Aug. 15, 1933. E. L. SNYDER 1,922,144

UNIT HEATER

Filed July 8, 1931

Fig. 2

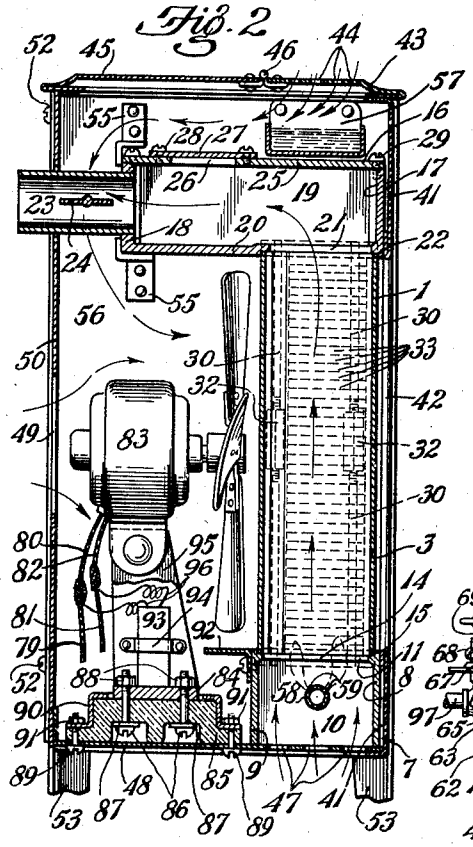


Fig. 1

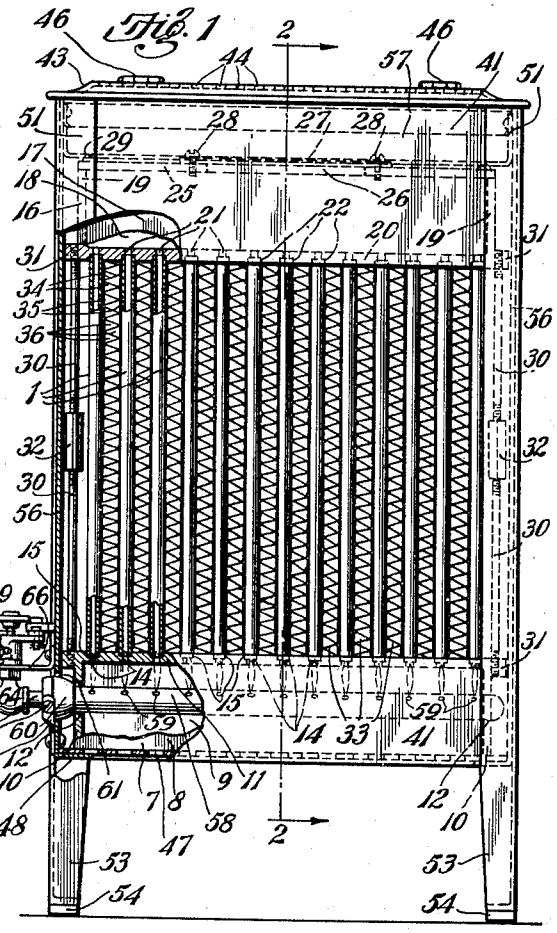


Fig. 4

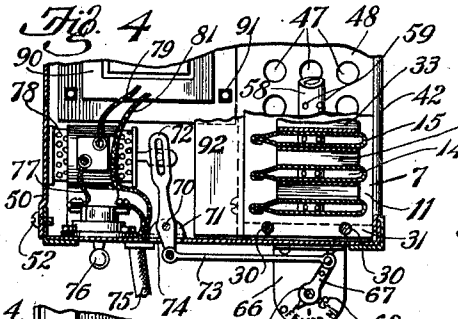


Fig. 3

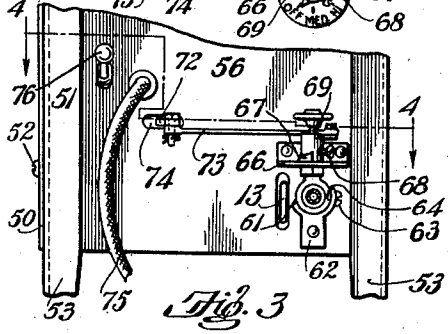


Fig. 5

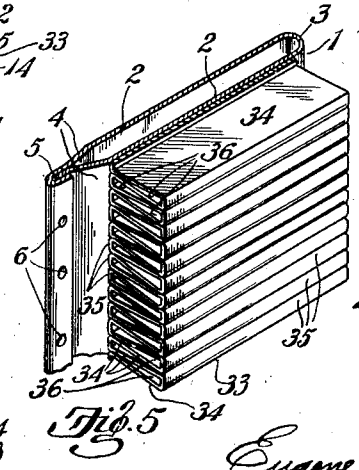
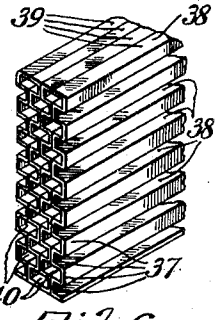


Fig. 6



INVENTOR.

Eugene L. Snyder

Patented Aug. 15, 1933

1,922,144

UNITED STATES PATENT OFFICE

1,922,144

UNIT HEATER

Eugene L. Snyder, Canton, Ohio

Application July 8, 1931. Serial No. 549,460

10 Claims. (Cl. 126—110)

My invention relates to improvements in unit heaters in which heat from a fuel burner or an electric heating element, is applied to a heat conducting radiator, through which, the air from a room is rapidly heated and circulated, by the aid of an electric fan; and the objects of my improvement are, first, to provide the radiator with vertically, flattened flues, spaced apart horizontally and contacting with heat conducting fins having flat, vertical walls; and to further provide the radiator with a lower burner chamber and an upper preheating chamber, with said flues and fins located between the chambers; second, to afford heat circulation inside the radiator without disturbing the flame from the fuel burner and without directly cooling the electric heating element, with the fan circulated air through the radiator; third, to circulate the radiated heat from the preheating chamber, with the room air to be heated; fourth, to operate the burner or the electric heat control in conjunction with the speed control for the electric fan.

