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Mahoney

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[54] **FIREPLACE HAVING A DAMPER-FUEL GAS SUPPLY INTERLOCK**

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[52] **U.S. Cl.** **126/286**, 126/127, 126/280, 431/20

[51] **Int. Cl.** **F23l 11/02**

[58] **Field of Search** ..... 126/285 R, 286, 288, 127; 431/20; 236/45

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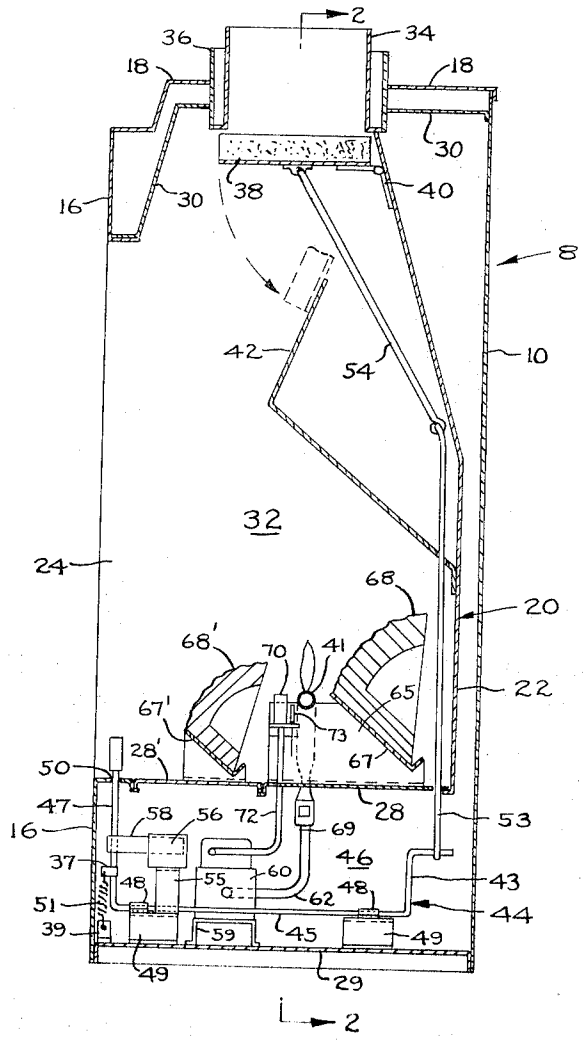
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Assistant Examiner—Ronald C. Capossela
Attorney, Agent, or Firm—Jefferson Ehrlich; Robert G. Crooks; John E. McRae

[57] **ABSTRACT**

A fireplace having a gas-fired burner extending substantially the entire transverse dimension of the firebox for producing an elongated flame zone in the space between two artificial logs. The fuel supply control means for the burner is located in a control compartment below the bottom wall of the firebox to minimize the overall width of the fireplace. Preferably the fuel supply control means is interlocked with the flue damper so that fuel gas can be delivered to the burner only when the damper is in its fully open position.

