June 7, 1955 W. S. PARRETT 2,710,181

GAS HEATER CONTROL

Filed Feb. 28, 1951 2 Sheets-Sheet 1

FIG. 1.

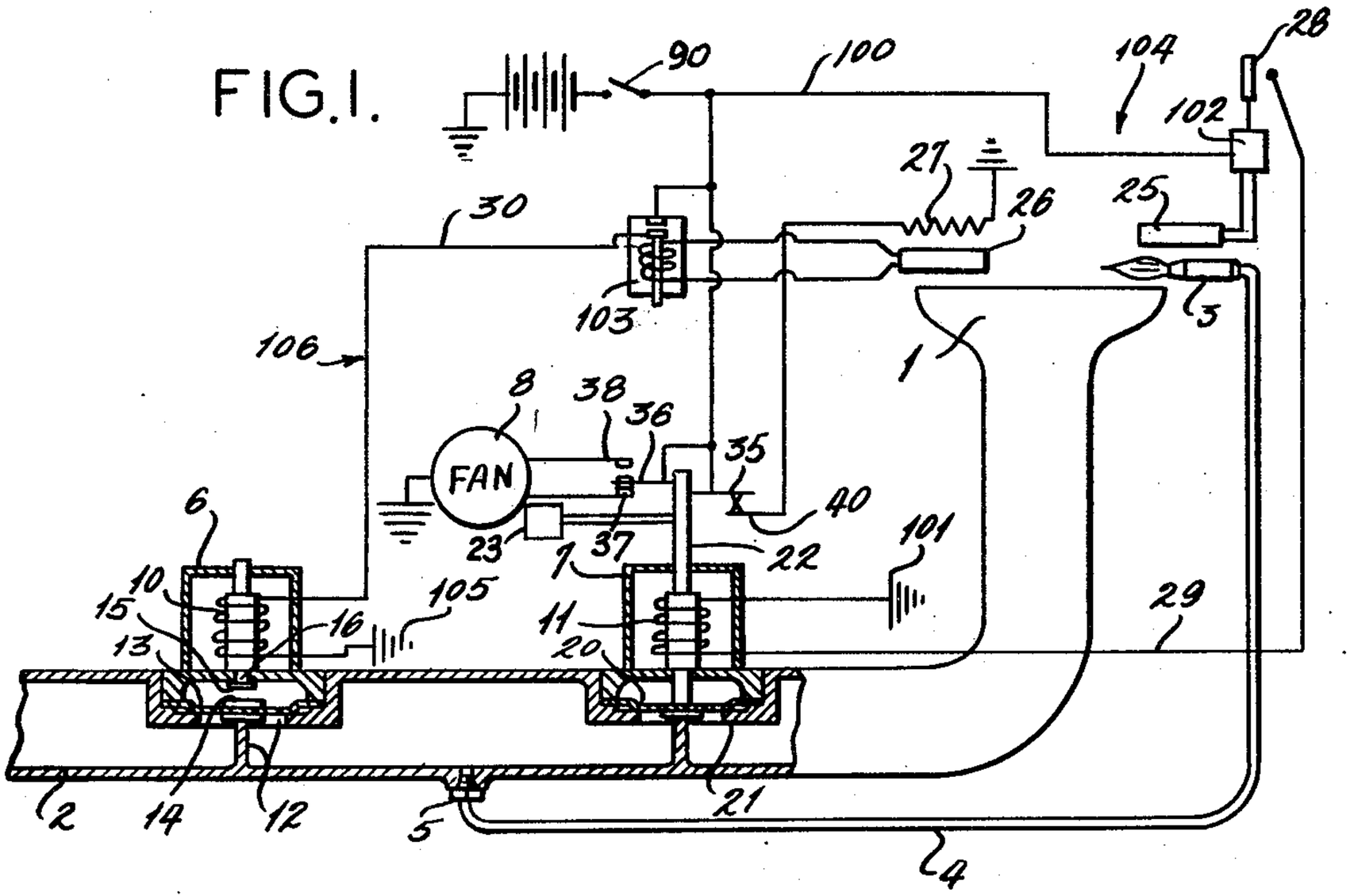

FIG. 2.