I attain these objects by the construction illustrated in the accompanying drawing, in which—

Fig. 1 is a front elevation of the heater, with parts broken away to show the interior; Fig. 2 a vertical section on line 2, 2, Fig. 1; Fig. 3, a fragmentary, exterior side elevation of the control mechanism; Fig. 4, a fragmentary plan section on line 4, 4, Fig. 3; Fig. 5, a perspective view of a portion of one of the flattened flues, and fins, which fit between the flues; Fig. 6, a fragmentary perspective view of a modified construction of the heat conducting fins.

Similar numerals refer to similar parts throughout the several views.

The vertical flue 1, as best illustrated in Fig. 5, has the vertically flattened side walls 2, a front semi-circular wall 3, the triangular rear walls 4, and the lock seam 5, provided with dimples 6, for securely holding the ends of the formed flue together.

The burner chamber, indicated generally at 7, is provided with front and rear walls 8 and 9 respectively, which are connected to, or formed integral with the end walls 10, and a top wall 11. The end walls 10, are provided with burner openings 12, and one of the walls is provided with the elongated opening 13, used when lighting the burner. The latter opening is best illustrated in Fig. 3. The top wall 11, is provided with a plurality of flue openings 14, which are equal in shape and measurements to the inside of the flues 1, and at the top side of each flue opening is a recess 15, equal in shape and measurements to the outside of the flues 1.

