Feb. 22, 1938. B. E. MEACHAM ET AL 2,109,399

LIGHTER ARRANGEMENT FOR GAS RANGES

Filed April 14, 1936 2 Sheets-Sheet 1

FIG. 1.

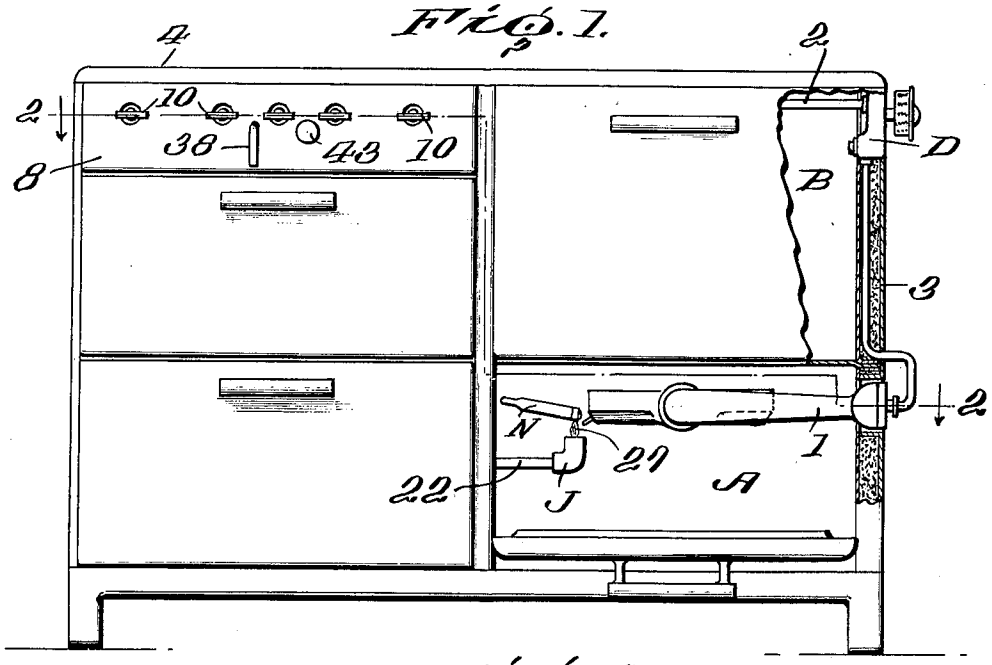
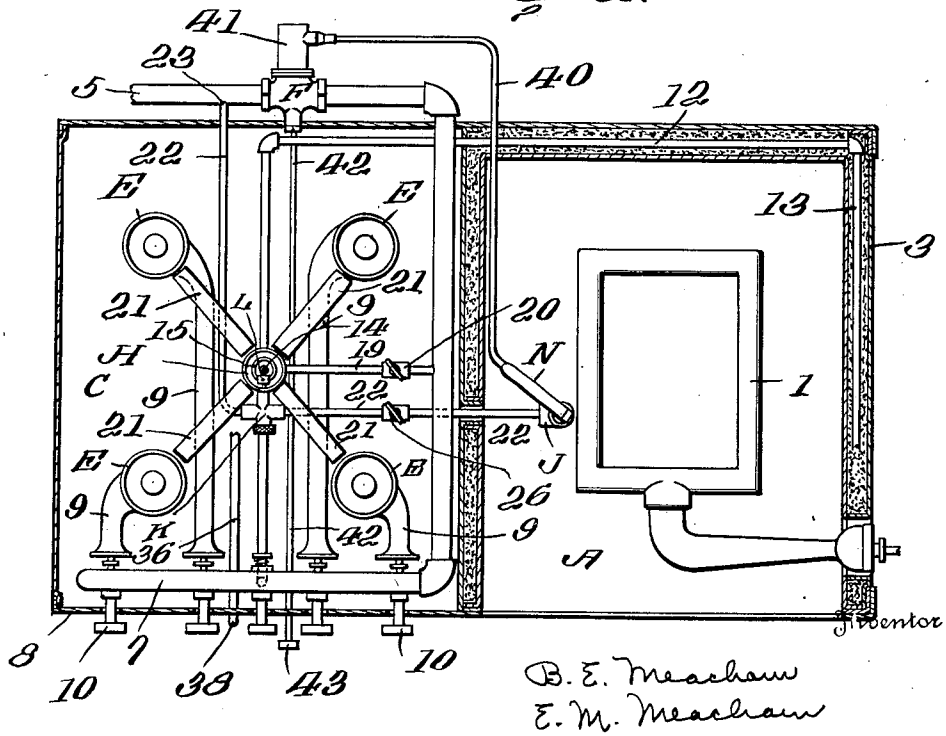


