Dec. 22, 1959 J. T. ALGER 2,918,119

PILOT BURNER ASSEMBLY

Filed Sept. 28, 1954

Fig. 1

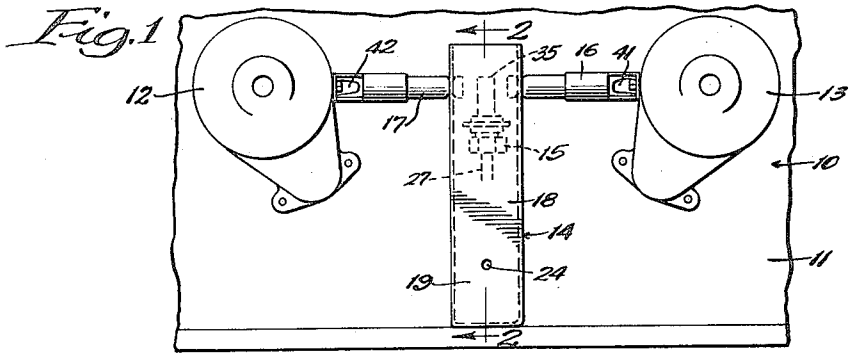


Fig. 2

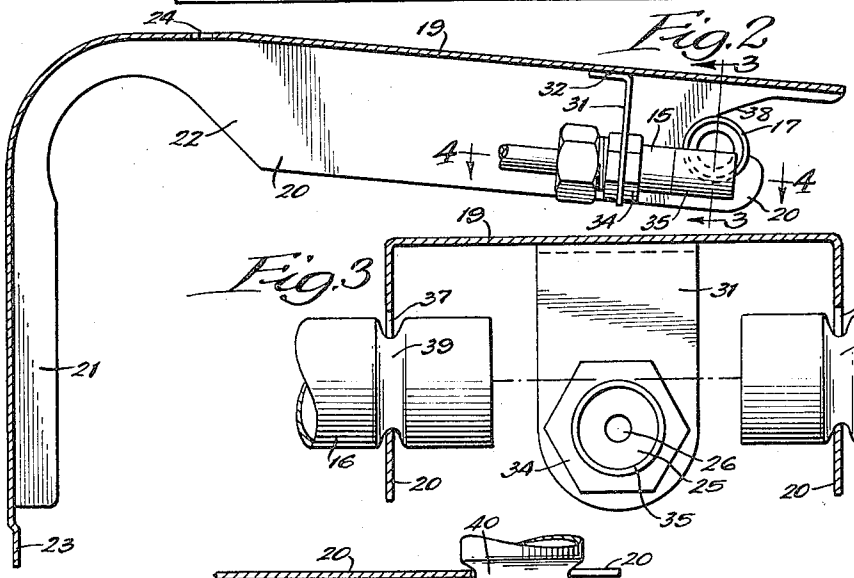
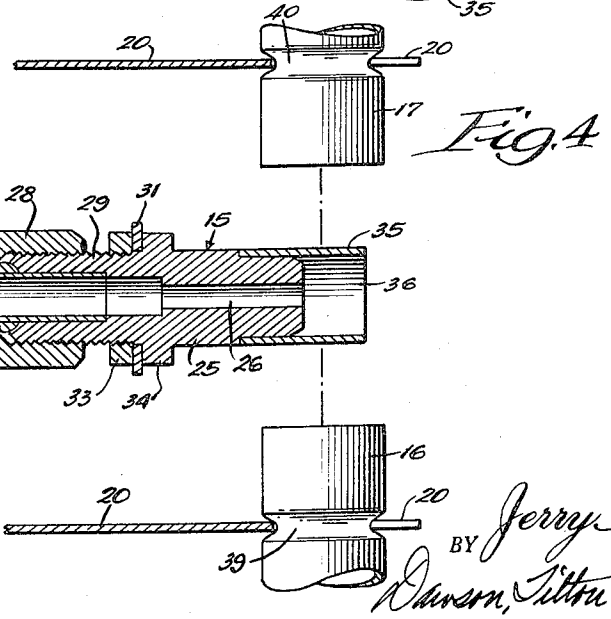


Fig. 3

Fig. 4



INVENTOR:
BY Jerry T. Alger,
Dawson, Tilton & Graham,
ATTORNEYS.

