The present invention relates to a dry heat modular electric radiator which allows a simple and effective assembly of its components, occupying a minimal space and considerably simplifying its manufacturing, comprising at least one ultraflat electric heating element (22) and two half-bodies (6), wherein each half-body (6) comprises at least two sections (1) which in turn comprises an outer face (2), an inner face (3), a first side (4) and a second side (5), each section (1) comprising front assembly means (7, 8) which allows assembling face to face said at least two sections (1) facing one another by their inner faces (3), there being a space which allows housing the ultraflat electric heating element (22) between said at least two inner faces (3) once said at least two half-bodies (6) are assembled.
The present invention relates to an electric heating radiator, of those called dry heat radiators.

The object of the invention is to simplify the constructive structure of radiators so that the latter is constructed in a simple and modular manner the manufacturing and assembling of which are easy. It is based on assembling sections with one another and with an internal heating system which transmits heat by conduction to the sections which in turn release it to the environment by radiation and convection, thus allowing a simple and effective assembly of its components, occupying a minimal space and considerably simplifying its manufacturing. Its main use is as a fixed heating apparatus making up a fast, healthy and effective heat source.

Another objective of this invention is that the device can accommodate one or several ultraflat resistances or heating elements, and without needing any type of enclosure, thus being able to transmit heat by direct conduction to the heater body, which in turn diffuses it by radiation and convection.

The body of this heater is formed by several vertical sections or columns obtained from a single and specific section, preferably made of extruded aluminum. These sections are assembled with one another as a result of the different assembling or clipping means which are easily fit together by pressing and without needing screws.

Another objective of this invention is that the sections are assembled face to face, their inner faces once said at least two sections are assembled together by means which allows assembling, connecting or attaching side by side said at least two sections of one and the same half-body facing one another by their sides. The body of the radiator is formed by assembling a determined number of identical sections.

The existence of radiators called dry heat radiators having modular construction made up of aluminum sections which are vertically arranged and assembled side by side making up the body of the radiator is currently known. A hole must be made between the assembled sections for placing the heating element.

An example of this type of radiators is EP 2000747, which describes a modular electric radiator is made up of sections which are assembled between one another by means of bushings, bars and screws.

Another example of a dry heat radiator can be seen in EP 1574803, which describes a modular electric radiator the body of which is formed from a plurality of aluminum sections which are positioned vertically and are attached at the side by means of hooks latching on one another to make up attaching means. The base section forming the body has longitudinal and transverse partitions. The transverse partitions must be perforated in some areas which must be traversed by the heating element, which has to be placed inside the body of the radiator. The heating element, in turn, consists of an electric resistor wound on a micanite sheet and covered by a flexible metal enclosure which allows fixing and immobilizing the heating element in its housing inside the body of the radiator.

These solutions are in use and have their pros and cons; a solution optimizing the manufacturing and assembly of dry heat modular radiators, while at the same time providing a new aesthetic aspect as a complimentary factor is desirable.

The two half-bodies of a radiator is thus assembled with a single section typology, there being a fixed and exact separation between the two sections, which allows housing the heating element, whereby in addition to the ease of assembling, simplifying the manufacturing process and minimizing the stocking of parts are achieved. The sections are light, without partitions, whereby a large savings of material and therefore cost is achieved.

The possibility that once said at least two sections are assembled face to face, their inner faces are separated by a distance substantially equal to the width of said at least one ultraflat electric heating element is contemplated.

Likewise, it is contemplated that the front assembly means comprise a plurality of fins extending from the inner face of a section of a first half-body, wherein said fins can be inserted through an opening correspondingly located in the inner face of a section of a second half-body having an inner latch or flange in which the fin...
is locked, preferably by clipping or latching, once said two sections are assembled face to face.

[0016] Assembling a radiator of any length is thus achieved by means of the side assembly of the sections forming each half-body, followed by the front assembly of the two half-bodies, for obtaining the complete radiator. Thus, each section can be assembled to the next section and successively to all those which make up the radiator. This solution allows configuring radiators of different lengths, heights and powers, with a simple assembly by pressing.

