

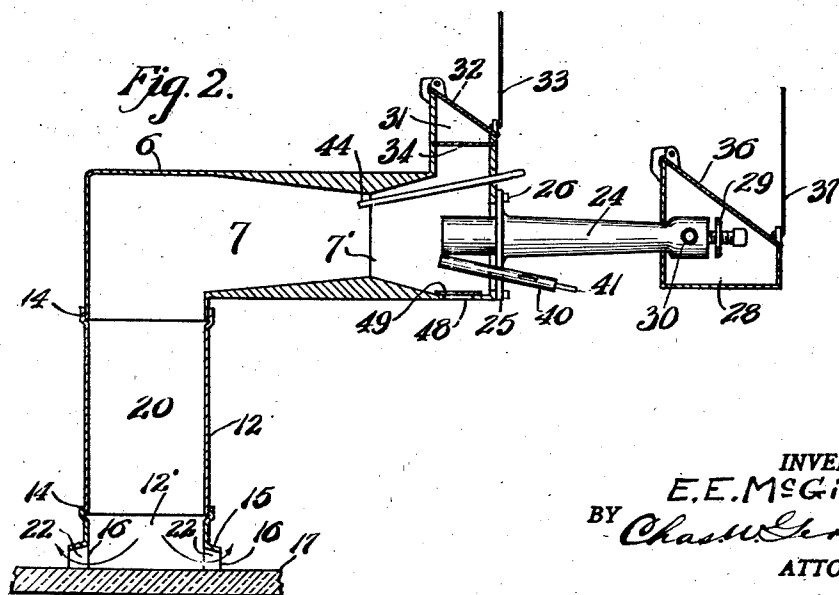
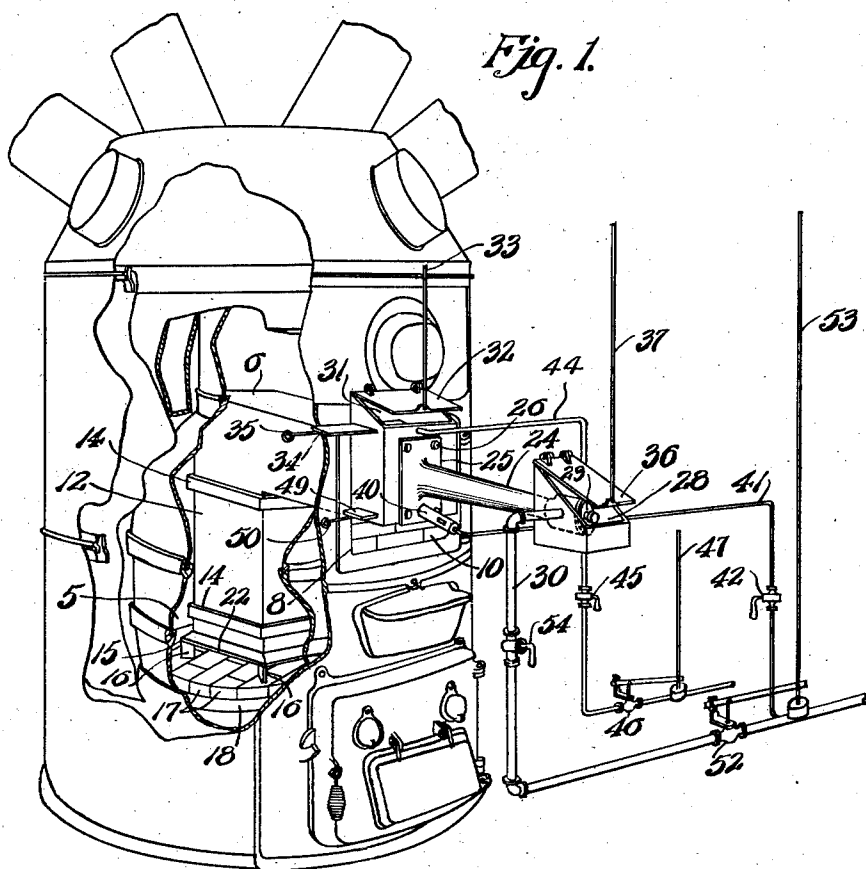
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OIL AND GAS BURNING FURNACE

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OIL AND GAS BURNING FURNACE

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This invention relates to furnace and burner construction, with particular reference to furnaces of the warm air type for house heating purposes, and aims to provide a novel and improved burner arrangement adapted for the burning of either oil or gas, or both oil and gas as the fuel supply, according to conditions of use.

