April 26, 1932. F. A. GAUGER ET AL 1,855,741

WATER HEATER APPLIANCE

Original Filed Feb. 28, 1923 2 Sheets-Sheet 1

Fig. 1.

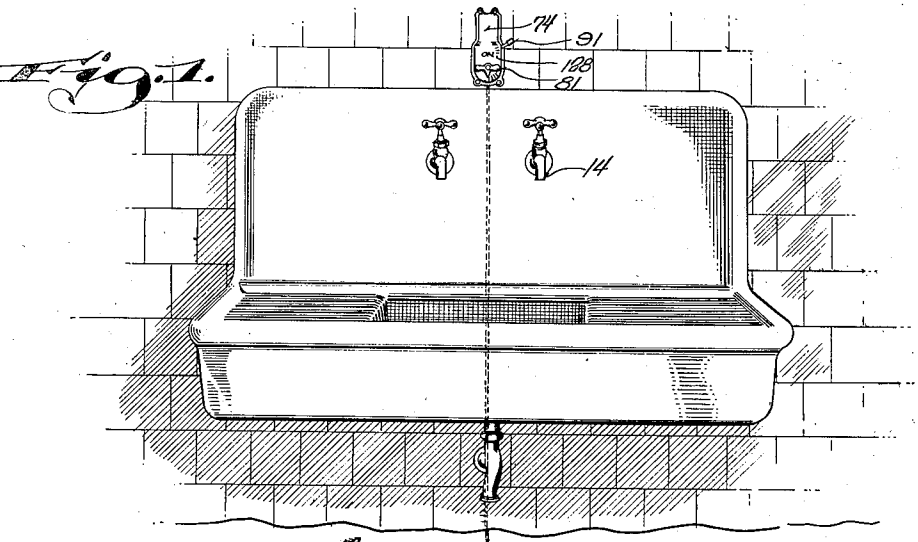


Fig. 2.

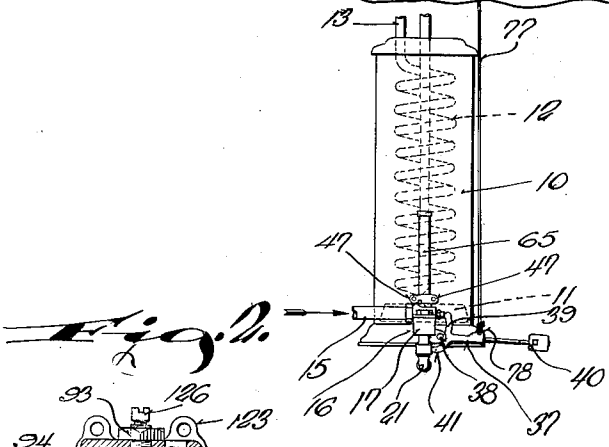


Fig. 3.

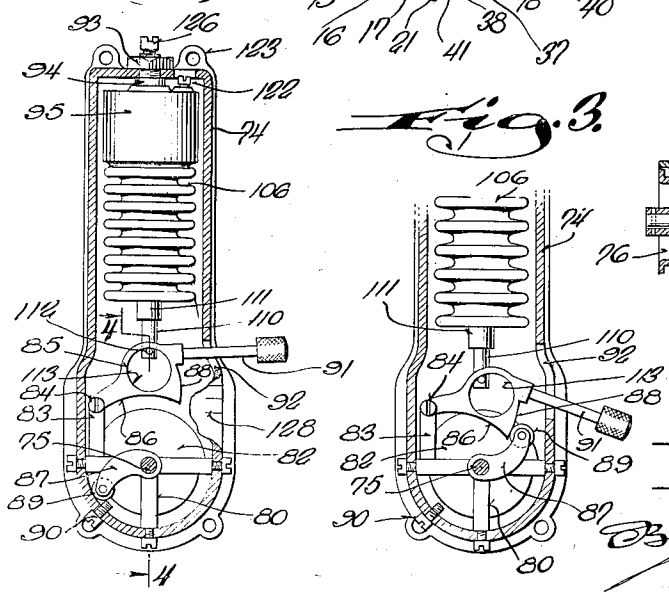
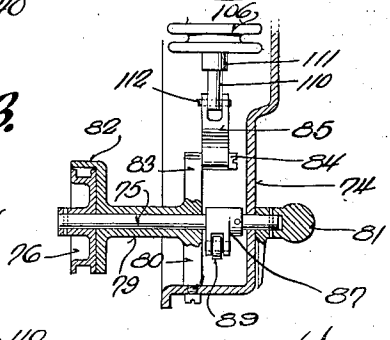


