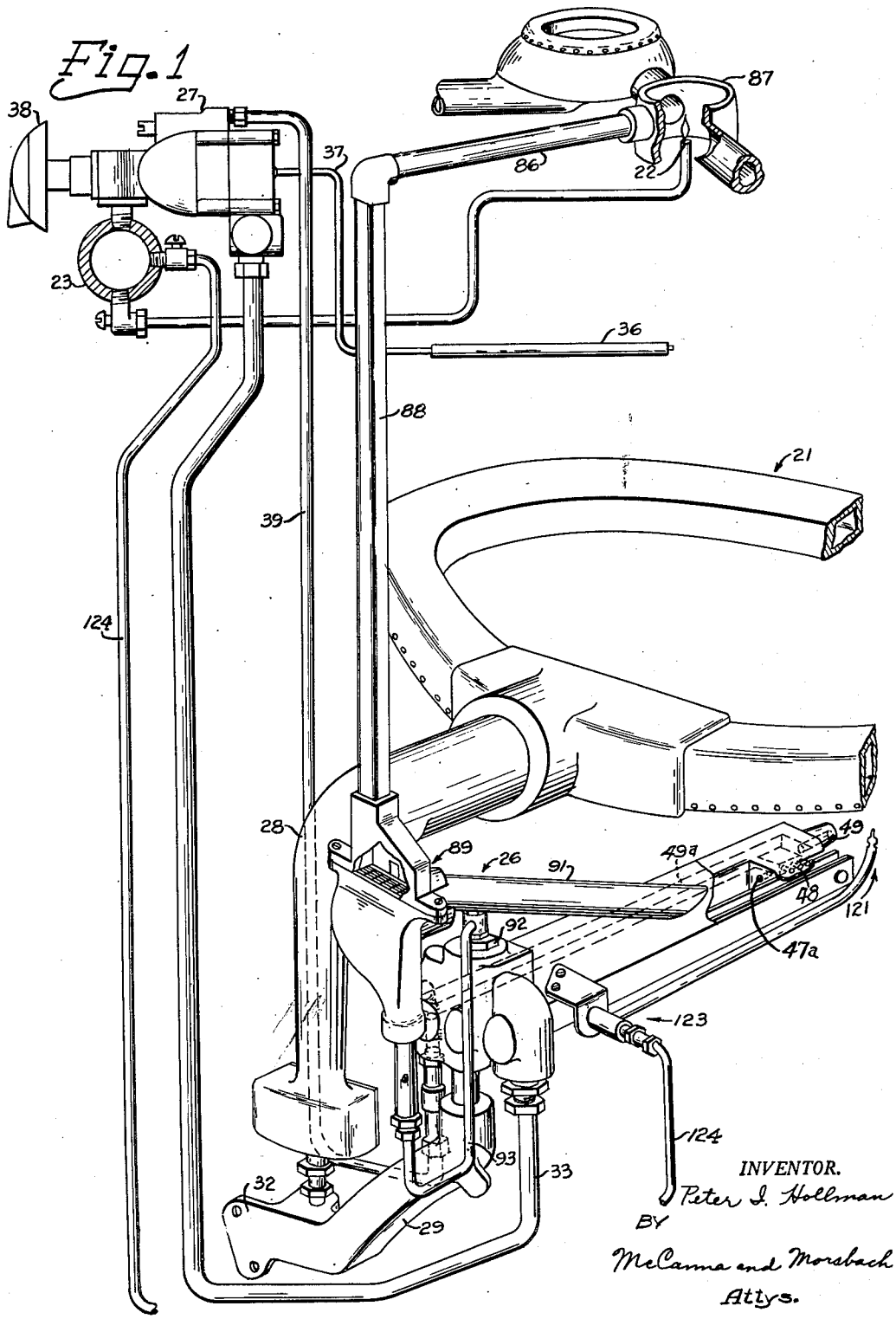
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LIGHTER VALVE UNIT

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Fig. 1



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Fig. 2

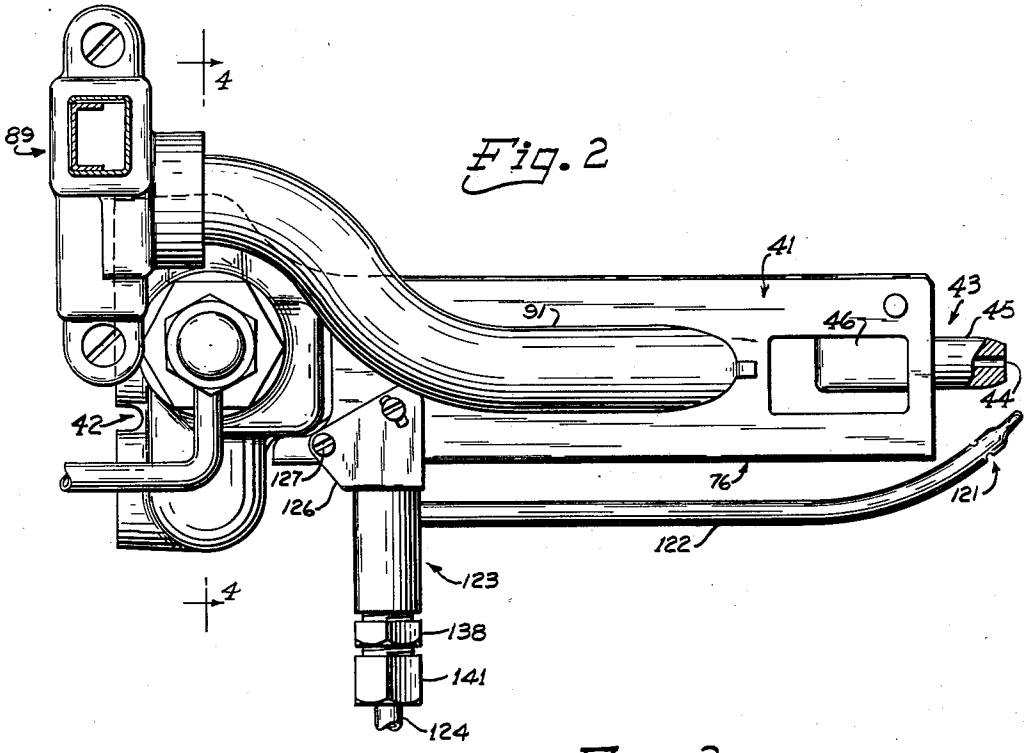
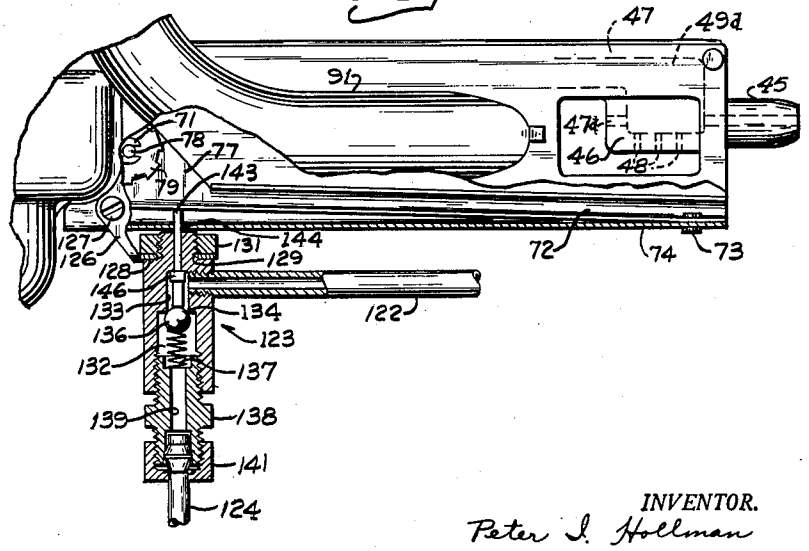


