



(11) **EP 2 299 777 A1**

(12) **EUROPEAN PATENT APPLICATION**  
published in accordance with Art. 153(4) EPC

(43) Date of publication:  
**23.03.2011 Bulletin 2011/12**

(51) Int Cl.:  
**H05B 3/26 (2006.01) F24C 7/04 (2006.01)**

(21) Application number: **08761562.1**

(86) International application number:  
**PCT/ES2008/000317**

(22) Date of filing: **07.05.2008**

(87) International publication number:  
**WO 2009/133214 (05.11.2009 Gazette 2009/45)**

(84) Designated Contracting States:  
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR  
HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT  
RO SE SI SK TR**  
Designated Extension States:  
**AL BA MK RS**

(71) Applicant: **Violante Gutierrez Ascanio, S.I.**  
**35011 Las Palmas de Gran Canarias (ES)**

(72) Inventor: **MONTORO CORRAL, Eugenio**  
**E-35011 Las Palmas de Gran Canarias (ES)**

(30) Priority: **30.04.2008 ES 200800901 U**

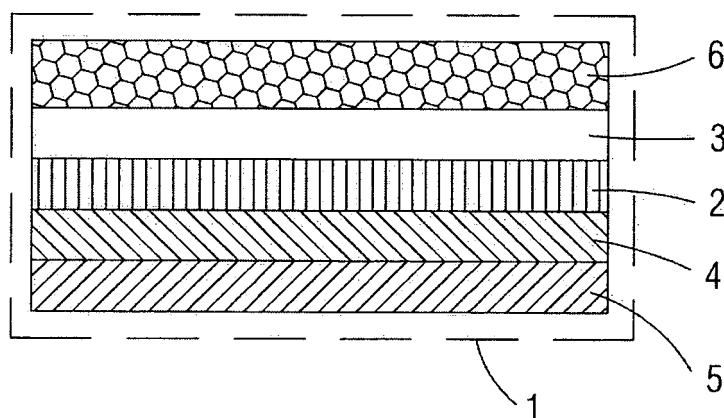
(74) Representative: **Isern-Jara, Nuria**  
**J. Isern Patentes y Marcas**  
**Avda. Diagonal 463 Bis 2°**  
**08036 Barcelona (ES)**

(54) **HEATING SYSTEM**

(57) Heating system comprising an electric heater with a laminar structure formed by an extractable plate provided with an electricity conductive layer and a radiant heat-emitting layer that emits radiant heat when an electric heat source is applied by way of an electric circuit of multiple conductor cables within the heating layer, being provided with means for regulating the intensity of the

radiant heat emitted and means for rapid installation/extraction, in such a way that the radiant heat-emitting layer can be maintained at a temperature of 80-110°C with an energy density of 750-800 w/m<sup>2</sup>. Thus, a highly-efficient heating system based on infrared radiation is obtained, allowing an energy saving that can reach 30%, and up to 50% in areas with large losses of air or in partially open spaces, therefore an economic saving.

**FIG. 1**



## Description

### DESCRIPTIVE MEMORY, OBJECT OF THE INVENTION

**[0001]** The present application is related to a heating system incorporating notable novelties and advantages.

**[0002]** More particularly, the invention relates to a heating system of radiant heat emission applicable to indoor and outdoor delimited spaces, capable of a higher energetic efficiency than heating devices known today.

### BACKGROUND OF THE INVENTION

**[0003]** Nowadays, most traditional heating systems for heating the inside of homes or offices are based either on the use of electric radiators that consume a large amount of electric energy, or on the use of gas heaters, which first require an installation that needs regular maintenance for safety reasons.

**[0004]** The operation of the above-described two heating systems is based on maintaining the inside of a delimited space warm by heating the air contained inside it, in such a way that when the user leaves said delimited space, the user suffers a thermal impact essentially due to the fact that air is not a good conductor of heat, and therefore the body of the user maintains his/her body temperature more or less equal regardless of the temperature of the ambient air. In addition, opening a window that is in contact with the outside environment under cold conditions gives rise to a rapid cooling of the air inside the delimited space despite the operation of the heating equipment, and therefore its efficacy may be questioned from both the points of view of energy efficiency and performance.

