April 30, 1940. T. A. WETZEL 2,198,895

CONTROL MEANS FOR BURNERS

Filed Feb. 1, 1937 2 Sheets-Sheet 1

Fig. 1.

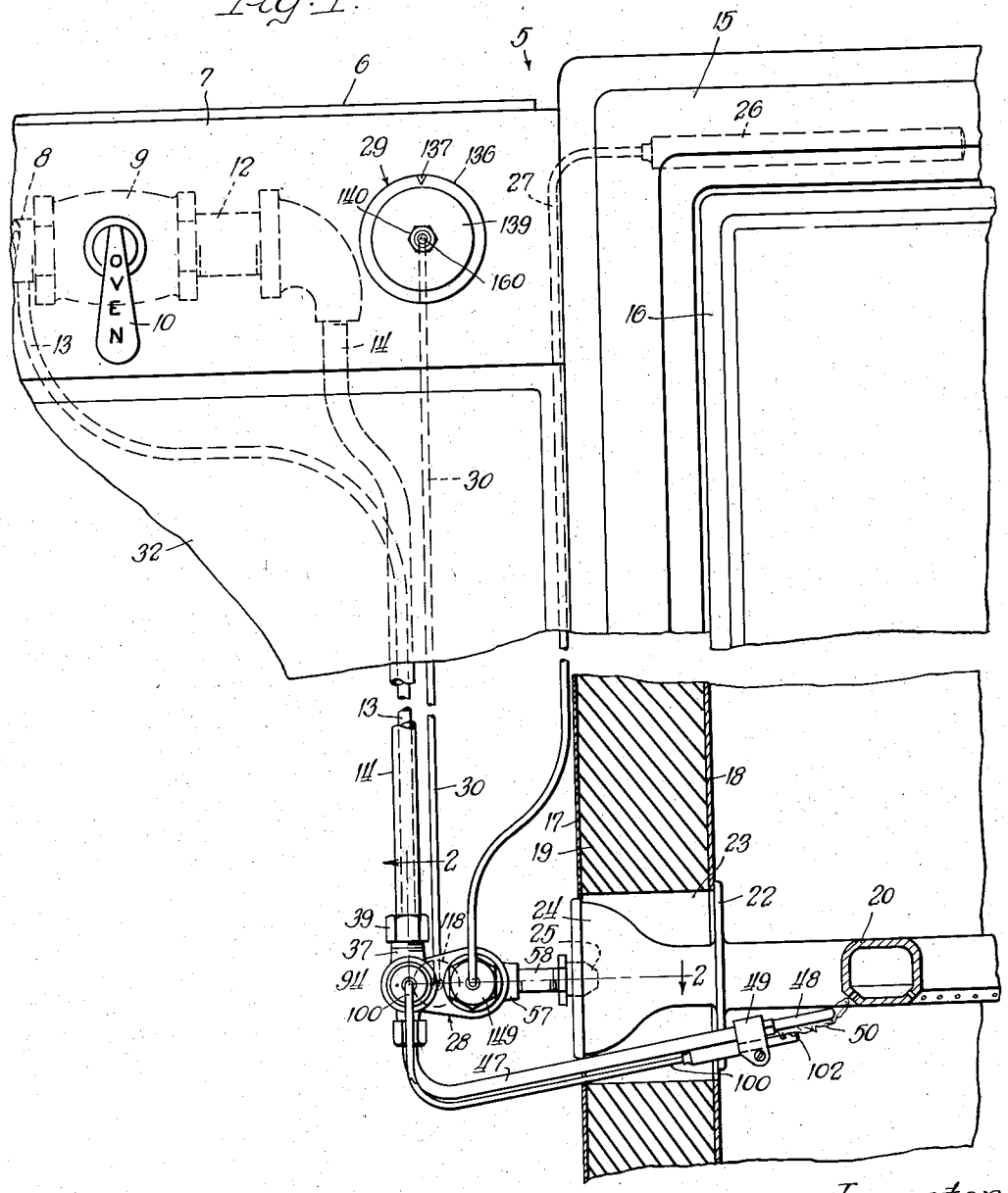

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Fig. 2.

