July 6, 1948. G. B. BELLINGER 2,444,490

SAFETY GAS BURNER

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Fig. 1.

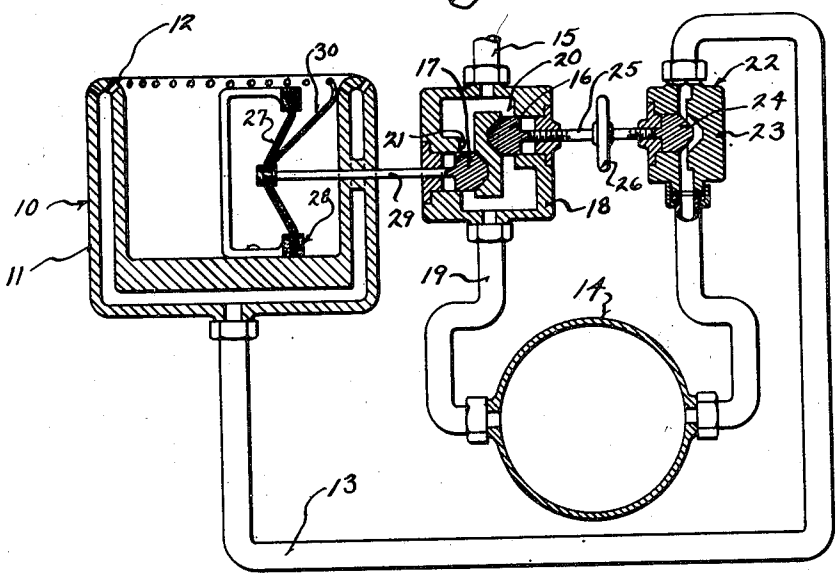

Fig. 2.

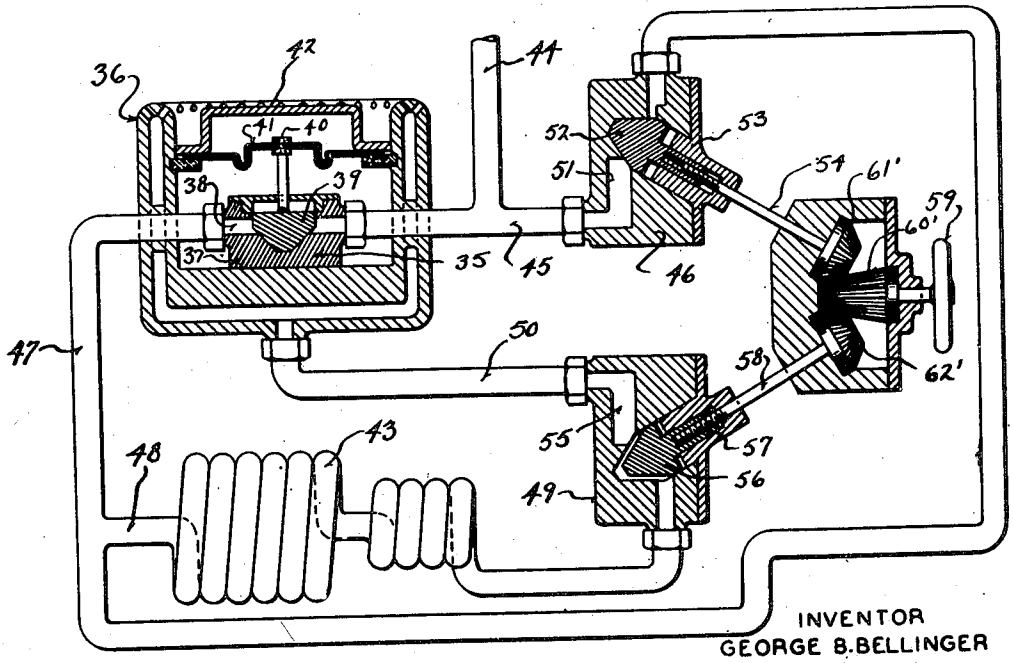

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Fig. 3.

