Oct. 6, 1942. P. S. HARPER 2,297,762

GAS BURNERS

Filed March 4, 1940 2 Sheets-Sheet 1

Fig. 1

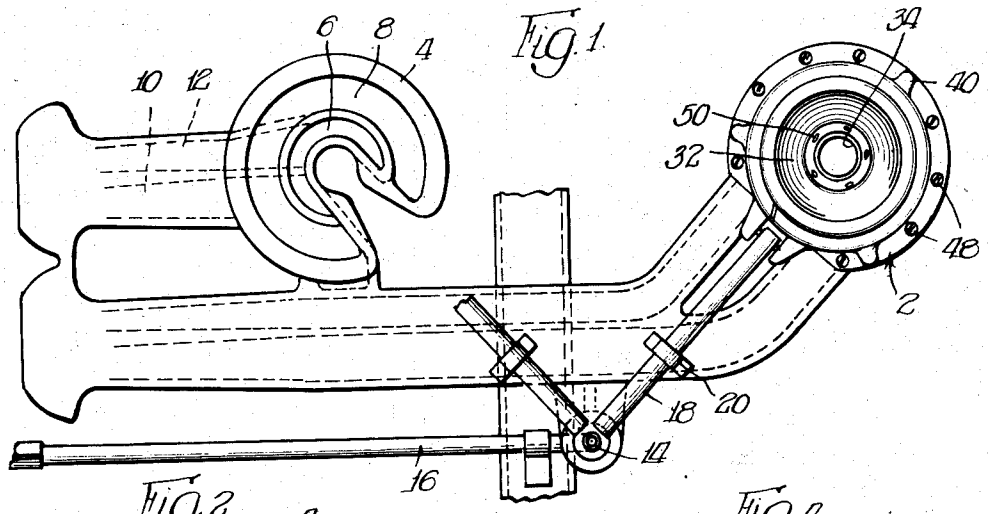


Fig. 2

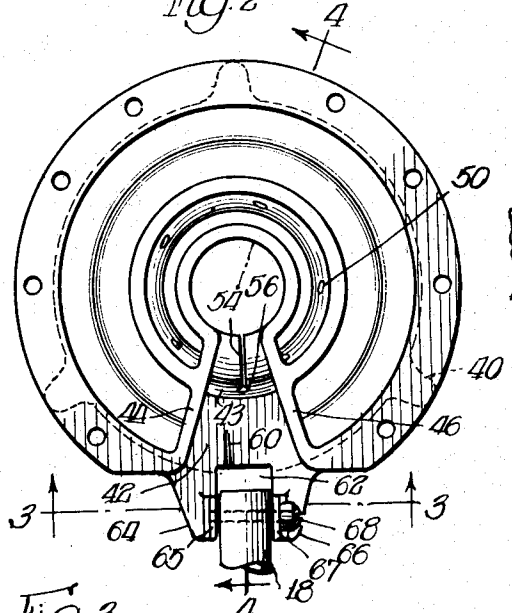


Fig. 4

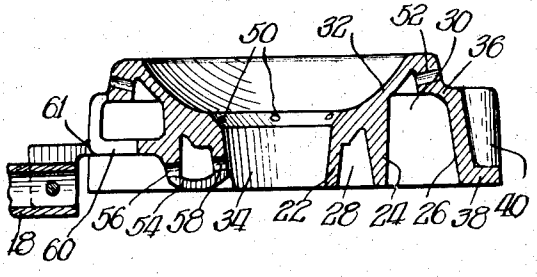
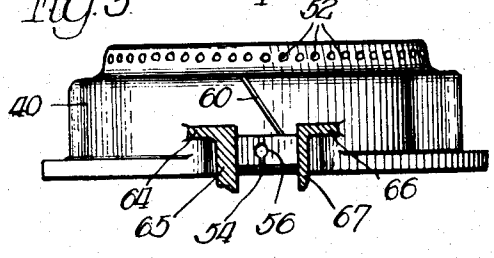


Fig. 3



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Fig. 5.

