

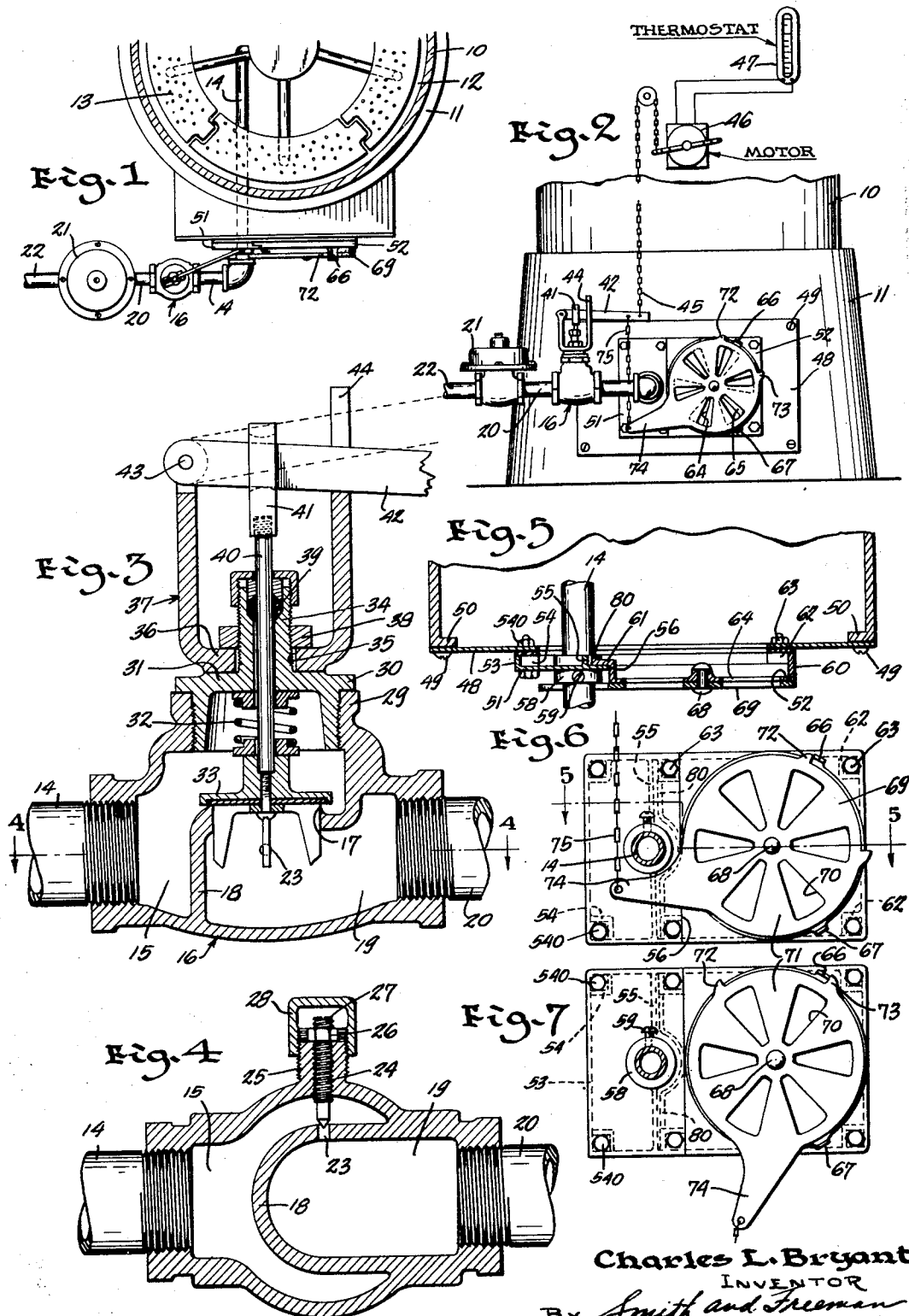
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CONTROL DEVICE FOR HEATERS

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CONTROL DEVICE FOR HEATERS

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This invention relates to control devices for heaters and has for an object the provision of new and improved devices of this character.

In the drawing accompanying this specification and forming a part of this application, I have shown, for purposes of illustration, one form which my invention may assume, and in the drawing:

Figure 1 is a fragmentary horizontal sectional view through a furnace, disclosing a plan view of an embodiment of the invention,

Figure 2 is a fragmentary, partially diagrammatic, front elevational view of said embodiment, showing the air control shutter in partially open condition,

Figure 3 is an enlarged fragmentary vertical sectional view of a control valve utilized in connection with said embodiment,

Figure 4 is a fragmentary horizontal sectional view corresponding to the line 4—4 of Figure 3,

Figure 5 is a horizontal sectional view corresponding to the line 5—5 of Figure 6,

Figure 6 is a fragmentary front elevational view of the air control shutter mechanism illustrating the shutter in fully opened condition, while

Figure 7 is a view similar to Figure 6, and illustrating the air control shutter mechanism in still another position.

