Oct. 6, 1942. J. G. AMES 2,297,856

GAS BURNER

Filed Oct. 23, 1939 2 Sheets-Sheet 1

Fig. 1.

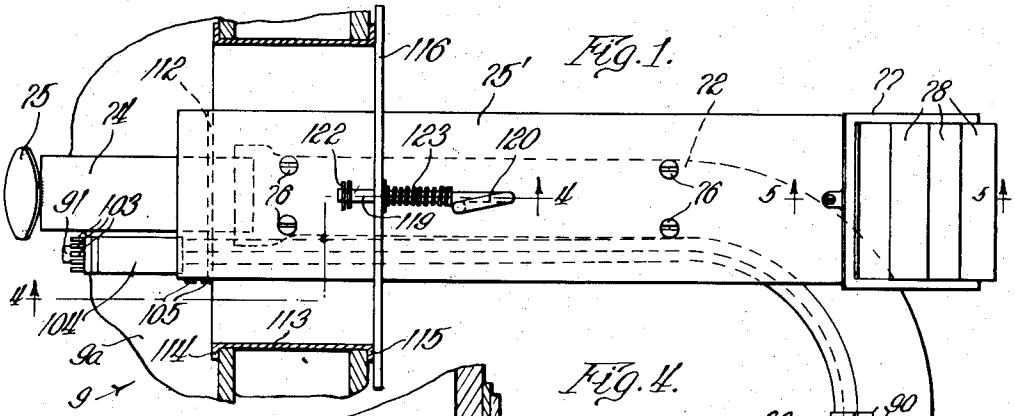


Fig. 4.

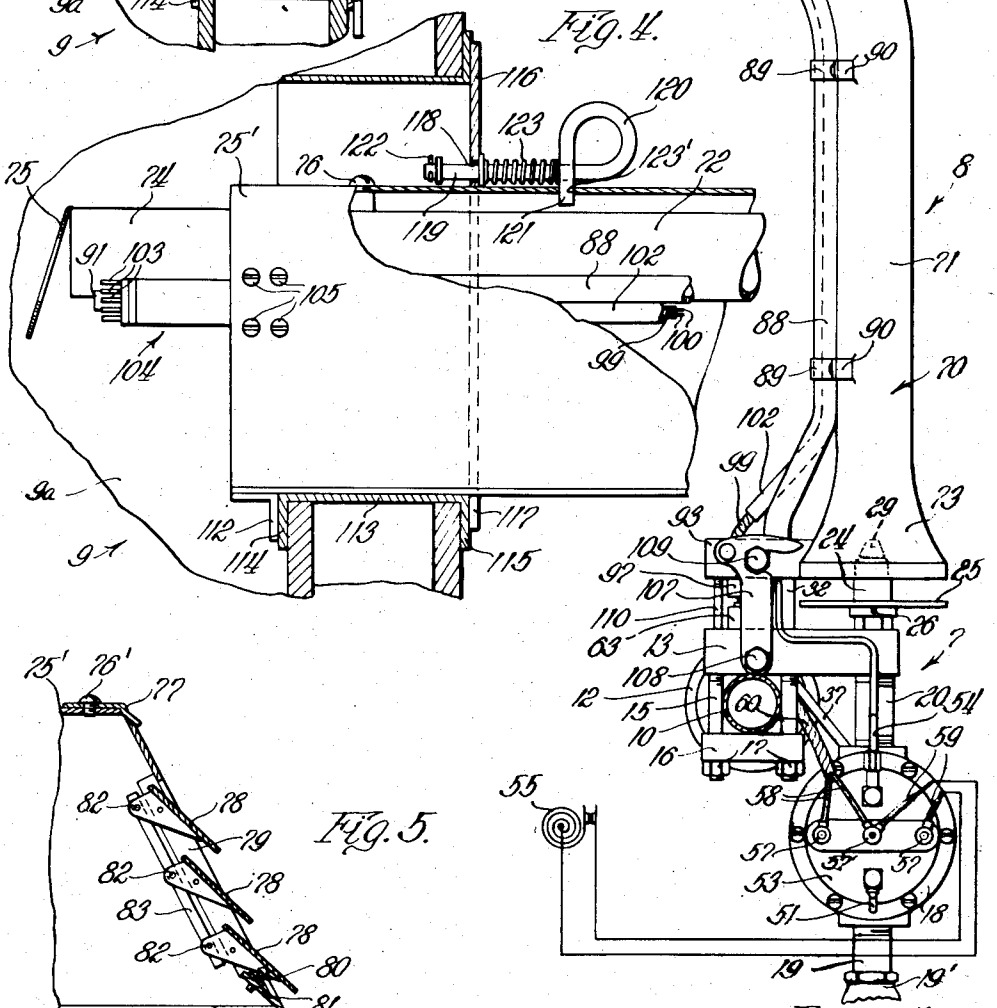


Fig. 5.

