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(54) ATMOSPHERIC BURNER UNIT FOR UNVENTED GAS LOGS HEATER

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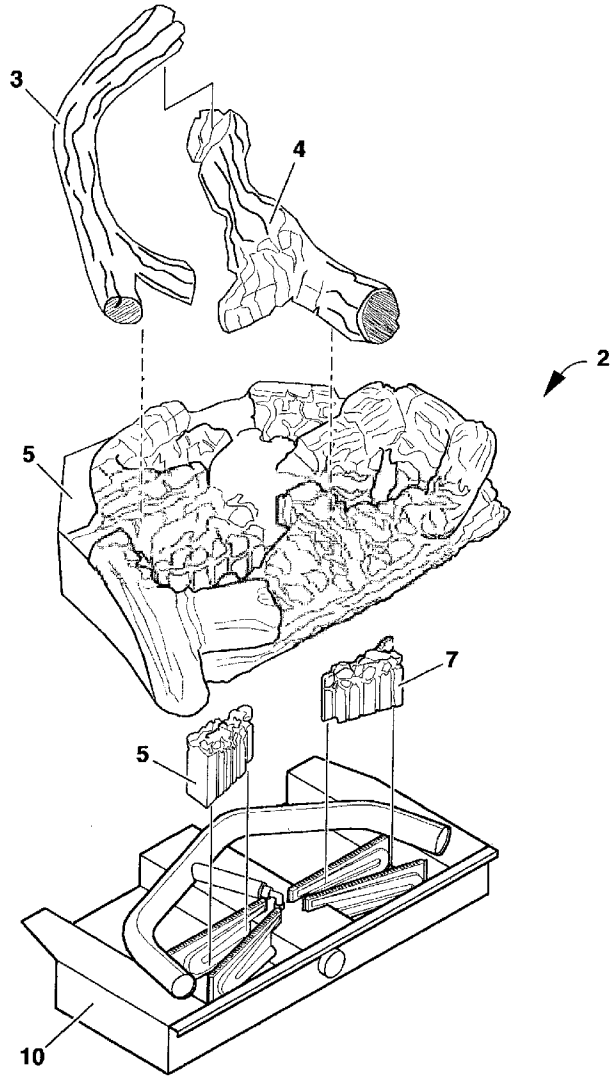
(57) **ABSTRACT**

An atmospheric burner unit for use in an unvented gas log heater has a base and a gas distribution valve supported by the base. The valve has an inlet opening and a number of outlet openings. A plurality of burner elements are mounted by the base. Each of the burner elements has an inlet port and a plurality of outlet ports. The inlet port of each burner element is in proximate spaced relationship with an outlet opening of the gas distribution valve thereby defining open spaces through which gas may flow from the distribution valve to the burner elements thus obviating the use of tubes or other conduits.