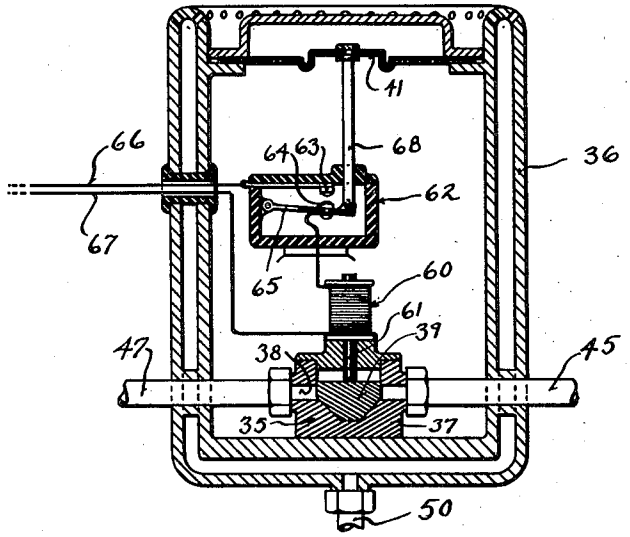

Fig. 4.

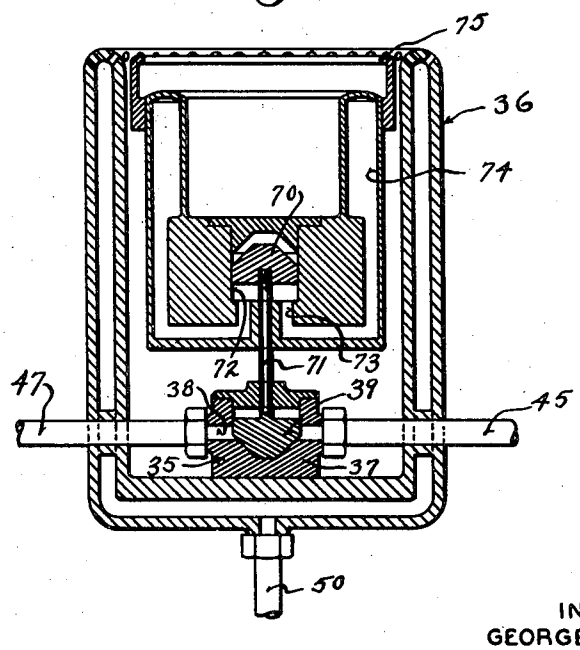

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Fig. 5.

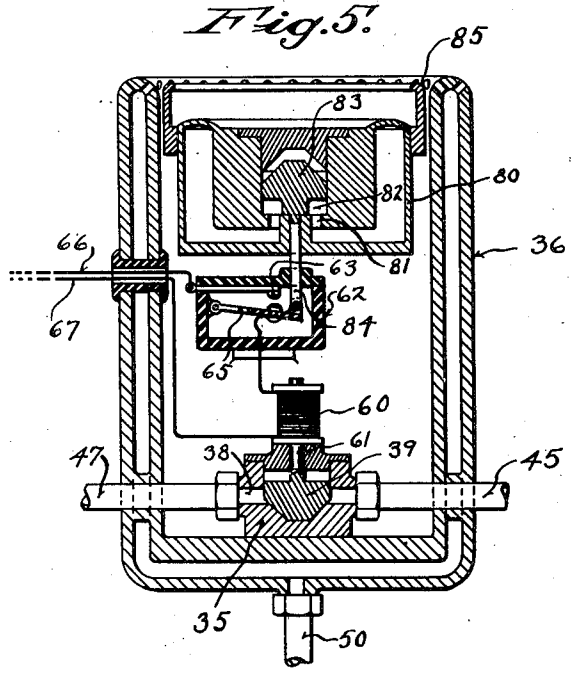
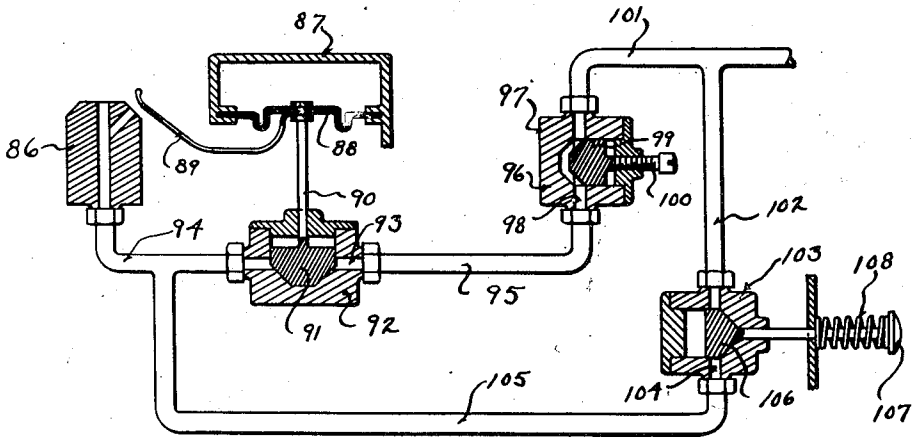