The preheating chamber, indicated generally at 16, is practically twice the width of the burner chamber, and its front and rear walls 17 and 18 respectively are connected or formed integral with the end walls 19, and the bottom wall 20. The bottom ball 20, contains the flue openings 21, and the recesses 22, which are identical to the flue openings 14, and the recesses 15, shown in the burner chamber 7. In the rear wall 18 of the preheating chamber, is located a stovepipe sleeve 23, containing a butterfly valve 24. A cover 25, having an opening 26, covered with a plate 27, held in place by screws 28, forms the top of the preheating chamber, and it may be held in position by screws 29. When the heater is equipped with a gas burner as illustrated, and later described, the plate 27 is positioned as shown in Figs. 1 and 2, and the butterfly valve 24 may be regulated as desired. In the event the heater is equipped with an electric heating element the plate 27 may be removed and the butterfly valve opened.

In the assembly of the radiator, the flues 1, are placed in the recesses 15, of the burner chamber 7 and the recesses 22, of the preheating chamber 16.

Owing to the fact that a radiator of this type will be subjected to a heat much greater than the melting point of solder, it will not be practical to solder the flues to the chambers, and as the flues and chambers may be made of different kinds of metals, the welding of these parts would offer considerable trouble, especially from a production standpoint.

To facilitate the assembly of these parts, tie rods 30, are screwed into flanges 31, located at each end of the burner and preheating chambers, and into the right and left hand threaded nuts 32.

In order to obtain a greater heating area, fins 33, are placed between, and in contact with each of the flues 1. As best illustrated in Fig. 5, the fins may be made of a continuous strip, so shaped as to form a series of abutting triangles having inclined walls 34, vertical walls 35, and triangular openings 36.

The modified form of fins shown in Fig. 6 is of the rack tooth type, in which, are formed the vertical walls 37, and the horizontal walls 38. This type of fin is also formed of a continuous strip, and the required number of sections may be placed adjacent to each other to obtain a sufficient width to contact with the sides

of the flues. In the illustration are four sections as indicated by the numeral 39, and when so placed these sections form rectangular openings 40.

The radiator is placed in a suitable sheet metal cabinet provided with a front panel 41, having an opening 42, which is substantially the same area as that occupied by the tubes and fins. A lid 43, having perforations 44, is secured to the top panel 45, by means of the hinges 46.

Apertures 47, in the bottom plate 48, are so located as to be within the inside area of the burner chamber 7. Either a square or round opening 49, is located approximately in the center of the rear removable panel 50, which is secured to the angular corner posts 51, by the screws 52. The lower portion of the corner posts are slightly tapered and extend below the bottom plate in the form of legs 53, and sound absorbing pads 54, may be cemented or otherwise fastened to the bottoms of the legs.

To prevent shifting of the radiator in the cabinet, brackets 55, contacting with the rear of the preheating chamber, are secured to the side panels 56, of the cabinet.

A water pan 57, spaced slightly above the preheating chamber, and adjacent to the under side of the perforated lid 43, will add moisture to the air circulated through the radiator.

Inserted in the burner openings 12, and supported by the burner chamber end walls 10, is a burner 58, having two rows of holes 59, which are in alignment with the flues 1. Connected to one end of the burner, is a mixing chamber 60, and an opening 61 is provided in one of the cabinet side panels 56, to receive the mixing chamber. A bracket 62, with a set screw 63, and riveted to the side panel, supports the mixing chamber.

The valve 64 is connected to the burner by a nipple 65, and directly above the valve body is located a dial plate 66, with suitable markings for regulating the flame of the burner. An indicating lever 67, is held in proper adjustment by a set screw 68, which impinges the valve stem 69.

Pivoted at 70, to a bracket 71, is a slotted lever 72, one end of which is connected to a rod 73, which in turn is connected to the indicating lever 67. The bracket 71 may be spot-welded to the side panel 56, and it is so located as to be directly below the slot 74, in the panel, through which the rod end of the slotted lever extends.

