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(54) LOW-CONSUMPTION ELECTRIC RADIATOR

(57) It is constituted from a rectangular frame partially divided inside into two regions and comprising a removable front cover. The upper surface of the left region comprises an outlet grate, and a diffusing element in the form of a finned coil is arranged inside the frame and connected, by suitable connecting means, to the exchanger heater store located in the right region and consisting of a suitable material which is hermetically sealed and covered with an insulating material, housing a heat-transfer fluid, a coil and an electrical resistor. The volume of the liquid circulating inside the coil of the exchanger and the diffuser is approximately 500 cm^3, which promotes low energy consumption. The pump and at least two electronic and thermostatic devices regulating the ambient temperature and the temperature of the heat-transfer fluid of the store are arranged outside the store but inside the frame. The system has safety valves for the coils and for the store. All of these elements, together with the resistor, are connected to the electric power supply source.

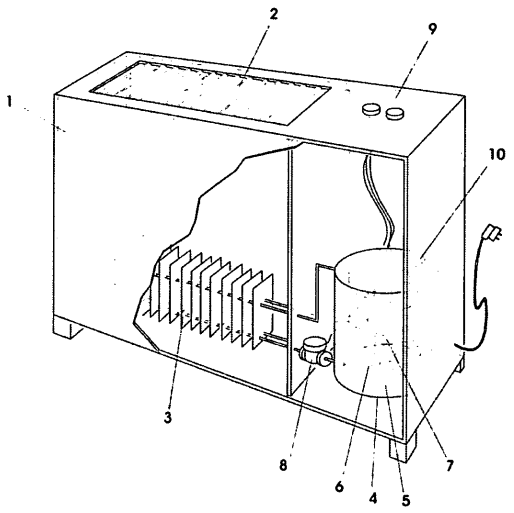

FIG. 1

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Description

[0001] The present invention relates to a heat radiator unit that provides a variety of novelties with their corresponding advantages although exteriorly it may seems to those already known in the state of the art. It is about to obtain an modular autonomous radiator that allows to be adapted to the needs of each room or area, could being used both in private homes and in buildings, industrial buildings and in any other place wherein it is required the use of heat radiation.

[0002] The use of such apparatus is well known especially in countries where in several seasons the temperature decreases of considerable way. The name of radiator comes from, at the beginning, when was invented, it was assumed that the heat was exchanged by radiation but, due to the scarce surface it has, only in few cases this its true, when its surface temperature exceeds 70ºC. In most cases, the conventional regulation systems do not reach that temperature and most of the heat is exchanged by convection. The heat emission or dissipation of a radiator depends of the temperature difference among its surface and the surrounding environment and the amount of surface in contact with that environment. The larger exchange surface and greater temperature difference, the larger is the exchange. Often it is called radiator to an apparatus which is heated by an electrical resistor, but according to the above definition, it was a heater, since it produces its own heat. Although in this case there is no gas or other substance emissions, at least where the energy is consumed, but can there be emissions, and importantly, where the electrical energy is produced. A radiator requires maintenance which consisting of a periodic purge, whereby the air inside the pipes obstructing the inlet of hot water to the elements that form the radiator is removed. Apart from the purger, a radiator must to have a water valve, a hot water inlet and a cold water outlet with other valve that serves to set the hydraulic balance and for dismount the radiator that is called holder. When a fan is added to a radiator in order to accelerate its action, it is called fan coil or heater. The difference between a radiator and a heater is that in the radiator there is no energy production, it is limited to be a heat dissipater which arrives to the radiator generally by a network of pipes through which circulates water heated by a producing device located in other place.

[0003] With the present invention is intended to solve several disadvantages of such radiators like the disadvantages discussed above. Also it has to be intended to create an apparatus that provides greater security and comfort, while it is pursued save costs, space, time and also facilitate the moving and the handling of said apparatus.

[0004] The patent object of this invention has its field of application in the auxiliary industry of the heat radiators, specifically the industry in charge of the electric radiators.

[0005] The state of the art provides several apparatus of heat radiation, but none with the novelties proposed by the present invention or with the advantages that the invention provides.

[0006] In the utility model num. 273 137 is presented a wall type boiler comprising a hydraulic circuit closed for the water of environmental heating and a hydraulic circuit opened for the sanitary hot water, **characterized in that** the secondary exchanger comprises transportation means cooperating among themselves and with the inner wall of said exchanger in order to guide the heating water on the coils crossed by the sanitary water and to create stilling chambers required to achieve the deaeration of the water heating allowing to a derivation channel to connect directly the inlet and the outlet when the circulation in the sanitary water circuit is interrupted.

[0007] The document ES 480 871 provides a heating system of the type in which the heating is carried out by heating elements, by hot water produced in a heating organ, such that a boiler, **characterized in that** the heating elements are constituted in each room or area to be heated by at least a conductive tube embed in the floor of the room or area with twisting shape and whose ends are connected to a distribution manifold which is disposed in turn connected to the heating organ of the water and independently regulates the temperature in each area by respective thermostats and valves, such that solenoid or motorized valves.