Fig. 4.



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WATER HEATER APPLIANCE

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Fig. 5.

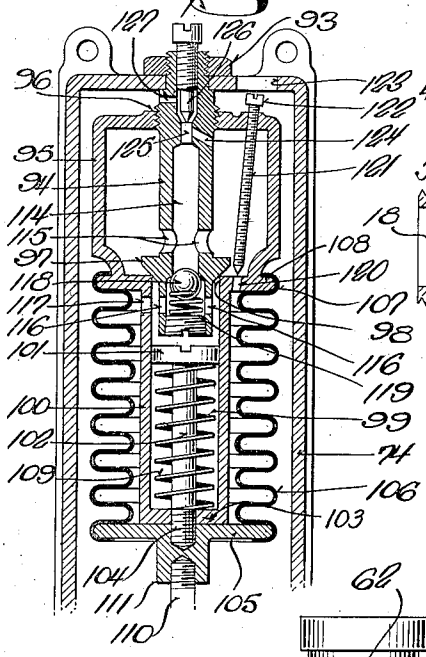


Fig. 6.

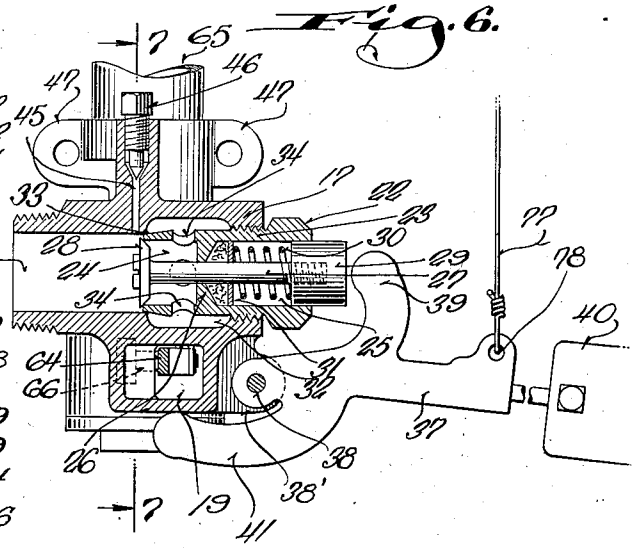
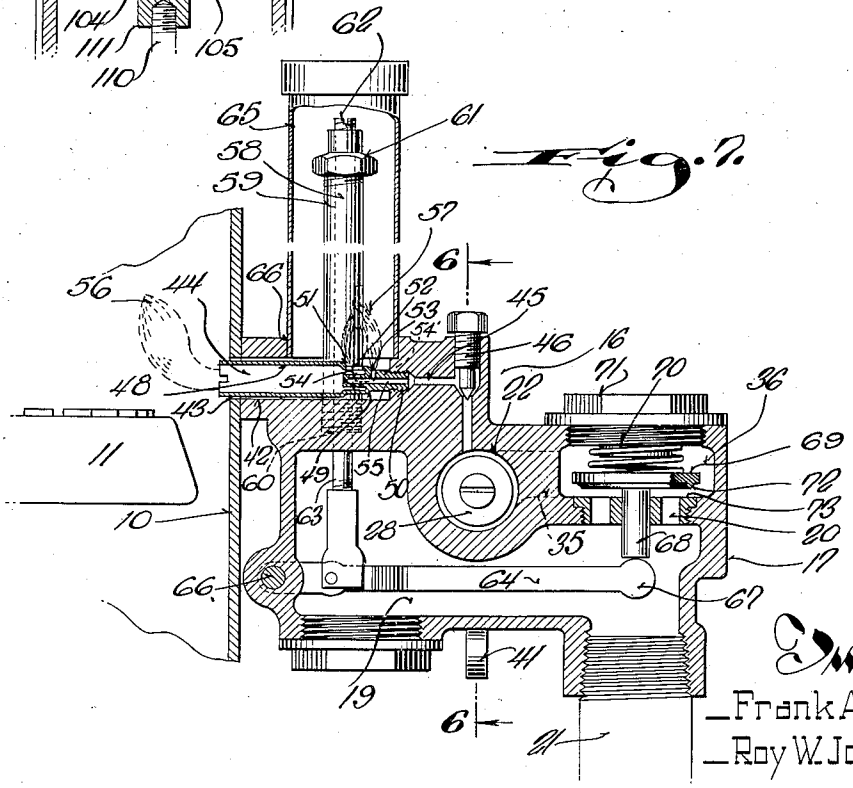