Fig. 3



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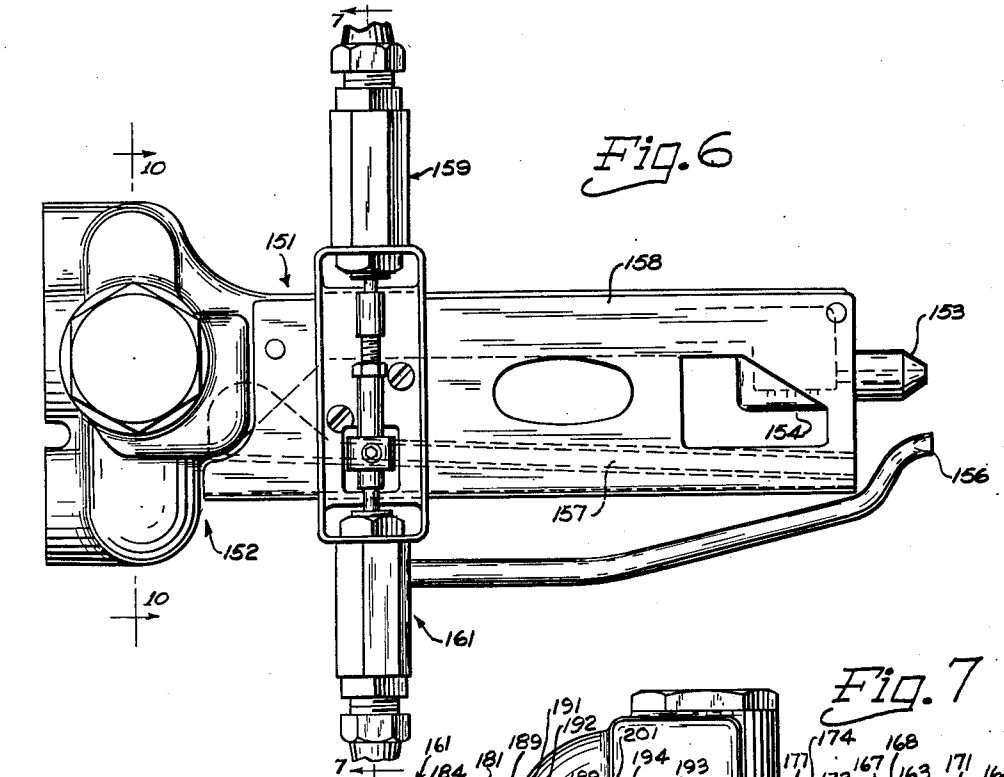


Fig. 6

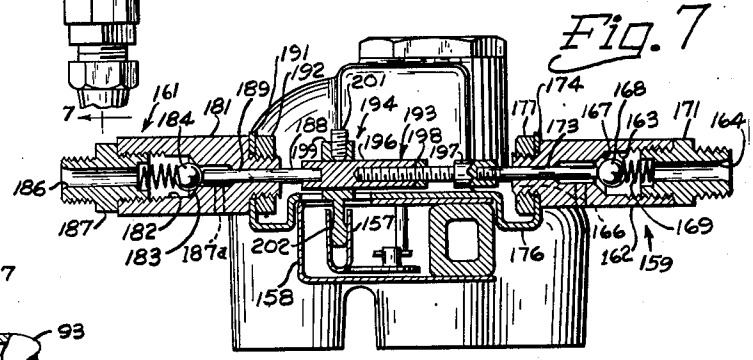
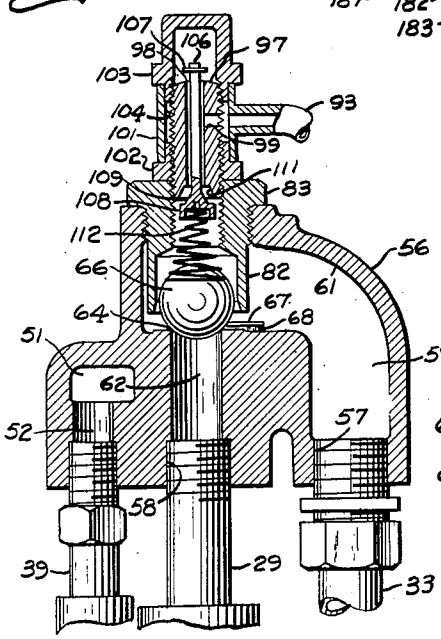


