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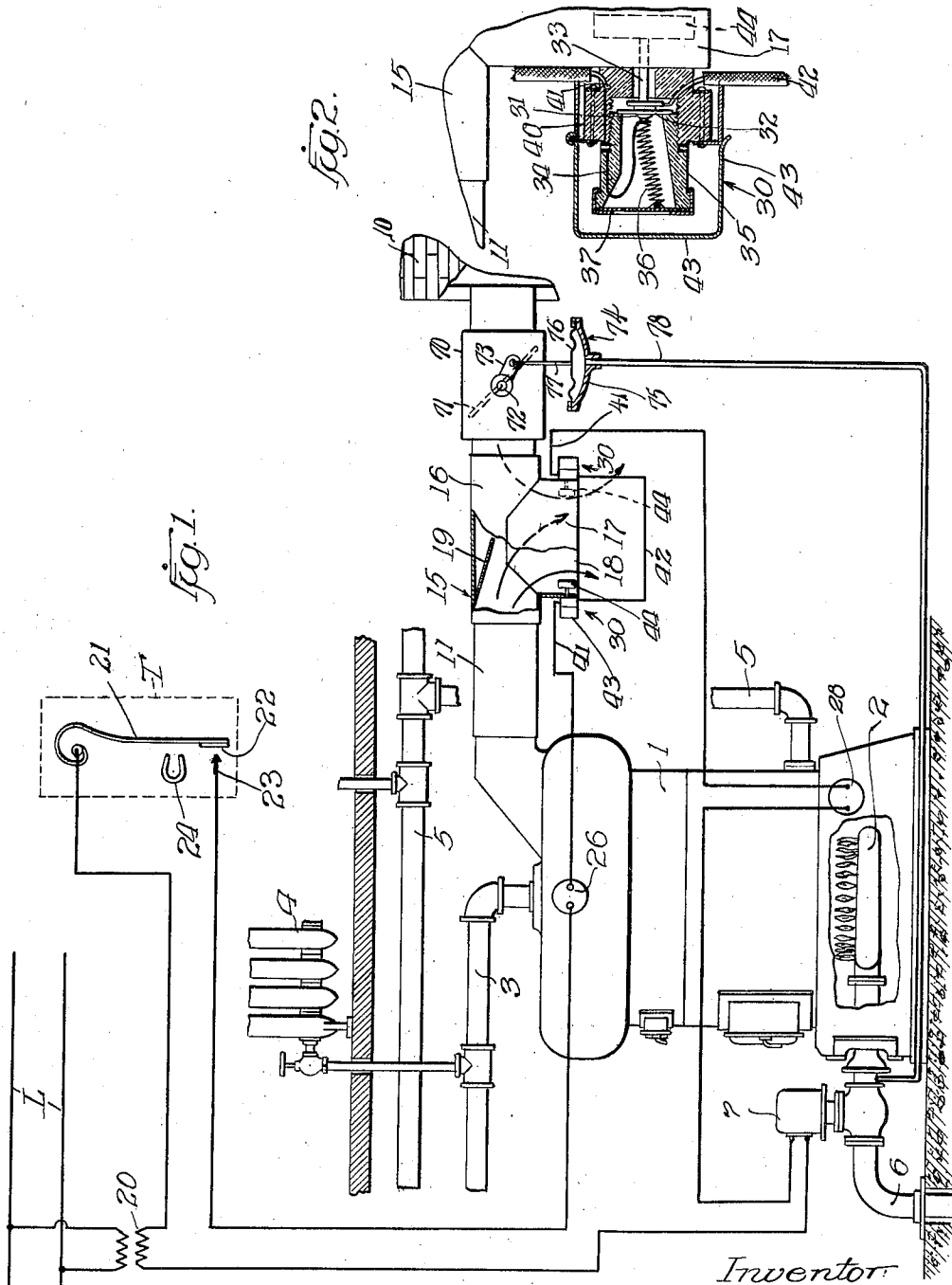
E. L. TORNQUIST

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GAS BURNER CONTROL SYSTEM

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GAS BURNER CONTROL SYSTEM

Earl L. Tornquist, Elmhurst, Ill.

