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(54) FLAME SIMULATING ASSEMBLY

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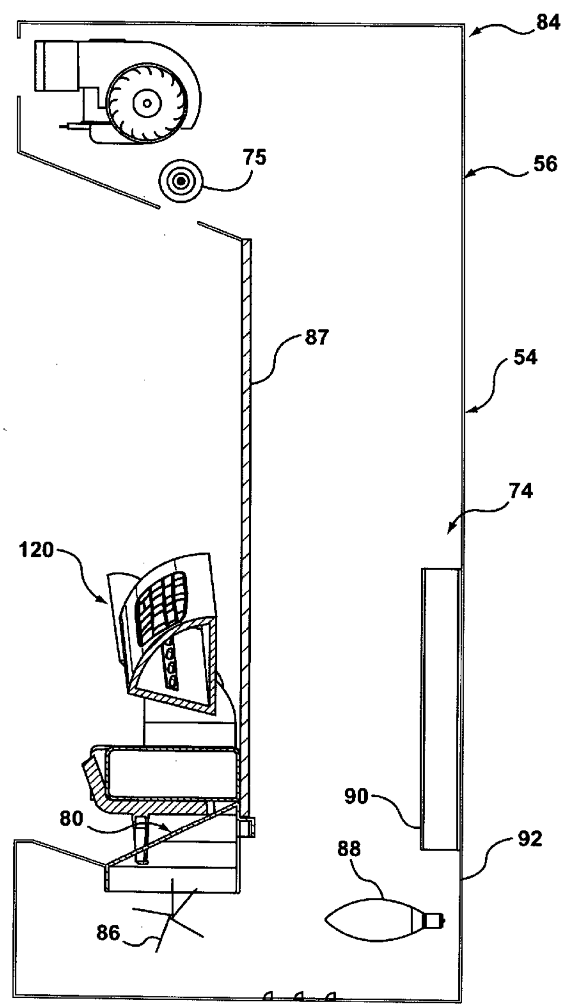
(52) **U.S. Cl.** **40/428**

(57) **ABSTRACT**

A simulated fuel bed for simulating a combustible fuel in a fire. The simulated fuel bed includes a plurality of simulated combustible fuel elements, including one or more light-producing simulated combustible fuel elements. A body of the light-producing simulated combustible fuel element has one or more cavities therein, and one or more light sources positioned to direct light therefrom inside the cavity. The body includes an exterior surface and one or more light-transmitting parts extending between the cavity and the exterior surface. The light-transmitting part is positioned in a path of light from the light source. The light from the light source is transmittable through the light-transmitting part to the exterior surface for simulating glowing embers of the combustible fuel.