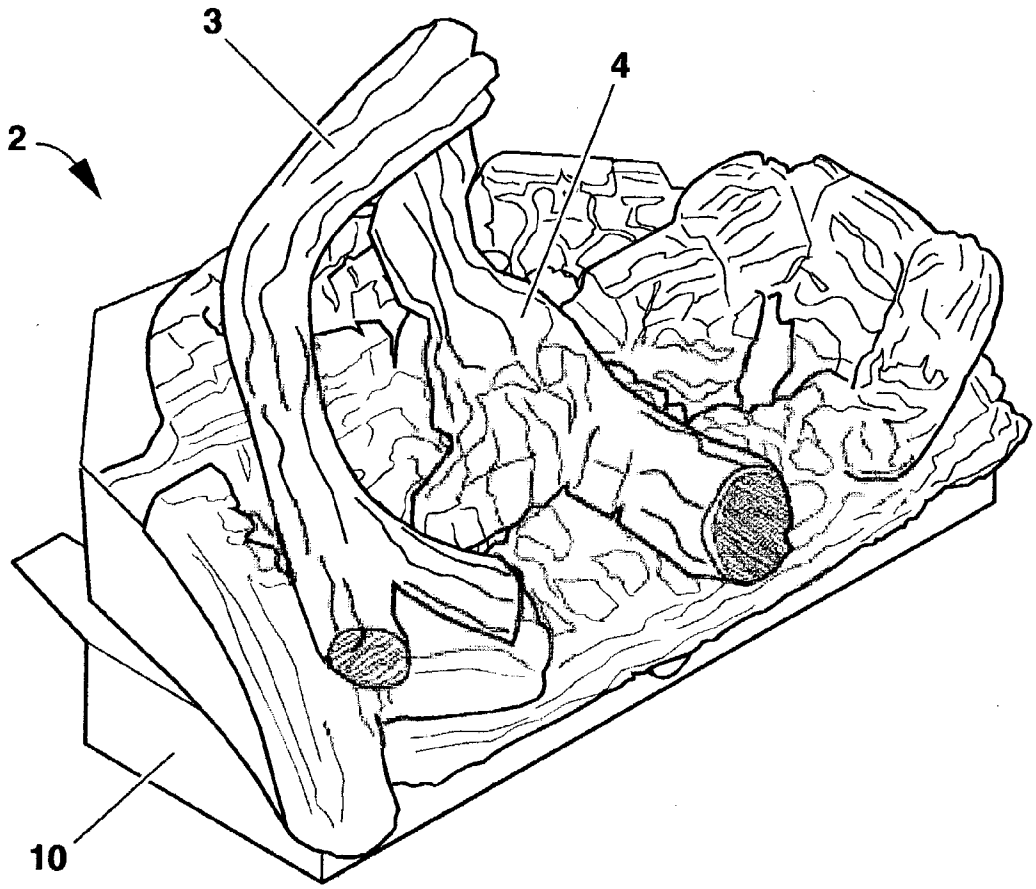
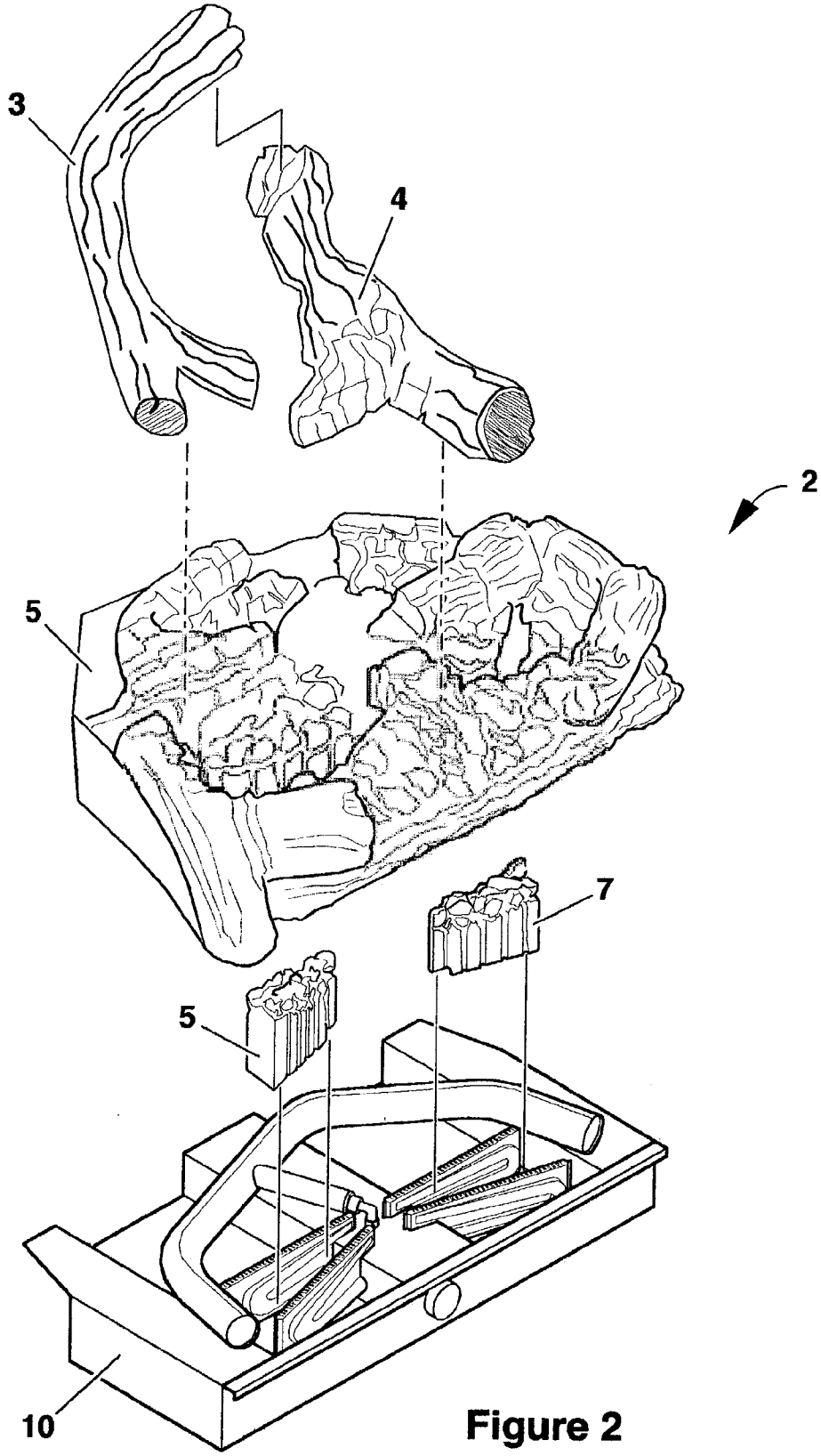


Figure 1



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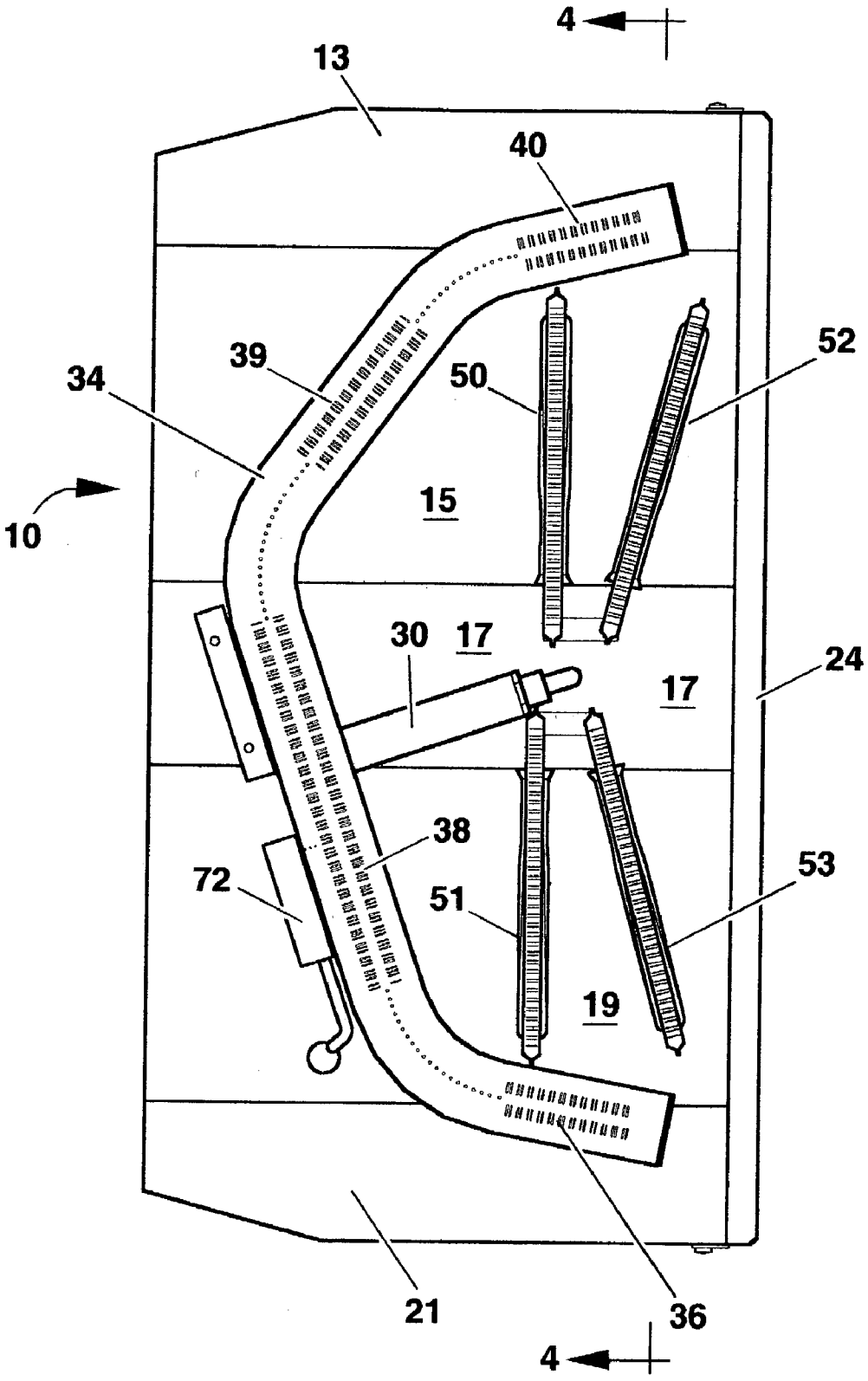