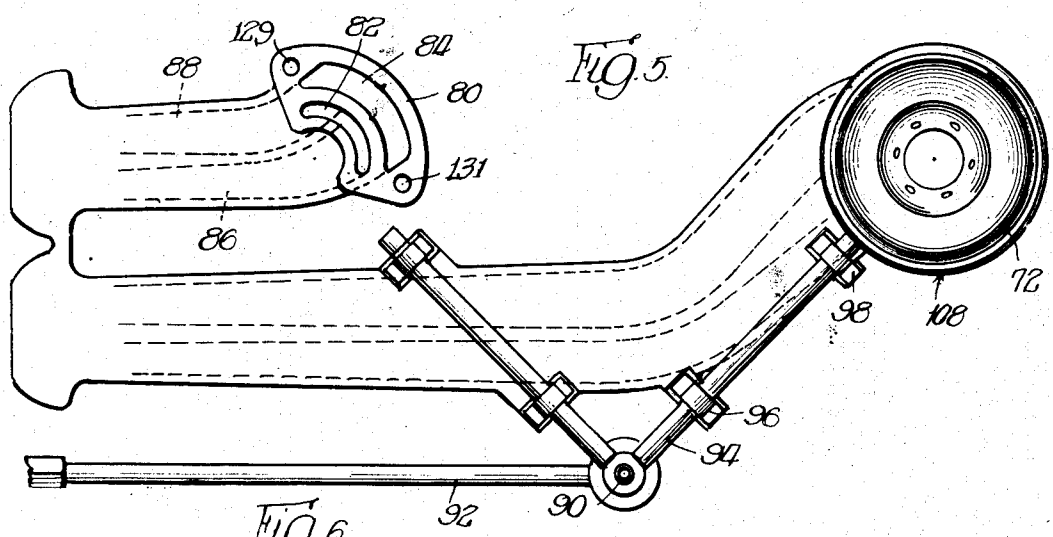


Fig. 6.

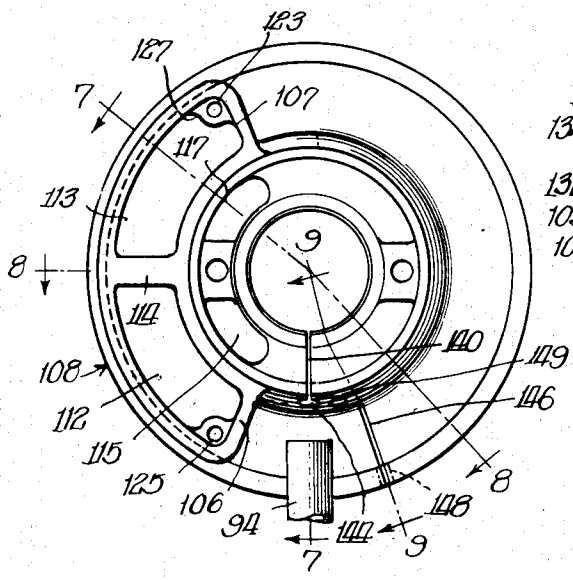


Fig. 8.

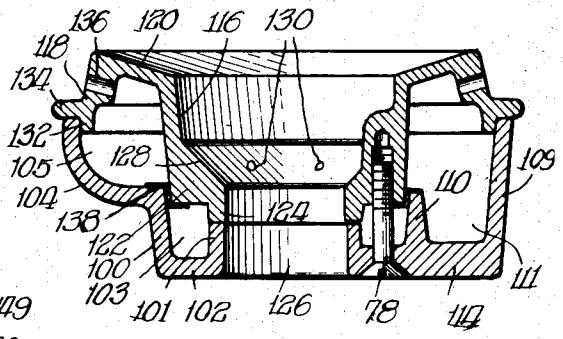


Fig. 9.

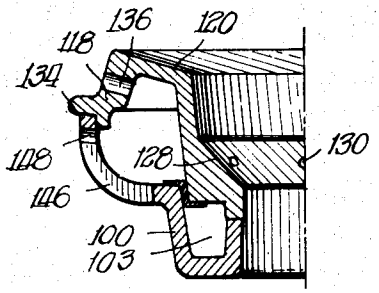
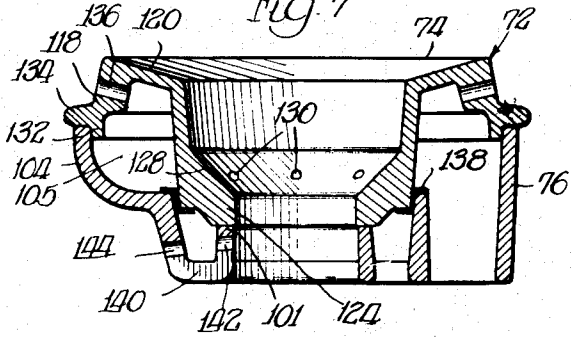


Fig. 7



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UNITED STATES PATENT OFFICE

2,297,762

GAS BURNER

Philip S. Harper, Chicago, Ill., assignor, by direct and mesne assignments, of one-fourth to Philip S. Harper and one-fourth to Carolyn L. Harper, both of Chicago, Ill., and one-fourth to Harris Trust and Savings Bank, an Illinois banking corporation, as trustee of the Philip S. Harper trust, and one-fourth to said Harris Trust and Savings Bank, as trustee of the Carolyn L. Harper trust

Application March 4, 1940, Serial No. 322,062

5 Claims. (Cl. 158—115)

The present invention relates to novel burner constructions, and more in particular to multiple type burners for gas stoves and the like, embodying novel means for lighting said burners or cross-lighting between the said burners.