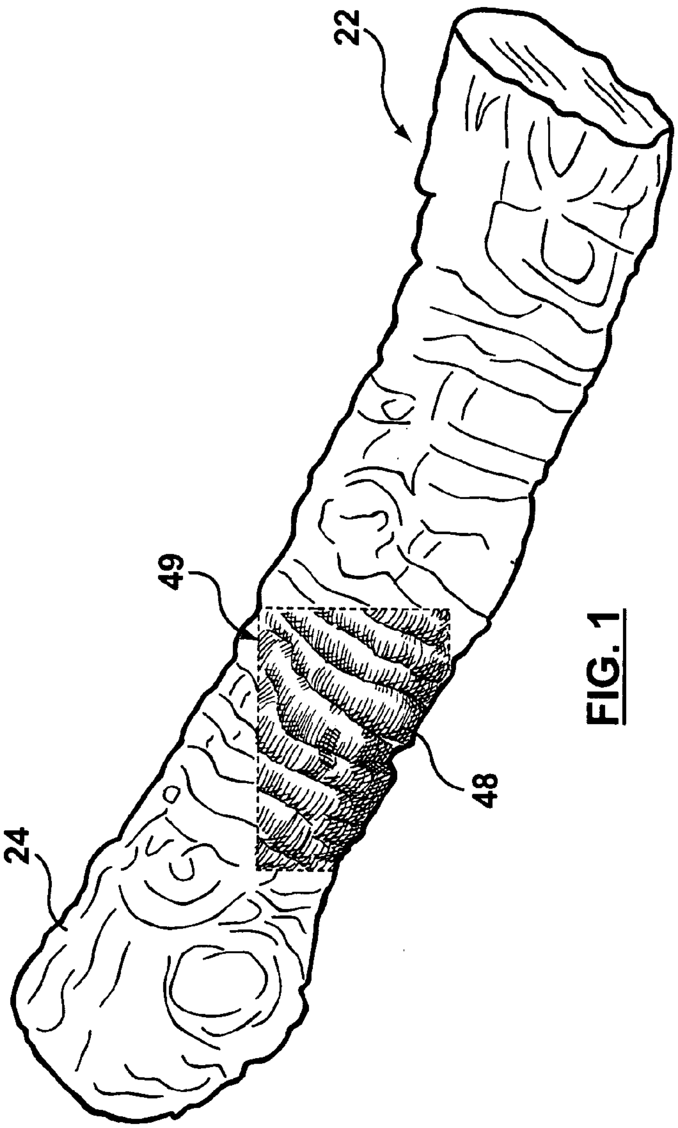


FIG. 1

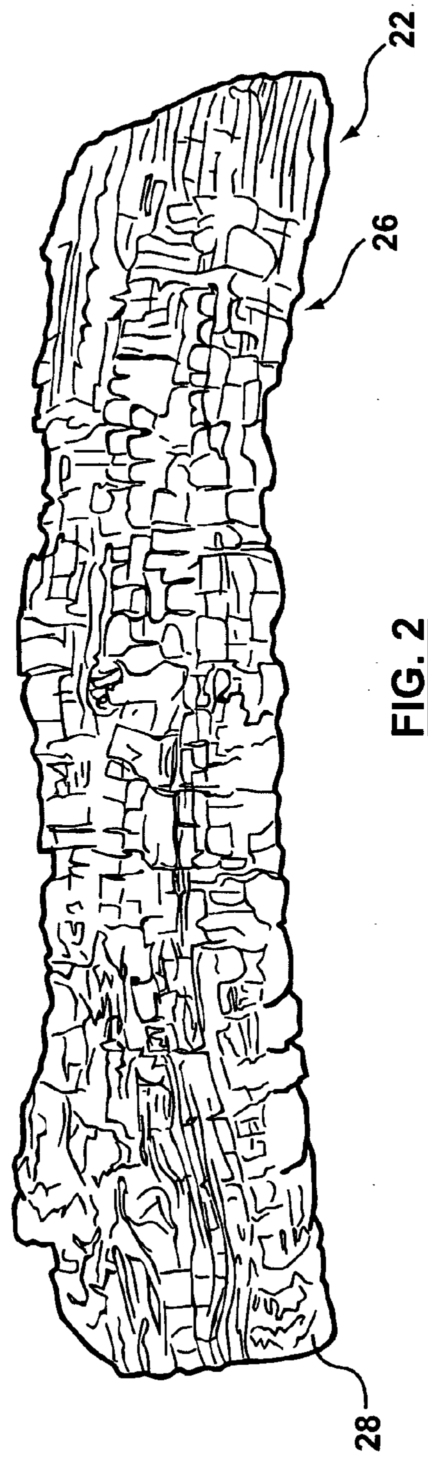


FIG. 2

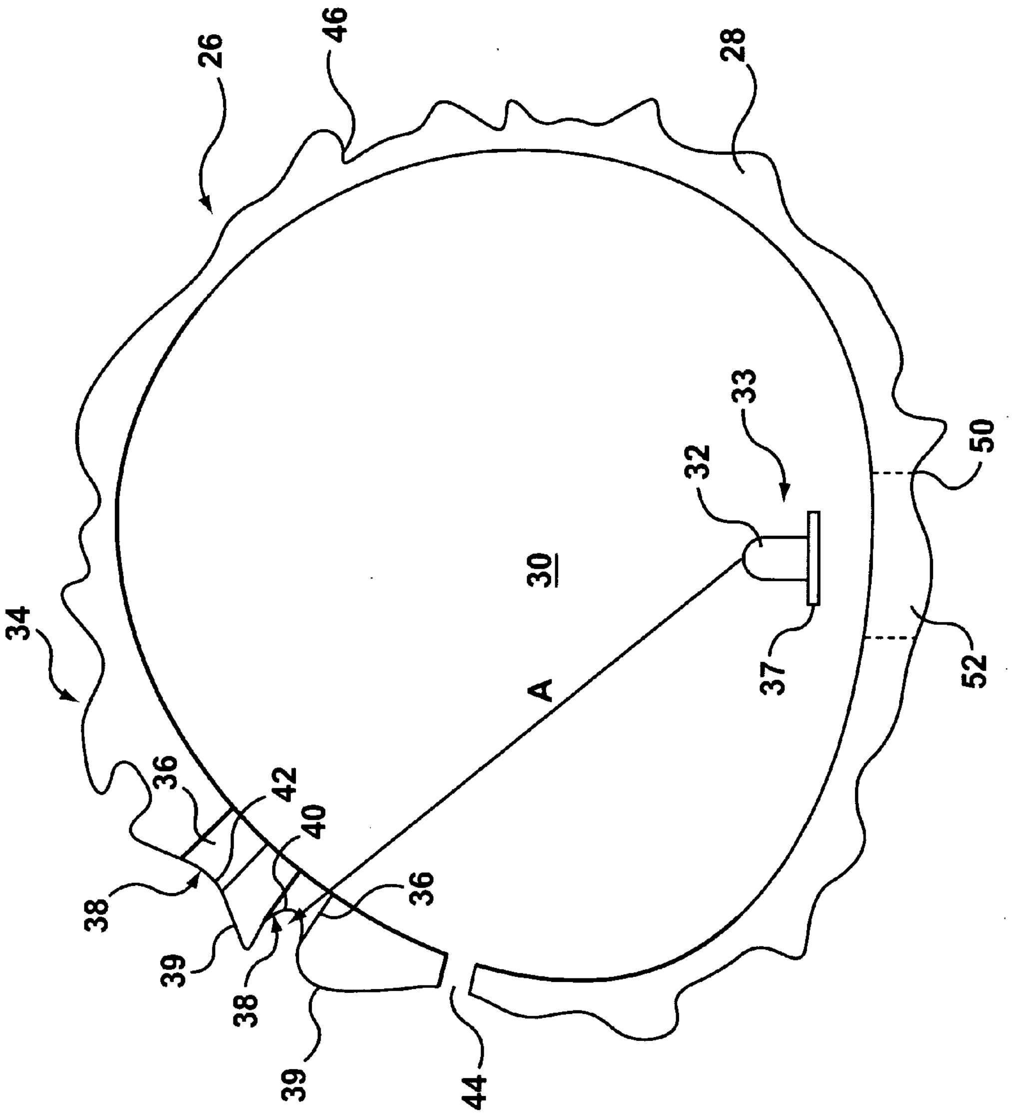


FIG. 3

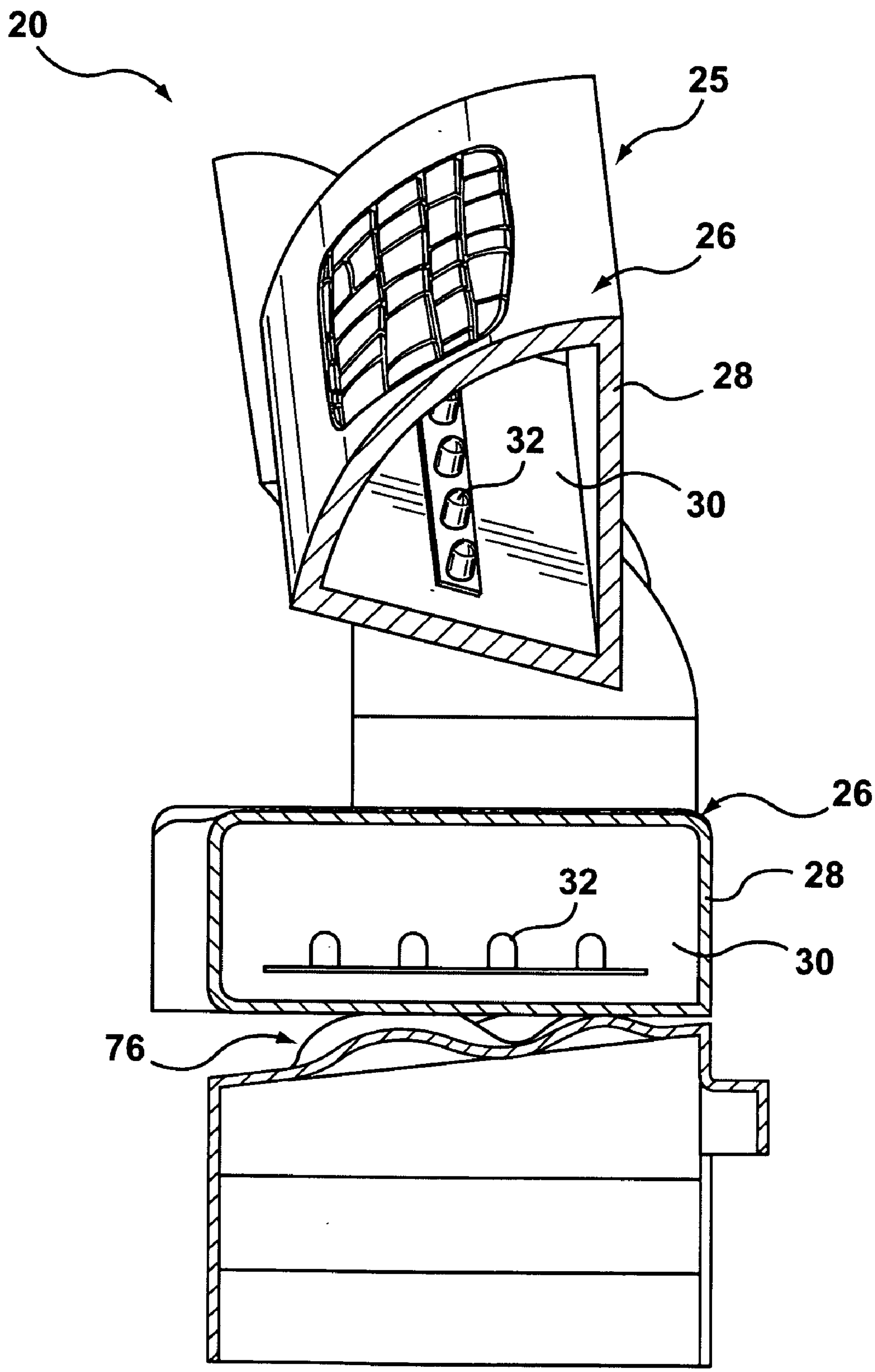


FIG. 4A

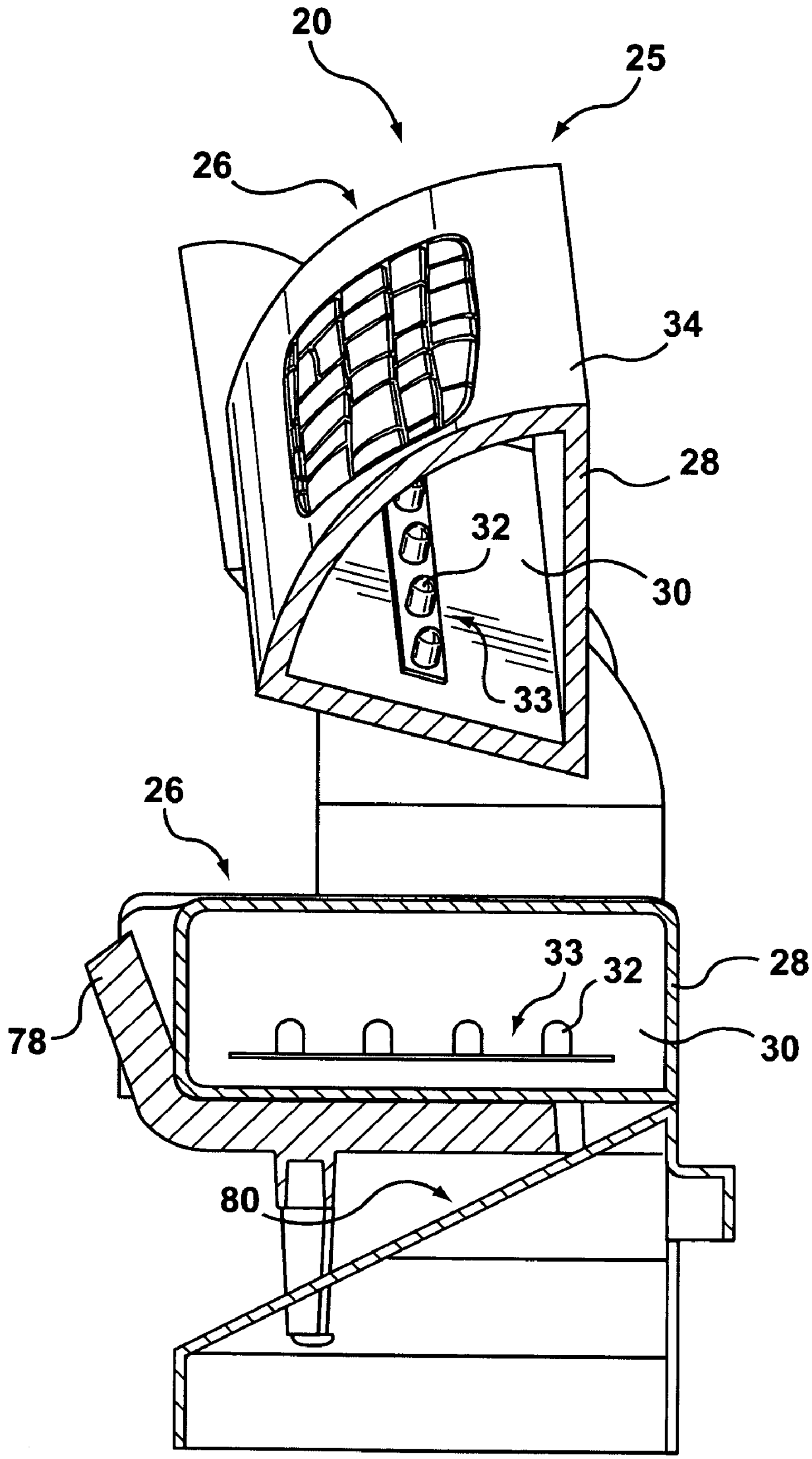


FIG. 4B

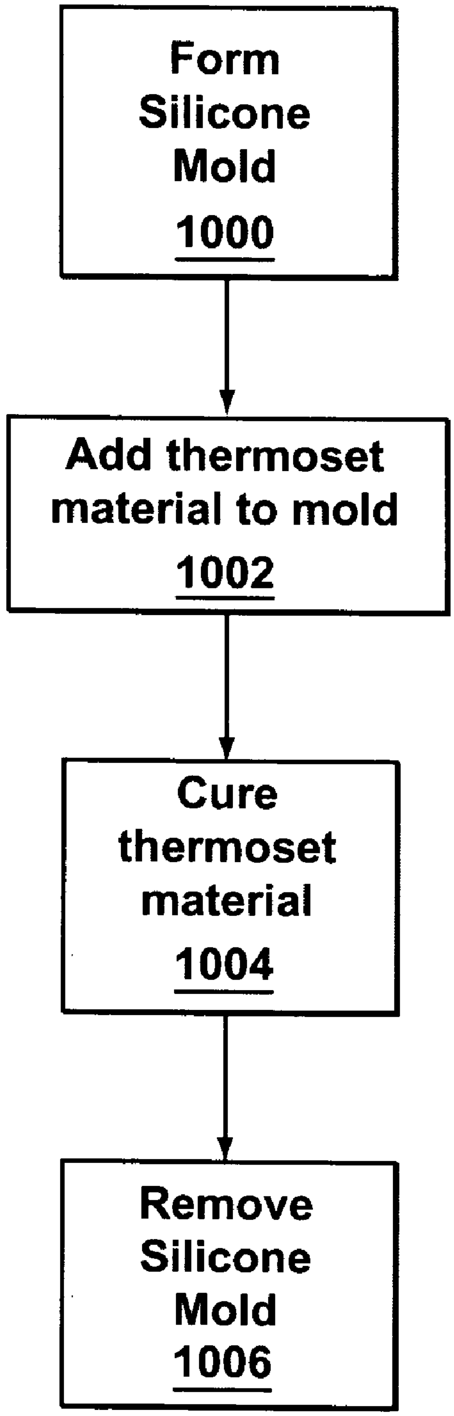

Form Silicone Mold 1000
Add thermoset material to mold 1002
Cure thermoset material 1004
Remove Silicone Mold 1006

FIG. 5

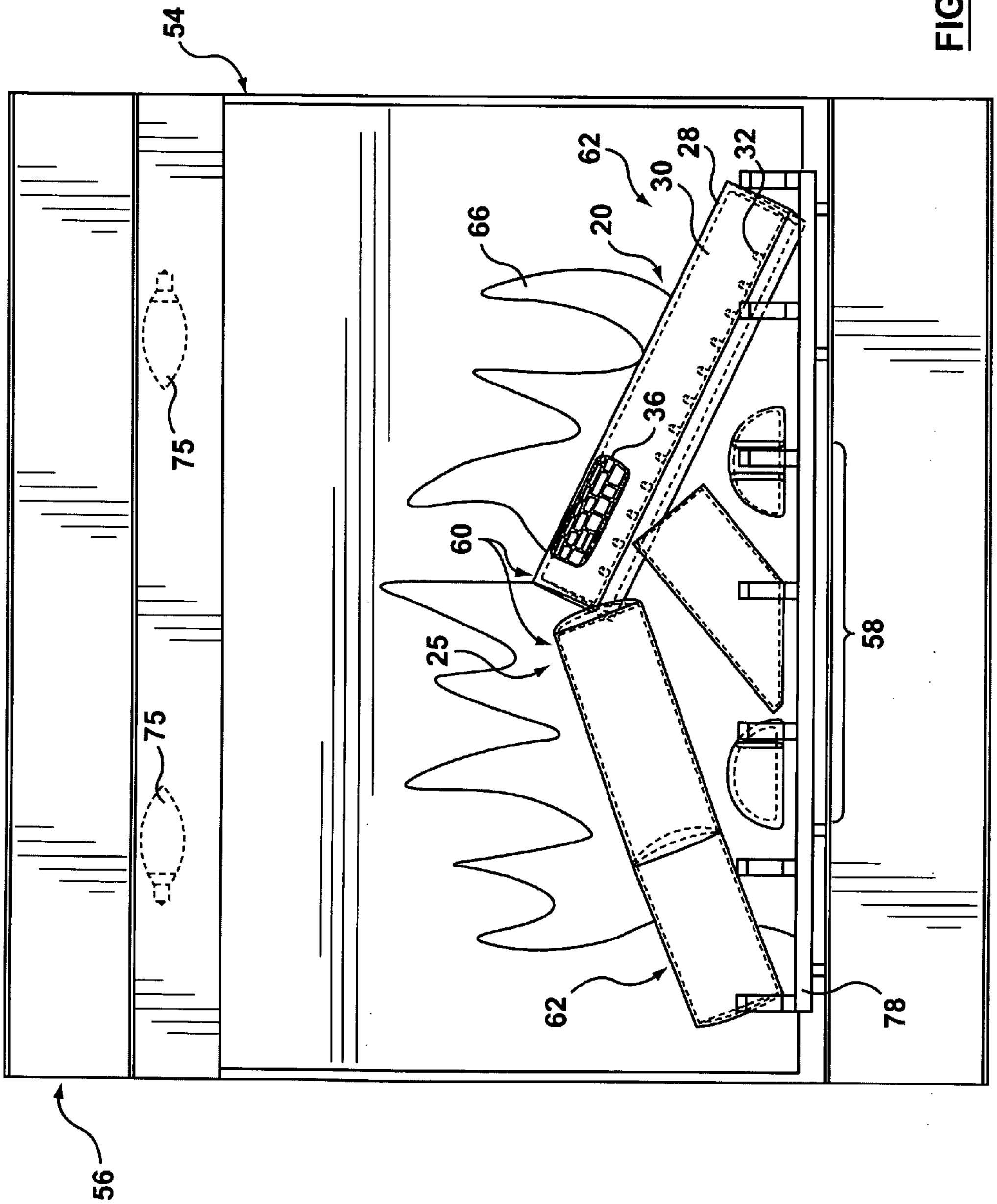


FIG. 6

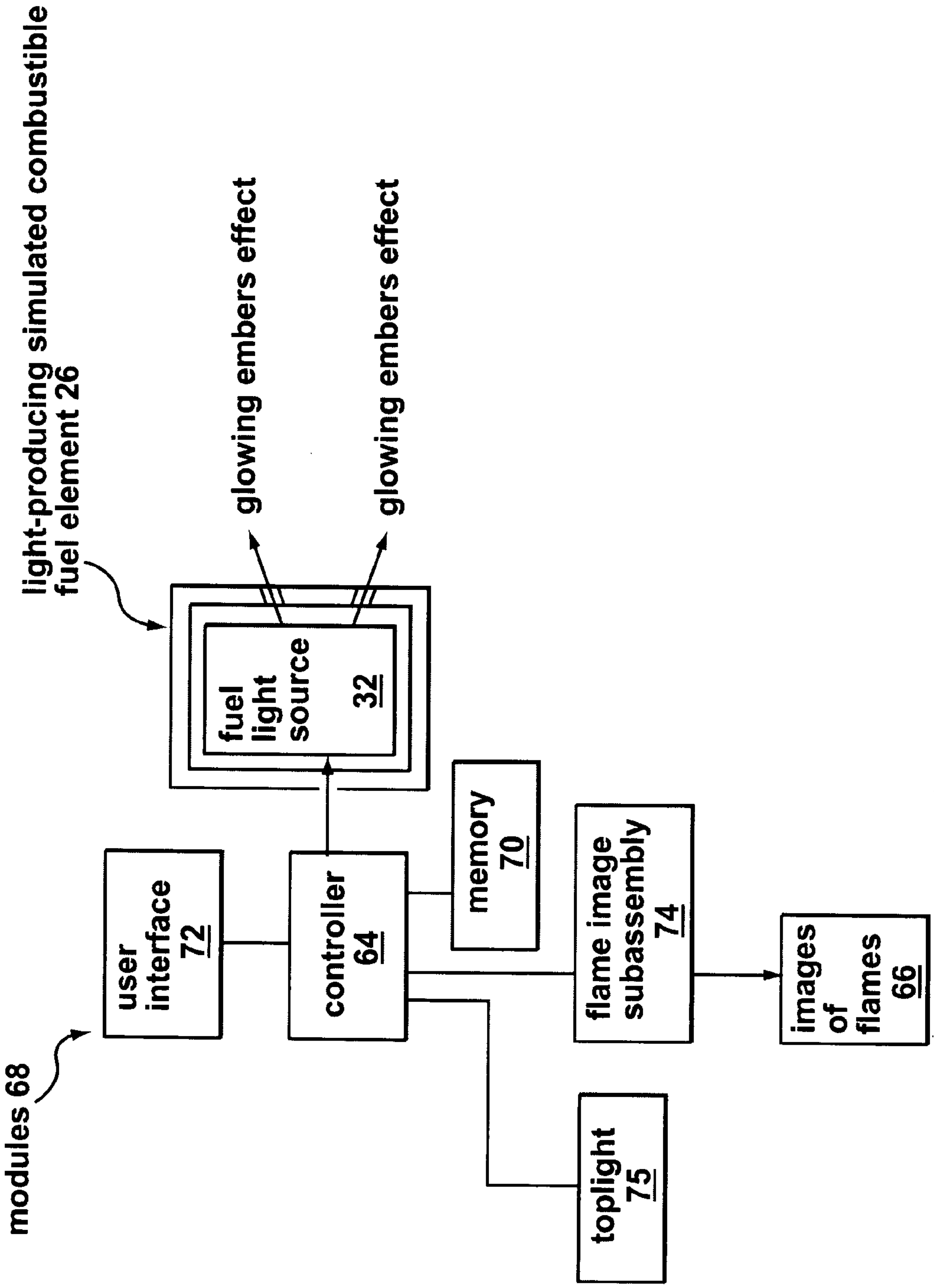

light-producing simulated combustible fuel element 26
glowing embers effect
glowing embers effect
fuel light source 32
modules 68
user interface 72
controller 64
memory 70
flame image subassembly 74
images of flames 66
toplight 75