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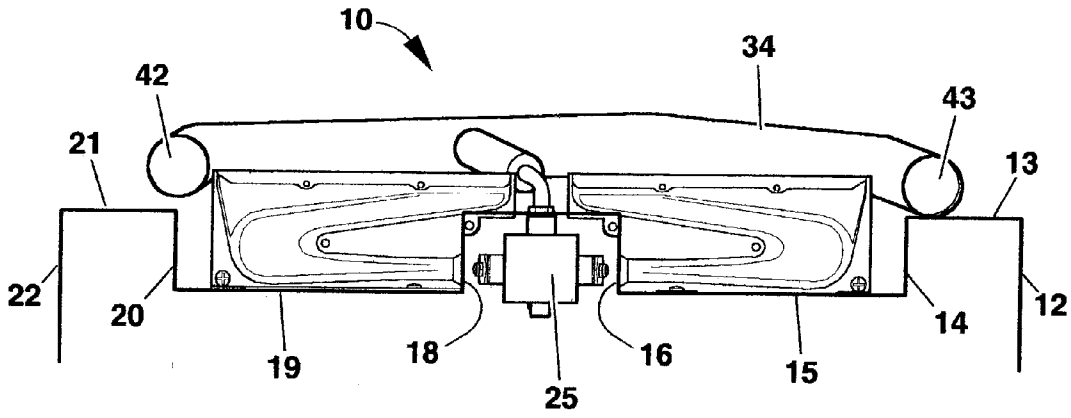

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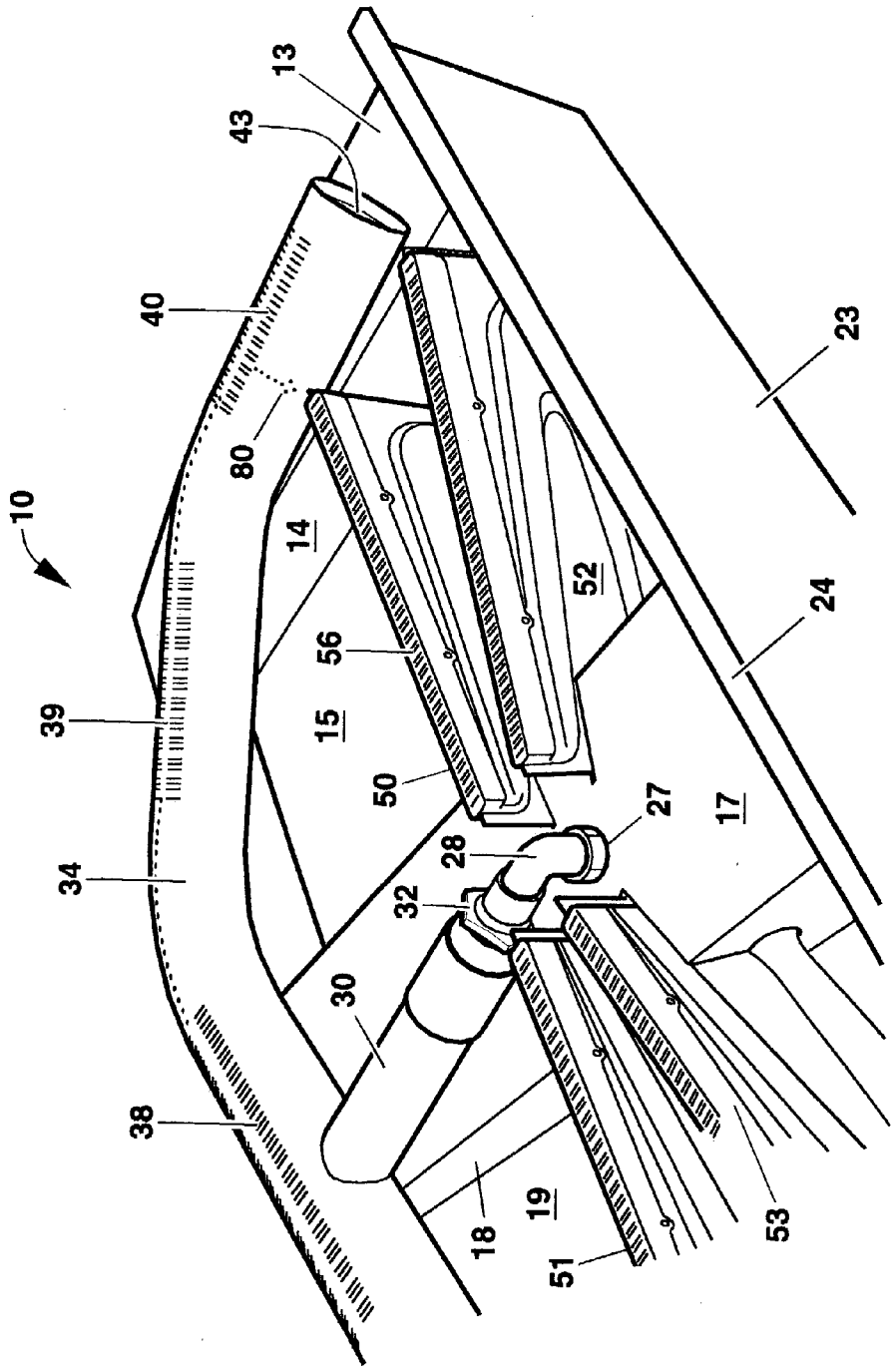