24 Claims, 6 Drawing Figures



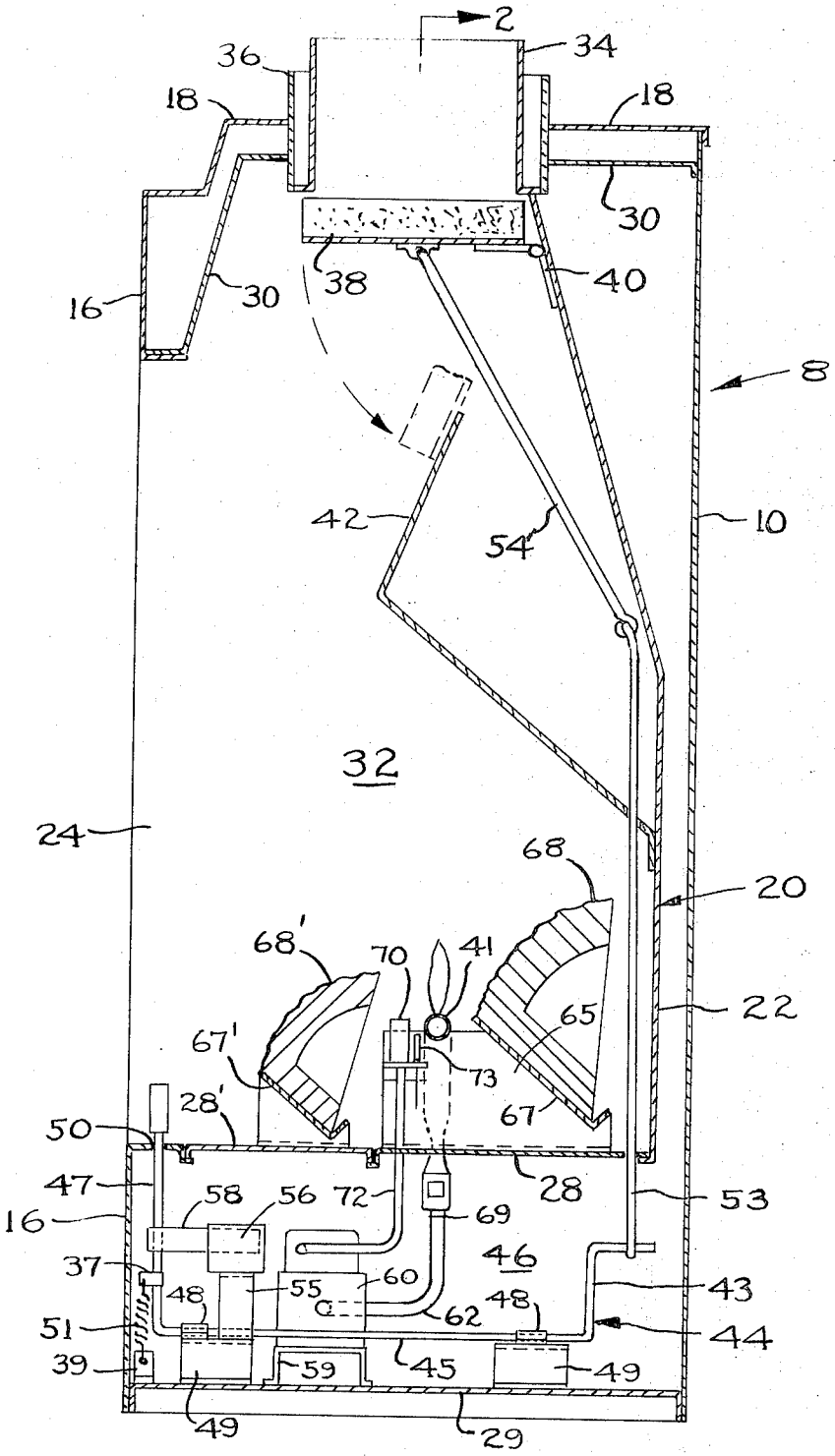

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FIG. 1

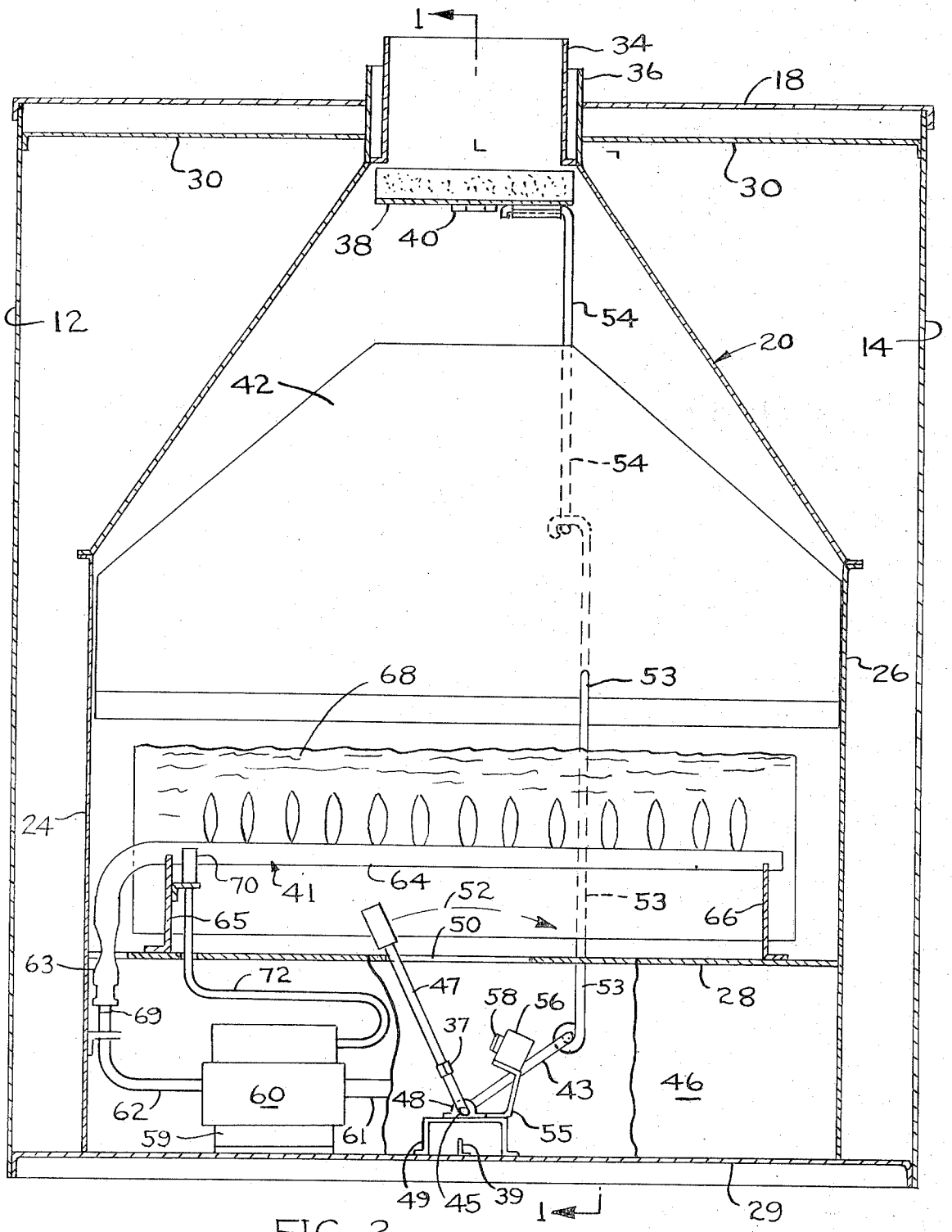

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FIG. 2

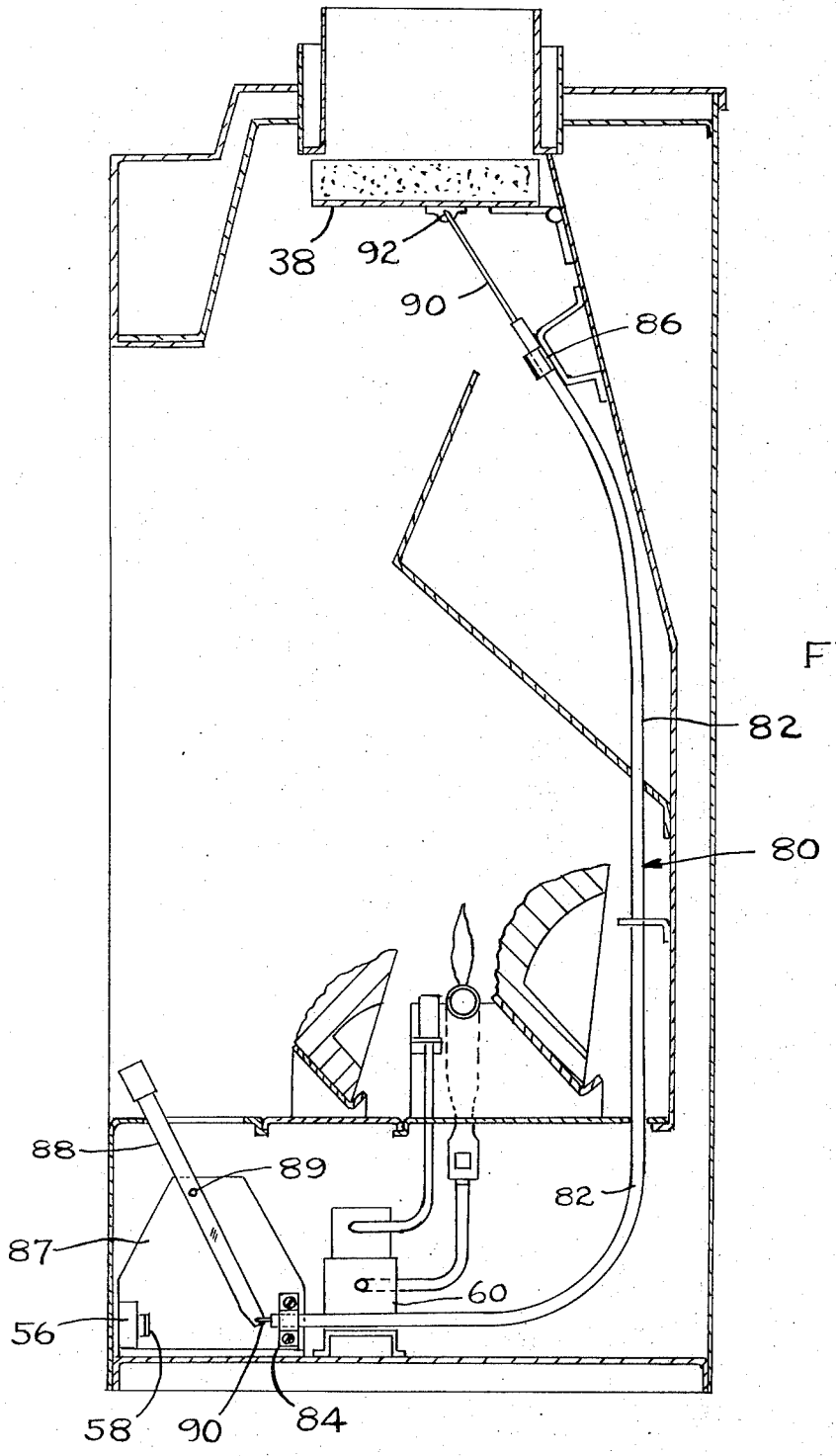


FIG. 3

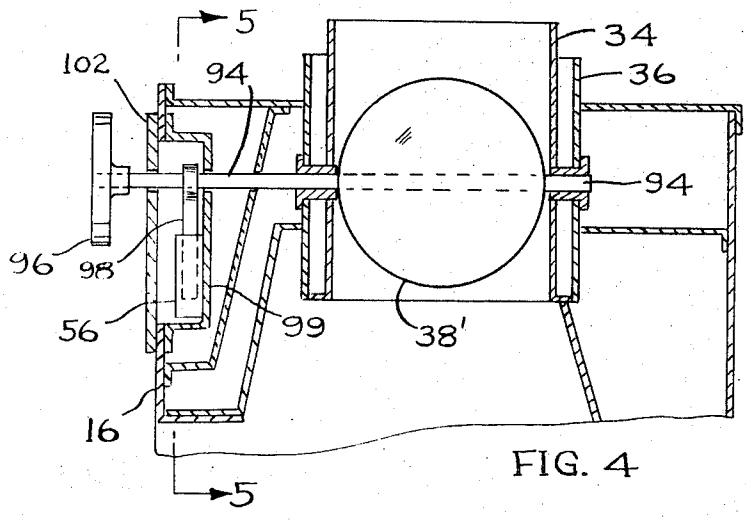


FIG. 4

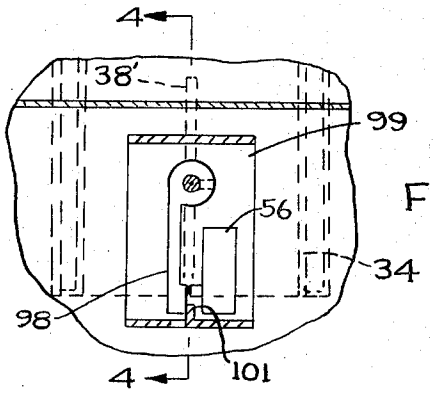


FIG. 5

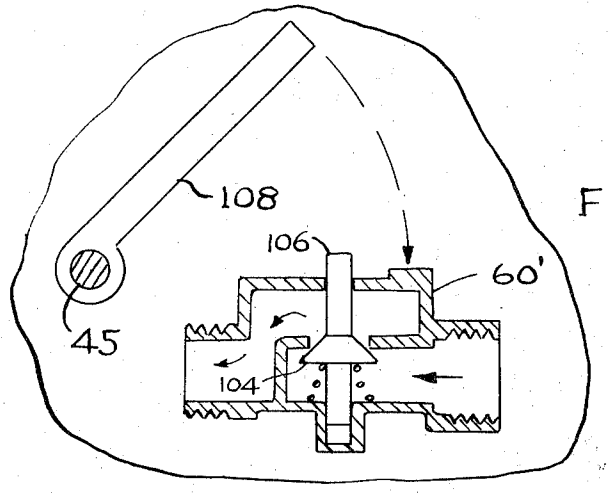


FIG. 6

FIREPLACE HAVING A DAMPER-FUEL GAS SUPPLY INTERLOCK

SUMMARY OF THE INVENTION

The invention proposes a fireplace having a ribbon type gas burner extending transversely across the firebox in the space between two artifical logs. The burner includes a downwardly extending mixer tube that receives a fuel gas spud in a subjacent control compartment. The mixer tube does not appreciably add to the length of the burner; therefore the burner can provide a flame