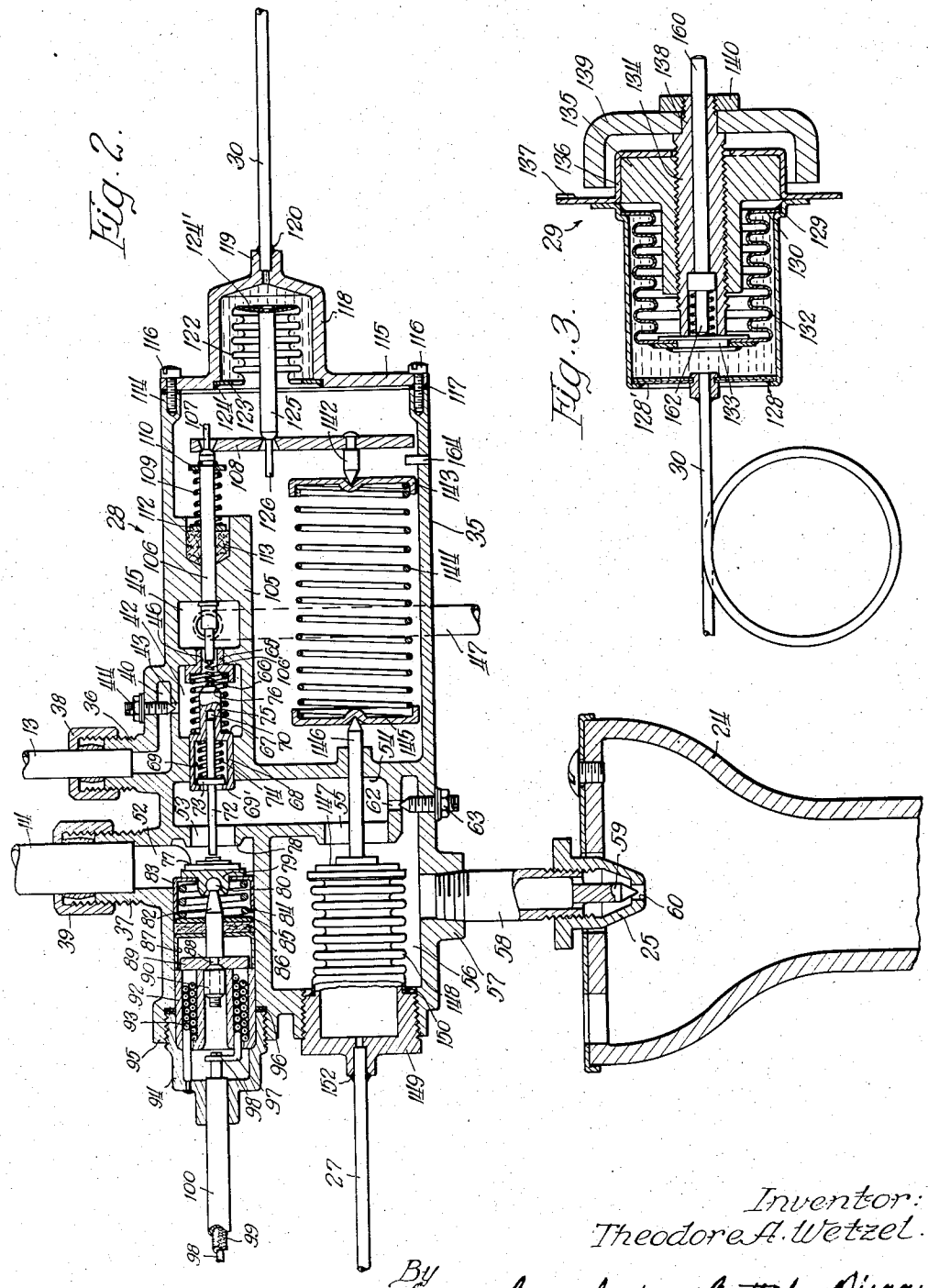

Fig. 3.

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CONTROL MEANS FOR BURNERS

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21 Claims. (Cl. 236—1)

This invention relates to control means for burners, and more particularly to control means for regulating the operation of burners such as are employed in ovens and the like. While the invention is illustrated and described in conjunction with the embodiment thereof in the control of an oven burner for a domestic gas range, it is to be understood that it is not limited to this particular application, but may be employed in other burner control arrangements.

One of the primary objects of the present invention is to provide, in conjuction with the pilot burner employed in the oven, a thermo-electric safety shut-off device for shutting off the supply of fuel to the main burner whenever the pilot burner is extinguished. In connection with this feature, I provide a structure wherein the main supply valve tends to return to closed position when manually opened, until such time as the pilot burner is again ignited.

Another object of the present invention is to provide, in addition to the shut-off means controlled by the pilot burner, an oven heat regulator and thermostat for maintaining selected temperatures in the oven by control of the gas flow to the main burner. In conjunction with the means for selecting the desired temperature in the oven I provide remotely operating reset means for opening the pilot burner supply valve and the main burner control valve to secure ignition of the pilot burner and consequent ignition of the main burner.

In the preferred form of the invention I contemplate providing a main control unit, disposed between the gas supply manifold and the burner to be controlled, such as an oven burner. This unit is adapted to have connections leading thereto from the supply manifold for separately supplying gas for the pilot burner and main burner, with independent connections from the unit to the respective burners. Incorporated in the same unit are cooperating valves controlling the main burner fuel supply and the pilot burner fuel supply through the unit, both valves being under the control of a thermocouple responsive to the pilot burner.

Incorporated in the same unit is a secondary control valve for regulating the flow of gas to the main burner in accordance with the temperature which it is desired to maintain in the oven or other medium to which heat is supplied by this burner. This valve is under the conjoint control of a thermostat disposed in the space being heated and responsive to temperatures therein, and a selecting device mounted remote from the unit and the oven for determining or selecting the desired temperature. The selecting device also includes means for resetting the cooperating pilot and main burner valves when it is desired to ignite the pilot burner.

Another feature of the present invention resides in the construction and arrangement of the constituent parts of the control unit, and their interconnection and disposition for facilitating control thereof by the various remotely disposed controlling members, such as the thermocouple, thermostat and selecting and resetting device.

Still another advantage provided by the present invention resides in the improved control unit with its compact and simplified arrangement of parts, and improved means for controlling the burner fuel supply and the valve resetting mechanism.

Other objects and advantages of the present invention will appear more fully from the following detailed description which, taken in conjunction with the accompanying drawings, will disclose to those skilled in the art the particular construction and operation of a preferred form of the present invention.