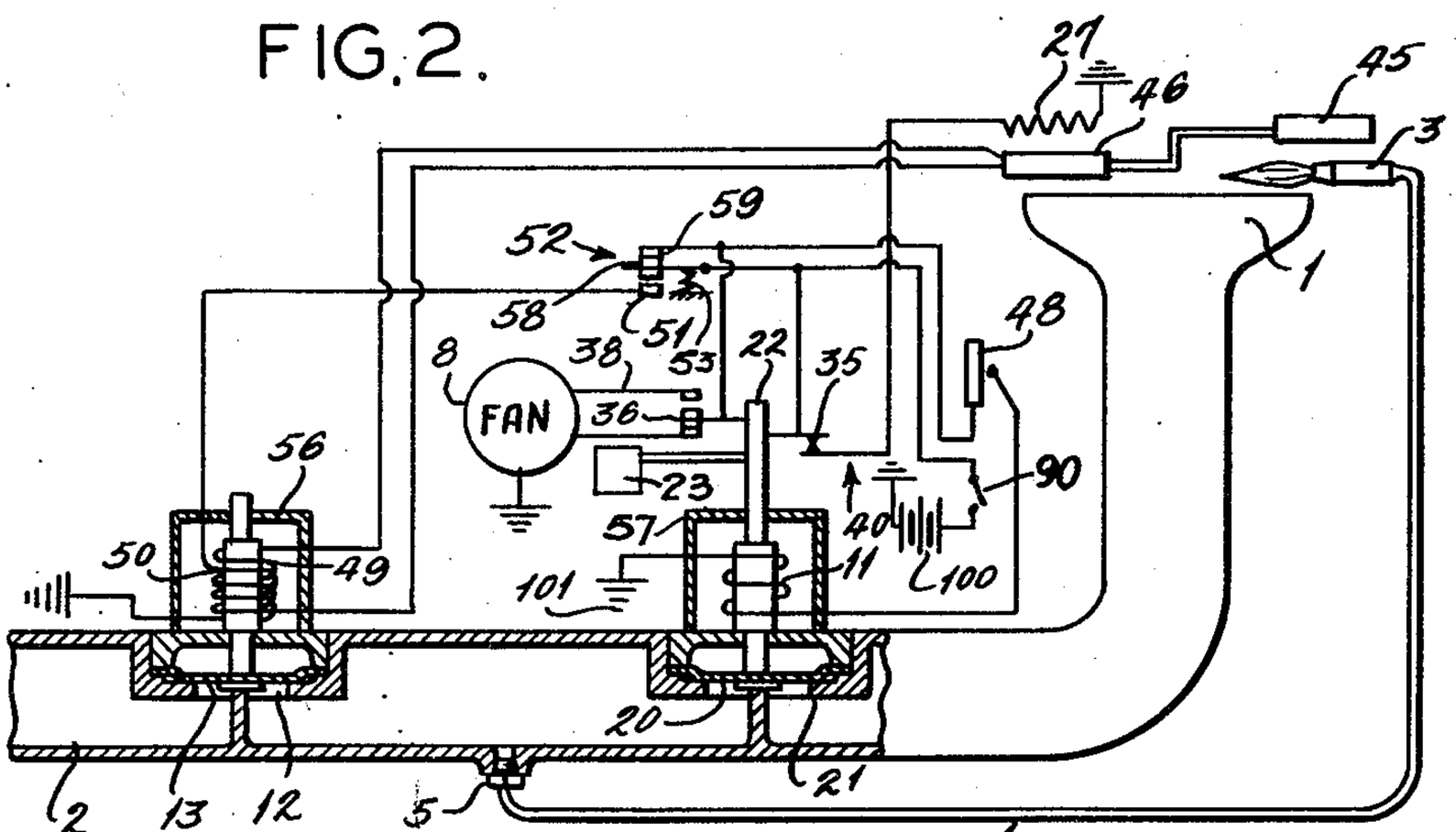

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FIG. 3.

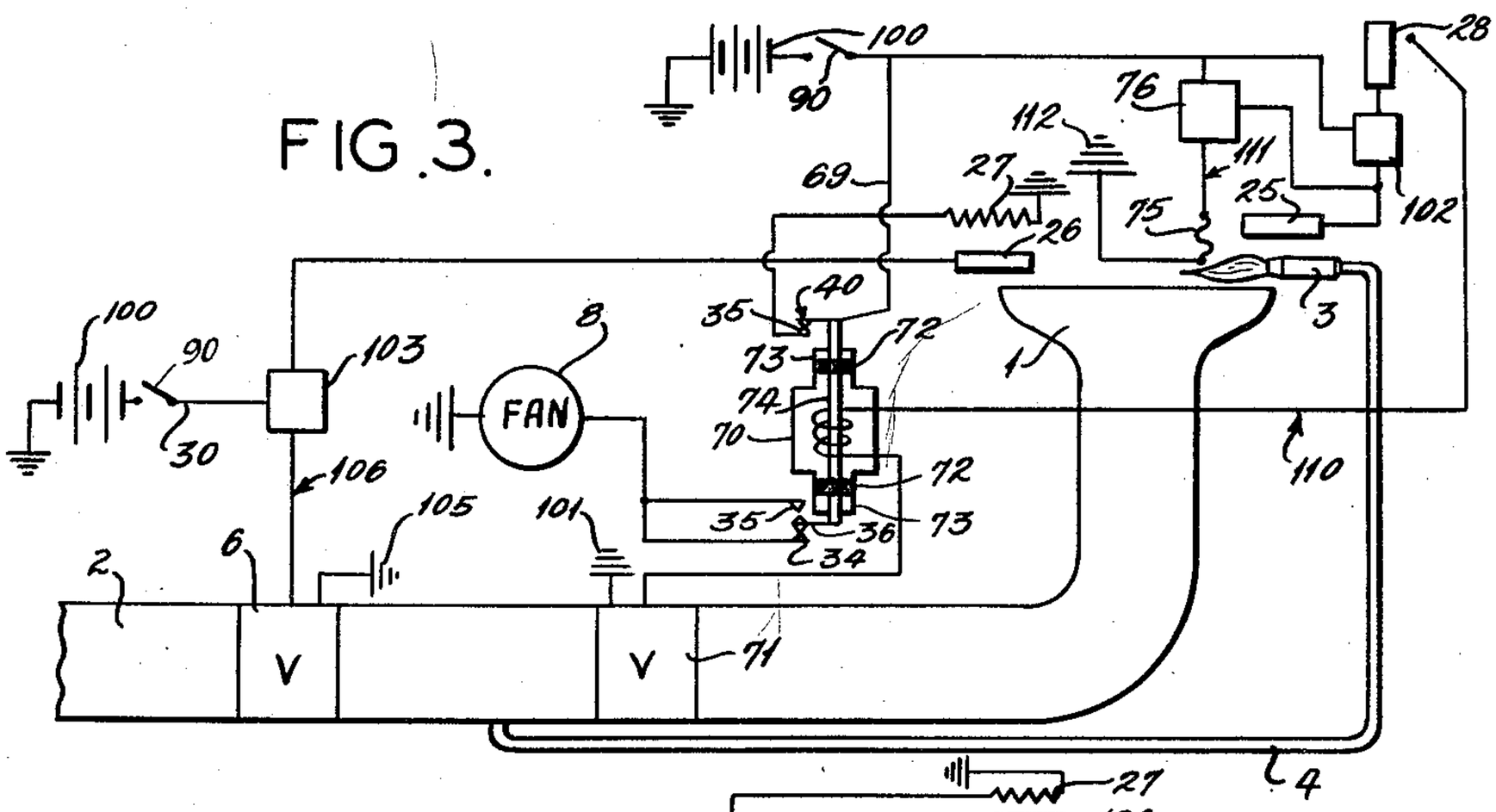


FIG. 4.