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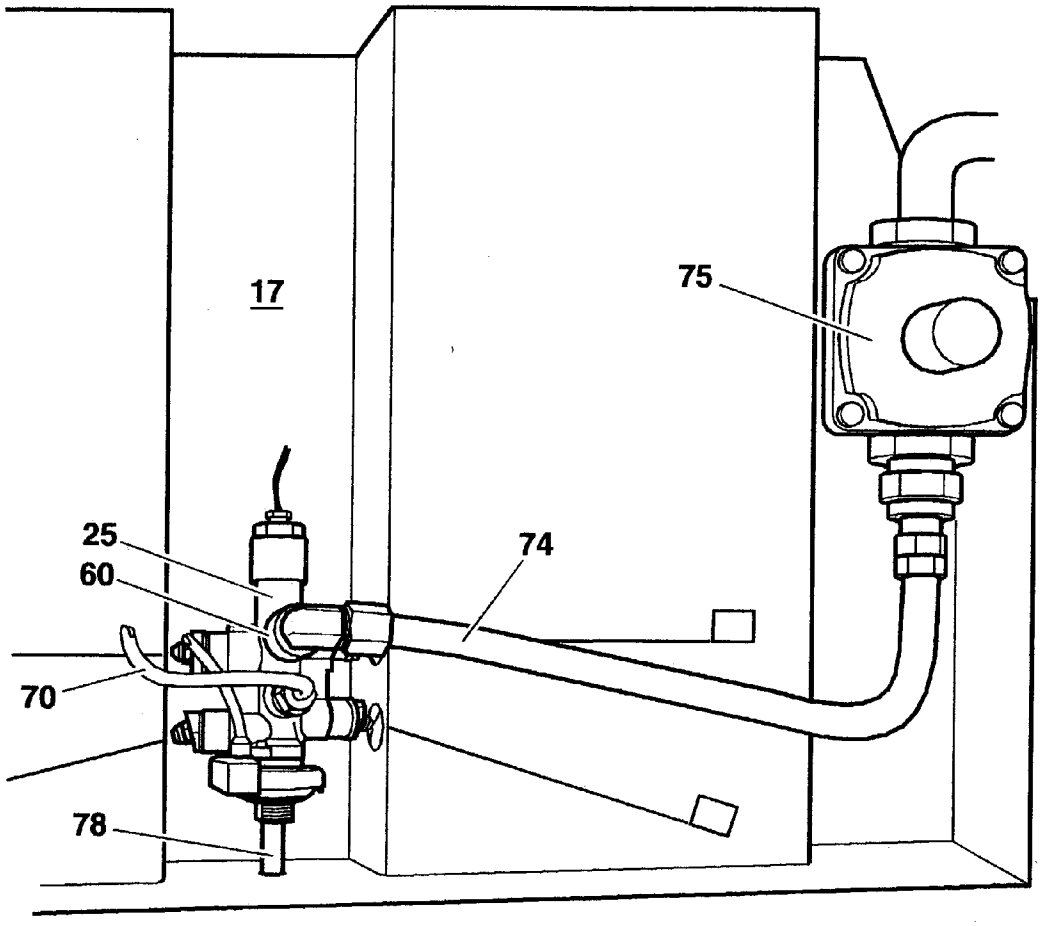

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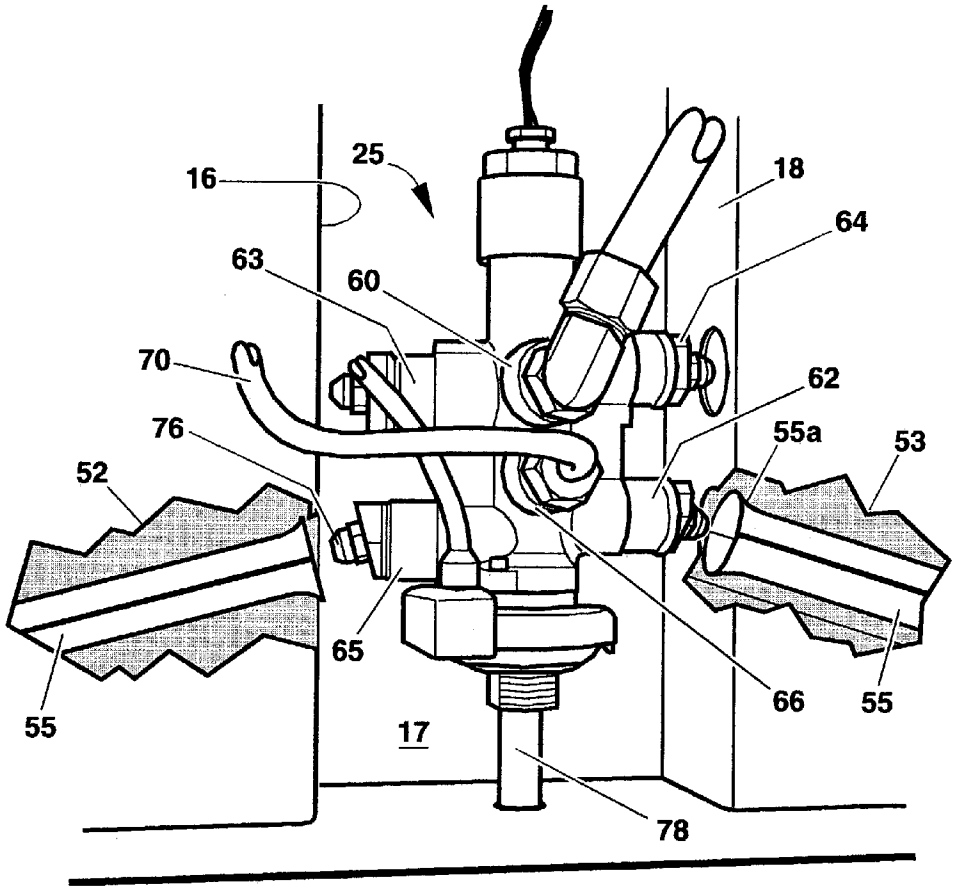

