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P. J. PATCH

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GAS BURNER AND PILOT

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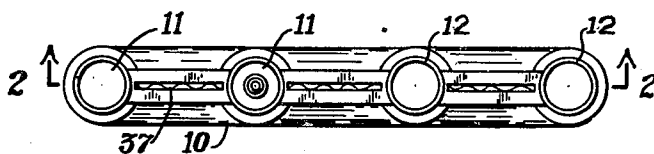


Fig. 1

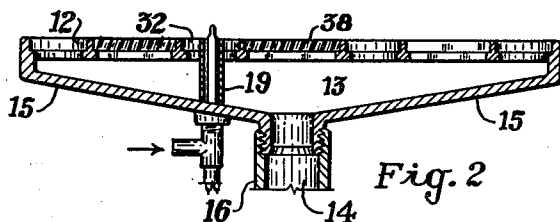


Fig. 2



Fig. 6

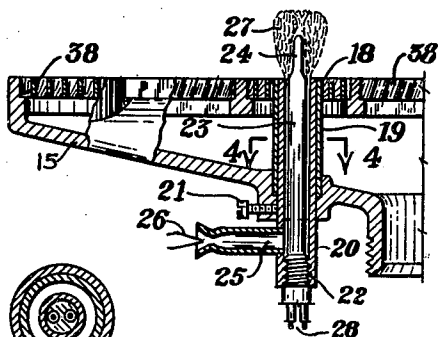


Fig. 3

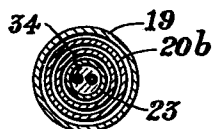


Fig. 8



Fig. 4

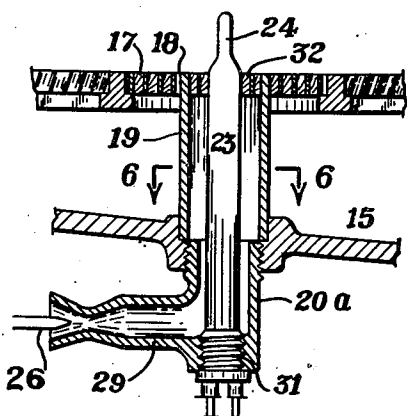


Fig. 5

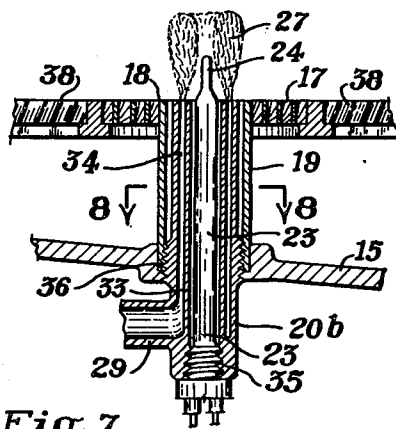


Fig. 7

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## UNITED STATES PATENT OFFICE

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## GAS BURNER AND PILOT

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This invention relates to improvements in gas burners and pilots of the type employed in connection with heating installations more particularly in connection with the heating of residences.

In the heating of buildings with gas it is customary to employ multi-flame furnaces, each flame being connected with a flue.

It is, of course, essential that the flame must always be kept alive, for otherwise the thermostats will open the gas valves and fill the furnace, and sometimes the building, with gas, for which reasons destructive explosions might occur.

Practically every gas installation of the automatic control type is provided with a pilot flame that is constantly burning and which assures that the gas for the main flame of the burner will always be ignited when the gas is turned on by the automatic thermostatic control mechanism.

In addition to the pilot flame, the main burners are interconnected by narrow slots forming burners which carry the flame from the pilot burner to the main burners and ignite the gas from the pilot flame.

Every burner must, of course, be provided with an automatic means for turning off the gas to the pilot burner and to the main burners as well in case the pilot flame for any reason is extinguished. It has been customary to employ a bimetallic switch mechanism for cutting off the gas to the burners when the pilot flame becomes extinguished. The bimetallic thermo-responsive valve control has now been superseded in many places by a thermal couple positioned adjacent the pilot flame to receive heat from it as long as it is burning. If the pilot flame, however, becomes extinguished, the current generated by the thermal couple decreases and reaches a point below a predetermined value, a valve, responsive to the current generated by the thermal couple, will close, cutting off the supply of gas to the burners by rendering the control mechanism inoperative for the purpose of turning on the gas in response to the thermostats.

As all of the mechanisms and means referred to above are old, they have not been illustrated, but attention has been called to them for the purpose of more clearly describing the present invention.

It is the object of this invention to produce a pilot flame assembly of an improved construction that permits of ready replacements and substitution of parts, in case the same becomes inoperative due to a mechanical or electrical defect.

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More specifically, it is the object of this invention to produce a pilot burner assembly and construction that can be entirely removed from the main burner without affecting the operation of the main burner, so far as the combustion of fuel is concerned, and in which the thermal couple or other heat responsive element forms a part of the pilot burner assembly, in such a way that it can be quickly and easily removed and replaced, in case necessity should arise, without in the least interfering with the operation of the main burner.