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Fig. 2.

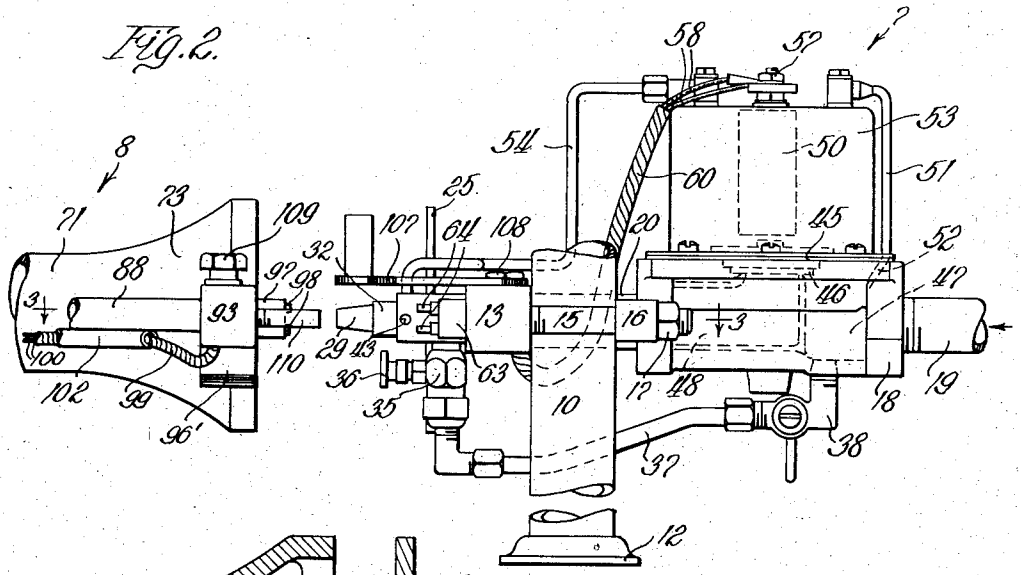
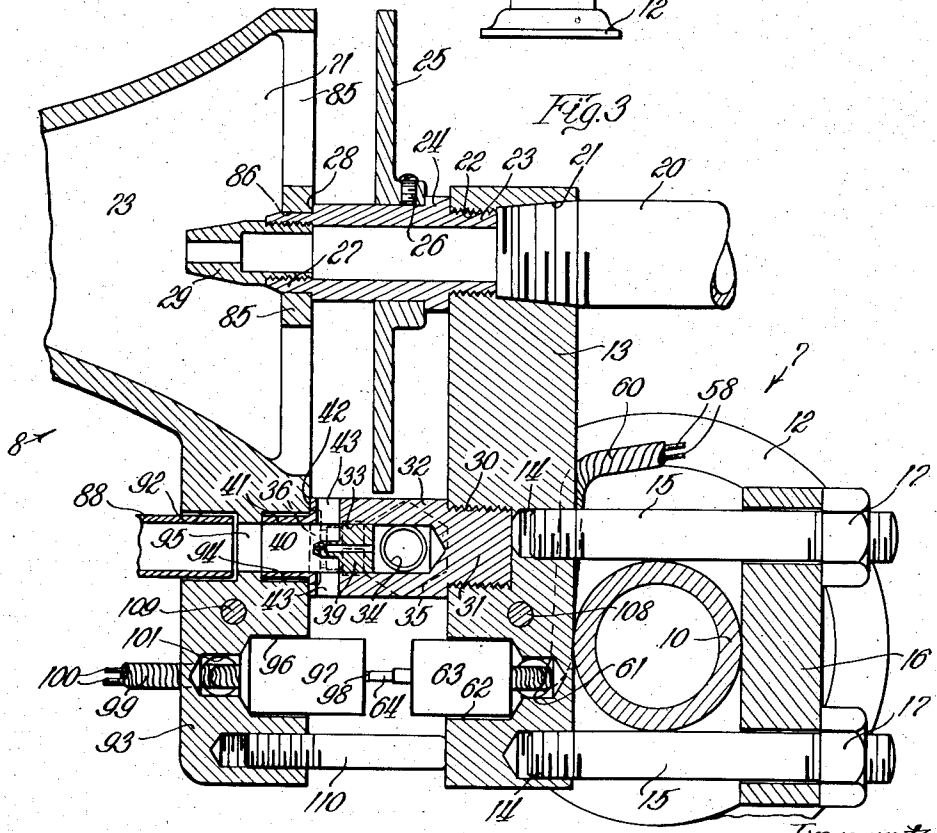


Fig. 3



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UNITED STATES PATENT OFFICE

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GAS BURNER

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Application October 23, 1939, Serial No. 300,723

14 Claims. (Cl. 158—7)

The present invention relates to an improvement in gas burners and more particularly is concerned with a gas burner adapted for use as a substitute for solid fuel in a furnace primarily designed for the burning of solid fuel, such gas burner being preferably of a capacity which will supply the requisite heat during the fall and spring months when the demand upon the system is relatively light.