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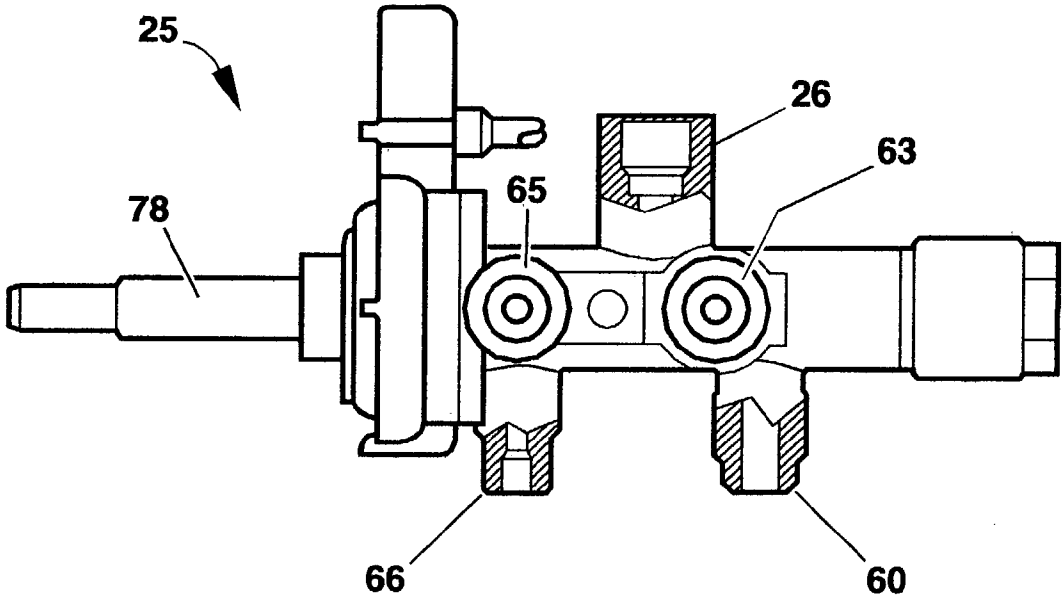

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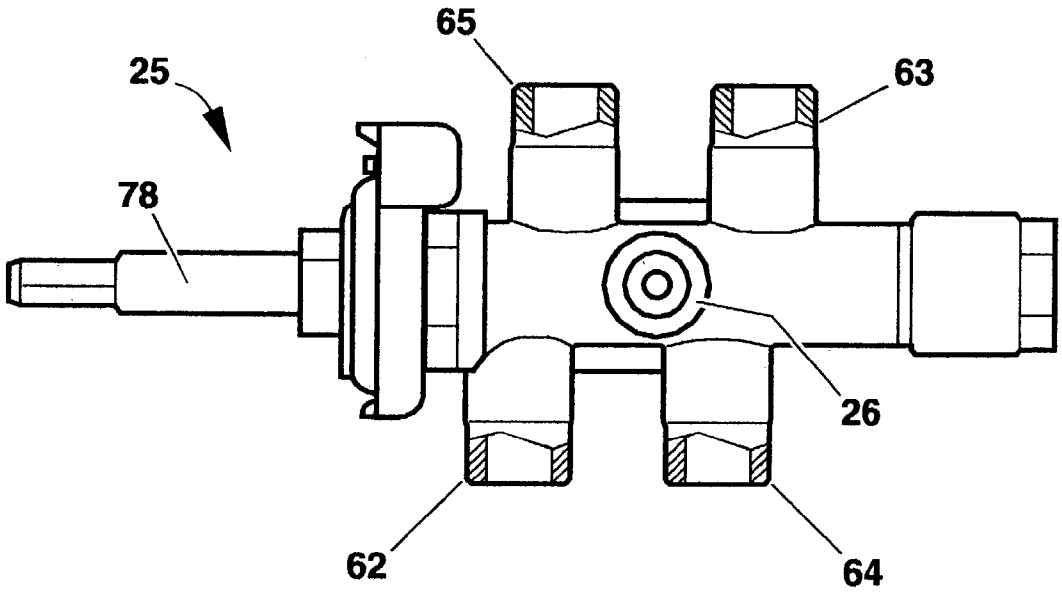

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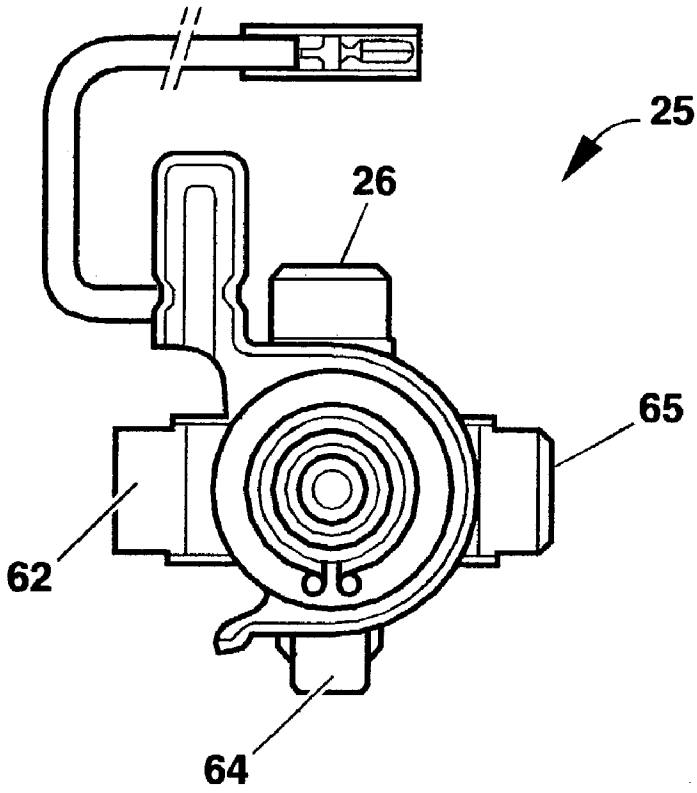