pattern for almost the entire log length. There is very little lost space adjacent the ends of the logs so that the fireplace can be of minimum width while still providing a relatively extensive flame pattern.

Preferably the fuel gas supply valve for the burner is interlocked with the flue gas damper so that fuel gas can be supplied to the burner only when the damper is in its fully open position. The object of this arrangement is to ensure against the possibility that the products of combustion might be discharged into the room, as would otherwise be possible if the damper were inadverently left closed while the fuel gas supply valve was opened.

THE DRAWINGS

FIG. 1 is a sectional view of a fireplace embodying the invention, taken on line 1—1 in FIG. 2;

FIG. 2 is a sectional view taken on line 2—2 in FIG. 1;

FIG. 3 is a view similar to FIG. 1, but illustrating another embodiment of the invention;

FIG. 4 is a fragmentary sectional view of another embodiment of the invention, taken on line 4—4 in FIG. 5;

FIG. 5 is a sectional view taken on line 5—5 in FIG. 4;

FIG. 6 is a fragmentary view illustrating another embodiment of the invention.

The fireplace shown in FIGS. 1 and 2 comprises an outer casing 8 which includes a back panel 10, side panels 12 and 14, front panel 16, and top panel 18. The fireplace further comprises an inner firebox casing 20 which includes a back wall 22, internal side walls 24 and 26, bottom wall 28 and interior roof wall 30. The space between outer casing 8 and firebox casing 20 may be a dead air space or a glass-foam filled space for insulation purposes; alternately fans (not shown) may be positioned in said space to circulate air around the exterior surfaces of the firebox and out into the room, in the manner of conventional circulator fireplaces.