### DESCRIPTION OF THE INVENTION

**[0005]** The present invention has been developed with an aim to providing a heating system that solves the abovementioned disadvantages, also contributing other additional advantages that will be obvious from the description provided below.

**[0006]** It is therefore an object of the present invention to provide a heating system for delimited indoor spaces and relatively delimited outdoor areas, such as, for example, terraces, characterized in that they comprise an electric heater with a laminar structure formed of an extractable plate that can be fixed onto a surface by way of a wall or ceiling that is provided with an electrically-conductive layer and a layer capable of emitting heat by radiation that emits radiant heat when a source of electric heat is applied, by way of an electric circuit of multiple conducting cables on the heating layer, said electric heater being provided with means for regulating the intensity of emitted radiant heat and means for rapid installation/extraction such that the radiant heat-emitting layer can be maintained at a temperature of 80-110°C with an en-

ergy density of 750-800 w/m<sup>2</sup>. The radiant heat emitted is infrared radiation within a wavelength range of 50-1000µm.

**[0007]** Thanks to these features, a highly-efficient heating system based on infrared radiation is obtained that generates heat in a totally different manner than in the above mentioned traditional systems, allowing an energy saving that can reach 30%, and up to 50% in areas with large losses of air or in partially open spaces. Capitalizing infrared radiation also eliminates noxious bacteria, as well as bad odours. Another notable advantage is the fact that no maintenance of the installation is ever required, such as is necessary for systems based on gas, and heat losses are lower because no piping, valves or radiators are used. The application of this heat source allows to heat physically material things, as opposed to the ambient air contained inside of a delimited space.

**[0008]** The 50-1000µm wavelength range is highly penetrative in organic materials, including the human body, and acts usefully as an aid for the body, as human metabolism is favoured by said wavelength range.

**[0009]** Other advantageous features and embodiments of the system according to the invention are disclosed in the dependent claims.

**[0010]** Preferably, the electric heat source by way of an electric circuit is associated to at least a solar collection plate, in such a way as to allow to further reduce the energy consumption required to effect the heating function.

**[0011]** Preferably, the extractable plate is made up of aluminium, also being provided with lighting means electrically powered by an electricity source that is independent of the electric circuit for the plate, in such a way that it can be used as a light spot and be situated centred on the ceiling of a room or delimited space. The fact that the plate is up of aluminium allows to reduce notably the weight of the electric heater, especially if said plate is of a large size.

**[0012]** According to another aspect of the invention, the extractable plate comprises a heat-insulating layer situated on the outer surface, on the opposite side of radiant heat-emitting side.

**[0013]** Said insulating layer is up of glass fibre coated with a glass fibre mesh. Advantageously, the extractable plate is provided with a smoke detector, thus enhancing possible uses of the heating system. Regulating means for the electric heater consist of a thermostat, which can be of the remotely controlled type, allowing a simple and fast regulation according to the user's needs at any time.

**[0014]** According to another preferred feature of the invention, the rapid installation/extraction means consist of a support deck that can be fixed to a surface by way of a ceiling or side wall secured with screws elements, said support deck being formed of a plurality of ribs along the whole perimeter of the support deck, the free end of which includes a flexible flange that is perpendicular to the rib in such a way that, in an assembled condition, the electric heater is coupled to the support deck in a fixed

way that is relatively simple for the user. In this way, the user can easily extract or ready the electric heater for transport and installation at any other desired location, which is a fact still unknown.

**[0015]** Other features and advantages of the heating system object of the present invention will become obvious from the description of a preferred, though non exclusive, embodiment, which is illustrated by way of a non-limiting example in the attached drawings, wherein:

#### BRIEF DESCRIPTION OF THE DRAWINGS

##### **[0016]**

Figure 1.- Section view of the electric heater of the heating system for indoor delimited spaces according to the present invention;

Figure 2.- Schematic front view of the heating system in an indoor delimited space.