One of the important features of the invention is the provision of a combustion burner and radiator structure which may be easily and quickly installed in connection with any of the ordinary types of fire boxes in warm air furnaces, in either single or multiple unit assembly, and which may be conveniently adjusted or repaired, as occasion demands.

A further primary object of the invention is to provide a type of burner which is characterized by a high ratio of radiant heat adapted to be given off from the burner in an efficient well distributed manner, for insuring a maximum rate of heat transfer. In this connection, it is a purpose of the invention to reduce the amount of air admitted for maintaining combustion to only the actual minimum required volume and also to stop the admission of such air at those times when the operation of the burner is interrupted. For efficiency of operation, the ratio of the primary to the secondary air supplied the burner is adapted to be accurately adjusted and controlled, and the arrangement is furthermore such as to be adapted for either manual, or automatic or thermostat control. In this connection it is also a novel feature of the invention to exclude the admission of air by way of the ash pit of the furnace, in order to obtain further efficiency with reference to the air circulation.

Another particularly important feature of my improved burner construction is in the provision of a burner element having means for the usual adjustment of its primary air supply, in combination with means for either manually or automatically cutting off entire-

ly the air supply to said burner element at such times as the flow of fuel thereto is interrupted.

With these general objects in view, as well as various minor objects as will appear in the course of the detailed description, the invention will now be described by reference to the accompanying drawing illustrating one form of construction which I have devised for embodying the proposed improvements, after which those features and combinations deemed to be novel will be set forth and claimed.

In the drawing—

Figure 1 is a perspective view, with portions broken away, illustrating a furnace and burner construction embodying the proposed features of improvement; and

Figure 2 is a vertical detail sectional view illustrating the burner and radiator assembly proper, on an enlarged scale, together with certain of the control of adjusting connections.

Referring now to the drawing in detail, this illustrates the improved furnace and burner construction as made up of a combination combustion and radiator structure comprising a plurality of casting sections adapted to be positioned within the fire bowl or chamber 5 of a furnace of any desired type. The upper casting section 6 is formed with a Venturi passage 7, and is mounted in horizontal position through the furnace door opening 8, the remainder of said opening being sealed by means of fire bricks 10 or the like.

At substantially the center of the fire chamber 5 the casting section 6 communicates with one or more upright casting sections 12, 12', etc., joined together as indicated at 14, the lowermost section 12' being formed with a flaring base flange 15 supported by means of the legs 16 upon blocks 17 of suitable fire clay or similar refractory and non-conductive

material, which are supported upon the grate ring 18 at the bottom of the fire chamber. Thus, the upright casting sections provide a vertical passage 20 leading from the rear end of the horizontal passage 7, whereby the gases or products of combustion are conducted through the lower outlet passages 22 afforded by the spaces between the legs 16 above the blocks 17.

At the outer end of the casting section 6 I provide a gas burner tube 24, preferably of the Venturi type and having a flange 25 for securing the same to the outer face of said casting, as by means of cap screws 26, with the discharge end of the tube 24 projecting within the passage 7, as represented in Figure 2. The other end of said tube 24 is housed within a primary air intake chamber 28, where it is fitted with an air regulating cap 29 and a gas receiving or intake pipe 30. The outer end of the casting section 6 is also provided with a second air supply passage 31 for conducting secondary air to the passage 7, for the regulation of which air supply a damper 32 is provided, having a remote control connection 33; and for further regulation I provide the passage 31 with a sliding shutter 34 having an exterior handle 35 for convenient manual adjustment. A similar damper 36 having a remote control connection 37 is provided for regulating the primary air supply to the chamber 28.