One of the wires from the feed cable 75, is connected to one of the terminals of the switch 76, and a lead wire 77, from the other switch terminal is connected to the rheostat 78. From the rheostat, another lead wire 79, is spliced to the fan lead wire 80, and the remaining feed wire 81, is spliced to the other fan lead wire 82, of the electric fan 83.

The fan base 84, is preferably mounted to a rubber pad 85, by means of the long screws 86 provided with washers 87, and nuts 88. Screws 89, extending through the bottom plate 48, the pad 85, and the metal pad support 90, are provided with nuts 91, for anchoring the fan in the cabinet. With this construction it will be seen that a fan mounted in this manner will have most of its vibration noises absorbed by the rubber pad.

The angular plate 92, extending between the cabinet side walls 56, and held in position by screws in the burner chamber wall 9, serves as a deflector which prevents the air from the fan entering any small crack which may be present between the bottom plate 48, and the burner chamber 7. The cabinet side walls and the bottom wall of the burner chamber, also tend to direct the air from the fan through the radiator.

In order not to disturb radio reception, by the interference set up by an electric fan motor, a condenser 93, held in place by a clamp 94, riveted to the fan bracket 95, is connected by its wires 96, to the fan leads 80 and 82.

The heater thus constructed may be set at any convenient place in the room, or if preferred, it may be placed in a fireplace. In the construction of a new building, a recess in the wall of each room may be provided for the heater, so that it will be flush with the wall. It is desirable that the stovepipe sleeve 23, be connected to a chimney or vent pipe, in order to carry off the burnt gases from the preheating chamber.

The pipe 97, extending from the valve 64 is connected to the supply of fuel for the burner, which may be artificial or natural gas, or any suitable liquid fuel, and the operation of the heater is as follows:

The feed cable 75, is connected to a source of electric current for the operation of the fan 83, the switch 76 being in the open position. The gas valve 64, is then turned counter-clockwise, so as to bring the pointer on the indicating lever 67, in alignment with the marking, medium, on the dial plate 66. The burner 58, is then lighted, which may be followed by a further turning of the valve in the direction mentioned above, to bring the indicator point to the marking, high. This manipulation of the valve will produce a high flame in each flue, to quickly heat up the radiator and will have caused the rod 73, to move rearwardly, which in turn caused the slotted end of the lever 72, to move forward, thereby setting the rheostat 78, in the high speed position. Fresh air is admitted to the flues, through the apertures 47, which produces a good combustion and assists in moving the heat upwardly through the flues to heat the preheating chamber. The burnt gases are carried off through the open butterfly valve 24, to a vent pipe or chimney, (not shown) without escaping into the room. The movement of the incoming and heated air is best illustrated by the arrows.

In a few minutes the heat is conducted through the flues and fins, and the switch 76, is then closed, running the fan at high speed, which pulls a portion of the room air through the opening 49, in the back of the cabinet. A portion of the air is also drawn through the perforations 44 in the lid, and as indicated by arrows, travels over and around the preheating chamber, which is radiating sufficient heat to heat this air before it is driven through the radiator by the fan.

The water in the pan 57, will become warm and a portion of its moisture will be circulated with the warm air.

It will thus be seen that the air from a room will be circulated through a radiator of intense heat, at a very rapid rate of speed, which will, of course, heat the room in a very short period of time.

When the room has been heated to the desired temperature the burner valve is then turned clockwise to a position where the indicator may point to medium, which will reduce the fuel pressure and automatically reduce the speed of the

fan, thereby producing a lower temperature and a slower circulation of heated air.

I am aware that prior to my invention, unit heaters have been made with radiators having steam or hot water circulated through them, which have a fan for circulating the radiated heat.

I therefore do not claim broadly the combination of a fan and a heat radiating unit; but I claim:

1. A unit heater including a radiator, a fuel burner for heating the radiator, a manually controlled indicating valve for regulating said burner, a fan for circulating air heated by the radiator, a rheostat for regulating the speed of the fan, and means controlled by the operation of the valve for operating the rheostat.