Figure 3.- Schematic front view of the system of rapid installation/extraction of the heating system for indoor delimited spaces.

Figure 4.- Isometric view of an example of positioning of the heating system of the invention, and

Figure 5.- View of a second example of positioning of the heating system on a balcony of a residential building.

#### DESCRIPTION OF A PREFERRED EMBODIMENT

**[0017]** From the attached figures, an embodiment of the system of the invention comprises an electric heater generally designated (1) with a laminar structure, as will become clear from the following description.

**[0018]** Said electric heater (1) is formed of an extractable plate (2) that is, for example, rectangular having the dimensions 60x120 cm provided with a heating layer (3) and a radiant heat-emitting layer (4) that emits radiant heat when an electric heat source is applied by way of an electric circuit of multiple conductor cables in the heating layer (3), being provided with means for regulating the intensity of the radiant heat emitted and means for rapid installation/extraction, which are described below. The radiant heat emitted is infrared radiation within a wavelength range of 50-1000 $\mu$ m. In addition, the electric heater is provided with a coating layer with surface relief 5 located on the outermost surface of the radiant heat-emitting layer, said layer (5) possibly being made up from a mixture of SiO<sub>2</sub> and CaO<sub>2</sub> and a heat-insulating layer (6) located on the outer surface, on the opposite side of the radiant heat-emitting side, which can be made up of glass fibre coated with a glass fibre mesh.

**[0019]** Obviously the dimensions of the electric heater assembly (1) can vary such that they are the measurements of width and length corresponding to a single plate of a suspended ceiling of the type formed by a plurality of such plates arranged in a matrix in such a way that the space occupied by one of the plates could be occu-

pied by an electric heater, in a way that renders installation even simpler and not requiring any additional space nor the use of screw elements.

**[0020]** The electric heat source by way of an electric circuit is associated to a solar collection plate, for example of the photovoltaic type, provided with the respective converter, in such a way as to supply the electrical energy as renewable energy. The assembly of solar collection plate and energy converter is represented in a general manner by reference (13) in figure 2. Obviously the converter transports electricity through cable (14) connected to the electric heater (1).

**[0021]** The heating layer (3) is made up of cables of Nicrome (alloy of nickel, iron and chrome) coated with a synthetic resin having excellent thermal resistance, flexibility and small physico-chemical variations.

**[0022]** Also in addition, the extractable plate (2) is provided with a smoke detector (7) of the known type, therefore will not be explained in any more detail, thus having greater versatility.

**[0023]** The means of regulation consist of a remotely-controlled thermostat (8) connected by infrared radiation or radiofrequency to its respective receptor housed in the extractable plate (2), the thermostat of which has a body provided with a display and buttons for regulating, in such a way that the user is able to regulate the heating intensity.

**[0024]** The extractable plate (2) can also be advantageously provided with lighting means electrically powered by an electricity source that is independent of the electric circuit for the electric heater (1), said means being a plurality of LED lights or conventional bulbs (9) (not shown), thus having greater versatility compared to heating systems known in the art.

**[0025]** Now, with regard to rapid installation/extraction means, and in the light of figure 3, these consist of a support deck (10) that can be fixed to a surface by way of a ceiling or side wall secured with screws elements, said support deck (10) being formed of a plurality of protruding ribs (11) along the whole perimeter of the support deck (9), more particularly a protruding rib (11) in each side of the support deck (10), including on the free end of each protruding rib (1) a flexible flange (12) that is perpendicular to the rib (11) and is orientated towards the inside, in such a way that, in an assembled condition, the electric heater (1) is fixedly coupled to the support deck (1).

**[0026]** As can be seen from figures 4 and 5, the system described above can be installed both indoors and outdoors, being more effective than any other known heating system, and being particularly useful in outdoor spaces, because the traditional systems are not efficacious when installed in outdoor areas or delimited spaces.