A pilot gas burner 40 is mounted through the flange 25 with its flame end adjacent the inner end of the tube 24, said burner 40 being provided with a supply pipe 41 and valve 42.

Provision is also made for burning oil, by means of an oil supply pipe 44, fitted with a manual valve 45 and automatic control valve 46, and connected so that the discharge end of the pipe 44 is positioned within the passage 7 past the Venturi throat portion 7' thereof. For affording an additional supply of air when burning oil, the front end of the passage 7 is provided with an air intake opening 48 regulated by a sliding shutter 49 having the exterior handle 50.

It is also proposed to provide an automatically controlled valve 52 as well as manual valve 54 for the gas pipe line 30, and remote control connections 47 and 53 for the valves 46 and 52, respectively.

From the foregoing it will be apparent that I have provided a practical and efficient construction for carrying out the several desired objects of my invention. It is well recognized that the most effective method of heat transfer is by means of radiation, and the present burner casting assembly provides a construction in which there is an unusually ample heat radiation surface provided within the fire chamber, as the products of combustion traverse the spaces 7 and 20 within the castings; and as these hot gases are emitted

from the lower end of the castings, by way of the openings 22, the walls of the fire bowl are again scrubbed by the upward travel of the gases, with this corresponding further opportunity for the transfer of heat by both conduction and convection. The central location of the burner casting assembly obviously also effects an even distribution of the heat which is given off during this travel of the gases on their way to the flue. It will be seen also that the movement of the products of combustion is at a comparatively rapid rate, and is induced by a relatively slight pull or draft transmitted from the flue. In this connection it may be pointed out that the improved burner and casting assembly are adapted not only for what is known as atmospheric burner operation, but is equally adapted for power burner operation, of any of the various well known types, using a forced draft in conjunction with the chimney draft.

It will also be noted that the air supplied for combustion is admitted by way of the burner unit, where it is most effective, and the ratio of the primary to the secondary air can be very accurately adjusted and regulated, which is an important advantage, for enabling the burner to be operated with either slow or quick burning gases. As shown in Figure 2, the provision for regulating the primary air to the burner element 24 is by means of the cap 29, but by providing also the primary air chamber 28 enclosing the outer end of the tube 24 and having the damper 26, it is apparent that this damper may be regulated by means of the connection 37, either for admitting air to the chamber 28, or for shutting off entirely the supply of primary air to the burner.

As already stated, the remote control connections to the several dampers and valves may be either manually or automatically controlled (as by means of a thermostat—not shown), and in the case of a thermostat control the connections 33, 37, 47 and 53 may be operated by the same arm or lever on the thermostat for simultaneously lifting the connections and thereby opening the dampers as well as the valves all in unison, or permitting the same to be simultaneously closed. Consequently, in the event of closing of the valves 46 and 52, the same operation would result in the closing of the dampers 32 and 36, for shutting off the outside air supply. The importance of this feature lies in the prevention of any excess air traveling into the burner chamber, with the attendant cooling effect, and consequent retarding of the burner action by delaying or slowing up the reigniting of the fuel when the valves are again opened. Of course the valve 45 is turned into closed position when oil is not being used, otherwise it is left open as illustrated in Figure 1. The valve 34 in the sec-

ondary air chamber 31 is adjusted to the proper point for obtaining the necessary volume of secondary air, in the preliminary operation of starting the burners, after which this position is fixed, and further regulation obtained by operation of the damper 32. The slide 49 is maintained in closed position unless oil is being burned, in which event the slide is opened to a greater or less extent, according to the volume of air necessary for the efficient operation of the oil burner. The discharge point of the oil burner tube 44 is positioned as illustrated, being that best adapted for the efficient burning of the oil, as well as allowing any oil drippings to drain down the inner slope of the Venturi throat and thence down into the fire bowl. Since it is necessary to have the gas burner operating so long as the oil is being used as fuel, in the construction illustrated, it is obvious that the oil control connection 47 should be operated, preferably automatically, for simultaneously shutting off the flow of oil whenever the gas burner is shut off by closing of the valve 52.