The embodiment of the invention, as shown, comprises a furnace 10 having a fire-box 11 defining a combustion chamber 12, in which is positioned a burner 13, supplied with gas through a pipe 14 extending outwardly through the forward end of the fire-box 11, and communicating with an outlet chamber 15 of valve means 16, through a valve seat opening 17 in a separating partition 18, with an inlet chamber 19 of the valve means 16, thence with a pipe 20 and pressure regulator 21, the latter having a pipe 22 leading to a source of gas supply. The separating partition 18 of the valve means, in addition to the valve seat opening 17, is also provided with a by-pass opening 23 affording communication between the chambers 15 and 19 of the valve means 16, regulated in size by a needle valve 24 tapped through a boss 25, secured by a locking nut 26 and having a notched end 27, by means of which the needle valve 24 may be adjusted, the notched end of the needle valve 24 preferably being covered by a cap 28.

The casing of the valve means 16 is provided with a threaded boss 29 adapted for the threaded reception of a fitting 30, the wall 31 of which serves as an abutment for one end of a spring 32 bearing upon a valve 33 normally closing the valve seat 17 between the chambers 15 and 19

of the valve means 16, said fitting 30 having an upstanding threaded boss 34, projecting through an opening 35 in the bottom wall 36 of a bracket 37, with a nut 38 threaded thereon for securing the bracket 37 in position, also having a stuffing box 39 through which extends a valve stem 40, connected at its lower end to the valve 33, and secured at its upper end to a looped portion 41, through which is loosely extended a lever 42 pivoted at 43 to an upstanding side portion of the bracket 37, thence extending between furcations 44 carried by said bracket 37.

Secured to the outer end of the lever 42 are actuating means comprising a flexible member 45 secured to an operating motor 46 of a well known type, adapted to be controlled by a thermostat 47, also of a well known type, which may be located at some distance from the furnace and in the compartment to be heated.

Cooperating with the valve control means and with the fire-box 11 of the furnace is a safety air control mechanism, comprising a closure 48 secured along its edges by screw-bolts 49 to flanges 50 at the forward position of said fire-box 11, and the closure 48 has a rectangular opening closed by a pair of cooperating plates 51 and 52, the former having a flange 53 extending toward the closure 48, and angular connecting webs 54, within which bolts 540 extend to secure the corners of the plate 51 to the closure 48, and a reinforcing rib 55 disposed inwardly of the free edge 56, and connected with a boss 58 surrounding a hole through which the pipe 14 extends, and the boss 58 has a set screw 59 extending therethrough, clamping the plate 51 to the pipe 14. The plate 52 closes the remaining portion of the opening of the closure 48, has a flange 60 extending toward the closure 48, has an offset edge 61 fitting beneath the free edge of the plate 51, has connecting webs 62 within which extend bolts 63 which secure the plate 52 to the closure 48, and has a rib 80 adjacent its forward edge curved to clear the boss 58.

The plate 52 is also provided with radially disposed openings 64, separated by radially extending webs 65, and is further provided with stops 66 and 67. Rotatably carried by the plate 52, by means of a bolt 68 is a rotatable or oscillatable shutter 69 having openings 70 and webs 71 corresponding in position to the openings 64 and webs 65 of the plate 52, and said shutter 69 is further provided with a projection 72 adapted to cooperate with the stop 66, and a projection 73 also adapted to cooperate with the stop 66, and is further provided with a weighted extension

lever 74, connected by a flexible connection 75 to the outer end of the lever 42, the connection 75, with the valve 33 closed, being of such length as to hold the shutter 69 in such position as to place the webs 71 of the shutter in line with the openings 64 of the plate 51 and hence close off admission of air to the fire-box 11.

It will be noted that the air control mechanism is applied to a furnace in which the pipe 14 is disposed at the left-hand side of the fire-box 11; yet the control mechanism is equally adaptable for use in a furnace wherein the pipe 14 is disposed at the right-hand side of the fire-box 11. In the latter case the two plates 51 and 52 would be bodily rotated through 180° from the position shown in Figure 6, for instance, and the shutter 69 reversed and adjusted to cooperate with the stop 67 instead of the stop 66, thus obtaining the same relative disposition of the parts as heretofore described.