FIG. 2.



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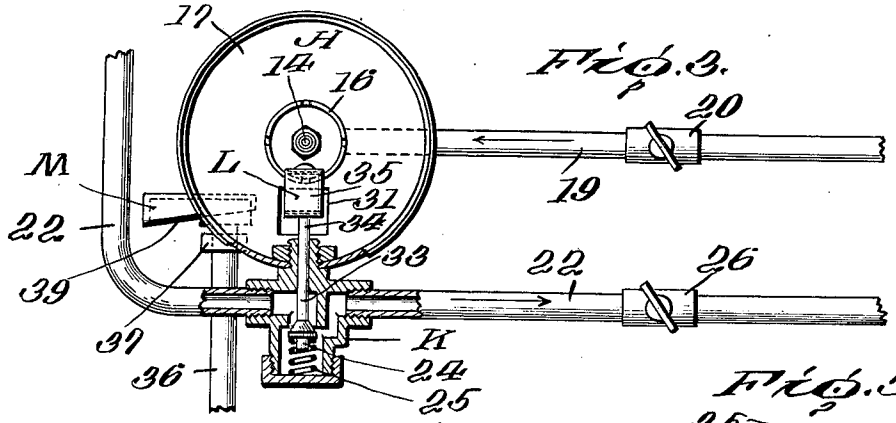


Fig. 3.

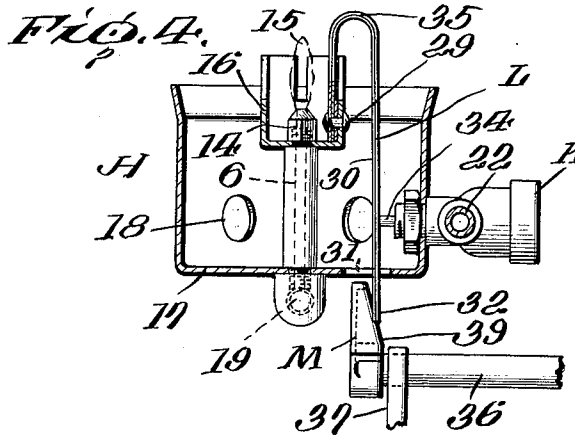


Fig. 4.

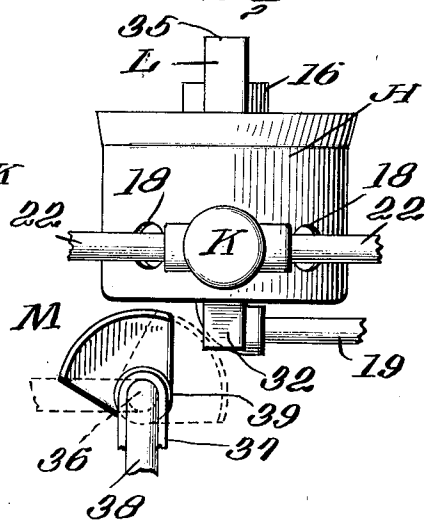


Fig. 5.