Fig. 7

Fig. 4



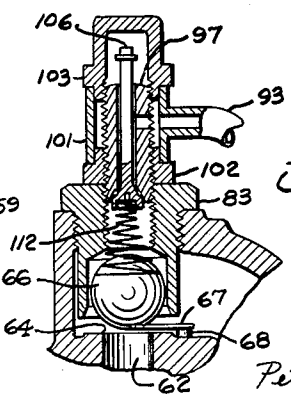


Fig. 5

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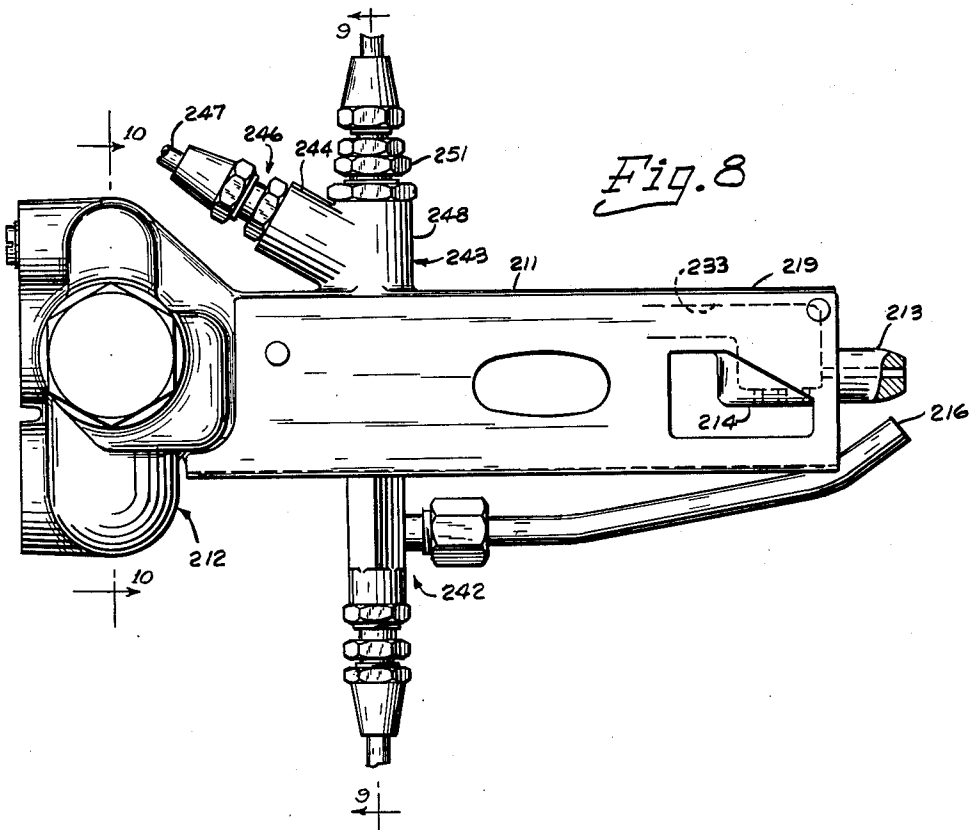
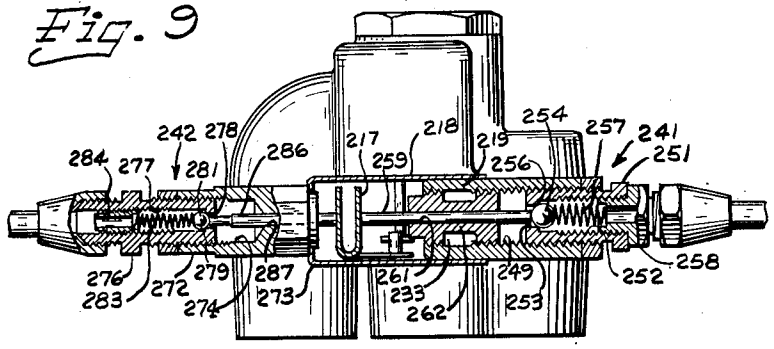


Fig. 8

Fig. 9



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Fig. 10

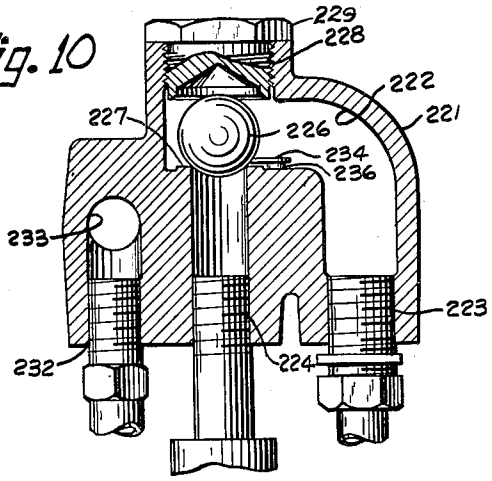


Fig. 11

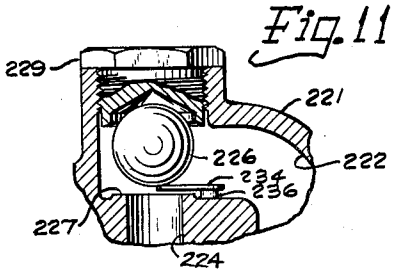


Fig. 12

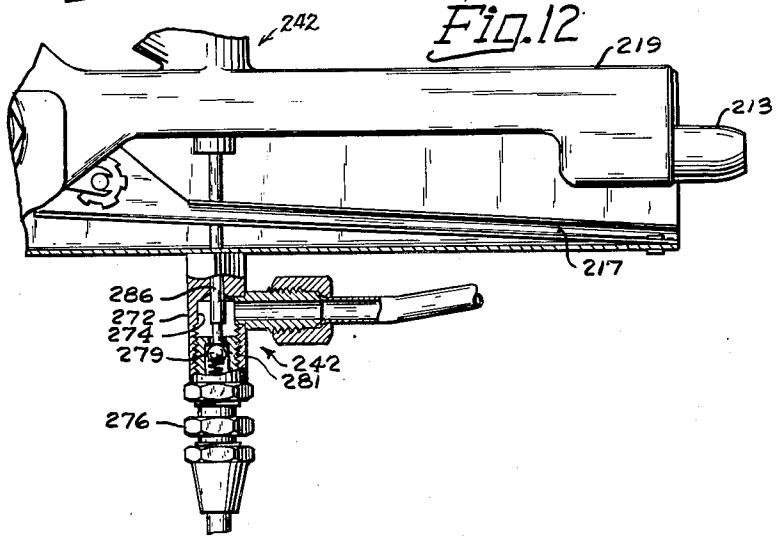
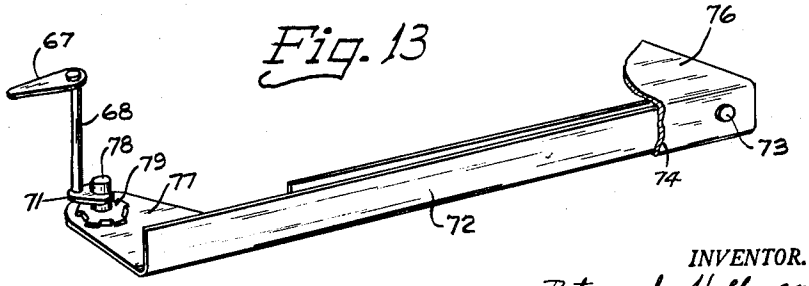


Fig. 13



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UNITED STATES PATENT OFFICE

2,639,765

LIGHTER VALVE UNIT

Peter I. Hollman, Rockford, Ill., assignor to Geo. D. Roper Corporation, Rockford, Ill., a corporation of Illinois

Application May 26, 1950, Serial No. 164,478

11 Claims. (Cl. 158—133)

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This invention relates to a lighter valve unit for lighting the oven burner on a gas stove.

An object of this invention is the provision of a lighter unit of the above character that is simple in construction, that provides for maximum efficiency and that is relatively inexpensive to produce.

It is also an object of this invention to provide a novel lighter unit which includes a safety valve and a pilot burner rigidly mounted in a unitary assembly, a thermal strip arranged to respond to heat from the pilot burner, a stand-by pilot burner and control valve therefor, and operative connections between the thermal strip and the safety valve and the pilot burner valve so that the operation of these valves is responsive to the thermal strip.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which—

Figure 1 is a perspective view of an oven lighting system utilizing a lighter valve unit embodying the present invention;

Fig. 2 is a top plan view of the lighter valve unit;

Fig. 3 is a fragmentary view similar to Fig. 2 with portions cut away to show details of construction;

Fig. 4 is a sectional view taken substantially along the line 4—4 of Fig. 2;

Fig. 5 is a view similar to Fig. 4 and showing the safety valve in its open position;

Fig. 6 is a plan view of a modification of the invention;

Fig. 7 is a sectional view taken substantially along the line 7—7 of Fig. 6.