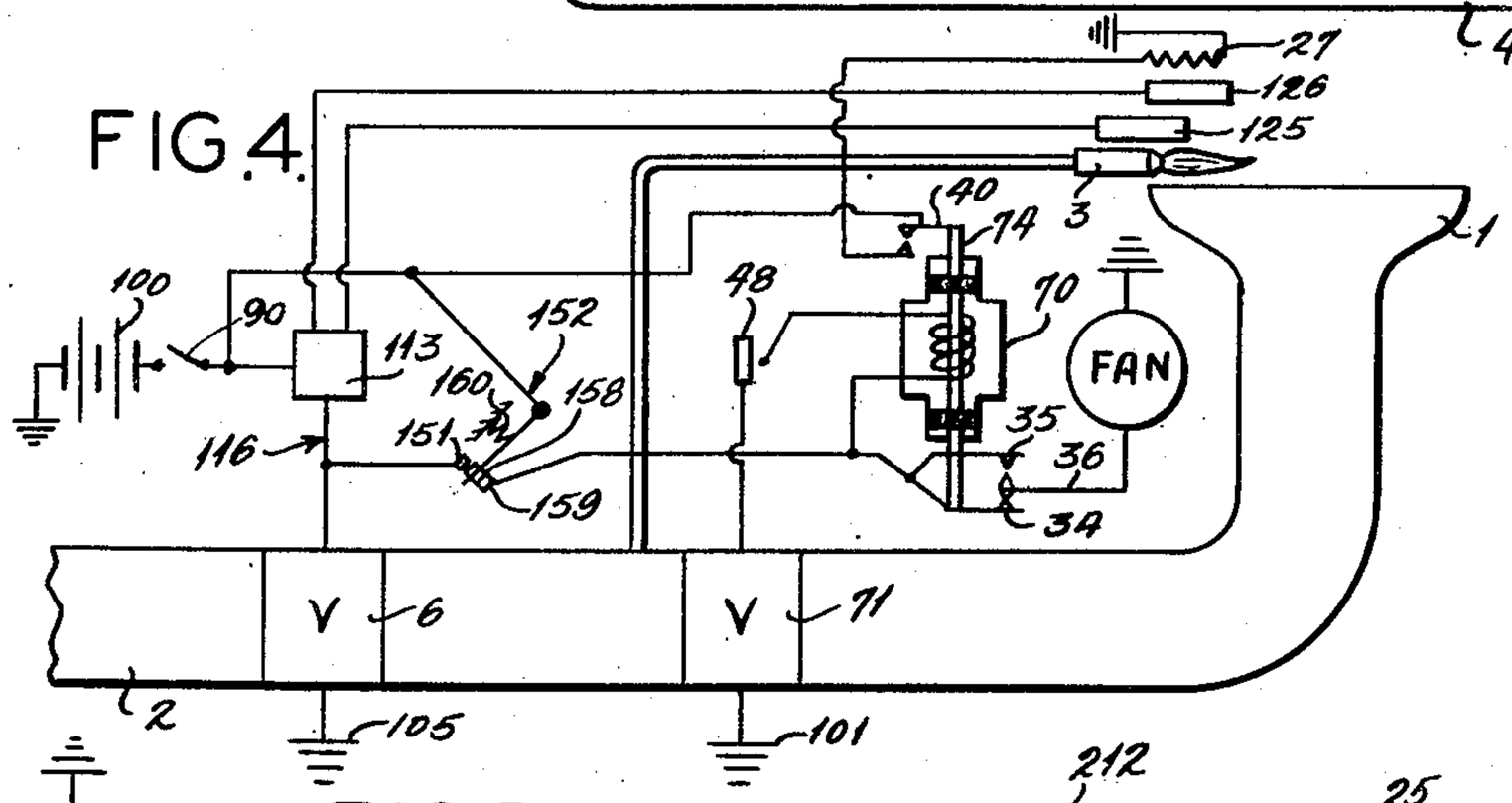
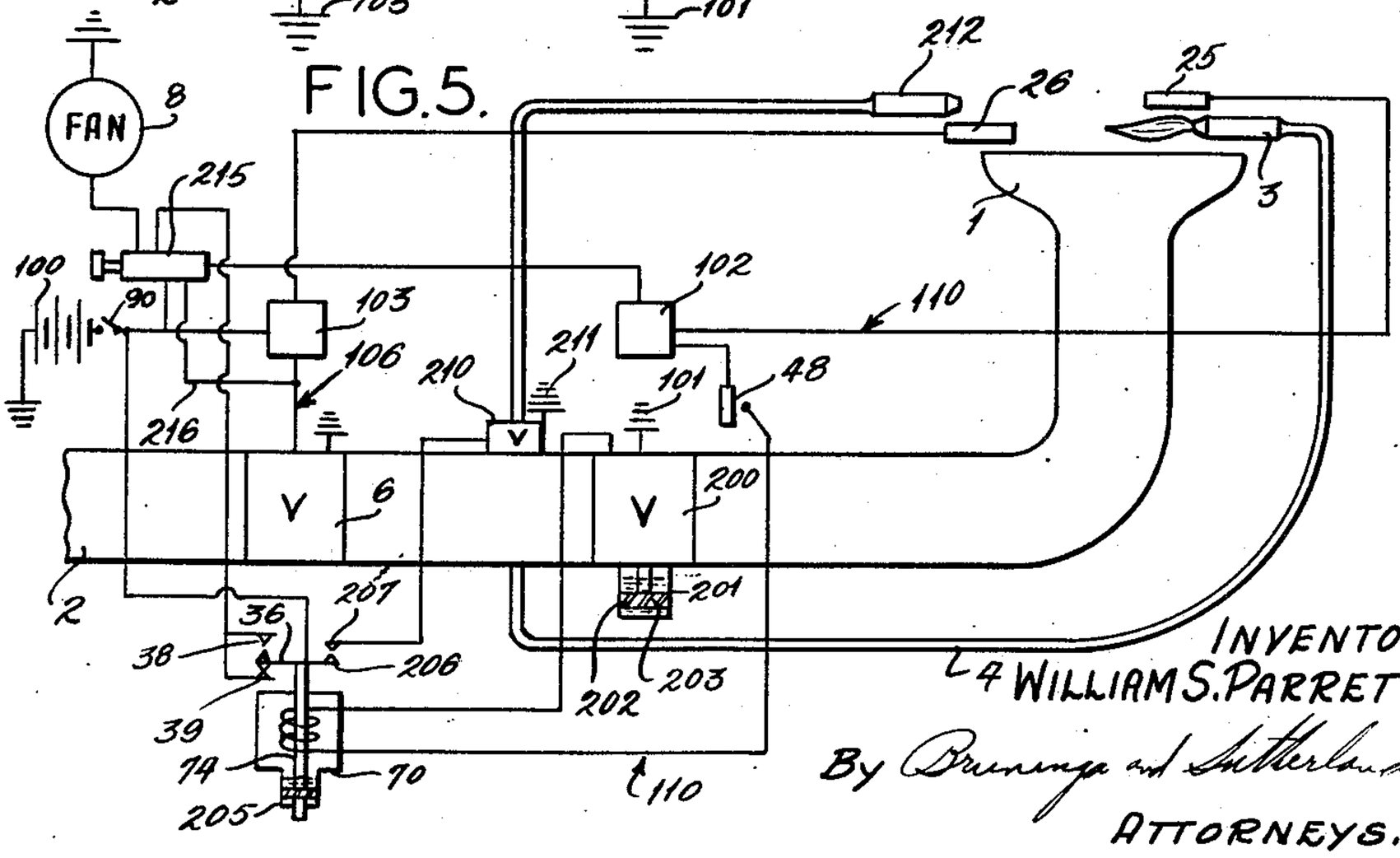