A further object of the invention is to provide a burner having associated therewith a tubular member which forms an integral part of the burner structure and into which the pilot burner assembly can be inserted.

A still further object is to produce a pilot burner assembly of a very simple construction, in which the pilot flame entirely surrounds the thermal couple so as to always assure the transfer of heat thereto.

Where a thermo-responsive device, such as a thermal couple or bimetallic switch element is positioned adjacent to, but to one side of, the pilot flame, the latter may be diverted by air or gas currents in such a way as to prevent it from transmitting the necessary amount of heat to the thermo-responsive device. By positioning the thermo-responsive element within a hollow flame, it is obvious that it will always receive heat from the flame, regardless of the presence or absence of gas currents.

Having thus set out some of the objects of this invention, the invention itself will now be described in detail and for this purpose reference will be had to the accompanying drawing in which the invention has been illustrated in its preferred form and in which:

Figure 1 is a top plan view of a typical gas burner of the type employed in heating installations;

Figure 2 is a section taken on line 2—2, Figure 1, and shows the position of the pilot burner assembly with relation to the burners and the burner body;

Figure 3 is a fragmentary section to an enlarged scale, showing one form of pilot burner construction;

Figure 4 is a section taken on line 4—4, Figure 3;

Figure 5 is a fragmentary section similar to that shown in Figure 3 and shows another form of pilot burner construction;

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Figure 6 is a section taken on line 6—6, Figure 5;

Figure 7 is a fragmentary section similar to Figures 3 and 5 and shows another specifically different form of pilot burner construction and assembly; and

Figure 8 is a section taken on line 8—8 Figure 7.

In Figure 1 reference numeral 10 designates the hollow body of the burner and reference numeral 11 designates the burner head sockets in which the burner heads or nozzle elements are positioned.

In the present drawing four burner head sockets have been shown, each of which is circular and provided with a shoulder 12 on which a burner head or nozzle element rests. The burner body is hollow and the chamber therein has been designated by reference numeral 13. A threaded nipple 14 is provided at the central portion of the bottom wall 15 and this is connected to the upper end of a throat mixer 16 which may be either an atmospheric mixer or an air pressure mixer. Since both of these types of mixers are old and well known, they have not been illustrated in the drawing.

A nozzle 17 of each multiple flame burner is provided with a central circular opening which has been designated by reference numeral 18 in Figures 3, 5 and 7. A tube 19 is positioned in coaxial relation with one of the burner head sockets and has its lower end connected with the bottom wall 15 of the burner body. Wall 15 is provided with an opening that communicates with the interior of tube 19. Although the interior of tube 19 communicates with the atmosphere below the burner body, no gas can escape downwardly as the tube has an airtight seal with wall 15. The pilot burner assembly to which this invention relates, is positioned within tube 19 and will now be described in detail.

In Figure 3 the pilot burner assembly has been shown as consisting of a tube 20 that has an external diameter slightly less than the inside diameter of tube 19 and which can be inserted into tube 19 from the bottom. Tube 20 is held in position by means of a set screw 21 or other mechanical equivalent means. The lower end of tube 20 has an internal thread 22. Positioned within tube 20 and spaced from the inner wall thereof, is the tubular body 23 of the thermo-responsive element which is provided at its upper end with a thermal couple hot junction 24. A throat mixer tube 25 is communicated with an opening in the wall of tube 20. Gas is directed into this throat mixer by means of a jet 26. The gas from the jet 26 mixes with air in the throat tube 25 and the mixture flows out between the tubular member 23 and the inner surface of tube 20 emerging in an annular stream which, when ignited forms a hollow flame 27 that surrounds the thermal couple junction 24. The two wires that have been designated by reference numeral 28 are the terminals of the thermal couple and extend to a valve control mechanism that has not been shown.

As long as the gas is ignited, forming the hollow flame 27, the thermal couple generates the current necessary to retain the control valve in open position, but if this flame is extinguished, this valve, which has not been shown, will close, thus assuring that no dangerous admission of unburned fuel will be delivered to the furnace when the pilot flame is not burning.

In Figure 5 a slightly modified form of pilot

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burner assembly has been shown. This view has been drawn to a somewhat larger scale and shows a construction in which tube 20 has been replaced by an upwardly extending tubular portion 20a of a fitting resembling a T. The lateral chamber 29 forms a mixing throat into which gas is introduced by means of a jet 26. The thermal couple comprising parts 23 and 24 is introduced through a threaded opening 31 in the bottom of the T as shown in the drawing. The gas flows out between the inner surface of tube 19 and the outer surface of member 23 and forms a hollow flame entirely enclosing the thermal couple. A gas diffuser 32 may be positioned in the annular opening at the discharge end of tube 19. This may be formed from a corrugated metal strip like those designated by reference numerals 32 in Figures 2, 3 and 5.

In Figure 7 another modification has been shown. In this construction tube 20, in Figure 3, has been replaced by a double tube, the outer one being designated by reference numeral 20b. A smaller tube 33 is positioned within tube 20b and spaced therefrom forming an annular passage 34. The two tubes are interconnected at their lower ends and the interior of tube 33 terminates in a threaded opening 35 in which the thermal couple, comprising members 23 and 24, is threadedly connected.