Fig. 8 is a plan view of another modification of the invention;

Fig. 9 is a sectional view taken substantially along the line 9—9 of Fig. 8;

Fig. 10 is a sectional view taken substantially along the line 10—10 of Fig. 8;

Fig. 11 is a view similar to Fig. 10 showing the safety valve in its open position;

Fig. 12 is a view showing the details of construction of the mechanism for actuating the safety valve; and

Figure 13 is a fragmentary perspective view showing the thermally responsive mechanism for operating the safety valve.

Referring now to the drawings the invention is shown embodied in a lighter valve unit adapted for use in a lighting system wherein a remotely located oven or main burner 21 is lighted from a

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constantly burning pilot burner 22 mounted on the top of the range and used for igniting the cooking burners on top of the range.

For purposes of better understanding the lighter valve unit a brief description of a system with which it may be used will be first described. As shown in Figure 1 this system includes a gas supply manifold 23, the burner 21, the lighter unit mounted adjacent the main burner 21, flash-back means 26 disposed between the constantly burning pilot burner 22 and the lighter unit for flashing flame from the former to the latter and a temperature control and shut-off valve unit 27 for controlling and regulating the flow of gas from the manifold 23 to the main burner 21. The main burner 21 is connected to the manifold 23 through a mixing tube 28, a conduit 29, having mounting flanges 32 for attaching the conduit to the side wall of an oven, not shown, the lighter valve unit, and a conduit 33 in communication with the temperature control unit 27 mounted on the manifold 23 to be in communication therewith.

The temperature control unit 27 may be of any conventional construction. The unit, as shown for purposes of illustration, is of the type disclsoed in U. S. Patent 2,303,011 issued November 21, 1942, to which reference may be had for a more detailed description of its construction and mode of operation. In general the unit 27 includes mechanism operable in response to changes in temperatures on a bulb 36 mounted in the oven and connected to the unit 27 by a capillary tube 37. A control knob 38 is associated with the unit 27 to extend through the gas manifold cover plate, not shown, to be accessible from the front of the range. The knob 38 controls the opening and closing of the shut-off valve in the unit 27 and for positioning the parts of the control mechanism in the unit to effect a preselected temperature in the oven. Normally the knob 38 is biased outwardly from the cover plate so that the knob must be depressed before it is free to rotate. When the knob 38 is rotated and set for a preselected temperature in the oven, the mechanism in the unit 27 is positioned so that gas is permitted to flow through conduits 33 and 39 to the lighter unit.

As best seen in Figs. 1, 2, 3, 4 and 5, the lighter unit includes a body 41 having a safety valve 42 at one end and pilot burner means 43 formed at the opposite end. As shown the pilot burner means includes an oven pilot burner facing away from the safety valve, formed by a port 44 in a nozzle 45 mounted at one end of a boss 46 on a

support arm 47 rigid with and extending outwardly from the safety valve 42. The arm 47 is arranged so that the nozzle 45 is adjacent to or in lighting proximity to the main burner 21. On the opposite end of the boss 46 is a port 47a facing the safety valve 42. On the side of the boss 46 away from the support arm 47 is a plurality of ports 48, and a flame transmitting slot 49 between the ports 48 and the port 44. The ports 44, 47a and 48 are in communication with a passageway 49a formed in the support arm 47 so that when gas issues from the ports 44, 47a and 48 and is ignited the ports in effect define respectively an ignition pilot burner for lighting the main burner 21, a pilot burner for lighting the pilot burners 44 and 48, and an actuating pilot burner. The opposite end of the passageway 49a is in communication with a horizontal passageway 51 (see Fig. 4) leading to a vertical passageway 52 formed in the safety valve.

While any suitable safety valve may be used, in this embodiment of the invention it includes a casing 56 fixedly mounted on the arm 47 and has an inlet port 57 adapted to be connected to the gas supply line 33 and an outlet port 58 adapted to be connected to the conduit 29 leading to the main burner 21. The inlet port 57 in the casing 56 is in communication with a generally vertically extending passageway 59 formed on the right hand side of the casing 56, as shown in Fig. 4 and terminates in a chamber 61 formed in the upper central portion of the casing. The outlet port 58 is in communication with a vertically extending passageway 62 disposed centrally of the casing and is also in communication with the chamber 61. The lands adjacent the passageway 62 on the interior of the casing form a valve seat 64. A ball or valve element 66 is disposed in the chamber 61 and is movable between a position in which it seats on the seat 64 to prevent the flow of gas between the inlet and outlet ports 57 and 58 and an open position in which the gas is free to flow between the inlet and outlet ports. The ball is normally biased to its closed position by the effect of gravity. Where desired spring means or the like may be used to normally urge the ball to seat on the valve seat. In this embodiment of the invention a lever 67 is utilized to move the valve element 66 between its open and closed positions. The lever 67 is connected at one end to a shaft 68 (see Figs. 3, 4, 5 and 13) which projects through the casing 56 of the safety valve. The opposite or outer end of the shaft is connected to a lever 71 (see Fig. 3). A thermostatic or thermal strip 72 is disposed adjacent the pilot burner 48 so that when it is lighted the flame therefrom is directed against the thermal strip causing it to distort and thereby move the lever 71 and in turn unseat the ball 66. As shown the thermal strip 72 has a generally channel or U-shaped cross section and is in substantially parallel relation with the arm 47. At one end the strip 72 is riveted as by a rivet 73 or may be welded as desired to a bridging portion 74 of a U-shaped member 76, the sides or legs of which straddle the arm 47 and are supported thereby so that the U-shaped member in effect defines a housing and support for the thermal strip. At its opposite end the strip 72 is in spaced relation to the bridging portion 74 and terminates in a flange 77 at substantially right angles to the legs of the strip. A pin 78 on the flange is disposed between the arms of the bifurcated end of the lever 71 to provide a driving connection between the thermostatic strip 72 and the lever 67. The pin 78 is eccentrically mounted on a rotatable base 79, suitably secured to the flange 77 so that the position of the pin 71 relative to the flange may be readily adjusted. While heating of the thermal strip by the actuating pilot burner 48 causes distortion of the thermostatic strip to open the safety valve through the levers 67 and 71, it is to be understood also that when the actuating pilot burner 48 is extinguished that the thermostatic strip 72 cools and tends to assume its original position. In so doing the lever 67 is moved to its initial position permitting the ball 66 to seat and thereby cause the safety valve to return to its normally closed position shown in Fig. 4. A ball guide 82 in the form of a cylindrical extension on a bushing 83 in axial alignment with the passageway 62 and threaded into an opening at the top of the casing 56 of the safety valve positions the ball 66 in its movement between its closed and open positions shown in Figs. 4 and 5, and prevents the ball from becoming displaced.