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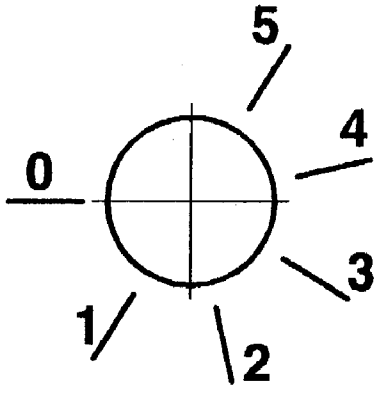


Figure 11

Figure 12A

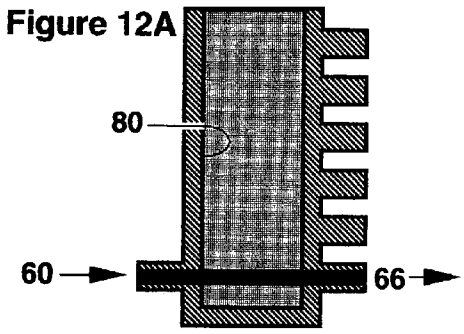


Figure 12B

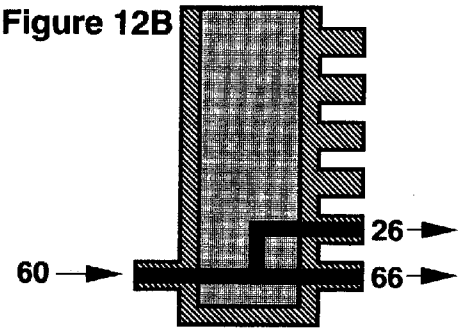
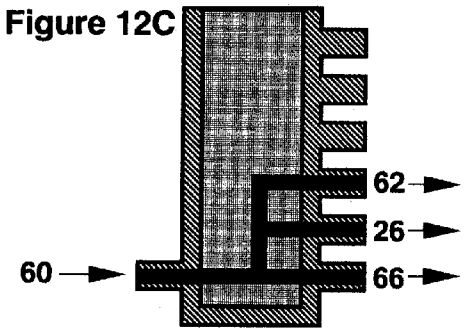


Figure 12C



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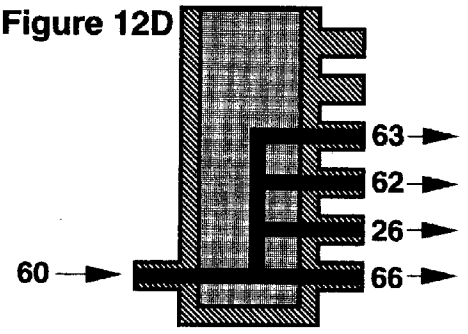


Figure 12E

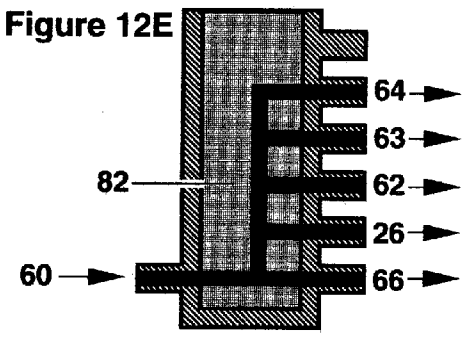
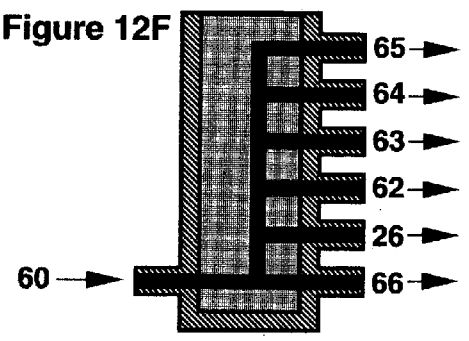


Figure 12F



ATMOSPHERIC BURNER UNIT FOR UNVENTED GAS LOGS HEATER

[0001] This application is based on provisional application 60/374,968, filed Apr. 23, 2002.

[0002] The present invention relates to gas burners. More particularly, the present invention relates to an atmospheric gas burner unit for use in an unvented, gas log heater.

BACKGROUND OF THE INVENTION

[0003] Unvented gas log units are popular products for supplemental heating and decorative use in residential housing and commercial establishments in the United States and other countries. Manufacturers offer many different models to appeal to consumers' tastes. Differentiation is generally achieved through artificial log appearance, grate design, flame color and control system.

[0004] The artificial logs attempt to duplicate the appearance of wood, such as oak or birch, for example, a cut (round or split) and other wood features such as knotholes, peeled bark or branching. These artificial logs are typically made of refractory ceramic fiber or concrete composite.

[0005] The grate may be straightforward or ornate in design. Cast iron, sheet metal and brass are typical materials used to make these grates.

[0006] The atmospheric gas burners provide either blue or yellow flames. On most manufacturers' designs, blue flame burners are used in conjunction with refractory ceramic logs to create glowing surfaces that radiate heat. Yellow flame burners can be used with any artificial log material as the flames should not touch any log surface in order to ensure low emissions (e.g., less than 0.02% air-free carbon monoxide) and to prevent possible soot generation.

[0007] The control systems can have manual, thermostat, wireless remote or wired remote operation. The control systems also include pilot- flame ignition units and safety control valves.

[0008] The national product standard, ANZI Z21.11.2, regulates the maximum allowable input of unvented gas logs to 40,000 BTU/hour. Many prior art gas log units have only one burner; consequently, the minimum heat input that can be achieved would be about 20,000 BTU/hour. As a supplemental heater, this amount of heat is too much for most applications.