Among the objects of the present invention is to provide a novel burner of the multiple burner type characterized by the incorporation of novel means for effecting cross-lighting between the said burners.

Among the problems involved in the manufacture of burners of the type herein contemplated are those relating to the burner efficiency, the ease of manufacture, the arrangement of the said burner elements to provide for supplying the necessary secondary air supporting combustion, and the design of the said burner to facilitate its manufacture at low cost. Considerable thought and attention have been directed to the manufacture of these burners so as to secure increased efficiency by proper design of the burner elements, and the location of the burners in respect of one another. In the constructions herein comprehended, the normal location of the burners in order to secure the efficiency desired, does not permit direct cross-lighting of the said burners, and it is accordingly necessary to provide some auxiliary means to bring about this condition. Heretofore in the construction of these burners, one of the principal factors involved has been the disposition of the burners in respect to one another for maximum burner efficiency with very little attention being given to the question of cross-lighting other than to provide such a means without regard to its relation to the burner construction in respect of increased manufacturing costs due to more complicated designs, addition of parts or elements, and the increased labor involved in assembling the same.

The present invention therefore has as one of its principal objects the provision of a multiple type burner characterized by embodying within its structure novel means for effecting cross-lighting between the said burners and being of simplified design requiring a minimum of parts and manufacturing steps, thus greatly decreasing manufacturing costs, yet providing for the efficient cross-lighting of the burners without in any way affecting their normal operating efficiency.

The invention has proceeded upon the theory of providing a novel cross-lighting means for the burners which may be embodied in the burner assembly in such a way as to greatly simplify their design, yet being so constructed and arranged that the same will not clog and may be readily cleaned when desired.

Still a further object of the present invention is to provide a novel burner of the multiple burner type embodying in its construction novel means for cross-lighting, comprising flame propagation means communicating with gas conducting chambers of the said burners and being disposed in flame igniting relation to the said burners and to each other. More particularly, such novel structure for the cross-lighting means may be constituted by adjacently disposed slots or openings in the walls of the said chambers, so disposed in relation to one another and to the said burners that flame propagation may be effected between the said burners.

Still a further object of the present invention is to provide a novel arrangement for the flame propagation means whereby flame may be propagated effectively and efficiently to effect cross-lighting of the burners, as desired. Such an assembly therefore contemplates an arrangement of the said flame propagation means with due regard for the burner design and the secondary air requrements for the said flame propagation means to assure proper travel of flame along the same. In the illustrative embodiments selected to disclose the invention, the said flame propagation means may include a slot or openings in communication with one of the gas conducting chambers for one of the burners disposed adjacent an unrestricted passage for the movement of secondary air.

The present invention also contemplates a novel construction and arrangement for the said flame propagation means with respect to at least one of the said burners whereby flame propagation may be properly effected between the same and said burner even though obstructions in the form of an abutment or overhanging ledge, are interposed therebetween in accordance with burner design requirement or for burner efficiency and the like.

Still another object within the purview of the present invention is to provide means in combination with the structures hereinabove described whereby lighting of said burners may be effected from a flame remotely positioned with respect to the said burners.

Other objects, features, capabilities and advantages are comprehended by the invention, as will later appear and as are inherently possessed thereby.

Referring to the drawings:

Figure 1 is a top plan view of a burner device incorporating a burner head made in accordance with the present invention;

Figure 2 is a bottom plan view of the burner head shown in Figure 1 of the drawings;

Figure 3 is a view partly in cross section and partly in elevation of the burner head of Figure 2, taken in the plane represented by line 3—3 of that figure;

Figure 4 is a fragmentary view in cross section taken in the plane represented by line 4—4 of Figure 2 of the drawings;

Figure 5 is a top plan view of a burner device embodying a burner head of modified construction;

Figure 6 is a bottom plan view of the burner head shown in Figure 5;

Figure 7 is a view in cross section taken in the plane represented by line 7—7 of Figure 6;

Figure 8 is a view in cross section taken in the plane represented by line 8—8 of Figure 6; and

Figure 9 is a fragmentary view in cross section taken in the plane represented by line 9—9 of Figure 6.