FIG. 5.



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GAS HEATER CONTROL

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4 Claims. (Cl. 263—33)

This invention relates to gas heater controls and has particular application to the open flame type of gas heater in which the hot gases from the flame are blown by a fan into an area to be heated. In open flame heaters known heretofore, difficulty has been experienced in lighting the main flame burner, even though the pilot light has continued to burn. This leads to the dangerous condition in which the flow of gas to the main gas burner remains unchecked while the gas is blown into the space to be heated. In such installations as gas-heated laundry dryers and the like, the fan has been allowed to run continuously though the main flame burns intermittently. In other installations, the fan is started simultaneously with the admission of gas to the main burner.

One of the objects of this invention is to provide a control system whereby the lighting of the main gas burner is facilitated but the supply of gas to the main burner is shut off if that burner fails to be lighted within a reasonable time.

Other objects will become apparent to those skilled in the art in the light of the following description and the accompanying drawing.

In accordance with this invention, generally stated, a gas heater control is provided to shut off the draft from the fan or blower while the main burner is given an opportunity to ignite. If the main burner fails to light within a reasonable time, means are provided for automatically shutting off the supply of gas to the main burner.

Referring to the drawings:

Figure 1 is a diagrammatic view of one embodiment of this invention;

Figure 2 is a diagrammatic view of another embodiment of this invention;

Figure 3 is a diagrammatic view of still another embodiment of this invention, showing an ignitor element;

Figure 4 is a diagrammatic view of still another embodiment of this invention; and

Figure 5 is a diagrammatic view of still another embodiment of this invention, in which an electric heating element is omitted.

Referring now to Figure 1 for an illustrative embodiment of this invention, 1 represents a main burner, connected to a main gas supply line 2. A pilot light 3 is positioned to ignite gas issuing from main burner 1. The pilot light 3 is supplied with gas from the main gas supply line 2 through a pilot line 4. Pilot line 4 is connected at 5 to main gas supply line 2 intermediate a first gas valve 6 and a second gas valve 7. A fan is indicated diagrammatically at 8. First gas valve 6 is operated by a magnetic coil 10. Second gas valve 7 is operated by a solenoid 11. First valve 6 is of a simple magnetic-diaphragm type with a valve seat 12 and a diaphragm 13 upon which a plate 14 of magnetic metal is secured. A non-magnetic separator 15 may be interposed between the magnetic plate 14 and the pole 16 of the magnet. In the embodiment shown, the second valve 7 is a diaphragm type valve having a diaphragm 20 and a seat 21, but the diaphragm 20 is operated by the movement of the stem 22.

