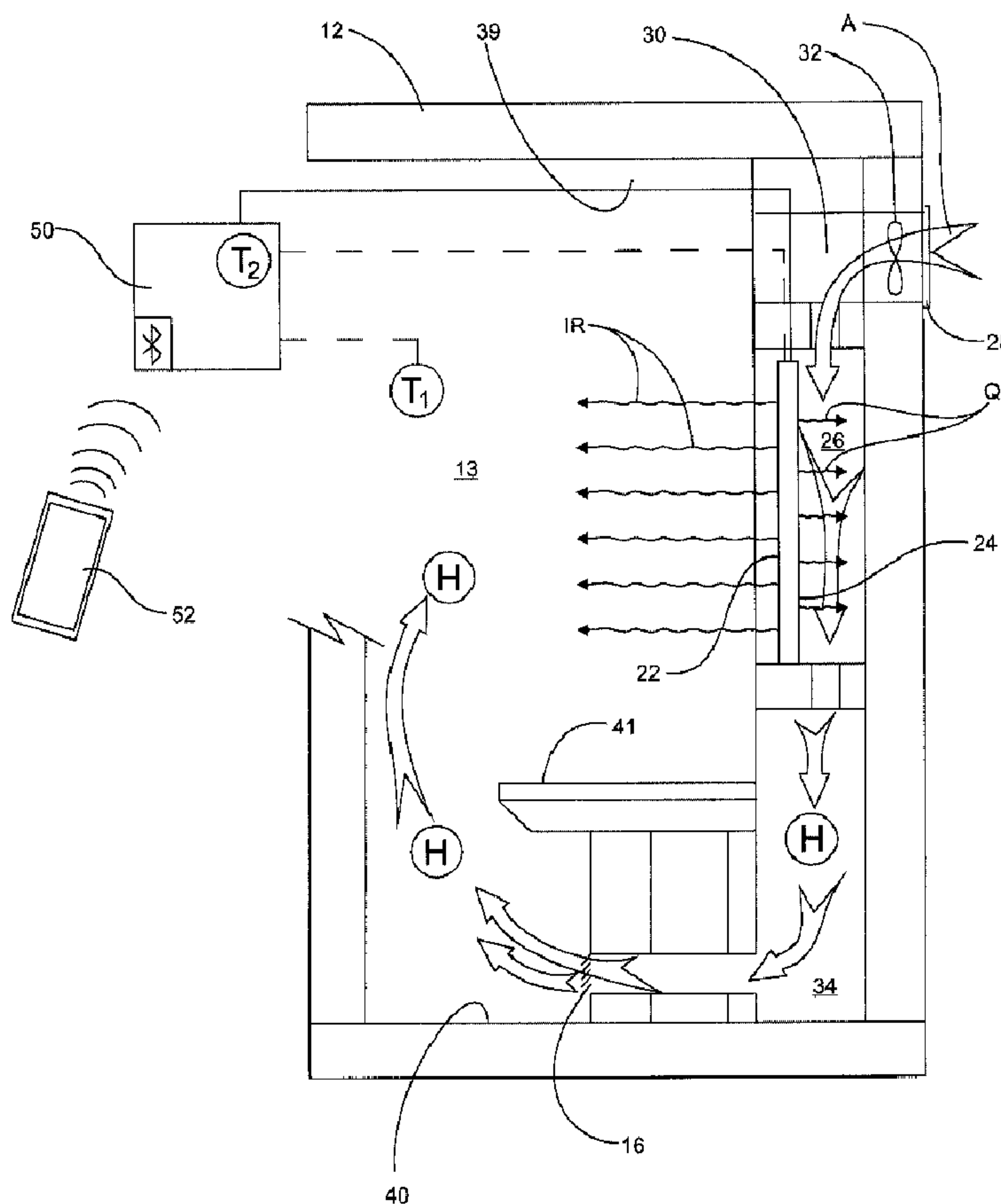




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(71) Demandeur/Applicant:  
SPA LOGIC INC., CA  
(72) Inventeur/Inventor:  
AMENDT, DARCY S., CA  
(74) Agent: GOODWIN MCKAY

(54) Titre : SAUNA INFRAROUGE HYBRIDE  
(54) Title: HYBRID INFRARED SAUNA



(57) **Abrégé/Abstract:**

A hybrid sauna provides far infrared radiant heat to a user from a first side of a far infrared heat panel while waste heat is collected as heated air from the backside of the panel by flowing air through an air passageway and across the panel. The heated air is

(57) **Abrégé(suite)/Abstract(continued):**

distributed into a user space through openings in a divider structure incorporating the panel, the divider separating the user space from the air passageway. The air circulates in the sauna natural thermal cycle or by forced air. The heat panels and environment may be controlled by a short range wireless remote.

