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[54] **GAS FIREPLACE**
8 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** ..... **126/121,** 126/90 R, 126/92 R, 126/116 B, 126/127
[51] **Int. Cl.** **F24c 3/00**
[50] **Field of Search** ..... 126/127, 128, 129, 121, 120, 116, 116 B, 110, 86, 89, 90, 92, 92 C

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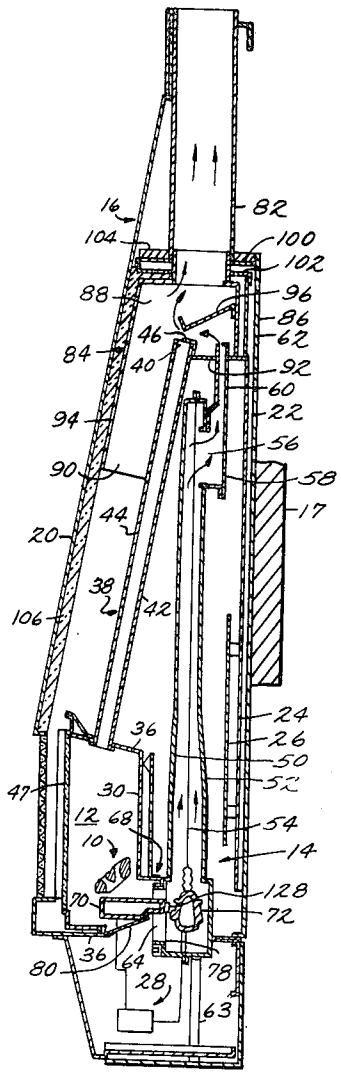
ABSTRACT: A wall-mounted, gas-fired fireplace unit includes a decorative simulated-log gas burner and a gas-fired, room-heating unit disposed behind the logs within a common decorative cabinet. Room air passes in heat exchange relationship with the exterior of the heating unit, while hot combustion products from the log burner are directly vented to avoid heating room air. A manually operable control system permits the log burner and heating unit to be used separately or together.



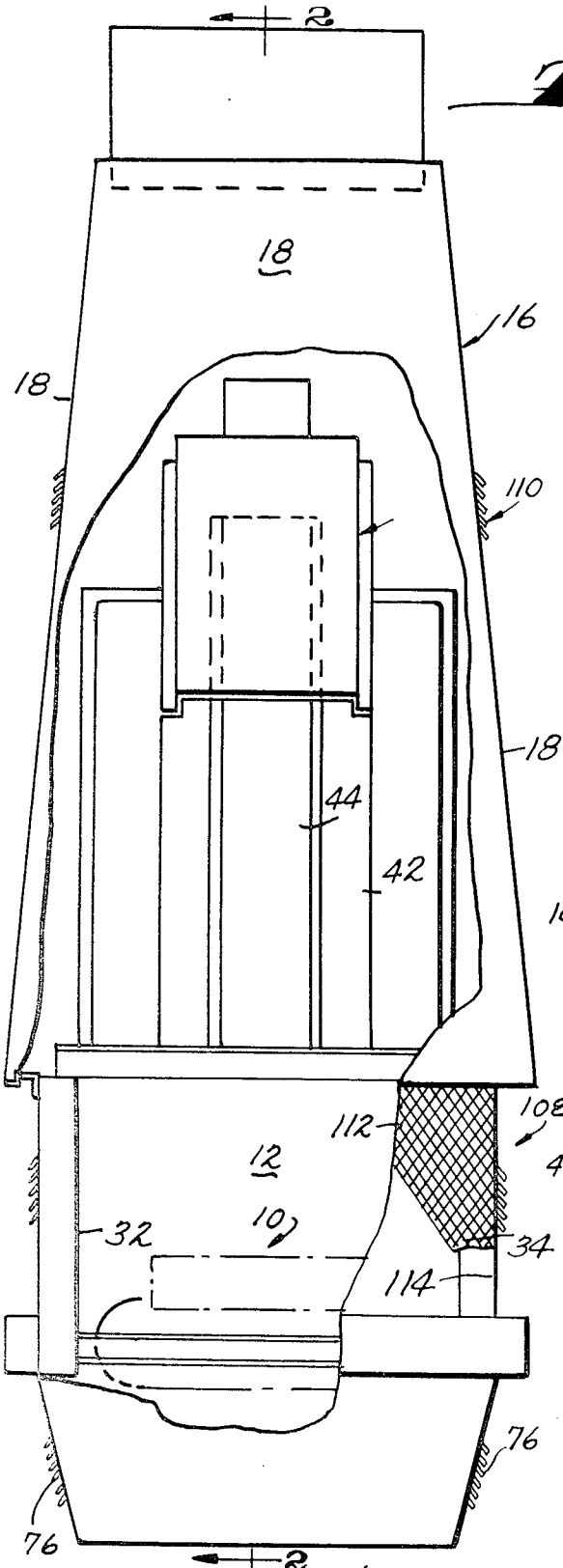


Fig. 1.