Positioned to be heated by pilot 3 is a pilot thermocouple 25. Positioned to be heated by the flame from main burner 1 when that burner is lighted is a main burner thermocouple 26. An electric heater 27 is positioned to heat main burner thermocouple 26 when that heater is energized. A thermostatic switch 28 is provided to respond to changes in temperature of the heated area to maintain the desired temperature therein. In the

illustrative embodiment shown, pilot thermocouple 25 controls the circuit 104 from a suitable power source 100 through a main switch 90, thermostat 28, wire 29, solenoid 11 of second valve 7 to the ground 101. To this end, a circuit-breaking device 102 is arranged to break the circuit when pilot thermocouple 25 has cooled to a predetermined temperature, and to complete the circuit when that temperature is exceeded. Devices of this character are well known to the art. Main burner thermocouple 26 is also connected to a circuit breaker 103, to break the circuit 106 from the source 100 through wire 30 and coil 10 to ground 105 when the main burner thermocouple 26 cools below a predetermined temperature, and to complete that circuit when the thermocouple is heated above that temperature. Connected to move with stem 22 of valve 7 are contacts 35 and 36, connected to power source 100. Contact 36 moves between fan circuit contacts 37 and 38. Contact 35 makes and breaks contact with heater switch 40.

In the operation of this embodiment, assuming that pilot 3 is unlighted, that thermostatic switch 28 is closed, and that current is being supplied to contacts 35 and 36, heater 27 will be operating to heat main burner thermocouple 26 to close the circuit 106 to maintain first valve 6 in open position. Second valve 7 will, however, remain closed even though thermostat 28 is closed, because pilot thermocouple 25 is cold. Gas is being supplied to pilot 3 through pilot line 4. When pilot 3 is manually lighted, pilot thermocouple 25 will, when it reaches the necessary temperature, close the circuit 104 to raise the stem 22 of the valve 7. As the stem 22 rises, heater switch 40 is opened. At the same time, the fan circuit through contacts 36 and 37 is opened to stop the fan. The rising of the stem 22 raises the diaphragm 20 to admit gas to the main burner. Damping means 23, shown schematically in the drawing, are provided for damping the travel of the stem 22 to allow a reasonable time for the ignition of the main flame while the fan circuit remains broken. The damping means 23 may be any suitable device, such as a dash pot. When the stem 22 approaches the upper limit of its travel, the fan circuit is restored through contacts 36 and 38 again to start the fan.

The main burner thermocouple 26 begins to cool when heater switch 40 is opened. Thermocouples insulated or otherwise regulated to have a cooling time of around one minute, are well known. If, then, the main burner is ignited within the time required for the main burner thermocouple 26 to cool, the first valve 6 will be maintained in its open position. However, if main burner 1 fails to ignite within the time required by main burner thermocouple 26 to cool after the second valve 7 opens, the circuit 106 is broken and the coil 10 of the first valve 6 is de-energized, allowing the diaphragm 13 to seat, shutting off all of the gas. When the first valve 6 is closed initially, the second valve 7 remains open. However, the shutting of the first valve 6 cuts off the gas to pilot 3, cooling pilot thermocouple 25, interrupting circuit 104, and allowing second valve 7 to close. When second valve 7 closes, the fan circuit is restored. The closing of second valve 7 also closes heater switch 40 supplying current to heater 27 to heat main burner thermocouple 26. The heating of main burner thermocouple 26 closes circuit 106, which opens first valve 6. The system is now restored to the condition assumed at the beginning of the description of the operation of the device. Normally, of course, main burner 1 will be ignited, since the fan 8 is turned off long enough practically to insure the ignition of the main burner. The opening and closing of the second valve 7 is then controlled by thermostatic switch 28.

In the embodiment shown in Figure 2, pilot thermocouple 45 and main burner thermocouple 46 are connected in series with one another and are connected to op-

erate first valve 56 through winding 49. A second winding 50, to operate first valve 56, is connected through contact 51 to the two-way switch 52. A thermostatic switch 48 is connected to control a second valve 57, when spring-biased contact 58 and contact 59, also parts of the switch 52 are in their normally engaged position to complete a circuit from power source 100. The remaining elements of the embodiment shown in Figure 2 are the same as those shown in Figure 1, and will be given the same numerical designations.

In the operation of the embodiment shown in Figure 2, the combined current of thermocouples 45 and 46 is required to operate the valve 56. That is to say, neither of the thermocouples acting without the other is capable of maintaining the valve 56 in open position, though the full generating capacity of both the thermocouples is not needed. Assuming now that pilot 3 is not burning, and that thermostatic switch 48 is open, first valve 56 and second valve 57 will be closed. The closing of thermostatic switch 48 will complete the circuit through normally closed contacts 58 and 59 to open second valve 57. However, since the first valve 56 is closed, the opening of second valve 57 will have no immediate effect on the main burner or pilot. It can be seen that if first valve 56 were now opened manually, gas would be admitted not only to pilot 3 but to main burner 1, making lighting dangerous. In order to prevent this, the switch 52 is provided. When the contact 58 is moved manually against contact 51 against the bias of spring 53, the thermostat circuit through contacts 58 and 59 is broken, and the second valve 57 closes, blocking the supply of gas to main burner 1. At the same time, current is supplied to the winding 50 of first valve 56 to open that valve, thus admitting gas from main supply line 2 through pilot line 4 to pilot 3. Pilot 3 may now be lighted. The closing of second valve 57 has allowed heater 27 to operate to heat main burner thermocouple 46. The contact 58 need only be held against contact 51 until pilot thermocouple 45 and main burner thermocouple 46 are heated sufficiently to maintain the first valve 56 open. Then when contact 58 is released to again make contact with contact 59, the thermostat circuit is completed to open second valve 57. The mechanics of opening of valve 57 are the same as in the opening of valve 7 in the first embodiment, i. e., the complete opening is timed to allow the main burner 1 to be lighted after contacts 36 and 37 break and before contacts 36 and 38 meet to restore the fan circuit.