To maintain combustion of a bed of solid fuel a certain minimum rate of combustion and minimum volume of burning fuel must be maintained in order to keep the fire going. But for the low output of heat required in the spring and fall months that minimum fire may be in excess of the demand for heat. Hence such a minimum fire cannot be reduced to the actual demand and, in addition to causing discomfort to occupants of the building, the fire actually wastes fuel. Thermostatic control under those conditions is not feasible.

It is known to provide a gas burner which may be substituted as the heating means in a furnace which is primarily constructed for burning solid fuel, and to install such a burner in the furnace in the fall until cold weather arrives and then remove the gas burner and fire with solid fuel. The flexibility of gas combustion adapts it to thermostatic control over a wide range. Such form of control is therefore an accepted part of the substitute installation.

The primary object of the invention is to provide means which will make it easier for the operator to put the gas burner into service and, when the necessity arrives, to take it out of service.

Another object is to provide an improved mounting for the necessary parts of such a substitute installation.

A further object is to make the installation and removal of the gas burner safe, both to the user and to the device itself.

Other and incidental objects will be apparent from the following detailed description and illustration of the preferred embodiment of the invention.

The preferred method of use of such substitute gas burner is to insert the burner in the firebox when gas is to be burned and then when the solid fuel burner is to be put into service the gas burner is removed from the firebox. Heretofore it has been the practice to provide a burner with thermostatic control and automatic safety pilot control as a unit, and to move the unit as a whole into and out of position with the burner in the firebox, as desired. To permit this it has been customary to provide flexible hose connections from a fixed gas connection to the burner unit and likewise to provide flexible electrical connections to the unit, so that the unit may be swung into and out of position.

There are a number of objections to this form of apparatus, chief of which is that the flexible connections are subject to deterioration and destruction, with consequent leakage of the gas which is difficult to detect until it becomes serious. Further, the unit is too clumsy for convenient installation and, as heretofore developed, has had a very insecure and unsatisfactory mounting, generally in the furnace door frame or opening itself.

I propose, according to the present invention, to provide a burner of the type adapted for spring and fall use in which certain parts thereof are permanently installed, these parts being those to which permanent connection of the gas supply and permanent connection of the thermostatic control may be made and permanently maintained. To this permanent installation I attach and remove, as the occasion demands, an extension which includes the part projected into the firebox and constituting the actual burner, with suitably severable connections whereby the removable part may be applied to or removed from the furnace with a minimum of effort and inconvenience. This removable part, being relatively light, may more easily be supported from the permanent mounting and from the door frame of the furnace.

A further preferred feature is the automatic interlock between the stationary and the removable parts of the burner whereby separation of the removable part from the stationary part automatically shuts off not only the main gas flow but also the pilot flow and severs the electric connections to the automatic safety pilot control. Thereby, whether through accident or design, separation of the parts renders the installation absolutely safe, both to the occupants of the building and to the apparatus itself.

A further feature is the provision of a substantially L-shape removable extension member whereby the stationary part of the gas burner may be permanently installed adjacent to and laterally of the fire door of the furnace in which position it will not interfere with firing of the furnace when solid fuel is to be used.

A still further feature is the provision of resilient means with which the burner end of the

removable extension member is detachably secured to the furnace.

The permanent part of the installation may now be supported adequately and the connections of gas and of the electric controls may be made in a permanent, workmanlike manner, obviating the danger of flexible hose and flexible connections.

Now in order to acquaint those skilled in the art with the manner of constructing and operating my invention, I shall describe, in connection with the accompanying drawings, a specific embodiment of the same.

In the drawings:

Figure 1 is a plan view of the gas burner of my invention and illustrating semi-diagrammatically a part of a furnace and the fire door opening thereof, within which a portion of a removable extension member of the gas burner is positioned;

Figure 2 is a side elevation of the stationary member of the gas burner of my invention which is mounted adjacent the furnace laterally of the furnace door with a portion of one end of the removable extension member in side elevation and spaced therefrom;

Figure 3 is a horizontal sectional view taken on line 3—3 of Figure 2;

Figure 4 is a side view partly in section taken along the line 4—4 of Figure 1 illustrating the manner in which one end of the removable extension member is secured to the furnace; and

Figure 5 is a detail vertical sectional view taken on line 5—5 of Figure 1.