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ABSTRACT

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A hybrid sauna provides far infrared radiant heat to a user from a first side of a far infrared heat panel while waste heat is collected as heated air from the backside of the panel by flowing air through an air passageway and across the panel. The heated air is distributed into a user space through openings in a divider structure incorporating the panel, the divider separating the user space from the air passageway. The air circulates in the sauna natural thermal cycle or by forced air. The heat panels and environment may be controlled by a short range wireless remote.

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## HYBRID INFRARED SAUNA

### FIELD

The invention relates to infrared saunas, more particularly saunas implementing both infrared and heated air for providing benefits to the user.

### BACKGROUND

Conventionally, there are two choices for saunas, dry saunas and infrared saunas. Dry saunas rely only on convection to supply heated air to the sauna user and conduction to transfer heat from the heated air to the user's body. Infrared saunas typically use the far infrared (FAR) portion of the electromagnetic spectrum (5.6 to 1,000 microns). The FAR segment of the electromagnetic spectrum occurs just below red light. FAR is not visible but is received by the user and can be felt as heat. Saunas using FAR are believed to impart health and aesthetic effects.

Options for producing FAR include far infrared heat panels such as, carbon fibre heaters and ceramic heaters. Carbon fiber heaters are generally accepted as having advantages including a large infrared emitting surface and being sufficiently cool to avoid serious injury if accidentally touched. Basically, carbon fiber heaters are thin, large surface area composite assemblies of electrically stimulated, carbon-impregnated material sandwiched between glass sheets. The composite assembly is vulnerable to overheating.

One aspect of FAR is that a user does not need to be immediately adjacent the heater as long as the infrared radiant energy reaches the user. The user is directly warmed, without needlessly heating the air or area around the

1 user. Such saunas need not be enclosed and, if so, are typically not insulated  
2 due to the low enclosure temperatures.

3 Applicant understands that, to date, conventional saunas have  
4 implemented carbon fiber heaters for FAR emissions only. The saunas are  
5 generally not insulated and any heat generated at the heater has been shed by  
6 conduction through the sauna walls.

7 FAR heaters use meagre power and typically operate on  
8 household current. Some of the health benefits of FAR heaters are believed to  
9 be related to mere exposure to the emitted wavelength, including deep tissue  
10 therapy, resulting in only some warming of the user. Thus the user's perception  
11 of receiving some health benefit is less than immediately apparent and, more so,  
12 one left to faith. Thus, some users tend to abandon the FAR sauna experience  
13 and course of treatment before having received the full potential of benefits  
14 available.

15 What is required is a sauna having a more overt and effective  
16 environment for encouraging greater user participation, maximum efficiency, and  
17 perceived benefits.

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SUMMARY

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A hybrid sauna is provided which both heats the environment about the user and generates far infrared (FAR) energy for direct heating and health benefits of the user. The hybrid sauna combines the benefits of FAR saunas and traditional organic dry saunas. Carbon fibre FAR heat panels provide radiant energy. Such panels are vulnerable to component overheating. Accordingly, the hybrid sauna described herein implements FAR heat panels within a system and control which provides radiant energy, cools the panels and provides dry heat to the sauna enclosure for perceptible effect and enjoyment by a user.

Generally, the FAR heat panels are arranged in an enclosure with an emission surface directing radiant energy to the user, while also incorporating the opposing backside of the panel in a heat exchanger to an air passageway. The air passageway collects waste heat and directs it into the user space. The air can circulate through the passageways and user space by natural convention or by forced air. Controls ensure at least user space environmental temperature control and can also provide panel control and overheating protection. Further a wireless control system is provided for interfacing with various controls and modules of the sauna including an interface to an entertainment system.

Therefore, in one aspect a hybrid sauna comprises an enclosure forming a user space and at least one FAR heat panel having a first panel side for emitting FAR and a second panel side for releasing waste heat, the first side oriented for emitting the FAR towards the user space. At least one air passageway is provided in fluid communication with the second panel side for removing waste

1 heat from the second panel side and producing a heated air. The heated air is  
2 directed through an air outlet to the user space.