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The present invention relates generally to combustion controlling means and is more particularly concerned with controlling the operation of vented gas appliances so that the burner will be shut off in the event that the flue becomes stopped, an objectionable back- or down-draft occurs, or any other condition exists in which, under the continued operation of the burner, dangerous quantities of the products of combustion would be discharged into the space surrounding the appliance.

Most appliances of any appreciable capacity depend upon flues or chimneys for the removal of the products of combustion, and in this connection means such as draft hoods have been developed to insure the ready escape of the products of combustion in the event that for some reason there is no draft in the flue or chimney, or there is a back draft or a stoppage in the flue beyond the draft hood. Such draft hoods not only prevent a backdraft from entering the appliance but they also prevent variations of stack action of the flue from objectionably effecting the proper operation of the appliance.

Good modern practice and established safety rules require the installation of a draft hood or the like having means to vent the products of combustion from the burner through a relief or spillage opening into the space around the appliance in order that combustion may be complete and the flame in the burner will not be extinguished or excess of quantities of carbon monoxide produced. If the amount of gas consumed by the appliance is large in proportion to the air space available in which the appliance is functioning, the spillage of flue gases or products of combustion into the zone surrounding the burner, if temporary, may not be harmful and, in general, serves the useful purpose of preventing for the time being improper operation of the burner. However, where a continued down-draft occurs, or where the chimney becomes blocked also creating a continuous condition, it is objectionable to permit the discharge of the products of combustion into the space surrounding the appliance for, in the first place, the presence of flue gases is in itself objectionable and, even though the draft hood and the appliance are arranged to operate satisfactorily with complete combustion where all of the products of combustion are vented through the draft hood, the continued spillage of the flue gases into, for example, a basement, soon results in at least a partial depletion of the oxygen content of the air in the basement. Thus, even though the appliance

and the draft hood are correctly coordinated theoretically, the continued operation of the burner under these conditions, and especially where the source of oxygen for the burner is the air in the basement, may produce carbon monoxide in dangerous quantities.

It is, therefore, a principal object of the present invention to provide a simple means for shutting down the burner or appliance whenever the products of combustion are spilled into the space surrounding the appliance, indicating a blocked chimney or a down-draft condition in which the continued operation of the burner becomes objectionable. A further object of the present invention is the utilization of the heat of the products of combustion, escaping through the relief opening of the draft hood under any of the aforesaid abnormal conditions for any appreciable length of time, to actuate a device serving to shut down the burner and place the appliance out of operation.

A further object of the present invention is the disposition of a thermally responsive unit, either a bimetallic or a fusible element, or both, in the path of movement of the products of combustion passing through the relief opening, and so connecting said unit so that the appliance will be shut down whenever the heat of the products of combustion cause the operation of the thermal element.

These and other objects and advantages of the present invention will be apparent to those skilled in the art after a consideration of the following detailed description of the preferred structural arrangements, taken in conjunction with the accompanying drawings.

In the drawings:

Figure 1 is an elevation, partly diagrammatic, illustrating one way of embodying the principles of the present invention in the control connections for a gas burner, the furnace having an automatic damper;

Figure 2 is an enlarged fragmentary detail, showing one of the two thermal responsive units associated with the draft hood in the manner shown in Figure 1;

Figures 3, 4, and 5 illustrate a different type of draft hood and different locations for the temperature sensitive unit responsive to the spillage of flue gases through the draft hood vent, Figure 5 being a section taken along the line 5—5 of Figure 4; and

Figure 6 is a view similar to Figure 1 and illustrates a simplified form of the present invention

utilizing a bimetallic strip, rather than a fusible element.

Referring now more particularly to Figure 1, in order to illustrate the principles of the present invention I have selected a construction embodying a hot water furnace 1 serving as a house heating plant and fired by a gas burner 2 and arranged to contain a heating medium, such as water, which is directed through a supply main 3 to radiators 4 in the room or space to be heated. The cool water from the radiating system, represented by the radiators 4, is directed back to the heater 1 through a return pipe 5. The gas burner 2 is supplied with gas from a supply conduit 6 controlled by a gas valve 7 of any desired construction. Generally, such gas valves are arranged to be controlled by an electric circuit, and one well known type of gas valve which may be installed in the construction illustrated includes an electric motor which is arranged to open the valve controlling the supply of gas when a circuit through the motor is completed, the valve automatically closing when the control circuit is opened. It is to be understood, of course, that any other type of controlling means for supplying gas to the burner 2 is contemplated by the present invention. It is to be further understood that the present invention is not necessarily limited to a hot water heater nor to a burner employing gas, for other forms of fuel and other types of burners may be employed. The gas valve 7 therefore represents any form of burner controlling means and the heating plant 1 represents any type of combustion utilizing device.