Fig. 7.



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Patented Apr. 26, 1932

1,855,741

UNITED STATES PATENT OFFICE

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WATER HEATER APPLIANCE

Original application filed February 28, 1923, Serial No. 621,937. Divided and this application filed October 5, 1925. Serial No. 60,509.

This application is a division of the one filed February 28, 1923, Serial No. 621,937 and refers more particularly to water heater appliances of the type generally applied to the hot water systems of a household, although it may be employed in connection with any device where it will properly function.

The present type of automatic heating device is subject to many objections such as its expensiveness of construction and operation, and the dangers incidental to its operation, in that should the pilot light be extinguished a manipulation of the fuel control valve permits the escapage of fuel and results in a serious menace to life and property.

It is, therefore, one of the objects of this invention to provide an appliance of the character described in which the burner proper is incapable of connection with its fuel supply while the pilot light is extinguished.

In the ordinary or simplified type of household water heating device it is customary to operate the heater for a desired period of time to first heat the water in a tank, and the lighting and extinguishing of the heater burner has heretofore been actuated by manual manipulation or else by a valve control embodied in the plumbing of the house and actuated by the flow of water through the pipes. In the last mentioned type of control many objectionable features exist, such as cost of installation, incidental to the plumbing necessary to connect the control valve with the water pipes, and its inability of perfect control.

Having this in mind, it is another object of our invention to provide a water heater appliance equipped with a time controlled element whereby the heater burner may be ignited and maintained connected with its source of fuel for any predetermined period of time after which the burner is automatically disconnected from its fuel supply, at the same time permitting the manual extinction of the burner before the set period of operation has expired.

Another object of this invention resides in the provision of an improved valve means for connecting the burner with its source of fuel for any predetermined period of time which is normally urged to closed position and is movable to open position by a lever actuated from a control device, which is counter-balanced and urged by gravity to a position disengaging the valve.

A further object of this invention resides in the provision of an auxiliary or thermostatically actuated valve in the fuel supply line for disconnecting the burner from its source of fuel supply upon extinction of the pilot light, said valve being actuated by a lever connected with a thermostatic device whereby a maximum opening movement is obtained.

Another objectionable feature inherent to automatically actuated heater appliances is that the concussion incidental to the ignition of the burner frequently results in the extinction of the pilot light and the consequent rendering of the appliance inoperative until the pilot light is again ignited and it is, therefore, a still further object of this invention to provide an improved pilot light construction wherein the pilot light is carefully protected against the concussion incidental to the lighting of the appliance burner to thus produce a more dependable device.