United States Patent Office 2,918,119
Patented Dec. 22, 1959

2,918,119

PILOT BURNER ASSEMBLY

Jerry T. Alger, Chicago, Ill., assignor to Cribben and Sexton Company, Chicago, Ill., a corporation of Illinois

Application September 28, 1954, Serial No. 458,793

4 Claims. (Cl. 158—115)

This invention relates to a pilot burner assembly and more especially to such an assembly that is useful in kitchen ranges and similar stove structures.

As is well known, a pilot burner assembly has for its function the ignition of the combustible gas at the main burners of a range whenever gas is supplied to those burners. This function is accomplished by providing the pilot burner with a limited supply of gas that is ignited and burns as a small but continuous flame. The assembly is equipped with conduit means extending between the pilot burner and main burners and when gas is supplied to a main burner a portion thereof flows through the conduit means to the pilot burner and is exploded. The explosion returns through the conduit means to the main burner and ignites the gas present at that burner.

In a sense the continuous burning of the pilot flame is inefficient and wasteful for the open pilot flame is only required during the limited periods of ignition of the main burners. Further, the continuous flame, though small, creates heat that must be dissipated. Desirably, then, the flame is kept as small as possible, or stated another way, the B.t.u. output of the pilot burner should be minimized as much as possible with the result that less fuel will be consumed and less heat will be developed. However, the flame must be great enough to maintain itself in the environment of a kitchen and, further, it must be great enough so that it is not extinguished by the explosions that occur during ignition of the main burners.

There exists a need for an improved pilot burner assembly that will provide a reliable pilot flame while consuming substantially reduced quantities of gas and producing less heat than known pilot burners, and it is accordingly an object of this invention to provide such an improved pilot burner assembly. Another object of the invention is to provide a pilot burner assembly wherein the pilot flame is used to heat and expand the combustible gas prior to the ignition thereof, whereby less gas is consumed with a resultant saving in fuel and whereby less waste heat is developed. Further, in this system a portion of the normally waste heat is utilized in expanding the gas.

Still another object is in providing a pilot burner flame pattern that is related to the explosion conduits and to the pattern of the explosion waves that issue therefrom in a manner such that the pilot flame, even though it consumes less gas, is not extinguished or blown out by the explosions that occur in igniting the main burners. A further object is to equip a pilot burner at the ignition end thereof with a shield forming an extension of the burner and that provides an expansion chamber therein, the pilot flame being effective to heat the shield and the gases expanding thereinto, whereby a given volume of gas consumed by the pilot flame has a smaller B.t.u. value than an equal volume of the gas prior to the expansion thereof.

Still a further object is to orient explosion tubes extending between the pilot and main gas burners with respect to the pilot flame so that the explosion patterns at the mouths of the tubes do not cross the center line of the pilot flame. Additional objects and advantages will appear as the specification proceeds.

An embodiment of the invention is illustrated in the accompanying drawing, in which

Figure 1 is a broken top plan view of a kitchen range showing the location of a pair of main burners with respect to a pilot burner assembly embodying the invention; Fig. 2 is a longitudinal sectional view taken on the line 2—2 of Fig. 1; Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 2; and Fig. 4 is a longitudinal sectional view of the pilot burner taken on the line 4—4 of Fig. 2.

The stove assembly 10 illustrated in the drawing may be substantially conventional and made in accordance with the usual kitchen range designs. The range or stove may incorporate the customary catch tray 11 that has positioned thereover a pair of main gas burners 12 and 13. The burners 12 and 13 may be mounted on the stove in any suitable manner and will have conduits communicating therewith that carry combustion gas to the burners. It will be appreciated that control valves will be positioned in the conduits and that suitable manual control knobs will be provided for opening and closing the valves to selectively supply combustion gas to the burners.