In the drawings:

Figure 1 is a front elevational view, with parts thereof broken away, showing a preferred manner of arranging the control unit and actuating devices of the present invention as applied to a cooking range;

Figure 2 is a transverse sectional view, being more or less of a developed sectional view taken substantially on line 2—2 of Figure 1; and

Figure 3 is a sectional view taken through the selecting unit shown in Figure 1.

Referring now in detail to the drawings, I have shown in Figure 1 a kitchen range or the like indicated generally by the reference numeral 5, having a flat top 6 within which are disposed open top range burners, provided with the front panel member 7 upon which is mounted the control cocks for the burners and behind which extends the fuel supply manifold 8 having a pilot burner supply 13 connected thereto and having a valve 9 therein controlled by the gas cock 10 for supplying fuel through the member 12 to the main oven burner supply conduit 14.

The range oven is indicated generally at 15, having the usual horizontally hinged door 16 at the front thereof, and comprising a pair of spaced wall members 17 and 18 between which may be disposed insulating material as indicated at 19.

Below the oven compartment 16 is disposed the main burner indicated generally at 20, this burner being provided with a flange portion 22 adapted to engage about the defining edge of an opening 23 formed in the side wall of the range, and having the air inlet portion 24 into which the gas spud 25 is adapted to extend.

Disposed in the upper portion of the oven 15 is a pressure type thermostat 26, which may comprise a bulb or other type of containing member having the relatively small conduit 27 extending

therefrom to the control unit indicated generally at 28. The tube or conduit 27 is preferably capillary in size, so that slight changes in pressure within the bulb 26 will be transmitted practically instantaneously to the pressure actuated means within the control unit 28.

Mounted upon the front panel 7 of the range is a suitable selecting mechanism indicated generally at 29, and disclosed in detail in Figure 3. The member 29 is provided with a conduit 30 leading therefrom behind the panel 7 and behind the front wall 32 of the range downwardly to the control unit positioned adjacent the main oven burner 20. The purpose of this conduit will be described in detail in connection with the description of the control unit.

Considering now in detail the structure shown in Figure 2, the control unit comprises a housing 35, having the threaded extending bosses 36 and 37 projecting from one side thereof, these bosses being adapted to receive the lower ends of the pilot gas supply conduit 13 and the main oven burner gas supply conduit 14, these conduits being secured within the bosses 36 and 37 by the cap nuts 38 and 39, respectively, in a manner which is well known.

The pilot burner conduit 13 opens into the chamber 40 formed in the housing 35, the chamber 40 in turn opening into the inlet chamber 42 of the pilot burner control valve assembly through the port 43, this port being controlled by a metering screw 44 to predetermine the quantity of fuel being supplied to the pilot burner.

The outlet chamber 45 of the pilot valve assemblies communicates with the inlet chamber 42 through the valve passage 46, and from the chamber 45 a suitable conduit connection 47 is provided leading to the pilot burner 48. The pilot tip is supported by threaded engagement upon a fitting 49 which, in turn, is supported by suitable means below the oven burner 20, as illustrated in Figure 1. The pilot tip 48 preferably has opening means along the bottom and inner end, at which opening means the pilot flame burns as indicated at 50 in proximity to the oven burner 20. The particular form of the pilot tip and the particular arrangement of the opening therein for producing the pilot flame may, of course, vary widely within the scope of the present invention.

The main fuel supply conduit 14 opens into the chamber 52 formed in the housing 35, and the fuel from this chamber passes through the valve opening 53 into the chamber 54, and thence outwardly through the passage 55 into the chamber 56, which has a laterally extending boss 57 providing a connection for the nipple 58 through which the gas is supplied to the spud 25 for entrance into the bell 24 of the main oven burner. It will be noted that the spud 25 is adjustably threaded upon the end of the nipple 58, the nipple in turn being provided with a projecting stud portion 59, whereby the amount of gas flowing outwardly through the port 60 of the spud may be controlled.

Preferably a suitable by-pass opening 62 is provided between the chambers 54 and 56, controlled by the metering screw 63, so that in the event valve passage 55 is closed, a sufficient amount of gas will still flow to the burner to maintain a minimum quantity of gas thereto to insure continuous ignition of the oven burner.

Considering now in detail the thermal electric cutoff for controlling the supply of fuel to the main oven burner and to the pilot burner, the housing 35 is provided with counterbored portions extending substantially coaxial of the passageways 46 and 53. A suitable bushing 65 is mounted within the passageway 46, and has an extending flange portion disposed within the chamber 42 forming a seat for one end of a spring member 66, the opposite end of this spring member being biased against a shoulder 67 formed on a slidable valve member 68 mounted for sliding movement between the passageway 54 and the pilot valve chamber 42. The member 68 is provided with an axially extending recess 69, and is also provided with the axially extending counterbored portion 70 adapted to receive the inner end of a spindle member 72 extending outwardly from the recess 69. The member 72 is provided with a collar 73 intermediate its ends, this collar serving to form a seat for one end of the spring 74, the opposite end of the spring 74 being biased against the inner face of the recessed portion 69 of the member 68. The end of the member 68 is spun over, as at 69', to form a stop for the spindle collar 73. It will thus be noted that the spindle member 72 is capable of relative movement with respect to the member 68, with the spring member 74 normally urging the spindle 72 outwardly with respect to the recess 69. Adjacent its inner end, the member 68 is provided with a reduced portion 75 formed with a conical surface 76 at the end thereof adapted to form a valve seating portion engaging the defining edge of the passageway 46 within the bushing 65.