[0009] Several advantages exist with gas log units having multiple burners that are smaller in size and input. First, each burner by itself has a low-heat input. As an example, an invented gas log unit may have five burners of 7,000 BTU/hour each. Any number can be turned "on" thereby producing a wide-range of total input. In this example, the input settings could be 7,000 to 35,000 BTU/hour on 7,000 BTU/hour increments. These variable inputs would satisfy the supplemental heating requirements for a room under any operating parameters (such as volume of space, outside temperature, air exchange rate and desired inside temperature, for example). Second, these burners would be operated either full "on" or "off " This all-or-nothing mode results in the best combustion characteristics and eliminates the emissions problems associated with modulation, Importantly, modulation is a significant consideration relative to low nitrogen dioxide (NO2) designs—a pending requirement in this product category. Third, different burners can be arranged to achieve a multiplicity of aesthetic appearances, such as horizontal ember beds, vertical radiant surfaces, blue flames, yellow flames, yellow/blue flames for example.

[0010] Unfortunately, there are disadvantages associated with the prior art multiple burner units. The provision of multiple burners necessarily requires a substantial amount of tubing to direct the gas (natural gas or liquefied petroleum, commonly known as propane or LP), from the source to the various burners. Of course, this necessary tubing increases the costs of material and assembly labor.

[0011] Representative prior art patents are: Smith U.S. Pat. Nos. 5,470,018; Manning et al 5,795,145; and Manning et al 5,915,952.

SUMMARY AND OBJECTS OF THE INVENTION

[0012] The invention resides in an atmospheric burner unit for a gas log heater having a unique gas distribution valve associated with multiple burners in a manner which minimizes the amount of tubing required to direct the gas to the various burners.

[0013] A primary object of the present invention is the provision of an atmospheric burner unit wherein gas may be directed from plural outlets on the distribution valve to multiple burners without the need for tubing.

[0014] Another object of the present invention is the provision of an atmospheric burner unit wherein multiple burners may be ignited directly or indirectly from a single ignition unit.

[0015] These and other objects and advantages of the present invention may be ascertained from the following description and drawings of a preferred embodiment.

DESCRIPTION OF THE DRAWINGS

[0016] **FIG. 1** is an isometric view of an unvented artificial gas log fireplace assembly embodying the atmospheric burner unit of the present invention;

[0017] **FIG. 2** is an exploded isometric view of the artificial gas log fireplace assembly embodying the atmospheric burner unit of the present invention;

[0018] **FIG. 3** is a top view of the atmospheric burner unit of the present invention;

[0019] **FIG. 4** is a section taken generally along the line **4-4** of **FIG. 3**;

[0020] **FIG. 5** is an enlarged, fragmentary, isometric top view;

[0021] **FIG. 6** is an enlarged, fragmentary bottom view of the burner unit;

[0022] **FIG. 7** is an enlarged, fragmentary bottom view showing primarily the gas distribution valve;

[0023] **FIG. 8** is a side view of the gas distribution valve;

[0024] **FIG. 9** is a top view of the gas distribution valve;

[0025] **FIG. 10** is a rear view of the distribution valve;

[0026] **FIG. 11** is a diagrammatic view showing operation of the distribution valve; and.

[0027] FIGS. 12A-12F are schematic views shoeing operation of the distribution valve.

DESCRIPTION OF A PREFERRED EMBODIMENT

[0028] Referring first to **FIGS. 1 and 2**, an unvented gas log fireplace assembly is generally designated **2**. This assembly includes artificial logs **3**, **4**, **5**, **6** and **7**. As indicated above, these logs are typically made of refactory ceramic fiber or a concrete composite. The gas log heater assembly **2** also includes an atmospheric burner unit, generally designated **10**, which embodies the present invention. Of course, the artificial logs may be provided in a variety of sizes and shapes as desired. Suitable brackets and stands (not shown) may be provided to support the logs on and above the burner unit.

[0029] Now referring primarily to **FIGS. 3, 4** and **5**, the atmospheric gas burner unit **10** includes a stamped sheet metal frame or base defined by walls **12** through **22**. A front wall **23** having a flange **24** may be suitably attached to the sheet metal section forming the walls **12** through **22**.

[0030] It will be noted that the walls **16**, **17** and **18** form a recess or cavity for receiving a gas distribution valve, generally designated **25**. (This valve is disclosed to some extent in Italian application M02000A000241, filed Nov. 3, 2000, and assigned to the assignee of the present application).

[0031] Referring to FIGS. **8**, and **9** it will be noted that the valve **25** has a cylindrical outlet **26** with an exterior threaded portion received within an opening (not shown) in the wall section **17**. A fastener **27** (**FIG. 5**) is engaged with the threaded formation on the outlet **26** for securing the distribution valve **25** to the base frame.

[0032] Still referring to **FIG. 5**, it will be seen that the fastener **27** also engages an elbow **28**. This elbow is connected to a tube **30** by means of a fastener **32**. The tube **30** is attached to, and communicates with the interior of, a tube burner generally designated **34**. The opening (not shown) in the burner **34** which communicates with the tube **30** serves as the gas inlet port for the tube burner **34**.

[0033] The tube burner **34** may be of a variety of shapes depending on the desired configuration of the logs. In the embodiment shown for purposes of illustration, the tube burner **34** has four rectilinear sections provided with respective sets of outlet ports **36**, **38**, **39** and **40**. The tube burner **34** is also provided with end caps **42** and **43** as best seen in **FIG. 4**.

[0034] The tube burner **34** is suitably mounted to the base frame. This tube burner is preferably, but not necessarily, adapted to produce yellow flames.

[0035] The atmospheric gas burner unit **10** also includes four blade burners **50**, **51**, **52** and **53**, These blade burners may be adapted to produce blue or yellow flames or a mixture thereof The four blade burners are of identical construction.

[0036] Referring to **FIG. 7**, each blade burner includes a central opening or chamber **55** having a flared inlet portion **55***a* at its inner end. Each blade burner has a set of outlet openings or ports **56** communicating with the chamber **55**.