Fig. 6.



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SAFETY GAS BURNER

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7 Claims. (Cl. 158—117.1)

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This invention appertains to gas burners for boilers, cooking ranges and the like, and more particularly to a novel safety device for gas burners wherever used.

It is one of the primary objects of my invention to provide novel means for automatically cutting off the supply of illuminating gas to a burner should the burner flame become extinguished from any cause and thereby effectively prevent the occurrence of accidents usually accompanying the accidental extinguishing of gas burner flames.

Another salient object of my invention is to provide novel means for preventing the flow of illuminating gas from a gas main to a burner should the manually operated control valve for the burner be turned on without the lighting of the burner.

A further important object of my invention is to provide an auxiliary reservoir for supplying gas to a gas burner in sufficient quantity to insure the lighting of the burner and the heating of an automatic mechanism for opening a main valve when the manually operated control valve is turned on, thereby allowing the flow of gas from the main source of supply to the burner.

A still further object of my invention is to provide a novel and simple means for effectively and automatically opening and closing the main supply valve to a gas burner according to the temperature of said burner.

With these and other objects in view the invention consists in the novel construction, arrangement and formation of parts, as will be hereinafter more specifically described, claimed, and illustrated in the accompanying drawings, in which drawings:

Figure 1 is a vertical sectional view showing my novel control mechanism incorporated with a gas burner, the view being of a diagrammatical nature only.

Figure 2 is a view similar to Figure 1 but showing a slightly modified form of my invention and with the temperature operated valve mounted within the burner.

Figure 3 is a vertical sectional view through a gas burner showing an electrical mechanism incorporated in the burner operated from my thermo-metal control for actuating the valve thereby controlling the gas from the main source of supply, the view still being of a diagrammatical nature.

Figure 4 is a view similar to Figure 3 but showing the control valve actuated from the expansion and contraction of expansible gas effected by the heat from the burner.

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Figure 5 is a view similar to Figure 3 and showing the electric control switch for the solenoid actuated valve operated by the expansion and contraction of expansible gas which is effected by the heat from the burner.

Figure 6 is a diagrammatical view illustrating another form of my novel control mechanism, the mechanism being particularly adaptable for use on gas stoves.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the numeral 10 generally indicates a gas burner which can be of any approved type. For the purpose of illustration, I have shown the same to include a hollow body 11 provided with gas outlets 12 which constitute the ignition point of the burner. Communicating with the lower end of the burner is a gas supply pipe 13.