Fig. 2.

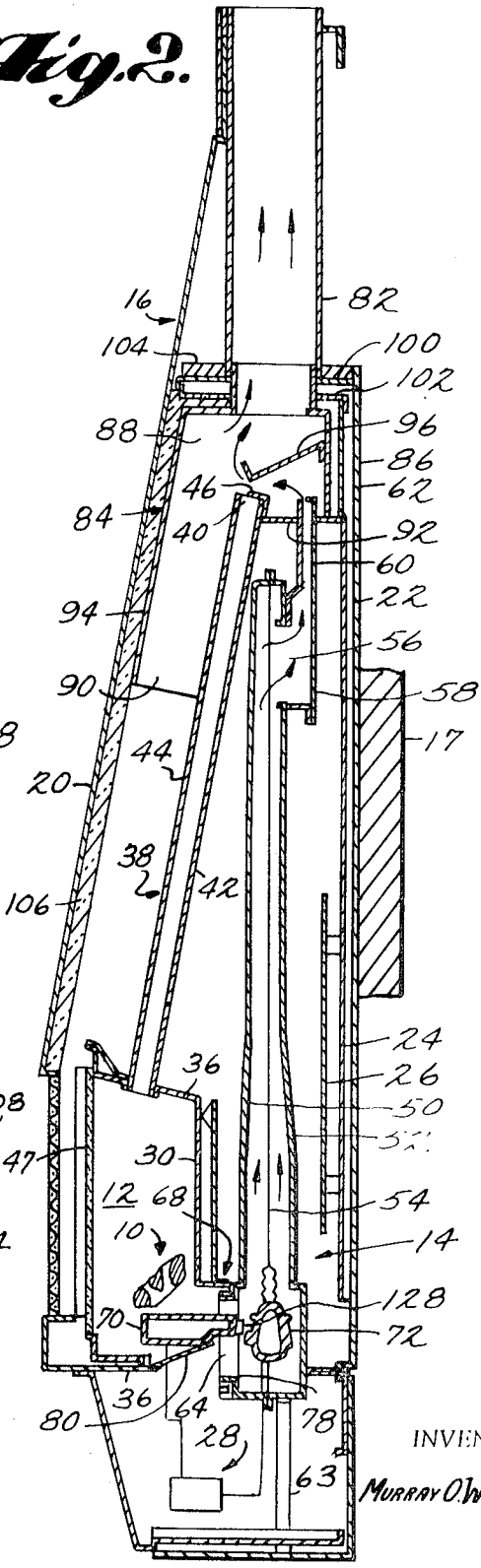


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Fig. 3.

