United States Patent	12392495
Kind Code	B2
Date of Patent	August 19, 2025
Inventor(s)	Beckstead; Benjamin Larry et al.

Electric fireplace with integrated air conditioner

Abstract

Apparatuses, systems, methods, and computer program products for an electric fireplace are described. An apparatus may include an electronic display configured to display one or more flame visualizations. An apparatus may include a heat source coupled to the electronic display and configured to heat a surrounding environment. An apparatus may include a cooling source coupled to the electronic display and configured to cool the surrounding environment, the electronic display, the heat source, and the cooling source sharing a single power source.

Inventors: **Beckstead; Benjamin Larry (Kanab, UT), Beckstead; Jedediah Seal (Erda, UT)**

Applicant: **ARCTIC FLAME FIREPLACES LLC** (Kanab, UT)

Family ID: **1000008762426**

Assignee: **ARCTIC FLAME FIREPLACES LLC (Kanab, UT)**

Appl. No.: **18/092789**

Filed: **January 03, 2023**

Prior Publication Data

Document Identifier	Publication Date
US 20230213201 A1	Jul. 06, 2023

Related U.S. Application Data

us-provisional-application US 63296468 20220104

Publication Classification

Int. Cl.: **F24C7/00** (20060101); **F25B13/00** (20060101); F24F1/0007 (20190101); F24F5/00 (20060101)

U.S. Cl.:

CPC **F24C7/004** (20130101); **F25B13/00** (20130101); F24F1/0007 (20130101); F24F5/0096 (20130101); F24F2221/18 (20130101)

Field of Classification Search

CPC: F24C (7/004); F24C (3/006); F25B (13/00); F24F (1/0007); F24F (5/0096); F24F (2221/18); F24B (1/1808); F21S (10/43); F21S (10/043); F21S (10/046)

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
4132263	12/1978	Stinnett	N/A	N/A
5775408	12/1997	Shimek et al.	N/A	N/A
7422011	12/2007	Bachinski et al.	N/A	N/A
10309671	12/2018	Nyhof et al.	N/A	N/A
2005/0076903	12/2004	Briere	N/A	N/A
2009/0245353	12/2008	Choi et al.	N/A	N/A
2012/0202415	12/2011	Rudd	454/338	F24F 7/06
2013/0233841	12/2012	Gallo	219/201	H04N 5/64
2018/0010819	12/2017	Nyhof	N/A	F24F 1/0003
2020/0340696	12/2019	Nyhof	N/A	F24F 11/88

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
2459927	12/2008	GB	F24C 3/006
2516127	12/2014	GB	F24B 1/1808
WO-2013014455	12/2012	WO	F24B 1/1808

Primary Examiner: Trpisovsky; Joseph F

Attorney, Agent or Firm: Kunzler Bean & Adamson

Background/Summary

CROSS-REFERENCES TO RELATED APPLICATIONS (1) This application claims the benefit of U.S. Provisional Patent Application No. 63/296,468 entitled “HVAC (Heating Ventilation Air Conditioning) AC Heat Pump Electric Fireplace” and filed on Jan. 4, 2022 for Benjamin Larry Beckstead, et al., which is incorporated herein by reference in its entirety for all purposes.

FIELD

(1) This invention relates to electric fireplaces and more particularly relates to electric fireplaces with air conditioning.

BACKGROUND

(2) Electric fireplaces can be convenient, easy to install, and aesthetically pleasing. However, in areas where air conditioning is also desirable, air-conditioning units may not be as aesthetically pleasing, typically comprising large plastic boxes installed in a window or on a wall.

