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PILOT FLASH TUBE IGNITION SYSTEM

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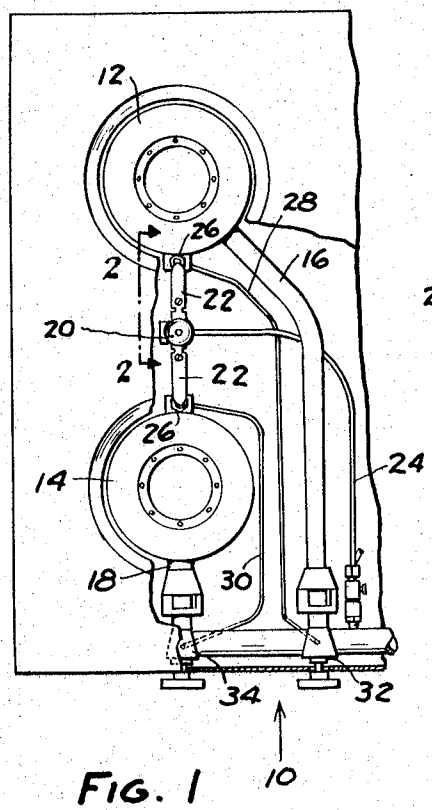



FIG. 1

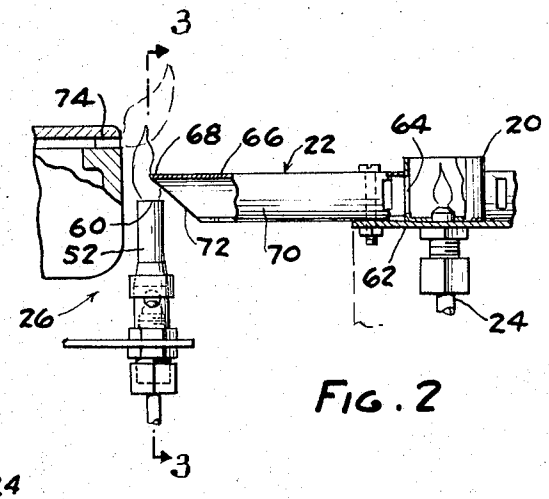



FIG. 2

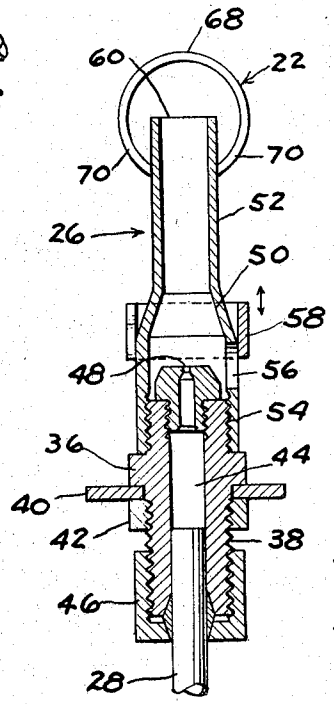



FIG. 3

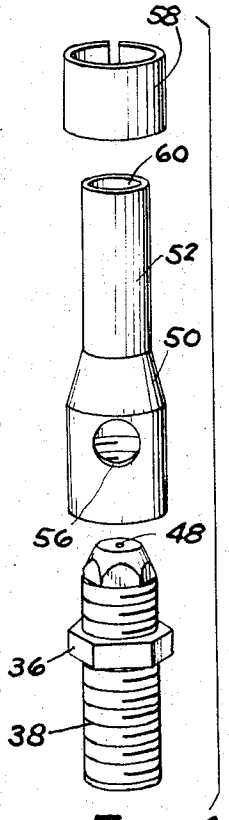



FIG. 4

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# PILOT FLASH TUBE IGNITION SYSTEM

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This invention involves a gas burner, pilot, and flash tube ignition system in a gas range or the like.

It is conventional in modern gas ranges to provide a centrally located pilot burner and flash tubes which radiate therefrom toward the individual main gas burners. A small, transitional pilot burner is provided between the outer end of each flash tube and the main burner toward which it extends. Means are provided for directing gas into the flash tube for ignition at the central pilot. The resulting flame flashes back through the central flash tube and ignites the transitional burner where gas burns at the rate of about 325 B.t.u. to 350 B.t.u. per hour to provide what is termed a "keep warm" flame. This flame is in igniting relation to gas issuing from the main burner and thus also provides a pilot flame. The pilot flame continues to burn while the main burner is in operation, thereby stabilizing the main burner flame at low turndown and the two flames together burn at a rate of about 1,225 B.t.u. to about 1,250 B.t.u. per hour to maintain what is termed a "simmer" flame.