In the combustion of any fuel, whether solid, liquid or gas, flue products are produced, and the disposal of these products of combustion must be taken care of in order to insure the proper and safe continuous operation of the appliance. Generally a chimney or flue is provided for all units except those of limited capacity, and the products of combustion vented therethrough. In Figure 1, the reference numeral 10 indicates a chimney and the heating plant 1 is connected thereto by means of a stack pipe 11. An automatic damper 12, which will be referred to later, may be employed and is connected so as to open and close automatically when the gas valve 7 is opened and closed. In venting the products of combustion of the burner 2 through the pipe 11 and into the chimney 10 it is essential that the plant be arranged to secure a proper disposal of the products of combustion in the event that for some reason there is no draft up the chimney or if there should occur, either temporarily or otherwise, a back- or down-draft, or if the chimney should become blocked as by something falling onto or into the chimney. It is also essential to prevent a down-draft from entering the heating plant 1, for if that should occur, the fire may be extinguished or the proper combustion of the fuel interfered with. It is also essential for proper and economical operation of the heating plant 1 to neutralize the effect of variations in the stack action of the chimney 10 upon the heating unit. Variations in stack action occur quite frequently, especially on windy and blustery days and also if there are adjacent higher buildings which under many conditions tend to create eddy currents of air and unsteady draft action in the flue.

In order to meet these conditions, draft hoods have been provided and are interposed between the heating unit and the stack. One form of

generally accepted draft hood is illustrated in Figure 1. The draft hood, indicated by the reference numeral 15, is arranged for interposition in a horizontal stack pipe, such as 11, and includes generally horizontal cylindrical portion 16 and a downwardly directed section 17 open at its lower end, as at 18, and in full communication with the horizontal cylindrical section 16. A baffle 19 is placed transversely of the portion 16 in the position shown in Figure 1.

In operation, the effect of the draft hood 15 is, in the first place, to provide for the inlet of air from the zone surrounding the furnace 1 into the stack 10 so as to take care of excessive draft requirements without drawing excessive amounts of air through the heating plant 1. In the second place, when a down-draft through the chimney 10 occurs, the air pressure is relieved by an air movement outwardly through the spillage opening 18 in the portion 17 in the general direction indicated by the broken arrow in the right hand portion of the draft hood, and the further effect of the draft hood 15 is, under these conditions, to vent the heating plant 1, thereby providing for the flow of the products of combustion outwardly into the basement or space surrounding the heating plant 1 in the general direction of the solid line arrow. Draft hoods, such as the one indicated at 15, are so designed that the burner 2 will operate properly and efficiently even though the products of combustion are for a time vented in the manner just indicated. Also, if there should be no draft at all in the chimney 10 the products of combustion from the burner 2 will be vented downwardly through the spillage opening in the portion 17 in the general direction of the third arrow shown in Figure 1.

While draft hoods of the type just mentioned serve very satisfactorily to protect the heating plant from temporary conditions in the nature of draft variations and the like, by momentarily spilling the products of combustion into the basement or space surrounding the heating appliance, continued operation in this fashion is objectionable. In the first place, the purpose of the draft hood is to prevent variations in the draft from affecting the complete combustion of the fuel, where ordinarily, without a draft hood, diminution of stack action would result in incomplete combustion and the possible formation of dangerous carbon monoxide, and by spilling the products of combustion through the draft hood 10, the complete combustion of the heating appliance is, at least, temporarily, not affected. However, most heating plants are in most cases installed in places, such as a basement, where space is limited, and therefore, even though the draft hood operates properly, if the products of combustion continue to be spilled into the basement, which forms the source of supply of oxygen for the burner, a condition may arise in which combustion is no longer complete and the formation of dangerous carbon monoxide is begun, even though the prevention of this condition is one of the primary objects of the draft hood.

Recognizing, therefore, that the escape of products of combustion through the vent opening of the draft hood is an indication of abnormal conditions and that the continuous escape of the products, especially in the large installations, under these conditions is undesirable and dangerous, the present invention contemplates so controlling the operation of the burner that if the products of combustion are spilled into the basement or space surrounding the appliance for

any appreciable length of time, the appliance is shut down automatically.