In accordance with my invention I arrange adjacent to the burner 10 a gas reservoir 14 and this reservoir can be in the nature of a spherical tank, if so desired. This tank or reservoir is adapted to be initially filled with gas, as will be later described. The main gas supply line pipe 15 has communication with this reservoir and the flow of gas to the reservoir from the main supply pipe 15 is controlled by a manually operated valve 16 and an automatically operated valve 17. A single valve casing 18 can be provided for these valves and the supply pipe 15 communicates with one end of the casing and a conduit pipe 19 communicates with the other end of the casing and leads to the reservoir. The valve casing has formed therein two channels indicated respectively by the reference characters 20 and 21 and the valve 16 controls the flow of gas through the channel 20 but the automatically operated valve 17 controls the flow of gas through the channel 21. The flow of gas from the reservoir 14 is through the pipe 13 and this pipe 13 has incorporated in the length thereof a control valve 22. The control valve consists of a casing 23 having a channel therethrough. The valve body 24 controls the flow of gas through the channel and consequently the flow of gas from the reservoir and to the burner. The valve 16 and the valve 24 are provided with a common stem 25 which can be turned by a hand wheel 26 or similar device. The valve stem 25 is threaded into the valve casings 18 and 23 in such a manner that when the stem is turned in one direction the valve 16 will be moved to a closed position and the valve

24 to an open position. When the stem is turned in the opposite direction, the valve 24 will be closed and the valve 16 will be opened.

As heretofore stated, the valve 17 is automatically operated and to pull the valve in and out, off and on its seat I provide a thermo-metal control. This can consist of a bowed strip of bi-metallic material 27 carried by a bracket 28 which is preferably formed from non-heat conducting material. Secured to the central portion of the bowled metallic thermostat 27 is the stem 29 of the slide valve 17. To facilitate the conducting of heat to the thermostat, a heat-conducting strip 30 can be secured to the thermostat adjacent to the central portion thereof, and this strip can terminate adjacent to the burner openings 12.

It is to be understood that this showing above described is of a diagrammatic nature and that valves of suitable characters other than shown in Figure 1 can be used.

In operation of this form of my invention, initially the stem 25 is turned so that the valve 24 will be in a closed position and the valve 16 will be in an open position. Hence, gas can flow from the gas main into the reservoir but no gas will flow to the burner. When it is desired to light the burner the stem 26 is turned by the operator so that the valve 16 will move to a closed position and the valve 24 will move to an open position. The gas can now flow from the reservoir 14 to the gas burner. If for some reason the burner is not lit, no harmful results will take place in that only the small supply of gas stored in the reservoir 14 will escape. Considering that the reservoir is placed in communication with the burner and the burner is then lighted by the operator, heat will be generated which will effect the thermostat 27 for drawing the automatically controlled valve 17 off of its seat. Gas can now flow from the main pipe 15 through the channel 21 through the conduit 19, through the reservoir 14, through the pipe 13, into the burner and the burner will be maintained in a lighted condition.

Should the burner be extinguished through any cause, the thermostat 27 will cool and this will result in the moving of the valve 17 on its seat and the shutting off of the gas to the reservoir. Hence, accidents from the accidental extinguishing of the burner will be eliminated.

In Figure 2 I have shown another form of my invention and in this form I arrange the automatic controlled valve 35 within the gas burner 36. This valve 35 includes a valve casing 37 having a passageway 38 therethrough for the flow of gas and the flow of gas through the passageway is controlled by the slide valve 39. This valve 39 has formed thereon or secured thereto a stem 40 which is secured to the bi-metallic thermostat 41. Connected with the thermostat is a heat conductor strip or cap 42 so that heat generated by the burner will be readily conducted to the thermostat 41. When the thermostat is heated, the valve 39 will be drawn off of its seat. In lieu of providing a reservoir in the form of a tank as shown in Figure 1, I can provide a reservoir which can consist of a coil 43 of copper or similar tubing. The main gas supply pipe communicates with a manifold 45 and this manifold has one branch communicating with one end of the valve casing 37 and the other branch thereof communicates with a valve casing 46 which will be later described. The opposite end of the valve casing 37 has communicating therewith a gas conduit pipe 47, and this pipe leads to the other end of the valve casing 46 opposite from the branch

pipe 45. The pipe 47 also has communication with one end of the coil 43 through a branch pipe 48. The opposite end of the coil communicates with one end of a valve casing 49 and the opposite end of the valve casing 49 communicates with the burner through a conduit pipe 50.