The opposite end of the spindle 72 has abutting engagement with a valve member indicated generally at 77 adapted to engage the valve seat 78 formed at the inlet side of the passageway 53. The valve member 77 is provided with a valve disc retaining portion 79 having a socket therein adapted to receive the ball end 80 of a valve stem member 82. Secured about the socket portion 79 is a cup-shaped member 83 which is fixed for conjoint movement with the valve 77, and which forms an enclosing retainer for the relatively heavy spring 84. The spring 84 is biased at one end against the interior surface of the base of the cupshaped member 83, and at its opposite end bears against a washer 85 engaging suitable packing 86 disposed between the washer and the outer surface of the base of a second cup-shaped member 87. The member 87 is thereby fixed in position within the recess of the housing 35, and is sealed against passage of gas therepast by the gasket member 86. The outer end of the valve stem 82 is provided with a reduced portion 88, adapted to receive an armature member 89, this armature member being loosely secured to the valve stem 82 by means of the nut 90 engaging the projecting threaded end of the valve stem. This swivelly mounts the armature disc 89 in position with respect to the valve stem 82, and assures that it will have free movement within the cup-shaped member 87, being centered upon the valve stem in such manner that it will also be centered within the member 87 so as to be normally disposed out of contact with the inner surfaces of the cylindrical wall thereof.

A suitable magnet frame 92, which is formed of an annular member having a double wall within which is disposed the electromagnetic coil 93, has the end surfaces thereof formed for engagement by the armature 89 when the magnet 92 is energized. One end of the coil 93 is connected to the threaded cap member 94 which threads into an enlarged end 95 of the housing 35, and which has internal shoulder portions engaging the external shoulders of the magnet in order to lock the

same in fixed position within the housing. A suitable gasket 96 may be interposed between the inner end of the member 94 and the inner end of the enlarged recess 95.

The opposite end of the coil 93 is connected through conductor 97 with a conductor 98 carried within suitable insulating means disposed within the interior of a metallic tubular member 100 that extends into the end of the cap member 94. The tubular member 100 forms one conductor for a thermocouple circuit which includes the conductor 98 as the other line conductor. Thus the coil 93 is connected between the conductors 98 and 100, and current flowing through these conductors will energize the coil 93. The conductor or tube 100, with the inner conductor 98 therein, extends substantially along the line of the pilot burner supply conduit 47 to the fitting 49, and is clamped in this fitting so that the extremity thereof, which is formed of dissimilar metals to provide a welded junction 102 forming the hot junction of the thermocouple produced thereby, is disposed in the path of the pilot burner flame 50. It will thus be seen that the junction 102 has one conductor extending therefrom in the form of the outer enclosing metallic tube 100 connected through the cap member 94 to one end of the coil 93, and the opposite conductor thereof is enclosed in insulated relation within the metallic tube 100 and is connected at its opposite end to the other terminal of the coil 93 through the conductor 97.

The housing 35 is provided, adjacent the pilot valve member 68, with an offset internal extension 105, adapted to form a suitable guiding support for a spindle member 106 which, at its inner end, is adapted to have abutting engagement with the valve end portion 75 of the member 68, and at its opposite end is provided with a projecting fin portion 107 having rocking engagement within the cross arm or lever 108. A suitable spring 109 is biased between a thrust collar 110 carried on the extending end of the spindle 106 and a packing washer 112 adapted to compress suitable packing 113 into position about the lateral surface of the spindle 106 in order to prevent passage of gas from the pilot supply outlet chamber through the spindle passageway 105.

The end of the housing 35 is provided with a thickened shoulder 114, which is adapted to be closed by a suitable cap member 115 secured to the shoulder 114 by means of a plurality of cap screws 116, there preferably being a gasket 117 interposed therebetween for sealing the interior of the chamber.

The cap member 115 is provided with a suitable offset cylindrical portion 118, which is provided with an extending boss 119 to which is sealed the conduit 30, as by means of solder indicated at 120, or the like. Disposed within the interior of the chamber 118 is a bellows-like pressure-actuated member 122, which is provided at its inner end with a flange portion 123 sealed to a suitable shoulder formed in the inner surface of the cap member 115, as indicated at 124. Extending through the bellows member 122, and secured to a bimetallic end closure 124' thereof which compensates for temperature changes, is a plunger member 125 projecting into unit 35 and having the pin-like projecting portion 126 piloted in the cross-arm or lever 108. It will thus be apparent that upon collapse of the bellows 122, the spindle 125 will move outwardly with respect thereto, exerting a pressure to the left upon the cross-arm 108. The chamber 118 about the bellows 122 is filled with a suitable liquid which is not appreciably affected by changes in temperature. The liquid within the chamber 118 communicates through the capillary tube 38 with the interior of the chamber 128 formed at the selecting means 29, as shown in Figure 3. Chamber 128 is formed as a substantially cylindrical cup-shaped stamping, provided with a shoulder portion 129 adapted to receive one end 130 of a suitable bellows member 132 sealed annularly at the shoulder 129 and carrying a closed end portion 133 at its opposite end, which is maintained in abutting engagement with a threaded spindle 134. The base end of chamber 128 is provided with a bimetallic disc 128' to correct the pressure due to temperature changes.

