April 6, 1948. C. S. STOUT 2,439,109

AIR HEATING FURNACE WITH SELECTIVELY CONTROLLED RADIATOR STRUCTURE

Filed Nov. 18, 1944 2 Sheets-Sheet 1

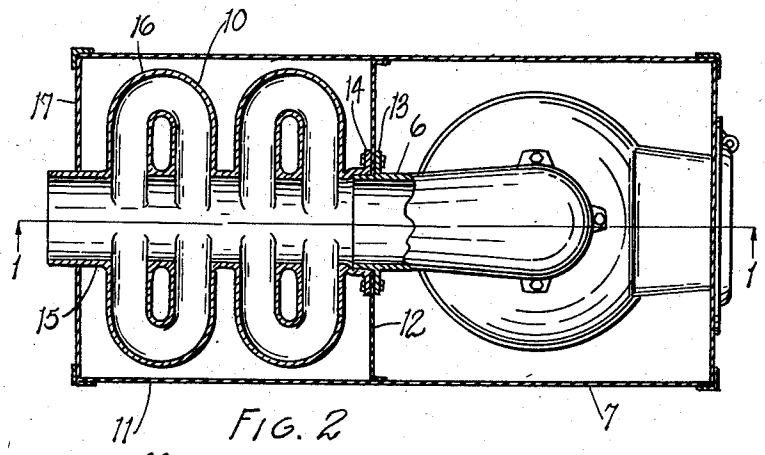


FIG. 2

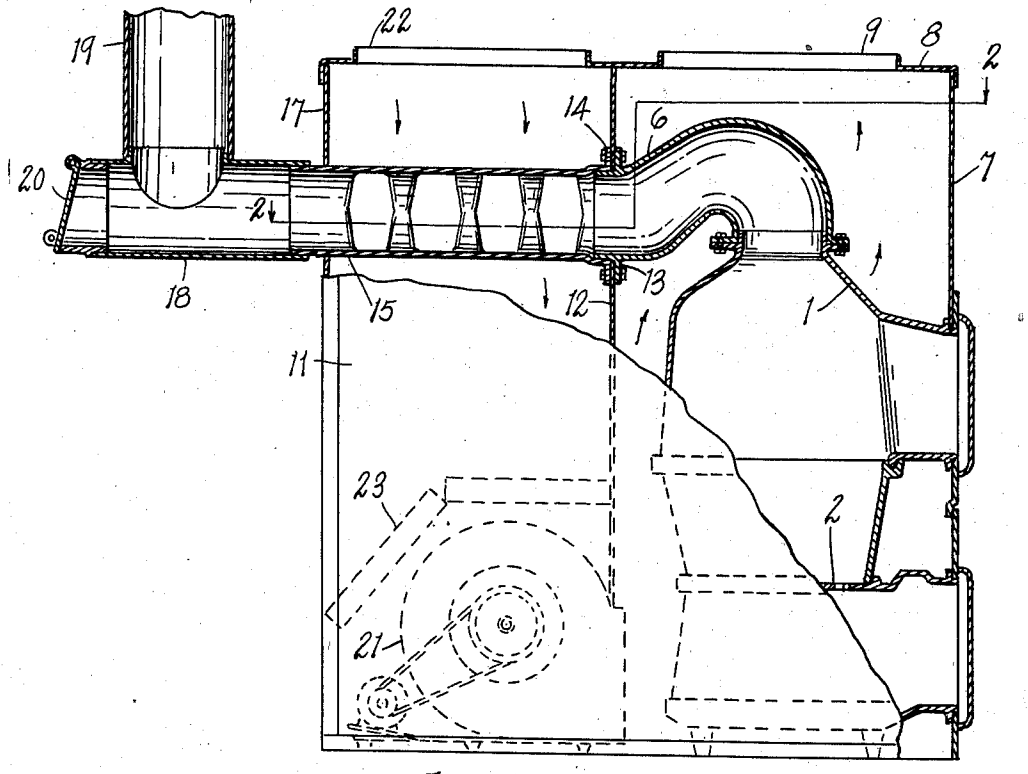


FIG. 1

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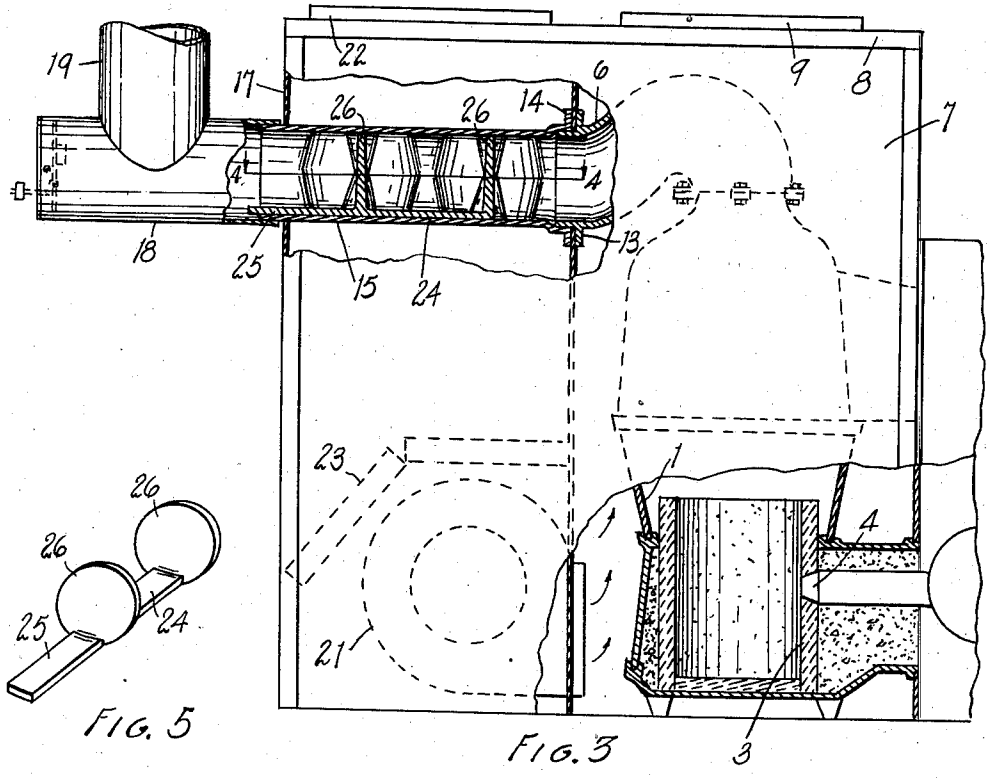


FIG. 3

FIG. 5

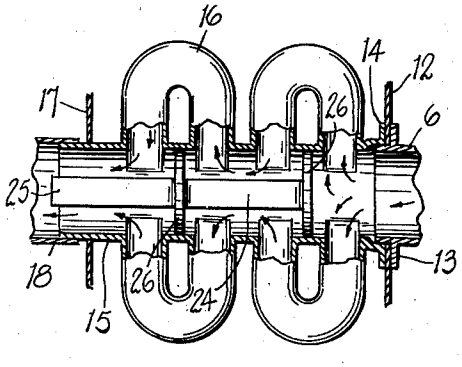


FIG. 4

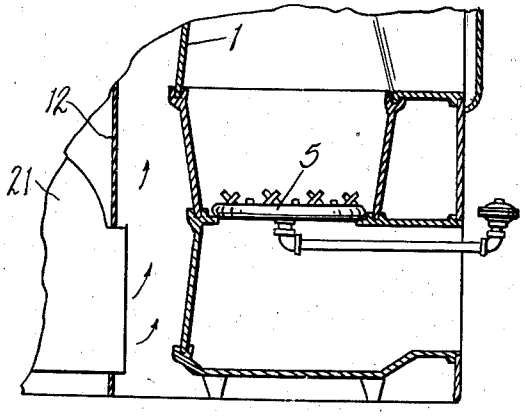


FIG. 6

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UNITED STATES PATENT OFFICE

2,439,109

AIR-HEATING FURNACE WITH SELECTIVELY CONTROLLED RADIATOR STRUCTURE

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Application November 18, 1944, Serial No. 564,093

8 Claims. (Cl. 126—99)

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This invention relates to improvements in air heating furnace with selectively controlled radiator structure.

The main objects of this invention are:

First, to provide a furnace which may be readily adapted for the burning of gas or oil or solid fuel and which is highly efficient for either adaptation.

Second, to provide a furnace structure in which there is a free flow of air through the hot air casing and around the combustion unit.

Third, to provide a hot air furnace in which a large percentage of the heat units are utilized.

Fourth, to provide in a furnace a radiator structure which is readily adapted for the particular installations and the types of fuel and one which may be easily cleaned.

Objects relating to details and economies of the invention will appear from the description to follow. The invention is defined in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation partially in vertical section of a furnace embodying the features of my invention, certain parts being shown mainly in conventional form, the baffles of the main conduit partition walls being omitted.

Fig. 2 is a horizontal fragmentary view partially in horizontal section on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary view partially in vertical section of an embodiment of my invention adapted to a liquid fuel burning furnace.

Fig. 4 is a fragmentary view partially in section on line 4—4 of Fig. 3.

Fig. 5 is a perspective view of the radiator partition or baffle member removed from the radiator.