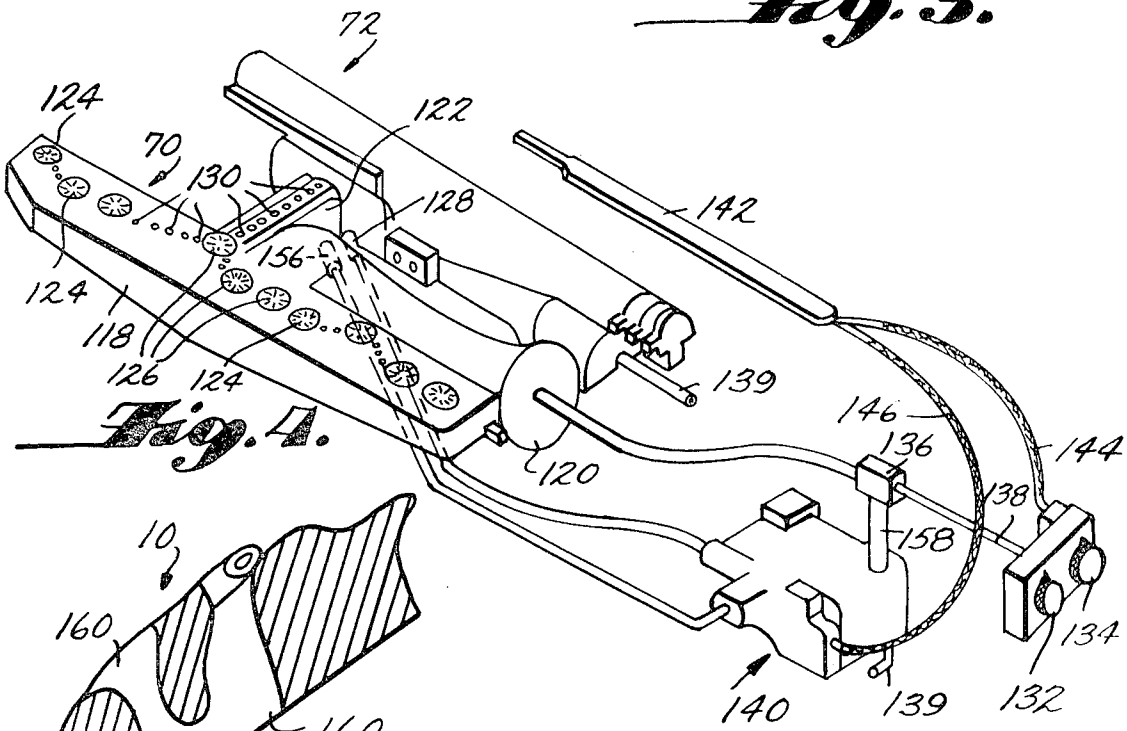


Fig. 4.

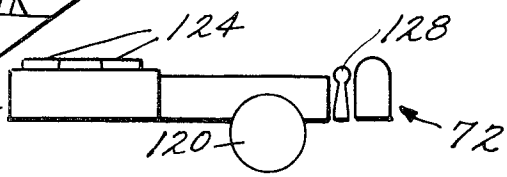
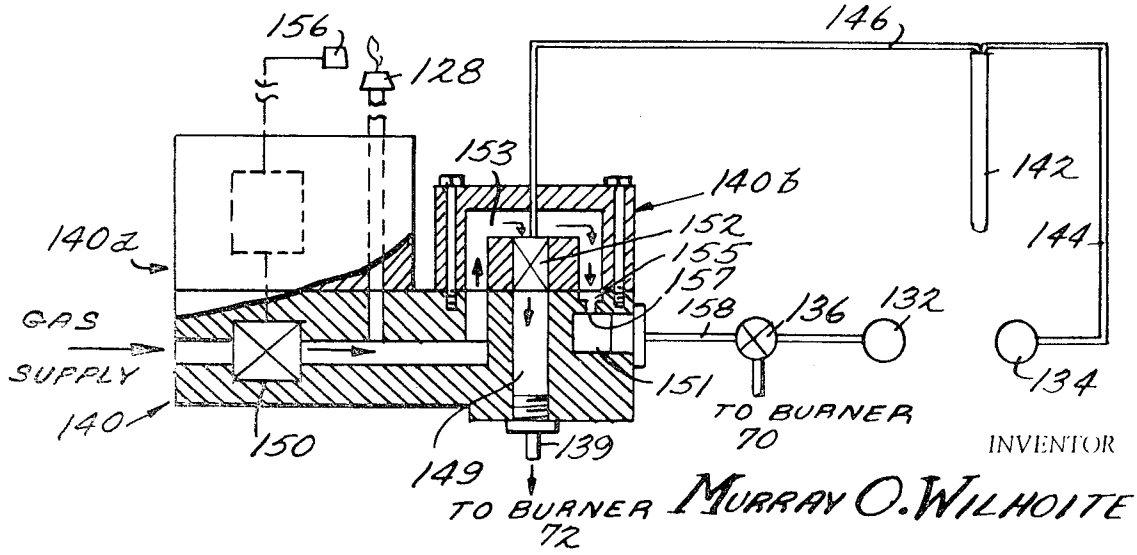


Fig. 3a.



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GAS FIREPLACE

This invention relates to a combination fireplace and fluid fuel heater and in particular to an improved structure which includes both a decorative simulated-log gas burner and a gas-fired heating unit adapted to heat room air.