Normally, of course, the pilot 3 remains lighted. Main burner thermocouple 46 is heated by the heater 27, while second valve 57 is closed, and by the flame of main burner 1 when second valve 57 is open to maintain first valve 56 open at all times. The operation of the heater is then governed, as in the embodiment of Figure 1, by the opening and closing of the thermostat.

In the embodiment shown in Figure 3, the main burner thermocouple 26 and its circuit may be of the same character as the corresponding thermocouple and circuit in the embodiment of this invention shown in Figure 1. Thus main burner thermocouple 26 controls the circuit 106 (source 100 through the wire 30 and the coil of the first valve 6 to the ground 105) by means of circuit breaker 103. The heating element 27 may also be the same as that in the embodiment shown in Figure 1. The pilot burner thermocouple 25 operates through the circuit breaker 102 to control a circuit 110 (power source 100 through the thermostat 28 to a ground 101). However, the circuit 110 differs from the circuit 104 of the embodiment shown in Figure 1 in that a delay switch 70 working independently of the second valve 71 is interposed in the circuit 110. Delay switch 70 is indicated diagrammatically in Figure 3 to include a movable core 74, the travel of which is damped by a pair of sponge rubber disks 72 sliding within cylinders 73. The arrangements of the fan motor contacts and of the heater switch are comparable with those shown in Figure 1 and

are numbered accordingly. A single wire 69 is indicated as connected to energize both contact 36 and switch 40. The second valve 71 may be of any well-known magnetic or solenoid-operated type. In this embodiment, the pilot thermocouple 25 is arranged to control an ignitor element 75 through a circuit-making device 76. The circuit-making device 76 differs from the circuit-breaking devices 102 and 103 in that whereas in the elements 102 and 103 the cooling of the controlling thermocouples break the circuit, the cooling of pilot thermocouple 25 serves in element 76 to make the circuit 111 from power source 100 through ignitor element 75 to ground 112. Conversely, when the pilot thermocouple 25 is heated by pilot light 3, the circuit 111 is broken through circuit-maker 76.

In the operation of the device shown in Figure 3, assume that the thermostatic switch 28 is closed but that neither the main burner 1 nor pilot burner 3 is lighted and that pilot thermocouple 25 is cold. Circuit 110 is broken by circuit breaker 102. The heating element 27 is operating to heat main burner thermocouple 26 to allow first valve 6 to be maintained in open position. Gas is being admitted to pilot burner 3. Since pilot burner thermocouple 25 is cool, the circuit 111 is closed, to operate ignitor element 75 which, in actual practice, may be positioned closely adjacent pilot burner 3 and protected from the draft from the fan 8. Ignitor element 75 ignites the gas issuing from the pilot burner 3. When the pilot burner thermocouple 25 is heated, circuit 111 is broken and circuit 110 is restored. The restoration of circuit 110 actuates the core 74, breaking the heater switch 40 and the fan circuit. The fan circuit is restored when the contact 36 reaches the contact 38. In the meantime, however, the second valve 71 has been open fully to admit gas to main burner 1. Normally, the main burner will ignite while the fan circuit is broken and before the main burner thermocouple 26 cools sufficiently to break the circuit 106. However, if the main burner 1 fails to ignite, the main burner thermocouple 26 will cool to break the circuit 106 through circuit breaker 103, thus shutting first valve 6. The shutting of first valve 6 cuts off the supply of gas to the pilot burner 3 cooling pilot burner thermocouple 25 to break the circuit 110 and make the circuit 111. The breaking of circuit 110 allows the movable core 74 of the switch 70 to drop to its normal position, when the heater switch 40 is closed. The closing of heater switch 40 supplies current to heater element 27 to allow first valve 6 to be again opened. The opening of first valve 6 admits gas to pilot burner 3 which gas is ignited by ignitor element 75 to repeat the cycle. It can be seen that should the ignitor 75 fail to operate, only the gas from the pilot 3 will escape since until pilot burner 3 is ignited the pilot thermocouple 25 will not be heated to close the circuit 110 controlling the second valve 71. As in the embodiment of this invention shown in Figure 1, the system may be shut down so that first valve 6 remains closed either by cutting off the current from the source 100, or by breaking the circuit 106, either directly or by cutting out the main burner thermocouple 26 or the heater 27.

In the embodiment shown in Figure 4, both the pilot thermocouple 125 and main burner thermocouple 126 serve to control the circuit 116 of first valve 6, as did the pilot and main burner thermocouples in the embodiment shown in Figure 2. Unlike the embodiment shown in Figure 2, however, pilot thermocouple 125 and main burner thermocouple 126 operate independently to break the circuit 116. That is to say, in the embodiment shown in Figure 2, the control is serial whereas in the embodiment shown in Figure 4 it is multiple. The cooling of either pilot thermocouple 125 or main burner thermocouple 126 below a predetermined temperature will serve to operate circuit breaker 113 to break the circuit 116. In Figure 4, an independent delay switch

70, similar to that shown in Figure 3, is indicated. By way of variety, the contacts **34** and **35** are shown as carried by the core **74** while the contact **36** remains stationary. In this embodiment, a switch **152** is provided in which a contact **158** is normally biased into engagement with a contact **159** to connect the source **100** to the thermostat circuit. The contact **151** of the switch **152** is connected to bypass the circuit breaker **113**.