FIG. 7

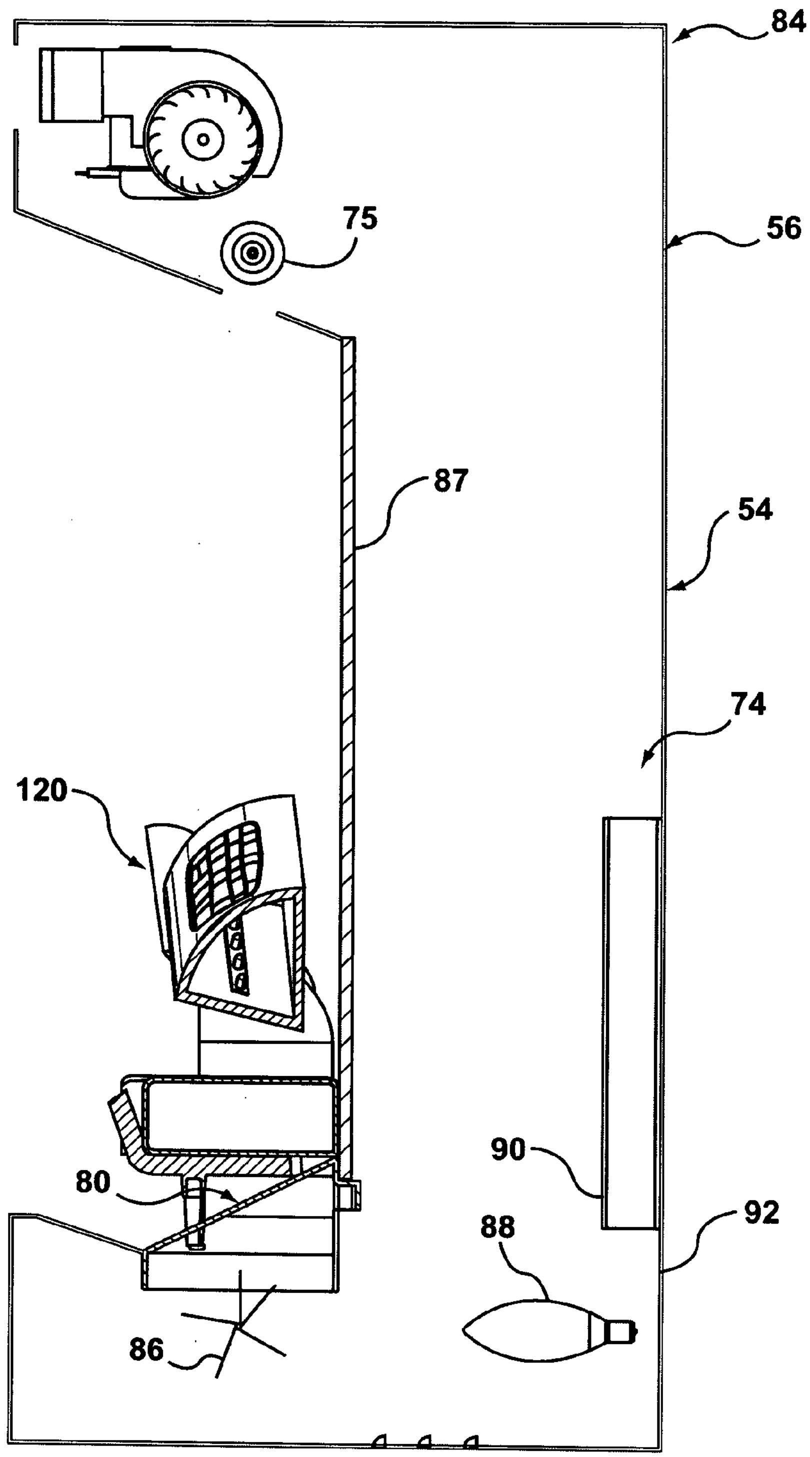


FIG. 8

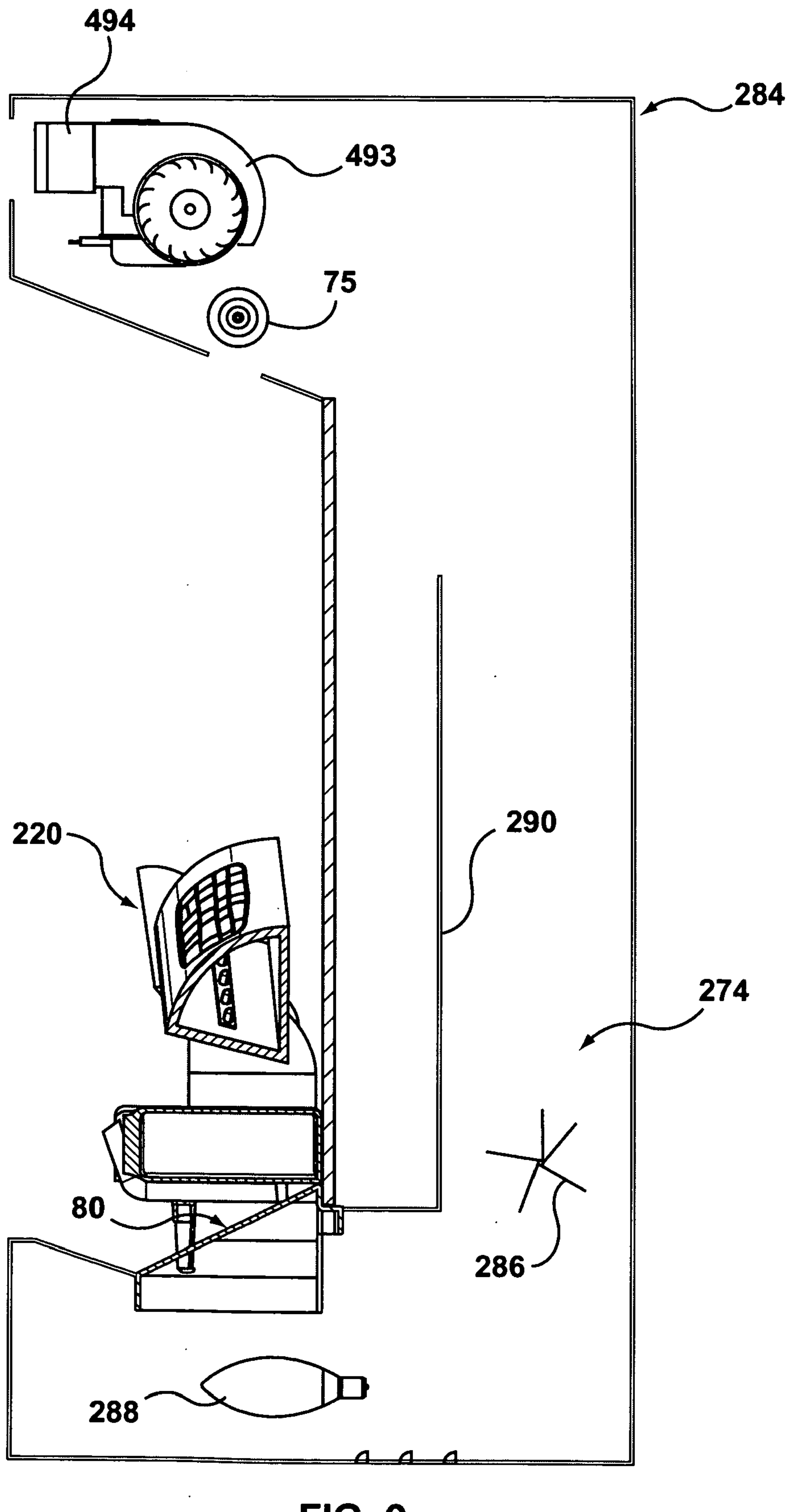


FIG. 9

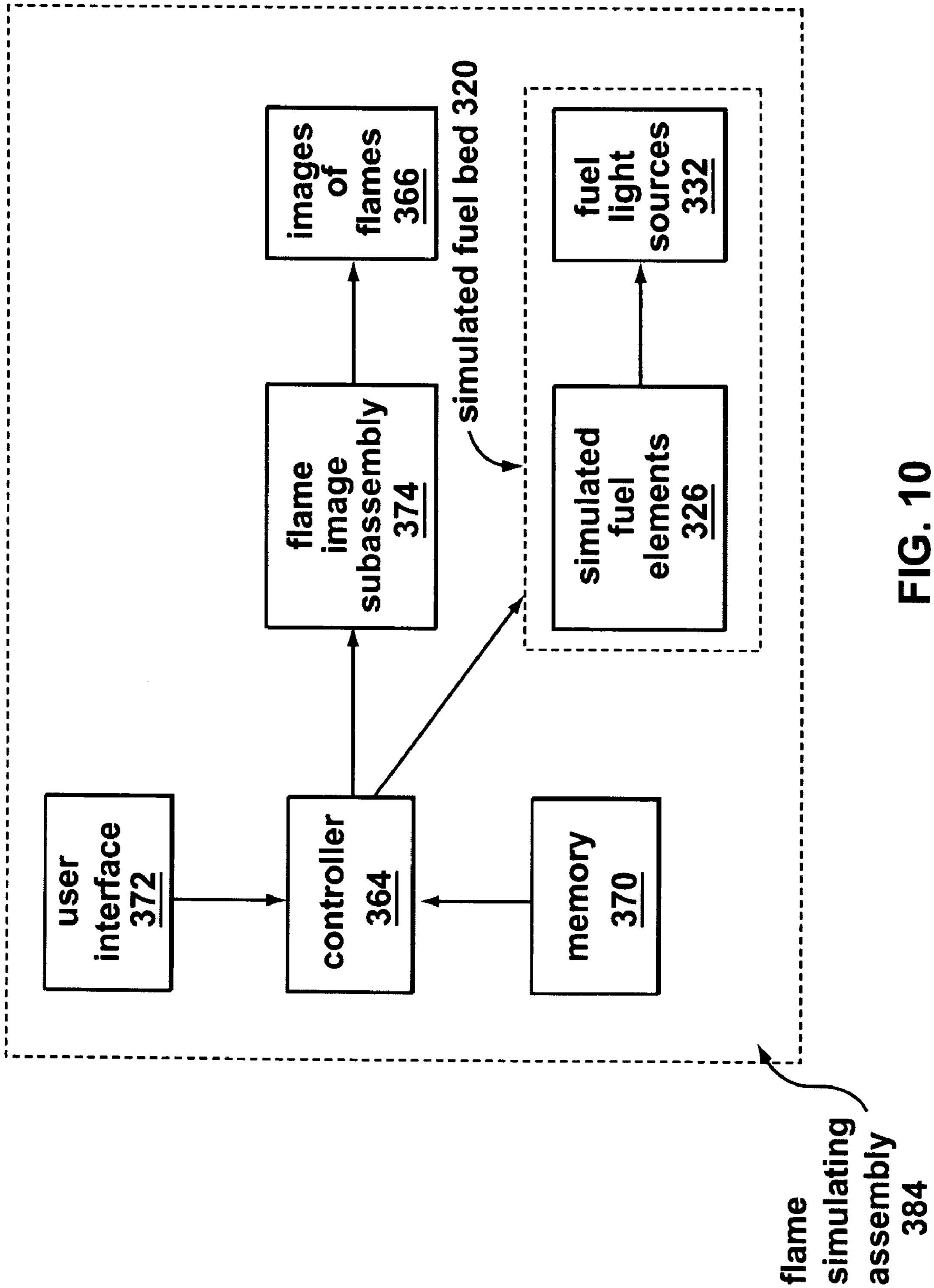

user interface 372
controller 364
memory 370
flame image subassembly 374
images of flames 366
simulated fuel bed 320
simulated fuel elements 326
fuel light sources 332
flame simulating assembly 384

FIG. 10

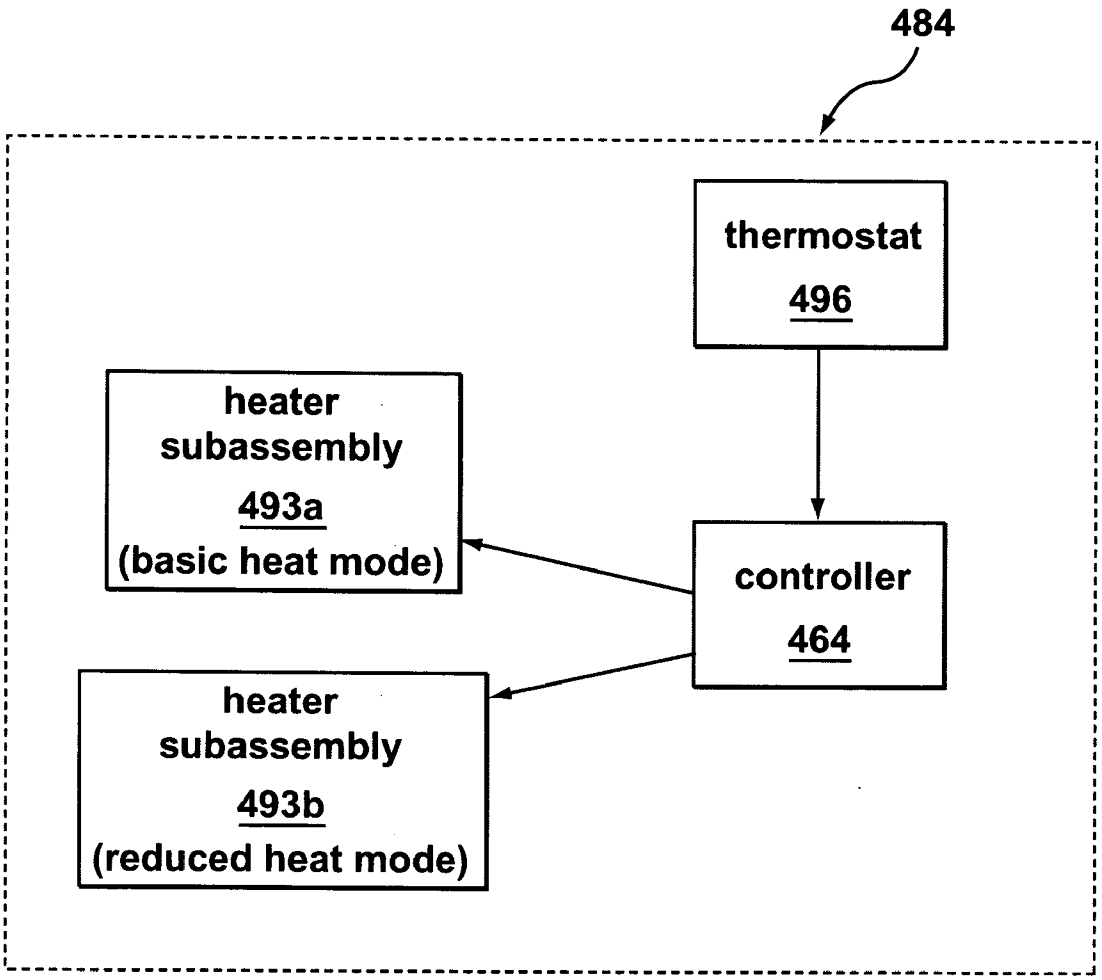

484
thermostat
496
heater
subassembly
493a
(basic heat mode)
controller
464
heater
subassembly
493b
(reduced heat mode)