A gas fireplace typically includes a simulated-log structure and an associated gas burner for producing a flame which in combination with the log structure gives the appearance of burning logs. In some constructions the heat generated by the burning gas is utilized to warm the room air by indirect heat exchange between the combustion products and the room air. In other constructions products can be vented without any appreciable heat exchange with room air. Sometimes an additional gas-fired heating unit is employed in conjunction with the simulated-log burner. So far as is known, all of these known structures suffer from a lack of versatility in that little or no control can be exerted separately over the heating and decorative functions of the devices. As a result, these known devices have the disadvantage of tending to overheat the room when used during warm weather or in mild climates.

It is therefore one object of the present invention to provide a combination gas-operated fireplace and heater unit in which a decorative simulated-log burner and a gas space heater can be operated separately or together. In the preferred embodiment, rather than using a conventional gas control unit for each of the two burners, there is provided a special simplified control unit which achieves separate control of the burners with a minimum of parts.

A further object of the invention is to provide a combination gas-fired fireplace and heater having an improved internal arrangement of its major parts, particularly the relative positions of the simulated-log burner and the heating unit and the construction of the parts which achieve venting of the combustion products. In particular, there is provided a special draft hood which receives combustion products separately from the simulated-log burner and from the heating unit and channels them into a common main flue.

A further object of the invention is the provision of a special simulated-log structure and burner combination which produces a particularly pleasing decorative effect during operation. In the preferred construction the simulated-log structure is an integral ceramic structure having the form of a plurality of logs stacked one on the other with spaced apart openings therebetween to permit flames from the underlying burner to project above the upper surface of the integral log structure.

The invention will further understood from the following detailed description of an illustrative embodiment taken with the drawings in which:

FIG. 1 is a front elevational view, partly broken away, of a fireplace construction embodying the principles of the present invention;

FIG. 2 is a sectional view taken on the line 2–2 of FIG. 1;

FIG. 3 is a fragmentary perspective view of the burners and the control system therefor;

FIG. 3A is a schematic sectional view of the main control valve of FIG. 3, and

FIG. 4 is a vertical transverse sectional view through the simulated-log structure.

Referring to FIGS. 1 and 2 there is shown a gas fireplace construction which includes among its major components a decorative simulated-log structure **10** disposed within an open-front hearth box **12** and an upright gas heater unit **14** disposed behind the hearth box **12**. An external cabinet **16**, open at the front of the hearth box **12**, surrounds the internal parts as is conventional in the art. In the illustrated embodiment the fireplace is adapted to be mounted on a wall **17** of a room, and the cabinet is comprised of front and sidewalls **18** and **20** and suitable wall mounting plates such as shown at **22** and rear heat shields such as shown at **24** and **26**. The lower portion of the cabinet below the hearth box **12** and heater unit **14** houses a gas supply and control system **28** illustrated schematically in FIG. **2** and more in detail in FIG. **3**.

The hearth box **12** includes a rear wall **30**, spaced-apart sidewalls **32** and **34** and a top wall **36** from the central portion of which there extends an upwardly and rearwardly inclined flue conduit **38** having an open upper end **40**. In the illustrated embodiment the flue conduit **38** is defined between a sheet of metal **42** extending upwardly from the top wall **36** of the hearth box **12** and a relatively narrow sheet metal channel **44** having flanged edges secured to the front face of the sheet **42**. The upper end of the flue conduit **38** is restricted in cross section as by means of an angle piece **46** in order to achieve proper draft characteristics. The front of the hearth box is sealed with a glass panel **47**.

The hearing unit **14** includes a combustion chamber which may be of the now conventional construction which includes spaced-apart front and rear walls **50** and **52** secured together along their edges **54** to define a space through which combustion products travel in indirect heat exchange with the room air in contact with exterior surfaces of the walls **50** and **52**. The upper end of the rear wall **52** is provided with a centrally located hole **56** through which combustion products pas into a suitable outlet structure **58** having an upwardly directed open-ended discharge tube **60**. The end of the tube **60** is restricted in cross section as by a lip **62** in order to achieve proper draft characteristics. The entire combustion chamber is supported within the cabinet **16** in any suitable manner as by a floor-supported bracket **63** or the like located in the lower portion of the cabinet.