SUMMARY
(3) Apparatuses for an electric fireplace with an integrated air conditioner are presented. In one embodiment, an electronic display is configured to display one or more flame visualizations. A heat source, in some embodiments, is coupled to an electronic display and configured to heat a surrounding environment. A cooling source, in a further embodiment, is coupled to an electronic display and configured to cool a surrounding environment. An electronic display, a heat source, and a cooling source, in certain embodiments, share a single power source.
(4) Systems for an electric fireplace with an integrated air conditioner are presented. An electric fireplace, in one embodiment, includes an electronic display configured to display one or more flame visualizations, a heat source coupled to the electronic display and configured to heat a surrounding environment, and a cooling source coupled to the electronic display and configured to cool the surrounding environment. An electronic display, a heat source, and a cooling source, in some embodiments, share a single electric power source. One or more head units, in certain embodiments, are spatially offset from an electric fireplace. One or more head units, in one embodiment, comprise an additional heat source configured to heat a surrounding environment and an additional cooling source configured to cool the surrounding environment.
(5) Computer program products are disclosed comprising computer program code stored on a non-transitory computer readable storage medium. Computer program code, in certain embodiments, is executable by a processor to perform operations. An operation, in one embodiment, includes displaying one or more flame visualizations on an electronic display. An operation, in a further embodiment, includes selectively heating a surrounding environment using a heat source coupled to an electronic display. An operation, in some embodiments, includes selectively cooling a surrounding environment using a cooling source coupled to an electronic display. An electronic display, a heat source, and a cooling source, in one embodiment, share a single power source.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) In order that the advantages of the invention will be readily understood, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments that are illustrated in the appended drawings. Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings, in which:
(2) FIG. **1** is a perspective view illustrating one embodiment of a system for an electric fireplace with integrated air-conditioning;
(3) FIG. **2** is a perspective view illustrating a further embodiment of a system for an electric fireplace with integrated air-conditioning;
(4) FIG. **3** is a cutaway front view illustrating one embodiment of an electric fireplace with integrated air-conditioning;
(5) FIG. **4** is a cutaway side view illustrating one additional embodiment of an electric fireplace with integrated air-conditioning; and
(6) FIG. **5** is a schematic flow chart diagram illustrating one embodiment of a method for an electric fireplace with integrated air-conditioning.
DETAILED DESCRIPTION
(7) Aspects of the present invention are described herein with reference to system diagrams, flowchart illustrations, and/or block diagrams of methods, apparatuses, systems, and computer program products according to embodiments of the invention. It will be understood that blocks of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart

illustrations and/or block diagrams, can be implemented by computer readable program instructions.

(8) FIG. **1** depicts one embodiment of a system **100** for an electric fireplace **102** with an integrated air conditioner. The system **100**, in the depicted embodiment, includes an electric fireplace **102***a*, a head unit **102***b*, one or more controllers **110**, a building **112** with a cabinet **114**, a data network, a computing device **118**, and an outdoor unit **120**.

(9) In general, the electric fireplace **102***a* and/or the separate head unit **102***b* of the system **100** may comprise both a heat source and a cooling source (e.g., a heat pump configured to alternatively heat and/or cool a surrounding environment in different modes, or the like). The electric fireplace **102***a*, in the depicted embodiment, comprises an electronic display **104**, configured to display one or more flame visualizations **106** and/or other visualizations. In this manner, in certain embodiments, the system **100** may provide both heating and cooling from the same electric fireplace **102***a*, behind an attractive, aesthetically pleasing display **104** with a dynamic visualization **106**, instead of requiring a separate plastic box of an air conditioning unit on a wall or in a window.

(10) The electric fireplace **102***a*, in the depicted embodiment, includes an electronic display **104** with a flame visualization **106**, a return vent **108***a*, a supply vent **108***b*, and a controller **110**. In one embodiment, the electronic display **104** comprises an illuminated display such that the flame visualization **106** and/or one or more other visualizations are illuminated. For example, in various embodiments, the electronic display **104** may comprise one or more light bulbs, a light-emitting diode (LED) screen, a liquid-crystal display (LCD) screen, a plasma screen, an organic LED (OLED) screen, an electroluminescent display screen, a quantum-dot LED screen, an electronic ink screen, or the like.

(11) In some embodiments, the electronic display **104** is configured to display a dynamic and/or animated flame visualization **106** (e.g., with moving and/or animated flames **106**, or the like). In other embodiments, electronic display **104** and/or the flame visualization **106** may be substantially static (e.g., a drawing, painting, stamp, photo, print, cutout, streamers, foil or mirror and/or another reflective material, an artificial log, a log set, stone and/or rocks, crystals, glass, a three dimensional display, a flat two dimensional display, or the like) and one or more electronic lights, fans/blowers, or the like may actuate and/or give an appearance of movement to the substantially static flame visualization **106** (e.g., lights blinking and/or moving, a fan/blower moving illuminated streamers, or the like).

(12) In certain embodiments, instead of or in addition to a flame visualization **106**, the electronic display **104** may display one or more other visualizations (e.g., a wind visualization, an ocean visualization, an outdoor landscape visualization, a sunrise or sunset visualization, a photo slideshow visualization, or the like). The electronic display **104**, in a further embodiment, may comprise a television and/or display monitor, or the like, with one or more video and/or audio inputs (e.g., HDMI, DVI, DisplayPort, VGA, RCA, coaxial, or the like), a broadcast television antenna, or the like.