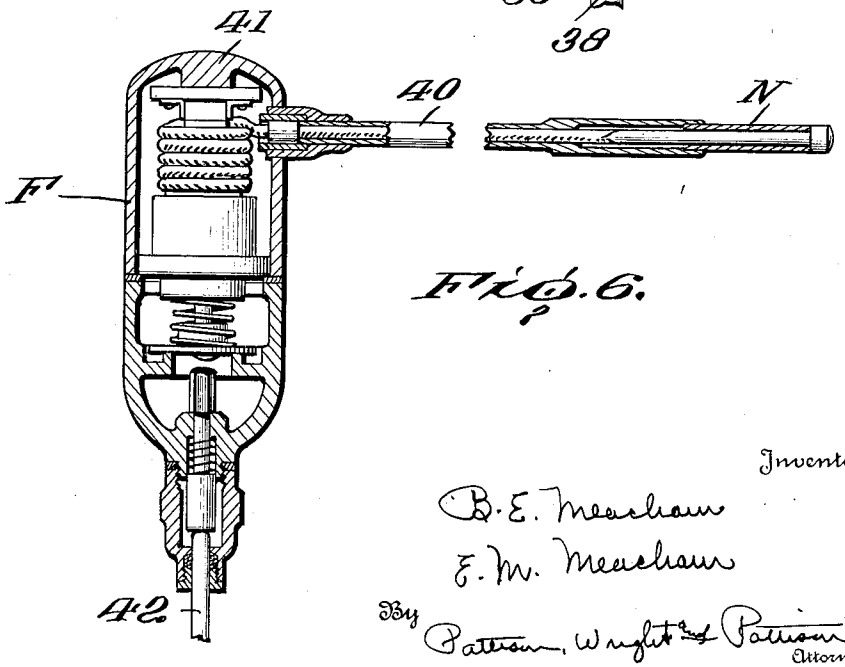


Fig. 6.

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UNITED STATES PATENT OFFICE

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LIGHTER ARRANGEMENT FOR GAS RANGES

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4 Claims. (Cl. 158—115)

This invention relates to an improved lighter arrangement for gas ranges and more particularly to an arrangement for providing for the ignition of a plurality of burners or groups of burners such as the oven burner and the cooking top burners by a plurality of pilot lights or pilot burners.

Another, among other objects of the invention, is the provision of a novel means for opening and holding open for a predetermined time the valve which controls the supply of gas to that pilot light which controls the operation of the main control valve.

Another and still further object of the invention is the provision of an automatic lighter arrangement for gas ranges which is both dependable and efficient in operation and at the same time by reason of its simplicity can be cheaply and readily assembled and is consequently cheap of manufacture.

Other specific objects, novel features of construction and improved results of the invention will appear in more detail from the following description when read in the light of the accompanying drawings.

In the drawings:

Fig. 1 is a view in front elevation of a range equipped with the present invention, portions of the range being broken away and shown in vertical section to better illustrate the component parts making up the gas range and the present invention.

Fig. 2 is a horizontal sectional view taken on the line 2—2 of Fig. 1 looking in the direction indicated by arrow.

Fig. 3 is a top view of the pilot light burner which services the cooking top burners, the valve which controls the flow of fuel to the oven burner being shown in horizontal section.

Fig. 4 is a detail view in vertical section through the cooking top burner pilot light, the parts associated with and operated by the thermostatic element of this pilot light being shown in full lines.

Fig. 5 is a detail view in elevation of the cooking top burner pilot light.

Fig. 6 is a detail view in vertical section of the main safety valve and the thermo-couple.

The present lighter arrangement is such that it is applicable to gas ranges of varying constructions and is not limited in use to a gas range of the particular and specific construction hereinafter described, although it is believed that the range construction described and illustrated is a conventional range arrangement and one which is found in wide usage.