While any suitable flash system may be used, for purposes of illustrating the invention the flash system includes a horizontally disposed tube 86 in communication with and supported by a housing 87 encircling the pilot burner 22, a vertically disposed tubular portion 88 connected to the opposite end of the horizontal tube 86, a sub-burner 89 and a flash tube 91 between the sub-burner 89 and the pilot burner 47a. Gas is normally supplied to the sub-burner 89 from the manifold 23 through the conduit 33, a sub-burner valve 92 and a conduit 93 connected to the sub-burner 89. The sub-burner and its operation is described more fully in my co-pending application, Serial No. 105,545, filed July 19, 1949, to which reference may be had for complete details of construction and operation. In this embodiment of the invention the sub-burner valve is mounted directly on top of the safety valve. As best seen in Figs. 4 and 5 the valve includes a sleeve 97 threaded into an opening formed in the bushing 83. The sleeve 97 is formed with a generally vertically extending passageway 98 and a transaxial passageway 99 intermediate its ends in communication with the axially extending passageway 98. An annular or ring member 101 encircles the sleeve 97 and is supported at one end by a spacer 102 threadably mounted on the sleeve and at its opposite end by a combined spacer and cap member 103. The ring member 101, the spacers 102 and 103 and the sleeve 97 define an annular passageway 104 encircling the sleeve and in communication with the passageway 99 in the sleeve. The annular passageway 104 is arranged to be in communication with the conduit 93 leading to the sub-burner 89 (see Figure 1). A reciprocable member or plunger 106 is slidably disposed in the passageway 98 and a snap ring 107 is associated with the upper end of the plunger 106 to prevent passage of the plunger through the passageway 98. At its lower end the plunger 106 is provided with a head 108 and a tapered portion 109 at the lower end of the plunger connects the head 108 with the plunger 106. The lower end of the sleeve 97 is formed with a valve seat 111 against which the tapered portion 109 is shaped to seat. Normally the plunger 106 is positioned so that the tapered portion 109 is out of engagement with the seat 111 as shown in Fig. 4. In this position of the parts, gas flowing into the safety valve through the passageway 59, the chamber 61, flows through the passageway 98, the transaxial passageway

99, the annular passageway 104 to the conduit 93 leading to the sub-burner. Seating of the tapered portion 109 on the seat 111 in the present instance is effected by upward movement of the ball 66. To this end a coil spring 112 is disposed between the lower end of the plunger 106 and the ball 66, to form a driving connection therebetween. The spring is of such length that in its normal position it rests on the top of the ball 66 as shown in Fig. 4 and the plunger 106 rests on the upper end of the spring 112 in a position so that the tapered portion 109 is away from the seat 111. The spring in addition to providing a driving connection between the ball 66 and the plunger 106 also provides a lost motion or overtravel connection between the ball 66 and the plunger 106 in the event of misalignment of parts or the like.

The lighter unit also includes an auxiliary or stand-by pilot burner means 121. As shown, the latter is formed at one end of a tube 122 in substantial parallel relation to the housing 76. At its outer end the tube curves in toward the direction of the pilot burner 44 to be adjacent the burner 21 as shown in Figure 1. At its opposite end the tube is connected to a valve 123 which in turn is connected to the gas supply manifold through the conduit 124.

The valve 123 is supported on the housing 76 by a bracket 126 secured thereto as by screws 127. For adjustment purposes at least one of the screw holes in the bracket 126 may be in the form of an elongated slot so that the position of the valve relative to the housing may be varied. One end of the casing of the valve 123 is of a reduced cross sectional area to define a shoulder 128 and is threaded. The reduced portion extends through an opening 129 in the bracket 126 and a nut 131 on the opposite side of the bracket to the valve 123 secures the latter to the bracket. The valve casing is formed with an axially extending chamber 132 and one end of the casing is provided with a passageway 133 in communication with the chamber 132. The passageway 133 is of somewhat smaller cross sectional area than the chamber 132 and thereby defines a valve seat 134 at one end of the chamber 132. A ball or valve element 136 is disposed within the chamber 132 and is movable between a position in which it seats on the seat 134 to close communication between the passageway and the chamber and a position in which the ball 136 is away from the seat 134 so as to permit communication between the passageway 133 and the chamber 132. A spring 137 is disposed between an end of the chamber 132 defined by a fitting 138 and the ball 136 to normally urge the ball into engagement with the valve seat 134 or its closed position. As shown the passageway 133 is in communication with the tubular member 122. The fitting or bushing 138 is formed with an axially extending passageway 139 in communication with the chamber 132. The conduit 124 is connected to the bushing 138 by a suitable coupling member 141.

The opening and closing of the valve is controlled by a gland pin 143 actuated by the thermal strip 72. Thus as shown in Fig. 3 the gland pin 143 extends through the valve casing or body and through an opening 144 in the bridging member 74 so that its end abuts against the side of the thermal strip. The opposite end of the pin or plunger 143 abuts against the ball 136. With this arrangement it will be seen that upon distortion of the thermal strip the pin 143 is moved so as to move the ball 136 away from the seat 134. Also it will be seen that upon cooling of the thermal strip the spring 137 acts to seat the ball 136 through the pin 143. A collar 146 mounted on the gland pin intermediate its ends is engageable with the end wall of the valve casing in which the passageway 133 is formed to prevent accidental withdrawal of the gland pin 143 from the valve casing.

The operation of the lighter unit in a system as shown in Figure 1 is as follows. It is assumed that the constantly burning pilot burner 22 is lighted and the main burner 21, the pilot burners 44, 47*a*, 48 and 121, and the sub-burner 89 are unlighted. The temperature control unit is in its off position and the safety valve 42 is closed. To light the burner 21 the operator of the range depresses the control knob 38 and positions the temperature control unit for a preselected cooking temperature in the oven and permits gas to flow from the gas manifold 23 to the conduit 33 to the inlet port 57 of the safety valve 42. The ball 66 however is in its closed position and gas cannot flow to the burner 21. The tapered portion 109 on the plunger 106 of the sub-burner valve is away from the seat 111 so that the valve is in its open position as shown in Fig. 4 and gas is free to flow from the chamber 61 in the casing 56 through the passageway 98, the transaxial passageway 99, the annular passageway 104, the conduit 93 to the sub-burner. Concurrently with this flow of gas, gas also flows from the temperature control unit 27 through the conduit 39, through the passageways 52 and 51 in the casing 56, the passageway 49*a* in the support arm 47 to the pilot burner 47*a*, the pilot burner 48, and the pilot burner 44. Gas flowing from the pilot burner 47*a* flows through the tube 91, to the sub-burner 89. This gas together with the mixture flowing directly to the sub-burner 89 flows up through the tubular portion 88 and the tubular portion 86. When gas issues from the tube 86 into the housing 87, the gas ignites and flame flashes back to the sub-burner 89 and to the pilot burner 47*a*. After the lighting of the pilot burner 47*a*, flame is flashed to the actuating pilot burner 48 and in turn the pilot burner 44. The flame of the actuating pilot burner 48 is directed against one side of the thermostrip 72 so that the heat of the flame causes distortion of the strip 72. Upon heating the strip 72 moves in a counterclockwise direction of rotation about its riveted end as seen in Fig. 3. This movement of the strip causes the lever 71 to be moved to rotate the shaft 68 and in turn the lever 67. Rotation of the lever 67 unseats the ball as shown in Fig. 5. With the ball 66 in this position gas flows from the chamber 61 in the safety valve 42 through the passageway 58 to the main burner 21 and is ignited by the pilot burner 44.