Products of combustion are exhausted from the firebox combustion space 32 through a circular cross section flue 34 located within a radiant shield tube 36. A square damper 38 is pivotally mounted below flue 34, as by means of a hinge 40, for movement between a closed position (full lines) and an open position (dotted lines). In its open position the damper rests against the upper face area of a downdraft deflector plate 42, which acts to divert downdrafts away from the subjacent burner tube 41.

Damper 38 is moved between its closed and opened positions by means of a linkage which includes a manual crank structure 44 located in a control compartment 46 formed below firebox 20; i.e., between firebox wall 28 and base pan 29. Structure 44 comprises a shaft 45 having an upwardly extending handle 47 at its forward end, and a laterally extending crank arm 43 at its rear end. The shaft is positioned in suitable bearings 48 carried on front and rear platforms or straps 49.

Handle 47 extends upwardly through a slot 50 in the bottom wall of the firebox to enable crank structure 44 to be moved manually in a vertical arc about the axis of shaft 45, as indicated by numeral 52 (FIG. 2). Arcuate movement of structure 44 causes crank arm 43 to move clockwise (FIG. 2) to move the connected link 53 downwardly. Link 53 has its upper end pivotally connected to another link 54 that connects with damper 38. Therefore, it will be seen that clockwise movement of handle 47 (FIG. 2) produces downward movement of damper 38 from its full line closed position to its dotted line open position. An overcenter tension spring 51 can be trained between a fixed anchorage 39 and an anchorage 37 on handle 47 to normally hold the linkage structure in the damper-closed position, except when handle 47 is manually moved. The spring is omitted from FIG. 2.

As shown in FIG. 2, the frontmost bracket 49 carries an auxiliary bracket arm 55 that mounts a normally open snap switch 56. The switch has an operator arm 58 that extends forwardly across the path taken by handle 47 as it moves to the damper-open position. Therefore the handle movement not only controls the damper but also the switch.

The switch is electrically connected to the solenoid portion of a conventional fuel gas supply valve 60 mounted on bracket 59 in fluid connection with a fuel gas supply line 61. The valve includes a main discharge line 62 that terminates in a spud 69 partially entering into the air-fuel gas mixer tube portion 63 of the aforementioned burner 41. As seen in FIG. 2, burner 41 is of generally L-shaped configuration; it includes an elongated horizontal burner port section 64 and the shorter vertical venturi mixer portion 63. The burner is shown resting on the upper concave edges of two widely spaced log-support brackets 65 and 66 which are suitably screwed or otherwise carried on bottom wall 28 of the firebox. The preferred arrangement is such that the L-shaped burner can be lifted off brackets 65, 66 and the subjacent fuel gas spud when necessary for clean-out purposes, inspection, repair, replacement, etc.

Brackets 65 and 66 are appropriately connected with a V-shaped cradle 67 that removably mounts an artificial log 68. A second bracket-cradle assembly is positioned forwardly from burner 41 to mount a somewhat smaller artifical log 68'. The second assembly is carried on a panel 28' that forms a removable portion of the firebox bottom wall. Removal of panel 28 furnishes access to the gas valve, switch, wiring and other mechanisms located in control compartment 46.

It will be seen from FIG. 2 that port section 64 of burner 41 occupies substantially the entire transverse dimension of the firebox between side walls 24 and 26. The burner can therefore provide flames over essentially the entire length of log 68. The fireplace can be relatively small in a transverse dimension while still providing a highly visible log fire effect. The L-shaped character of the burner, together with the disposition of the fuel supply control mechanism in a subjacent control chamber, contributes to the compact fireplace design.

Burner ignition can be accomplished by conventional mechanism, for example a standing pilot burner **70** supplied with fuel gas from supply line **72.** A conventional thermopile or fluid bulb **73** may respond to the pilot flame to directly or indirectly control the energization of gas valve **60.** Valve **60** may be a conventional gas valve of the type commonly employed in furnaces, wall heaters, ovens, etc.

If a thermopile is to be the sole source of electrical energy for the system the aforementioned switch **56** may be electrically connected in series with the valve **60** solenoid and thermopile **73,** such that the thermopile cannot energize the valve solenoid except when switch **56** is in the closed position, which happens only when damper **38** is open. If the system is to be supplied with electrical power from an external source then the thermopile or bulb **73** may be used to control a switch in the power circuit. Switch **56** may be connected in series with the power switch and the valve solenoid to make the burner ignition process dependent on the position of damper **38.**

Switch **56** may be considered as part of the fuel supply control means in that it controls gas valve **60.** Crank structure **44** may be considered as an interlock means between the damper and the fuel supply control means.