The spindle 134 is adapted to be threaded through a suitable bushing member 135 carried by the frame plate 136 upon the front of the oven panel 7. The frame plate 136 is preferably provided with an indicating marker or pointer 137, which may be formed integral therewith or may be painted thereupon, as desired. The spindle 134 is provided with a reduced portion 138, to which is secured a dial or indicating member 139, the same being clamped to the spindle by the nut 140. By registering suitable indications upon the annular surface of the dial member 139 with the indicator 137, the spindle is adjustably threaded within the bushing 135, to produce a corresponding expansion or contraction of the bellows member 132. The chamber 128 being filled about the external surface of the bellows with the liquid which communicates with the liquid in the chamber 118, it is apparent that upon expansion of the bellows 132 in the chamber 128, a pressure will be transmitted to the liquid in the chamber 118, collapsing this bellows to the same extent, and thereby producing an outward thrust on the spindle 125, thus causing bearing member 142 carried by the arm 108 to be moved to the left.

Similarly, a collapse of the bellows 132 within the chamber 128 will reduce the pressure in this chamber, and consequently reduce the pressure in the chamber 118, thereby causing an extension of the bellows 122 and a retraction of the spindle 125 with respect to the arm 108.

Considering now in detail the oven heat regulating mechanism, the selecting member 29, with the component parts as illustrated, is connected to the cross-arm 108 with a suitable bearing member 142 adapted to have bearing engagement against a spring follower member 143 receiving one end of a coil spring 144. The opposite end of the spring 144 is engaged in the spring follower 145, which, in turn, is supported for bearing engagement about the pointed end of a valve stem member 146 connected to a valve member 147 carried by a suitable Sylphon bellows or similar pressure-actuated member 148, which is sealed to the inner end of a threaded cap member 149, as indicated at 150. The cap member 149 is provided with a suitable passage at its outer end into which extends the conduit 27, the conduit being sealed thereto as indicated at 152. The interior of the bellows 148, the cap member 149, the tube 27, and the bulb 26 in the oven chamber are filled with a vapor-liquid medium producing pressure variations in accordance with temperature variations at the bulb 26.

Variations of temperature in the oven will result in variations in pressure within the bulb 26, producing a transmission of this pressure through the tube 27 to the interior of the bellows member

148, thereby producing a variation in the positioning of the valve 147 with respect to the passage 55.

In order to produce an initial setting of the valve member 147, the selecting spindle 134 is rotated to an extent determined by the indications on the cooperating dial and pointer members 139 and 137, producing a change in pressure in the chamber 116 which actuates the spindle 125 for moving the cross-arm 108 to the left to put a predetermined tension upon the spring 144, which transmits this tension through the spindle 146 to the valve member 147, thereby producing a predetermined pressure within the bellows 148 and within the bulb 26. This initially positions the valve member for operation to produce a predetermined temperature within the oven, the mechanism being calibrated to provide the desired effect. However, as the temperature in the oven builds up, expansion of the fluid in the bulb 26 will result in expansion of the bellows 148, slightly closing the valve member 147, and thereby reducing the flow of gas to the burner 20. Similarly, a decrease in temperature within the oven below that required will result in collapse of the bellows 148, opening the valve 147 and providing for an increased flow of fuel through the passageway 55 into the chamber 56 and thence to the burner 20.

Assuming now that the parts are in the position shown in Figure 2, with the burner 20 and the pilot burner 48 ignited, and the selecting mechanism set to provide a predetermined temperature within the oven, variations from this temperature will produce variations in the position of the bellows 148, thereby controlling within a limited range the amount of variation of temperature within the oven with respect to the selected temperature. These variations, due to expansion and contraction of the fluid in the bulb 26, will be resisted by the pressure of the spring 144 and will maintain the temperature within the oven at approximately the desired temperature. Although spring 144 tends to rock the arm 108 about the pin portion 126 of the spindle 125, such movement is not possible due to excessive pressure of spring 109. Assume now that the pilot burner becomes extinguished, due to a draft, or for any other reason. The thermocouple element of junction 102 immediately cools, thereby deenergizing the coil 93 and thus deenergizing the magnet frame 92. As a result, the armature 89 is no longer held against the base of the magnet 92, and the spring 84, which is a relatively powerful spring, urges the valve member 77 down onto its seat 78. Upon initial movement of the valve member 77 towards its seat, the spindle member 72 is moved inwardly, and, due to the pressure of the spring 74, tends to compress the spring 66, thereby moving the member 68 inwardly with respect to the valve seat 65, and moving the pilot valve control member into valve-closing position. Any amount of lost motion required, due to differences of position of the valve members 77 and 76 with respect to their respective seats, will be accommodated by the sliding movement of the spindle 72 with respect to the recess 70, under the influence of spring 74, so that as the pilot valve member 76 seats prior to seating of the valve 77, the spindle 72 has sufficient lost motion movement to allow seating of the valve 77. In the preferred construction the spring 74 allows valve 76 to seat slightly sooner than valve 77, and accommodates the necessary overtravel to provide for positive seating of both members.