FIG. 11

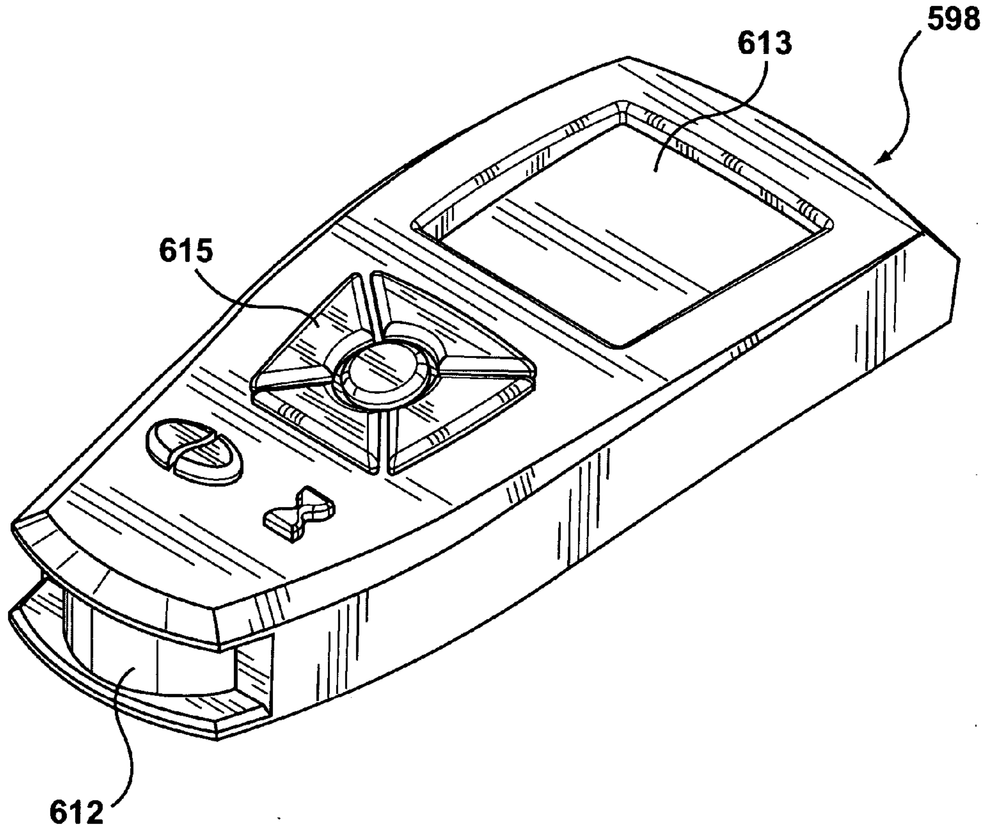


FIG. 12

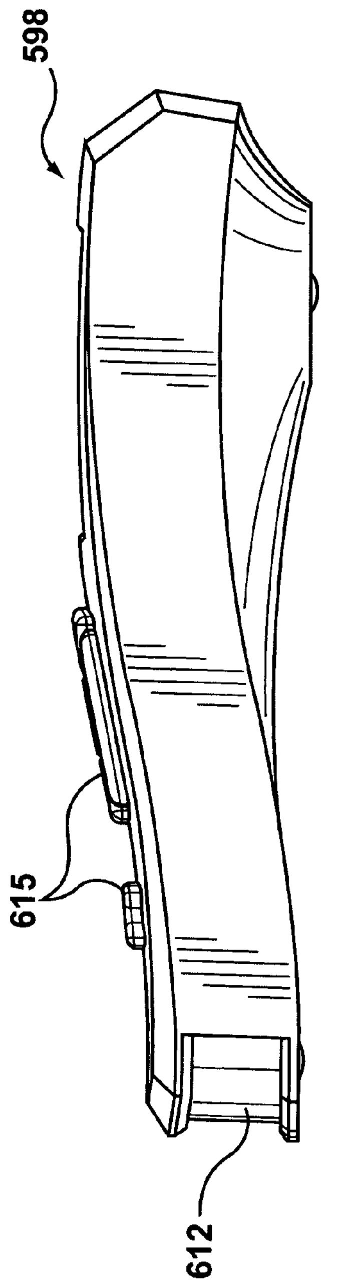


FIG. 13

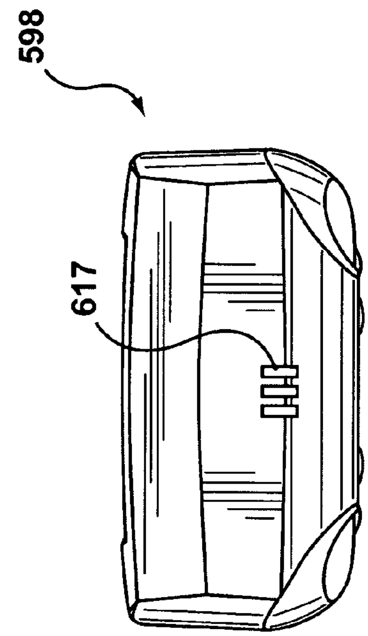


FIG. 15

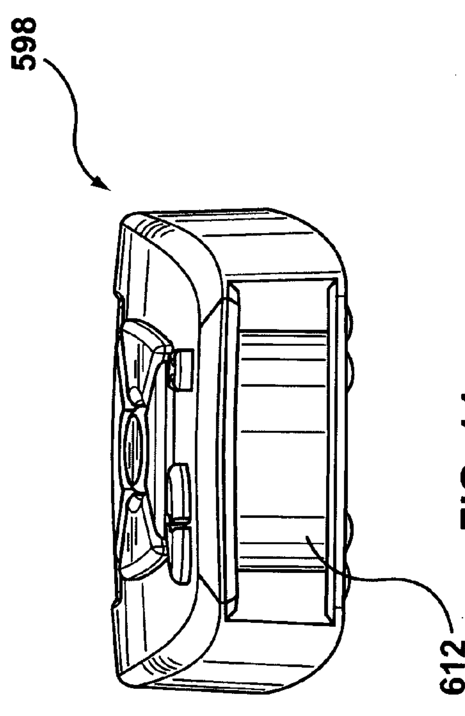


FIG. 14

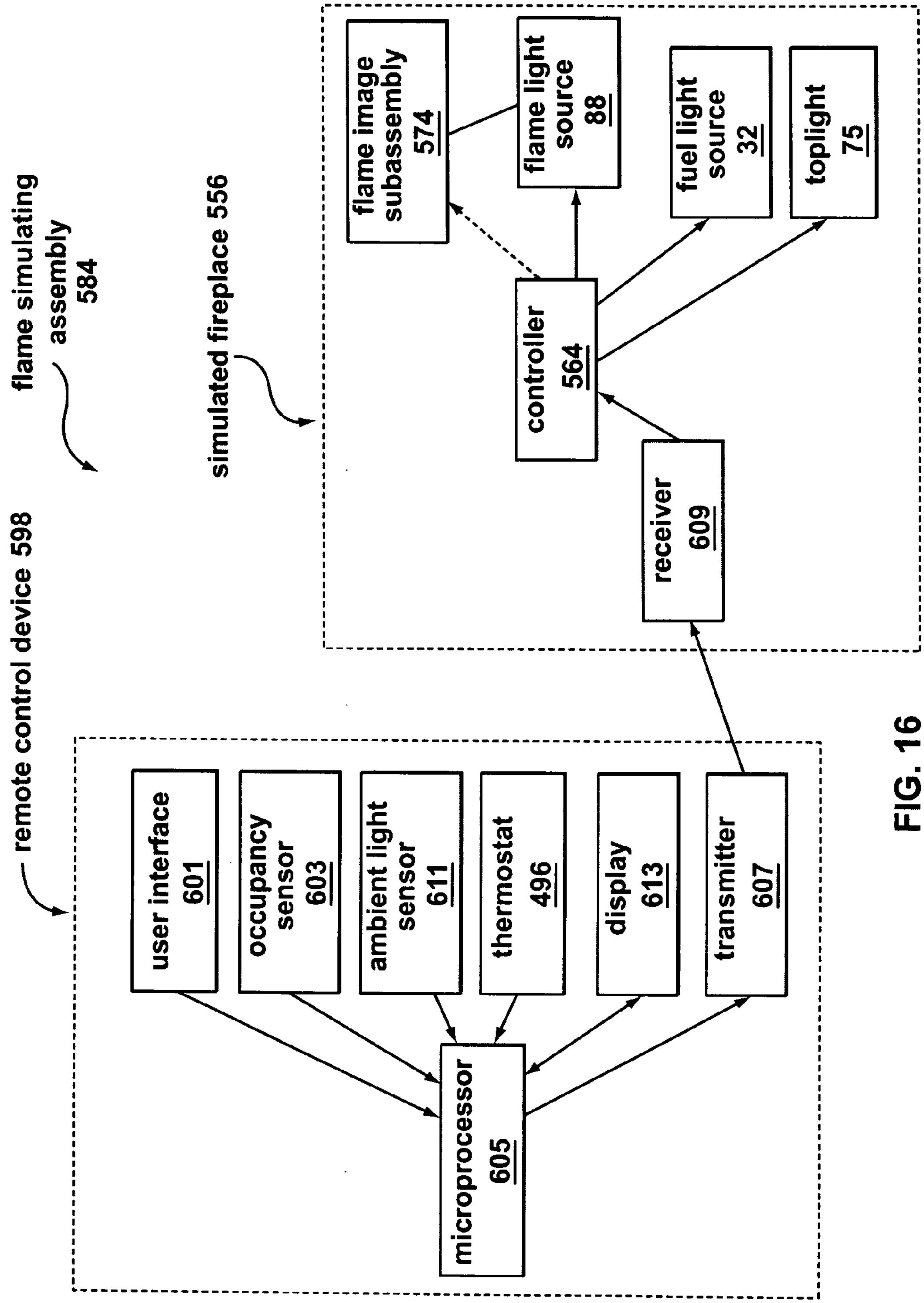

flame simulating assembly 584
remote control device 598
simulated fireplace 556
user interface 601
occupancy sensor 603
ambient light sensor 611
thermostat 496
display 613
transmitter 607
microprocessor 605
receiver 609
controller 564
flame image subassembly 574
flame light source 88
fuel light source 32
toplight 75

FIG. 16

FLAME SIMULATING ASSEMBLY

[0001] This application claims the benefit of U.S. Provisional Application No. 60/628,109, filed Nov. 17, 2004.

FIELD OF THE INVENTION

[0002] This invention is related to a flame simulating assembly for providing images of flames.

BACKGROUND OF THE INVENTION

[0003] Various types of flame simulating assemblies, such as electric fireplaces, are known. Many of the prior art flame simulating assemblies include a simulated fuel bed which resembles a burning solid combustible fuel, as well as embers and ashes resulting from the combustion. For example, U.S. Pat. No. 566,564 (Dewey) discloses an electric heating apparatus with a cover (B') which "is made . . . of a transparent or semitransparent material" (p. 1, lines 50-52). The cover is "fashioned or colored" so that it resembles coal or wood "in a state of combustion when light is radiated through it" (p. 1, lines 53-57).

[0004] However, the use of a cover or a (partially translucent shell) such as the cover disclosed in Dewey to imitate burning solid combustible fuel has some disadvantages. First, a portion of the shell typically is formed to simulate the fuel (e.g., logs), and another portion of the shell simulates an ember bed (i.e., embers and ashes) which results from combustion of the fuel. For instance, where the combustible fuel to be simulated is wood in the form of logs, the logs are simulated in the shell by raised parts which are integral to the shell, rather than pieces which are physically separate from the ember bed. Because it is evident from even a cursory observation of this type of prior art simulated fuel bed that the raised parts (i.e., simulated logs) are actually formed integrally with the simulated ember bed part of the shell, this type of simulated fuel bed tends to detract from the simulation effect sought.

[0005] Another disadvantage of the prior art results from characteristics of the typical light source which is intended to provide light which imitates the light produced by glowing embers in a real fire. In the prior art, the same light source is often used to provide both a flame effect (i.e., to simulate flames), and an ember simulation effect (i.e., to simulate glowing embers). However, the characteristics of light from embers are somewhat different from those of light from flames. For instance, embers generally tend to glow, and pulsate, but flames tend to flicker, and move. Because of these differences, attempts in the prior art to use the same light source to provide a flame simulation effect and a burning ember simulation effect have had somewhat limited success.

[0006] Also, the positioning of the light source intended to provide the ember simulation effect is somewhat unsatisfactory in the prior art. In a natural fire, most glowing embers are located on partially-consumed fuel, and the balance of the glowing embers are located in the ember bed. However, in the prior art, the relevant light source is positioned somewhat lower than the simulated fuel portions, i.e., beneath the shell. Accordingly, because the light which is simulating the light from glowing embers is located well below the shell, an observer can easily see that the light does not originate in the vicinity of the raised portions representing logs, but instead is originating from below the shell. In this way, the usual location of the light source in the prior art undermines the simulation effect.

[0007] U.S. Pat. No. 2,285,535 (Schleft) discloses an attempt to address the problem of the fuel parts being obviously integrally formed with the simulated ember bed. Schlett discloses a "fireplace display" including "an arrangement of actual fuel or of a fuel imitation . . . such as imitation wood logs" (p. 1, lines 22-24). In Schlett, therefore, the problem of the simulated logs appearing unrealistically to be part of the simulated ember bed is apparently addressed by the "fuel" (i.e., either actual logs or imitation logs, and also either actual lumps of coal or imitations thereof) being presented as discrete physical entities in the absence of an ember bed (as shown in FIG. 2 in Schlett). Also, Schlett does not disclose any attempt to simulate glowing embers in the fuel.