The transitional burner is relatively small and has a small primary air inlet. When the transitional burner structure heats up as a result of use of any part of a gas range, the Venturi action by which primary air is drawn into the transitional burner changes and this results in a deficiency of primary air in the gas-air mixture at the burner port. It would be desirable to introduce this mixture into the flash tube for ignition purposes, but the mixture is so rich that it cannot be relied upon to flash back from the central pilot burner to the transitional burner. Rather, this mixture is likely to ignite and burn at the inner end of the flash tube adjacent the central pilot.

The object of this invention is to provide a simple, inexpensive, transitional burner and flash tube combination which is improved to facilitate use of the gas issuing from the transitional burner port for introduction into the flash tube and which will assure reliable flashback ignition of the transitional burner and main burner despite primary air deficiencies in the mixture issuing from the transitional burner port.

Generally, the invention contemplates extending an upper end portion of the flash tube part way over the top of the transitional burner port to scoop a part of the gas issuing from the burner port in turbulent condition into the flash tube. The flash tube has lower portions extending below the transitional burner port and being open to the air so that the turbulent air mixture entering the flash tube entrains air from the outside and compensates for the initial primary air deficiency.

One form of the invention is illustrated in the accompanying drawings.

FIG. 1 is a fragmentary generally top plan view of a gas range incorporating an ignition system according to this invention.

FIG. 2 is a fragmentary enlarged generally sectional view on line 2—2 of FIG. 1.

FIG. 3 is an enlarged sectional view on line 3—3 of FIG. 2.

FIG. 4 is an exploded perspective view of the parts of the transitional burner.

Shown in the drawings is a gas range 10 having main burners 12 and 14 furnished with a gas and air mixture through conventional Venturied mixing pipes 16 and 18 respectively. A conventional central pilot burner 20 is provided between main burners 12, 14 and a flash tube 22 radiates outwardly from pilot burner 20 toward each of the main burners. Fuel gas is furnished to the central pilot through a gas line 24. A small transitional burner 26 is provided between the outer end of each flash tube and the associated main burner.



This transitional burner may also be termed a pilot and keep warm burner since by itself it provides a keep warm flame and in addition serves to ignite the main burner. The transitional burner flame also stabilizes the main burner flame at simmer position. Transitional burners 26 are provided with fuel by gas take-off lines 28, 30 connected into valves 32 and 34 which respectively also control the flow of gas into mixing pipes 16 and 18. At a first On position of either valve, gas is furnished to its associated transitional burner 26 and at subsequent On positions of the valve, gas is also furnished to its associated main burner 12 or 14.

Each transitional burner 26 has a base 36 with a threaded extension 38 by which it is clamped to a support 40 by a nut 42 and gas line 28 is secured within an internal gasway 44 in the base by a packing nut 46 also threaded onto extension 48 as shown in FIG. 3. Gasway 44 terminates in an orifice 48 through which gas is injected into a constricted Venturi region 50 of a burner tube 52 whose lower end is threaded onto base 36 as at 54. Tube 52 is provided with a primary air inlet 56 whose effective size is adjustable by a collar 58 axially slidably disposed around the base portion of the tube. The upper end 60 of tube 54 is open to provide a burner port.

Flash tubes 22 are anchored to a support 62 adjacent central pilot burner 20, and the inner ends 64 of the flash tubes are open to pass a gas-air mixture from port 60 to the central pilot flame for ignition. Flash tube 22 has an upper wall portion 66 whose end 68 is spaced above and extends about half way across the diameter of burner port 60 at the top of transitional burner tube 52 as shown in FIGS. 2 and 3. Also, as shown therein, tube end 68 is spaced vertically above tube end 60 by about half of the diameter of tube 22. Thus, tube 22 has lower wall portions which extend below burner port 60. The outer ends of the lower wall portions are spaced horizontally from burner tube 52 to provide an opening 72 below and to one side of burner tube 52 (FIG. 2).

In use, it may be assumed that central pilot burner 20 is in operation but that all other burners associated with gas range 10 are turned off so that all parts of the main burner and transitional burner system are at room temperature. To turn on one of the main burners such as burner 12, valve 32 is operated to admit fuel gas into line 28 from which it issues from orifice 48 into burner tube 52. The Venturi action at restriction 50 causes inspiration of primary air through inlet 56.