Since the fire bowl is not only sealed against the admission of air from the fire pit, but provided with a heat insulating lining by the refractory and non-conducting brick elements 17, there is no chilling of the air within the fire bowl by such directly admitted air; and likewise there is no waste heat allowed to escape into the ash pit, such as would only tend to retard the proper house air circulation.

The construction of the radiator casing sections is of a character as to present no manufacturing difficulties, and are in sectional units adapted for easy installation by way of the fire door, and adjustment into the proper position in symmetrical relation within the fire bowl. It is also apparent that the radiator and burner assembly is adapted for installation in any type or shape of fire box, round, rectangular, or otherwise. It is equally obvious that more than one of the radiator and burner assemblies may be installed where the capacity should demand additional units, and the dimensions of the fire box permit such multiple assembly.

While I have illustrated and described what I now regard as the preferred mode of embodying the invention in practice, I desire to reserve the right to make all such changes or modifications as may fairly fall within the scope of the appended claims.

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

1. A furnace and burner construction comprising, in combination with the fire bowl of the furnace, a radiator member mounted within said bowl and provided with a burner assembled therewith by way of the fire door, means for supplying fuel and air to the

burner, and means providing a heat insulation lining for the bottom of the fire bowl and also sealing the same against the admission of any air from the ash pit.

2. A furnace and burner construction comprising, in combination with the fire bowl of the furnace, a radiator member mounted within said bowl and formed with an initial horizontal passage and a vertical passage central within the fire bowl for travel of the combustion gases and discharging the same at the bottom of the bowl, and a burner communicating with said horizontal passage by way of the fire door.

3. A furnace and burner construction comprising, in combination with the fire bowl of the furnace, a sectional radiator member comprising a horizontal casting section and one or more vertical casting sections adapted to be assembled within the fire bowl by way of the fire door, and providing an initial horizontal passage and a vertical passage for the travel of the combustion gases and discharging the same at the bottom of the bowl, and a burner communicating with the outer end of said horizontal casting section.

4. A furnace and burner construction comprising, in combination with the fire bowl of the furnace, a sectional radiator member comprising a Venturi-throated horizontal casting section and one or more vertical casting sections adapted to be assembled within the bowl by way of the fire door with said vertical casting sections positioned centrally within the bowl, and a burner assembled in connection with the outer end of said horizontal casting section.

5. A furnace and burner construction comprising, in combination with the fire bowl of the furnace, a radiator assembly mounted within the fire bowl, separate gas and oil fuel burning elements mounted in connection with said radiator assembly, and means for regulating the operation of said burner elements independently of each other.

6. A furnace and burner construction comprising, in combination with the fire bowl of the furnace, a radiator assembly mounted within the fire bowl, separate gas and oil fuel burning elements mounted in connection with said radiator assembly, and independent remote control means for regulating both the fuel and air supply to said burner elements.

7. A furnace and burner construction comprising, in combination with the fire bowl of the furnace, a sectional radiator member comprising a Venturi-throated horizontal casting section and one or more vertical casting sections positioned centrally within the bowl, and a liquid fuel burner assembled in connection with the outer end of said horizontal casting section and including a burner tube having its discharge end projecting into said horizontal section to a point past the

most constricted portion of the passage there-through.

8. A furnace and burner construction comprising, in combination with the fire bowl of the furnace, a sectional radiator member comprising a Venturi-throated horizontal casting section and one or more vertical casting sections positioned centrally within the bowl, and a burner assembly comprising a gas burner tube connected with the outer end of said horizontal section, and a liquid fuel burner tube having its discharge end projecting into said horizontal section to a point past the most constricted portion of the passage therethrough.

In witness whereof I hereunto affix my signature.

ELWIN E. MCGILL.

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