FIG. 3

The FIG. **3** structure is quite similar to the structure of FIGS. **1** and **2** except for the interconnecting mechanism between the damper and the manual control element. As shown in FIG. **3,** the interconnecting mechanism comprises a flexible connector **80** having a sleeve **82** anchored and clamped at its opposite ends, as at **84** and **86.** Clamp **84** is associated with an upstanding bracket **87** that supports manual lever **88** for arcuate movement around pivot shaft **89.** The lower end of lever **88** is connected with a wire **90** that runs within sleeve **82** to an anchorage **92** on damper **38.** It will be seen that arcuate manual movement of lever **88** in a front-to-rear plane will produce an opening or closing movement of the damper **38.**

The lower front edge area of lever **88** preferably registers with an operator arm **58** of snap switch **56,** such that when lever **88** is moved a sufficient distance to fully open damper **38** the switch is actuated from its normally open condition to its circuit closed condition. The switch may be interconnected with the electrical power supply for valve **60** in the aforementioned manner so that operation of the switch causes fuel gas to be delivered to the burner.

FIG. 4

In the FIG. **4** arrangement the flue damper consists of a butterfly damper blade **38'** carried on a pivot shaft **94** that extends forwardly into the room. A knob **96** can be manually turned to move the shaft and damper from the illustrated open position to the closed position, not shown.

Shaft **94** carries an arm **98** that engages the actuator button of switch **56** when the damper nears its full open position. Switch **56** may be mounted on any suitable support structure, as for example the illustrated strap **99** screwed or otherwise affixed to the fireplace front panel **16.** A tab **101** may be struck out of the strap to limit movement of arm **98** and thereby prevent damage to the switch.

Suitable wiring, not shown, would interconnect switch **56** with the gas valve located in the control compartment beneath or adjacent the firebox. Access to switch **56** may be had through an escutcheon **102** screwed or clipped onto the fireplace front panel. Operationally the FIG. **4** device would function in the same fashion as the earlier described structures.

Switch **56** may be viewed as an interlock means between the damper and gas supply means in that it locks out the valve at all times other than when the damper is in the full open position.

FIG. 6

FIG. **6** fragmentarily illustrates an embodiment of the invention wherein the fuel gas supply valve is actuated by mechanical means rather than electrical means. As shown, the gas valve **60'** includes a poppet valve element **104** whose shaft **106** extends out of the valve casing into registery with an arm **108** carried by shaft **45.**

Shaft **45** would correspond with the similarly numbered shaft shown in FIGS. **1** and **2.** Thus, the shaft would in practice form part of a manually-operated crank structure **44.** As shown in FIG. **6,** manual rotation of the crank structure to the damper-open position would be accompanied by a downward movement of shaft **106** and a consequent opening of the poppet **104.** The gas burner would thereby be supplied with fuel for ignition from the adjacent pilot flame or other ignition device.

With the FIG. **6** arrangement it would be necessary to position a second thermocouple-energized solenoid valve in series flow connection with gas valve **60'.** The second valve would function as a safety to prevent delivery of fuel gas to the main burner if the pilot flame were extinguished.

FEATURES OF THE INVENTION

An important feature of the invention is believed to be the L-shaped construction of burner **41,** whereby the air-fuel gas mixer tube **63** extends vertically rather than horizontally. With this arrangement the mixer tube can perform its function without increasing the total length of the burner beyond the dimensions of the firebox and/or without necessitating an increase in the firebox width.

Another important feature of the invention is believed to be the disposition of the control compartment **46** directly below the firebox. With such an arrangement the control components are accessible (through panel **28'**) while still being concealed from view. Further, the control compartment does not add to the overall width or depth of the fireplace, and the fireplace can therefore be installed in relatively restricted spaces.

In the illustrated arrangements the burner is turned on or off by movement of a conveniently accessible handle, knob or similar element. In the arrangements of FIGS. **1, 3** and **6** the handle is located on the hearth. In the FIG. **4** arrangement the knob is located above the fireplace opening. In each case the element is in a readily accessible location where the user is in no danger of burning himself during the turn-off or turn-on operations.

A common feature of the various illustrated embodiments is the interlock between the damper and fuel gas supply means. In the FIG. **1** structure the interlock

comprises handle **47** and switch operator **58.** In the FIG. **4** structure the interlock consists of the actuator arm **98.** In the FIG. **6** construction the interlock take the form of a lever **108.**

The damper-gas valve interlock is advantageous in preventing outrush of combustion products into the room, as would otherwise be possible if the damper were permitted to be closed while the burner was in operation.

