.

The wall of the fire pot 5 has a front opening 14 for removing clinkers and tending to the fire, and an enclosed passage 15 has a trap door 17 that can be swung open to permit the clinkers to drop downwardly into the ash pit. This ash pit is provided by a horizontal partition with which the base 4 is provided, and said partition separates the superposed ash pit 19 and fresh air compartment 20 which extend to the front wall of the casing 1 that is provided with the respective ash and air draft doors 21 and 22. The partition 18 has an opening 18^a and ash plates 18^b therein which are mounted on fulcrums so that they can be tilted for dump-

ing the ashes into the compartment 20. The door 22 can be opened for removing the ashes, and to control the draft.

An arcuate bustle pipe 23 surrounds the fire pot and extends almost through a complete circle, with its ends terminating at the opposite sides of the passage 15, and this pipe 23 has a horizontal partition 24 therein extending from one side of said pipe to the other at the rear of the furnace, which provides a baffle for the products of combustion. The wall of the fire pot is provided with outlets 25 extending radially therefrom and communicating with the pipe 23 below the horizontal plane of the partition 24, and, as shown, there are four outlets 25 disposed in the oblique lines as seen in Figure 2, and the partition 24 terminates between the outlets at the opposite sides and extends below the flue 8 leading up from and connected to the pipe 23 at the rear of the magazine 6. A vertical partition 26 closes the passage in the pipe 23 underneath the partition 24 at the rear. Therefore, the products of combustion in passing through the rear outlets 25 into the pipe 23 below the partition 24, must pass forwardly under said partition and thence upwardly across the ends thereof, while the products of combustion which pass through the forward outlets 25 pass rearwardly and upwardly in the pipe 23 over the ends of the partition 24. In this way, the partition or baffle 24 causes the products of the combustion from the rear outlets 25 to move through the same distances as from the forward outlets 25, and avoids the direct passage of the products of combustion from the rear outlets 25 to the flue 8 as would otherwise occur. This results in the conservation of heat, and renders the draft through the several outlets 25 uniform, to render the burning of the fuel also uniform around the wall of the fire pot. This bustle pipe 23 will be heated by the products of combustion flowing therethrough, and the heat will be dissipated or radiated to the fresh air which flows upwardly within the casing 1 from the inlet 2 to the outlets 3, the air flowing on both the inner and outer sides of the pipe 23 which is spaced concentrically between the casing 1 and fire pot. The ends of the pipe 23 having openings 27 permitting said pipe to be cleaned out, and these openings are normally closed by slides 28 that can be raised to permit fine ashes to be removed from said pipe.

The fire pot is provided therein with a hollow tube grate providing a slotted grate adjacent to the side wall of the fire pot, and for this purpose, the upper edge portion of the fire pot 5 is offset inwardly, to provide the shoulder 32 and flange 31 which supports the magazine 6. An arcuate vertical grate is provided within the fire pot, composed of vertical tubes 33 which have their upper ends

inserted within openings in the shoulder 32, and the lower portions of said tubes extend angularly outward, as at 34, and are seated within air inlet openings 35 with which the wall of the fire pot is provided near the lower edge thereof. The tubes 33 can be disposed in inclined as well as vertical positions, according to the shape of the grate desired, and it will therefore be understood that the portions 34 can be disposed at various angles with the tubes 33. The tubes are spaced apart to form the grate, the bars of which are hollow, and said tubes are spaced from the wall of the fire pot thus providing an annular or arcuate air space surrounding the grate through which the products of combustion can circulate to pass through the outlets 25. Fresh air can flow through the openings 35 and tubes or grate bars 33 to greatly facilitate the heating of the air, and to also cool the grate bars, thereby preventing the fire pot from burning through, so that the tubular grate bars are of advantage in several respects. The tubes 33 are provided near their lower ends with side lugs 36 that contact with one another, thus serving to space the tubes apart, and prevent them from warping out of shape at the elbows thereof. Said tubes are further provided at their inner sides and adjacent to their elbows or lower ends, with inwardly extending notched lugs 37 providing a seat for the base grate 38 on which is disposed the rotatable grate or damper 39 having radial slots to register with the slots of the grate 38. The grate 39 has an arm 40 extending within the passage 15 to be operated by a poker or implement inserted past the door 16, for opening and closing the slots of the grate 38, to control the discharge of ashes from the fire pot, and to shake the fuel from underneath from time to time to loosen up the ashes and fuel.