In the operation of the embodiment shown in Figure 4, assume that neither the pilot burner **3** nor the main burner **1** is ignited, that the pilot thermocouple **125** is cold, that the thermostatic switch **48** is closed, and that the switch **152** is in its normally biased position with contacts **158** and **159** in engagement. The second valve **71** will be open since the thermostat circuit is complete. The first valve **6** will, however, be closed since the circuit breaker **113** is operated by pilot thermocouple **125** to break the circuit **116**. In order to start the burner cycle, it is only necessary to move the contact **158** against the bias of spring **160** out of engagement with contact **159** and into engagement with contact **151**. This establishes a circuit from the source **100** through the switch **152** around circuit breaker **113** to valve **6** to open that valve. At the same time, the thermostat circuit and the fan circuit are cut off from the source **100** so that the fan is stopped, the second valve **71** is closed and the core **74** of the delay switch **70** drops to close heater switch **40**. As in the embodiment of this invention shown in Figure 2, the heater switch **40** is supplied with current directly from the source **100** so that the breaking of the fan circuit does not prevent the operation of the heater **27**. Gas is now being supplied to pilot burner **3**. After pilot burner **3** is ignited, the switch **152** need be held manually only long enough for the heater **27** to heat the main burner thermocouple **126** past the critical temperature required to maintain the circuit **116** closed and until the pilot flame has heated the pilot thermocouple **125** past that critical temperature. Switch **152** may then be released to restore the thermostat and fan circuits. The restoration of the thermostat circuit opens the valve **71** and initiates the movement of the core **74** of the delay switch **70** again temporarily breaking the fan circuit to allow the main burner **1** to be ignited. Of course, if the main burner **1** fails to ignite, main burner thermocouple **126** cools below the critical temperature, closing valve **6** which extinguishes the pilot flame **3** so that pilot thermocouple **125** again controls the circuit **116** as was assumed at the beginning of the description of the operation of this embodiment.

In the embodiment shown in Figure 5, the electric heating element **27** is omitted and its function is performed by an arrangement of gas flames. In this embodiment, two pilot burners are provided, one of which corresponds with the pilot burners of the previous embodiments. The other pilot will be called a control pilot to differentiate it. The first valve **6** may be of any desired suitable character, as in the remaining embodiments. The second valve **200** is shown as being equipped with a liquid-filled dash pot **201** having a piston **202** with an orifice **203** to damp its travel. As in the embodiment shown in Figure 3, pilot thermocouple **25** controls the thermostat circuit **110** (source **100**, thermostat **48**, delay switch **70**, second valve **200**, ground **101**) through circuit breaker **102**. In the present embodiment, the delay switch **70** is provided with a liquid-filled dash pot. The particular kinds of damping devices used are simply by way of illustration. The contacts **36**, **38** and **39** controlling the fan circuit at the delay switch **70** are the same as those shown in Figure 3. A contact **206** on the core **74** engages a contact **207** when switch **70** is energized. The engagement of contacts **206** and **207** completes a circuit from a current source **100** through a control pilot valve **210** to its ground **211** to close that valve, shutting off the gas to control pilot **212** when the first valve **6** is open. Main burner thermocouple **26** is positioned to be heated by the main burner **1** when it is ignited and by control pilot **212** when that pilot is ignited. Main burner thermocouple **26** normally controls the first valve circuit **106** through the circuit breaker **103** as in the embodiment shown in Figure 3. A bypass from the source **100** to the first valve **6** around circuit breaker **103** is provided through push button switch **215** and line **216**. In its normally biased position, push button switch **215** completes the fan circuit from the source **100** through contacts **36** and **38** or **39** to the fan, cuts off the line **216** from the source **100** so that the circuit breaker **103** is effective in controlling the circuit **106**, and connects the source **100** to the circuit breaker **102**. When the push button switch **215** is pushed in, the fan and the thermostat circuits are broken and the bypass around circuit breaker **103** to valve **6** is effected.

In the operation of the embodiment shown in Figure 5, assume that the main burner **1**, the pilot burner **3** and the control pilot **212** are not burning, that the main burner thermocouple **26** and the pilot thermocouple **25** are cold, that push button switch **215** is in its normally biased position, and that the thermostatic switch **48** is closed. First valve **6**, controlled by main burner thermocouple **26** through circuit breaker **103**, is closed. Second valve **200**, controlled by pilot thermocouple **25** through circuit breaker **102**, is also closed. Delay switch **70**, part of circuit **110**, is also deenergized so that contacts **36** and **39** are engaged while contacts **206** and **207** are separated. The fan is, therefore, running and the control pilot valve **210** open. If, now, the push button switch **215** is pushed in, the fan circuit and the thermostat circuit **110** are broken and the circuit breaker **103** is bypassed to open first valve **6**.

Pilot burner **3** and the control pilot **212** may now be lighted. When the pilot thermocouple **25** and the main burner thermocouple **26** have been heated sufficiently to maintain the circuits which they control, the push button switch **215** may be released restoring the fan circuit and the thermostat circuit **110**, and the first valve circuit **106**. The restoration of the thermostat circuit **110** energizes the delay switch **70** and the valve **200**, to interrupt the fan circuit, close the control pilot valve **210** and admit gas to the main burner **1**. It can be seen that if the main burner fails to ignite, the main burner thermocouple **26** will act to break the circuit **106** to close the first valve **6**. If the main burner does ignite, the circuit **106** will be maintained as in the embodiments shown in Figures 1 and 3. When the thermostat **48** opens, the contacts **206** and **207** will separate almost immediately. If desired, the delay switch **70** may be so constructed as to allow a quick initial break of the contacts **206** and **207**. The breaking of contacts **206** and **207** opens the control pilot valve **210** to admit gas to the control pilot **212**. At the same time, the valve **200** closes relatively slowly due to the action of the dash pot **203**. There is thus an opportunity while the main flame is still burning and while the fan circuit is interrupted, for the control pilot **212** to be lighted from the main flame. When control pilot **212** is lighted, circuit **106** is maintained to hold first valve **6** open. Thus the control pilot **212** serves the function of heater element **27** in the remaining embodiments.