Referring now more in detail to the drawings, a burner head embracing the present invention and selected to illustrate the same is generally referred to as 2, and is disclosed in Figure 1 of the drawings in operative association with a burner base 4 which is one of a group or battery of such burners which may be used in a burner device for gas stoves or the like. The base 4 of the burner device of Figure 1 comprises essentially two concentrically arranged gas conducting chambers, such as 6 and 8, communicating by way of suitable ducts 10 and 12, respectively, with a valved gas supply and with the said burner 2 which incorporates improved structure in accordance with the present invention. Operatively associated with a battery of such burners is a pilot light 14, supplied with gas through valved jet 16 and with which is associated a plurality of flash tubes, such as 18, each of which may be mounted as disclosed within a bracket such as 20, on one of the gas conduits and connected to an individual burner head, as will be hereinafter more fully described.

The present invention is directed more in particular to the construction of the burner head 2, with special provision for cross-lighting between the two burners provided on the head. In the illustrative example of Figures 1 to 4 inclusive, the said head is preferably of integral construction, formed by way of a casting to provide the concentrically arranged upstanding walls 22, 24 and 26, providing therebetween the annular gas conducting chambers 28 and 30, the said upstanding walls being bridged or connected adjacent their top by a concave or dished web 32. The web or wall 32 terminates along its upper marginal edge with the wall 26 and at its lower marginal edge with the upstanding wall 22, thus providing a flue at the center of the burner defined in part by the annular wall 22.

The outer upstanding wall 26 is slightly tapered from its lower end toward the top and is provided with an annular shoulder 36 for a purpose to be hereinafter more fully described. This upstanding wall 26 is further provided at its lower end with an annular laterally extending flange 38 reinforced by a plurality of pillars 40 suitably positioned around the same. The head further embodies in its construction a bridging or connecting web or wall 42 axially offset as at 43 at its junction with wall 24 and extending across the annular chambers 28 and 30, the said bridging web or wall being of segmental formation, as disclosed in the drawings, and being defined laterally by the marginal upstanding walls 44 and 46, which merge with the walls 22, 24 and 26.

The burner head is secured to the base 4 therefor by means of a plurality of bolts or the like 48 engaging in aligned openings provided in the annular flange 38 and the opposed flange of the said base 4, it being observed that when the burner head is connected in the position disclosed in Figure 1, as by means of said bolts or screws, that the annular walls 22, 24 and 26 and the radially disposed walls 44 and 46 are disposed in abutting relation to complementary walls of the said burner base whereby the chambers 28 and 30, together with the chambers 6 and 8, form completely enclosed conduits communicating with the conduits 10 and 12, respectively, for the passage of gas to the burner head.

The formation of the burner head as disclosed above provides for the efficient operation of two burners, the inner one of which is formed as by way of a plurality of burner ports 50 extending into communication with the chamber 28 at the junction of upstanding wall 22 and connecting wall 32, this burner arrangement being in close association with the flue 34 formed by upstanding wall 22, and being used as a simmer burner in the particular burner device herein disclosed. The main burner is provided by way of a plurality of burner ports 52 extending through upstanding wall 26 adjacent the shoulder 36 in communication with chamber 30.

With particular reference to the design for the burner head above described, and with respect to the location of the burner ports 50 and 52 relative to one another and the other associated elements of the burner design, it has been found that efficient operation of the burners is attained. However, the arrangement is such that it is impossible to cross-light directly from one of the said burners to the other, and the particular improvement contemplated by the present invention relates to novel means for effecting this cross-lighting between the two said burners.

Such means in the illustrative embodiment of Figures 1 to 4 inclusive is constituted by an elongated slot 54 formed in the connecting web 42 in communication with the annular chamber 28 and which may terminate at each end in enlarged orifices or ports 56 and 58 oppositely disposed to one another, the former being in opposed relation to the open end of the flash tube 18 and the latter of which is disposed in flame igniting relation to the burner ports 50. The said cross-lighting means further includes an elongated slot 60 formed in part in the connecting web 42 and in part in the upstanding wall 26, the said slot terminating in the said connecting web 42 in flame igniting relation to the orifice 56, and at its other end in flame igniting relation to one or more of the burner ports 52. In order to facilitate flame propagation or travel along slot 60 upwardly to the burner ports 52, it has been found desirable to dispose the said slot in wall 26 in inclined relation with respect to the axis of the burner head and to curve or round the edge 61 at the junction of the bridging web 42 and wall 26, and to further provide a suitable passage or opening for supplying secondary air thereto. This latter requirement is fulfilled by the provision of the opening 62 defined in part by the said curved or rounded edge

61 and in part by the spaced lugs 64 and 66 provided with the depending flanges 65 and 67, respectively. These flanges 65 and 67 further provide a supporting means for the flash tube 18 which is connected to said flanges by means of a bolt or the like 68.