It should be noted that the valves are seated without rocking arm 108 about the pin portion 126 of the spindle 125. With the valves thus closed, the fuel supplied to both the pilot burner and the main burner is shut off, and consequently no fuel escapes. When it is desired to reignite the pilot burner, in order to allow ignition of the main burner, the reset stem 160, carried within the spindle 134 and projecting outwardly from the selecting means 29, is pushed inwardly manually, the plunger end 162 thereof engaging the end 133 of the bellows 132 to expand the same, thereby increasing the pressure of the fluid in the chamber 128 to an extent such as to collapse the bellows 122 and force the spindle 125 outwardly of the bellows, thereby placing pressure upon the cross-arm 108. As a result, the cross-arm 108 tends to move to the left, and by reason of the stop member 164 provided in the housing 35, if the cross-arm 108 tends to pivot in a clockwise direction about the spindle 125 due to the strong pressure of spring 84 and 109, the stop member prevents such movement and insures that the cross-arm 108 will impart a translatory movement to the spindle 106 sufficient to move the valve member 76 and the valve member 77 away from the valve seats and to compress the spring 84, whereby the armature 89 is moved into engagement with the magnet face of magnet 92. This allows gas to flow to the pilot burner, whence it is ignited and the heat thereof applied to the thermocouple. As soon as the thermocouple junction 102 becomes heated, the magnet coil 93 is energized, and consequently maintains the armature 89 in attracted position against the magnet frame. The reset stem 160 can then be released, and the parts assume normal operating position.

It is to be understood, of course, that the temperature desired within the oven can be controlled by the selecting means independently of the operation of the control valves actuated by and under the control of the thermocouple. The metering passageway 62 is provided to insure a minimum flow of gas to the main burner 20 even when the valve 147 is closed over the passageway 55, this minimum flow to the burner being found desirable in some instances.

I am aware that various changes may be made in details of the constituent parts of the present invention, and in their arrangement and cooperating relationship with respect to other of the parts thereof, and I do not intend to be limited to the exact details illustrated and described in the preferred embodiment of my invention disclosed herein. The invention is to be understood as being limited only as defined by the scope and spirit of the appended claims.

I claim:

1. In combination, a main burner, a pilot burner therefor, a fuel supply line, separate conduits between said line and said burners, a common control unit in said lines having coaxially spaced conjointly operable valves for controlling flow of fuel to said burners, means in said unit responsive to extinguishment of said pilot burner for closing both said valves, secondary valve means in said unit for controlling flow of fuel to said main burner, means acting in opposite directions on said secondary valve means for selecting and maintaining a predetermined operating temperature at said main burner, a thermocouple subject to the heat of the pilot burner, an

electromagnet connected to said thermocouple and having an armature which when attracted holds said main burner valve open and, when retracted, permits closing of said valve, and means actuated by a portion of said selecting means for resetting said armature to attracted position and said main burner valve to open position.

2. The combination, with a pilot burner and a main burner having separate fuel supply conduits, said main burner being adapted to supply heat to an enclosure, of a common control unit for both said burners, including normally closed shut-off valves in said conduits, means responsive to ignition of the pilot burner for holding said valves open but inoperative to move said valves to open position, a secondary valve in said unit for said main burner, remotely disposed selecting means acting to control the position of said secondary valve for maintaining a predetermined temperature in said enclosure, and means actuated by a portion of said selecting means for resetting the means for holding the valves open.

3. In combination, a control unit having separate inlet passages for receiving fuel for a main burner and a pilot burner, valves in said passages having limited lost motion connection therebetween and normally conjointly urged toward closed position, thermo-electric means responsive to ignition of said pilot burner for holding said valves open, outlet passages in said unit for each of said burners, a secondary valve in the outlet passage for the main burner, pressure-actuated selecting means operable from a remote point for selecting the position of said secondary valve, opposing pressure-actuated means responsive to the temperature developed by said main burner for controlling said valve position, and means actuated by a portion of said selecting means for resetting the thermo-electric means for holding the valves open.

4. A control unit adapted to be interposed in the fuel supply lines between a gas supply manifold and a main burner and associated pilot burner, comprising a housing having separate fuel supply inlets and outlets for each of said burners, a pair of valves between the inlet and outlet for the main burner, a single valve between the inlet and outlet for the pilot burner, remotely disposed selecting means for controlling the operating position of one of the main burner valves, remotely disposed means for varying said position in accordance with temperature variations produced by said main burner, means interconnecting the other main burner valve and pilot burner valve for conjoint operation, theremoelectric means for holding one of said last two valves open when said pilot burner is ignited, means for closing said valves upon extinguishment of said pilot burner, and resetting means for said last two valves actuated by a portion of said selecting means.

5. In combination, a fuel supply manifold, a main gas burner, an associated pilot burner, fuel supply conduits between said manifold and each of said burners, a control unit having valve means controlling gas flow through both conduits, thermoelectric means for holding the valve means for one conduit open when the pilot burner is ignited, means for shutting off the valve means for both said conduits upon extinguishment of said pilot burner, a second valve in said unit for controlling the main burner conduit, pressure actuated means in said unit operable by a remotely disposed pressure developing means for selecting the operating position of said valve, opposing pressure actuated means in said unit for varying the said position in accordance with remotely disposed pressure means responsive to temperatures developed by said main burner, and means actuated by a portion of said selecting means for resetting said thermo-electric means.

6. In combination, a fuel supply manifold, a main gas burner, an associated pilot burner, fuel supply conduits between said manifold and each of said burners, a control unit having valve means controlling gas flow through both conduits, thermoelectric means for holding the valve means for one conduit open when the pilot burner is ignited, means for shutting off the valve means for both said conduits upon extinguishment of said pilot burner, a second valve in said unit for controlling the main burner conduit, pressure actuated means in said unit operable by a remotely disposed pressure developing means for selecting the operating position of said valve, opposing pressure actuated means in said unit for varying the said position in accordance with remotely disposed pressure means responsive to temperatures developed by said main burner, and reset means disposed at said selecting means and independently operable through said first pressure actuated means in said unit for resetting said valve means.