(13) As described in greater detail below, in some embodiments, the controller **110** may dynamically customize and/or adjust the flame visualization **106** based on a mode of the electric fireplace **102***a* (e.g., a heating mode, a cooling mode, or the like). For example, the electronic display **104** may display a flame visualization **106** comprising a warm color hue (e.g., one or more of a yellow, orange, and/or red hue, or the like) during a heating mode, may display a flame visualization **106** comprising a cool color hue (e.g., one or more of a blue, green, and/or magenta hue, or the like) during a cooling mode, or the like. In certain embodiments, the controller **110** may also play one or more sounds associated with a mode of the electric fireplace **102***a* using one or more speakers associated with the electronic display **104** (e.g., sounds of a crackling fire during a heating mode, sounds of wind and/or a storm in a cooling mode, or the like).

(14) In certain embodiments, the electric fireplace **102***a* includes a return vent **108***a* and a supply vent **108***b*. In the depicted embodiment, the return vent **108***a* and the supply vent **108***b* are both

disposed in a surface of the electronic display **104** (e.g., a front surface through which the electronic display **104** is visible, through which the flame visualization is visible, or the like such as a glass surface, a plastic or other polymer surface, or the like). The electric fireplace **102***a* may comprise one or more fans, blowers, or the like to draw air in through one or more supply vents **108***b* and to force the air (e.g., after the electric fireplace **102***a* has heated or cooled the air) out through one or more return vents **108***a*.

(15) By disposing one or more vents **108** in a front surface of the electric fireplace **102***a* and/or the electronic display **104**, in some embodiments, the electric fireplace **102***a* may be installed flush and/or substantially flush with a wall of the building **112**, or the like. In other embodiments, one or more vents **108** may be disposed in one or more side surfaces (e.g., a top surface, a bottom surface, a left surface, a right surface, or the like) of the electric fireplace **102***a*, perpendicular to the front surface and/or the electronic display **104**, and the electric fireplace **102***a* may be installed extending at least partially out from a wall of the building **112** (e.g., instead of being flush) to accommodate the one or more vents **108**.

(16) The electric fireplace **102***a* and/or the head unit **102***b*, in certain embodiments, include both a heat source and a cooling source. Both a heat source and a cooling source, in one embodiment, may be mechanically coupled to (e.g., within a single housing, mounted behind, or the like) the electronic display **104** of the electric fireplace **102***a*.

(17) In one embodiment, the heat source and the cooling source comprise a single heat pump (e.g., a split system air conditioner, a direct-current (DC) inverter heat pump, or the like) configured to both heat the surrounding environment in a heating mode and to cool the surrounding environment in a cooling mode. For example, the electric fireplace **102***a* and/or the head unit **102***b* may comprise an indoor unit (e.g., with an evaporator coil, an expansion valve, a fan, or the like) in fluid communication (e.g., through one or more refrigerant lines) with an outdoor unit **120** (e.g., with a compressor, condenser coil, fan, or the like).

(18) In some embodiments, a reversing valve is disposed between the electric fireplace **102***a* and/or the head unit **102***b* and the outdoor unit **120**, to reverse the flow of refrigerant between them to switch between a heating mode and a cooling mode (e.g., in response to a signal from a controller **110**, or the like). The heat source and/or the cooling source, in various embodiments, may include a DC inverter heat pump, an air-source heat pump, a ground-source and/or geothermal heat pump, an absorption heat pump, a closed-loop heat pump, an open-loop heat pump, a reverse cycle chiller, a cold climate heat pump, or the like.

(19) In one embodiment, the electronic display **104**, the heat source, and the cooling source share a single power source, such as an electric power source or the like (e.g., without requiring a combustible fuel source to heat the surrounding environment, or the like). In some embodiments, an electric fireplace **102***a* and/or a head unit **102***b* may also comprise a secondary heat source (e.g., supplemental heating, electric heating coils, a backup burner, or the like) to temporarily heat and/or defrost coils in response to the reversing valve switching modes, or the like.

(20) In some embodiments, a single outdoor unit **120** may be in communication with (e.g., through one or more refrigerant lines) and/or otherwise connect to multiple electric fireplaces **102***a* and/or head units **102***b*. In another embodiment, a system **100** may include multiple outdoor units **120** for multiple electric fireplaces **102***a* and/or head units **102***b*.