I claim:

1. A fireplace comprising a firebox, a fuel gas burner located in the firebox; a control compartment located below the firebox; fuel supply control means including a solenoid located in the control compartment; a flue extending upwardly from the firebox for exhausting combustion products therefrom; a damper arranged to open and close the flue; manual control means for moving the damper between its opened and closed positions; said burner being an L-shaped ribbon type burner having a burner port section extending horizontally across the firebox for substantially its entire transverse dimension, said burner including a mixer tube extending downwardly in the direction of the control compartment near one sidewall of the firebox; said fuel supply control means including a fuel gas spud extending upwardly to the mixer tube to supply same with fuel, and means responsive to the opening of the damper to actuate the solenoid to allow fuel to be supplied to said burner.

2. The fireplace of claim **1** wherein the L-shaped burner is removably supported within the firebox so that it can be lifted away from the fuel gas spud.

3. The fireplace of claim **1** wherein the forward section of the firebox bottom wall is removable for access to the control compartment.

4. The fireplace of claim **1** and further comprising means interlocking the damper and the solenoid of said fuel supply control means so that fuel is delivered to the burner only when the damper is in its open position.

5. The fireplace of claim **4** wherein the damper is moved to and from its open position by means of a crank structure fulcrumed in the control compartment for movement in a vertical arc; said crank structure including a horizontal shaft extending in a front-to-rear direction, a handle extending upwardly from the shaft through a forward section of the firebox bottom wall, and a crank arm extending from the shaft adjacent the firebox rear wall.

6. The fireplace of claim **4** wherein the damper is carried on a pivot shaft that extends forwardly from the flue into the room; said interlocking means comprising an electric switch disposed in front of the flue for actuation by the shaft as the damper moves to and from its open position.

7. The fireplace of claim **4** wherein the damper control means includes a manual lever fulcrumed in the control compartment for movement in a vertical arc; said lever extending upwardly through a slot in the bottom wall of the firebox to provide an exposed actuator handle.

8. The fireplace of claim **7** wherein the fuel supply control means comprises an electrically-controlled gas valve, and an electric switch operable to open and close said valve; the aforementioned lever having a mechanical connection with said switch to operate same as it undergoes the aforementioned arcuate movement.

9. A fireplace comprising a firebox; a fuel burner located in the firebox; a control compartment located below the firebox; fuel supply control means including a solenoid valve located in the control compartment; a flue extending upwardly from the firebox for exhausting combustion products therefrom; a damper arranged to open and close the flue; manual control means for moving the damper between its opened and closed positions; and means for coupling the damper with the solenoid valve of said fuel supply means so that, in response to the movement of the damper, fuel is delivered to the burner only when the damper is in its open position.

10. The fireplace of claim **9** wherein the damper is moved to and from its open position by means of a crank structure fulcrumed in the control compartment for movement in a vertical arc; said crank structure including a horizontal shaft extending in a front-to-rear direction, a handle extending upwardly from the shaft through a forward section of the firebox bottom wall, and a crank arm extending from the shaft adjacent the firebox rear wall.

11. The fireplace of claim **9** wherein the damper is carried on a pivot shaft that extends forwardly from the flue into the room; said interlocking means comprising an electric switch disposed in front of the flue for actuation by the shaft as the damper moves to and from its open position.

12. The fireplace of claim **9** wherein the damper control means includes a manual lever fulcrumed in the control compartment for movement in a vertical arc; said lever extending upwardly through a slot in the bottom wall of the firebox to provide an exposed actuator handle.

13. The fireplace of claim **12** wherein the fuel supply control means comprises, in addition to the valve, and an electric switch operable to open and close said valve; the aforementioned lever having a mechanical connection with said switch to operate same as it undergoes the aforementioned arcuate movement.

14. A fireplace comprising a firebox; a fuel burner located in the firebox; a control compartment located adjacent the firebox; fuel supply control means located in the control compartment; a flue extending upwardly from the firebox for exhausting combustion products therefrom; a damper arranged to open and close the flue; manual control means for moving the damper between its opened and closed positions; and means interlocking the damper and fuel supply means so that fuel is delivered to the burner only when the damper is in its substantially open position, said interlocking means including a solenoid to control said fuel supply means and switch means operated in response to the movement of said manual control means to control the operation of said solenoid.

15. The fireplace of claim **14** wherein the damper is moved to and from its open position by means of a crank structure fulcrumed in the control compartment for movement in a vertical arc; said crank structure including a horizontal shaft extending in a front-to-rear direction, a handle extending upwardly from the shaft through a forward section of the firebox bottom wall, and a crank arm extending from the shaft adjacent the firebox rear wall.

16. The fireplace of claim **14** wherein the damper is carried on a pivot shaft that extends forwardly from the flue into the room; said switch means being disposed in

front of the flue for actuation upon movement of the shaft as the damper moves to and from its open position.

17. The fireplace of claim **14** wherein the damper control means includes a manual lever fulcrumed in the control compartment for movement in a vertical arc; said lever extending upwardly through a slot in the bottom wall of the firebox to provide an exposed actuator handle.