[0037] Referring particularly to **FIGS. 8, 9** and **10**, the gas distribution valve **25** includes an inlet opening **60** and six outlet openings including the outlet opening **26** and five additional outlet openings **62-66**, The outlet **26** communicates with the elbow **28** for delivering gas to the tube burner **34**. The outlet **62** communicates with the flared opening **55***a* of the blade burner **52**. Similarly, the outlet **63** communicates with the opening **55** in the blade burner **51**. The outlet **64** communicates with the chamber **55** of the blade burner **50**; the outlet opening **65** communicates with the opening **55** in the blade burner **53**. Finally, the outlet opening **66** communicates with a tube **70** (**FIGS. 6 and 7**) extending to a pilot light and ignition assembly **72** shown in **FIG. 6**. As noted in **FIG. 7**, each of the outlet openings **62-65** preferably communicate with an outlet nipple, such as the nipple **76**, to facilitate the passage of gas to the adjacent flared openings **55***a* in the respective blade burners.

[0038] As seen in **FIG. 6**, the inlet opening **60** communicates with a tube **74** extending to a thermostat and safety control valve, generally designated **75**. This control valve communicates with the main regulator assembly (not shown).

[0039] The gas distribution valve **25** has a central longitudinal bore **80** (FIGS. **12A-12**) rotatably receiving a cylindrical valve member **82** which is attached to the valve stem **78**. An operating knob (not shown) may be attached to the valve stem for manually rotating the cylindrical valve member to the desired rotary position. It will be understood that the cyclindrical valve member **82** has various passageways (shown schematically in FIGS. **12A-12F**) for communicating the inlet opening **60** with one or more of the valve outlet openings **26** and **62-66**. This valve member is similar to the valve shown in U.S. Pat. No. 5,470,018 referred to above.

[0040] Turning to FIGS. **1112A-12F**, when the rotary valve member **82** is in the "0" position, the inlet opening **60** is not in communication with any of the outlet openings. When the control knob is rotated counterclockwise (as seen in **FIG. 11**) to position "1", the inlet opening **60** is placed in communication with outlet **66** for admitting gas to the pilot light and ignition assembly **72**. During successive rotation of the valve member, the inlet opening **62** remains in communication with the outlet opening **66** which extends to the pilot light assembly.

[0041] When the operating member is rotated to position "2" shown in **FIG. 11**, gas is admitted to outlet opening **26** thereby permitting the flow of gas to tube burner **34** for exit from the ports **36**, **38**, **39** and **40** and ignition by the pilot light assembly **72**. Movement of the cylindrical valve member to position "3" shown in **FIG. 11** permits the flow of gas to outlets **66**, **26** and **62**, the latter communicating with right rear blade burner **50**. Gas in blade burner **50** is ignited from the flames emanating from tube burner **34**. As noted in **FIG. 5, a** set of transfer ports **80** in burner **34** facilitates the ignition of gas in blade burner **50**.

[0042] When the rotary valve member is rotated to position "4" shown in **FIG. 11**, left rear blade burner **51** will receive the supply of gas; this gas will be ignited from the flames emanating from the set of ports **36** in tube burner **34**, again through the agency of transfer ports (not shown) formed in the burner **34** adjacent the ports **36**. Finally when the rotary valve member is rotated to position "5" as seen in **FIG. 11**, both front blade burners **52** and **53** will receive the

flow of gas. These two burners will be ignited from blade burners **50** and **51** because of the close proximity of the inner ends of burners **50,52** and thew inner ends of blade burners **51,53**.

[**0043**] The present invention has been described in detail with reference to a preferred embodiment thereof However, variations and modifications can be effected within the spirit and scope of the invention as defined by the following claims.

We claim:

1) A gas burner assembly comprising:

a) a base;

b) a gas distribution valve supported by the base and having an inlet opening and a plurality of outlet openings; and

c) a plurality of burner elements mounted by the base, each having an inlet port and a plurality of outlet ports, the inlet port of each burner element being in proximate spaced relationship with respective ones of said valve outlet openings thereby defining open spaces through which gas may flow from the distribution valve to the burner elements

2) A gas burner assembly comprising:

a) a base;

b) a gas distribution valve supported by the base and having an inlet opening and plurality of outlet openings;

c) a first burner element mounted by the base and having an inlet port and a plurality of outlet ports;

d) conduit means communicating said inlet port of the first burner element with one of the outlet openings of the distribution valve;

e) a plurality of second burner elements mounted by the base and each having an inlet port and a plurality of outlet ports, the inlet ports of the second burner elements being in proximate spaced relationship with respective other outlet openings of the gas distribution valve thereby defining open spaces through which gas may flow from the distribution valve to the second burner elements; and

f) an ignition unit mounted by the base in adjacent relationship with one of said first and second burner elements thereby to ignite gas admitted to said one of said first and second burner elements, at least one of the others of said first and second burner elements having a portion thereof in adjacent relationship with said one of said first and second burner elements whereby gas ignition in said one of said first and second burner elements causes ignition in the others of said first and second burner elements.

3) A gas burner assembly comprising:

a) a base;

b) a gas distribution valve supported by the base and having an inlet opening and a plurality of outlet openings;

c) a plurality of burner elements mounted by the base and each having an inlet port and a plurality of outlet ports, the inlet ports of the burner elements being in proximate spaced relationship with respective outlet openings of the distribution valve thereby to define open spaces through which gas may flow from the valve outlet openings to the burner elements; and

d) an ignition unit mounted on the base in adjacent relationship with one of said burner elements thereby to ignite gas admitted to said one burner element, at least one of the others of said burner elements having a portion thereof in adjacent relationship with said one burner element whereby gas ignition in said one burner element causes ignition in the others, of said burner elements.

4) The gas burner assembly according to claims **1**, **2** or **3** wherein said distribution valve is further defined by:

a) a valve body having a first cylindrical bore;

b) said valve body having a plurality of second through bores each communicating with said cylindrical bore and defining said outlet openings of the distribution valve;

c) a cylindrical valve unit mounted in said first cylindrical bore for rotation therein and having an axial bore defining at least in part said inlet opening of the distribution valve, said cylindrical valve unit also having a plurality of radial through bores each communicating with said axial bore, said radial through bores being positioned for selective registry with respective ones of said second through bores in response to rotary movement of said cylindrical valve unit.

5) The gas burner assembly according to claim 4 wherein at least three of said second through bores define longitudinal central axes contained in a common plane perpendicular to the axis of rotation of said cylindrical valve unit.

6) The gas burner assembly according to claim 2 wherein said ignition unit is mounted adjacent said first burner element.

* * * * *