(21) In certain embodiments, one or more controllers **110** may be configured to govern and/or control one or more operations of the system **100** (e.g., of an electric fireplace **102***a*, a head unit **102***b*, a computing device **118**, or the like). For example, in some embodiments, a controller **110** may comprise logic hardware such as one or more of a processor (e.g., a CPU, a microcontroller, firmware, microcode, an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or other programmable logic, or the like), a volatile memory, non-volatile computer readable storage medium, a network interface, a printed circuit board, or the like. A controller **110**, in further embodiments, may include computer program code stored on a non-transitory computer

readable storage medium, executable by a processor to perform one or more of the operations described herein with regard to the electric fireplace **102***a* and/or the head unit **102***b*, or the like.
(22) A controller **110**, in one embodiment, may be in communication with one or more of a heat source, a cooling source, an electronic display **104**, or the like (e.g., and may send one or more control signals, commands, or the like). In some embodiments, a controller **110** may be configured to display one or more flame visualizations **106** on the electronic display **104** (e.g., a first flame visualization **106** during a heating mode, a second flame visualization during a cooling mode, a warm color hue such as yellow/orange/red during a heating mode, a cool color hue such as blue/green/magenta during a cooling mode, or the like).
(23) A controller **110**, in certain embodiments, may determine a mode for an electric fireplace **102***a* and/or a head unit **102***b* (e.g., a heating mode, a cooling mode, a temperature setting, or the like) based on user input. For example, a controller **110** may receive user input from a thermostat disposed on a wall of the building **112**, from a remote control device (e.g., an infrared remote control, a radio frequency remote control, a Bluetooth® remote control, or the like), from a user interface of a computing device **118** over a data network **116** (e.g., a mobile computing device such as a smartphone, a smart watch, a tablet, a laptop, or the like; a desktop computer; a gaming device; a set-top box; and/or another computing device **118** comprising a processor and a memory). In some embodiments, a controller **110** may actuate a reversing valve of a heat pump to turn on a heat source in a heating mode in response to a temperature being at or below a heating threshold, may actuate a reversing valve of a heat pump to turn on a cooling source in a cooling mode in response to a temperature being at or above a cooling threshold, or the like.
(24) The system **100**, in one embodiment, includes multiple electric fireplaces **102***a* and/or head units **102***b* (e.g., spatially offset in different rooms and/or other locations of the building **112**, or the like), each with an additional heat source and/or cooling source (e.g., a heat pump, or the like). In the depicted embodiment, multiple electric fireplaces **102***a* and/or head units **102***b* are connected to the same outdoor unit **120**. Multiple controllers **110**, in some embodiments, may communicate and/or coordinate to share one or more settings, statuses, thermometer and/or other sensor readings, or the like.
(25) In the depicted embodiment, a head unit **102***b* is disposed in a cabinet **114** (e.g., above a refrigerator). In other embodiments, a head unit **102***b* may be installed and/or disposed in a ceiling, in a kitchen island, in a closet, in a cupboard, on a wall, in a window, or the like. Multiple electric fireplaces **102***a* and/or head units **102***b* may be strategically disposed in different locations around the building **112** to provide a complete distributed heating and/or cooling solution, either as a retrofit solution or as the building **112** is being newly constructed.
(26) The data network **116**, in one embodiment, includes a digital communication network that transmits digital communications. The data network **116** may include a wireless network, such as a wireless cellular network, a local wireless network, such as a Wi-Fi network, a Bluetooth® network, a near-field communication (NFC) network, an ad hoc network, or the like. The data network **116** may include a wide area network (WAN), a local area network (LAN), an optical fiber network, the internet, or other digital communication network. The data network **116** may include a combination of two or more networks. The data network **116** may include one or more servers, routers, switches, and/or other networking equipment.
(27) One or more electric fireplaces **102***a*, head units **102***b*, and/or computing devices **118** may be in communication over a data network **116**, either directly or through a backend server computing device, or the like. A controller **110** executing on a computing device **118** (e.g., computer executable program code, an installable application, a mobile application, or the like), in some embodiments, may provide a user interface for a user to perform one or more actions for one or more electric fireplaces **102***a* and/or head units **102***b*. For example, a controller **110** may present a graphical user interface on a display screen of a computing device **118** enabling a user to set a desired temperature for a surrounding environment (e.g., a room, a floor, or other location) of the