[0008] WO 01/57447 (Ryan) discloses another attempt to provide a more realistic simulated fuel bed. Ryan discloses "hollow simulated logs", each of which includes an ultraviolet light tube (p. 11, lines 25-27). The simulated logs are described as preferably being made from cardboard tubing, but also may be constructed in other ways (p. 12, lines 18-27 and p. 13, line 1). An ember simulator is provided which is painted with fluorescent paint (p. 18, lines 4-6). Also, silk flame elements, meant to simulate flames, are treated so that they fluoresce when exposed to ultraviolet light from the ultraviolet light tubes positioned in the cardboard tubing. The tubing includes apertures to permit exposure of fluorescent elements to ultraviolet light from inside the tubing. However, the tubing appears unrealistic in appearance, and the fluorescing portions would appear to be unconvincing imitations of flames and embers, which would generally not be fluorescent in a natural fire.

[0009] In addition, the flame simulating assemblies of the prior art typically do not provide for control, beyond activation and de-activation, of the light sources providing images of flames or other light sources. In particular, prior art flame simulating assemblies do not typically include controls which provide for increases or decreases in the intensity of the light provided by one or more light sources in relation to ambient light intensity.

[0010] There is therefore a need for a simulated fuel bed to overcome or mitigate at least one of the disadvantages of the prior art.

SUMMARY OF THE INVENTION

[0011] In its broad aspect, the invention provides a simulated fuel bed for simulating a solid combustible fuel in a fire. The simulated fuel bed includes a plurality of simulated combustible fuel elements. Each said simulated combustible fuel element has a body colored and formed for simulating an entire combustible fuel element. The simulated combustible fuel elements include one or more light-producing simulated combustible fuel elements. The body of the light-producing simulated combustible fuel element has one or more cavities therein. The light-producing simulated combustible fuel element has one or more light sources positioned to direct light therefrom inside the cavity. The body of the light-producing simulated combustible fuel element also includes an exterior surface and one or more light-transmitting parts extending between the cavity and the exterior surface. Also, the light-transmitting part is positioned in a path of light from the light source. The light from the light source is transmittable through the light-transmitting part to the exterior surface for simulating glowing embers of the combustible fuel.

[0012] In another aspect, the simulated fuel bed additionally includes a simulated ember bed. The simulated combustible fuel elements are positionable at least partially above the simulated ember bed.

[0013] In another of its aspects, the simulated fuel bed includes a controller to cause the light from the light source to pulsate for simulating light from glowing embers.

[0014] In yet another aspect, the body includes one or more apertures positioned relative to the light source for permitting said light from the light source to pass through the aperture.

[0015] In another of its aspects, the invention provides a flame simulating assembly including a flame image subassembly for providing images of flames and a simulated fuel bed. The flame image subassembly positions the images of flames so that said images of flames appear to emanate from the simulated fuel bed. The simulated fuel bed includes a plurality of simulated combustible fuel elements, each of the simulated combustible fuel elements having a body colored and formed for simulating an entire combustible fuel element. The combustible fuel elements include one or more light-producing simulated combustible fuel elements. The body of the light-producing simulated combustible fuel element has a cavity therein. The light-producing simulated combustible fuel element also has one or more light sources positioned at least partially in the cavity. The body of the light-producing simulated combustible fuel element additionally has one or more light-transmitting parts positioned in a path of light from the light source. The light-transmitting part extends between the cavity and the exterior surface so that the light-transmitting part resembles glowing embers of the combustible fuel upon transmission therethrough of light from the light source. The simulated fuel bed also includes a controller for causing the light from the light source to pulsate for simulating light from glowing embers.

[0016] In another aspect, the invention includes a method of forming a simulated combustible fuel element. The method includes the steps of first, providing a resiliently flexible mold prepared using as a model a partially burned sample of a combustible fuel element, and second, introducing a predetermined amount of a liquefied body material into the mold. The third step is rotating the mold to produce a body comprising the body material and resembling the entire combustible fuel element. The body includes one or more cavities and an exterior surface. Next, the body material is cured, to solidify the body material. In the fifth step, an access hole is formed in the body in communication with the cavity, and in the sixth step, one or more light sources are inserted at least partially in the cavity through the access hole, to locate the light source in a predetermined position. The next step involves inserting plug material into the access hole, to substantially block the access hole. The final step involves coating at least a portion of the exterior surface in accordance with a predetermined exterior surface pattern to provide (i) one or more light-transmitting parts positioned in a path of light from the light source (the light-transmitting part being colored to resemble glowing embers of the combustible fuel upon transmission therethrough of light from the light source), and (ii) one or more substantially opaque exterior parts colored to resemble a non-ember part of the combustible fuel.

[0017] In yet another aspect, the invention provides a flame simulating assembly including a flame image subassembly for providing images of flames and a simulated fuel bed, the flame image subassembly being positioned relative to the simulated fuel bed so that the images of flames at least partially appear to emanate from the simulated fuel bed. The flame simulating assembly also includes a controller for causing the flame image subassembly to provide a predetermined sequence of changes in the images of flames.

[0018] In another aspect, the predetermined sequence of changes includes a gradual increase in intensity of the images of flames.

[0019] In yet another aspect, upon commencement of the predetermined sequence of changes the intensity of the images of flames is relatively low, so that the predetermined sequence of changes resembles a natural fire during commencement thereof.

[0020] In another of its aspects, the predetermined sequence of changes includes a gradual decrease in intensity of said images of flames.

[0021] In yet another aspect, the predetermined sequence of changes causes the images of flames to resemble a natural fire which is gradually dying.

[0022] In another of its aspects, the predetermined sequence of changes proceeds at a preselected rate.

[0023] In another aspect, the preselected rate is determined by the controller.

[0024] In another aspect, the controller is controllable by a user via a user interface and the predetermined sequence of changes proceeds at a rate determined by the user via the user interface.

[0025] In yet another aspect, the flame simulating assembly additionally includes one or more fuel light sources positioned in one or more simulated fuel elements in the simulated fuel bed, to simulate glowing embers.

[0026] In another of its aspects, the controller is adapted to cause the light provided by the fuel light source to vary.

[0027] In another of its aspects, the invention includes a flame simulating assembly including a heater subassembly comprising at least one heater element, the heater subassembly being adapted to operate in a basic heat mode, in which the heater subassembly consumes a first amount of electrical power, and also being adapted to operate in a reduced heat mode, in which the heater subassembly consumes a second amount of electrical power, the first amount being substantially greater than the second amount. The flame simulating assembly also includes a controller comprising means for converting the heater subassembly between the basic heat mode and the reduced heat mode.

[0028] In yet another of its aspects, the flame simulating assembly additionally includes a thermostat for controlling the heater subassembly, the thermostat being adapted to operate the heater subassembly in the basic heat mode upon ambient temperature differing from a preselected temperature by more than a predetermined difference, and the thermostat being adapted to operate the heater subassembly in the reduced heat mode upon ambient temperature differing from the preselected temperature by less than the predetermined difference.

[0029] In another of its aspects, the invention provides a flame simulating assembly including a simulated fireplace with a flame image subassembly for providing images of flames and a simulated fuel bed, the flame image subassembly being positioned relative to the simulated fuel bed so that the images of flames at least partially appear to emanate from the simulated fuel bed. The flame simulating assembly also includes a controller for controlling the simulated fireplace and an occupancy sensor for detecting motion and operatively connected to the controller. The occupancy sensor is adapted to send an activation signal to the controller upon detection of motion, and the occupancy sensor is also adapted to send a de-activation signal to the controller upon the sensor failing to detect motion during a predetermined time period. The controller is adapted to activate the simulated fireplace upon receipt of the activation signal, and to de-activate the simulated fireplace upon receipt of the de-activation signal.

[0030] In yet another of its aspects, the invention provides a flame simulating assembly including a simulated fireplace with a flame image subassembly for providing images of flames, a simulated fuel bed, and one or more light sources for supplying light having an intensity. The flame image subassembly is positioned relative to the simulated fuel bed so that the images of flames at least partially appear to emanate from the simulated fuel bed. The flame simulating assembly also includes a controller for controlling the simulated fireplace and an ambient light sensor for sensing ambient light intensity. The ambient light sensor is adapted to transmit a first signal to the controller upon the ambient light intensity being greater than a predetermined first ambient light intensity, and the ambient light sensor is adapted to transmit a second signal upon the ambient light intensity being less than a predetermined second ambient light intensity. The controller is adapted to increase the intensity of the light provided by the light source upon receipt of the first signal, to a predetermined maximum. The controller is also adapted to decrease the intensity of the light provided by the light source upon receipt of the second signal, to a predetermined minimum.

[0031] In another aspect, the invention provides a flame simulating assembly including a simulated fireplace with a flame image subassembly for providing images of flames and a simulated fuel bed, the flame image subassembly being positioned relative to the simulated fuel bed so that the images of flames at least partially appear to emanate from the simulated fuel bed. The flame simulating assembly also includes a controller for causing the flame image subassembly to provide a predetermined sequence of changes in the images of flames, a receiver operatively connected to the controller, and a remote control device for controlling the simulated fireplace. The remote control device includes a user interface for receiving input from the user and converting the input into input signals, an occupancy sensor for detecting motion, the occupancy sensor being adapted to generate occupancy-related signals upon detection of motion, and a microprocessor for converting the input signals and the occupancy-related signals into output signals. The remote control device also includes a transmitter for transmitting the output signals to the receiver on the simulated fireplace, so that the simulated fireplace is controllable by the input signals and the occupancy-related input signals transmitted from the remote control device.

[0032] In yet another aspect, the remote control device additionally includes an ambient light sensor.

[0033] In another aspect, the remote control device includes a display screen for displaying data regarding the input signals and the output signals.

[0034] In another of its aspects, the invention includes a simulated fuel bed for simulating a combustible fuel in a fire. The simulated fuel bed includes one or more light-producing simulated combustible fuel elements with a body colored and formed for simulating an entire combustible fuel element. The body of the light-producing simulated combustible fuel element has one or more cavities therein. The light-producing simulated combustible fuel element also has one or more light sources positioned to direct light therefrom inside the cavity. The body of the light-producing simulated combustible fuel element also has an exterior surface and one or more light-transmitting parts extending between the cavity and the exterior surface. The light-transmitting part is positioned in a path of light from the light source, the light from the light source being transmittable through the light-transmitting part to the exterior surface for simulating glowing embers of the combustible fuel.

[0035] In yet another aspect, the simulated fuel bed additionally includes a simulated ember bed. The light-producing-simulated combustible fuel element is positionable at least partially above the simulated ember bed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] The invention will be better understood with reference to the drawings, in which:

[0037] **FIG. 1** is an isometric view of a top side and an end of an embodiment of an embodiment of simulated solid combustible fuel element of the invention;

[0038] **FIG. 2** is a bottom view of the simulated solid combustible fuel element of **FIG. 1**;

[0039] **FIG. 3** is a cross-section of an embodiment of the simulated solid combustible fuel element of the invention, drawn at a larger scale;

[0040] **FIG. 4A** is a cross-section of an embodiment of a simulated fuel bed of the invention, drawn at a larger scale;

[0041] **FIG. 4B** is a cross-section of an alternative embodiment of the simulated fuel bed of the invention;

[0042] **FIG. 5** is a functional block diagram schematically representing a method of forming the simulated solid combustible fuel elements of the invention;

[0043] **FIG. 6** is a front view of an embodiment of a flame simulating assembly of the invention;

[0044] **FIG. 7** is a functional block diagram schematically representing an embodiment of the simulated fuel bed of the invention;

[0045] **FIG. 8** is a cross-section of the flame simulating assembly of **FIG. 6**;

[0046] **FIG. 9** is a cross-section of an alternative embodiment of the flame simulating assembly of the invention;

[0047] **FIG. 10** is a functional block diagram of an alternative embodiment of the invention;

[0048] **FIG. 11** is a functional block diagram of another embodiment of the invention;

[0049] **FIG. 12** is an isometric view of an embodiment of a remote control device of the invention;

[0050] **FIG. 13** is an elevation view of a side of the remote control device of **FIG. 12**;

[0051] **FIG. 14** is an elevation view of a back end of the remote control device of **FIG. 12**;

[0052] **FIG. 15** is an elevation view of a front end of the remote control device of **FIG. 12**; and

[0053] **FIG. 16** is a functional block diagram illustrating functional aspects of the remote control device of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0054] Reference is first made to **FIGS. 1-7** to describe an embodiment of a simulated fuel bed in accordance with the invention indicated generally by the numeral **20** (**FIGS. 4A, 4B**). The simulated fuel bed **20** is for simulating a solid combustible fuel burning, and partially consumed, in a natural fire. Preferably, the simulated fuel bed **20** includes a number of simulated solid combustible fuel elements **22** (**FIGS. 7, 8**), for simulating fuel elements which have not been consumed by the fire, or have only partially been consumed. Each simulated combustible fuel element **22** has a body **24** which is colored and formed to resemble an entire solid combustible fuel element, as will be described.

[0055] As shown in **FIGS. 4A, 4B** and **5**, the elements **22** are preferably arranged in a pile **25**, for instance, to imitate a pile of wooden logs in a natural fire. It will be understood that the simulated fuel elements **22** may, in the alternative, be formed and colored to resemble pieces of coal. Where the simulated fuel elements **22** are formed to resemble pieces of coal, the simulated fuel elements **22** are preferably arranged in a pile, positioned to resemble a pile of coal in a natural fire.

[0056] Preferably, the simulated solid combustible fuel elements **22** include one or more light-producing simulated solid combustible fuel elements **26**. In one embodiment, each light-producing simulated solid combustible fuel element **26** preferably has a body **28** which is also colored and formed to resemble an entire solid combustible fuel element, and which includes one or more cavities **30** therein. The light-producing simulated solid combustible fuel element **26** also preferably includes one or more fuel light sources **32** which are positioned to direct light therefrom inside the cavity **30**. As will be described, the light sources **32** in each light-producing simulated solid combustible fuel element **26** are preferably included in a fuel light source subassembly **33**. Preferably, the pile **25** includes more than one light-providing simulated fuel element **26**, and the elements **26** are positioned and arranged in the pile **25** for optimum simulation of a natural fire, as will be described. It will be understood that, alternatively, only one light-producing simulated fuel element **26** may be used, if desired.