7. A control unit having separate passages therethrough for supplying fuel to a main burner and to an associated pilot burner, valve means in said unit controlling said passages, thermo-electric means responsive to ignition of said pilot burner and including an electromagnetic coil in said unit for normally holding the valve means for one of said passages open, spring means for closing the valve means for both of said passages upon extinguishment of said pilot burner, a main burner control valve in the main burner fuel supply passage in said unit, bellows means connected to said valve at one end of said unit and to a remotely disposed pressure developing member responsive to the heat of said main burner, a second bellows in the opposite end of said unit and carrying an inwardly projecting spindle, a cross-arm on said spindle, remotely disposed selecting means including a pressure developing member for actuating said second bellows to produce predetermined movement of said cross-arm, resilient means actuated by said cross-arm for prestressing said first bellows means to effect a predetermined operating position of said main burner control valve, means at said selecting means and operable independently thereof for actuating said cross-arm, and motion-transmitting means between said cross-arm and said valve means for resetting said valve means.

8. In a system of the class described wherein there is a main burner, a pilot burner, fuel supply means for the main burner and said pilot burner, controlling means including a main burner valve operative to control the fuel supply for the main burner and a pilot burner valve for controlling the fuel supply for the pilot burner, the combination with said system of a thermocouple subject to the heat of the pilot burner, an armature connected to the main burner valve, an electromagnet connected to said thermocouple and cooperable with said armature to hold said main burner valve open by energization of the electromagnet by the thermo-electric current set up by said thermo-

couple when the pilot burner is ignited, means for moving said main burner valve and said pilot burner valve to closed position upon extinguishment of said pilot burner, selecting means for setting said controlling means for maintaining different temperatures, and resetting means actuated by a portion of said selecting means and common to said main burner valve and said pilot burner valve for moving both said valves to open position and said armature into position to be held by said electromagnet.

9. In a system of the class described wherein there is a main burner, a pilot burner, fuel supply means for the main burner and said pilot burner, controlling means comprising a pair of main burner valves operative to control the fuel supply for the main burner, and a pilot burner valve for controlling the fuel supply for the pilot burner, the combination with said system of a thermocouple subject to the heat of the pilot burner, an armature connected to one of the main burner valves, an electromagnet connected to said thermocouple and cooperable with said armature to hold the main burner valve connected to said armature open by energization of the electromagnet by the thermo-electric current set up by said thermocouple when the pilot burner is ignited, thermostatic means for controlling the other of said main burner valves, means for moving the main burner valve connected to said armature and said pilot burner valve to closed position upon extinguishment of said pilot burner, selecting means for setting said controlling means for maintaining different temperatures and resetting means actuated by a portion of said selecting means and common to the main burner valve connected to said armature and to said pilot burner valve for moving both of said valves to open position and said armature into position to be held by said electromagnet.

10. In combination, a main burner, a pilot burner, fuel supply means for the main burner and said pilot burner, a unitary control device between said fuel supply means and said burners, a pair of main burner valves constituting a unitary part of said control device, each operative to control the fuel supply for the main burner, a pilot burner valve constituting a unitary part of said control device for controlling the fuel supply for the pilot burner, an armature connected to one of the main burner valves, a thermocouple subject to the heat of the pilot burner, an electromagnet constituting a unitary part of said control device, said electromagnet being cooperable with said armature to hold one of said main burner valves open by energization of the electromagnet by the thermocouple when the pilot burner is ignited, thermostatically controlled means constituting a unitary part of said control device for controlling the other of said main burner valves, means for moving the main burner valve connected to said armature and said pilot burner valve to closed position upon extinguishment of said pilot burner, selecting means for setting said control device for maintaining different temperatures, and resetting means actuated by a portion of said selecting means and common to the main burner valve connected to said armature and to said pilot burner valve for moving both of said valves to open position and said armature into position to be held by said electromagnet.

11. Safety device for heating and other apparatus comprising, in combination, means to control the supply of operative energy to the apparatus, heat generating means, pilot means for said heat generating means, a thermocouple subject to the heat of said pilot means, an electromagnet connected in circuit with said thermocouple, an armature for said electromagnet which when attracted causes said controlling means to supply operative energy to the apparatus and when retracted causes said controlling means to shut off the supply of operative energy to the apparatus, selecting means for setting said controlling means for different temperatures, and means actuated by a portion of said selecting means for resetting said armature to attracted position.

12. Safety device for heating and other apparatus comprising, in combination, heat generating means, pilot means for said heat generating means, a thermocouple subject to the heat of said pilot means, an electromagnet connected in circuit with said thermocouple, an armature for said electromagnet, controlling means including a valve member connected to said armature and held in position to permit a supply of operative energy to the apparatus when the armature is attracted and compelled to position shutting off the supply of operative energy to the apparatus when the armature is retracted, selecting means for setting said controlling means for maintaining different temperatures, and means actuated by a portion of said selecting means for resetting said armature to attracted position and said valve member to position permitting a supply of operative energy to the apparatus.

13. Safety device for heating and other apparatus comprising, in combination, heat generating means, pilot means for said heat generating means, a thermocouple subject to the heat of said pilot means, an electromagnet connected in circuit with said thermocouple, an armature for said electromagnet, controlling means including a valve member connected to said armature and held in position to permit a supply of operative energy to the apparatus when the armature is attracted and compelled to position shutting off the supply of operative energy to the apparatus when the armature is retracted, selecting means having different operations and adapted by one operation for setting said controlling means for maintaining different temperatures, and means actuated by a different operation of said selecting means for resetting said armature to attracted position and said valve member to position permitting a supply of operative energy to the apparatus.