With the above and other objects in view which will appear as the description proceeds, our invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

In the accompanying drawings, we have illustrated one complete example of the physical embodiment of our invention constructed according to the best mode we have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is an elevational view illustrating our improved device and the manner of mounting the control thereof at a point remote therefrom;

Figure 2 is a view, partly in vertical section and partly in elevation, illustrating the

interior of the remote control device, the parts being in the positions they occupy when the appliance is inoperative;

Figure 3 is a fragmentary view, partly in vertical section and partly in elevation, illustrating the lower portion of the remote control device with the parts in the positions they occupy when the appliance is in operation;

Figure 4 is a fragmentary view, partly in section and partly in elevation, taken through the lower half of the control device on the plane of the line 4—4 of Figure 2;

Figure 5 is an enlarged fragmentary sectional view of the upper portion or sylphon control unit of the remote control device, the parts being in contracted or inoperative position;

Figure 6 is a fragmentary view, partly in section and partly in elevation, taken on the plane of the line 6—6 of Figure 7 and,

Figure 7 is a view, partly in section and partly in elevation, taken through the valve mechanism on the plane of the line 7—7 of Figure 6.

Referring now more particularly to the accompanying drawings, 10 indicates the outer casing of a water heater appliance having a burner 11 disposed beneath a heating coil 12 which is connected with the plumbing of a household by pipes 13 in which is included the usual water tank, not shown, having a connection with a faucet 14. The burner 11 is connected with a source of fuel supply by a pipe line 15 in which is disposed an improved control device 16 now about to be described.

The control device comprises a casing or casting 17 provided with an inlet chamber 18 and an outlet chamber 19 connected by a port 20. The fuel supply line 15 is connected with chamber 18 and the burner 11 connected with the outlet chamber by a pipe 21, a valve 22 controlling the passage of fuel through the inlet chamber 18.

Valve 22 comprises a sleeve or plug member 23 having an inner bore 24 and an outer bore 25 connected by an apertured partition 26 through which passes a valve stem 27 carrying at its inner end a valve head 28 adapted to seat against the inner end of the valve sleeve, a plunger or head 29 being formed on the outer end of the valve stem for engagement by a suitable operating means, to be later described, for opening the valve.

The valve is normally urged to closing position, with its head 28 seating against the inner end of the sleeve, by a spring 30 confined between head 29 and a washer 31 which firmly secures suitable packing between it and part 26 to prevent escapage of fuel. The chamber 18 is enlarged, as at 32, adjacent the inner end of the valve sleeve and the inner end of the sleeve is tapered and seats against a shoulder 33 formed by said recess to prevent the flow of fuel therepast, the walls of the sleeve being apertured, as at 34, to connect bore 24 with recess 32 so that the fuel will pass from the fuel supply through bore 24, openings 34, recess 32, a passage 35 connecting recess 32 with an auxiliary valve chamber 36 directly communicating with bore 20, through bore 20 and to the burner through outlet 19 and pipe connection 21 when the valve is open.

The means for manipulating valve 22 comprises a lever 37, the inner end of which is pivotally secured, as at 38, to lug 38′ formed on the casting 16, an arm or finger 39 on the lever being engageable with the plunger head 29 to move the same against the force of spring 30 when the outer end of the lever is raised. The outer end of the lever is preferably provided with a counter-balance weight 40 whereby finger 39 will be normally held free of the plunger head and the movement of the lever on its pivot under the force of weight 40 is limited by a finger 41 on the lever which is engageable with the undersurface of the casting, as illustrated in Figures 1 and 6.

A constantly burning pilot light is provided to ignite the burner when valve 22 is open and casting 17 is provided with a recess 42 adapted to communicate with an aperture 43 in the side of casing 10 adjacent the burner 11, a pilot tip 44 of special construction, as later described, being positioned in said recess. The pilot is furnished with a constant supply of fuel through a by-pass 45 leading from the inlet 18, the volume of fuel passing through by-pass 45 being controlled by a needle valve or set screw 46.