Referring now to the drawings, the reference numerals 7 and 8 indicate the stationary and removable extension members, respectively, which together constitute the gas burner of my invention. The stationary member 7 is preferably permanently mounted in position laterally of the fire door of a furnace 9 upon a vertically extending pipe 10 having a foot 12 suitably secured to the basement floor. This pipe or post 10 may be further supported or braced at its upper end, or may be mounted in any other preferred manner.

A horizontally extending crossarm or frame member 13 is bored and tapped at 14—14, for the reception of stud bolts 15—15 which extend through a horizontally disposed clamp member 16, the stud bolts carrying nuts 17 for securely clamping the frame member and clamp member to the vertically extending pipe 10. The stationary member 7 consists, in part, of an automatic electrically operated gas supply valve 18, connected at its inlet end with a gas supply pipe or manifold 19. A threaded nipple 20 extends from the outlet end of the valve 18 to a tapped bore 21 in crossarm 13, as shown in Figure 3 of the drawings. A threaded counterbore 22 extending axially of pipe socket 21, receives the threaded reduced end 23 of a nipple 24, upon which a primary air shutter plate 25 is adjustably mounted by means of a set screw 26 whereby it may obstruct to greater or less degree the entry of primary air into the induction tube 73. The opposite end 27 of the nipple is reduced to form a shoulder 28 the purpose of which is to secure and support the hub of the spider at the open end of the air induction tube 73. A nozzle 29 is threaded into the end of the nipple 24. This nozzle contains a graduated orifice for controlling the rate of gas discharge. By substitution of nozzles with larger or smaller orifices the rate of gas flow to the burner head may be regulated.

Frame member 13 is further provided with a suitable recess 30, in which is mounted the reduced end 31 of a pilot gas supply nipple 32, having a longitudinally extending bore 33 formed therein. A transverse bore 34 extends through the bottom wall of nipple 32 and intersects the longitudinally extending bore 33. The outlet end of an automatic shut-off valve 35 communicates with said transverse bore 34. The valve body of valve 35 is normally held closed by spring means therein, and the valve may be opened by depressing valve operating button 36. The construction of valve 35 is old and well known and is of the type employed in the well known Rutz gas pilot. The inlet end of valve 35 is connected as by a compression coupling to one end of a copper tube pilot gas supply conduit 37, the opposite end of which is connected by a suitable fitting and compression coupling to the inlet side of valve 18. A hand operated shut-off cock 38 may be interposed between valve 35 and valve 18 for manually shutting off the supply of gas to the pilot gas supply member 32, when the burner is taken out of use.

A pilot gas supply nozzle 39 constituting an orifice adjustable by substitution is suitably secured intermediate the ends of bore 33, and is adapted to discharge a stream of gas into pilot burner mixing chamber 40 formed in the reduced end 41 of member 32. The reduced end forms a tubular extension beyond the shoulder 42. This tubular extension fits telescopically into a socket formed in the wing or extension 93 formed on the side of the air induction tube 73. Radially extending air ports 43 intersect the longitudinally extending bore 33 and communicate with pilot gas mixing chamber 40 for supplying air thereto. These primary air induction ports 43 open to atmosphere and lie back of the tip of the pilot nozzle 39.

The electrically operated gas valve 18 is provided with a diaphragm 45, carrying a valve disc 46 cooperating with a suitable valve port for controlling flow of gas from supply manifold 19 through an inlet chamber 47 through the valve port and thence through an outlet chamber 48. The valve is opened by means of an electromagnet 50, which in turn is adapted to be electrically connected to a thermopile 103 positioned at the inner end of the removable extension member 8, see Figures 1 and 4. A thermostat 55 is located in the space to be heated and is preferably permanently connected by leads 58—59 in series with the thermopile 103 through the provision of three connecting posts 57—57' and 57 mounted on the electromagnet housing 53. A small bore conduit 51 extends from a duct 52 in the base of valve 18 and communicates with the inlet chamber of the valve below the diaphragm 45, and is suitably secured to the electromagnet housing 53 permitting gas to flow from the manifold 19 to the electromagnet housing 53 above the diaphragm 45. A similar conduit 54 is suitably secured at one end to and communicating with the interior of the electromagnet housing 53 and at its other end conduit 54 communicates through the upper one of radial ports 43 with longitudinal bore 33 of pilot gas supply member 32, as shown in Figures 2 and 3, on the atmospheric side of the nozzle 39. It will thus be seen that gas pressure in the manfiold 19 will not tend to open the valve and any gas passing through conduit 51, housing 53 and conduit 54 which constitute a bleed will be directed to the induction tube of the pilot burner. The electric gas valve shown

and described is well known, and it is to be understood that the invention is not to be limited to the specific form illustrated as this shows but one form of automatic electrically operated gas valve suitable for use with my invention.