building **112**, to set a mode (e.g., a heating mode, a cooling mode, a combined heating and cooling mode, or the like), to select a visualization **106**, to set a timer for heating and/or cooling, or the like.
(28) FIG. **2** depicts one embodiment of a system **200** for an electric fireplace **102** with integrated air-conditioning. The electric fireplace **102** of FIG. **2**, in some embodiments, may be substantially similar to the electric fireplace **102***a* described above with regard to FIG. **1**. In the depicted embodiment, the electric fireplace **102** includes an electronic display **104** with a flame visualization **106** and one or more vents **108***a-b*, a heat source **202**, a cooling source **204**, a duct **206**, an outside unit interface **208**, and a power source interface **210**.
(29) In one embodiment, as described above with regard to FIG. **1**, a heat source **202** and a cooling source **204** may be combined/integrated as a single heat pump. In other embodiments, a heat source **202** may comprise an electric heating coil, a forced air furnace (e.g., with a combustible fuel source), or the like and a cooling source **204** may comprise a central air conditioner (e.g., a ducted system), a hybrid and/or dual fuel air conditioner, or the like.
(30) In one embodiment, a duct **206** is disposed to direct air between the supply vent **108***b*, past the heat source **202** and/or the cooling source **204**, and out the return vent **108***a*, or the like. The duct **206** may comprise a channel, a guide, a cavity, and/or another opening providing fluid communication between one or more vents **108***a-b* and the heat source **202** and/or the cooling source **204**. The duct **206** may comprise a durable material, such as a metal, a plastic or other polymer, a ceramic, a glass, a composite material, or the like. In some embodiments, the duct **206** may comprise a plastic or other polymer material rather than a metal, as the heat source **202** may not be configured to reach as high a temperature as a furnace and/or burner that uses a combustible fuel source, or the like.
(31) In one embodiment, an outside unit interface **208** may comprise one or more tubes and/or pipes in communication with an outside unit **120** (e.g., in fluid communication to transport refrigerant, or the like). An outside unit interface **208** may be in communication with a compressor, an expansion device, a reversing valve, or the like (e.g., either as part of an electric fireplace **102***a*, a head unit **102***b*, an outside unit **120**, or the like). In one embodiment, a power source interface **210** may comprise an electrical interface such as an electrical plug, an electrical cord, a hard-wired electrical interface, or the like. In other embodiments, a power source interface **210** may comprise a gas line or other interface to a combustible fuel source (e.g., a non-electric fuel source, as a supplement and/or backup to an electric power source, in place of an electric power source, or the like).
(32) FIG. **3** depicts one embodiment **300** of a cutaway front view of an electric fireplace **102** with integrated air-conditioning and FIG. **4** depicts one embodiment **400** of a cutaway side view of an electric fireplace **102**. The electric fireplace **102** of FIG. **3** and/or of FIG. **4**, in some embodiments, may be substantially similar to one or more of the electric fireplace **102***a* of FIG. **1** and/or the electric fireplace **102** of FIG. **2**. The depicted embodiment **300** of FIG. **3** comprises a cutaway front view with the electronic display **104** removed and the depicted embodiment **400** of FIG. **4** comprises a cutaway side view.
(33) The electric fireplace **102** includes a combined heat source **202** and cooling source **204** that comprises a heat pump with a fan, blower, or other air mover (e.g., that sucks air through the supply vent **108***b*, into the duct **206**, and out the return vent **108***a*) and an evaporator coil or other heat exchanger that heats the air in a heating mode and cools the air in a cooling mode (e.g., depending on a state of a reversing valve, a compressor, or the like as commanded by the controller **110**).
(34) FIG. **5** depicts one embodiment of a method **500** for an electric fireplace **102** with integrated air-conditioning. The method **500** begins and a controller **110** displays **502** one or more flame visualizations **106** on an electronic display **104**.
(35) A controller **110** determines **504** whether or not to initiate a heating mode (e.g., based on user input, a temperature satisfying a heating threshold, a setting, a reading from a thermometer or other

temperature sensor, or the like). If the controller **110** determines **504** to initiate a heating mode, the controller **110** selectively heats **506** a surrounding area using a heat source **202** coupled to the electronic display **104**.

(36) A controller **110** determines **508** whether or not to initiate a cooling mode (e.g., based on user input, a temperature satisfying a cooling threshold, a setting, a reading from a thermometer or other temperature sensor, or the like). If the controller **110** determines **508** to initiate a cooling mode, the controller **110** selectively cools **510** a surrounding area using a cooling source **204** coupled to the electronic display **104**. The method **500** continues, with a controller **110** continuing to determine **504**, **508** when to initiate heating and/or cooling modes.

(37) Reference throughout this specification to “one embodiment,” “an embodiment,” or similar language means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. Thus, appearances of the phrases “in one embodiment,” “in an embodiment,” and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment, but mean “one or more but not all embodiments” unless expressly specified otherwise. The terms “including,” “comprising,” “having,” and variations thereof mean “including but not limited to” unless expressly specified otherwise. An enumerated listing of items does not imply that any or all of the items are mutually exclusive and/or mutually inclusive, unless expressly specified otherwise. The terms “a,” “an,” and “the” also refer to “one or more” unless expressly specified otherwise.