According to the preferred operation of the device hereinabove described, the valve mechanism associated with the source of gas is so constructed and arranged as to first introduce combustible gas into annular chamber 28 for the burner ports 50. Gas introduced into chamber 28 is discharged through orifice 56 into the flash tube 18 where it is ignited by pilot light 14 and which likewise causes the ignition of the gas discharged through the slot 54. The flame then travels along this slot and will ignite the gas being discharged through the simmer burner ports 50. Upon further operation of the same valve, or another valve, combustible gas may be introduced into the chamber 30 of the burner head and is discharged through the slot 60 where it is ignited by the flame at slot 54 and jet 56. This flame then travels upwardly to the burner ports 52 to ignite the gas being discharged therefrom.

Although cross-lighting has been effected before in burner devices of the type herein described, nevertheless such means as have been provided in the past have increased the cost of manufacture and have seriously interfered with manufacturing procedures, particularly where the burner heads are of cast construction. According to the present invention, no auxiliary elements or parts need be incorporated in the burner heads to effect the cross-lighting between the burners, thus greatly simplifying the manufacture of these burner heads and the manufacturing processes by which the same are made. Embodied in the simplified construction are the two slots communicating with the annular gas conducting chambers, and which are in flame igniting relation one to the other, as well as with simmer and main burner ports, whereby cross-lighting can be effected. According to this simplified construction, the simmer and main burner ports can be located for maximum burner efficiency.

The principles involved in the constructions shown in Figures 1 to 4 inclusive may be readily embodied in burner heads of multi-part construction, as more particularly exemplified in Figures 5 to 9 inclusive, which figures disclose one of a plurality of embodiments in which the cross-lighting means of the hereinbefore described embodiments may be incorporated. In this embodiment selected to further illustrate the invention, the burner head 72 is constituted by two parts 74 and 76 secured together by way of one or more bolts or screws 78 and which assembled burner head may be incorporated in a burner device such as disclosed in Figure 7, comprising a group or battery of burner bases 80, each of which is formed with radially spaced gas conducting chambers 82 and 84, which may communicate with gas conducting conduits 86 and 88, respectively, leading to a source of combustible gas controlled by suitable valve mechanism.

As in the previous illustrative embodiments of the invention, a pilot light 90, controlled by valved jet 92, may be provided substantially centrally of the group of burners, and which pilot light is in association with the ends of a plurality of flash tubes 94, one being used for each of the burners of the group and which may be mounted upon gas conductors as by way of the spaced brackets 96 and 98.

The part 76 of the burner head is of integral construction and is formed in part by the radially spaced upstanding walls 100 and 101 integrally connected by a bridging or connecting wall or web 102 to form in part an annular auxiliary or simmer burner gas conducting chamber 103 therebetween. Said part 76 is further formed with a curved or dish-shaped wall 104 overhanging wall 100 and forming in part a main gas conducting chamber 105. Walls 100 and 104 extend partially around the head and merge with the radially extending end walls 106 and 107 of a manifold 108 which provides means for introducing gas into the burner head. This manifold further includes the radially spaced walls 109 and 110 forming in part the manifold chamber 111 therebetween which communicates with the main gas conducting chamber 105. This manifold is further provided with spaced openings 112 and 113 separated by way of a wall 114 extending between walls 109 and 110 for reinforcing said manifold, and the said openings providing means for communicating with the manifold chamber 111 for introducing gas therein and to the said chamber 105 from the chamber 84. The said connecting wall 102 at the manifold 108 is provided with the spaced openings 115 and 117 whereby gas can be introduced into the said auxiliary chamber 103 from the chamber 82. As will be clearly apparent from the drawings, the manifold 108 is of such a construction as to seat upon the base 80 whereby the openings 112, 113 and 115 and 117 are in proper communicating relation with the chambers 84 and 82, respectively. The head 72 is secured to said base 80 by means of bolts or the like registering in openings 123 and 125 formed in ears 127 adjacent the ends of the openings 113 and 112 and 129 and 131, respectively, formed in base 80.