14. Safety device for heating and other apparatus comprising, in combination, heat generating means, pilot means for said heat generating means, a thermocouple subject to the heat of said pilot means, an electromagnet connected in circuit with said thermocouple, an armature for said electromagnet, controlling means including a valve member connected to said armature and held in position to permit a supply of operative energy to the apparatus when the armature is attracted and compelled to position shutting off the supply of operative energy to the apparatus when the armature is retracted, selecting means mounted for rotation for setting said controlling means for maintaining different temperatures, said selecting means being capable of axial movement, and means actuated by axial movement of said selecting means for resetting said armature to attracted

position and said valve member to position permitting a supply of operative energy to the apparatus.

15. Safety device for heating and other apparatus comprising, in combination, heat generating means, pilot means for said heat generating means, a thermocouple subject to the heat of said pilot means, an electromagnet connected in circuit with said thermocouple, an armature for said electromagnet, controlling means including a valve member connected to said armature and held in position to permit a supply of operative energy to the apparatus when the armature is attracted and compelled to position shutting off the supply of operative energy to the apparatus when the armature is retracted, fluid pressure means for setting said controlling means for maintaining different temperatures, and means actuated by said fluid pressure means for resetting said armature to attracted position and said valve member to position permitting a supply of operative energy to the apparatus.

16. A combined main burner and pilot burner control unit comprising separate fuel supply passages extending therethrough for each burner, coaxially mounted valves in said passages, a thermocouple subject to the heat of said pilot burner, an electromagnet connected in circuit with said thermocouple, an armature for said electromagnet which, when attracted, holds the valve for the main burner passage open, means for yieldingly holding the valve for the pilot burner passage open independently of said armature, and means for moving both of said valves to closed position when said armature is released and moves to its retracted position.

17. Safety device for heating and other apparatus comprising, in combination, means to control the supply of operative energy to the apparatus, an electromagnet, a thermocouple electrically connected with said electromagnet and adapted to be subjected to the heat of a flame, an armature for said electromagnet which, when attracted, causes said controlling means to supply operative energy to the apparatus and when retracted causes said controlling means to shut off the supply of operative energy to the apparatus, selecting means for setting said controlling means for different temperatures and comprising a member operable as a part of said selecting means in the selecting operation, and means actuated by said selecting member for resetting said armature to attracted position.

18. Safety device for heating and other apparatus comprising, in combination, means to control the supply of operative energy to the apparatus, an electromagnet, a thermocouple electrically connected with said electromagnet and adapted to be subjected to the heat of a flame, an armature for said electromagnet which, when attracted, causes said controlling means to supply operative energy to the apparatus and when retracted causes said controlling means to shut off the supply of operative energy to the apparatus, selecting means, means for resetting said armature, and a member common to said selecting means and said resetting means for actuating said selecting means to set said controlling means for different temperatures and also adapted for actuating said resetting means to reset said armature to attracted position.

19. Safety device for heating and other apparatus comprising, in combination, heat generating means, pilot means for said heat generating means, a thermocouple subject to the heat of said pilot means, an electromagnet connected in circuit with said thermocouple, an armature for said electromagnet, controlling means including a valve member connected to said armature and held in position to permit a supply of operative energy to the apparatus when the armature is attracted and compelled to position shutting off the supply of operative energy to the apparatus when the armature is retracted, selecting means, means for resetting said armature, and a member common to said selecting means and said resetting means for actuating said selecting means to set said controlling means for different temperatures, and also adapted for actuating said resetting means to reset said armature to attracted position.

20. In combination, a main burner, a fuel supply line leading to said burner, a pilot burner, a thermostatic valve for regulating the supply of fuel to said main burner, thermostat means for adjusting said valve to maintain selected temperatures, safety shutoff valve means for shutting off the supply of fuel to both the main burner and the pilot burner, means subject to the heat of the pilot burner for maintaining said safety shutoff valve means in open position as long as the pilot burner is lighted and operable to release said safety shutoff valve means for movement to closed position on extinguishment of the pilot burner, temperature selecting means for adjusting said thermostatic valve to different positions to select different temperatures to be maintained by said thermostat means, resetting means for said safety shutoff valve means, and a member under the control of said temperature selecting means and operable as a part of said resetting means for resetting said shutoff valve means to open position.

21. In combination, a main burner, a fuel supply line leading to said burner, a pilot burner, a thermostatic valve for regulating the supply of fuel to said main burner, thermostat means for adjusting said valve to maintain selected temperatures, safety shutoff valve means for shutting off the supply of fuel to both the main burner and the pilot burner, an electromagnet having an armature, which when attracted holds said shutoff valve open, a thermocouple placed in position to be heated by said pilot burner and connected in circuit with said electromagnet whereby said armature is held in attracted position and said safety shutoff valve means is held in open position as long as said thermocouple is heated by said pilot burner but on extinguishment of said pilot burner said armature is released for movement of the armature to retracted position and movement of said safety shutoff valve means to closed position, selecting means for adjusting said thermostatic valve to different positions to select different temperatures to be maintained by said thermostat means, resetting means for said armature and said shutoff valve means, and a member under the control of said temperature selecting means and operable as a part of said resetting means for resetting said armature to attracted position and said shutoff valve to open position.

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