The combustion chamber is in communication with the hearth box **12** through a centrally located opening **64** in the lower part of the front wall **50** of the combustion chamber and a complementary opening in the rear wall **30** of the hearth box **12**, there being provided for this purpose a suitable tubular connection **68**. Two gas burner tubes **70** and **72** are disposed at the elevation of the openings **64** and **68**, the forward burner **70** being located within the hearth box **12** below the simulated-log structure **10** and the rear burner **72** being located in the combustion chamber. In the interest of simplicity and economy of construction, a single pilot burner **74** is disposed between the burners and for igniting both the burners. Combustion air from the room reaches the burners by entering through louvers **76** in the cabinet sidewalls near the lower ends thereof and then passing upwardly through an opening **78** in the bottom wall of the hearth box **12** and past a sheet metal radiation shield **80**.

Combustion products from the burners **70** and **72** are vented to the outside of the building through a common main flue pipe **82** which may extend upwardly through the roof or upwardly and then horizontally through the wall **17**. The combustion products from the inclined flue conduit **38** and from the discharge tube **60** from the combustion chamber enter the lower end of the lower end of the main flue pipe **82** by way of a common draft hood **84** which neutralizes downdrafts likely to be caused by ambient wind conditions while ensuring proper operating updraft during operation.

In the illustrated construction the draft hood **84** is a generally boxlike sheet metal structure of lesser width than the combustion chamber and defined by a rear wall **86**, two laterally spaced-apart sidewalls one of which is shown at **88**, a partial bottom wall **92** and an inclined front wall **94** extending downwardly a substantial distance below the bottom wall **92**. The front wall **94** is spaced away from the parts **42** and **44** which form the flue conduit **38** so as to define a relief opening **90** of substantial cross section. The relief opening **90** functions in the event of a blocked main flue to carry combustion products out of the draft hood **84**. The upper end of the flue conduit **38** projects a short distance into the draft hood at a location directly in front of the partial bottom wall **92**, and the upper end of the discharge tube **60** projects through the partial bottom wall **92**. An L-shaped upwardly and rearwardly inclined antidowndraft baffle **96** is disposed above the upper ends of the flue conduit **38** and the tube **60**, and the flow paths for combustion products are shown by the arrows in FIG. **2**.

The top wall of the draft hood **84** is provided with an upwardly extending discharge pipe **98** which is telescoped into the lower end of the main flue **82**. At this location the fireplace cabinet **16** is provided with an internal top wall structure. In the illustrated embodiment the wall structure is defined by two vertically spaced-apart horizontal plates **100** and **102** which are suitably apertured to allow passage of the main vent therethrough. In order to minimize heating of room air by operation of the simulated-log burner, the upper plate is provided with a layer of thermal insulation **104**, and the inner surface of the front wall **20** of the cabinet **16** is also covered with thermal insulation **106**. On the other hand, room air is intended to be heated by the heating unit **14**, and to this end the cabinet sidewalls **18** are interrupted at the location of the hearth box, as shown at **108** in FIG. **1**, to allow entry of room air. Louvers **110** in the sidewalls at the location of the draft hood allow passage of warmed air back into the room. A flexible traversing firescreen **112** is mounted in front of the glass plate **47** and around the interrupted sides of the cabinet **16**. A vertical metal plate **114** with louvers **116** therein is disposed at each side of the space to cover the internal parts from view while permitting entry of room air.

FIG. **3** illustrates the two burners **70** and **72**, arranged parallel to each other, and the control system by means of which the burners may be used together or separately. The fireplace burner **70** includes an elongated hollow cast iron body **118** and an integral venturi-type gas and air inlet structure **120** which merges with a hollow projection **122** on the body **118**. The upper surface of the body **118** is provided with a plurality of spaced-apart ports each of which is fitted with a tip **124** designed to produce a tall, irregular or flickering flame. In the illustrated embodiment the tips are ceramic disks perforated with a plurality of radial slots **126**. The spacing between the tips **124** is irregular, and some of the tips are offset with respect to others in order to conform generally to the pattern of holes in the ceramic log structure **10**. A pilot light **128** is disposed adjacent the outer end of the projection **122**, and a series of small ignition ports **130** is provided in the projection **122** is order to carry the initial flame to the tips **124**. Additional ignition ports **130** are provided between some of the tips **124** where the spacing is too great to permit flame propagation between tip **124** and its neighbor.

The heating unit burner **72** is a separate structure although it is physically connected to the projection **122** of the fireplace burner **70** as by suitable brackets (not shown). The burner **72** may be of any conventional design which is compatible with the dimensions of the heating unit **14** (FIG. **2**) **106** in which it is employed. The pilot light **128** is arranged so that it will light both the burner **72** and the ignition ports **122** of the burner **70**.