Tube 20b is threadedly connected with the lower end of tube 19 and with the burner wall 15 at 36. It will be seen that the thermal couple can be disconnected from the tube for repair or replacement. Gas is introduced through the mixing throat 29 and emerges in an annular stream forming flame 27, as shown in the drawing.

It will be seen from the above description that the pilot flame assembly can be removed and replaced without interfering with the operation of the burner because tube 19 is part of the burner structure and prevents escape of gas downwardly. It is therefore possible to replace the thermal couple, in case this should become defective, without interfering with the operation of the main or pilot burner.

The whole pilot burner assembly is constructed so as to be assembled as a unit and so that it may be introduced into tube 19 or separated therefrom in assembled form.

The construction shown in Figure 5 is the simplest, but all of them have the common characteristic of removability and the production of an annular flame.

Although the pilot has been shown as associated with one burner of a multi-flame burner, it is evident that it can be used with a single flame burner or with any number of burners. The flame from the pilot controlled burner is transmitted to the others through the line burners 37 in which are positioned corrugated metal strips 38, the corrugations preferably extending diagonally as shown in the drawing.

The gas to the main burner can be supplied by means of an atmospheric mixing chamber or the gas and air can be introduced under pressure and mixed in the desired proportions in ways now quite common.

In the drawing and in the description, the mixing throats have been shown and described as extending laterally at an angle of substantially ninety degrees. It is to be understood, however, that the angular relation between the mixing throat and the tube is optional and that it can be inclined at any suitable angle. Where

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the character "T" is employed, it is not to be understood in a limiting sense, but broadly enough to include a "Y" fitting or any equivalent.

Having described the invention what is claimed as new is:

1. A gas burner, comprising, a hollow body having a top wall and a bottom wall, provided with axially aligned openings, the opening in the top wall being the larger, a tube having its lower end positioned in the opening in the bottom wall and its upper end in the opening in the top wall, an annular gas distributing nozzle surrounding the upper end of the tube, a tubular member forming part of a thermo-responsive device, positioned in the tube a seal between the lower end of the tube and said tubular member, the outside diameter of the tubular member being less than the inside diameter of the tube whereby an annular passageway for combustible fuel is formed, means for introducing a combustible gaseous mixture into the annular space which, when ignited, forms a tubular flame, and a thermal device at the upper end of the tubular member.

2. A gas burner comprising, a hollow body having a top wall and a bottom wall provided with aligned openings, the opening in the top wall being the larger, a tube secured at its lower end in the opening in the bottom wall, an annular gas distributing nozzle in the opening in the top wall, the upper end of the tube terminating in the opening in the nozzle, a branched fitting connected with the lower end of the tube, the lateral portion forming a mixing throat, a tubular member forming part of a thermo-responsive device threadedly connected with the lower end of the fitting and extending upwardly to a point beyond the upper end of the first tube, a thermal element at the upper end of the tubular member, and mean for introducing a combustible gaseous mixture through the mixing throat into the space between the tube and the tubular member which, when ignited, forms a tubular pilot flame that encloses the thermal element.

3. A gas burner, comprising a hollow body having a top wall and a bottom wall provided with axially aligned openings, the opening in the top wall being the larger, a tube having its lower end secured in the opening in the bottom wall, the upper end terminating in the opening in the top wall, an annular gas distributing nozzle in the opening in the top wall, surrounding the upper end of the tube, a pilot burner assembly positioned in the tube, said assembly comprising, a tube of an outside diameter slightly less than the inside diameter of the first men-

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tioned tube, inserted into the latter from below and removably associated therewith, a throat mixer extending laterally from and in communication with the interior of said second tube, a tubular member forming part of a thermo-responsive device inserted into said second tube from below and removably connected with the lower end thereof, the tubular member having a diameter less than the interior diameter of the second tube forming with the latter an annular cylindrical chamber, a thermal element at the upper end of the tubular member, and means comprising said throat mixer for introducing a combustible gaseous mixture into said annular chamber which, when ignited, forms a tubular flame enclosing the thermal element.

4. A gas burner, comprising, a hollow body having a top wall and a bottom wall provided with aligned openings, the opening in the top wall being the larger, a tube secured at its lower end in the opening in the bottom wall, the upper end of the tube terminating in the opening in the top wall, an annular gas distributing nozzle in the opening in the top wall, and a pilot burner assembly insertable into the tube from below, said assembly comprising two concentric tubes, one positioned within the other, the two tubes being connected at the bottom, the outside diameter of the inner tube being less than the inside diameter of the outer tube forming an annular cylindrical chamber, means for introducing a combustible gaseous mixture into the cylindrical chamber, a tubular member, forming part of a heat responsive device, positioned in the inner tube and removably connected with the lower end thereof, and a thermal element at the upper end of the tubular member above the nozzle, whereby when the gas from the annular cylindrical chamber is ignited it will form a hollow flame surrounding the thermal element.

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