3 The at least one panel and air passageway can be multiple panels  
4 and passageways, typically one passageway per panel. The heat air can be  
5 discharged adjacent a bottom the user space for natural circulation therethrough.  
6 The air can be drawn from the ambient environment outside the enclosure using an  
7 air mover.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

10 Figure 1 is a perspective cutaway view of a sauna having an  
11 enclosure and fit with one embodiment of a hybrid far infrared and dry sauna;

12 Figure 2 is a perspective partially assembled view of an embodiment  
13 of a heat exchange unit suitable for far infrared heat panels of a hybrid sauna of  
14 Fig. 1, the heat exchanger with air moving therethrough for delivery of conditioned  
15 air; and

16 Figure 3 is a partial, side, cross-sectional view of the enclosure of  
17 Fig. 1 illustrating perspective view of an enclosure illustrating both far infrared  
18 emissions and heated, conditioned air for warming the enclosure.

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DETAILED DESCRIPTION

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As shown in Fig. 1, a hybrid sauna 10 is illustrated having an enclosure 12 defining a user space 13 for a user to enjoy the sauna. The sauna has at least one far infrared (FAR) radiant heat panel 14 (in dotted lines) for the use of the user and an air outlet 16 for discharging heated air H. The enclosure 12 includes enclosing walls, a user access opening and can include windows and a variety of conventional sauna comfort features not shown

3

At least one FAR heat panel 14 is installed at one or more locations in the enclosure 12 with an open line of infrared transmission to the user space 13. As shown, FAR heat panel or panels 14 are installed towards a back of the enclosure 12 for emitting radiant energy IR forwards, towards the user in the user space 13. For aesthetics and separating the user space from the panel 14, a FAR-transparent fabric or material 18 is situated between the FAR heat panels 14 and the user space 13, camouflaging the FAR heater 14 yet emitting the radiant IR energy therethrough.

4

Further, means are provided for recovering waste heat Q from the FAR heat panels 14 (See Fig. 3) which is otherwise lost to the environment outside of the enclosure. Recovered heat Q is discharged from the air outlet 16 for substantially immediate and perceptible enjoyment by the user.

5

With reference to Figs. 2 and 3, each FAR heat panel 14 forms part of a panel-to-air heat exchanger 20. Each FAR heat panel 14 is a flat, planer panel, thin in depth and having a front-side first panel side 22, comprising a low temperature radiant emitter oriented towards the user space, and an opposing, backside second panel side 24 for dumping waste heat Q. Each FAR heat panel 14 is associated with its own air passageway such as a heat transfer duct 26.



1 The second side of the FAR panel 14 faces the duct 26 and is in thermal  
2 communication therewith. Air A flows through the duct 26 passes over the  
3 second side of FAR heat panel 14, receiving waste heat Q therefrom, resulting in  
4 heated air H for ultimate discharge to the user space 13. The air circulation  
5 cools the FAR heat panels 14. The FAR heat panel 14 is fit to a divider structure  
6 between the user space and the at least one air passageway, wherein the at  
7 least one FAR infrared heater is fit to the divider.

8 Air A can circulate across the backside of the panel 14 by natural  
9 thermal cycle, such as convection or be forced thereby. While air A can pass  
10 across the FAR heat panel 14 in any direction to recover heat Q, in one  
11 embodiment, heated air H, passes from top to bottom across the panel 14 and is  
12 discharged adjacent a bottom 40 of the user space 13. Discharged heated air H  
13 can circulate by a natural thermal cycle, such as convection, up through the user  
14 space 13. The air outlet 16 can be in fluid communication with, and adjacent, an  
15 upper end 39 of the user space 13 or enclosure 12. Air A can be forcibly  
16 circulated through the user space 13 and duct 26 using various air movers.  
17 Further, one might initially internally recirculate heated air H, particularly during a  
18 sauna preheat stage.

19 In an embodiment, during steady state operation, fresh outside air  
20 A is sourced from the environment outside the enclosure. Outside air A flows  
21 through an inlet 28 and into the duct 26 for discharge through air outlet 16. The  
22 inlet 28 can be located adjacent the upper end 39 of the enclosure 12 and be  
23 urged into the duct 26 using an air mover such as a fan 32 for discharge through  
24 the air outlet 16 and through the divider adjacent the bottom 40 of the enclosure  
25 12.