[0057] In one embodiment, the body **28** additionally includes an exterior surface **34** and one or more light-transmitting parts **36** extending between the cavity **30** and the exterior surface **34**. Each light-transmitting part **36** is preferably positioned in a path of light from the light source **32**, as shown schematically by arrow "A" in **FIG. 3**. Light from the fuel light source **32** is transmittable through the light-transmitting part **36** to the exterior surface **34** for simulating glowing embers of the combustible fuel.

[0058] Preferably, and as shown in **FIGS. 1 and 2**, the bodies **24** of the simulated solid combustible fuel elements **22** are textured to resemble the exterior surfaces of actual solid combustible fuel elements (e.g., wooden logs or pieces of coal) which are partially burned, as will be described. Also, the entire body **24** of each simulated fuel element **22** closely resembles the entire exterior surface of the actual combustible fuel, for a more realistic simulation effect (**FIGS. 1-3**). It will be understood that the elements **22** are not shown in **FIGS. 4A, 4B** and **8-9** with detailed exterior surfaces (i.e., as shown in **FIGS. 1-3**) only in order to simplify the drawings. Because of the process used to form the elements **22**, the exterior surfaces thereof include many realistic features, as will be described.

[0059] In one embodiment, the fuel light source subassembly **33** preferably includes two or more light sources **32** which are positioned to direct light therefrom inside the cavity **30** to the light-transmitting part **36**. Also, it is preferred that each light source **32** is a light-emitting diode (LED). The fuel light source subassembly **33** preferably also includes a printed circuit board (PCB) **37** on which the LEDs **32** are mounted. It will be understood that the PCB **37** includes the necessary circuitry and other electronic components required for operation of the LEDs **32**, as is known in the art. The PCB **37** is connectable to a source of electrical power (not shown), for operation of the LEDs **32**. The manner in which the PCB **37** is connected to the power source is not shown in the drawings because it is well known in the art.

[0060] In the preferred embodiment, and as can be seen in **FIG. 3**, the light-producing simulated solid combustible fuel element **26** includes the PCB **37** and LEDs **32** mounted thereon (i.e., the fuel light source subassembly **33**) located in the cavity **30**. The connection of the PCB **37** to the power source may be, for example, via wires (not shown) electrically connected to the PCB **37** inside the cavity **30**, and also electrically connected to the power source outside the body **28** of the light-producing simulated solid combustible fuel element **26**, for transmission of electrical power to the fuel light source subassembly **33**. It will also be understood that various power sources (e.g., batteries positioned inside the cavity **30**) could be used with the light source subassembly **33**.

[0061] As can be seen in **FIG. 3**, the light-transmitting part **36** is located between a preselected part **38** of the exterior surface **34** and the cavity **30**. Preferably, the preselected part **38** is a portion of the exterior surface **34** which has been treated (or left untreated, as the case may be) so that it is capable of substantially transmitting light, and other parts **39** of the exterior surface **34** have been treated so that they substantially block light. The body **28** is preferably formed of a material which is at least partially translucent, as will be described. For reasons further described below, the body material preferably is white in color.

[0062] Preferably, and with a view to achieving a realistic appearance, the exterior surface is substantially covered with paint or any suitable coloring agent, in any suitable colors (e.g., black and/or grey and/or brown), mixed and/or positioned as required. However, it is preferred that the paint (or coloring agent) is spread only thinly, or not at all, in or on the preselected parts **38** on the exterior surface **34** which are intended to allow light to be transmitted therethrough, for simulating glowing embers. The preselected parts **38** may be substantially exposed areas **42**, and also preferably include one or more crevices **40** (**FIG. 3**).

[0063] For example, the paint or other coloring agent is preferably applied so that it is relatively thin in a substantially exposed area **42**, and also so that the paint substantially does not cover the crevice **40** (**FIG. 3**). Because of this, light from the light source **32** is transmittable directly through the crevice **40** and also through the exposed area **42**.

[0064] The parts **39** of the exterior surface **34** which are not intended to simulate glowing embers preferably are treated so that they have sufficient paint (or coloring agent) on them to block light from the fuel light source(s) **32**. For example, where the fuel which is simulated is wood, the parts **39** preferably resemble the parts of a burning natural log which do not include glowing embers. As shown in **FIGS. 1-3**, the body **28** preferably resembles an entire log, and the exterior surface **34** therefore preferably includes both one or more preselected parts **38** intended to simulate glowing embers and other parts **39** which are not intended to simulate glowing embers in configurations and arrangements which imitate and resemble different parts respectively of a burning natural log. Similarly, where the fuel which is simulated is coal, the body **28** preferably resembles an entire piece of coal.

[0065] The color of the light produced by the fuel light source **32** and the color of the translucent material of the body **28** which includes the light-transmitting part **36** preferably are selected so as to result in a realistic simulation of burning fuel. In one embodiment, the body **28** preferably is primarily a white translucent material (i.e., with paint or any other suitable coloring agent applied on the exterior surface **34**, as described above), and the light produced by the fuel light source **32** is any suitable shade of the colors red, yellow or orange or any combination thereof, depending on the burning fuel which the simulated fuel bed **20** is intended to resemble. The term reddish, as used herein, refers to any suitable color or combination or arrangement of colors used in the simulated fuel bed **20** to simulate colors of burning or glowing embers in a natural fire, and/or flames in a natural fire.

[0066] Also, the body **28** preferably includes one or more cracks or apertures **44** through which light from the fuel light source **32** is directly observable. The intensity of light from glowing embers in different locations in a natural fire varies. Accordingly, because the light from the fuel light sources **32** which is directly observable is brighter than the light from the sources **32** transmitted through the light-transmitting portions **36**, the cracks or apertures **44** provide a realistic simulation due to the variation in intensity of the light from the light source **32** which the cracks or apertures **44** provide, i.e., as compared to the light from the fuel light sources **32** transmitted through the light-transmitting parts **36**. In addition to cracks or apertures **44** which may be intentionally formed in the body **28** upon its creation (i.e., in accordance with a predetermined pattern), other cracks or apertures may be formed in the body **28**, i.e., other than pursuant to a predetermined pattern. Such cracks or apertures may be formed when the body **28** is created, or they may be formed later, e.g., the simulated fuel elements **22** may crack after an extended period of time. For this reason also, it is preferable that the fuel light sources **32** provide reddish light.

[0067] However, it will be understood that other arrangements are possible. For example, in an alternative embodiment, the body material of the light-producing simulated fuel element **26** is colored reddish, and in this case, the light produced by the fuel light source **32** preferably is substantially white, i.e., uncolored.

[0068] Preferably, the simulated combustible fuel elements **22** are formed in a silicone rubber mold (**FIG. 5**). The silicone rubber mold is resiliently flexible. Preferably, a thermoset material (e.g., polyurethane), substantially liquefied, is poured into the mold, which is then rotated (step **1002**, **FIG. 5**). Preferably, the amount of material is sufficient to form the body **28**, but also insufficient to form a solid body, so that the cavity **30** is formed inside the body **28** The rotation of the mold is in accordance with rotational molding generally, and will not be described here in detail because it is well known in the art. After rotation, the material is cured (step **1004**, **FIG. 5**). After curing, the mold is peeled off (step **1006**, **FIG. 5**), and realistic surface features such as undercuts (**FIG. 3**) can be provided. This procedure results in simulated fuel elements **22** with exterior surfaces having a detailed, irregular and realistic texture, such as the elements **22** shown in **FIGS. 1-3**, simulating an entire exterior surface of a natural log including undercuts **46** (**FIG. 3**). For example, as can be seen in a detailed area **49** in **FIG. 1**, the exterior surface **34** may include a plurality of ridges **48** simulating a surface of a semi-burned log. (It will be understood that the area **49** shown in **FIG. 1** is exemplary only, and the balance of the surface **34** is understood to resemble the portions of the surface **34** illustrated in area **49**. The details of the ridges **48** have not been shown outside the area **49** in **FIG. 1**, and in **FIG. 2** for simplicity of illustration.)

[0069] In order to create the silicone rubber mold (step **1000**, **FIG. 5**), first, a sample of semi-burned combustible fuel (e.g., a partially burned log) is covered in silicone rubber, which is then allowed to set. The silicone rubber mold is cut, and then separated from the sample log. Preferably, only one cut is made in the mold. For example, a single cut along a length of the mold large enough to facilitate removal of the sample log is preferred. In most cases, a significant amount of debris (i.e., small pieces of wood which fell off the log) remains in the first mold. In practice, a second mold is required to be taken, in order to obtain a mold which accurately reproduces the surface of the sample but does not include a significant amount of debris. To obtain the second mold, the process described for the first mold is repeated. The second mold tends to have less debris because, for a particular sample log, most of the debris is removed by the first mold. It will be understood that a plurality of sample logs are used in order to provide simulated fuel elements with different bodies, for a more realistic simulation effect.

[0070] Where the fuel which is to be simulated is coal, the same procedure is used to create the simulated fuel elements **22**, with sample pieces of coal.

[0071] Preferably, the body **28** of the light-producing simulated fuel element **26** is formed so that it includes the cavity **30** therein. As noted above, it is preferred that, once solidified, the body **28** is at least partially translucent. In the alternative, the body **28** of the light-producing simulated fuel element **26** may be made without the cavity **30** formed therein. However, in this case, the cavity **30** is subsequently formed in the body **28**, by any other suitable means, e.g., drilling.

[0072] As described above, it will be understood that the simulated fuel element **22** which are not light-producing elements **26** may not include the cavity **30**. Preferably, the exteriors of the simulated elements **22** which are not light-producing are substantially the same as the exteriors of the light-producing simulated fuel elements **26**.

[0073] Preferably, when the body **28** of the light-producing fuel element **26** is formed, the body represents the entire log. However, in order to permit the light source subassembly **33** to be inserted into the cavity **30** where the cavity **30** was formed during the creation of the body **28**, an aperture **50** preferably is formed in the body **28** which is in communication with the cavity **30**. The aperture **50** may be formed in any suitable manner, such as, for example, by drilling.

[0074] Preferably, the light assembly **33** (**FIG. 4A, 4B**), is inserted into the cavity **30** through the aperture **50**, to position the LEDs **32** relative to the light-transmitting part(s) **36** as required. After the light assembly **33** has been positioned in the cavity **30**, a plug **52** of material is inserted into the aperture **50**. The plug material may be any suitable material. Preferably, the plug material is the thermoset material of the body **28** which is cured and colored similarly to the parts of the exterior surface **34** which are adjacent to the aperture **50**. If electrical wires are used to connect the PCB **37** to an electrical power source, then such wires are preferably allowed to extend through the aperture **50** before the plug **52** is emplaced in the aperture. The wires are preferably positioned so that they are not generally noticeable to an observer when the light-producing simulated fuel element **26** is positioned in the pile **25** with other elements **22**.

[0075] As shown in **FIG. 6**, the pile **25** of simulated fuel elements **22** preferably is positioned in a housing **54** of a simulated fireplace **56**. The pile **25** has a central region **58** which is generally positioned centrally relative to the simulated fireplace housing **54**. In imitation of a natural fire, portions **60** of the light-producing simulated fuel elements **26** which are located substantially in the central region **58** preferably are treated so that a plurality of light-transmitting parts **36** are located in the portions **60**. However, end portions **62** of the light-producing simulated fuel elements **26** which are generally positioned outside the central portion **58** preferably have relatively fewer light-transmitting portions **36**. In one embodiment, the fuel light sources **32** are positioned inside the simulated fuel elements **26** substantially in the portions **60**. In the alternative, however, the light sources **32** are positioned in the end portions **62** as well as the portions **60**, and relatively more paint is layered on the end portions **62** so that light is substantially not directed out of the end portions **62**. The central positioning of the light-transmitting portions **36** in the pile **25** results in an improved simulation of glowing embers.

[0076] Preferably, the simulated fuel bed **20** also includes a controller **64** (**FIG. 7**) for controlling the fuel light source **32**. For instance, the fuel light source **32** may be controlled by the controller **64** to provide pulsating light, for simulating light from glowing embers. In one embodiment, the controller **64** causes light from the light source **32** to pulsate randomly.

[0077] In another embodiment, the controller **64** causes the light from the fuel light source **32** to pulsate systematically, and/or in a predetermined pattern. Preferably, the predetermined pattern in which the light from the fuel light source **32** pulsates is determined in relation to images of flames **66** which are provided in the simulated fireplace **56**, to simulate flames emanating from the simulated fuel bed **20** (**FIG. 6**).

[0078] The controller **64** preferably includes one or more modules **68**, including a memory storage means **70** and a user interface **72**. The controller **64** can include, for example, firmware which provides options selectable by a user (not shown) via the user interface **72**. In addition, or in the alternative, direct (manual) control by the user via the user interface **72** may be permitted. Alternatively, the controller **64** could be programmed to cause variations in the light produced by the LEDs **32** in accordance with a predetermined sequence in a program stored in memory **70**. The controller **64** also preferably includes any suitable means for causing light created by the light source **32** to vary as required, e.g., a triac to vary voltage as required, as is known in the art.

[0079] As shown in **FIG. 6**, the simulated fuel bed **20** is preferably positioned in the simulated fireplace **56**. In one embodiment, the simulated fireplace **56** includes a flame image subassembly **74**, for providing the images of flames **66**. The simulated fuel bed **20** is preferably positioned in the simulated fireplace **56** so that the images of flames **66** appear to emanate from the simulated fuel bed **20**. Such arrangements are disclosed, for example, in U.S. Pat. Nos. 5,642,580 and 6,050,011. Each of U.S. Pat. No. 5,642,580 and U.S. Pat. No. 6,050,011 is hereby incorporated herein by reference.

[0080] Also, the controller **64** is programmable to modulate the fuel light source **32** in accordance with one or more selected characteristics of the images of flames **66**. For instance, in one embodiment, the controller **64** preferably is programmed so that, upon the speed of rotation of an element in the flame image sub-assembly **74** increasing (i.e., to result in images of flames **66** which flicker faster), the controller **64** causes the rate of pulsation of light from the light source **32** to increase proportionately, but also realistically. It is preferred that increases in pulsation not correspond directly (i.e., linearly) to increases in the rate at which the flame effect flickers.