The lighter which we provide is, after it has been once set in operation, completely automatic and provides a construction whereby the escape of unburned or raw gas from any of the main burners or any of their pilot light burners is absolutely prevented. It is to be recognized that the escape of raw or unburned gases into the kitchen or other room in which the range might be placed is not only undesirable but is highly dangerous and is a condition which must be adequately and safely guarded against.

A burner or burners or a pilot light may become extinguished in numerous different ways and when extinguished will discharge unburned or raw gases unless it is immediately relighted or the gas supply to it stopped. Probably the chief cause of extinguishing a burner or a pilot light is a "boil-over" or a heavy or sudden draft or gust of wind. A "boil-over" is the condition which exists when food or liquid within a container on the range boils or overflows its sides. The matter which overflows the utensil or container is very apt to smother the flame at a burner or a pilot light and is further very likely to either completely or partially clog their burner orifices.

It has been found also that in many instances young children either carelessly or accidentally open a gas cock and permit unburned or raw gas to escape from an unlighted burner.

Having reference now to the drawings which illustrate one embodiment of our invention in combination with a conventional form of gas range, A represents the broiling oven, B the baking oven, and C the cooking top burner chamber of the range. A single burner 1 serves both the broiling and baking ovens and is under the control of an oven heat regulator D, the thermostatic element 2 of which is illustrated as extending into the upper portion of the baking oven through the end wall 3 thereof.

The cooking top burners are designated at E and in conformity with the usual practice are situated adjacent the four corners of the cooking top burner chamber and below the cooking top portion 4 of the range.

Gas from a suitable supply (not shown) is brought to the cooking top and oven burners by a conduit 5 which is preferably positioned at the back of the range and has a pipe portion extending forwardly through the cooking top burner chamber which terminates in a manifold 7 extending across the front end of the burner chamber behind a suitable concealing panel 8.

The cooking top burners are provided with mixing tubes 9 to which gas is supplied from the gas supply manifold under the control of the burner cocks or valves 10 the handles of which are positioned exteriorly of the burner chamber panel 8. The oven burner also receives its gas from the manifold 7 and the fuel is conducted to this burner by a pipe the portions 12 and 13 of which are concealed between the double spaced walls of the oven. It will be understood of course that all gas reaching the oven burner 1 must first pass a valve which is under the control of the oven heat regulator D. This particular arrangement is so well understood by those skilled in the art that further description of this feature is considered unnecessary.

A valve F which we have termed a safety valve, is positioned in the main fuel supply pipe or conduit 5 and provides a positive means, when closed, of cutting off all gas supply to any of the cooking top burners or the oven burner.

The pilot light or burner for servicing the cooking top burners is designated as an entirety at H and comprises a burner tip 14 which burns a flame 15 within a protecting cup 16, which cup in turn is concentrically arranged within a larger protecting cup or housing 17 having a series of openings in its side walls. This pilot receives its gas from the pipe portion of the fuel conduit through a supplemental conduit 19 in which is positioned a manually operable valve 20. This valve 20 provides a means for properly adjusting the size of the pilot flame 15. Attention is directed to the fact that the pilot H receives its gas from the supply conduit at a point back of the safety valve F and hence its supply of gas is primarily under the control of said safety valve.

Although the cooking top burner pilot H serves a dual function as will be hereinafter described, one of its primary functions is servicing the cooking top burners, and accordingly a series of flash tubes 21 extend radially from this pilot outwardly to and terminate adjacent the cooking top burners and constitute means whereby the pilot light will ignite any cooking top burner when gas is being delivered to that burner. The mode of operation of a flash tube pilot lighter is sufficiently well understood by those skilled in the art as to need no further detailed description.