The part 74 of the burner head is constituted by an inner annular wall 116 and an outer annular wall 118 interconnected by a bridging web or wall 120 which is inclined inwardly from the wall 118 toward wall 116, as disclosed. The wall 116 is provided adjacent its lower end with an enlarged part 122 disposed to abut with walls 100 and 110, and which enlarged part terminates in a downwardly depending annular wall 124 disposed to have end abutting relation with the wall 101, whereby a vertical inner flue 126 is provided which merges with the lower end of an annular inclined surface 128, and which surface is provided with a plurality of burner ports 130 extending into communicating relation with the chamber 103. The opposed wall 118 is provided with a depending annular flange 132 fitting within the walls 104 and 109 and adjacent which is an annular ledge or flange 134 overhanging the adjacent abutted end of walls 104 and 109, the said wall 118 being further provided between wall 120 and annular ledge 134 with a plurality of outwardly extending burner ports or jets 136 communicating with the main gas conducting chamber 105.

According to the embodiment disclosed, the enlarged part 122 seats with a metal gasket 138 disposed between the same and the adjacent walls 100 and 110 for sealing the joint between the two parts 74 and 76 when the screws or the like 78 are tightened.

Flame propagation may be effected between

the pilot light 90 and the simmer burner ports when gas is introduced into auxiliary chamber 103 by a slot 140 provided in the walls 100, 101 and 102 which may terminate at one end in orifice or jet 142 in flame igniting relation to the simmer burner orifices 130, and at its other end in a jet or orifice 144 disposed in opposed relation to the flash tube 94. In order to effect a cross-lighting between the simmer burner and the main burner, part 76 is further provided with a slot 146 formed in the wall 104 and terminating at one end in flame igniting relation to the orifice 149 which in turn is in flame igniting relation to the orifice 144, and at its other end in enlarged orifice or jet 148 disposed to emit a jet of flame beyond the ledge 134, whereby flame may be propagated to the main burner ports 136. By disposing the slot 146 in angularly displaced relation to the slot 140 the flash tube 94 may be brought into effective operative association with said slot 140 without interfering in any way with the lighting of the outer burner. In order to effectuate flame propagation between orifice 144 and the slot 146 the said orifice 149 is provided intermediate the same whereby the lighting of the outer burner can be easily and readily accomplished.

As in the previously described embodiments, novel means for cross-lighting between the burners is incorporated in the multi-part burner construction to provide a simplified design with a minimum of parts which can be readily and easily manufactured at low cost and without affecting in any way the efficiency of the said burners.

While I have herein described and upon the drawings shown illustrative embodiments of the invention, it is to be understood that the invention is not limited thereto, but may comprehend other constructions, arrangements of parts, details and features without departing from the spirit of the invention.

I claim:

1. In a double burner construction, the combination of a burner member having inner and outer noncommunicating gas chambers, each adapted to be connected to an independently controlled source of gas supply, said burner member having a series of inner gas ports in communication with said inner gas chamber, and a series of outer gas ports in communication with said outer gas chamber, in which said inner and outer series of gas ports are disposed so that the flames from one of said series of gas ports will not directly ignite the gas emerging from said other series of gas ports, a pilot light, and a flash tube extending from a point adjacent said pilot light to a point adjacent said burner member, a flash tube feeding port spaced from said two series of gas ports and communicating with one of said gas chambers and disposed to project gas into the adjacent end of said flash tube, gas outlet means in said burner member communicating with said inner gas chamber and constituting a flame propagating means for igniting said inner series of gas ports from said flash tube feeding port, and gas outlet means in said burner member communicating with said outer gas chamber and constituting a flame propagating means for igniting said outer series of gas ports from said flash tube feeding port.

2. The construction defined in claim 1 further characterized in that the flash tube feeding port is disposed in communication with the inner gas chamber.

3. The construction defined in claim 1 further characterized in that the gas outlet means communicating with said outer gas chamber is disposed to propagate a flame along a path which is at an angle to the vertical whereby the respective portions of said propagated flame have free access to secondary air of combustion.

4. The construction defined in claim 1 further characterized in that the gas outlet means communicating with said outer gas chamber is a slot formed in the wall of said chamber.

5. The construction defined in claim 1 further characterized in that the gas outlet means communicating with said outer gas chamber is a diagonally disposed slot formed in the wall of said gas chamber.

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