As illustrated in the drawings, that part of the casting 17 surrounding recess 42 is slightly enlarged and provided with a pair of opposed ears or lugs 47 through which pass suitable attaching screws for securing the device to casing 10. The pilot tip 44 is in the form of a tube or shell 48, the outer end of which extends slightly into the casing 10 through opening 43 and the inner end of which is reduced, as at 49, and medially secured to a nipple 50 which is threaded into by-pass 45 at its point of communication with recess 42. The outer end of the nipple is positioned within the inner end of the tube 48 and terminates adjacent a shoulder 51 which defines the diameter of the major portion of the tube, the tip 44 having an aperture 52 in its part above the inner end of the nipple. The nipple has an aperture 53 slightly inwardly of point 49 and an aperture 54 located at a point registering with the aperture 52, the nipple having a passage 55 therethrough communicating the interior of tube 48 with the by-pass, the passage 55 being restricted at its end in tube 48 to insure a supply of fuel to the flame 57, air being admitted to the tube through an opening 54′ therein.

With this construction of the pilot tip, sep-

arate flames 56 and 57 are maintained at the outer end of tube 48 and at apertures 52 and 53 respectively, the flames 56 playing toward the burner 11 and flame 57 playing on the thermostatic device 58, now about to be described. In the event the concussion, incidental to the ignition of the burner 11, extinguishes flame 56, flame 57 will remain lit and consequently the fuel passing outwardly through tube 48 again ignited through opening 52, as will be readily apparent. Should the other flame 57 become extinguished through any cause, it will be ignited by flame 56. The fuel issuing from the port 53 and forming a part of the flame 57 when ignited is in igniting relation to the combustible mixture issuing from the port 52 but is located further from the zone of concussion and hence less liable to become extinguished than the ignited fuel issuing from the port 52.

The thermostatic device 58 comprises a tube 59 preferably of metal having a high coefficient expansion, the inner end of which is secured, as at 60, to the casting 17 adjacent the pilot tip and the upper end of which is provided with a cap 61 adjustably mounting the upper end 62 of a rod 63 passing through an opening in the casting 17 and having its lower end pivotally connected with a lever 64 mounted in chamber 19. Rod 63 is preferably formed of metal having a very low coefficient of expansion so that while the pilot is ignited the flame 57 plays on tube 59 and extends the same as a result of which rod 63 will be moved outwardly of compartment 19, as will be readily apparent. The thermostatic device and flame 57 are protected by a guard tube or housing 65 having a snug, but removable fit in a recess 66 surrounding the thermostatic device and that part of the pilot providing the flame 57.

The lever 63, as illustrated in Figure 7, has one end pivotally secured to one wall of the casting 17, as at 66, and its other end 67 engageable with the stem 68 of a valve 69 which is adapted to close port 20 and disconnect the fuel supply independently of the valve 28, valve 69 being normally urged to closed position by a spring 70 confined between the head of the valve and a removable plug or cap 71. The rod 63 is so adjusted that when tube 59 is expanded under the influence of the heat from flame 57, valve 69 will be held in open position against th action of its spring and when the tube 59 cools, by reason of the extinguishing of the pilot light, the same contracts and permits movement of the rod 63 into chamber 19 and the consequent return of the valve to closed position. Valve 69 has an annular rib 72 which seats on a flange 73 surrounding port 20 and in the event the seat becomes imperfect, same can be readily corrected by striking the top of the valve a sharp blow.

From the above it will be readily obvious that immediately upon opening of valve 28 the burner 11 is connected with its course of fuel, the pilot light igniting the same, and in the event the concussion incidental to the igniting of the burner extinguishes flame 56, the same will be instantly relighted by flame 57 through the opening 51. In the event the pilot is completely extinguished, the opening of valve 28 will have no effect, as valve 69 will be closed, as previously described. Thus the burner will be disconnected from its source of supply until the pilot is again ignited and the thermostatic device heated sufficiently to open valve 69.