The oven burner 1 is serviced or ignited by a pilot J which is positioned within the broiler chamber A at a point adjacent and slightly below the over burner. This pilot light burner receives its fuel through a pipe or conduit 22 which has connection as at 23 with the main fuel supply pipe 5 at a point in front of the safety valve F. This pilot light would constantly receive fuel were it not for the presence, in its fuel supply line, of the supplemental safety valve K. By reference to Fig. 3 of the drawings it will be seen that the valve element 24 of this valve is urged normally towards its seat and a closed position by a coil spring 25, and this valve will be in an open position only when the cooking top pilot H is burning, as will be hereinafter more particularly described. A manually operable valve 26 positioned in the fuel line to the oven burner pilot at a point intermediate the pilot and the supplemental safety valve K provides a means for adjusting the size of the flame 27 burned at this pilot.

The position of the valve element 24 of the supplemental safety valve K is dependent upon and determined by the thermostatic element L. The thermostatic element L is a bi-metallic strip bent into a U-shape with one short leg of the element secured as at 29 to the cup 16 of the cooking top pilot light while its other and longer leg 30 extends downwardly outside of the small cup 16 and through an opening 31 provided in the bottom of the larger cup 17. The extreme lower end 32 of this leg of the thermostatic element extends well beyond the bottom of the larger cup for a specific purpose which will be hereinafter described.

The valve element 24 of the supplemental safety valve K is provided with an elongated stem 33 the outer end 34 of which extends into the interior of the large cup 17 and is in alignment with and adapted to be engaged by the long leg 30 of the bi-metallic thermostatic element or strip L.

With the arrangement thus far described it will be seen that a considerable portion of the thermostatic element is closely adjacent the pilot flame 15 and consequently subjected to the heat generated by said flame. When the flame is burning the heat generated will cause the bowed portion 35 of the strip to expand and thus move the leg 30 of the strip into engagement with the end 34 of the valve stem and cause the valve element 24 to move from its seat against the tension of the coil spring 25 and thereby permit so long as the pilot flame 15 is burning, the delivery of fuel to the oven pilot light J.

As will hereinafter appear from a reading of the description given of the operation of the present lighter arrangement, some provision must be made for providing a manual means for opening the supplemental safety valve K in the event the cooking top burner pilot light has become deliberately put out or has become extinguished through accidental cause. To accomplish the above we provide a cam M which is carried by a shaft 36 which is rotatably supported adjacent one end in a suitable standard or bracket 37 while its opposite end passes through and is rotatably supported in the closure panel 8 at the front of the cooking top burner chamber. The outer end of this shaft is provided with a handle 38 which extends at right angles to the shaft and in effect constitutes a bell-crank. The cam M at the inner and opposite end of the shaft has a cam face 39 which upon rotation of the shaft by the bell crank-like handle is caused to engage the depending end 32 of the long leg 30 of the thermostatic element L and move that leg towards and into engagement with the end 34 of the valve stem 33. The cam is so designed as to cause sufficient movement of the valve element 24 as to open this valve and permit the flow of fuel through the pipe 22 to the oven burner pilot light J.

The main safety valve F is a thermostatically operated valve which is operated by the heat generated by the flame of the oven burner pilot J. The valve which we propose to use is one which can be bought on the open market and its particular construction forms no part of the present invention and it will therefore be described only in general terms. N designates a thermo element positioned within the heat zone of the flame 27 of the oven pilot light J while 40 designates a tube interconnecting this element with the housing portion 41 of the safety valve. There is within the safety valve housing a valve which is normally urged towards a closed position by suitable resilient means and there is also within the housing an electro-magnet which when energized has sufficient strength to

hold said valve in an open position against the tension of said resilient means after the valve has been manually opened. In other words, the electro-magnet is not sufficiently strong to open the valve against the tension but will hold the valve open after it has once been opened manually. Electric wires run from this electro-magnet through the tubing **40** and have connection with the thermo element N. This element might be called a thermo-couple and has the attribute of generating current when subjected to heat. This thermo element or thermo-couple when subjected to heat will generate a current very quickly and the wires within the tube **40** conduct this current to the electro-magnet carried within the housing of the safety valve. Means for initially manually opening the valve element within the safety valve is provided in the form of a rod **42** which extends from the valve through the cooking top burner chamber and the panel **8** at the front thereof and terminates in a handle **43** which is conveniently positioned at the front of the range adjacent to the cooking top burner valves **10** and the operating handle **38** of the cam.