In operation, assuming the valve 33 to be tightly engaging the seat 17, no gas will pass to the burner 13 except a minute quantity which escapes through the needle valve controlled by-pass opening 23, such quantity of gas being sufficient to maintain a pilot flame at the burner 13, thus serving in the manner of a pilot burner, and the burner 13 at all times will have a sufficient supply of gas to maintain a pilot flame, even though the main valve opening 17 be entirely closed by the valve 33. The amount of gas thus supplied through the by-pass opening 23 may be nicely regulated by adjustment of the needle valve 24. During this condition of the fuel supply means the shutter 69 will be entirely closed, as will be understood.

When the temperature in the compartment to be heated drops below a predetermined limit, the thermostat 47 is affected, causing actuation of the motor 46, thereby lifting the lever 42, operating the shutter 69 to open the same, raising the valve head 33, and permitting flow of gas at full pressure through the valve means 16, through the pipe 14, to the burner 13, and the gas is ignited at the burner 13 due to the presence of the pilot flame supplied by the small quantity of gas passing through the by-pass opening. Opening movement of the shutter 69 is limited by the stop 66, yet permits full opening of the shutter, and in this position the required amount of air will be supplied to obtain the best results. When the temperature again rises in the compartment heated, so as to affect the thermostat 47, operation of the motor 46 takes place in a reverse direction, the valve 33 and the shutter 69 move to fully closed position, yet a restricted quantity of gas is supplied to the burner 13 through the by-pass opening 23 so as to maintain combustion until the full pressure of gas is again required.

It will be observed that when the valve 33 is fully closed, and the shutter 69 fully closed, that the projection 73 will not have reached the stop 66, and this feature is of great importance, since if the connection should happen to break, or accidentally become disconnected, the shutter 69 is free to drop to fully open position, such as shown in Figure 7, before the projection 73 reaches engagement with the stop 66, and by reason of such engagement the shutter is held in fully open position; hence should breakage or accidental disconnection occur, the shutter will automatically assume its fully opened condition, regardless of the continued operation of the gas control means, and will supply sufficient air to obtain proper combustion, and will prevent

development of dangerous carbon monoxide and disagreeable gases incident to incomplete combustion which would occur if the shutter should accidentally be allowed to remain in its closed condition during combustion. Thus the apparatus will be found to comply fully with laws or proposed laws relating to safety requirements in apparatus of this character.

It will be apparent to those skilled in the art that the embodiment of the invention herein described accomplishes at least the principal object of my invention, and it will also be apparent that uses and advantages other than those herein referred to are inherent in the construction; it will further be understood that various changes and modifications may be made without departing from the spirit of the invention; consequently it will be understood that the embodiment herein disclosed is illustrative only and the invention is not limited thereto.

I claim:

1. A control device of the character described having air inlet means, and movable means movable to a first open or partially open position to admit air, movable to a closed position to exclude air, and movable also to a different open position also to admit air, said movable means being normally urged to assume said different open position.

2. A control device of the character described having air inlet means, and movable means movable to a first open or partially open position to admit air, movable to a closed position to exclude air, and movable also to a different open position also to admit air, said movable means being operable normally to assume a fully opened condition at said different open position.

3. A control device of the character described having air inlet means, and movable means movable to a first open or partially open position to admit air, movable to a closed position to exclude air, and movable also to a different open position also to admit air, regulating mechanism connected to said movable means for regulating movement thereof within the range of said first open and closed positions, said movable means being normally urged to assume said different open position in event of disconnection from said regulating means.

4. A device of the character described comprising: fuel inlet means, air inlet means having movable means movable to a first open position to admit air, movable to a closed position to cut off air, and movable to a different open position to also admit air, and regulating mechanism common to said fuel inlet means and to said movable means for automatically regulating said fuel inlet means and for moving said movable means within the range of said first open position and said closed position; said movable means being operable to automatically assume said different open position in event of disconnection from said regulating mechanism.

5. In a furnace, the combination with a fire chamber having an opening, a burner in said chamber, fuel inlet means having a pipe extending through said opening, and a closure for said opening comprising a plate secured to said pipe and to said furnace, and another plate interengaged with said first plate, secured to said furnace, and carrying air inlet means for admitting air to said fire chamber, said latter plate being engageable and detachable independently of said first plate.

6. In a furnace, the combination with a fire

chamber having an opening, a burner in said chamber, fuel inlet means having a pipe extending through said opening, and a closure for said opening comprising a plate secured to said pipe and to said furnace, and another plate interengaged with said first plate secured to said furnace, and carrying air inlet means for admitting air to said fire chamber, said latter plate being engageable and detachable independently of said first plate; said plates and said air inlet means being reversible depending upon which side of said fire chamber said pipe may be placed.