[0008] In the document ES 1 065 787 relates to a modular electric radiator, **characterized in that** comprises at least: heating means, comprising at least, a plurality of thermal metal resistors, a plurality of curved-profile diffuser modules, in turn comprising, a plurality of inner flanges, attachment means, a plurality of attachment bars. Radiators of the type set forth, in which the body is formed by at least two horizontal conduits, an upper and a lower conduit, and a series of vertical conduits running between the horizontal conduits closed at their ends are already known. This body is completed with two series of outer diffuser flanges located at both sides of the horizontal and vertical conduit assembly in a coplanar position on each side. The assembly thus formed is closed on the sides by means of respective covers housing the control elements, such as the on-off switch, thermostats, etc. It is also known that the assembly of the body is subdivided, according to planes perpendicular to the horizontal conduits, into identical independent modules, each of which modules includes horizontal conduit sections, a vertical conduit running between the horizontal conduit sections, into which it opens, and two vertical diffuser flanges running in coincidence with the vertical conduits attached thereto. The horizontal tube sections have an inner threading in a different direction after their end sections. Consecutive modules are attached by means of intermediate bushings which are externally arranged and after their end sections threaded in a different direction, coincident with the inner threading of the horizontal tube sections, such that upon rotating these intermediate bushings in the corresponding direction they

are screwed at the same time in the opposing ends of the horizontal tube sections of two consecutive modules. In these radiators the body formed from the horizontal and vertical conduits is filled with oil or a similar thermal fluid which is heated by means of resistors installed inside the same body. This configuration demands that the closing of the ends of the horizontal conduits be air tight for the purpose of preventing leaks of the thermal fluid. In addition the weight of these radiators is relatively high since the horizontal and vertical conduit assembly is filled with oil or another similar thermal fluid. Finally it must be pointed out that the fact that the radiator is filled with oil implies an increase in the cost of the radiator.

[0009] Currently in the state of the art are known the radiators connected to boilers that require a large inversion in facilities and maintenance, with the additional disadvantage that in the case of any part of the facility presents a leak or any other type of problem, all the systems will be affected. They are also well known the electric radiators that consume a large amount of electric energy making more expensive its use.

[0010] Many of the systems cited above do not provide sufficient security to the facilities, and in turn are uncomfortable since they can not be transported easily; many of them are fixing making impossible to move them when is desired to change its location. Also it is found that the known radiators are heavy and do not allow the adaptation of the temperature in the place wherein it is used. The installation of these apparatus is complicated and expensive, and in many cases is impossible connect them to alternative and ecological energies.

[0011] However, it is not known a radiator based on a group of methods, materials and elements that permit an adapted use to the needs of the user. Neither is it known the application of this system so practical and economical in electric radiators.

[0012] All these conjugated elements give rise to a final result in which are provided significant differencing features against the current state of the art, providing a series of progresses in the elements already known with their corresponding advantages.

[0013] In particular:

- It is provided a low-consumption electric radiator because the volume of the liquid to be heated is reduced.
- The manufacture, installation and maintenance are simple and economical, making the final product considerably cheaper.
- It can be used with renewable energies like solar or wind power.
- Due to it is modular autonomous and not central, it can be set the temperature the way the user likes it based on the desired area, being, for example, a room at a determined temperature and other at any different temperature.
- It is easily transportable and lightweight.
- Due to it is electric is not susceptible of gas leaks, making it safer.
- It does not require works or licenses for their installation in any type of building.
- It does not require a central installation or network of general plumbing.
- Save space thanks to its reduced volume and allows the change of site easily since is not a fixed device.

[0014] Thus, the invention is constituted from the following elements:

A rectangular frame partially divided inside into two regions and comprising a removable front cover, comprising the upper surface of the left region an outlet grate, and a diffusing element in the form of a finned coil is arranged inside the frame and connected, by suitable connecting means, to the exchanger heater store located in the right region and consisting of a suitable material which is hermetically sealed and covered with an insulating material, housing a heat-transfer fluid, a coil and an electrical resistor. The pump and at least two electronic and thermostatic devices regulating the ambient temperature and the temperature of the heat-transfer fluid of the store are arranged outside the store but inside the frame. The system has safety valves for the coils and for the store. All of these elements, together with the resistor, are connected to the electric power supply source.

[0015] In a different embodiment, both the dimensions and the volume of the liquid circulating inside the coil of the exchanger and the diffuser vary according to the needs of the area to be conditioned.

[0016] The store resistor heats the heat-transfer fluid located inside thereof, transmitting heat to the fluid that runs the coils both of the store and the diffuser wherein the air is heated.