Concurrently with the unseating of the ball 66 the flow of gas to the main burner 21, the plunger 106 moves upwardly to the position shown in Fig. 5 so that the tapered portion 109 seats against the seat 111. This closes communication between the chamber 61 and the passageway 98 so that the flow of gas to the sub-burner 89 is stopped. During the movement of the thermal strip 72 it also engages the pin 143 of the valve 123 and forces the ball 136 away from the seat 134. Under these conditions gas flows directly from the manifold 23 through the conduit 124 through the valve 123, the conduit 122 to the pilot burner 121. The latter is lighted

from the pilot burner 44 or main burner 21. As long as gas flows to the pilot burner 48, it will be noted that the pilot burner 48 supplies heat continuously to the strip 72 to maintain the latter in its distorted position and the pilot burner 44 and the stand-by pilot burner 121 are in lighting proximity with the main burner 21.

When the cooking operation is over, the operator of the range returns the knob 38 to its original position, thereby closing the shut-off valve 27. As a consequence the flow of gas to the safety valve 42 is interrupted. Simultaneously the flow of gas through the conduit 39, the passageways 51, 52 and 49*a* to the pilot burners 47*a*, 44 and 48 is stopped. As soon as the flow of gas to the burners is stopped the burners are extinguished. Due to the fact that there is a certain amount of residual heat in the thermostatic strip 72 and it takes an appreciable length of time for it to cool, the valve 123 is maintained in an open position, since the pin 143 holds the ball away from the seat 134 until the thermostatic strip 72 returns to its normal position. Consequently for a limited period of time after the return of the control knob 38 to its original position gas continues to flow through the conduit 124, the valve 123 to the stand-by pilot burner 121. During the time required for the thermostatic strip 72 to cool, the safety valve is in an open position since the ball 66 is not permitted to seat until the thermostatic strip 72 returns to its original position. Should the operator of the range for some reason or other desire to relight the main burner 21 immediately after shutting it off, it will be apparent that gas would flow from the gas manifold 23 through the heat control unit 27, the safety valve 42 to the main burner 21. The latter would be ignited by the pilot burner 121. Gas would also flow to the pilot burners 44, 47*a* and 48 and would be ignited from the main burner 21 or stand-by pilot burner. It is to be understood that since the sub-burner control valve is closed, the lighting system would not go through its cycle of flashing back from the constantly burning pilot burner 22 as described hereinbefore.

In the event the control knob 38 is returned to its off position for a length of time, sufficient to allow the thermostatic strip 72 to cool and return to its normal position, the valve 123 closes since the spring 137 urges the ball 136 into engagement with the valve seat 134 as soon as the thermostatic strip returns to its original position. When the valve 123 closes the supply of gas to the pilot burner 121 is stopped and the flame extinguished. Thereafter should the control knob 38 be turned again to some preselected temperature setting for a cooking operation, the lighting system will go through its complete cycle of operation as described hereinbefore including the flashing of the flame from the constantly burning pilot burner 22 to the sub-burner 89 and the pilot burners 44, 47*a* and 48.

In Figs. 6 and 7 there is shown a modification of the lighter unit. In general, this modification has the same general construction as described hereinbefore including a body 151, a safety valve 152 at one end of the body and pilot burner 153, an actuating pilot burner 154, and a stand-by pilot burner 156 at the opposite end of the body, a thermal strip 157 arranged to be heated by the actuating pilot burner and a housing 158 for the strip mounted as described hereinbefore. In this embodiment

of the invention the sub-burner control valve 159 is mounted on one side of the body 151 and the standby pilot burner control valve 161 is mounted on the opposite side of the body so that both valves may be directly actuated by the thermal strip 157. As best seen in Fig. 7 the sub-burner valve 159 includes a body 162 having an axially extending passageway 163 defining a chamber in communication with an inlet passageway 164 adapted to be in communication with a gas supply and an outlet passageway 166 adapted to be connected to a sub-burner assembly. At one end of the body the chamber 163 has a frusto-conical surface 167 defining a seat for a ball valve 168. The latter is normally urged to its seated position by a spring 169 acting between the ball and the bottom of a spring receiving recess formed in a fitting 171 threaded into the open end of the passageway forming the chamber and through which the inlet passageway extends. A gland pin 173 extending through a snug fitting passage in the body in alignment with the passage 163 is shaped to engage the ball 168 and control the seating and unseating thereof. The valve body 162 is mounted on a flange 174 of a bracket 176 supported by the body 151. As shown, one end of the valve body 162 is of reduced cross sectional area and is shaped to project through an opening 174. A nut 177 threaded on the valve body on the side of the flange opposite the main part of the body coacts with the body to secure the latter in position as shown in Fig. 7.

The stand-by pilot valve 161 is of similar construction and includes a body 181 having a central chamber 182 with a conical-shaped seat 183 at one end and a ball valve 184 movable into and out of engagement with the seat to control the flow of gas from the inlet passageway 186 in a fitting 187 adapted to be connected to a gas supply and an outlet passageway 187*a* adapted to be connected to a stand-by pilot 156. The ball valve 184 is controlled by a gland pin 188 extending through a snug fitting passageway 189 formed in the body and engageable with the ball valve. The valve body is mounted on a flange 191 of the bracket 176 as by having one end of the body formed with a threaded reduced cross sectional area and shaped to pass through an opening in the flange so that a nut 192 mounted on the outer end of the body as shown in Fig. 7 abuts against the flange and rigidly secures the valve body to the latter.

As best seen in Fig. 7 the valve body 162 and 181 are arranged so that the gland pins 173 and 188 face each other and are in substantially coaxial alignment above the body 151. The outer ends of each pin are interconnected by a driving connection comprising an adjustable member 193 between the pins and a member 194 interconnected with the thermal strip 157 so that upon heating of the latter the strip will deform and effect simultaneous control movement of both the sub-burner valve and the stand-by pilot burner valve. The adjustable member includes a cylindrical portion 196 having a recess receiving the end of the gland pin 188 and a portion 197 threadably engaged with the cylindrical portion and having a recess for receiving the gland pin 173. A jam nut 198 acting between the threaded portion 197 and the cylindrical portion 196 secures the parts in a desired adjusted position. The member 194 includes a collar 199 embracing the member 196 and secured in position by a setscrew 201 and an arm 202 projecting be-

tween the upstanding sides of the thermal strip 157.