The electromagnet housing 53 is provided with connecting posts 57—57 and 57' to which the leads 58 and 59 are connected in series with each other. The connecting posts 57 have electrical connection with the terminals of the winding of electromagnet 50. Leads 58 are enclosed within a flexible cable 60 extending from the housing 53 to a vertical opening 61 formed in the bottom of frame member 13, said frame member 13 being recessed at 62 for the reception of an insulated terminal block 63, within which the leads 58 are connected to spring pressed contact fingers 64. The spring terminal block contains two telescopic plunger contacts. This form of contact is well known in the automotive industry.

Referring again to Figure 1, it will be seen that the removable extension member 8 is substantially L-shaped in plan and has a main gas burner supply tube or conduit 70, having an inlet portion or arm 71 extending coaxially with gas supply conduit 20, and an outlet portion or arm 72 extending substantially at right angles to inlet portion 71 so that the burner may be positioned within the fire door of the furnace when the removable extension member 8 is coupled to stationary member 7. While the preferred form of the removable extension is L-shaped the invention is not to be limited to that specific form. It may involve a lesser or greater degree of bend or may if desired be straight. Thus the stationary member 7 may be mounted in position adjacent the furnace in spaced relation thereto and preferably laterally thereof, in which position it will not interfere with firing of the heater when solid fuel is to be used.

A mixing chamber or air induction bell 73 is formed at the open end of portion 71. A tubular main gas burner head 74, formed of a piece of wrought metal tubing is disposed within a socket formed on the open end of arm 72, and it is adapted to project into the fire pot or combustion space of the furnace. Whereas the mixing tube 70 is preferably formed of cast iron the extension or burner head 74 is a piece of wrought metal tubing. It is not so likely to crack when heated by the fire.

The burner head 74 has a flame directing plate 75 preferably of approximately circular configuration and of greater diameter than the diameter of the burner tube, welded at the top thereof to the upper margin of the burner tube. This deflector disc or baffle extends downwardly and outwardly diagonally to deflect the gas discharged by the head 74 down into the fire pot. The plate 75 causes the issuing admixture of gas and air to burn in a semi-spherical flame within the fire pot 9a of the furnace resulting in efficient combustion, within the space where the solid fuel is burned when solid fuel is employed.

Outlet portion or arm 72 of conduit 70 extends directly and frontally into the furnace through the fire door opening. It is suitably secured and mounted as by screws 76 within an air duct 75' of rectangular cross section. This air duct has an open end adapted to extend at its inner end into fire pot 9a. Suitably secured to the opposite end of the duct, as by screws 76', is a shutter plate 77 having louvers 78 pivotally mounted in flanges 79 preferably bent inwardly from and formed integrally with the plate 77, for controlling the supply of secondary air to the combustion chamber of furnace 9 (see Figure 5). An adjustable set screw 80 threads into flange 81 formed integral with and at the bottom of end plate 77 and engages the bottom louver 78. The louver members are pivotally mounted at 82 upon a common operating arm 83 and the set of louvers 78 may be adjusted to any desired position by manipulation of adjusting screw 80.

A supporting spider 85 is formed integrally with main gas burner conduit 70 within the open end of a gas mixing chamber or induction bell 73. The hub of spider member 85 has an opening 86, which when the units 7 and 8 are assembled, is piloted on and fitted over reduced end 27 of nipple 24. The shoulder 28 of the nipple abuts the hub and is instrumental in properly positioning the units with respect to each other.

A pilot gas mixing conduit 88, which is preferably a bent wrought metal tube, extends alongside the main gas burner mixing conduit 70 and is mounted thereon by clamps 89, secured by screws to boss portions 90 formed integrally upon the conduit 70. The pilot mixing conduit 88 is connected at its end adjacent the burner head 74 to a pilot burner 91, and its opposite end is suitably secured within a round socket 92 formed in an arm or bracket 93 extending laterally from and formed integrally with mixing chamber 73 of main burner conduit 70. A coaxial socket 94 receives the reduced end 41 of the pilot gas supply nipple 32 and communicates with pilot supply conduit 88 by means of a connecting bore 95. A depending boss 96' (see Figure 2) formed on the lower side of the laterally extending arm 93 engages valve button 36 of the valve 35, when the removable extension member 8 and stationary member 7 are telescopically coupled together, as in Figures 1 and 3, depressing valve button 36 causing the valve 35 to open and permit gas to flow to the pilot burner 91.

The laterally extending arm is recessed at 96, and suitably mounted therein is an insulated terminal block 97 having contacts 98 in its exposed end. A flexible conduit 99 having insulated leads 100 therein, extends through a vertical aperture 101 in the arm 93, the leads 100 being connected to contact members 98. The flexible conduit 99 is enclosed within a metal tube 102, disposed alongside the main burner conduit 70. This tube 102 is secured to the main mixing tube 70 by the clamps 89. The leads 100 at their outer ends are connected to a thermopile formed by a plurality of thermocouples 103, positioned about the periphery of the pilot burner tip, the thermocouples and the thermopile are constructed in the form of a unit 104, which is secured to one side wall of the air duct 75' by the screws 105. The contacts 98 engage the spring pressed contacts 64 of the permanently mounted terminal block 63 when members 7 and 8 are coupled together, and thus electrically connect the thermopile to leads 58 and thereby in a series circuit with the magnet of the valve 50 and the controlling room thermostat 55.