As it is very desirous to control valve 28 from a point remote from the heater and to retain valve 28 open for any desired length of time, we provide the arrangement illustrated in Figures 1 to 5. This device comprises a casing 74 in the lower part of which is journaled a shaft or rod 75 on which is fixed a pulley 76 adapted to receive one end of a cable 77, the other end of which is fixed to lever 37, as at 78. The rod is journaled in the casing 74 and a bearing 79 formed in a spider 80 secured in the casing, the rod having a handle 81 on its outer end to facilitate winding the cable 77 around the pulley 76 and to raise the lever 37.

The bearing 79 has its rear end formed with a guard 82 covering the pulley 76 to prevent the riding thereof of the cable 77 and one arm of the spider 80 has a standard or upwardly extending part 83 to which is pivotally secured, as at 84, a pawl or detent 85, the under surface 86 of which is struck on an arc substantially equal to that described by a crank arm 87 fixed on shaft 75 between the spider and the outer face of casing 74.

The outer free end 88 of the detent is struck from an arc employing the pivot 84 as a center and when shaft 75 is rotated in a clockwise direction with reference to Figures 1, 2 and 3, the roller 89 journaled in the outer end of the arm 87 will ride along the arcuate face 86 of the detent raising the same on its pivot until the roller passes the free end of the detent when the same drops therebehind to prevent its return under the influence of the counterbalance 40 on lever 47.

To permit the ready release of the crank arm, and its consequent return to a position with the roller 89 engaging a stop 90 carried by the casing 74, we provide a lever 91 having its inner end secured to the detent with its other end passed outwardly of the casing through a slot or opening 92, the curved or arcuate end face 88 of the detent facilitating the ready release of the arm 87, as will be obvious.

While it may be desirable in many instances to manually trip the detent to release the arm 87, means may be provided for accomplishing this feature after any predetermined limit of time, in the present instance the same being

in the form of a unit mounted in the upper end of casing 74, as will now be described.

Secured to the upper or top wall of casing 74 by having its upper end reduced and passed through an opening therein to receive clamping nut 93 is a valve stem 94 to which is secured a fluid receiving chamber 95 by being threaded on the valve stem 94, as at 96. The valve stem 94 extends through the chamber and has a valve head 97 on its lower end portion seating with the part of the chamber 95 surrounding an opening 98 in the bottom thereof. Extended from the bottom of the chamber 95 and having a bore 99 registering with the opening 98 is a sleeve 100 in which is slidably mounted the head 101 of a plunger or bolt member having its shank 102 passed outwardly through an opening in the closed end 103 of the sleeve with its end 104 secured to a plate 105 having one end of a sylphon 106 secured thereto, the other end of which is secured, as at 107, to a rib or flange 108 formed on the lower portion of the chamber 95.

The sylphon, together with a spring 109 coiled around stem 102 and confined between the head 101 and the closed end of the sleeve, at all times tends to retain plate 105 against the end of the sleeve, as illustrated in Figure 5, and when the parts are in this position detent 85 will be held out of the path of the arm 87 by a rod 110 having its upper end threaded in a boss 111 formed on plate 105 and its lower end provided with a pin 112 engaging in an enlarged opening 113 in the detent. The opening 113 is oversize to permit independent release of the detent when the sylphon is extended and spring 109 compressed, as will be obvious.

After the sylphon has been extended to permit the positioning of the detent within the path of arm 87, its gradual return under the action of spring 109 is controlled by a fluid such as oil or the like within the sylphon and chamber 95. The oil is permitted free passage into the sylphon, as it is extended, through a passage 114 in the valve stem 94, said passage having ports 115 communicating with the chamber and ports 116 communicating with bore 99 which is in turn connected with the interior of the sylphon through a port 117.

Passage 114 is normally closed by a check or ball valve 118 which is urged to closed position by a spring 119, and permits the unrestricted flow of the fluid into the sylphon. The gradual return of the sylphon is controlled by a by-pass 120 in the lower portion of the chamber which communicates directly with the interior of the sylphon, the opening of the by-pass being adjustable by a needle valve 121 having its head 122 positioned in alignment with an opening 123 in the top of casing 74 to facilitate its manipulation.