(38) Furthermore, the described features, advantages, and characteristics of the embodiments may be combined in any suitable manner. One skilled in the relevant art will recognize that the embodiments may be practiced without one or more of the specific features or advantages of a particular embodiment. In other instances, additional features and advantages may be recognized in certain embodiments that may not be present in all embodiments. These features and advantages of the embodiments will become more fully apparent from the following description and appended claims or may be learned by the practice of embodiments as set forth hereinafter.

(39) As will be appreciated by one skilled in the art, aspects of the present invention may be embodied as a system, method, and/or computer program product. Accordingly, aspects of the present invention may take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, micro-code, etc.) or an embodiment combining software and hardware aspects that may all generally be referred to herein as a “circuit,” “module,” or “system.” Furthermore, aspects of the present invention may take the form of a computer program product embodied in one or more computer readable medium(s) having program code embodied thereon.

(40) Many of the functional units described in this specification have been labeled as modules to emphasize their implementation independence more particularly. For example, a module may be implemented as a hardware circuit comprising custom very large scale integrated (“VLSI”) circuits or gate arrays, off-the-shelf semiconductor circuits such as logic chips, transistors, or other discrete components. A module may also be implemented in programmable hardware devices such as an FPGA, programmable array logic, programmable logic devices or the like.

(41) Modules may also be implemented in software for execution by various types of processors. An identified module of program code may, for instance, comprise one or more physical or logical blocks of computer instructions which may, for instance, be organized as an object, procedure, or function. Nevertheless, the executables of an identified module need not be physically located together but may comprise disparate instructions stored in different locations which, when joined logically together, comprise the module and achieve the stated purpose for the module.

(42) Indeed, a module of program code may be a single instruction, or many instructions, and may even be distributed over several different code segments, among different programs, and across several memory devices. Similarly, operational data may be identified and illustrated herein within modules and may be embodied in any suitable form and organized within any suitable type of data

structure. The operational data may be collected as a single data set or may be distributed over different locations including over different storage devices, and may exist, at least partially, merely as electronic signals on a system or network. Where a module or portions of a module are implemented in software, the program code may be stored and/or propagated on in one or more computer readable medium(s).

(43) The computer program product may include a computer readable storage medium (or media) having computer readable program instructions thereon for causing a processor to carry out aspects of the present invention.

(44) The computer readable storage medium can be a tangible device that can retain and store instructions for use by an instruction execution device. The computer readable storage medium may be, for example, but is not limited to, an electronic storage device, a magnetic storage device, an optical storage device, an electromagnetic storage device, a semiconductor storage device, or any suitable combination of the foregoing. A non-exhaustive list of more specific examples of the computer readable storage medium includes the following: a server, cloud storage (which may include one or more services in the same or separate locations), a hard disk, a solid state drive ("SSD"), an SD card, a random access memory ("RAM"), a read-only memory ("ROM"), an erasable programmable read-only memory ("EPROM" or Flash memory), a static random access memory ("SRAM"), a Blu-ray disk, a memory stick, and any suitable combination of the foregoing. A computer readable storage medium, as used herein, is not to be construed as being transitory signals per se, such as radio waves or other freely propagating electromagnetic waves, electromagnetic waves propagating through a waveguide or other transmission media (e.g., light pulses passing through a fiber-optic cable), or electrical signals transmitted through a wire.

(45) Computer readable program instructions described herein can be downloaded to respective computing/processing devices from a computer readable storage medium or to an external computer or external storage device via a network, for example, the Internet, a local area network, a wide area network, a personal area network, a wireless mesh network, and/or a wireless network. The network may comprise copper transmission cables, optical transmission fibers, wireless transmission, routers, firewalls, switches, gateway computers and/or edge servers. A network adapter card or network interface in each computing/processing device receives computer readable program instructions from the network and forwards the computer readable program instructions for storage in a computer readable storage medium within the respective computing/processing device.

(46) Computer readable program instructions for carrying out operations of the present invention may be assembler instructions, instruction-set-architecture ("ISA") instructions, machine instructions, machine dependent instructions, microcode, firmware instructions, state-setting data, or either source code or object code written in any combination of one or more programming languages, including an object oriented programming language such as Smalltalk, C++ or the like, and conventional procedural programming languages, such as the C programming language or similar programming languages.