It can be seen that some of the features of each of the illustrative embodiments described may be incorporated in the remaining embodiments, and that numerous variations in the construction of the elements of this invention, are possible within the scope of the specification and accompanying claims. Thus the push button switch of the embodiment shown in Figure 5 may be simplified and used in the embodiment shown in Figures 2 and 4. The dash pots of Figure 5 may be used in any of the remaining embodiments. The ignitor element **75** and its circuit of Figure 3 may be incorporated in the embodiments of Figures 1, 2 and 4. The auto-generating thermocouples of Figure 2 may be utilized to control

directly the valves of the remaining embodiments. Similarly, the thermocouples in series in the embodiment shown in Figure 2 may be of various other thermally-responsive types arranged either to control a circuit breaker in a circuit from an external source or simply to make and break contact themselves to interrupt an external circuit.

The making and breaking of the heater circuits of the embodiments shown in Figures 1 through 4 of the fan circuits in all of the embodiments and the control of the control pilot valve in the embodiment shown in Figure 5 can also be accomplished by other means besides the movement of a valve stem 22 or the core of a delay switch 70. Simple timing devices and relays are well known to the art for accomplishing these purposes.

In those installations in which the fan need not run during the entire period in which the main burner is not lighted, so that it is off when gas is first admitted to the main burner, the circuits shown and described may be simply altered to provide for a delay in the starting of the fan after the gas is first admitted to the main burner. In any event, it is desirable to make the interval during which the fan is off after gas is initially supplied to the main burner correspond substantially with the cooling time of the main burner thermocouple so that the full period during which gas is supplied to the main burner may be utilized to light that burner without a draft. At the same time, it is desirable that the accumulated gas be cleared from the burner area after the gas of the main burner is shut off.

In the embodiments described, the draft has been cut off by stopping the fan. It can be seen that means may be provided for cutting off the fan draft by means of a damper or bypass. However, the system of the illustrative embodiments is simple and effective.

It has been found that the control system of this invention allows the use of a vigorous draft, since the difficulty experienced heretofore has been not in maintaining the burning of the gas at the main burner, but in initiating it. The supplying of copious quantities of air also insures complete combustion, and allows greater temperature regulation by variation in the amount of air supplied.

Thus it can be seen that a simple, efficient, easily-operated device is provided for facilitating the ignition of the main burner, for cutting off the supply of gas to the main burner if that burner fails to ignite, and for scavenging the explosive mixture from the burner area after the gas supply to the main burner is cut off.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. An intermittently operating open flame gas heater having a gas supply conduit; first and second electrically controlled gas valves in said conduit and spaced along said conduit from one another; a normally constantly burning pilot burner connected to said gas supply conduit between said first and second valves; a main burner connected to said gas supply conduit beyond said second gas valve whereby each of said valves is positioned to control the gas flow to said main burner, each of said valves acting when de-energized to shut off the flow of gas to the main burner; a fan driven by a motor, said fan providing a draft of air to commingle with the products of combustion of the main burner; first temperature responsive means having a minimum operating temperature, positioned to be heated above that temperature by the pilot burner when the pilot burner is burning and operatively connected to one of the electrically operated valves to de-energize the valve and thus shut off the flow of gas to the main burner when the temperature of the first temperature responsive means is below its minimum operating temperature; a second temperature responsive means having a minimum operating temperature and positioned to be heated by the main burner flame to

a temperature in excess of said minimum operating temperature, said second temperature responsive means being operatively connected to the first electrically operated valve to de-energize said valve and thus shut off the flow of gas to the main burner when the temperature of said temperature responsive means falls below its minimum operating temperature; auxiliary heating means positioned to heat the second temperature responsive means to a temperature in excess of the minimum operating temperature of the second temperature responsive means; means responsive to the de-energizing of the second valve to energize the auxiliary heating means and responsive to the energizing of said second valve to de-energize the auxiliary heating means; and means responsive to the energizing of the second valve to de-energize the fan motor for a period of time substantially coincident with the period of time required for the cooling of the second temperature responsive means from the temperature to which it is heated by the auxiliary means to its minimum operating temperature.

2. An intermittently operating open flame gas heater having a gas supply conduit; a main burner connected to said conduit an electrically controlled gas valve in said conduit, said gas valve acting when de-energized to close to shut off the flow of gas to said main burner and when energized, to open; a normally constantly operating fan providing a draft of air to the heater to commingle with the products of combustion of the main burner; and means responsive to the energizing of said gas valve to cut off the draft of air from the fan to the heater for a fixed predetermined period and thereafter to restore the draft of air to the heater.

3. A gas heater controlled by a thermostatic switch, said gas heater having a main burner to which gas is supplied in response to the closing of said thermostatic switch; main burner igniting means; a fan supplying a draft of air to said heater; means operatively associated with said main burner to automatically shut off the supply of gas to said main burner after a predetermined time after gas is initially supplied to said burner if said burner fails to ignite during that period; and means actuated in response to the closing of said thermostatic switch to cut off the draft of air from the fan for a time interval substantially coincident with the period between the time gas is initially supplied to said main burner and the time that the gas is automatically shut off, and thereafter to restore the draft of air from said fan.

4. A gas heater controlled by a thermostatic switch, said gas heater having a gas supply conduit; a main burner connected to said conduit; an electrically controlled valve in said conduit, said valve being supplied with current through a valve circuit frm a current source, said thermostatic switch being part of said valve circuit, said valve acting when de-energized to close and cut off the supply of gas to the main burner and when energized, to open; a fan driven by a normally constantly running electric motor, said fan supplying a draft of air to said heater to commingle with the products of combustion of the main burner; means responsive to the closing of the thermotatic switch and completion of the valve circuit to de-energize the fan motor for a fixed predetermined time within which gas issuing from said main burner will normally be ignited, and thereafter to energize the fan motor.

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