It is preferable to hingedly suspend a slotted guard 41 within the opening 14, to prevent the fuel from running through the opening 14 into the passage 15, and permitting said guard to swing inwardly when introducing a poker, hook or other implement to the fire pot for removing clinkers. This guard 41 thus permits clinkers to be withdrawn from underneath the coal above them.

The air is admitted into the fire pot from the center thereof, by means of a dome 42 of the center of the grate 38 and having slotted walls for the radial discharge of air through the fuel to the slotted side wall plate composed of the tubes 33. This dome 42 has a conical cap 43 secured thereon, as seen in Figure 1, to deflect the coal and fuel away from the sides of the dome 42, and prevent the slots thereof from being clogged up, and also facilitate the passage of air through the fuel.

The bottom of the dome 42 has an air inlet tube or pipe 44 depending therefrom through the grate 38 and partition 18, so that the fresh air can flow upwardly from the compartment 20 into the dome. The air thus passes upwardly through the ash pit and is distributed radially in all directions through the fuel in the fire pot to pass between the tubes or hollow grate bars 33, and the products of combustion can circulate in rear of the tubes 33 to pass through the outlets 25 and thence through the bustle pipe 43 to the flue 8.

The damper 9 is normally closed, so that the products of combustion are constrained to flow through the outlets 25, but when an updraft is desired, the damper 9 can be opened, thereby permitting some of the products of combustion to pass upwardly through the magazine 6 and through the outlet 7 to the flue 8.

By the provision of the air inlet dome 42 and the side wall grate of the fire pot, the air can flow radially in all directions through the fuel, thus affording uniform combustion of the fuel, and directing the heat toward the wall of the fire pot. The tubular grate bars also provide for the quick heating of the air which passes therethrough, as well as lengthening the life of the fire pot structure. A further advantage resides in heating the air which passes over bustle pipe 23 in which the products of combustion circulate before reaching the outlet flue 8.

The modification shown in Figure 4 uses a nipple 45 extending through the shoulder 32 of the offset portion 31 and having a supporting flange 46, the upper end of the tube 33 receiving the nipple 45 instead of extending upwardly through the opening, as in Figures 1 and 3. This construction will permit of expansion and contraction, and also facilitate the assemblage of the parts, but it will be understood that the tubes 33 can expand through the openings in the shoulder 32, with the construction as shown in Figure 1.

Figure 5 illustrates a different form of dome 42' with an integral cap 43'.

Having thus described the invention, what is claimed as new is:—

1. A furnace comprising a fire pot, a side wall grate therein composed of air circu-

lating tubes having their upper and lower ends communicating through the wall of the fire pot, said wall having outlet openings between the upper and lower ends of said tubes, and an air inlet dome centrally of the fire pot having openings in its side walls for the radial flow of air into and through the fire pot and radially between said tubes to and through said openings.

2. A furnace embodying a fire pot, a fuel magazine thereon, a side wall grate within the fire pot composed of air circulating tubes having their upper and lower ends communicating through the wall of the fire pot, said wall having outlet openings between the upper and lower ends of said tubes, a bottom grate within the lower portions of said tubes, and an air inlet dome on said bottom grate having openings in its side walls for the radial flow of air into and through the fire pot and between said tubes.

3. A furnace embodying a fire pot, the wall of which has lower openings near its lower edge, the upper edge portion of said wall being offset inwardly and having openings, a fuel magazine supported on said upper edge of the fire pot wall, grate tubes at the inside of the fire pot spaced from the wall thereof and having their upper ends communicating through the last named openings and their lower end portions extending angularly outward and supported by said wall in communication with said lower openings, said wall having outlet openings between the upper and lower ends of said tubes, a bottom grate within the lower end portions of said tubes, said lower end portions of the tubes having lugs supporting said bottom grate, an air inlet dome on the bottom grate centrally of the fire pot having openings in its side walls for the radial flow of air into and through the fire pot and between said tubes, and a conical deflector on said dome for spreading the fuel from the magazine radially from the sides of the dome.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THEOSIS C. SEBRING.

Witnesses:

PRESTON C. LUKE,
CARL A. MOHN.