1                   In an embodiment, the at least one FAR heat panel 14 is two or  
2 more panels 14,14 ... three being shown, and at least one passageway or duct  
3 26.

4                   To maximize heat collection, each panel 14 is provided with its own  
5 duct 26. Outside air A flows into an intake header 30 in fluid communication with  
6 and for distribution into the multiple ducts 26,26,... . Similarly, a discharge  
7 header 34 is in fluid communication with and for collection of heated air H from  
8 the multiple ducts 26,26,... .

9                   With reference to Fig. 3, the outside air A to the enclosure 12  
10 enters the intake header 30 adjacent the upper end 39 and travels along the  
11 heat transfer ducts 26 receiving waste heat Q rejected from the FAR heat panels  
12 14. The heated air H is collected in the discharge header 34 for discharge  
13 adjacent the bottom 40 of the enclosure 12. Heated air H naturally rises from the  
14 bottom 40, through the user space 13, resulting in a comfortable environment for  
15 a user. A seat 41 is provided for user comfort and is placed adjacent the FAR  
16 heat panels 14.

17                   The enclosure 12 materials of construction are generally of non-  
18 toxic glue and cedar chosen for its pleasant and non-toxic characteristics in  
19 sauna conditions. All materials meet RoHS (Restriction of the use of certain  
20 Hazardous Substances) standards, including being free of lead and Cadmium 6.  
21 Other than windows and other features not so amenable, the enclosure 12 is  
22 insulated to retain heat from the heated air H.

23                   In one embodiment, the FAR heat panels 14 are carbon fibre FAR  
24 heat panels 14 supplied with household 110V/15A current and can provide  
25 infrared in the 7 to 14 micron range, with emphasis on the 8.4 to 9.4 micron

1 range used for infrared therapy. Each of three carbon fibre FAR heat panels 14  
2 can be about 250 Watts each, which can raise the comfortably temperature of a  
3 standard sized enclosure 12 in about five minutes, consuming a maximum of  
4 about 1.27 kW/h which at current rates of \$0.11 per kW is about \$0.14/h.

5 As stated, carbon fibre FAR heat panels 14 are vulnerable to  
6 overheating. As described herein, waste heat Q is recovered as heated air H,  
7 circulated for the comfort of the user. Further one or more temperatures can be  
8 monitored to manage user comfort and protect the FAR heat panel 14. A  
9 controller 50 is electrically connected to one or more of the FAR heat panels 14  
10 and to enclosure comfort controls. One or more temperature sensors T2 monitor  
11 the operating panel temperature of the FAR heat panels 14. Depending upon  
12 the operating state of the heat exchanger 20, the controller 50 will protect the  
13 panels 14 by either discontinuing energy input thereto or removing more heat.  
14 The controller 50 can shut off the FAR heat panels 14 or initiate the flow of air A  
15 through the at least one air passageway and over the second panel side if the air  
16 temperature exceeds a if the temperature exceeds a set point or threshold  
17 temperature.

18 Another temperature sensor T1 can monitor the temperature of the  
19 user space 13 and modulate FAR heat panels 14 and fans 32 to maintain the  
20 temperature T1 of the user space. A manual input pad enables user adjustment  
21 of the user space environment.

22 The controller 50 is also equipped for receiving control signals from  
23 a wireless remote 52, including typically, a smartphone, tablets and similar  
24 devices and a wireless and wired interface at the sauna. The wireless interface  
25 receives a combination of communication signals transmitted from the wireless



1 remote device. A smartphone application program can be paired with the  
2 controller 50 through a wireless interface for controlling all of the regular  
3 functions of the hybrid sauna 10.

4 In one embodiment, the wireless system includes a form of short-  
5 wavelength radio transmission, such as that under the BLUETOOTH® protocol.  
6 The Bluetooth® word mark and logos are registered trademarks owned by  
7 Bluetooth SIG, Inc. of WA, USA. A BLUETOOTH™ microcontroller receives and  
8 decodes the BLUETOOTH™ signals, and a Wi-Fi router receives and decodes  
9 the communication signals, the communication signals being transmitted using  
10 Wi-Fi protocols.