This lighter unit operates in the same manner as that described hereinbefore for the embodiment shown in Figs. 1–5.

In Figs. 8–12 there is shown another embodiment of the invention. This embodiment is quite similar to the embodiment shown in Figs. 6 and 7 and includes a body 211, a safety valve 212 at one end of the body, a pilot burner means including a main pilot burner 213, an actuating pilot burner 214 and a stand-by pilot burner 216 at the opposite end of the body, a thermal strip 217 arranged to be heated by the actuating pilot burner, a housing 218 for the strip attached to a support arm 219 as shown in the embodiment disclosed in Figs. 1–5. The safety valve as best seen in Figs. 10 and 11 includes a casing 221 having a chamber 222 in communication with an inlet passageway 223 adapted to be connected to the main gas supply and an outlet passageway 224 adapted to be connected to the main burner. A ball valve 226 shaped to seat on a land 227 around the inner end of the outlet passageway 224 forms the valve element. Access to the chamber 222 and the ball 226 may be had through an opening 228 receiving a plug 229 overlying the upper end of the passageway 224. The casing is also provided with a passageway 232 adapted to be in communication with the passageway 233 in the support arm 219 leading to the pilot burner means. Movement of the ball 226 is controlled by a lever 234 mounted on a shaft 236 supported on the casing and the thermal strip 217 is interconnected with the shaft to rotate the latter in the manner described for the embodiment shown in Figs. 1–5.

In this embodiment of the invention the sub-burner control valve 241 is located on one side of the body 211 and the stand-by pilot burner control valve 242 is located on the opposite side to be laterally of the thermal strip 217. As shown, the sub-burner valve 241 includes a Y-shaped body 243 having its stem portion cast integral with the arm 219. One of the arms 244 of the Y-shaped body is at an angle to the stem and is cored for receiving a fitting 246 adapted to be connected to a conduit 247 leading to a gas supply. The other arm 248 projects outwardly from the stem 219 in alignment with the stem portion of the body and is formed with a passageway 249 cored to receive a fitting 251. As shown the fitting 251 is formed with a central passageway 252. At one end of the fitting the latter is formed with an aperture 253 effecting communication between the passageway 249 and the chamber 252. The chamber 249 is also adapted to be in communication with the conduit 247. A ball valve 254 in the chamber 252 is adapted to seat against the seat 256 to prevent the flow of fluid from the inlet passageway to an outlet passageway formed in the fitting 251. A spring 257 acts between the ball and a bushing 258 in the outer end of passageway 249 to urge the valve to its normally seated position. A gland pin 259 acts between the thermal strip and the ball to transmit movement of the thermal strip to the ball. As shown in Fig. 9 the gland pin 259 extends through a snug fitting aperture 261 formed in a member 262 extending transversely of the gas passageway 233 in the support arm 219 so that the aperture 261 is sealed or out of communication with the gas passageway 233.

The stand-by valve 242 includes a body 272 secured to a bridging portion 273 of the housing as by welding. Disposed within the body is a passageway 274 for receiving a fitting 276 having a chamber 277. At its inner end the fitting is formed with an opening 278 in communication with the passageway 274. A ball element 279 forms a valve and is shaped to seat on a valve seat 281 formed at one end of the chamber. A spring 283 acts between a bushing 284 disposed in the fitting 276 and the ball to normally urge the ball to its seated position as shown. A gland pin 286 extending through a snug fitting opening 287 in the end of the valve body 272 is shaped to engage the side of the thermal strip 217 and is responsive to movement of the thermal strip 272.

As best seen in Fig. 9 with this construction the sub-burner control valve 241 and the stand-by pilot burner valve 242 are disposed on opposite sides and laterally of the thermal strip 217. With this construction the thermal strip effects simultaneous control movements of the stand-by pilot burner valve and the sub-burner valve and also the thermal strip is directly connected to the respective valves and thereby assures a positive driving action of the valve elements. The relative position of the valves 241 and 242 may also be adjusted where desired for alignment purposes.

While in the foregoing description and in the accompanying drawings there have been disclosed three preferred embodiments of the present invention, it is to be understood that various modifications, omissions and refinements which depart from the specific illustrated embodiments of the invention may be adopted without departing from the spirit and scope of the present invention.

I claim:

1. In a lighter unit the combination of a safety valve having an open and a normally closed position, first pilot burner means, means rigidly interconnecting the safety valve and the first pilot burner means and having a passageway for effecting communication between the pilot burner means and a fuel supply, a thermal strip positioned to be heated by said first pilot burner means, means acting between said safety valve and said thermal strip operable to move the safety valve to its open position when the strip is heated to a preselected temperature, a sub-burner valve having a normally open and a closed position and arranged to control the flow of fuel to a sub-burner, means acting between said sub-burner valve and the thermal strip operative to move the sub-burner valve to its closed position when the strip is heated to a preselected temperature, a stand-by pilot burner adjacent the first pilot burner means, stand-by pilot burner valve means arranged to control the flow of fuel to said stand-by pilot burner and having an open and a normally closed position, and means acting between said thermal strip and said stand-by pilot burner valve means for moving said stand-by pilot burner valve means to its open position when the said thermal strip is heated to a preselected temperature.

2. In a lighter unit the combination of a body, a first pilot burner mounted at one end of said body, a safety valve mounted at the opposite end of said body and normally biased to a closed position, a sub-burner valve mounted on said body having an open and a closed position, means acting between the safety valve and the sub-burner valve operative to move the sub-burner valve to its closed position when the safety valve

is in its open position and operative to move the sub-burner valve to its open position when the safety valve is in its closed position, said body being formed with a passageway extending through the body for effecting a flow of gas between a gas supply and the first pilot burner, a thermal strip mounted on said body to be heated by said first pilot burner and operable to move said safety valve to its open position when the thermal strip is heated to a preselected temperature, a stand-by pilot burner mounted on said body, conduit means for conducting gas from a gas supply to said stand-by pilot burner, valve means connected in said conduit means and having an open and a closed position, and means acting between said thermal strip and said valve means operable to move said valve means between said closed and open positions in response to a preselected heating of said thermal strip by said first pilot burner.

3. In a lighter unit the combination of a body, a safety valve adapted to be connected in series in a fuel supply line to control the flow of fuel therethrough and having an open and a normally closed position, first pilot burner means spaced from the safety valve, means for rigidly interconnecting the safety valve and the first pilot burner means and having a passageway in communication with the pilot burner means adapted to be connected to a fuel supply, a thermal strip arranged to be heated by said first pilot burner means, means acting between the safety valve and the thermal strip operable to move the safety valve to its open position when the strip is heated to a preselected temperature, stand-by pilot burner means adjacent the first pilot burner means, means defining a passage leading to said stand-by pilot burner means and adapted to be connected to a fuel supply, a stand-by pilot burner valve means in said passage for controlling the flow of fuel to said stand-by pilot burner means and having an open and a normally closed position, and means acting between said thermal strip and said stand-by pilot burner valve means for moving the latter means to its open position when said thermal strip is heated to a preselected temperature.