The valve casings 46 and 49 are of a similar type and the valve casing 46 is provided with a passageway 51 through which the gas flows. The flow of gas through the passageway 51 is controlled by a slide valve 52 having an internally threaded stem 53. Threaded in the stem 53 is a rotatably threaded rod 54.

The valve casing 49 is also provided with a channelway 55 through which the gas flows and a slide valve 56 is provided for controlling the flow of gas through the channel. The slide valve has formed thereon an internally threaded stem 57 into which is threaded a rotatable rod 58. One rod 54 is provided with right-hand threads while the rod 58 is provided with left-hand threads, and these rods are adapted to be synchronously turned by single operating handle or wheel 59. This can be accomplished by a beveled gear 60' secured to the wheel and meshing with beveled pinions 61' and 62' secured respectively to the rods 54 and 58. By turning the hand wheel 59 in one direction, the valve 52 will be closed and the valve 56 will be opened. By turning the handle wheel in the opposite direction, the valve 56 will be closed and the valve 52 will be opened.

This view is also of a diagrammatical nature and various changes can be made regarding the shape of the valves and the operating means therefore.

Initially, the valve 52 is in an open position and the valve 56 is in a closed position and gas from the main conduit 44 will flow through the channel 51, through pipe 47, and into the coil 43. Gas will be prevented from flowing to the burner by the valve 56.

When it is desired to light the burner, the hand wheel 59 is turned and the valve 52 is moved to a closed position and the valve 56 is moved to an open position, as shown in Figure 2. Gas will now flow from the coil 43 to the burner and the burner can be lit. Upon the heating of the burner, the thermostat 41 will raise the slide valve 39 and gas will be permitted to flow from the pipe 44, through the passageway 38 of a valve 35, through the pipe 47, through the pipe 48, through coil 43, through the passageway 55 of valve 49 to the burner. If the burner is extinguished, the thermostat will cool and close the valve 39, thus effectively shutting off the flow of gas to the burner.

I can provide other means for operating the valve 39 and in Figures 3, 4 and 5 I have shown various forms for actuating this valve.

As is clearly illustrated in Figure 3, I can provide a solenoid 60 for actuating the valve 39. In this instant, the valve is provided with a stem 61 which forms the core of the solenoid. The energizing of the solenoid is controlled by a switch 62 including a stationary contact 63 and a movable contact 64 carried by a pivoted switch lever 65. Feed and return electric wires 66 and 67 lead from a suitable source of electrical energy and the wire 66 can be connected with the stationary contact 63. The wire 67 leads to one terminal of the solenoid and the other terminal of the solenoid is electrically connected with the movable contact 64. The thermostat 41 is connected to the movable switch lever 65 by a rod 68 so that upon movement

of the thermostat the circuit through the solenoid can be opened and closed.

In this form of my invention, upon the heating of the thermostat 41, the switch will be closed and the solenoid will be energized and the core 61 will be raised, moving the valve 39 to an open position. The other parts of the control can be the same as shown in Figure 2.

In Figure 4 the valve 39 can be operated by a piston 70 and this piston is connected directly to the stem 71 of the valve. The piston 70 is slidably mounted in a cylinder 72, the lower end of which has communication through ports 73 with a chamber 74. This chamber 74 can be mounted directly within the burner 36. Secured to the upper end of the chamber is a collar 75 formed from heat conducting material, and this collar is arranged adjacent to the burner opening. The chamber 74 is filled with a gas with a high coefficient of expansion, such as carbon dioxide, ammonia and the like. In this form of my invention, upon the lighting of the burner, the chamber 74 will become heated and the gas contained therein will expand forcing the piston 70 to rise. The raising of the piston will open the valve 39. The burner will then operate in the same manner as the burner described in Figure 2.