(47) The computer readable program instructions may execute entirely on the user's computer, partly on the user's computer, as a stand-alone software package, partly on the user's computer and partly on a remote computer or service or entirely on the remote computer or server or set of servers. In the latter scenario, the remote computer may be connected to the user's computer through any type of network, including the network types previously listed. Alternatively, the connection may be made to an external computer (for example, through the Internet using an Internet Service Provider). In some embodiments, electronic circuitry including, for example, programmable logic circuitry, FPGA, or programmable logic arrays ("PLA") may execute the computer readable program instructions by utilizing state information of the computer readable program instructions to personalize the electronic circuitry to perform aspects of the present invention.

(48) These computer readable program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks. These computer readable program instructions may also be stored in a computer readable storage medium that can direct a computer, a programmable data processing apparatus, and/or other devices to function in a particular manner, such that the computer readable storage medium having instructions stored therein comprises an article of manufacture including instructions which implement aspects of the function/act specified in the flowchart and/or block diagram block or blocks.
(49) The computer readable program instructions may also be loaded onto a computer, other programmable data processing apparatus, or other device to cause a series of operational steps to be performed on the computer, other programmable apparatus or other device to produce a computer implemented process, such that the instructions which execute on the computer, other programmable apparatus, or other device implement the functions/acts specified in the flowchart and/or block diagram block or blocks.
(50) The schematic flowchart diagrams and/or schematic block diagrams in the Figures illustrate the architecture, functionality, and operation of possible implementations of apparatuses, systems, methods, and computer program products according to various embodiments of the present invention. In this regard, each block in the schematic flowchart diagrams and/or schematic block diagrams may represent a module, segment, or portion of code, which comprises one or more executable instructions of the program code for implementing the specified logical functions.
(51) It should also be noted that, in some alternative implementations, the functions noted in the block may occur out of the order noted in the Figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. Other steps and methods may be conceived that are equivalent in function, logic, or effect to one or more blocks, or portions thereof, of the illustrated Figures.
(52) Although various arrow types and line types may be employed in the flowchart and/or block diagrams, they are understood not to limit the scope of the corresponding embodiments. Indeed, some arrows or other connectors may be used to indicate only the logical flow of the depicted embodiment. For instance, an arrow may indicate a waiting or monitoring period of unspecified duration between enumerated steps of the depicted embodiment. It will also be noted that each block of the block diagrams and/or flowchart diagrams, and combinations of blocks in the block diagrams and/or flowchart diagrams, can be implemented by special purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and program code.
(53) As used herein, a list with a conjunction of “and/or” includes any single item in the list or a combination of items in the list. For example, a list of A, B and/or C includes only A, only B, only C, a combination of A and B, a combination of B and C, a combination of A and C or a combination of A, B and C. As used herein, a list using the terminology “one or more of” includes any single item in the list or a combination of items in the list. For example, one or more of A, B and C includes only A, only B, only C, a combination of A and B, a combination of B and C, a combination of A and C or a combination of A, B and C. As used herein, a list using the terminology “one of includes one and only one of any single item in the list. For example, “one of A, B and C” includes only A, only B or only C and excludes combinations of A, B and C. As used herein, “a member selected from the group consisting of A, B, and C,” includes one and only one of A, B, or C, and excludes combinations of A, B, and C.” As used herein, “a member selected from the group consisting of A, B, and C and combinations thereof” includes only A, only B, only C, a combination of A and B, a combination of B and C, a combination of A and C or a combination of

A, B and C.
(54) Means for performing the steps described herein, in various embodiments, may include one or more of a network interface, a controller (e.g., a CPU, a processor core, an FPGA or other programmable logic, an ASIC, a microcontroller, and/or another semiconductor integrated circuit device), a heat source, a cooling source, an electronic display, a hardware appliance or other hardware device, other logic hardware, and/or other executable code stored on a computer readable storage medium. Other embodiments may include similar or equivalent means for performing the steps described herein.
(55) The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