11 The application program can activate many of the sauna functions  
12 remotely including: preheating the hybrid sauna 10 and providing a return signal  
13 when the temperature is at a setpoint; setting timers for length of treatment,  
14 setting hybrid sauna performance including temperature, use of FAR, or both  
15 FAR and hybrid heat. BLUETOOTH®-enabled, and media-loaded devices can  
16 also stream media to the controller for presentation on audio, visual components  
17 in the sauna. This avoids the handling of conventional media in a hybrid sauna  
18 environment. Further, this frees the user from conventional automobile-stereo  
19 constraints typically supplied with other saunas.

20 Wireless connectivity to the wireless remote device and networks  
21 offers a broad range of connectivity and operability, including internet access  
22 and remote diagnostics. The wireless interface such as the Wi-Fi router can  
23 receive and decode communication signals being transmitted using Wi-Fi  
24 protocols.

25



1                   **THE EMBODIMENTS OF THE INVENTION IN WHICH AN**  
2 **EXCLUSIVE PROPERTY OR PRIVILEGE IS BEING CLAIMED ARE DEFINED**  
3 **AS FOLLOWS:**  
4

- 5                   1.       A hybrid sauna comprising:  
6                   an enclosure forming a user space;  
7                   at least one far infrared heat panel having a first panel side for  
8 emitting far infrared and a second panel side for releasing waste heat, the first  
9 side oriented for emitting the far infrared towards the user space;  
10                  at least one air passageway in fluid communication with the second  
11 panel side for removing waste heat from the second panel side and producing a  
12 heated air; and  
13                  an air outlet for directing the heated air to the user space.  
14
- 15                  2.       The hybrid sauna of claim 1 wherein the air outlet is in fluid  
16 communication with at a top of the user space.  
17
- 18                  3.       The hybrid sauna of claim 1 further comprising an air mover  
19 in the at least one passageway for forcing air over the second panel side, and  
20 wherein the air outlet is in fluid communication with a bottom of the user space.  
21
- 22                  4.       The hybrid sauna of claim 1 further comprising one air  
23 passageway, of the at least one air passageways, for each of the at least one far  
24 infrared heat panel.  
25

1                   5.     The hybrid sauna of claim 1 further comprising:  
2                   at least one sensor for monitoring a panel temperature of the at  
3 least one far infrared heat panel; and  
4                   a controller for shutting off the at least one far infrared heater if the  
5 panel temperature exceeds a threshold temperature.

6  
7                   6.     The hybrid sauna of claim 1 further comprising:  
8                   at least one sensor for monitoring an air temperature of the heated  
9 air flowing in the at least one air passageway; and  
10                  a controller for flowing air through the at least one air passageway  
11 and over the second panel side if the air temperature exceeds a threshold  
12 temperature.

13  
14                  7.     The hybrid sauna of claim 1 further comprising:  
15                  at least one sensor for monitoring a user space temperature of the  
16 user space; and  
17                  a controller for managing one of or both of the at least one far  
18 infrared heater and a flow of air through the at least one air passageway if the  
19 user space temperature exceeds a user space threshold temperature.

20  
21                  8.     The hybrid sauna of claim 7 wherein the controller is  
22 operatively connected to the at least one far infrared heater and to an air mover  
23 in the at least one air passageway, the air mover forcing air over the second  
24 panel side.

25

1           9.     The hybrid sauna of claim 7 wherein  
2           the controller further comprises a wireless interface; and  
3           a wireless remote for communication with the controller's wireless  
4 interface.

5  
6           10.    The hybrid sauna of claim 1 wherein the enclosure further  
7 comprises a divider structure between the user space and the at least one air  
8 passageway, wherein the at least one far infrared heater is fit to the divider.

9  
10          11.    The hybrid sauna of claim 10 wherein the divider structure  
11 comprises the air outlet at a bottom end of the divider structure for fluid  
12 communication between the at least one air passageway and a bottom of the  
13 user space.

14  
15          12.    The hybrid sauna of claim 11 wherein the at least one air  
16 passageway has an air inlet adjacent a top of the enclosure.

17  
18          13.    The hybrid sauna of claim 11 wherein the at least one air  
19 passageway further comprises:

20                 an air inlet at an upper end thereof; and

21                 an air mover in the at least one air passageway to force air flow  
22 from the air inlet, over the second panel side to collect waste heat, and out of the  
23 air outlet.

24

1                   14. The hybrid sauna of claim 13 wherein the air inlet is  
2 connected to a source of air external to the enclosure.

3

4                   15. The hybrid sauna of claim 1 wherein the user space further  
5 comprises a seat for locating a user adjacent the first panel side.