4. In a lighter unit the combination of a safety valve having an open and a normally closed position, first pilot burner means, means for rigidly interconnecting the safety valve and the first pilot burner means and having a passageway for effecting communication between the pilot burner means and a fuel supply, a thermal strip positioned to be heated by said first pilot burner means, means acting between said safety valve and said thermal strip operable to move the safety valve to its open position when the strip is heated to a preselected temperature, a sub-burner valve having a normally open and a closed position and arranged to control the flow of fuel to a sub-burner, means for mounting said sub-burner valve at one side of said thermal strip, means acting between said sub-burner valve and the thermal strip operative to move the sub-burner valve to its closed position when the strip is heated to a preselected temperature, a stand-by pilot burner adjacent the first pilot burner means, stand-by pilot burner valve means arranged to control the flow of fuel to said stand-by pilot burner and having an open and a normally closed position, means for mounting said stand-by pilot burner valve means at the opposite side of said thermal strip and means acting between said thermal strip and said stand-by pilot burner valve means for moving said stand-by pilot burner valve means to its open position when the said thermal strip is heated to a preselected temperature.

5. In a lighter unit the combination of a body having a safety valve mounted at one end of said body and having an open and a normally closed position, first pilot burner means mounted at the opposite end of said body, said body having a passageway for effecting communication between the pilot burner means and a fuel supply, a thermal strip mounted adjacent one side of said body and positioned to be heated by said first pilot burner means, means acting between said safety valve and said thermal strip operable to move the safety valve to its open position when the strip is heated to a preselected temperature, a sub-burner valve having a normally open and a closed position, means for mounting said sub-burner valve on one side of said body, means acting between said sub-burner valve and the thermal strip operative to move the sub-burner valve to its closed position when the strip is heated to a preselected temperature, a stand-by pilot burner adjacent the first pilot burner means, stand-by pilot burner valve means arranged to control the flow of fuel to said stand-by pilot burner and having an open and a normally closed position, means for mounting said stand-by pilot burner valve means on the side of said body opposite the sub-burner valve and means acting between said thermal strip and said stand-by pilot burner valve means for moving said stand-by pilot burner valve means to its open position when the said thermal strip is heated to a preselected temperature.

6. In a lighter unit the combination of a body having a safety valve mounted at one end of said body and having an open and a normally closed position, first pilot burner means mounted at the opposite end of said body, said body having a passageway for effecting communication between the pilot burner means and a fuel supply, a thermal strip mounted adjacent one side of said body and positioned to be heated by said first pilot burner means, means acting between said safety valve and said thermal strip operable to move the safety valve to its open position when the strip is heated to a preselected temperature, a sub-burner valve having a normally open and a closed position, a gland pin for actuating said sub-burner valve, a stand-by pilot burner valve having an open and a closed position, a gland pin for actuating said stand-by pilot burner valve, bracket means mounted on said body to support the sub-burner valve at one side of the top of the body and to have the gland pin for the sub-burner valve overlie the body and to support said stand-by pilot burner valve on the opposite side of the top of the body to have the gland pin for the stand-by pilot burner valve overlie the body and face the gland pin for the sub-burner valve, and driving means between said gland pins and the thermal strip operative to move the sub-burner valve to its closed position and the stand-by pilot burner valve to its open position when the strip is heated to a preselected temperature and to move the sub-burner valve to its open position and the stand-by pilot burner valve to its closed position when the strip cools.

7. In a lighter unit, the combination of a body having a safety valve at one end, said body having an inlet and outlet port associated with said safety valve, said body having a first pilot burner means mounted at the opposite end and an arm

interconnecting the safety valve and first pilot burner means, said arm having a passageway in communication with the first pilot burner means and adapted to be connected to a fuel supply line, a thermal strip mounted on said body at one side of said arm arranged to be heated by said first pilot burner means, sub-burner valve means mounted on said body to be disposed laterally of said thermal strip, said sub-burner valve means having a closed and an open position, a gland pin for actuating said sub-burner valve means extending through said arm to engage one side of said thermal strip and operative to effect movement of said sub-burner valve means to a closed position when the thermal strip is heated, means in said passageway encircling said gland pin to seal the passageway from atmosphere, a stand-by pilot burner, stand-by pilot burner valve means mounted on the opposite side of said body to be disposed laterally of said thermal strip at the side thereof opposite said sub-burner valve means, said stand-by pilot burner valve means arranged to control the flow of fuel to the stand-by pilot burner and having an open and a normally closed position, a gland pin for actuating said stand-by pilot burner valve means extending through said arm to engage said opposite side of the thermal strip and operative to effect movement of said stand-by pilot burner valve means to its open position when said thermal strip is heated to a preselected temperature.

8. In a lighter unit, the combination of a body having a safety valve at one end, said body having an inlet and outlet ports associated with said safety valve for connecting the safety valve in a line between a fuel supply and a main burner, said body having first pilot burner means mounted at the opposite end and an arm for interconnecting the safety valve and first pilot burner means, said arm having a passageway in communication with the first pilot burner means and adapted to be connected to a fuel supply line, a thermal strip mounted on said body at one side of said arm arranged to be heated by said first pilot burner means, sub-burner valve means mounted on said body on one side of said thermal strip, said sub-burner valve means having a closed and an open position, second pilot burner means, auxiliary valve means arranged to control the flow of fuel to said second pilot burner means mounted on said body to be on the opposite side of said thermal strip, said auxiliary valve means having an open and a normally closed position, and means acting between said thermal strip and said sub-burner valve means and said auxiliary valve means to move said sub-burner valve means to its closed position and said auxiliary valve means to its open position when said thermal strip is heated to a preselected temperature.

9. In a lighter unit, the combination of a body having a safety valve at one end and first pilot burner means mounted at the opposite end, said body having an arm interconnecting the safety valve and first pilot burner means, said arm having a passageway in communication with the first pilot burner means and adapted to be connected to a fuel supply line, a thermal strip mounted on said body at one side of said arm arranged to be heated by said first pilot burner means, sub-burner valve means mounted on said body to be disposed laterally of one side of said thermal strip, said sub-burner valve means having a closed and an open position, second pilot burner means, auxiliary valve means arranged to control the flow of fuel to said second pilot burner means mounted on said body to be disposed laterally of the opposite side of said thermal strip, said auxiliary valve means having an open and a closed position, and means acting between said thermal strip and said sub-burner valve means and between said auxiliary valve means and said thermal strip to move said sub-burner valve means to its closed position and said auxiliary valve means to its open position when said thermal strip is heated to a preselected temperature.

10. A lighter unit as set forth in claim 4 in which the sub-burner valve and the stand-by pilot burner valve means are in substantially coaxial relation one with respect to the other.

11. A lighter unit as set forth in claim 4 in which the sub-burner valve and the stand-by pilot burner valve means each includes a valve member normally spring pressed toward closed position and a gland member movable axially for moving its respective valve member to open position, and in which the gland members are in substantially coaxial relation one with respect to the other.

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