The gas-air mixture flows out of burner port 60 and some of it is scooped into flash tube 22 by tube end 68. This gas flows through flash tube 22 through the open inner end 64 thereof into igniting relation with the central pilot flame. The gas ignites and flashes back to ignite the fuel gas flowing out of burner port 60. Assuming that valve 32 has been operated to admit fuel gas into mixing tube 16, the flame at port 60 ignites the fuel gas flowing out of porting 74 in burner 12.

During operation of any of the main top burners of the range such as burners 12 or 14 or operation of an oven (not shown) underlying the top burner section, the parts of transitional burner 26 become warmed or heated and this changes the Venturi action at constriction 50 resulting in a deficiency of primary air inspirated through opening 56. Then, upon operating a valve 32 or 34 to ignite a main burner, the fuel mixture issuing from transitional burner port 60 is so rich in fuel gas that this mixture would not reliably flash back from the central pilot flame through

tube 22 for igniting the main burner. Rather, it would very likely burn at inner end 64 of the flash tube.

With the present construction, however, the mixture scooped into tube 22 by tube end 68 becomes turbulent as a result of the scooping action. The turbulent mixture entrains additional air through opening 72 and leans out sufficiently to insure flashback when the mixture is ignited at the central pilot flame. Thus, the present construction insures reliable igniting of the main and transitional burners even though the transitional burner structure 26 may be warmed by heat emanating from various burners in the gas range.

In practice, it has been found that even though enough air is entrained at opening 72 to lean out the richer mixture which occurs when the system is hot, not too much air is entrained at opening 72 to interfere with flashback ignition of the leaner mixture obtained when the system is cold. Thus, reliable ignition occurs regardless of whether the system is at room temperature or heated. It is theorized that the mixture adjacent the top of flash tube 22 is relatively rich in fuel gas; the mixture adjacent the bottom is relatively lean in fuel gas; and in between, there is an infinite variation in the richness. Somewhere within this range of variation, conditions are right to promote flashback ignition of the transitional pilot burner from the central pilot flame.

It is important that upper end 68 of the flash tube extend far enough over burner port 60 to scoop some of the fuel mixture into the flash tube for ignition purposes. However, if end 68 were to extend too far over port 60, the mixture issuing from inner end 64 of the flash tube would be rich enough in fuel gas to ignite and burn at that point. Alternatively, if flashback were obtained under these conditions, enough of the products of combustion from the transitional pilot burner flame might be scooped into flash tube 22 to smother the central pilot flame.

Very good results have been obtained in actual practice of the invention where upper tube end 68 extends about half way across burner port 60 and port 60 is located at about the horizontal center line of flash tube 22. End portions 72 of flash tube 22 need not have the tapered configuration shown so long as an opening is provided downwardly and to one side of burner port 60 for the entrainment of air. However, the tapered shape is convenient in manufacture and in practice may be preferred for that reason.

I claim:

1. In a gas range having a main burner; a main pilot burner and associated flash tube; and an intermediate pilot-and-keep-warm burner in the form of a tube having one end communicating with a source of fuel gas under pressure, another end with an upwardly directed burner port in igniting relation to said main burner, and means providing a primary air inlet between said ends;

improved structure wherein said flash tube has an upper wall portion and lower wall portions,

said upper wall portion having an end portion which is spaced vertically above said burner port,

said end portion extending over a portion only of said burner port,

the angle between the axis of said port and the direction of extent of said end portion, and the spacing between said port and end portion, being so related that fuel mixture issuing from said portion of said port is caused to impinge against said end portion at an abrupt angle and with a velocity adequate to turbulate and divert said mixture into said flash tube in sufficient quantity to support combustion,

said lower wall portions defining an opening below and spaced horizontally from said burner port into which air is entrained by the flow of the mixture diverted into said flash tube.

2. The improved structure defined in claim 1 wherein said end portion of said upper wall portion of said flash tube extends substantially one half of the distance across the diameter of said burner port.

3. The improved structure defined in claim 2 wherein said burner port is substantially aligned with the central axis of said flash tube, said burner port having an axis which is substantially perpendicular to said axis of said flash tube.

4. The improved structure defined in claim 1 wherein said burner port is substantially aligned with the central axis of said flash tube.


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