**[0027]** The details, forms, dimensions and other accessory elements, as well as the materials used for manufacturing the apparatuses and devices forming part of the heating system of the invention can be conveniently substituted by other technical equivalents that do not de-

part essentially from the invention nor from the scope as defined by the claims provided below.

## Claims

1. Heating system, **characterized in that** it comprises an electric heater with a laminar structure formed by an extractable plate provided with an electricity-conductive layer and a radiant heat-emitting layer that emits radiant heat when an electric heat source is applied by way of an electric circuit of multiple conductor cables within the heating layer, being provided with means for regulating the intensity of the radiant heat emitted and means for rapid installation/extraction, in such a way that the radiant heat-emitting layer can be maintained at a temperature of 80-110°C with an energy density of 750-800 w/m<sup>2</sup>, wherein the emitted radiant heat is infrared radiation within the wavelength range of 50-1000µm. 5 10 15 20
2. Heating system according to claim 1, **characterized in that** the electric heat source by way of an electric circuit is associated to at least one solar collection plate provided with its respective converter. 25
3. Heating system according to claim 1, **characterized in that** the extractable plate is made up of aluminium.
4. Heating system according to claim 1, **characterized in that** the extractable plate is provided with lighting means that are powered electrically by an electricity source that is independent of the electric circuit for the plate. 30 35
5. Heating system according to claim 1, **characterized in that** the extractable plate comprises a heat-insulating layer situated on the outer surface on the opposite side of the radiant heat-emitting side. 40
6. Heating system according to claim 5, **characterized in that** said insulating layer is made up of glass fibre coated with a glass fibre mesh.
7. Heating system according to claim 1, **characterized in that** the extractable plate is provided with a smoke detector. 45
8. Heating system according to claim 1, **characterized in that** the regulating means consist of a thermostat. 50
9. Heating system according to claim 1, **characterized in that** it also comprises a coating layer with a surface relief situated on the outermost surface of the radiant heat-emitting layer. 55
10. Heating system according to claim 9, **characterized in that** said coating layer with a surface relief is made

up from a mixture of SiO<sub>2</sub> and CaO<sub>2</sub>.

11. Heating system according to claim 1, **characterized in that** the means for rapid installation/extraction consist of a support deck to be fixed on a surface by way of a ceiling or side wall secured by screw elements, said support deck being formed of a plurality of ribs along the whole perimeter of the support deck, the free end of which includes a flexible flange that is perpendicular to the rib and orientated towards the inside, in such a way that, in an assembled condition, the electric heater is coupled to the support deck in a fixed way.
12. Heating system according to claim 1, **characterized in that** the heating layer is made up of Nicrome cables coated with a synthetic resin.