Fig. 6 is a fragmentary view illustrating an adaptation of my invention as a gas burning furnace.

In general, the furnace body 1 is the same for burning solid fuel, liquid fuel or gas. In burning solid fuel, a grate shown conventionally at 2 is provided. In burning liquid fuel, a firepot 3 is provided with a nozzle 4 for injecting the liquid. In Fig. 6, I illustrate a gas burner 5 which is substituted for the grate 2. The adaptations to the burning of different fuels is of importance in that the remaining portions of the structure are such as to be readily adapted to the different fuels and to different installations.

The combustion chamber or furnace body 1 is provided with a lateral discharge 6 connected to the top of the combustion chamber. The hot air casing 7 is provided with a top 8 having a

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flange 9 to which a suitable conduit pipe header or delivery pipe may be connected.

My improved radiator unit comprises a radiator designated generally by the numeral 10 which is arranged in a casing 11. The hot air casing and the radiator casing have a wall 12 in common in the embodiment illustrated. The discharge 6 of the combustion unit extends through this wall and is provided with a flange 13 to which the flange 14 on the radiator is bolted.

The radiator comprises a longitudinal conduit 15 of uniform diameter from end to end and straight, this conduit however having a plurality of U-shaped branches or auxiliary conduits 16 opening to the sides thereof preferably in opposed pairs as shown in Fig. 2. The outer end of the main conduit 15 projects through the outer wall 17 of the radiator casing to receive the coupling member 18 of the smoke flue 19. A damper 20 is provided at the outer end of the member 18.

A blower 21 is arranged in the bottom of the casing 11 and delivers into the bottom of the hot air casing 7. An inlet 22 is provided at the top of the radiator casing so that the air is drawn into the radiator casing and across the radiator and discharged into the bottom of the hot air casing around the combustion unit or furnace body. Filters shown conventionally at 23 are preferably provided so that all the air circulated by the blower is filtered.

To adapt the radiator to different types of fuel and to different installations, I provide a baffle member 24 consisting of the horizontal bar 25 having baffles or partition walls 26 fixedly secured thereto. This baffle member may be removably arranged within the longitudinal conduit of the radiator member to position the baffle or partition walls 26 between the arms of the U-shaped radiator branches or auxiliary conduits as shown in Fig. 4 so that the products of combustion must circulate through these auxiliary conduits as is indicated by the arrows in Fig. 4. This arrangement is best calculated to utilize the heat units but for some fuels and installations a direct passage for the products of combustion through the main conduit is required and in such cases the baffle member is removed. It can be removed or inserted in the event the furnace is changed from one fuel to another or to adapt it to particular conditions of flue draft. The radiator may be quite readily cleaned as the branches are such that a cleaning tool may be readily passed through the same and the collected soot scraped or pulled out of the main conduit.

I have not attempted to illustrate or describe

all the embodiments or adaptations of my invention which I contemplate but it is believed that this disclosure will enable those skilled in the art to embody or adapt the same as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a combustion unit provided with a hot air casing, of a radiator unit comprising a hot air casing having one wall in common with the casing of said combustion unit, a radiator arranged in said radiator casing and comprising a main conduit connected at one end to the outlet of said combustion unit, the other end being adapted for connection to a smoke flue, said main conduit being straight and of uniform cross sectional diameter and having a plurality of horizontally disposed U-shaped auxiliary conduits or branches having both the inlet and discharge openings thereof connected to the sides of the main conduit between the inlet and outlet openings thereof, said auxiliary conduits being connected to the sides of the main conduit in opposed pairs, and a baffle member removably mounted in said main conduit and comprising a longitudinal bar having a plurality of disk-like conduit baffles secured thereto, said baffles being so spaced along the bar that a baffle is disposed in the main conduit between said inlet and discharge openings of each auxiliary conduit of each pair of auxiliary conduits for closing the main conduit between said inlet and discharge openings of each auxiliary conduit and thereby cause the products of combustion to flow through said auxiliary conduits in passing through the radiator.

2. The combination with a combustion unit provided with a hot air casing, of a radiator unit comprising a hot air casing having one wall in common with the casing of said combustion unit, a radiator arranged in said radiator casing and comprising a main conduit connected at one end to the outlet of said combustion unit, the other end being adapted for connection to a smoke flue, said main conduit being straight and of uniform cross sectional diameter and having a plurality of horizontally disposed U-shaped auxiliary conduits or branches having both the inlet and discharge openings thereof connected to the sides of the main conduit between the inlet and outlet openings thereof, and removable baffles disposed in said main conduit and so disposed that a baffle is located in the main conduit between said inlet and discharge openings of each auxiliary conduit for closing the main conduit between said inlet and discharge openings of each auxiliary conduit and thereby cause the products of combustion to flow through said auxiliary conduits in passing through the radiator.