[0081] In another embodiment, the simulated fireplace **56** also includes one or more toplights **75** positioned above the simulated fuel bed **20** (**FIG. 6**). The toplight **75** provides light directed downwardly onto the simulated fuel bed **20** and simulates light from flames which illuminates the fuel in a natural fire, thereby adding to the simulation effect provided by the simulated fireplace **56**. The use of a toplight in a simulated fireplace is described in U.S. Pat. No. 6,385,881, which is hereby incorporated hereby by reference.

[**0082**] In another embodiment, the controller **64** is programmable to modulate the toplight **75**, for example, in accordance with one or more selected characteristics of the images of flames **66**.

[**0083**] As described above, the LEDs **32** can be constructed so as to emit light having different colors. Preferably, LEDs **32** which produce different colors are arranged relative to each other in an element **26**, and also in a plurality of elements **26**, and modulated by the controller **64** to produce pulsating light respectively, together or separately as the case may be, to provide a realistic glowing ember effect through the light-transmitting part **36**. Each of the light sources **32** is adapted to pulsate independently in accordance with signals received from the controller **64**, if so desired.

[**0084**] The arrangements of the LEDs **32** relative to each other preferably takes into account LEDs inside the same light-producing simulated fuel element **26**. In addition, however, the positioning of LEDs **32** producing light with various colors should also take into account the LEDs **32** in all of the light-producing fuel elements **26** in the pile **25**, and in particular, LEDs **32** positioned in adjacent elements **26**.

[**0085**] In one embodiment, the simulated fuel bed **20** preferably includes a simulated ember bed **76** (**FIG. 4A**). In this embodiment, the plurality of simulated combustible fuel elements **22** are preferably positionable at least partially above the simulated ember bed **76**, as shown in **FIG. 4A**.

[**0086**] As can also be seen in **FIGS. 4B and 6**, the simulated fuel bed optionally includes a simulated grate element **78** for simulating a grate in a fireplace. The simulated combustible fuel elements **22** are positionable on the simulated grate element **78**. It is preferred that an alternative embodiment of a simulated ember bed **80** also is positioned beneath the grate element **78**.

[**0087**] In use, the user selects the desired control option using the user interface **72**, to control (via the controller **64**) light provided by the fuel light sources **32**. Preferably, the controller **64** is adapted to control light sources **32** in a number of light-producing simulated solid combustible fuel elements **26** in the simulated fuel bed **20**. In one embodiment, the light-producing elements **26** are positioned substantially near the bottom of the pile **25** (**FIG. 6**).

[**0088**] Additional embodiments of the invention are shown in **FIGS. 8-16**. In **FIGS. 8-16**, elements are numbered so as to correspond to like elements shown in **FIGS. 1-7**.

[**0089**] As can be seen in **FIG. 8**, a flame simulating assembly **84** includes the simulated fireplace **56** which has the flame image subassembly **74** for providing images of flames **66**. Different types of flame image subassemblies **74** are known in the art. For instance, the flame image subassembly **84** shown in **FIG. 8** includes a flicker element **86** for causing the images of flames **66** to fluctuate, for simulating flames. As shown in **FIG. 8**, the flame simulating assembly **84** also preferably includes the simulated fuel bed **120**. The flame image subassembly **74** positions the images of flames **66** (i.e., the images of flames are transmitted through a screen **87**) so that the images of flames **66** appear to emanate from the simulated fuel bed **120** (**FIG. 6**). The simulated fuel bed **120** includes the simulated ember bed **76** which is positioned below the simulated grate element **78**. The simulated fuel elements **22** are positioned in the grate **78** in a realistic pile **25**.

[**0090**] As shown in **FIG. 8**, the flicker element **86** is preferably located underneath the simulated ember bed **80**. The flame image subassembly **84** preferably also includes one or more flame light sources **88** and a flame effect element **90**. Also, as shown in **FIG. 8**, the simulated fireplace **56** also preferably includes the housing **54** with a back wall **92**, and the flame effect element **90** is preferably located on the back wall **92**.

[**0091**] In the flame image subassembly **74** shown in **FIG. 8**, the flame light source **88** is located generally below the simulated ember bed **80** and adjacent to the back wall **92**. Preferably, the light produced by the flame light source **88** is modulated to provide such changes in the images of flames **66** as may be desired. Also, the speed at which the flicker element **86** is rotated can also be varied, to provided any desired changes in the images of flames **66**.

[**0092**] Another embodiment of a flame simulating assembly **274** is shown in **FIG. 9**. As shown in **FIG. 9**, the flame simulating assembly **274** includes a flame image subassembly **284** which includes a flicker element **286**, a flame light source **288**, and a flame effect element **290**. The simulated fuel bed **220** is positioned so that the images of flames **66** appear to emanate from the simulated fuel bed **220**. As can be seen in **FIG. 9**, the flame light source **288** is preferably located directly underneath the simulated ember bed **80** in this embodiment. The flicker element **286** is, in this embodiment, positioned adjacent to the back wall **292**.

[**0093**] In another embodiment, the flame simulating assembly **384** includes a controller **364** which is adapted to effect a predetermined sequence of changes in the images of flames **366**. Preferably, the controller causes a flame image subassembly **374** to provide the predetermined sequence of changes (**FIG. 10**). For example, the predetermined sequence of changes may include a gradual increase in intensity of the images of flames **66**.

[**0094**] For the purposes hereof, intensity of light produced by a light source refers to the amount of light per unit of area or volume. For example, intensity may be measured in units of lumens or candelas per square meter.

[**0095**] Preferably, the predetermined sequence of changes are in accordance with software stored in a memory storage means **370** accessible by the controller **364**. The predetermined sequence of changes may proceed at a preselected rate. Also, the preselected rate may be determined by the controller **364**, if preferred. In another embodiment, the controller **364** is controllable by the user via a user interface **372** and the predetermined sequence of changes proceeds at a rate determined by the user via the user interface **372**.

[**0096**] In the preferred embodiment, the flame simulating assembly **384** also includes at least one fuel light source **332** positioned in one or more light producing simulating fuel elements **326** in the simulated fuel bed **320**, to simulate glowing embers.

[0097] Preferably, the controller **364** is operable in a start-up mode, in which a gradual increase in intensity of light providing the images of flames **366** takes place. In one embodiment, upon commencement of the predetermined sequence of changes, the intensity of the light providing the images of flames **366** is relatively low, so that the predetermined sequence of changes (i.e., a gradual increase in intensity of light providing the images of flames **366**) resembles a natural fire during commencement thereof. In an alternative embodiment, prior to commencement of the predetermined sequence of changes, the images of flames **366** are substantially nonexistent.

[0098] Similarly, in an alternative embodiment, the light providing the images of flames **366** is gradually decreased in intensity by the controller **364**. The decrease preferably proceeds until the images of flames **366** are substantially nonexistent, i.e., the gradually decreasing images of flames **366** resemble a natural fire which is gradually dying.

[0099] In another alternative embodiment, the flame simulating assembly **484** includes a heater subassembly **493** (**FIG. 9**) with one or more heater elements **494** therein, and preferably including a fan and a fan motor. The heater subassembly **493** is adapted to operate in a basic heat mode **493***a* (**FIG. 11**), in which the heater subassembly consumes a first amount of electrical power, and also to operate in a reduced heat mode **493***b* (**FIG. 11**), in which the heater subassembly **493** consumes a second amount of electrical power. The first amount of electrical power is substantially greater than the second amount of electrical power. The flame simulating assembly **484** also includes a controller **464** which includes a means for converting the heater subassembly **493** between the basic heat mode and the reduced heat mode (**FIG. 11**).

[0100] The flame simulating assembly **484** preferably also includes a thermostat **496** for controlling the heater subassembly **493**. The thermostat **496** is adapted to operate the heater subassembly **493** in the basic heat mode upon ambient temperature differing from a preselected temperature by more than a predetermined difference. Also, the thermostat is adapted to operate the heater subassembly **493** in the reduced heat mode upon ambient temperature differing from the preselected temperature by less than the predetermined difference.

[0101] As shown in **FIGS. 12-16**, a flame simulating assembly **584** of the invention preferably includes a remote control device **598** for controlling a simulated fireplace **556**. Preferably, the remote control device **598** includes a user interface **601** for receiving input from the user and converting the input into input signals. The remote control device **598** preferably also includes an occupancy sensor **603** for detecting motion. The occupancy sensor **603** is adapted to generate occupancy-related signals upon detection of motion. Also, the remote control device includes a microprocessor **605** and a transmitter **607** (**FIG. 16**). The microprocessor **605** is for converting the input signals and the occupancy-related signals into output signals. The transmitter **607** is for transmitting the output signals to a receiver **609** which is preferably positioned on the simulated fireplace **556**. The receiver **609** is operatively connected to a controller **564** which controls the simulated fireplace **556**. Accordingly, the simulated fireplace **556** is controllable by the user via input signals and by the occupancy-related input signals which are transmitted from the remote control device **598** to the receiver **609**, and subsequently to the controller **564**.

[0102] Preferably, the occupancy sensor **603** is adapted to send an activation signal to the controller **564** upon detection of motion. The activation signal is one of the occupancy-related signals which are transmitted from the remote control device to the receiver **609** which is operatively connected to the controller **564**, as described above. It is also preferred that the occupancy sensor **603** is also adapted to send a de-activation signal to the controller upon a sensor failing to detect motion during a predetermined time period (**FIG. 16**). The de-activation signal is another of the occupancy-related signals. The controller **564** preferably is adapted to activate the simulated fireplace **556** upon receipt of the activation signal. Also, the controller **564** preferably is adapted to de-activate the simulated fireplace **556** upon receipt of the de-activation signal.

[0103] Preferably, the remote control device additionally includes an ambient light sensor **611**. The ambient light sensor **611** is for sensing ambient light intensity. For the purposes hereof, ambient light intensity refers to the amount of ambient light per unit of area or volume. The ambient light in question is the light generally around, or in the vicinity of, the simulated fireplace and/or the user.

[0104] Preferably, the ambient light sensor **611** provides substantially automatic adjustment of the light provided by one or more light sources in a simulated fireplace **556** to provide an improved simulation effect. The light sources thus adjusted preferably include any or all of the toplight **75**, the flame light source **88**, and the fuel light source **32**. In one embodiment, the ambient light sensor **611** is adapted to provide a first signal which is transmitted to the controller **564** upon the ambient light intensity being greater than a predetermined first ambient light intensity. The ambient light sensor **611** is also preferably adapted to provide a second signal which is transmitted to the controller **564** upon the ambient light intensity being less than a predetermined second ambient light intensity. The controller **564** is adapted to increase the intensity of the light provided by the light source (i.e., being any one or all of the toplight **75**, the flame light source **88**, and the fuel light source **32**) upon receipt of the first signal, up to a predetermined maximum. Also, the controller **564** is adapted to decrease the intensity of the light provided by the light source upon receipt of the second signal, to a predetermined minimum.

[0105] In an alternative embodiment, the ambient light sensor **611** is adapted to cause the controller **564** to effect a preselected change in the intensity of the light supplied by the light source upon the ambient light intensity differing from the intensity of light from the light source to a predetermined extent. For example, the light source could be adjusted so that light provided by the light source has an intensity which is substantially proportional to the ambient light intensity. As noted above, the light source could be all or any one of the toplight **75**, the flame light source **88**, and the fuel light source **32**.

[0106] As can be seen in **FIGS. 12-15**, the occupancy sensor **603** and the ambient light sensor **611** preferably are positioned on the remote control device **598**. Preferably, the occupancy light sensor **603** includes a screen or lens **612** through which ambient light is transmittable (**FIGS. 12-14**). It is preferred that the ambient light sensor **611** also be positioned behind the screen **612**. Positioning the occupancy sensor **603** in the remote control device **598** provides the advantage that the occupancy sensor **603** is likely to detect motion because it is positioned on the remote control device **598**. Also, the ambient light sensor **611** senses ambient light generally in the vicinity of the user. Preferably, the remote control device includes a display screen **613** which, for example, may be a LCD display. The remote control device **598** also includes control buttons **615**, to be used to enable the user to provide input.

[**0107**] It is also preferred that the thermostat **496** (preferably, in the form of a thermistor) is positioned in the remote control device **598**, behind apertures **617** provided to enable ambient air to reach the thermistor. The advantage of having the thermistor positioned in the remote control device **598** is that temperature will be adjusted in accordance with the temperature of the ambient air generally in the vicinity of the user.

[**0108**] The display screen **613** is for displaying data regarding input signals and, preferably, output signals. Input from the user is receivable via the display screen, in one embodiment.

[**0109**] In an alternative embodiment, the receiver **609** is a transceiver, and information (data) is transmittable to the remote control device **598** from the controller **564** through the receiver **609**. In this case, the transmitter **607** is also a transceiver.

[**0110**] It will be appreciated by those skilled in the art that the invention can take many forms, and that such forms are within the scope of the invention as claimed. Therefore, the spirit and scope of the appended claims should not be limited to the descriptions of the preferred versions contained herein.

1. A simulated fuel bed for simulating a solid combustible fuel in a fire, the simulated fuel bed comprising:

a plurality of simulated combustible fuel elements, each said simulated combustible fuel element comprising a body colored and formed for simulating an entire combustible fuel element;

said simulated combustible fuel elements comprising at least one light-producing simulated combustible fuel element;

said body of said at least one light-producing simulated combustible fuel element comprising at least one cavity therein;

said at least one light-producing simulated combustible fuel element comprising at least one light source positioned to direct light therefrom inside said at least one cavity;

said body of said at least one light-producing simulated combustible fuel element additionally comprising:

an exterior surface;

at least one light-transmitting part extending between said at least one cavity and the exterior surface; and

said at least one light-transmitting part being positioned in a path of said light from said at least one light source, said light from said at least one light source being transmittable through said at least one light-transmitting part to the exterior surface for simulating glowing embers of the combustible fuel.

2. A simulated fuel bed according to claim 1 additionally comprising a simulated ember bed, said plurality of simulated combustible fuel elements being positionable at least partially above the simulated ember bed.

3. A simulated fuel bed according to claim 1 additionally comprising a controller to cause said light from said at least one light source to pulsate for simulating light from glowing embers.

4. A simulated fuel bed according to claim 3 in which the controller causes said light from said at least one light source to pulsate randomly.

5. A simulated fuel bed according to claim 3 in which the controller causes said light from said at least one light source to pulsate in a predetermined pattern.

6. A simulated fuel bed according to claim 5 in which the predetermined pattern is determined in relation to images of flames provided to simulate flames emanating from the simulated fuel bed.