6

7                   16. The hybrid sauna of claim 1 wherein the user space further  
8 comprises a seat for locating a user adjacent the first panel side and the heated  
9 air discharges below the user.

10

11                   17. The hybrid sauna of claim 1 wherein the at least one far  
12 infrared heat panel is two or more far infrared heat panels, the at least one air  
13 passageways further comprising:

14                   two or more passageways, one passage for each far infrared heat  
15 panel;

16                   an intake header for distributing air to each of the two or more  
17 passageways; and

18                   a discharge header for collecting heated air from the two or more  
19 passageways.

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Application number / numéro de demande: 2779444

Figures: 1

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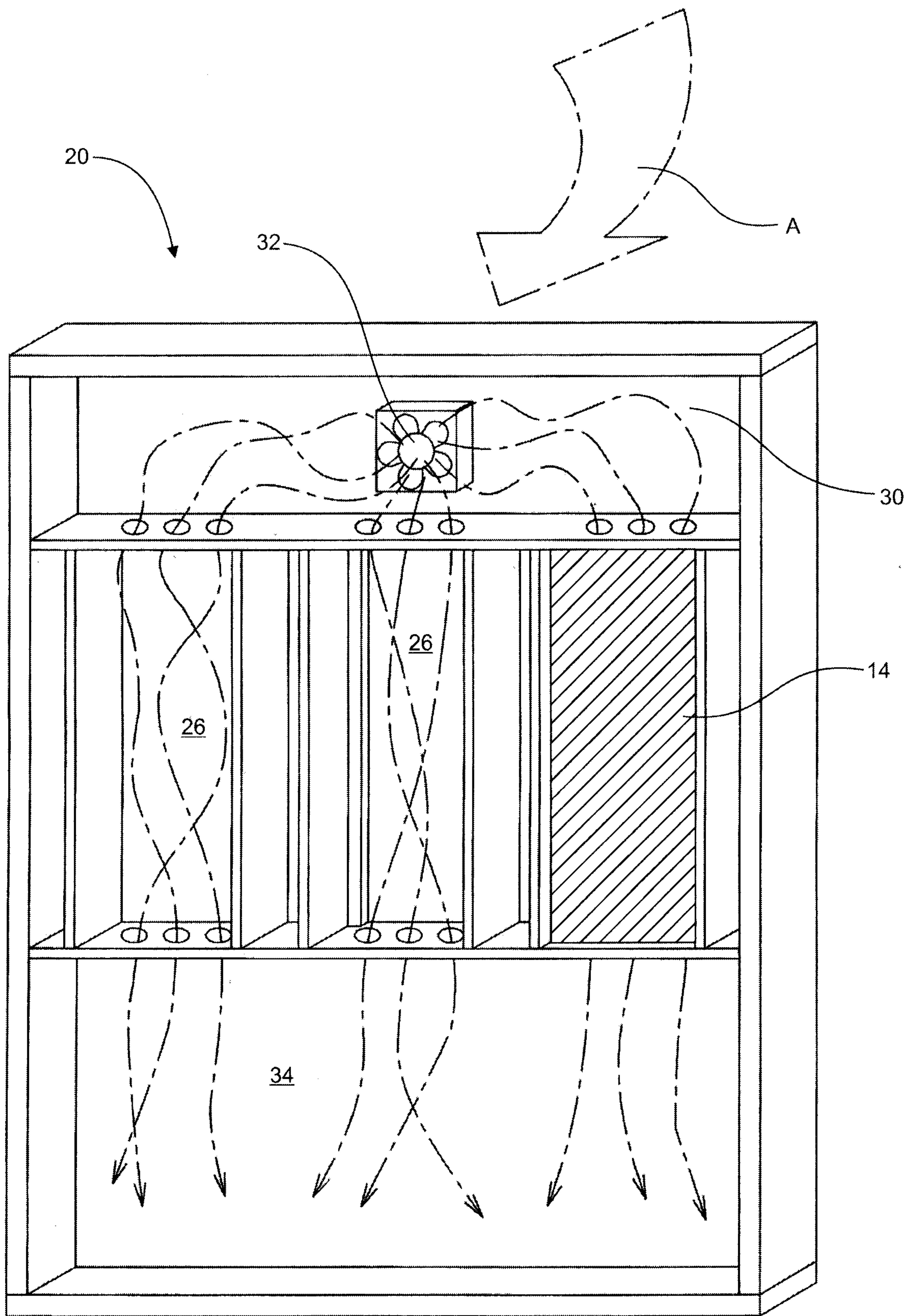
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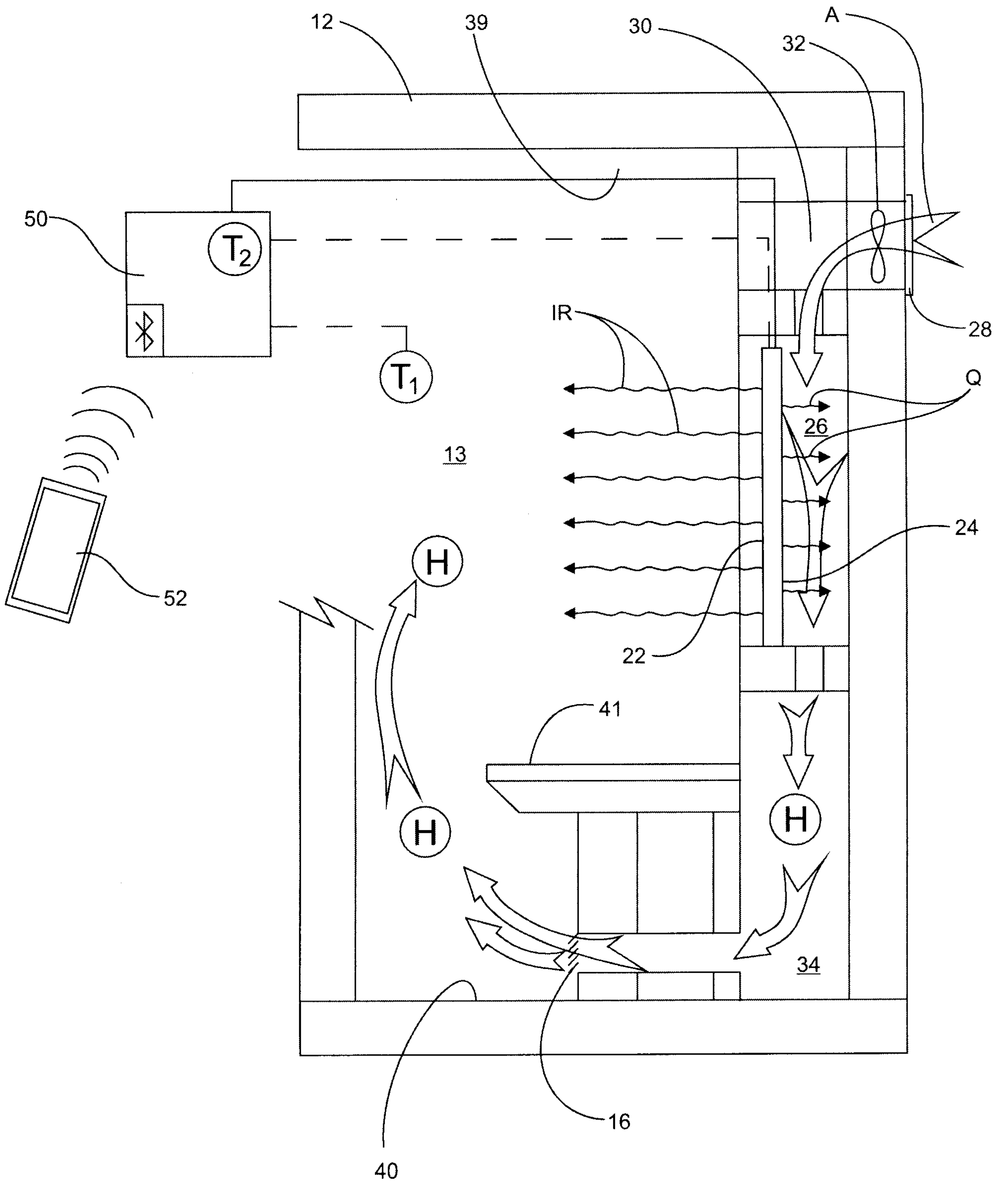
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Unscannable items  
received with this application  
(Request original documents in File Prep. Section on the 10<sup>th</sup> floor)

Documents reçu avec cette demande ne pouvant être balayés  
(Commander les documents originaux dans la section de préparation des dossiers au  
10ème étage)



**Fig. 2**



**Fig. 3**