Means are provided whereby the valve element in the safety valve F will remain open only so long as it is manually held in an open position through its operating rod **42**. The instant the handle of this rod is released the rod will no longer function to hold the valve element in an open position.

Attention is also directed to the fact that when the cam M is in a non-operative position with respect to the thermo element L that its bell crank-like handle **38** is in a vertical position whereas this handle, see Fig. 1 of the drawings, is in a horizontal position when the cam has been moved into operative engagement with the thermo element.

Assuming that neither of the pilot lights H or J are burning, the mechanism or range is placed in condition for automatic operation in the following manner.

The handle **38** is swung into a horizontal position, thereby swinging the cam into frictional engagement with the thermo element L and thus manually opening the supplemental safety valve K. It will be obvious that the resiliently urged valve together with the normal resiliency in the thermo element L will cause the cam to remain in the position into which it has been swung. With the valve K open the oven pilot light J is manually ignited. When this pilot light has been burning for about half a minute the stove operator manually opens the valve in the primary safety valve F. This valve will now remain held in an open position by the energized electro-magnet. The operator releases the handle **43** allowing it to return to its normal position. With the main safety valve open gas is now flowing to the cooking top burner pilot light H and this the operator now manually ignites. Within a short period of time the heat generated at this pilot will cause expansion of the thermo element L so that it will move out of engagement with the cam M. The weight of the handle **38** of the cam operating shaft **36** will cause the handle to swing back into a vertical position and move the cam M into nonoperative relationship with respect to the thermo element L.

From the foregoing it will be seen that the cam remained in operative relationship with the thermo element L a predetermined time, namely, a time until sufficient heat was generated at the cooking top burner pilot light to take over automatic control of the supplemental safety valve K through its connection therewith through the bimetallic thermo element L.

With both pilot lights burning the range becomes fully automatic. If any valve **10** to a cooking top burner is opened that burner becomes ignited by the cooking top burner pilot light through its respective flash tube. If the valve controlling the supply of fuel to the oven burner is opened that burner becomes immediately ignited by the oven burner pilot light J. If the pilot light J becomes extinguished the primary safety valve F shuts off fuel delivery to the cooking top burners, the oven burner and the cooking top burner pilot light. Immediately the cooking top burner pilot light becomes extinguished through the closing of the main safety valve F the thermo element L cools and the secondary valve K closes and stops delivery of gas to the oven pilot light. Thus it will be seen that no raw gas can escape from any of the main burners or any of the pilot light burners if the oven pilot light J becomes extinguished even though the manual valves controlling the supply of gas to the cooking top burners and the oven burner may be fully open.

Considering now the possibility of the cooking top burner pilot light becoming extinguished rather than the oven burner pilot light going out, it will be seen that in this event the thermo element L cools and the supplemental safety valve K closes fuel delivery to the oven pilot light J. The oven pilot light J of course then goes out and causes, as previously described, the main safety valve F to close and stop fuel delivery to the cooking top burners, the oven burner and the cooking top burner pilot light.

From the foregoing it will be seen that as long as both pilot lights are burning automatic means is provided for igniting all the main burners and that upon either one of the pilot lights becoming extinguished the arrangement operates automatically to positively prevent the escape of raw or unburned gases from any main burner or any pilot light burner of the range.

In the foregoing description we have described the primary automatic valve F as being of the type utilizing an electro-magnet which is set into operation by a thermo element or thermo-couple, but it is to be understood that the safety valve need not necessarily be of this specific type. Any thermostatically operated safety valve which requires an original manual setting in the open position could be utilized in our improved lighter arrangement with equal advantage. Mechanical means rather than magnetic means for holding the valve in an open position so long as the thermo element is heated could be easily and readily substituted for the particular specific safety valve construction hereinbefore described.