Figure 1: Radiator perspective

[0017] In the figure the listed elements correspond to the following:

1. Frame
2. Outlet grate
3. Diffuser
4. Exchanger heater store
5. Heat-transfer fluid
6. Coil
7. Electrical resistor
8. Pump
9. Electronic and thermostatic devices
10. Safety valve for coil and for store

[0018] The preferred embodiment given a way of non-limitative example is constituted from a rectangular frame (1) partially divided inside into two regions and compris-

ing a removable front cover, comprising in the upper surface of the left region an outlet grate (2), and a diffusing element (3) in the form of a finned coil is arranged inside the frame and connected, by suitable connecting means, to the exchanger heater store (4) located in the right region and consisting of a suitable material which is hermetically sealed and covered with an insulating material, housing a heat-transfer fluid (5), a coil (6) and an electrical resistor (7). The volume of the liquid circulating inside the coil of the exchanger and the diffuser is approximately 500 cm^3, which promotes low energy consumption. The pump (8) and at least two electronic and thermostatic devices (9) regulating the ambient temperature and the temperature of the heat-transfer fluid of the store are arranged outside the store but inside the frame. The system has safety valves (10) for the coils and for the store. All of these elements, together with the resistor, are connected to the electric power supply source.

Claims

1. LOW-CONSUMPTION ELECTRIC RADIATOR, consisting of a rectangular frame partially divided inside into two regions and comprising a removable front cover, having the upper surface of the left region an outlet grate, and a diffusing element in the form of a finned coil inside the frame **characterized in that** it is connected, by suitable connecting means, to the exchanger heater store located in the right region and consisting of a suitable material which is hermetically sealed and covered with an insulating material, housing a heat-transfer fluid, a coil and an electrical resistor. The volume of the liquid circulating inside the coil of the exchanger and the diffuser is approximately 500 cm^3. The pump and at least two electronic and thermostatic devices are arranged outside the store but inside the frame. The system has safety valves for the coils and for the store.

2. LOW-CONSUMPTION ELECTRIC RADIATOR, according to the claim 1, **characterized in that** both the dimensions and the volume of the liquid circulating inside the coil of the exchanger and the diffuser vary according to the needs of the area to be conditioned.

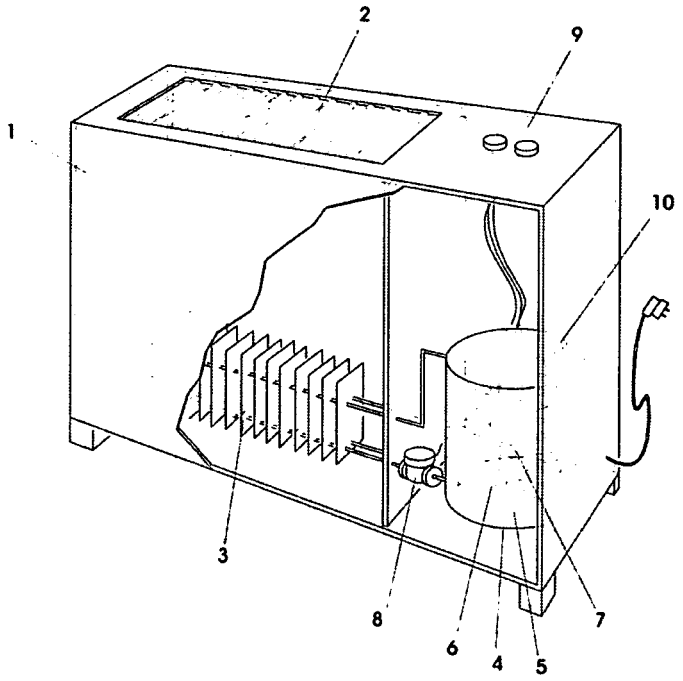

FIG. 1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 2009/000193

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)
cip8, f24d, f24c, h05b

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,WPI,electric,radiator, low,consum,coil,energy, saving

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BASE DE DATOS WPI in EPOQUE, week 200825,THOMSON SCIENTIFIC,LONDRES;AN 2008-d31882 & CN 200940864 Y (LIU HUABING) 29.08.2007	1,2
A	BASE DE DATOS WPI in EPOQUE, week 200820,THOMSON SCIENTIFIC,LONDRES;AN 2008-c67917 & CN 201014621 Y (LIU HUABING) 30.01.2008	1,2
A	FR 2377135 A1 (LE CRANN, MICHEL) 04.08.1978, the whole document.	1,2

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance.
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"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)
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"P" document published prior to the international filing date but later than the priority date claimed
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"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
"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
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
03.September.2009 (03.09.2009)	**(07/09/2009)**
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 P. Pérez Moreno Telephone No. +34 91 349 84 90

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

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/ ES 2009/000193

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
FR 2377135 A	04.08.1978	NONE	----------
CN 200940864	29.08.2007	NONE	
CN 2010146221	30.01.2008	NONE	

Form PCT/ISA/210 (patent family annex) (July 2008)

INTERNATIONAL SEARCH REPORT

International application No.

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CLASSIFICATION OF SUBJECT MATTER

F24D 3/00 (2006.01)
F24C 3/00 (2006.01)

Form PCT/ISA/210 (extra sheeet) (July 2008)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- ES 480871 **[0007]**
- ES 1065787 **[0008]**