The control system for burners **70** and **72** includes thermostatic and manual valving which permit operation of the burners together or separately by means of two manually rotatable control knobs **132** and **134** mounted at some convenient location on the exterior of the cabinet **16**. The knob **132** controls a conventional off-on valve **136** which supplies gas to the venturi mixer **120** of the burner **70** through an extension **137**, there being provided a rigid connecting rod **138** between the knob and the valve. Gas flow to the burner **72** is by way of a line **139** and is controlled by a conventional adjustable thermostatic valve located within a main control valve **140**, the arrangement including a conventional thermostatic element **142** and the usual tubes **144**,**146**. Rotation of the knob **134** to a desired temperature setting has the effect of opening the valve when the room temperature drops to a predetermined temperature and closing the valve when room temperature reaches a predetermined higher temperature. Adjusting the knob **134** to, for example, a setting of 40° F. has the practical effect of turning off the heating unit **14**.

The main control valve **140** may be of conventional construction with one important exception, and in the interest of simplicity the major parts of the valve **140** are illustrated schematically in FIG. **3A**. Valves of this kind are conventionally constructed of two basic valve components **140***a* and **140***b*, one of which embodies a safety feature in the form of a shutoff valve **150** which cuts off the gas flow in the event that the pilot light **128** becomes extinguished. The other component **140***b* includes the previously mentioned adjustable thermostatic valve, illustrated in FIG. **3A** at **152**.

Conventionally, the safety valve **150** is constructed in such a manner that it is held open by the electric current generated by a thermocouple **156** disposed to receive heat from the flame of the pilot light **128**. If the pilot light **128** becomes extinguished, the valve **150** closes, and no gas can flow to the thermostatic valve **152**.

In the illustrated construction the valve component **140***a* is provided with a first outlet **149** for the burner **72** and a second outlet **151** for the burner **70**. However, the gas passing through the safety valve **150** passes first into a chamber **153** in the valve component **140***b*. Gas from the chamber **153** can pass to the outlet **149** only when the thermostatic valve **152** is open, while gas is always available to the outlet **151** by means of a bypass hole **155** drilled through a wall **157** within the body of the valve component **140***b*. Ordinarily the component **140***b* is manufactured with a single operational gas outlet, such as the outlet **149**. However, it is customary for the component to have one or more nonoperating, dead end outlets facing in various directions so that a conveniently located outlet may be selected for making the desired connection, it being only necessary to drill a hole between the downstream side of the valve **152** and the appropriate outlet. According to the present invention, however, two outlets are employed, and one of them bypasses the valve **152**. By this arrangement one safety valve **150** serves both burners **70** and **72**, while at the same time the fireplace burner **70** can be operated independently of the thermostatic valve **152**.

The heat output of the burner **70** is considerably less than the output of the burner **70**. For example, a burner of 20,000 B.t.u. has been found to provide the necessary decorative flame, and actual heat to the room may be only 10,000 B.t.u. due to the intentionally inefficient construction of the vent conduit **38**. On the other hand the burner **72** may be designed to produce 35,000 B.t.u., 75 percent of which will be transferred to the room air by the walls **50** and **52** of the combustion chamber.

FIG. **4** illustrates the construction of the simulated-log structure **10** and its relationship to the burner **70**. The structure **10** is an integral refractory ceramic structure simulating four logs piled one on another and having a plurality of relatively large horizontally elongated openings **160** extending vertically through the structure at randomly spaced-apart locations between simulated logs. The openings **160** correspond to the naturally occurring spaces between piled logs resulting from the irregular diameters of the logs or the presence of protrusions on the logs. In practice, the openings **160** will be horizontally spaced apart in both a longitudinal and transverse direction with respect to the axes of the logs, and will conform generally to the pattern of tips **124** on the burner **70**. This arrangement, in operation, permits the tall flickering flames to project upwardly through the openings and above the upper surfaces of the ceramic structure **10**.

What is claimed is:

1. A gas-fired fireplace comprising:

a simulated-log structure including a first gas burner;

a flue conduit extending from an open lower end above said first burner upwardly to an open upper end;

a heating unit disposed behind said simulated-log structure and including a vertically elongated combustion chamber of greater height than said structure, said combustion chamber being formed by spaced-apart front and rear walls joined together along their edges and a second gas burner disposed within the lower part of said combustion chamber, said combustion chamber having a combustion gas outlet aperture at its upper end; an upwardly extending main vent conduit having a lower end common to both said flue conduit and said combustion gas outlet;

wall means surrounding said flue and at least that portion of said combustion chamber which is above said simulated-log structure and defining with said combustion chamber a space for heating room air, said wall means being provided with at least one room air inlet aperture at an elevation near the lower end of said combustion chamber and at least one heated air outlet aperture at an elevation near the upper end of said combustion chamber; and

manually operated gas supply means for selectively supplying gas to said first and second burners.