In Figure 5, I have shown means for operating the valve 39 similar to the means shown in Figure 3. However, in Figure 5 the electric switch 62 has its movable switch lever 65 actuated by the expansion and contraction of a gas instead of the bi-metallic thermostat 41. Hence, I arrange within the burner 36 a chamber 80 and this chamber is filled with the preferred gas having a high coefficient of expansion. The chamber has communication through ports 81 with the lower end of a cylinder 82. Slidably mounted within the cylinder is the piston 83. This piston is connected with the movable switch lever 65 by a rigid rod 84. This rod is preferably heat insulated from the switch lever 65. The chamber 80 also carries the heat conducting collar 85 which is disposed adjacent to the burner. Hence, the heat from the burner will be quickly conducted to the chamber for heating the gas therein. In operation of this form of my invention, upon the lighting of the burner and the heating of the gas in the chamber 80 the piston 83 will be raised pulling up on the rod 84 and moving the switch lever 65 to a circuit closing position. This will energize the magnet or solenoid 60. Upon the energizing of the solenoid the valve 39 will be moved to its open position and the apparatus functions as shown and described in Figure 2. While the valve 39 will return to its closed position by gravity upon the opening of the circuit, the valve can be spring pressed if so desired.

In Figure 6, I have shown a still further modified form of my invention, and this form can be effectively used on gas ranges and particularly on the pilot burner thereof. Hence, the burner 86 in Figure 6 can be considered as a pilot light and mounted adjacent to the pilot light is a support 87 and a bi-metallic thermostat 88. Heat is quickly conducted from the burner 86 to the central part of the thermostat by means of a heat-conducting strip 89. This strip is connected to the thermostat and terminates in close proximity to the burner. Secured to the thermostat is a valve stem 90 and the stem is secured to a slide valve 91 mounted in a valve casing 92. The valve casing has formed therein a passageway 93 and

the valve controls the flow of gas through said passageway. One end of the passageway has communicating therewith a pipe 94 which conducts gas to the burner and the other end of the passageway has communicating therewith a gas conducting pipe 95 which leads from a manually adjustable setting valve 96. This adjusting valve 96 includes a valve casing 97 having a passageway 98 therethrough and flow of gas through the passageway is controlled by a valve 99 which can be moved toward and away from its seat by a set screw 100 or the like adjustment. The opposite end of the valve casing has communicating therewith a gas conducting pipe 101 which can lead from the source of supply of gas. Communicating with the pipe 101 is a branch pipe 102, and this branch pipe 102 leads to a hand controlled valve 103. The hand controlled valve 103 is provided with a longitudinally extending passageway 104 and the opposite end of the passageway from the pipe 102 has communicating therewith a pipe 105 which communicates with the pipe 94. A slide valve 106 controls the flow of gas through the passageway, and this slide valve can be actuated by a thumb button or the like 107. The valve is normally held on its seat by a spring 108.

In operation of this form of my safety appliance, considering that the pilot light 86 is lit, the bi-metallic thermostat 88 becomes heated and moves the valve 91 to an open position. Then a controlled quantity of gas will be continuously supplied to the pilot as long as the pilot light is lit. When it is desired to light a burner the valve 106 is operated and gas in greater quantity will be supplied through pipe 102 through valve 103, pipe 105, pipe 94 and to the burner. As soon as the cooking burner becomes lit, the valve 106 can be released and the spring 108 will move the same on its seat. Should the pilot light go out through any cause, the thermostat 88 will cool, moving the valve 91 to a closed position. This will effectively shut off the flow of gas to the pilot and prevent the escape of gas therefrom.

In order to initially light the pilot, the manual valve 106 can be opened and held open until the thermostat 88 becomes sufficiently heated to raise the valve 91.

While I have shown a bi-metallic thermostat 88 for operating the valve 91, obviously the means shown in Figures 3, 4 and 5 can be employed if so desired.

While I have shown my invention utilized on illuminating gas burners, it is to be understood that the principles of my invention are equally applicable to burners using liquid fuel such as kerosene, and the like.