Referring now to the illustrated construction shown in Figure 1, the usual controlling means for the gas burner 2 includes a transformer 20 connected with the power line L and connected through suitable leads with a room thermostat T. This unit is usually in the form of a bimetallic spring 21 carrying a contact 22 and engageable with a companion contact 23. Many forms of thermostats have been devised, one of the more simple forms embodying a small magnet 24 cooperating with the bimetallic element 21 so as to secure the desired lag or differential action as between the on and off positions of the instrument. In controlling a gas burner, for example, other instruments are usually provided, such as a limit control 26 embodying a thermally controlled pair of contacts responsive to the temperature of the heating medium in the furnace 1, and a pilot thermostat 28, also including a pair of thermally responsive contacts. The instruments T, 26 and 28 are usually arranged in series with the gas valve control unit 7 so that the latter is actuated when the room thermostat calls for heat, which occurs when the temperature falls in the space to be heated and the contacts 22 and 23 brought into engagement, provided that the contacts in the unit 26 are not separated by the temperature of the heating medium becoming excessive and, further, provided that the contacts of the unit 28 are not separated by the extinguishment of the pilot light. Now according to the principles of the present invention I provide a fourth unit 30 also arranged in series with the instruments T, 26, 28 and 7, and I dispose the same in such relation to the draft hood 15 that it is thermally responsive to the spillage of the products of combustion from the plant 1 through the vent opening 18 of the draft hood. Since these escaping products contain heat, I utilize this energy to actuate the units 30 to shut down the burner 2 by interrupting the circuit exactly in the same manner that it would be interrupted, in the first place, by either the thermostat T opening the contacts 22 and 23 or the limit control switch 26 opening its contacts.

Referring now to Figure 2, I have illustrated, somewhat diagrammatically, one form of thermally sensitive unit which has proven satisfactory in installations of the character shown in Figure 1. The essential part of the unit 30 shown in Figure 2 is a fusible element 31, usually in the nature of a globule of solder, carried on a plate or disc 32 and interposed between a heat conducting stem 33 and an electrical conducting wire 34, the latter being in some instances in the nature of a fuse link. Usually, the parts 31, 32 and 34 are carried in a removable plug 35, the latter also carrying a tensioning spring 36 which is biased to pull the wire 34 away from the solder 31 and the plate 32 whenever the latter is raised to a temperature to soften or fuse the solder. The plug 35 carries a cap 37 which seals the opening in which the spring 36 and the fuse wire 34 are disposed. The unit 30 also includes a suitable base 40, receiving current carrying conductors 41 and 42 which are adapted to be connected, respectively, with the wire 34 and the solder carrying plate 32, and a casing 43 enclosing the parts. The heat conducting stem 33 is usually made as a part of the base 40.

A unit of this type is available commercially in the open market and the present invention is not concerned with the particular details thereof.

One of the advantages which is stated to be possessed by a unit of this character is that it affords a two-fold protection. First, the link 34 fuses under a current overload, and if an abnormal temperature rise should occur, the solder 31 softens, permitting the spring 36 to pull the wire 34 away from the plate 32, thereby interrupting the circuit from the conductors 41 and 34 to the disc 32 and the conductor 42. However, so far as the present invention is concerned, the fusible part 31 is the part relied upon to interrupt the controlling circuit for the gas control valve 7 under conditions in which the flue gases are spilled through the draft-hood vent. To this end, I preferably provide a heat collecting element in the form of a plate 44 and mount the same on the heat conducting stem 33. In installations involving a horizontal draft hood 15, I may provide two of such units, serially connected as shown in Figure 1, each with its heat collecting element 44 in a position to be heated by the products of combustion escaping through the draft hood vent 18.

The principal advantage of providing two of such units, serially arranged and serving, in effect, as one protective device, is that protection against the two principal abnormal conditions referred to above is automatically secured, namely, the condition of a blocked chimney, in which the flue gases from the appliance 1 pass out through the draft hood vent in a general direction corresponding to the broken line arrow, and a condition in which a down-draft occurs, in which case the products of combustion spill out through the draft hood vent in a general direction of the solid line arrow. By thus disposing a unit in each of these positions, the gas valve 7 is closed by either of the units 30 interrupting the control circuit upon the continuance of the abnormal condition for a length of time sufficient to soften or fuse the solder element 31.