2. A gas-fired fireplace comprising:

wall means defining an open-front hearth box having an upwardly extending flue conduit;

a gas-fired heating unit disposed behind said hearth box in spaced relation to the rear wall of said hearth box, said heating unit including a vertically disposed combustion chamber formed by spaced-apart front and rear walls joined together along their edges, said combustion chamber having a combustion gas outlet at its upper end and said front wall having an aperture opening into the rear of said hearth box;

a first gas burner disposed within said combustion chamber at the location of said aperture;

simulated-log burner means including a second gas burner disposed within said hearth box and closely adjacent said first burner;

gas supply and control means for said first and second burners including a single pilot burner disposed in a position to light both burners.

3. A gas-fired fireplace as in claim **2** wherein said second gas burner is constructed with a plurality of relatively large upwardly facing ports each of which is fitted with a gas distribution plug which effects a tall flame during operation, said fireplace further including an integral ceramic structure simulating a plurality of logs piled one on the other, said ceramic structure overlying said ports and having a plurality of spaced-apart relatively large openings extending upwardly therethrough at locations between the simulated logs, said openings permitting the tall flames from said gas distribution plugs to project above the upper surfaces of said integral ceramic structure.

4. A gas-fired fireplace as in claim **2** wherein said gas supply and control means includes:

a main gas inlet conduit, a first gas feed line for delivering gas to said first burner, a manually adjustable thermostatically controlled valve connected between said inlet conduit and said first gas feed line, a second gas feed fine for delivering gas to said second burner connected between said main gas inlet and said thermostatically controlled valve so as to bypass the latter, and a manual off-on valve connected into said second gas feed line whereby said first and second burners may be operated together or separately.

5. A gas-fired fireplace comprising:

a simulated-log gas burner;

wall means defining an open-front hearth box surrounding the top, bottom and sides of said simulated-log gas burner;

a flue conduit extending upwardly from the top of said hearth box and having an open upper end;

a gas-fired heating unit disposed behind said hearth box, said unit including a combustion chamber adapted to heat room air by heat-exchange between the exterior surfaces of said combustion chamber and room air, said combustion chamber being provided with an upwardly extending combustion gas outlet tube having an open upper end;

a draft hood disposed above said hearth box to receive combustion products from said flue conduit and from said combustion gas outlet tube, said draft hood being defined by front, side, rear and top walls which form a space into which the open upper ends of said flue conduit and said outlet tube project; and

a main flue conduit extending upwardly from the top of said draft hood for carrying off all combustion products.

6. A gas-fired fireplace as in claim **5** including a downdraft baffle located within said hood in overlying and spaced relation to the upper ends of said flue conduit and said outlet tube, the bottom of said draft hood being open and unobstructed at a location forward of said flue conduit.

7. A gas-fired fireplace as in claim **6** including a cabinet surrounding said flue conduit, draft hood and combustion gas outlet tube and defining with said combustion chamber a space for heating room air, said cabinet being provided with at least one room air inlet aperture near the lower end of said combustion chamber and with at least one heated room air outlet aperture at a higher elevation at the level of said draft hood.

8. A gas-fired fireplace comprising:

a room-heating unit including a first gas burner located in a combustion chamber which is adapted for heating room air;

a decorative simulated-log structure disposed in front of said heating unit and including a second gas burner;

a gas supply and control system adapted for manually operating first and second burners separately or together, said simulated-log structure, heating unit and supply and control system being disposed within decorative cabinet means having a hearth opening which exposes said simulated-log structure;

said gas supply and control system including a main gas inlet conduit, a first gas feed line for delivering gas to said first burner, a valve connected between said inlet conduit and said first gas feed line, temperature-responsive manually adjustable control means operatively connected to said valve for opening and closing said valve at preselected low and high room temperatures, respectively, a second gas feed line for delivering gas to said second burner connected between said main gas inlet and said valve so as to bypass the latter, and a manual off-on valve connected into said second gas feed line.

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