Interposed between the burners 12 and 13 is the pilot burner assembly that is designated generally with the numeral 14. The assembly 14 comprises a pilot burner 15, a pair of explosion conduits or channels 16 and 17, and a bracket or heat dissipater 18. The bracket or heat dissipater 18 comprises a generally U-shaped channel member having a top wall 19 and depending side walls 20. The channel member is turned laterally intermediate the ends thereof to provide a substantially vertical leg 21 and the main leg 22 that is generally horizontal, but that slopes inwardly and downwardly toward the explosion tubes 16 and 17. The bracket 18 may be secured to the stove 10 in any suitable manner and, for example, a clip member 23 may be provided adjacent the end of the leg 21 that will be tack welded or otherwise secured to the range frame or panels thereof. If desired, the bracket may be provided with an aperture 24 therethrough that is adapted to receive a screw that will be threadedly received within a threaded opening provided by a portion on the range frame. It is apparent from the drawings the bracket member or heat dissipater 18 provides a relatively large surface area that is adapted to conduct heat developed at the pilot burner 15 to the outer panels of the range 10 where it will be dissipated.

The pilot burner 15 comprises a nozzle 25 that is provided with a longitudinally extending bore or passage 26 therethrough. If desired, the passage 26 may be stepped, as illustrated best in Fig. 4, or it may be a continuous passage of substantially uniform diameter throughout its length. A flow conduit 27 is in open communication with the passage 26 and is adapted to carry a combustible gas to the nozzle 25. The conduit 27 is received within an enlarged end portion of the passage 26 and is tightly and sealingly secured within that enlarged passage portion by a fitting or nut 28 that is threadedly received upon the threaded end portion 29 of the nozzle and that engages an enlarged portion 30 of the conduit 27 to draw it tightly against the end of the nozzle. Preferably the nozzle and entire pilot burner assembly is supported upon the bracket 18 beneath the upper surface 19 thereof and between the depending side walls 20 by a hanger 31 that is generally L-shaped and that is rigidly secured to the top wall 19 of the bracket by any suitable means such as by the spot

welds 32, shown best in Fig. 2. The hanger 31 will be provided with an opening therethrough that receives the rear end portion of the nozzle 25 and a lock nut 33 that is threadedly received upon the threaded end portion 29 of the nozzle is adapted to rigidly lock the hanger 31 between itself and the shoulder or abutment 34 provided by the nozzle 25 for that purpose.

Rigidly secured to the outlet end of the nozzle 25 is a shield or sheath 35 that is preferably cylindrical and extends outwardly beyond the end portion of the nozzle. The shield 35 provides expansion chamber 36 therein into which the combustible gases expand as they are emitted from the outlet end of the passage 26. The shield 35 may be formed from any suitable material and preferably is metal that has good heat conducting properties. I prefer to use stainless steel for the shield 35 and have had excellent results when using that material. It will be appreciated, however, that other metals may be employed and, for example, Monel metal might be used, aluminum (but preferably not where bottled gas is the fuel being consumed), etc.

As is seen best in Figs. 3 and 4, the depending side walls 20 of the bracket or heat dissipater member 18 are provided with aligned openings 37 and 38 therethrough that receive respectively therein the explosion tubes 16 and 17. The openings 37 and 38 may be slot-like openings into which the explosion tubes are easily inserted and I prefer to employ openings of this character, as is shown in Fig. 2. The conduits 16 and 17 are freely supported within the openings 37 and 38 respectively, and preferably the conduits are provided with restricted areas 39 and 40 that are axially received within the openings within the walls 20. The restricted areas 39 and 40 and particularly because of the large conduit areas adjacent thereto, prevent longitudinal movements of the tubes 16 and 17 relative to the depending side walls 20 of the bracket 18. At their opposite ends the tubes 16 and 17 are supported upon the hangers 41 and 42, as is seen best in Fig. 1. The hanger members are rigidly secured to the main burners and extend outwardly therefrom toward the pilot burner assembly 14. The tubes 16 and 17 are provided at their outer ends with openings that are adapted to receive the hanger members therein. The hanger members are effective to support the outer ends of the tubes and each of the hanger members is provided with an opening therethrough that communicates with the flow passages through the tubes 16 and 17 and also with the flow chambers within the burners 12 and 13. Thus, when gas is supplied to the burners, a portion thereof flows through the hanger members and into the explosion conduits where it is carried toward the pilot burner 15 and is ignited for subsequently igniting the supply of combustible gas present at the main burners.