FIG. 1

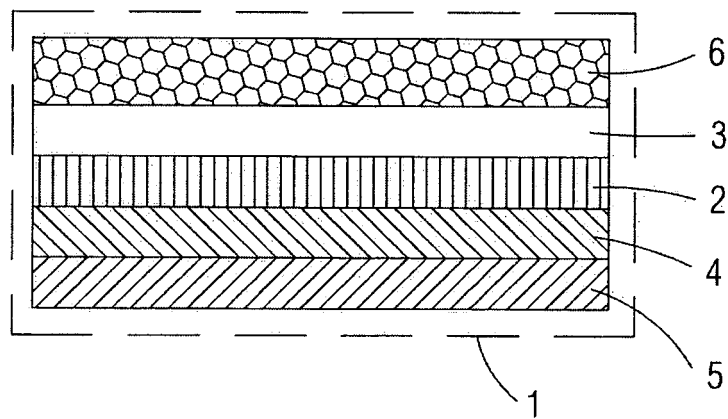


FIG. 2

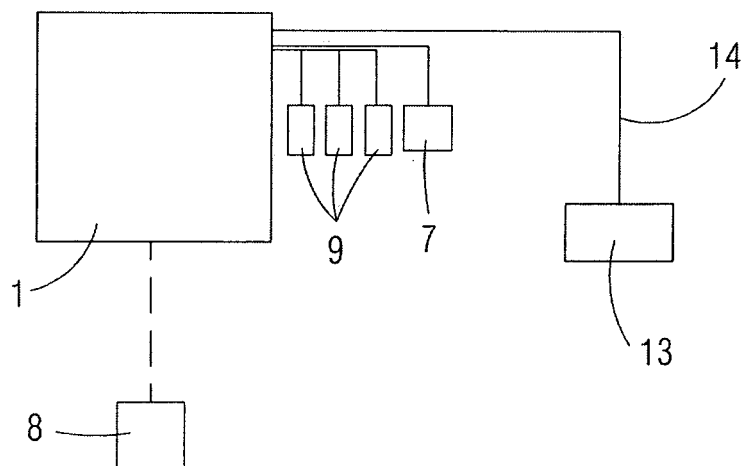


FIG.3

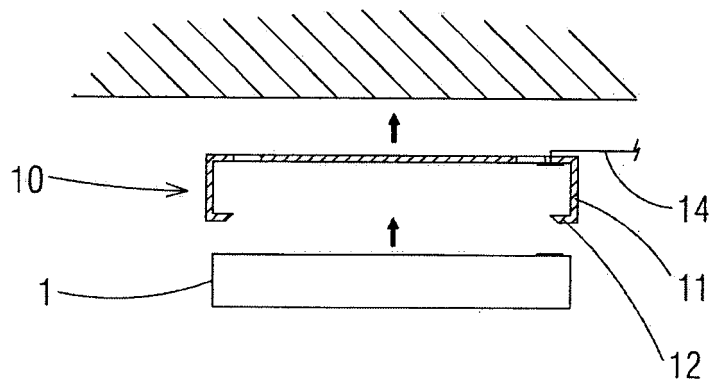


FIG.4

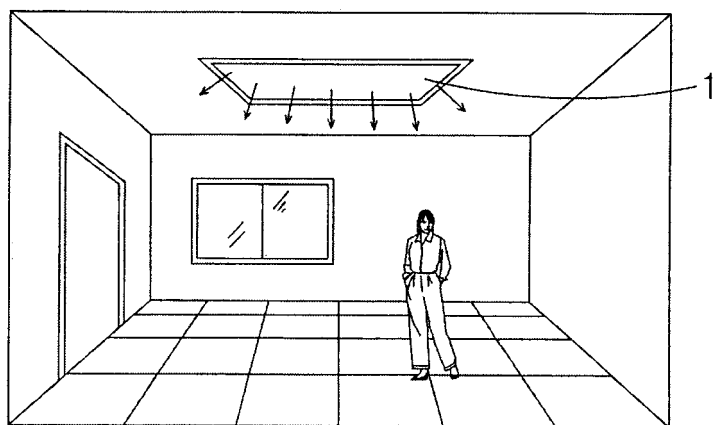
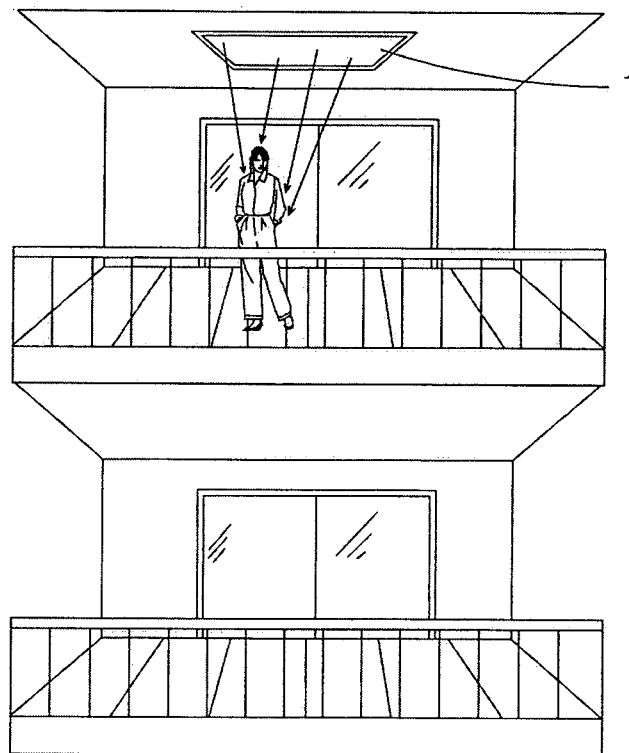