The removable extension member 8 is detachably connected to the stationary member 7 by means of a latch 107 pivotally secured to cross-arm 13 by means of a hinge pin or bolt 108. The hooked end of latch 71 is adapted to engage a grooved portion of a pin or bolt 109 threaded into the laterally extending arm 93. The latch when positioned as shown in Figures

1 and 3, effectively clamps the two units together. A spacer pin 110 threaded in member 93, together with the shoulder 28 of spacer supply conduit 24 and shoulder 42 of the pilot gas supply member 32 cooperate to maintain the members 7 and 8 in proper spaced relation when assembled. These two spacer members are on opposite sides of the latch 107, thereby producing a stable adjustment or attachment.

The air duct 75' is provided at its open end with a flange 112 welded or otherwise secured thereto and extending transversely across the bottom thereof. A suitable form of fire door opening is illustrated in the drawings. It is defined by a sleeve or tuyère 113 having flanged ends 114 and 115. The flange 112 on the bottom of the air duct 75' is adapted, when the air duct is positioned in the fire door opening and rests upon the sleeve 113, to abut against the flanged end 114 of the said sleeve 113.

A plate 116 of metal or of transite or like insulation having an opening or slot 117, conforming substantially to the rectangular configuration of the top and side walls of the air duct 75', is mounted over the air duct and is positioned to overlap and engage the flanged end 115 of the fire door opening sleeve 113 and lie substantially flush with the outside wall of the heater. The plate 116 is held in place by a spring pressed latch which performs the dual function of holding the burner leg in place in the door frame or opening and of holding the plate or door 116 over the door opening. The latch is formed of a rod bent into suitable shape. The plate 116 has an aperture 118 through which a straight part of the rod 119 projects. The main body of the latch lies outside of the furnace and has a handle 120 formed at one end thereof with a depending catch portion 121. A cotter pin 122 and a cooperating washer positioned at the inner end of rod 119 prevent its detachment from plate 116. A compression spring 123 is disposed about rod 119, with one end of the spring seating against a washer abutting plate member 116 and the other end of the spring abuts handle 120. The open end of the air duct 75' of removable extension member 8 projects far enough inwardly of the fire door of the furnace that the flange 112 of the air duct engages flange 114. The flange 112 might obviously be carried on an extension. The plate 116 is then mounted over the air duct and positioned to engage the outside wall of the furnace in which position the rod 119 is pushed toward the furnace by means of the handle 120 to compress spring 123. An aperture 123' is then made as by drilling in the top of the air duct to form a socket for depending portion 121 which is caught and held thereby.

It will thus be seen that the removable extension member 8 may be readily initially fitted to the individual furnace and installed in operative position with the stationary member and furnace. Thereafter it may be removed therefrom or reapplied thereto with a minimum of effort and inconvenience.

The operation of the gas burner of my invention is as follows, assuming that the removable extension member 8 is coupled to stationary member 7 and both installed in operative relation. The gas is turned on at a shut-off cock which is located in the pipe 19.

The spring operated valve 35 is in open position by reason of the valve button 36 being depressed by abutting boss 96', so that gas may be supplied to the pilot light burner upon opening of hand cock valve 38. It is to be understood, however, that the latter valve may be omitted if desired and admission of gas may be controlled only by the cock located in the gas supply pipe 19. Assuming that valve 38 is open, gas will flow through the conduit 37, valve 35, pilot gas supply member 32 through conduit 88 to the pilot burner 91. The pilot is then lighted. The heat from the pilot energizes the thermopile 103. Cover plate 116 is then placed in position in the manner already described. The room thermostat 55 is connected by leads 59—58 in series with the electromagnet 50 and the thermopile 103. If the temperature in the room is below the desired predetermined temperature the thermostat contacts will close and the electromagnet will be energized causing the gas valve 18 to open and gas will flow to the main burner 57, whereupon the gas will be ignited by the pilot burner. When the room is heated to the desired temperature, the thermostat contacts will open deenergizing the electromagnet, causing the gas valve to close and shut-off the supply of gas to the main burner.

If the pilot light should for some reason be extinguished, current will no longer be generated in thermocouples 103, which provides the source of electrictiy for energizing the electromagnet 50, and the valve 18 will close and remain closed until the pilot is reignited, regardless of the action of the room thermostat.