It is important in this connection to note that, in the first place, a protective unit of this type is in many instances not called upon to function very often. In fact, a protective unit, such as 30, may remain in position in any one installation for several years before a serious and long continued down-draft or a blocked chimney occurs, yet even under these conditions it is essential, if the unit is to actually be a protecting unit, that it shall operate promptly to cut off the burner. To this end, the unit shown in Figure 2 also has the advantage of providing a thermally sensitive element thereof, namely, the solder 31, sealed against contamination and deterioration by the cap 37, and also by the cover or casing 43. Therefore, these parts are removed from the deleterious effects of dust, gases and the like in the atmosphere and therefore are enabled to remain in inactive position over a long period of time and yet be fully responsive to interrupt the control circuit whenever the spillage of flue gases reaches the abnormal degree to which the device is in the first instance arranged to be responsive.

In Figure 3 I have shown how the instrument 30 may be installed on a vertical draft hood. In this figure the heating plant 1 has been shown as provided with a vertical stack pipe 50, and the draft hood for a vertical stack pipe includes a two part conical section 52 provided on its interior with a conical baffle 53 secured to the casing 52 by a plurality, usually three, supports 54, the lower portions of which are adapted to be connected with the upper end of the furnace section of the stack pipe 50. In a draft hood of this

type, under both down-draft and blocked chimney conditions, the flue gases spill out in a direction corresponding to the arrows shown in Figure 3, and in this case the thermal sensitive unit 30 is mounted with its heat collecting member 44 in the position shown in Figure 3, the member 44 being directly in the path of movement of the vented flue gases. The thermal unit shown in Figure 3 is installed in a control circuit of the type shown in Figure 1 and operates in substantially the same manner as the units 30 shown in Figure 1. As shown in Figures 4 and 5, the whole of the unit 30, including the casing thereof, may be mounted on one of the supports 54. It will be understood that the remainder of the system not shown in Figures 3, 4, and 5 is the same as in Figure 1.

A control circuit embodying a thermally sensitive element responsive to the spillage of flue gases, with the thermally responsive element in the nature of a member softened or fused by the heat of the flue gases, is not the only way in which the principles of the present invention may be embodied. For example, a unit 30a including a thermally sensitive member in the form of a simple bimetallic spring or strip 60, shown in Figure 6, may be mounted on the draft hood and if desired the bimetallic member may be sealed in a container 61 against contamination by dust, dirt and the like. The unit 30a may also be provided with suitable means for collecting and transmitting heat from the flue gases so as to operate the bimetallic member 61. The temperature responsive member 60 of the unit 30a is preferably a bimetallic element carrying at one end a contact 62 engageable with a contact 63, these contacts being arranged in serial relation with respect to the other instruments T, 26 and 28, as set forth in more detail in connection with Figure 1. If desired, the unit 30a may be provided with a magnet or some other lag producing means so that it will not be operated by momentary spillage, but the unit should be designed to open the control circuit if the flue gas spillage should continue for any appreciable length or dangerous lengths of time. As soon as the flue gas spillage or products of combustion cease to flow out of the draft hood or vent 52, the bimetallic spring or strip 60 begins to return to its normal position due to the decrease in temperature to which it is subjected. The flow outwardly of the products of combustion is replaced by the flow inwardly of air which serves to reduce this temperature. As soon as the contacts 62 and 63 are closed, the circuit to the winding of the electrically operated valve 7 is reestablished and the flow of gas to the burner 2 is again permitted. The gas will be ignited by the pilot flame, to which the pilot thermostat 28 is responsive, and which, as is the customary practice, operates independently of the valve 7.

There will be an inherent time delay in the operation of the bimetallic spring or strip 60 to its alternate operating position. This results from the time required to change its temperature, and it may be augmented in either direction by the provision of lag producing means, such as the magnet 24 shown in connection with the room thermostat T in Figures 1 and 6.