7. A device of the character described comprising: fuel inlet means, air inlet means having pivoted means rotatable to a first open position to admit air, rotatable to a closed position to cut off air, and rotatable to a different open position to also admit air, regulating mechanism common to said fuel inlet means and to said pivoted means for automatically regulating said fuel inlet means and for moving said pivoted means within the range of said first open position and said closed position, said pivoted means being overbalanced relative to the pivot thereof to automatically assume said different open position under the influence of gravity in event of disconnection from said regulating mechanism.

8. A control device of the character described, comprising: a burner; a valve for controlling the supply of fluid fuel to said burner; a valve for controlling the supply of air to said burner; and means for automatically operating said valves in accordance with the temperature of a selected locality heated by said burner, said fuel control valve being normally urged toward a closed position and said air control valve being normally urged toward an open position, whereby said fuel control valve will close and said air control valve will open in the event of their disconnection from said operating means.

9. A control device of the character described, comprising: a burner; a valve for controlling the supply of fluid fuel to said burner; a valve for controlling the supply of air to said burner; common means for automatically operating both of said valves in accordance with the temperature of a selected locality heated by said burner, said fuel control valve being normally urged by gravity toward a closed position and said air control valve also being normally urged by gravity toward an open position, whereby said fuel control valve will close and said air control valve will open in the event of their disconnection from said operating means.

10. A control device of the character described, comprising: a furnace provided with a burner; a valve for controlling the supply of fluid fuel to said burner; a valve for controlling the supply of air to said burner; a motor; means for operatively connecting said motor to said valves; a thermostat adapted to be located in a room heated by said furnace for controlling the operation of said motor to open and close said valves in accordance with the temperature of said room; and means for closing said fuel control valve and for opening said air control valve in the event that the connection between said motor and said valves should break.

11. A device of the character described, comprising: fuel inlet means; air inlet means having movable means movable to a first open position to admit air, movable to a closed position to cut off air, and movable to a different open position to also admit air; regulating mechanism

common to said fuel inlet means and to said movable means for automatically regulating said fuel inlet means to respectively open and close said fuel inlet means when said movable means are in said first open position and said closed position; said movable means being operable to automatically assume said different open position and said fuel inlet means said closed position in event of disconnection from said regulating mechanism.

12. A device of the character described, having a combustion chamber and a burner therein; conduit means for conveying gas to said burner; a valve casing interposed in said conduit means, and having a partition therein defining with said casing a fuel inlet chamber and a fuel outlet chamber, said fuel inlet chamber communicating through said conduit means for connection with a source of fuel under pressure, and said fuel outlet chamber communicating through said conduit means with said burner; valve mechanism for controlling communication between said chambers, and a valve cooperable with a valve seat in said partition and having an operating stem; a lever operatively connected with said operating stem; rotatable shutter means normally urged to closed position controlling an opening independent of said fuel conduit means and which communicates freely with the interior of said combustion chamber, said shutter means being connected with said lever for operation in unison with said valve mechanism, to admit air to said combustion chamber simultaneously with the opening of said valve mechanism and in a quantity proportional to the quantity of gas admitted; a by-pass opening through the partition in said valve casing for establishing communication between said inlet and outlet chambers independently of said valve mechanism for maintaining a pilot flame at said burner; and a needle valve mounted in said valve casing for controlling the size of said by-pass opening and thus the quantity of fuel passing through said by-pass.

13. A device of the character described, having a combustion chamber and a burner therein; conduit means for conveying gas to said burner; a valve casing interposed in said conduit means communicating on one side for connection with a source of fuel under pressure and on the other side with said burner; valve mechanism, normally urged to closed position, for controlling passage of gas through said casing, said valve mechanism having a reciprocable valve stem by movement of which said valve mechanism may be opened; a lever swingably mounted on said valve mechanism and operatively connected with said valve stem; thermostatically controlled means connected to said lever and regulating movement thereof for controlling opening and closing of said valve mechanism; rotatable shutter means, normally urged to closed position, and controlling an opening to said combustion chamber, independent of communication of said fuel conduit means with said burner, for admitting atmospheric air to said combustion chamber, said shutter means and said lever being interconnected whereby swinging movement of said lever effects rotation of said shutter means, said shutter means, said valve mechanism, and said connected lever being correlated to admit air to said combustion chamber simultaneously with opening movement of said valve and in predetermined proportion with respect to the amount of gas admitted.

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