So far as we know prior devices of this character which are known and in use or in respect to which patents have issued do not provide for definitely and absolutely cutting off the delivery of fuel to all the burners, including the pilot light burners, in the event of one of the pilot light burners becoming extinguished as we do, and our lighter arrangement for this reason is considered to be a definite improvement.

In our device the oven pilot burner is positioned within the oven and very closely adjacent the oven burner, with the result that an uneven or unbalanced heat does not occur in the oven and with the further result that a positive and practi-

cally instantaneous ignition of the oven burner is obtained from the pilot light.

We claim:

1. In combination with a stove, a plurality of cooking top burners, an oven burner, a cooking top pilot burner provided with means to ignite fuel flowing from any one of the cooking top burners, a fuel supply pipe leading to all of said burners including said pilot light burner, means including an oven pilot light burner positioned to ignite fuel flowing from the oven burner, a second fuel supply pipe leading to said pilot light burner, thermostatic valve means in the first mentioned fuel supply pipe and responsive to the heat of said oven pilot light burner, said valve means controlling the flow of fuel to said cooking top and oven burners and said cooking top pilot light burner and being operable to permit fuel flow only as long as said oven pilot light burner is burning and to close all said fuel flow upon failure of said oven pilot light burner, thermostatic valve means in the second fuel supply pipe leading to said oven burner pilot light and responsive to the heat of the cooking top burner pilot light and operable to permit fuel flow to the oven burner pilot light only when said cooking top burner pilot light is burning, whereby the fuel supply to said cooking top burners, the oven burner, and both of said pilot lights will be cut off upon extinguishment of either of said pilots.

2. In combination with a stove having a plurality of cooking top burners and an oven burner, ignition means including a cooking top pilot light burner for igniting the fuel flowing from any of the cooking top burners, a fuel supply pipe leading to all of said burners including the cooking top pilot light burner, an oven burner pilot light, a second and independent fuel supply pipe leading to said oven burner pilot light, a valve in the first named fuel supply pipe, manually operable means to open said valve, thermostatically operated means operable by the heat generated by the oven burner pilot light for holding said valve open after the same has been manually moved to that position, a normally closed valve in the independent fuel supply pipe leading to the oven burner pilot light, thermostatic means operable by the heat generated by the cooking top burner pilot light for holding said valve in an open position, manual means for opening said valve when said cooking top burner pilot light is extinguished, said manual means being automatically moved out of operative engagement with said valve when said cooking top burner pilot light has heated said thermostatically operated means sufficiently to cause said thermostatically operated means to hold said valve open and the parts operating whereby the fuel delivery to all of said burners including both of said pilot light burners is cut off upon the extinguishment of either of said pilots.

3. In a gas range having a plurality of cooking top burners and an oven burner located in a compartment therefor, a pilot light for the cooking top burners, a pilot light located in the said oven burner compartment and adjacent the said oven burner, a main gas manifold having communications with the said cooking top burners and with the said pilot light therefor, a valve for the said manifold and located in advance of the communications with the top burners and the pilot light therefor, a communication with the said manifold in advance of the said valve, the opposite end of the communication furnishing fuel for the said oven burner pilot, a thermostatic control for the valve in the manifold controlled by the oven burner pilot, and a thermostatic controlled valve in the communication between the oven burner pilot and said manifold.

4. A gas range comprising cooking top burners, an oven provided with an oven burner, a pilot light for the cooking top burners and a pilot light for the oven burner, a main gas manifold having connections with the cooking top burners and the said pilot light therefor, an independent fuel communication from the main manifold to the pilot light for the oven burner, a valve located in the main fuel manifold between the point of connection of the independent fuel communication and the communications with the cooking top burners and the pilot therefor, a thermostat operating the valve in the main manifold, a thermostatically operated connection between last said valve and the oven burner pilot, and a thermostatic valve located in the independent communication the last mentioned thermostat operated by the cooking top burner.

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