FIG. 5



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/ ES 2008/000317

## A. CLASSIFICATION OF SUBJECT MATTER

see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H05B, F24C, F24B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

INVENES,EPODOC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                    | Relevant to claim No. |
|-----------|-------------------------------------------------------------------------------------------------------|-----------------------|
| A         | EP 0211491 A1 (NGK INSULATORS LTD) 25.02.1987, page 5.                                                | 1-12                  |
| A         | DE 102004016040 A1 (NEW TECHNICS GMBH ELEKTROTECHN) 21.10.2004, the whole document.                   | 1-12                  |
| A         | WO 9314351 A2 (NELSON THOMAS MORGAN ; ARNT PER BERNARD) 22.07.1993, page 3, line 22 - page 4, line 2. | 1-12                  |
| A         | US 3062945 A (GLYNN) 06.11.1962, the whole document.                                                  | 1-12                  |



Further documents are listed in the continuation of Box C.



See patent family annex.

|                                                                                                                                                                         |     |                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| * Special categories of cited documents:                                                                                                                                | "T" | later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention                                         |
| "A" document defining the general state of the art which is not considered to be of particular relevance.                                                               |     |                                                                                                                                                                                                                                         |
| "E" earlier document but published on or after the international filing date                                                                                            |     |                                                                                                                                                                                                                                         |
| "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | "X" | document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone                                                                |
| "O" document referring to an oral disclosure use, exhibition, or other means                                                                                            | "Y" | document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents, such combination being obvious to a person skilled in the art |
| "P" document published prior to the international filing date but later than the priority date claimed                                                                  |     |                                                                                                                                                                                                                                         |
|                                                                                                                                                                         | "&" | document member of the same patent family                                                                                                                                                                                               |

Date of the actual completion of the international search

17.September.2008 (17.09.2008)

Date of mailing of the international search report

(01/10/2008)

Name and mailing address of the ISA/  
O.E.P.M.

Paseo de la Castellana, 75 28071 Madrid, España.

Facsimile No. 34 91 3495304

Authorized officer

J. A. Celemín Ortiz-Villajos

Telephone No. +34 91 349 54 93

Form PCT/ISA/210 (second sheet) (July 2008)

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

PCT/ ES 2008/000317

| Patent document cited<br>in the search report | Publication<br>date | Patent family<br>member(s)                                      | Publication date                                                   |
|-----------------------------------------------|---------------------|-----------------------------------------------------------------|--------------------------------------------------------------------|
| EP 0211491 AB                                 | 25.02.1987          | JP 62028389 U<br>JP 4001675 Y<br>US 4703154 A<br>KR 910000858 Y | 20.02.1987<br>21.01.1992<br>27.10.1987<br>08.02.1991<br>08.02.1991 |
| DE 102004016040 A                             | 21.10.2004          | DE 20305135 U<br>DE 20319901 U<br>WO 2004088214 A               | 14.08.2003<br>08.04.2004<br>14.10.2004<br>14.10.2004<br>14.10.2004 |
| WO 9314351 A                                  | 22.07.1993          | CA 2059417 AC<br>AU 3340793 A                                   | 16.07.1993<br>03.08.1993                                           |
| US 3062945 A                                  | 06.11.1962          | NONE                                                            | -----                                                              |

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES 2008/000317

CLASSIFICATION OF SUBJECT MATTER

**H05B 3/26** (2006.01)

**F24C 7/04** (2006.01)