3. The combination with a combustion unit provided with a laterally directed discharge for the products of combustion at its upper end, of a radiator unit comprising a straight main conduit connected at one end to the discharge of said combustion unit and adapted for connection at the other end to a smoke flue, said main conduit having a plurality of horizontally disposed opposed pairs of U-shaped auxiliary conduits having both the inlet and discharge openings thereof connected to the sides of the main conduit between the inlet and discharge openings thereof, and a baffle unit removably mounted in the main conduit and comprising a supporting bar adapted to rest on the bottom of the main conduit and having a plurality of baffles mounted thereon and supported thereby, said baffles being so spaced along the bar that a baffle is disposed in the main conduit between said inlet and discharge openings of each auxiliary conduit of each pair of auxiliary conduits to direct the products of combustion therethrough when the baffle unit is in position, there being a direct passage through said main conduit when the baffle unit is removed.

4. The combination with a combustion unit provided with a discharge for the products of combustion, of a radiator unit comprising a straight main conduit connected at one end to the discharge of said combustion unit and adapted for connection at the other end to a smoke flue, said main conduit having a plurality of U-shaped auxiliary conduits having both the inlet and discharge openings thereof connected to the sides of the main conduit between the inlet and discharge openings thereof, and a baffle unit removably mounted in the main conduit and comprising a supporting bar adapted to rest on the bottom of the main conduit and having a plurality of baffles mounted thereon and supported thereby, said baffles being so spaced along the bar that a baffle is disposed in the main conduit between said inlet and discharge openings of each auxiliary conduit to direct the products of combustion therethrough when the baffle unit is in position, there being a direct passage through said main conduit when the baffle unit is removed.

5. The combination with a combustion unit provided with a discharge for the products of combustion, of a radiator unit comprising a straight main conduit connected at one end to the discharge of said combustion unit and adapted for connection at the other end to a smoke flue, said main conduit having a plurality of horizontally disposed opposed pairs of U-shaped auxiliary conduits having both the inlet and discharge openings thereof connected to the sides of the main conduit between the inlet and discharge openings thereof, and baffles removably arranged in the main conduit, said baffles being so spaced in the main conduit that a baffle is disposed between said inlet and discharge openings of each auxiliary conduit of each pair of auxiliary conduits to direct the products of combustion therethrough.

6. The combination with a combustion unit provided with a discharge for the products of combustion, of a radiator unit comprising a straight main conduit connected at one end to the discharge of said combustion unit and adapted for connection at the other end to a smoke flue, said main conduit having a plurality of U-shaped auxiliary conduits having both the inlet and discharge openings thereof connected to the sides of the main conduit between the inlet and discharge openings thereof, and baffles so disposed that a baffle is located in the main conduit between said inlet and discharge openings of each auxiliary conduit to direct products of combustion therethrough, said baffles being adjustable relative to said last named inlet and discharge openings to permit passage of products of combustion through that portion of the main conduit disposed between the inlet and discharge openings of each auxiliary conduit.

7. The combination with a combustion unit, and a radiator comprising a main conduit connected at one end to the outlet of said combustion unit, the other end being adapted for connection to a smoke flue, said main conduit being

straight and of uniform cross sectional diameter and having a plurality of horizontally disposed U-shaped conduits or branches having both the inlet and discharge openings thereof connected to the sides of the main conduit between the inlet and outlet openings thereof, said auxiliary conduits being connected to the sides of the main conduit in opposed pairs, and a baffle member removably mounted in said main conduit and comprising a longitudinal bar having a plurality of disk-like conduit baffles secured thereto and adapted to be positioned and supported by said longitudinal bar, said baffles being so spaced along the longitudinal bar that a baffle is disposed in the main conduit between said inlet and discharge openings of each auxiliary conduit of each pair of auxiliary conduits to direct the products of combustion therethrough.

8. The combination with a combustion unit, and a radiator comprising a main conduit connected at one end to the outlet of said combustion unit, the other end being adapted for connection to a smoke flue, said main conduit being straight and of uniform cross sectional diameter and having a plurality of horizontally disposed U-shaped auxiliary conduits or branches having both the inlet and discharge openings thereof connected to the sides of the main conduit between the inlet and outlet openings thereof in opposed pairs, and baffles so disposed in the main conduit that a baffle is located between said inlet and discharge openings of each auxiliary conduit to direct products of combustion therethrough, said baffles being adjustable relative to said last named inlet and discharge openings to permit passage of the products of combustion through that portion of the main conduit disposed between the inlet and discharge openings of each auxiliary conduit.

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