If the removable extension member 8 is removed or becomes dislocated while the burner is in commission, it will be noted that the head 36 of the valve 35 will be released and the valve will be closed by spring means therein normally tending to close the valve. In addition, the electrical connection of the thermopile with the electromagnet through contacts 98 and 64 and thermostat 55 will be broken and the electromagnet 50 will be deenergized, causing the valve 18 to close. It will thus be apparent that gas cannot escape into the atmosphere through the valve 18 from the manifold 19 and further, gas cannot escape through the pilot gas supply member 32 because the valve 35 will be closed. It is desirable, however, to provide a hand operated valve in gas manifold 19, so that supply of gas to the stationary member may be completely shut off when the gas burner is not in service.

The rate of burning gas at the main burner may be regulated by varying the size of the orifice of the burner tip 29. The primary air may be controlled by adjustment of the air regulating plate 25 toward and away from the bell 73. The secondary air is regulated by adjusting the shutters 78—78.

The gas orifice and the primary air inlets of the pilot burner are fixed as no adjustment is necessary. However, different size orifices for the gas flow of the pilot may be utilized by changing the nozzle plug 39. Likewise the position of the plug 39 may be changed to obstruct more or less the air inlet ports 43.

While I have shown a thermopile as the preferred thermo-sensitive element and also as the preferred source of electric current, this is not the only way to secure the desired control of the main burner or to effect thermostatic control.

The advantages of this form of control are the fact that no external source of current is necessary. The low voltage avoids fire hazard or risk of injury to persons. Outage of the pilot cuts off

current flow and automatically closes the gas valve. No contacts in the heating zone are required. A separate source of current and a thermally controlled resistance might be employed instead of the thermopile. Also if desired a thermostat subject to the pilot flame might be employed. Any other form of safety device depending upon the pilot may be employed. Likewise any desired form of room thermostatic control may be utilized.

The convenience of removal and installation of the removable part and the permanence and trouble free character of the permanent part are pronounced advantages of the present invention. The inherent safety which the device provides is a further feature of advantage.

While I have shown the main body of the burner and the extension as separated on the plane of the gas orifices this is preferred but not essential. The division may be made beyond the gas nozzles if desired.

It is contemplated that other ignition means than a pilot may be employed in conjunction with the main burner. Thus if electric ignition be utilized the primary circuit may be cut through the junction between the main body and the extension and the control thereof be under a room thermostat. The ignition may be cut off by a thermostat subject to the heat of the flame.

The bridging of the terminals 64—64 to close the magnet valve and room thermostat circuit may be controlled by a thermo-expansive element carried on the extension member 8. Thus if the extension is removed or if the pilot is out the main valve 18 cannot be opened.

The removability of the extension and the disposal of the part which is permanently installed out of the way of the fire door are primary advantages.

While I have shown and described the preferred embodiment of my invention, it is to be understood that such is merely exemplary of my invention and that numerous modifications and rearrangements of parts may be made without departing from the essence of the invention.

I claim:

1. A gas burner of the class described comprising two parts with quick detachable couplings joining the parts when the burner is in service, one part comprising a body adapted to be permanently attached to a fixed support, said body having a permanent gas supply connection and a gas discharge nozzle, the other part constituting an extension of the body and comprising a secondary air duct, a mixing tube and burner head, said burner head and the outlet end of said air duct being adapted to be disposed within the combustion space of a furnace, means adapted for releasably mounting the extension adjacent the burner head and the outlet end of the secondary air duct upon the furnace, and quick detachable coupling means for connecting the inlet end of the mixing tube in operative relation to the gas discharge nozzle.

2. For use with a furnace having a side wall, a combustion space and a firing opening through the side wall leading into the combustion space, a two part gas burner comprising the combination of a stationary support adapted to be disposed adjacent but out of line with said opening, one part consisting of a main body having a permanent gas supply connection and a gas discharge nozzle, said body being attached permanently to said support, the other part consisting of an angularly disposed extension comprising a mixing tube and burner head, means for releasably mounting the burner head within the combustion space, said means including a cover plate for closing said opening, and means for detachably connecting the mixing tube to the body and in operative relation to the gas discharge nozzle.

3. A gas burner of the class described comprising two parts connected by a quick detachable coupling, one part comprising a body with means for permanently mounting the same, said body having a permanent gas supply connection, a main burner gas discharge nozzle and a pilot gas discharge nozzle, the second part comprising a removable extension comprising a main burner mixing tube with a burner head, and a pilot burner mixing tube and a pilot burner head, said tubes and heads being coupled together in fixed relation, a thermally responsive element subject to the pilot flame and carried by the extension, and a main shut-off valve automatically connected by said thermally responsive element to cause closure of the valve when pilot burner is out or when the extension is removed from the body.