Figure 1 also illustrates the present invention as embodied in a heating plant provided with an automatic damper, as indicated at 12, for closing off communication between the heating plant and the chimney whenever the burner is shut off. Generally, the means for operating the damper

12 is associated with the burner control so that whenever the burner is turned on, the damper is automatically opened. In some cases the pressure of the gas when the gas valve is opened is relied upon for opening the damper, and in other installations suitable electrical means are employed. Automatic dampers of this type are subject to the objection that in the event of the failure of the operating mechanism to open the damper when the burner is started up, all of the products of combustion will be spilled into the basement. The present invention is admirably adapted for installations employing automatic dampers, for the spillage of the flue gases through the vent of the draft hood will cause the thermally sensitive unit to shut off the burner if the spillage of flue gases continues for an appreciable length of time. Referring now to Figure 1, the reference numeral 70 indicates the casing of the automatic damper 12 in which a swingable mounted damper member 71 is pivoted for rocking movement on shaft or trunnion means 72. An arm 73 is connected to swing the damper 71 from one position to another, and associated with the arm 73 is operating mechanism 74 of any desired character. To illustrate the principles, I have shown a pressure responsive cell 75 having a flexible diaphragm 76 operatively connected with the arm 73 by means of a link 77. A gas conduit 78 leads from the cell 75 to the gas supply at one side of the gas valve so that whenever the gas valve is turned on, the pressure of the gas acts against the diaphragm 76 and causes the link 77 to swing the arm 73 and the damper 71, thereby opening communication between the heating plant 1 and the chimney 10.

In operation, the arrangement shuts off the burner if the same should be started up with the damper 71 in its closed position and the operating mechanism fails to shift the same to its open position. To illustrate, if the damper 71 remains closed and the burner 2 is started up, the flue gases will escape through the vent opening 18, but in doing so one or both of the units 30 will be actuated and will interrupt the control circuit leading to the gas burner. Interrupting the circuit, as explained above, serves to shut off the supply of gas. Thus, the present invention makes it possible to employ automatic dampers without running the risk of having all of the products of combustion spilled into the basement in the event that the automatic damper should fail to open.

While I have shown two forms of thermally sensitive units disposed in thermal relation with respect to the means providing for the venting of flue gases in the event of downdraft, flue stoppage or closed damper conditions and the like, it is to be understood that any other suitable type of temperature sensitive means may be provided, such as, for example, a mercury switch, and it is also to be noted that this latter type of unit also has the advantage of being sealed against the deterioration so as to remain operative after an inactive period of several months or years.

Thus, it is to be understood that the present invention is not to be limited to the specific details shown and described above, but that, in fact, widely different means may be employed in the practice of the broader aspects of my invention.

What I claim, therefore, and desire to secure by Letters Patent is:

1. A system for controlling the operation of a heating appliance comprising, in combination, a burner, a stack for conducting the products of

combustion from said burner to a chimney, a vent in said stack through which the products of combustion from said burner and the gas from said chimney may pass along different paths on occurrence of abnormal conditions, a valve for controlling the flow of fuel to said burner, an electric controller for said valve, circuit means for connecting said controller to a current source, and a pair of serially connected temperature responsive contact devices individually disposed in said paths through said vent and interposed in said circuit means for controlling the energization of said controller to effect closure of said valve on flow either of the products of combustion or gas from the chimney through said vent.

2. A heating plant comprising a fuel control device and means for conducting products of combustion from the heating plant, said means having an atmospheric vent opening, in combination with means responsive to flow of said products of combustion through said opening for actuating said device to shut off the supply of fuel and responsive to admission of air through said opening to actuate said device to establish the supply of fuel.

3. A heating plant comprising a fuel control device and means for conducting products of combustion from the heating plant, said means having an atmospheric vent opening, in combination with means responsive to the temperature of said products of combustion flowing through said opening for actuating said device to shut off the supply of fuel and responsive to the temperature of air flowing through said opening to actuate said device to establish the supply of fuel.

4. A heating plant for burning fluid fuel comprising a fuel control valve and means for conducting products of combustion from the heating plant, said means being formed with an atmospheric vent opening, in combination with means responsive to flow of said products of combustion through said opening to close said fuel valve and responsive to flow of air through said opening to open said valve and a pilot burner operating independently of said valve.

5. A heating plant for burning fluid fuel comprising a fuel control valve and means for conducting products of combustion from the heating plant, said means being formed with an atmospheric vent opening, in combination with means responsive to the temperature of said products of combustion flowing through said opening to close said fuel valve and responsive to the temperature of air flowing through said opening to open said valve and a pilot burner operating independently of said valve.