18. The fireplace of claim **17** wherein the aforementioned lever has a mechanical connection with said switch to operate same as it undergoes the aforementioned arcuate movement.

19. A fireplace comprising a firebox; a fuel gas burner located in the firebox; a control compartment located below the firebox; fuel supply control means located in the control compartment; a flue extending upwardly from the firebox for exhausting combustion products therefrom; a damper arranged to open and close the flue; manual control means for moving the damper between its opened and closed positions; said burner being an L-shaped ribbon type burner having a burner port section extending horizontally across the firebox for substantially its entire transverse dimension, said burner including a mixer tube extending downwardly in the direction of the control compartment near one sidewall of the firebox; said fuel supply control means including a fuel gas spud extending upwardly to the mixer tube to supply same with fuel; means interlocking the damper and fuel supply control means so that fuel is delivered to the burner only when the damper is in its open position; said manual control means including a manual lever fulcrumed in the control compartment for movement in a vertical arc; said lever extending upwardly through a slot in the bottom wall of the firebox to provide an exposed actuator handle; said fuel supply control means including an electrically controlled gas valve, and an electric switch operable to open and close said valve; the aforementioned lever having a mechanical connection with said switch to operate same as it undergoes the aforementioned arcuate movement.

20. A fireplace comprising a firebox; a fuel gas burner located in the firebox; a control compartment located below the firebox; fuel supply control means located in the control compartment; a flue extending upwardly from the firebox for exhausting combustion products therefrom; a damper arranged to open and close the flue; manual control means for moving the damper between its opened and closed positions; said burner being an L-shaped ribbon type burner having a burner port section extending horizontally across the firebox for substantially its entire transverse dimension, said burner including a mixer tube extending downwardly in the direction of control compartment near one sidewall of the firebox; said fuel supply control means including a fuel gas spud extending upwardly to the mixer tube to supply same with fuel; means interlocking the damper and fuel supply control means so that fuel is delivered to the burner only when the damper is in its open position; the damper being carried on a pivot shaft that extends forwardly from the flue into the room; said interlocking means comprising an electric switch disposed in front of the flue for actuation by the shaft as the damper moves to and from its open position.

21. A fireplace comprising a firebox; a fuel burner located in the firebox; a control compartment located below the firebox; fuel supply control means located in the control compartment; a flue extending upwardly from the firebox for exhausting combustion products therefrom; a damper arranged to open and close the flue; manual control means for moving the damper between its opened and closed positions; means interlocking the damper and fuel supply means so that fuel is delivered to the burner only when the damper is in its open position; the damper control means including a manual lever fulcrumed in the control compartment for movement in a vertical arc; said lever extending upwardly through a slot in the bottom wall of the firebox to provide an exposed actuator handle; the fuel supply control means comprising an electrically controlled gas valve, and an electric switch operable to open and close said valve; the aforementioned lever having a mechanical connection with said switch to operate same as it undergoes the aforementioned arcuate movement.

22. A fireplace comprising a firebox; a fuel burner located in the firebox; a control compartment located below the firebox; fuel supply control means located in the control compartment; a flue extending upwardly from the firebox for exhausting combustion products therefrom; a damper arranged to open and close the flue; manual control means for moving the damper between its opened and closed positions; means interlocking the damper and fuel supply means so that fuel is delivered to the burner only when the damper is in its open position; the damper being carried on a pivot shaft that extends forwardly from the flue into the room; said interlocking means comprising an electric switch disposed in front of the flue for actuation by the shaft as the damper moves to and from its open position.

23. A fireplace comprising a firebox; a fuel burner located in the firebox; a control compartment located adjacent the firebox; fuel supply control means located in the control compartment; a flue extending upwardly from the firebox for exhausting combustion products therefrom; a damper arranged to open and close the flue; manual control means for moving the damper between its opened and closed positions; means interlocking the damper and fuel supply means so that fuel is delivered to the burner only when the damper is in its fully open position; the damper control means including a manual lever fulcrumed in the control compartment for movement in a vertical arc; said lever extending upwardly through a slot in the bottom wall of the firebox to provide an exposed actuator handle; the fuel supply control means comprising an electrically controlled gas valve, and an electric switch operable to open and close said valve; the aforementioned lever having a mechanical connection with said switch to operate same as it undergoes the aforementioned arcuate movement.

24. A fireplace comprising a firebox; a fuel burner located in the firebox; a control compartment located adjacent the firebox; fuel supply control means located in the control compartment; a flue extending upwardly from the firebox for exhausting combustion products therefrom; a damper arranged to open and close the flue; manual control means for moving the damper between its opened and closed positions; and means interlocking the damper and fuel supply means so that fuel is delivered to the burner only when the damper is in its fully open position; the damper being carried on a pivot shaft that extends forwardly from the flue into the room; said interlocking means comprising an electric switch disposed in front of the flue for actuation by the shaft as the damper moves to and from its open position.

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