2. A unit heater including a cabinet, a radiator within the cabinet and having a plurality of flues, a burner chamber communicating with the lower ends of the flues, a preheating chamber communicating with the upper ends of the flues and extending rearward beyond the flues, air inlet apertures in the cabinet adjacent to the preheating chamber, and means beneath said rearward extension and behind said flues, for drawing air around the preheating chamber and forcing the air between the flues of the radiator.

3. In a unit heater, the combination of a radiator, a burner chamber at the bottom of the radiator and containing a fuel burner having a valve, an indicating dial on the valve, an indicating arm operatively connected to the valve, an electric fan behind the radiator, a rheostat electrically connected to the fan, a lever operatively connected to the rheostat, and means operatively connecting the lever with said indicating arm for coordinating the speed of the fan with the flow of fuel.

4. A unit heater including a cabinet, a radiator within the cabinet and having a plurality of wide, flattened flues, between which are located triangular fins, a heating chamber below and communicating with the flues and having heating means, a preheating chamber above and communicating with the flues and extending rearward beyond the flues, air inlet openings in the top of the cabinet, and a fan located below the preheating chamber and behind the flues.

5. A unit heater including a cabinet, a radiator within the cabinet and having a plurality of wide, flattened flues, between which are located U-shaped triangular fins, a heating chamber below and communicating with the flues and having heating means, a preheating chamber above and communicating with the flues and extending rearward beyond the flues, air inlet apertures in the top of the cabinet, and a fan located below the preheating chamber and behind the flues.

6. A unit heater including a cabinet, a radiator within the cabinet and having a plurality of wide, flattened flues, between which are located angular fins, a heating chamber below and communicating with the flues and having heating means, a preheating chamber above, and communicating with the flues and extending rearward beyond the flues, air inlet apertures in the top of the cabinet, and a fan located below the preheating chamber and behind the flues.

7. A unit heater including a cabinet, a radiator within the cabinet and having a plurality of wide flattened flues, between which are located fins substantially the width of the flues, a heating chamber below and communicating with the flues and having heating means, a preheating chamber above and communicating with the flues and extending rearward beyond the flues, a fan located below the preheating chamber, a water reservoir located above the preheating chamber, air inlet openings in the top of the cabinet above the reservoir, and an air inlet opening in the back of the cabinet adjacent to the fan.

8. A unit heater including a cabinet, a radiator within the cabinet and having a plurality of wide flattened flues, between which are located fins substantially equal in width to the flattened portion of the flues, a heating chamber below and communicating with the flues and having heating means, a box like preheating chamber above and communicating with the flues and extending rearward beyond the flues, said extending portion of said chamber spaced from the rear wall of the cabinet, openings in the top of the cabinet and means within the cabinet for drawing air through said openings and around the extended portion of the preheating chamber and forcing it between the flues and fins of the radiator.

9. A unit heater comprising a cabinet provided with a hinged lid on its top wall, said lid having a plurality of air inlet openings, a water reservoir below the lid, an air inlet opening in the rear of the cabinet and an air exhaust opening in the front of the cabinet, a radiator having heating means and located within the cabinet, a preheating chamber located above and communicating with the radiator and extending rearward beyond the body of the radiator, a fan located below the preheating chamber for drawing air through the cabinet inlet openings and exhausting air through the radiator and the exhaust opening.

10. A unit heater including a cabinet, a radiator within the cabinet, flattened flues in the radiator, fins in contact with the flues, box like chambers above and below the flues and communicating therewith, heating means for the radiator, air inlet openings in the top and rear of the cabinet, a fan for circulating air through the radiator, apertures in the bottom of the cabinet for the passage of air to the inside of the lower box-like chamber, means for regulating the heating means, and means operated by the regulating means for regulating the speed of the fan.

EUGENE L. SNYDER.