6. A heating plant comprising a fuel control device and means for conducting products of combustion from the heating plant, said means having an atmospheric vent opening, in combination with delayed action means responsive to the temperature created by the flow of said products of combustion through said opening for a predetermined time to actuate said device to shut off the supply of fuel and responsive to the temperature created by the flow of air through said opening for a predetermined time to actuate said device to establish the supply of fuel.

7. A heating plant comprising a fuel control device and a flue for conducting the products of combustion from the heating plant, said flue having an atmospheric vent opening therein, in combination with a thermostat in said vent opening and movable to a first position in response to flow of said products of combustion through

the opening and to a second position in response to the flow of air therethrough, and means controlled by the thermostat to actuate said control device to shut off the supply of fuel when the thermostat is in said first position and to actuate said device to establish the supply of fuel when said thermostat is in its second position.

8. In heating apparatus fired with fluid fuel, a heating unit having a flue extending therefrom provided with a draft hood, a valve controlling the supply of fuel to the heating unit, electrical means including a circuit for controlling the valve, an automatic flue damper which is normally closed and opened concurrently with the closing and opening of the valve, and means comprising a thermally responsive element adjacent the draft hood for causing the closure of the valve if the heating unit is operated following the opening of the valve and the damper fails to open.

9. In a gas-fired heating apparatus, a heating unit having a flue extending therefrom and provided with a draft hood, a fuel supply pipe having a valve, electrical means and a circuit therefor for controlling the valve, a flue damper in the flue beyond the draft hood, means for opening and closing the damper concurrently with the opening and closing of the valve, and a fuse in said circuit adjacent the draft hood and adapted to be blown if the flow of the products of combustion through the flue is prevented by the failure of the damper to open when the valve is opened.

10. Control means for a heating appliance having a burner, a stack for conducting the products of combustion from said burner to a chimney, a vent in said stack through which the products of combustion from said burner and the gas from said chimney may pass along different paths on occurrence of abnormal conditions, and a valve for controlling the flow of fuel to said burner, said control means comprising an electric controller for said valve, circuit means for connecting said controller to a current source, and a pair of serially connected temperature responsive contact devices individually disposed in said paths through said vent and interposed in said circuit means for actuating said controller to effect closure of said valve on flow either of the products of combustion or gas from the chimney through said vent.

11. Control means for a heating appliance having a burner, a stack for connecting the products of combustion from said burner to a chimney, a vent in said stack through which the products of combustion from said burner may pass along one or the other of two paths upon the occurrence of abnormal draft conditions, and a valve for controlling the flow of fuel to said burner, said control means comprising an electric controller for said valve, circuit means for connecting said controller to a current source, and a pair of serially connected temperature responsive contact devices individually disposed in said paths through said vent and interposed in said circuit means for controlling the energization of said controller to effect closure of said valve on flow of the products of combustion along either of said paths.

12. A system for controlling the operation of a heating appliance comprising, in combination, a burner, a stack for conducting the products of combustion from said burner, to a chimney, a vent in said stack through which the products of combustion from said burner and the gas from said chimney may pass along at least two differ-

ent paths on occurrence of abnormal conditions, a valve for controlling the flow of fuel to said burner, at least two temperature responsive devices disposed, respectively, in said paths, each
5 device responding to a flow of the products of combustion along the path in which the device is disposed, and connections between said devices and said burner whereby said valve is closed upon a flow of the products of combustion in
10 any one of the paths in which said devices are respectively disposed.

13. A system for automatically controlling the operation of a heating appliance, comprising, in combination, a burner, a valve for controlling the flow of fuel to said burner, an electric controller for said valve, circuit means for con-

necting said controller to a current source, a thermostatic unit interposed in said circuit means and including a thermally responsive element disposed in thermal relation to the flow of the products of combustion on diversion thereof from the
5 normal path and operative to actuate said controller for effecting closure of said valve to shut off the flow of fuel to said burner, and a pilot thermostat including a pair of contacts also disposed in said circuit means in series relation
10 with said thermostatic unit and operative to prevent a restoration of fuel flow through said valve after an interruption due to a diversion of the products of combustion, unless the pilot is burning.
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EARL L. TORNQUIST.