Claims

1. An apparatus, comprising: a single housing comprising: an electronic display configured to display one or more flame visualizations; a heat source coupled to the electronic display and configured to heat a surrounding environment; a cooling source coupled to the electronic display and configured to cool the surrounding environment; a return vent and a supply vent, at least one of the return vent and the supply vent disposed in a surface of the electronic display, the electronic display, the heat source, and the cooling source sharing a single power source such that the single housing is installable within one or more of an existing fireplace and an existing cabinet as a retrofit with the electronic display and the at least one of the return vent and the supply vent facing out of the one or more of the existing fireplace and the existing cabinet; and a duct disposed at least partially behind the electronic display, the duct directing air from the supply vent past one or more of the heat source and the cooling source and out the return vent.
2. The apparatus of claim 1, wherein the heat source and the cooling source comprise a heat pump configured to heat the surrounding environment in a heating mode and to cool the surrounding environment in a cooling mode.
3. The apparatus of claim 1, further comprising a controller in communication with the heat source, the cooling source, and the electronic display.
4. The apparatus of claim 3, wherein the controller is configured to display a first of the one or more flame visualizations during a heating mode in which the heat source heats the surrounding environment and to display a second of the one or more flame visualizations during a cooling mode in which the cooling source cools the surrounding environment.
5. The apparatus of claim 4, wherein the first of the one or more flame visualizations comprises a warm color hue comprising one or more of a yellow, orange, and red hue and the second of the one or more flame visualizations comprises a cool color hue comprising one or more of a blue, green, and magenta hue.
6. The apparatus of claim 3, further comprising computer program code stored on a non-transitory computer readable storage medium of a mobile computing device, the computer program code executable by the mobile computing device to communicate wirelessly with the controller with commands for one or more of the electronic display, the heat source, and the cooling source based on user input to the mobile computing device.
7. The apparatus of claim 1, wherein the surface comprises a front surface through which the electronic display is visible.
8. The apparatus of claim 7, wherein the front surface comprises a seal with the duct such that the air is forced through one or more of the return vent and the supply vent.
9. The apparatus of claim 1, wherein one or more of the return vent and the supply vents is

disposed in one or more side surfaces perpendicular to the electronic display, the one or more side surfaces shaped to extend out of a wall.

10. The apparatus of claim 1, wherein the single power source comprises an electric power source such that the heat source does not use a combustible fuel source to heat the surrounding environment.

11. A system, comprising: an electric fireplace comprising: an electronic display configured to display one or more flame visualizations; a heat source coupled to the electronic display and configured to heat a surrounding environment; a cooling source coupled to the electronic display and configured to cool the surrounding environment, the electronic display; a return vent and a supply vent, at least one of the return vent and the supply vent disposed in a surface of the electronic display, the electronic display, the heat source, and the cooling source sharing a single power source such that the single housing is installable within one or more of an existing fireplace and an existing cabinet as a retrofit with the electronic display and the at least one of the return vent and the supply vent facing out of the one or more of the existing fireplace and the existing cabinet; and a duct disposed at least partially behind the electronic display, the duct directing air from the supply vent past one or more of the heat source and the cooling source and out the return vent; and one or more head units spatially offset from the electric fireplace, each of the one or more head units comprising: an additional heat source configured to heat the surrounding environment; and an additional cooling source configured to cool the surrounding environment.

12. The system of claim 11, wherein the electric fireplace comprises a controller in communication with the heat source, the cooling source, and the electronic display and each of the one or more head units comprises a controller in communication with the additional heat source and the additional cooling source.

13. The system of claim 12, further comprising computer program code stored on a non-transitory computer readable storage medium of a mobile computing device, the computer program code executable by the mobile computing device to communicate wirelessly with both the controller of the electric fireplace and with the controller of each of the one or more head units to send commands for one or more of the electronic display, the heat source, and the cooling source and for one or more of the additional heat source and the additional cooling source based on user input to the mobile computing device.

14. The system of claim 12, wherein the controller of the electric fireplace is configured to display a first of the one or more flame visualizations during a heating mode in which the heat source heats the surrounding environment and to display a second of the one or more flame visualizations during a cooling mode in which the cooling source cools the surrounding environment.

15. The system of claim 14, wherein the first of the one or more flame visualizations comprises a warm color hue comprising one or more of a yellow, orange, and red hue and the second of the one or more flame visualizations comprises a cool color hue comprising one or more of a blue, green, and magenta hue.

16. The system of claim 11, wherein the surface comprises a front surface through which the electronic display is visible.

17. A computer program product comprising computer program code stored on a non-transitory computer readable storage medium, the computer program code executable by a processor to perform operations, the operations comprising: displaying one or more flame visualizations on an electronic display; selectively heating a surrounding environment using a heat source coupled to the electronic display; and selectively cooling the surrounding environment using a cooling source coupled to the electronic display, wherein a single housing comprises the electronic display, the heat source, and the cooling source which share a single power source, wherein at least one of a return vent and a supply vent are disposed in a surface of the electronic display such that the single housing is installable within one or more of an existing fireplace and an existing cabinet as a retrofit with the electronic display and the at least one of the return vent and the supply vent facing

out of the one or more of the existing fireplace and the existing cabinet.

18. The computer program product of claim 17, wherein the operations further comprise controlling operation of one or more of the electronic display, the heat source, and the cooling source based on user input received by a mobile computing device.