It can be seen best in Fig. 3 that the center line through the tubes 16 and 17 is substantially in line with the top of the shield 35. At the same time, the lowermost edge of the tubes 16 and 17 is only slightly below the longitudinal axis of the sleeve or shield 35 and that axis is also the central axis of the nozzle 25 and passage 26 therethrough. Horizontally, as is shown best in Fig. 4, the tubes 16 and 17 are substantially in line with the shield 35.

In operation of the structure a combustible gas is supplied through the conduit 27 to the nozzle 25 of the burner assembly 15. Preferably a suitable control valve (not shown) will be incorporated in the conduit 27 so that the actual volume of gas delivered to the pilot burner 15 can be regulated. The gas will issue from the outlet end of the passage 26 and will expand into the expansion chamber 36 provided about the discharge end of the nozzle 25 by the shield 35. The gas will be ignited and will provide a pilot flame that appears and stabilizes at the outer end of the shield 35. It will be appreciated that the pilot flame will burn upwardly and will extend above the upper surface of the shield 35.

Thus the pilot flame will heat the shield 35 and since it is formed from a material that is a relatively good heat conductor, the heat assumed thereby will be carried back to the end of the nozzle 25 and will also be transferred to the combustible gas that is present within the chamber 36. Thus the gas within the chamber 36 upon being heated will expand and will assume a much greater volume than it had initially. Because of this expansion, the heat developed by the pilot flame will be substantially reduced for an expanded gas providing a predetermined volume at a given pressure will have a much smaller B.t.u. rating than will an equal volume of the same gas when the gas is at a much lower temperature and has the same pressure as the expanded gas. For example, if a cubic foot of a certain gas at a certain temperature and pressure has a B.t.u. value of 1020 and that gas is then elevated to a higher temperature, the same volume of the gas, that is, a cubic foot at the same pressure will have a much smaller B.t.u. rating, for in effect, the latter cubic foot of gas will comprise only a portion of the initial cubic foot of gas that was at the lower temperature.

The flame of a pilot burner will be regulated to consume a certain volume of gas in some predetermined time. Therefore, if the gas initially supplied to the burner is heated prior to the ignition thereof, the flame can consume the required quantity of gas in the given time so that the desired flame characteristics are provided, but since the B.t.u. capacity of the expanded gas has been decreased, the pilot flame will produce less heat. That condition is desirable for, as has been brought out hereinbefore, substantially all of the heat produced by the pilot flame is waste and must be dissipated. It may be noted that a portion of the heat developed by the pilot flame is transferred back into the combustible gas to expand the same, and then that portion of the heat is utilized. Further, the nozzle 25 and the entire burner assembly is carried by the bracket or heat dissipater 18 through the hanger member 31. Thus a portion of the heat developed in the bracket member 18 is transferred back to the nozzle 25 through the hanger 31 and is utilized in that it elevates the temperature of the nozzle and aids in expanding the combustible gas that passes therethrough.

When it is desired to light one of the main burners, the control valve therefor is opened and combustible gas flows to the selected burner. A portion of the gas flows through the hanger 42 and into the conduit 17 (assuming that the main burner to be ignited is the burner 12). As the combustible gas advances toward the open flame provided by the pilot burner, that gas eventually reaches the mouth of the tube 17. Air is present at the mouth of the tube and the mixture of air and gas is such that the pilot flame is operative to cause an explosion of the combustible gas. Portions of the explosion return through the tube 17 and upon reaching the opposite end thereof are effective to ignite the combustible gases issuing through the ports in the main burner 12.