Changes in details may be made without departing from the spirit or the scope of my invention, but what I claim as new is:

1. In a safety device for gas appliances, a burner, a gas reservoir for supplying a limited quantity of gas to the burner, a manually operable valve for controlling the flow of gas from the reservoir to the burner, a controlled valve for controlling the flow of gas from a main source of supply to the burner, automatic means for opening and closing the last mentioned controlled valve according to the temperature of the burner, and valve means for admitting the flow of gas from the main source of supply to the reservoir when the manually operable valve is in a closed position thereby shutting off the supply of gas from the reservoir to the burner.

2. In a safety device for gas appliances, a gas

burner, a reservoir adapted to contain a limited quantity of gas, a conduit for supplying gas from the reservoir to the burner, a manually operated valve for controlling the flow of gas through said conduit, a conduit for supplying gas to the reservoir from a main source of gas supply, a valve casing interposed in the length of the last mentioned conduit having a pair of passageways therein for the flow of gas therethrough, a manually operable valve for controlling the flow of gas through one passageway, said valve being synchronously actuated with the first mentioned valve so that upon the opening of one valve, the other will be closed and vice versa, and a controlled valve automatically operated according to the temperature of the burner for controlling the flow of gas through the other valve passageway.

3. In a safety device for gas appliances, a gas burner, a reservoir adapted to contain a limited quantity of gas, a conduit for supplying gas from the reservoir to the burner, a manually operated valve for controlling the flow of gas through said conduit, a conduit for supplying gas to the reservoir from a main source of gas supply, a valve casing interposed in the length of the last mentioned conduit having a pair of passageways therein for the flow of gas therethrough, a manually operable valve for controlling the flow of gas through one passageway, said valve being synchronously actuated with the first mentioned valve so that upon the opening of one valve, the other will be closed and vice versa, and a controlled valve automatically operated according to the temperature of the burner for controlling the flow of gas through the other valve passageway, said automatic control means including a bimetallic thermostat arranged adjacent to the burner.

4. In a safety device for gas appliances, a gas burner, a reservoir adapted to contain a limited quantity of gas, a conduit for supplying gas from the reservoir to the burner, a manually operated valve for controlling the flow of gas through said conduit, a conduit for supplying gas to the reservoir from a main source of gas supply, a valve casing interposed in the length of the last mentioned conduit having a pair of passageways therein for the flow of gas therethrough, a manually operable valve for controlling the flow of gas through one passageway, said valve being synchronously actuated with the first mentioned valve so that upon the opening of one valve, the other will be closed and vice versa, and a controlled valve automatically operated according to the temperature of the burner for controlling the flow of gas through the other valve passageway,

said last mentioned valve being arranged within the body of the burner and said automatic operating means including a bi-metallic thermostat.

5. In a safety device for gas appliances, a gas burner, a conduit for supplying gas to the burner, and a valve automatically operated according to the temperature of the burner for controlling the flow of gas through the conduit, said valve including a valve body, an electrically operated solenoid for moving said valve body to an open and to a closed position, a thermostatically operated electric switch for closing the circuit to the electrically operated solenoid and a source of electric current for energizing the solenoid when the thermostatically operated switch is in a closed position.

6. In a safety device for gas appliances, a gas burner, a conduit for supplying gas to the burner, and a valve automatically operated according to the temperature of the burner for controlling the flow of gas through the conduit, said valve including a valve body, means for moving the valve body to an open and closed position including an expasible gas operated piston, a cylinder for the piston, and a chamber for an expansible gas located adjacent to the burner, having communication with one end of the cylinder.

7. In a safety device for gas appliances, a gas burner, a conduit for supplying gas to the burner and a valve automatically operated according to the temperature of the burner for controlling the flow of gas through the conduit, said valve including a valve body, means for moving the valve body to an open or closed position, including an electrically operated solenoid, a switch for opening and closing the circuit to the solenoid, means for automatically operating the switch, including an expansible gas operated piston and a cylinder for said piston, a source of electric current for energizing the solenoid when the expansible gas operated switch is in a closed position, and a chamber having an expansible gas therein located adjacent to the burner and having communication with one end of the cylinder.

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