In order to insure the perfect operation of the sylphon device and to prevent interference with its expansion by the formation of a vacuum in chamber 95, a by-pass 124 connects the upper portion of the chamber with the interior 114 of stem 94 which is restricted thereadjacent, as at 125, to provide a seat for engagement with a needle valve 126, an opening 127 communicating with the interior of stem 94 outwardly of seat 125 and the chamber 95. The needle valve 126 serves no function during the operation of the device, but merely is provided for convenience in shipping the appliance to close the upper end of the passage 114 and prevent escapage of any of the fluid, as will be readily apparent.

In operation of our device, the lever is depressed to any one of the graduations 128 on the casing front which represents a predetermined period of time, and shaft 75 is rotated in a clockwise direction with reference to Figures 1, 2 and 3 until arm 85 engages behind the detent 87, as a result of which valve 28 is opened. The detent being engaged behind the arm 85, lever 37 retains the valve in open position until the sylphon has been contracted, lifting the detent to free the arm and permit lever 45 to drop and rotate shaft 75 in a counter-clockwise direction with reference to Figures 1, 2 and 3 to close valve 28. As will be readily apparent, the sylphon may be adjusted to contract at any desired rate and the detent may be raised independent of the sylphon.

What we claim as our invention is:

1. A gas appliance of the character described comprising a valve casing having a passage therein adapted for connection with a supply pipe and a main burner respectively, a pilot burner, a plurality of valves arranged in said passage, thermo-responsive means subject to the heat of the pilot burner for automatically controlling the operation of one of said valves, means for biasing the other valve, cable means operatively connected to said other valve for reversing the position of the same, and a time element operatively associated with the cable means for holding the cable means in set position, wherein the valve is open, for a predetermined length of time and for automatically effecting quick release thereof and closing of the valve at the expiration of such time.

2. The combination with a gas burner and housing therefor having an aperture therein adjacent said burner, of a gas appliance comprising a casing having a passage therethrough, a spring-biased valve in said passage for opening or closing the same, a pilot burner carried by said casing, thermo-responsive means associated with said pilot burner, means interposed between said thermo-responsive means and said valve for rendering the operation of the latter dependent upon that of the thermo-responsive means, means for attaching said casing to said burner housing to operatively position said pilot burner in said aperture with reference to said

main burner, said casing having inlet and outlet openings for connecting said passage with the gas supply and said main burner respectively and also having a second gas passage for connecting said pilot burner with said supply, a second valve mounted in said first mentioned passage on the supply side of said first valve, and means for operating said second valve.

3. A pilot burner comprising a pilot tube having a pilot flame opening at one end, a nipple projecting into the other end of the pilot tube and having a fuel supply passage extending therethrough, said nipple and said pilot tube having cooperable transversely extending passages from which a second pilot flame issues laterally from the pilot tube.

4. A gas appliance of the character described comprising a main burner, a supply line leading thereto, a pilot burner operatively associated with said main burner and connected with said supply line, a plurality of valves arranged in said supply line, thermo-responsive means subject to the heat of the pilot burner cooperable with and automatically controlling the operation of one of said valves, a remote control station having a valve operating member connected to the other of said valves, means for biasing said last mentioned valve to closed position, a settable time element located at the control station and cooperable with the valve operating member for retaining the last mentioned valve in fixed open position for a predetermined time while providing for the automatic release of the valve operating member and the closing of the valve controlled thereby under the influence of its biasing means upon the expiration of the predetermined time interval for which the time element is set.

5. A pilot burner comprising a pilot tube having a pilot flame opening at one end, a nipple projecting into the other end of the pilot tube and having a fluid supply passage extending therethrough, said nipple having a transversely extending passage communicating with its fuel passage and constituting a second pilot flame opening, said pilot flame openings being in igniting relation to each other.

In testimony whereof we affix our signatures.

ROY W. JOHNSON.
FRANK A. GAUGER.