7. A simulated fuel bed according to claim 1 in which:

said at least one light-producing simulated combustible fuel element comprises at least two light sources positioned to direct light therefrom inside said at least one cavity; and

the simulated fuel bed additionally comprising a controller for causing light from each of said at least two light sources to pulsate respectively for simulating light from glowing embers.

8. A simulated fuel bed according to claim 7 in which each of said at least two light sources pulsates independently.

9. A simulated fuel bed according to claim 7 in which each of said at least two light sources provides light which is colored differently, for simulating light from glowing embers.

10. A simulated fuel bed according to claim 1 additionally comprising:

a simulated grate element for simulating a grate; and

said plurality of combustible fuel elements being positionable on the simulated grate element.

11. A simulated fuel bed according to claim 2 additionally comprising:

a simulated grate element for simulating a grate; and

the simulated ember bed being positionable substantially below the simulated grate element.

12. A simulated fuel bed according to claim 1 comprising:

at least two light-producing simulated combustible fuel elements; and

a controller for causing said light from said at least one light source respectively in each of said at least two light-producing simulated combustible fuel elements to pulsate respectively for simulating light from glowing embers.

13. A simulated fuel bed according to claim 1 in which each of said at least two light-producing simulated combustible fuel elements pulsates independently.

14. A simulated fuel bed according to claim 1 adapted for use with a flame simulating assembly, the flame simulating assembly comprising:

a flame image subassembly for providing images of flames;

the flame image subassembly being positioned relative to the simulated fuel bed such that the images of flames appear to emanate from the simulated fuel bed; and

the simulated fuel bed additionally comprising a controller for causing said light from said at least one light source to pulsate for simulating light from glowing embers.

15. A simulated fuel bed according to claim 1 in which said body comprises at least one aperture positioned relative to said at least one light source for permitting said light from said at least one light source to pass through said at least one aperture.

16. A simulated fuel bed according to claim 1 in which said at least one light source comprises at least one LED.

17. A simulated fuel bed according to claim 16 in which said at least one LED is mounted on a printed circuit board.

18. A simulated fuel bed according to claim 1 in which each said body of each said simulated combustible fuel element and said body of said at least one light-producing simulated combustible fuel element are formed in at least one resiliently flexible mold.

19. A simulated fuel bed according to claim 18 in which each said body is substantially comprised of a polyresin material.

20. A simulated combustible fuel element comprising:

a body colored and formed for simulating an entire combustible fuel element, the body comprising at least one cavity therein;

at least one light source positioned substantially inside said at least one cavity;

the body additionally comprising:

an exterior surface;

at least one light-transmitting part extending between said at least one cavity and the exterior surface;

said at least one light-transmitting part being positioned in a path of light from said at least one light source through which light from said at least one light source is transmittable to the exterior surface for simulating glowing embers of the combustible fuel; and

the exterior surface comprising at least one substantially opaque exterior part.

21. A simulated combustible fuel element according to claim 20 in which said at least one light-transmitting part comprises an exterior segment forming part of the exterior surface colored and formed to resemble glowing embers of the combustible fuel upon transmission therethrough of said light from said at least one light source.

22. A simulated combustible fuel element according to claim 20 in which said at least one light-transmitting part is substantially noncolored.

23. A simulated combustible fuel element according to claim 20 in which said at least one light-transmitting part is substantially translucent.

24. A simulated combustible fuel element according to claim 20 in which said at least one light source comprises at least one LED.

25. A simulated combustible fuel element according to claim 24 in which said light emitted by said at least one LED is colored.

26. A simulated combustible fuel element according to claim 25 in which said light from said at least one LED is colored reddish.

27. A simulated combustible fuel element according to claim 20 additionally comprising a controller for causing said light from said at least one light source to pulsate for simulating light from glowing embers.

28. A flame simulating assembly comprising:

a simulated fuel bed;

the flame image subassembly positioning said images of flames such that said images of flames appear to emanate from the simulated fuel bed;

the simulated fuel bed comprising:

a plurality of simulated combustible fuel elements, each said simulated combustible fuel element comprising a body colored and formed for simulating an entire combustible fuel element;

said combustible fuel elements comprising at least one light-producing simulated combustible fuel element;

said body of said at least one light-producing simulated combustible fuel element comprising at least one cavity therein;

said at least one light-producing simulated combustible fuel element comprising at least one light source positioned at least partially in said at least one cavity;

said body of said at least one light-producing simulated combustible fuel element additionally comprising at least one light-transmitting part positioned in a path of light from said at least one light source;

said at least one light-transmitting part extending between said at least one cavity and the exterior surface such that said at least one light-transmitting part resembles glowing embers of the combustible fuel upon transmission therethrough of light from said at least one light source; and

a controller for causing said light from said at least one light source to pulsate for simulating light from glowing embers.

29. A flame simulating assembly according to claim 28 in which the simulated fuel bed additionally comprises a simulated ember bed, on which said simulated combustible fuel elements are positioned.

30. A flame simulating assembly according to claim 28 additionally comprising a grate element for supporting said simulated combustible fuel elements, said grate element being colored and formed to simulate a fireplace grate.

31. A method of forming a simulated combustible fuel element comprising the steps of:

(a) providing a resiliently flexible mold prepared using as a model a partially burned sample of a combustible fuel element;

(b) introducing a predetermined amount of a liquefied body material into the mold;

(c) rotating the mold to produce a body comprising said body material and resembling the entire combustible fuel element, the body including at least one cavity and an exterior surface;

(d) curing the body to solidify said body material;

(e) forming an access hole in the body in communication with said at least one cavity;

(f) inserting at least one light source at least partially in the cavity through the access hole, to locate said at least one light source in a predetermined position;

(g) inserting plug material into the access hole, to substantially block the access hole; and

(h) coating at least a portion of the exterior surface in accordance with a predetermined exterior surface pattern to provide (i) at least one light-transmitting part positioned in a path of light from said at least one light source, said at least one light-transmitting part being colored to resemble glowing embers of the combustible fuel upon transmission therethrough of light from said at least one light source, and (ii) at least one substantially opaque exterior part colored to resemble a non-ember part of the combustible fuel.

32. A flame simulating assembly comprising:

a flame image subassembly for providing images of flames;

a simulated fuel bed;

the flame image subassembly being positioned relative to the simulated fuel bed such that said images of flames at least partially appear to emanate from the simulated fuel bed; and

a controller for causing the flame image subassembly to provide a predetermined sequence of changes in the images of flames.

33. A flame simulating assembly according to claim 32 in which the predetermined sequence of changes comprises a gradual increase in intensity of said images of flames.

34. A flame simulating assembly according to claim 33 in which upon commencement of the predetermined sequence of changes said intensity of said images of flames is relatively low, such that the predetermined sequence of changes resembles a natural fire during commencement thereof.

35. A flame simulating assembly according to claim 32 in which the predetermined sequence of changes comprises a gradual decrease in intensity of said images of flames.

36. A flame simulating assembly according to claim 35 in which the predetermined sequence of changes causes said images of flames to resemble a natural fire which is gradually dying.

37. A flame simulating assembly according to claim 32 in which the predetermined sequence of changes proceeds at a preselected rate.

38. A flame simulating assembly according to claim 37 in which the preselected rate is determined by the controller.

39. A flame simulating assembly according to claim 32 in which the controller is controllable by a user via a user interface and the predetermined sequence of changes proceeds at a rate determined by the user via the user interface.

40. A flame simulating assembly according to claim 32 additionally comprising at least one fuel light source positioned in at least one simulated fuel element in the simulated fuel bed, to simulate glowing embers.

41. A flame simulating assembly according to claim 40 in which said controller is adapted to cause said light provided by said at least one fuel light source to vary.

42. A flame simulating assembly according to claim 41 in which said controller causes light from said at least one light source to pulsate such that said light imitates light from glowing embers.

43. A flame simulating assembly according to claim 41 in which the controller causes said light from said at least one fuel light source to increase gradually in intensity.

44. A flame simulating assembly according to claim 41 in which the controller causes said light from said at least one fuel light source to decrease gradually in intensity.

45. A flame simulating assembly comprising:

a flame image subassembly for providing images of flames;

a simulated fuel bed;

the flame image subassembly being positioned relative to the simulated fuel bed such that said images of flames at least partially appear to emanate from the simulated fuel bed;

a heater subassembly comprising at least one heater element;

the heater subassembly being adapted to operate in a basic heat mode, in which the heater subassembly consumes a first amount of electrical power, and also being adapted to operate in a reduced heat mode, in which the heater subassembly consumes a second amount of electrical power, the first amount being substantially greater than the second amount; and

a controller comprising means for converting the heater subassembly between the basic heat mode and the reduced heat mode.

46. A flame simulating assembly according to claim 45 additionally comprising a thermostat for controlling the heater subassembly, the thermostat being adapted to operate the heater subassembly in the basic heat mode upon ambient temperature differing from a preselected temperature by more than a predetermined difference, and the thermostat being adapted to operate the heater subassembly in the reduced heat mode upon ambient temperature differing from the preselected temperature by less than the predetermined difference.

47. A flame simulating assembly comprising:

a simulated fireplace comprising:

a flame image subassembly for providing images of flames;

a simulated fuel bed;

the flame image subassembly being positioned relative to the simulated fuel bed such that said images of flames at least partially appear to emanate from the simulated fuel bed;

a controller for controlling the simulated fireplace;

an occupancy sensor for detecting motion and operatively connected to the controller, the occupancy sensor being adapted to send an activation signal to the controller upon detection of motion, and the occupancy sensor being adapted to send a de-activation signal to the controller upon the sensor failing to detect motion during a predetermined time period; and

the controller being adapted to activate the simulated fireplace upon receipt of the activation signal and to de-activate the simulated fireplace upon receipt of the de-activation signal.

48. A flame simulating assembly comprising:

a simulated fireplace comprising:

a flame image subassembly for providing images of flames;

a simulated fuel bed;

at least one light source for supplying light having an intensity;

the flame image subassembly being positioned relative to the simulated fuel bed such that said images of flames at least partially appear to emanate from the simulated fuel bed;

a controller for controlling the simulated fireplace;

an ambient light sensor for sensing ambient light intensity, the ambient light sensor being adapted to transmit a first signal to the controller upon said ambient light intensity being greater than a predetermined first ambient light intensity, and the ambient light sensor being adapted to transmit a second signal upon said ambient light intensity being less than a predetermined second ambient light intensity;

the controller being adapted to increase said intensity of said light provided by said at least one light source upon receipt of the first signal, to a predetermined maximum; and

the controller being adapted to decrease said intensity of said light provided by said at least one light source upon receipt of the second signal, to a predetermined minimum.

49. A flame simulating assembly according to claim 48 in which said at least one light source comprises at least one toplight positioned to direct light onto the simulated fuel bed, for simulating light from flames.

50. A flame simulating assembly according to claim 48 in which said at least one light source comprises at least one flame light source supplying light for providing said images of flames.

51. A flame simulating assembly according to claim 48 in which said at least one light source comprises at least one fuel light source simulating glowing embers.

52. A flame simulating assembly comprising:

a simulated fireplace comprising:

a flame image subassembly for providing images of flames;

a simulated fuel bed;

at least one light source for supplying light having an intensity;

the flame image subassembly being positioned relative to the simulated fuel bed such that said images of flames at least partially appear to emanate from the simulated fuel bed;

a controller for controlling the simulated fireplace;

an ambient light sensor for sensing ambient light intensity; and

the ambient light sensor being adapted to cause the controller to effect a preselected change in said intensity of said light supplied by said at least one light source upon said ambient light intensity differing from said intensity of said light from said at least one light source to a predetermined extent.

53. A flame simulating assembly according to claim 52 in which said intensity of said light from said at least one light source is proportional to said ambient light intensity.

54. A flame simulating assembly according to claim 52 in which said at least one light source comprises at least one toplight positioned to direct light onto the simulated fuel bed, for simulating light from flames.

55. A flame simulating assembly according to claim 52 in which said at least one light source comprises at least one flame light source supplying light for providing said images of flames.

56. A flame simulating assembly according to claim 48 in which said at least one light source comprises at least one fuel light source simulating glowing embers.

57. A flame simulating assembly comprising:

a simulated fireplace comprising:

a flame image subassembly for providing images of flames;

a simulated fuel bed;

the flame image subassembly being positioned relative to the simulated fuel bed such that said images of flames at least partially appear to emanate from the simulated fuel bed;

a controller for causing the flame image subassembly to provide a predetermined sequence of changes in the images of flames;

a receiver operatively connected to the controller;

a remote control device for controlling the simulated fireplace, the remote control device comprising:

a user interface for receiving input from the user and converting said input into input signals;

an occupancy sensor for detecting motion, said occupancy sensor being adapted to generate occupancy-related signals upon detection of motion;

a microprocessor for converting the input signals and the occupancy-related signals into output signals; and

a transmitter for transmitting the output signals to the receiver on the simulated fireplace,

whereby the simulated fireplace is controllable by said input signals and said occupancy-related input signals transmitted from said remote control device.

58. A flame simulating assembly according to claim 57 in which the remote control device additionally comprises an ambient light sensor.

59. A flame simulating assembly according to claim 57 in which the remote control device additionally comprises a display screen for displaying data regarding the input signals and the output signals.

60. A flame simulating assembly according to claim 59 in which input from the user is receivable via the display screen.

61. A flame simulating assembly according to claim 57 in which the receiver comprises a transceiver, and information is transmitted to the remote control device from the controller through the transceiver.

62. A simulated fuel bed for simulating a combustible fuel in a fire, the simulated fuel bed comprising:

at least one light-producing simulated combustible fuel element comprising a body colored and formed for simulating an entire combustible fuel element;

said body of said at least one light-producing simulated combustible fuel element comprising at least one cavity therein;

said at least one light-producing simulated combustible fuel element comprising at least one light source positioned to direct light therefrom inside said at least one cavity;

said body of said at least one light-producing simulated combustible fuel element additionally comprising:

an exterior surface;

at least one light-transmitting part extending between said at least one cavity and the exterior surface; and

said at least one light-transmitting part being positioned in a path of said light from said at least one light source, said light from said at least one light source being transmittable through said at least one light-transmitting part to the exterior surface for simulating glowing embers of the combustible fuel.

63. A simulated fuel bed according to claim 62 additionally comprising a simulated ember bed, said at least one light-producing simulated combustible fuel element being positionable at least partially above the simulated ember bed.

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