4. In a gas burner, the combination of a stationary member comprising a valve for controlling flow of gas therethrough permanently connected to a source of gas supply, means for actuating said valve permanently connected thereto, a removable tubular extension member adapted to be detachably connected to said stationary member in fluid conveying relation therewith, and means carried by said removable extension member and operative when said removble extension member and said stationary member are coupled together for controlling said first mentioned means.

5. In a gas burner, the combination of a stationary member comprising an electrically operated valve adapted to be disposed in a gas supply conduit, pilot gas supply means, and a thermostat for actuating said valve adapted to be permanently connected thereto, a removable extension member comprising a main burner conduit, a burner head therefor, a pilot burner and supply conduit therefor, and a thermally responsive member for supplying current to control opening of said valve, means detachably connecting said extension member to said stationary member, means operable upon connection of said extension member to said stationary member for supplying gas to said pilot burner, and means electrically connecting said thermally responsive member and said thermostat when said extension member is connected to said stationary member whereby said thermostat is adapted to operate said valve.

6. A stationary member for a gas burner of the character described comprising an electrically operated main supply valve permanently connected to a source of gas supply, a thermostatic control for opening and closing said valve permanently connected thereto, a pilot gas supply conduit, a second valve normally held closed for controlling flow of gas through said pilot supply conduit, and electrical connecting means whereby said thermostatic control is adapted to open and close said first valve.

7. In a gas burner adapted for use in a furnace having a fire pot provided with a fire door, the combination of a stationary member mounted adjacent to and laterally of the fire door opening of said furnace and permanently connected to a source of gas supply, a substantially L-shaped removable extension member detachably connected at one end thereof in operative

relation with said stationary member to receive gas therefrom, the opposite end of said extension member extending into the fire pot of said furnace and means for releasably mounting said opposite end in position within said fire door opening.

8. For use with a furnace having a fire door opening, the combination of an air duct adapted to be mounted in said fire door opening and extending into the furnace, a flange carried by said air duct and adapted to engage the inside of the wall of the furnace, a cover plate for said fire door opening mounted over said air duct and adapted to engage the outside of the wall of said furnace, means carried by said cover plate engaging said air duct to bias said cover plate against said outside wall of the furnace to detachably secure said air duct in position within said fire door opening and means for conducting gaseous fuel through said air duct.

9. In a gas burner, the combination of a stationary member comprising a valve permanently connected to a source of gas supply, a detachable extension member comprising a main burner conduit, a thermally responsive element carried by said extension member, and means whereby said thermally responsive element is adapted to control flow of gas through said stationary member when said extension member is operatively coupled thereto, and means for automatically shutting off flow of gas through said stationary member when said extension member is detached.

10. In a gas burner, the combination of a stationary member comprising a valve connected to a source of gas supply, a removable extension member comprising a main burner conduit, a thermally responsive element carried by said extension member, means for detachably connecting said stationary member and said extension member in operative relation, and means whereby said thermally responsive element is adapted to control flow of gas through said stationary member when said extension member is connected to said stationary member.

11. In combination with a furnace having a side wall, a combustion space and a door frame leading into the combustion space of a gas burner comprising two parts connected by a quick detachable coupling, one part comprising a body with means for permanently mounting the same, said body having a permanent gas supply connection, and a main burner gas discharge nozzle and a pilot gas discharge nozzle, the second part comprising a removable extension comprising a main burner mixing tube with a burner head, and a pilot burner mixing tube and a pilot burner head, said tubes and heads being coupled together in fixed relation, and means adapted for releasably mounting said extension member adjacent said main burner head and said pilot burner head within said door frame, said means including a cover plate for closing the opening defined by said door frame.

12. In a gas burner of the character described, the combination of a stationary member comprising an automatic shut-off valve adapted to be permanently connected to a source of gas supply, a removable extension member comprising a fluid conducting conduit, safety pilot means for controlling said shut-off valve carried by said extension member, quick detachable coupling means connecting said removable extension member to said stationary member in fluid conveying relation, and means adapted to connect said safety pilot means to said automatic shut-off valve for opening and closing the same when said extension member and said stationary member are connected together.

13. For use with a furnace having a fire door opening, the combination of an extension member comprising a gas supply manifold, a burner head and a secondary air duct, said burner head and the outlet end of said air duct being adapted to be disposed within the combustion space of said furnace, a cover plate for closing said fire door opening, said cover plate having an opening through which said extension member is adapted to extend into the furnace, and means associated with said extension member and said cover plate to connect said cover plate to said extension member and to bias said cover plate against the wall of the furnace.

14. In a gas burner the combination of a stationary member comprising a valve for controlling flow of gas from a source of gas supply, a removable tubular extension member adapted to be detachably connected to said stationary member, means for delivering gas passed by said valve to one end of the tubular extension, and means carried by said removable extension member and operative when said removable extension member and stationary member are coupled together for controlling said valve.

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