[0017] The number of sections can vary or can be selected according to the power required, such that they are assembled with one another in dual assembly. On one hand, being assembled side by side to form the front half-body and the rear half-body and, on the other hand, once the resistance or resistances or the heating elements are introduced, both half-bodies being assembled with one another face to face giving rise to the body of the heater with the integrated resistances.

Description of the Drawings

[0018] To complement the description that is being made and for the purpose of aiding to better understand the features of the invention according to a preferred practical embodiment thereof, a set of drawings is attached as an integral part of said description in which the following has been depicted with an illustrative and non-limiting character:

Figure 1 shows an exploded schematic view of all the elements of a preferred embodiment of the radiator of the invention, a perspective view of a preferred side assembly mode between two sections being depicted in detail A.

Figure 2 shows a cross section of a plurality of sections at a time prior to its assembly.

Figure 3 shows a section such as that of Figure 2, at a time after the side assembly of the sections of each half-body, but at a time prior to the front assembly of the half-bodies.

Figure 4 shows a section such as that of Figure 3, once the two half-bodies have been assembled face to face, i.e., once the complete radiator has been assembled.

Figure 5 shows a detail view corresponding to the front assembly means of two sections, at a time prior to its latching.

Figure 6 shows detail B marked in Figure 7, in which the front assembly means of two sections once latched has been depicted.

Figure 7 shows two cross sections of the radiator for each of its side closing parts, in which the side clipping for its assembly with the end sections of the radiator can be seen.

Figure 8 shows a perspective view of the complete radiator depicted in Figure 1, once mounted and assembled.

Preferred Embodiment of the Invention

[0019] In view of the described drawings how in one of the possible embodiments of the invention the radiator proposed by invention comprises two ultraflat electric heating elements (22), consisting of an electric resistance or plate formed by a support plate in which a conductor wire is wound, at least two plates made of micanite being arranged at the side, can be observed.

[0020] According to the invention, the radiator comprises two half-bodies (6), one front half-body and another rear half-body, wherein each half-body (6) comprises a plurality of sections (1) made of extruded aluminum, such that the body of the radiator is formed from assembling a determined number of identical sections (1), such that the same sections form a half-body and is rotated 180° with respect to the other half-body.

[0021] Each section (1) in turn comprises an outer face (2), an inner face (3), a first side (4) and a second side (5).

[0022] To enable connecting or attaching the sections side by side to form the half-bodies (6), each section (1) comprises side assembly means (12, 13, 14, 15).

[0023] Once the half-bodies (6) are formed, one of them is rotated 180°, leaving the sections forming the half-bodies facing one another by their inner faces (3). Likewise, each section (1) comprises front assembly means (7, 8), which allow assembling the half-bodies (6) facing one another by their inner faces (3) to form the body of the radiator, where being an exact space for housing the ultraflat electric heating element (22) between said inner faces (3) once the sections (1) are assembled. Once the half-bodies (6) are assembled face to face, the inner faces (3) are separated by a distance substantially equal to the thickness of the ultraflat electric heating element (22).

[0024] For each section (1) the front assembly means (7, 8) comprise a plurality of fins (7) of determined width arranged according to a vertical alignment, i.e. aligned with the section (1) itself, wherein each fin (7) extends from the inner face (3) of a section (1) of a first half-body (6).

[0025] Each fin (7) can in turn be inserted through an opening (9), having a suitable size and configuration, corresponding located in the inner face (3) of a section (1) of a second half-body (6), such that inside each opening (9) the section has a inner latch (8) in which the fin (7) is locked, preferably by clipping or latching, once said two sections (1) are assembled face to face. Thus, the ultraflat electric heating elements (22) can be arranged, both in position and in number, fit into the spaces between the plurality of fins (7), before the front assembly of the two half-bodies (6).

[0026] As can be seen in the Figures 5 and 6, the fins (7) are inclined with respect to an imaginary axis vertical to the inner face (3) of the section (1), whereby a greater collaboration in the side immobilization of the assembled
sections (1) is achieved, therefore once latched the inclination causes force or pressure to be exerted towards the side opposite to that latched, the opening (9) itself preventing the side movement of the assembled sections (1).