The explosion waves also advance outwardly from the mouth of the tube 17 and impinge against the open pilot flame. The force of these waves is often sufficient to blow out or extinguish the pilot flame. If reference is made to Fig. 4, it is seen that the explosion conduits 16 and 17 are substantially in line with the shield 35 and then only a portion of the shock waves from an explosion will impinge upon the pilot flame. Those shock waves will be directed outwardly and angularly across the open end of the shield 35 and then these waves will tend to be deflected by the pilot flame. By referring to Fig. 3, it is seen that the center line of the explosion tubes 16 and 17 is substantially at the elevation of the upper edge of the shield 35. Thus, only the lower portion of the shock wave pattern will tend to extend across the open end of the shield 35 for the upper portion of the shock wave pattern will extend above the shield. The

shock wave pattern will tend to be deflected by the upwardly oriented pilot flame and the flame then will be highly resistive to being extinguished by the shock waves of the explosion. At the same time the shock wave pattern does not extend below the center line of the pilot flame, and even if a portion of the flame tends to be extinguished, at least about half of the flame will remain and that portion of the flame is sufficient to maintain it in a continuously burning condition.

Thus, it is seen that the pilot burner assembly I have provided consumes less fuel than conventional pilot burners, and this results initially in a savings in the fuel and at the same time results in a reduction in the amount of heat that must be dissipated from the area about the pilot burner. Further, even though less fuel is consumed, the pilot flame provided is exceptionally stable and is highly resistive to being extinguished or knocked off by the forces of the explosions that occur when the main burners are ignited.

While in the foregoing specification and embodiment the invention has been illustrated and described in considerable detail for purposes of adequately disclosing the invention, it will be apparent to those skilled in the art that numerous changes may be made in those details without departing from the spirit and principles of the invention.

I claim:

1. In a range structure equipped with main gas burners, a bracket member comprising an inverted, generally U-shaped channel secured at one end to said range and positioned intermediate the main gas burners, a pilot burner assembly carried by said bracket member and therebeneath at a point intermediate said main gas burners, said pilot burner assembly comprising a generally horizontal nozzle provided with a flow passage therethrough communicating at one end with a source of gas and at its other end providing an outlet, and a shield in engagement with said nozzle and extending rearwardly therealong and outwardly beyond said outlet, said shield being formed of a material having relatively good heat conductivity and providing an expansion chamber into which gases issue from said outlet to be burned at the outer end of the shield, and a flow conduit extending between each of said main gas burners and said pilot burner, each of said flow conduits being carried at one end by a main gas burner and being adapted to receive combustible gas therefrom and being carried at its other end by said bracket member in relatively close proximity with said shield.

2. The structure of claim 1 in which said flow conduits have their longitudinal axes in substantial alignment with the uppermost point of said shield whereby the explosion pattern created upon ignition of a main gas burner is ineffective to extinguish the pilot flame provided at the open end of said shield.

3. In combination with a range having main gas burners, a pilot burner having a generally horizontally disposed nozzle provided with a flow passage therethrough communicating at one end with a source of combustible gas and having at its other end an outlet, a generally cylindrical shield carried by said nozzle in substantially contiguous engagement therewith and extending outwardly from said nozzle outlet to provide an expansion chamber thereabout, and a flow conduit for each of said main gas burners and extending from its burner to a position adjacent the outlet of said shield, said conduits being adapted to carry combustible gas from the main gas burners to said shield outlet for ignition of said main gas burners, the longitudinal axis of each of said flow conduits being substantially in line with the uppermost point of said shield, and in which the bottom of each of said flow conduits is generally in line with the longitudinal axis of said shield.

4. The combination of claim 3 in which the longitudinal axis of each of said flow conduits is rearward of the outlet of said shield, whereby shock waves issuing from said flow conduits pass angularly past the outlet of said shield.

References Cited in the file of this patent

UNITED STATES PATENTS

1,122,944	Kennedy	Dec. 29, 1914
1,702,731	Hymer	Feb. 19, 1929
1,743,912	Caldwell	Jan. 14, 1930
1,879,776	Toelle	Sept. 27, 1932
2,068,542	Geurink	Jan. 19, 1937
2,632,437	Chambers	Mar. 24, 1953
2,655,913	McCammant	Oct. 20, 1953