[0027] How the front assembly means (7, 8) comprise a front stop (10) located in the fin (7) which allows assuring an exact separation distance between the inner faces (3) of two sections (1) assembled face to face, depending on the thickness of the ultraflat electric heating element (22) can also be seen in said Figures 5 and 6. Likewise, the front assembly means (7, 8) comprise a side stop (11) located in the fin (7), preventing the relative movement between two sections (1) assembled face to face.

[0028] As has been mentioned, each half-body (6) comprises a plurality of sections (1), wherein each section (1) comprises side assembly means (12, 13, 14, 15) which allows assembling, connecting or attaching side by side the sections (1) of one and the same half-body (6) facing one another by their sides (4, 5).

[0029] As can be seen in Figures 2 to 4, the side assembly means (12, 13, 14, 15) of each section (1) comprise a female outer hook (12) orthogonally extending from the first side (4) in correspondence with the outer face (2), a male outer claw (13) extending from the second side (5) in correspondence with the outer face (2), a female inner hook (14) extending from the first side (4) in correspondence with the inner face (3) and a male inner claw (15) extending from the second side (5) in correspondence with the inner face (3), such that the outer hook (12) of a first section (1) can be locked by clipping or latching with the outer claw (13) of a contiguous second section (1) for its side assembly, and the inner hook (14) of the first section (1) can be locked by clipping or latching with the inner claw (14) of the second section (1).

[0030] Likewise, each section (1) comprises at least one intermediate groove (16) located in the outer face (2). The assembly means (12 and 13), once attached, define a groove (17), similar to the groove (16), such that the image obtained is that of a radiator obtained from the assembly of very thin sections.

[0031] In Figure 7 the side finishing (19), identical for the left and right sides, having attaching means in correspondence with those of the section (1) can be seen.

[0032] Finally, a preferred embodiment of the radiator is completed with diffusers (20), consisting of a plurality of aluminum or plastic parts having width equivalent to that of the simulated slats between the grooves (16, 17). In another possible embodiment, the diffuser (21) is a continuous aluminum part.

[0033] To couple each section (1) to its contiguous section, it has at either ends, respective "hooks" arranged opposite to the contiguous "hooks", such that all of and each of the sections (1) carries out the male function at one of the ends and the female function at the other.

[0034] The same occurs with front coupling, but with the sections (1) facing one another instead of being aligned. To achieve this front anchoring, each section (1) also has male-female hooks. In fact, each section (1) has a fin (7) which is coupled with the inner latch (8), traversing the hole or opening (9), while at the same time the other fin (9) is coupled with another latch (8) and this is done successively and/or simultaneously. To enable this coupling, the fins (7) have a suitable length. It is also necessary to consider the openings (9) facing the fins (7), the openings (9) must have a small clearance to facilitate their insertion. The openings (9) and the inclinations of the fins (7), also carry out another very important function. The fins (7) when approaching the openings (9) have a free entrance, but as the fins (7) are inserted into the openings (9), as a result of the inclination of the fins (7), they are pressed for a firmer clipping and given the opposite position of the pressure the sideway immobilization thereof is assured.

[0035] The resistances (22) can be inserted before closing both half-bodies (6). To achieve a correct positioning these resistances (22) are retained between the holes of the fins (7).

[0036] The stops (10) assure the distancing between both half-bodies (6). It is to be emphasized that to achieve a separation between thin half-bodies (6), which allows housing a resistance or ultraflat heating element (22), it has only been possible as a result of the ingenious structure of two facing sections (1) instead of a single section. It is a relief that with this limited separation between faces the drawbacks derived from a fairly larger opening which, due to technical conditions would require a single section have been overcome. It is a relief that as such the need of incorporating an enclosure to the resistance to thus cover this larger opening has been prevented. A quicker and more efficient heat transmission is also achieved. Another advantage of the invention is that a highly commercially appreciated thin section configuration, starting from wide sections and without extra cost which the thin sections have can be achieved. To that end, making in the outer faces (2) of the sections (1) intermediate grooves (16), with the same optical effect as the attachment between sections (1), forming a groove (17) it has been foreseen, being able to make more or less channels, or in other words sections (1) with a more or less thin appearance, but with the better economic cost. Thus the aesthetic aspect of the radiator, which in view of the design of the sections (1), optically gives the impression of being a radiator made up of thin vertical slats, when in reality they are not.

[0037] The radiator is finished with diffusers (20) coinciding with each apparent section (1), obtained by injection. Air moved by convection exits through these diffusers (20). Furthermore, they serve to aesthetically finish the apparatus reinforcing the thin section (1) configuration. Alternatively, a continuous diffuser (21) obtained by extrusion can be used, as the finishing and diffusing element. One of the side closing parts (19) accommodates the electric handling and control elements.

[0038] In view of this description and set of drawings,
the person skilled in the art will understand that the embodiments of the invention which have been described can be combined in many ways within the object of the invention. The invention has been described according to several preferred embodiments thereof, but for the person skilled in the art it will be evident that multiple variations can be introduced in said preferred embodiments without exceeding the object of the claimed invention.

Claims

1. Dry heat modular electric radiator comprising at least an ultraflat electric heating element (22), characterized in that it comprises two half-bodies (6), wherein each half-body (6) comprises at least two sections (1), each of which comprises an outer face (2), an inner face (3), a first side (4) and a second side (5), each section (1) comprising front assembly means (7, 8) which allows assembling face to face said at least two sections (1) facing one another by their inner faces (3), there being a space which allows housing the ultraflat electric heating element (22) between said at least two inner faces (3) once said at least two sections (1) are assembled.

2. Modular electric radiator according to claim 1, wherein once said at least two sections (1) are assembled face to face, their inner faces (3) are separated by a distance substantially equal to the width of said, at least one, ultraflat electric heating element (22).

3. The modular electric radiator, according to any of claims 1 and 2, wherein the front assembly means (7, 8) comprise a plurality of fins (7) extending from the inner face (3) of a section (1) of a first half-body (6), wherein said fins (7) can be inserted through an opening (9) correspondingly located in the inner face (3) of a section (1) of a second half-body (6) having an inner hook (8) in which the fin (7) is locked once said two sections (1) are assembled face to face.

4. Modular electric radiator according to claim 3, wherein said fins (7) are inclined with respect to an imaginary axis vertical to the inner face (3) of the section (1).

5. Modular electric radiator according to any of claims 3 and 4, wherein the front assembly means (7, 8) comprise a front stop (10) located in the fin (7) which allows assuring a separation distance between the inner faces (3) of two sections (1) assembled face to face.

6. Modular electric radiator according to any of claims 3 to 5, wherein the front assembly means (7, 8) comprise a side stop (11) located in the fin (7), which prevents the relative movement between two sections (1) assembled face to face.

7. Modular electric radiator according to any of the preceding claims, wherein each half-body (6) comprises at least two sections (1), wherein each section (1) comprises side assembly means (12, 13, 14, 15) which allows assembling side by side said at least two sections (1) of one and the same half-body (6) facing one another by their sides (4, 5).

8. Modular electric radiator according to claim 7, wherein the side assembly means (12, 13, 14, 15) of each section (1) comprise an outer hook (12) extending from the first side (4) in correspondence with the outer face (2), an outer claw (13) extending from the second side (5) in correspondence with the outer face (2), an inner hook (14) extending from the first side (4) in correspondence with the inner face (3) and a inner claw (15) extending from the second side (5) in correspondence with the inner face (3), such that the outer hook (12) of a first section (1) can be locked with the outer claw (13) of a second contiguous section (1) for its side assembly, and the inner hook (14) of the first section (1) can be locked with the inner claw (14) of the second section (1).

9. Modular electric radiator according to any of the preceding claims, wherein each section (1) comprises at least one intermediate groove (16) located in the outer face (2), and at least one simulated groove (17) formed upon assembling the attaching means (12 and 13).
**DOCUMENTS CONSIDERED TO BE RELEVANT**

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The present search report has been drawn up for all claims

**Place of search** Munich  
**Date of completion of the search** 6 July 2012  
**Examiner** Ellis, David

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