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(72) Inventor: **Ragaini, Stefano**
60025 Loreto
(AN) (IT)

(74) Representative: **Gentili, Enrico**
MAR.BRE S.R.L.
Via San Filippo 2
60044 Fabriano (IT)

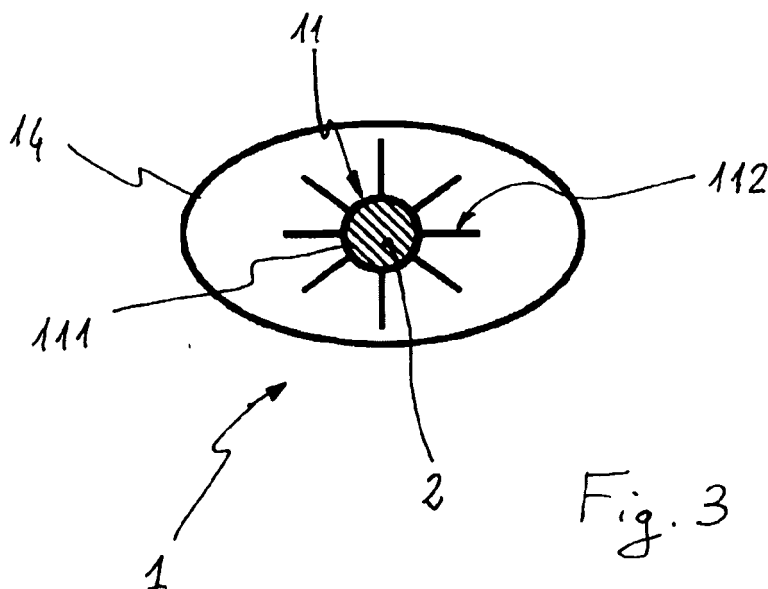
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(71) Applicant: **Rag-All s.p.a.**
60025 Loreto (AN) (IT)

(54) **Electric radiator with tubular resistance**

(57) Object of the invention hereof is a heating element (1) for room heating comprising an emitter (11) capable of yielding heat to the room wherein is located and an electric resistance (2) of the type comprising an outer

tubular element (21) housed in a seat (111) of said emitter (11); the electric resistance is kept in operating position through interference coupling between said outer tubular element thereof (21) and said seat (111).



Description

[0001] Object of the present invention is an electric radiator, extruded or die-cast, for room heating or similar applications.

[0002] The invention relates therefore to the field of room heating systems, in particular to the field of electric, portable or wall installable radiators.

[0003] It is known that, in electric powered radiators for room heating it is employed, as heating mean, an immersion electric resistance usually arranged within one or more elements of the radiator thereof and immersed in the fluid (usually water or oil) that acts as propagating mean (from now on "thermal-vector fluid") for the heat thereby produced.

[0004] Usually, but not necessarily, the electric resistances employed to heat the thermal-vector fluid circulating in radiators for room heating can belong to the armoured or the cartridge type, that is the type comprising a metal tubular element constituting the sheath where within the spiral of an electric resistance filament (usually Nickel/Chromium) is contained; some Magnesium Oxide, lamination pressed so to retain the spiral resistance at the centre of the sheath, acts, on the other hand, as a dielectric ensuring an excellent transmission of the generated heat from the resistance towards the sheath thereof.

[0005] Several metal alloys capable to undergo the processing required by the construction technology, in particular plastic deformations, further than capable to withstand the operating temperatures, are suitable to act as a sheath in case of resistances immersed in water or other liquids, moreover, the metal alloy shall have the required resistance to corrosion. The electric resistances employed in radiators for room heating have, thus, a sheath made of copper or stainless steel alloys.

[0006] The correct operation of the electric resistance is usually controlled by an integrated thermostating system comprising at least a thermostat for the adjustment of the developed thermal power and, possibly, a thermal protector that intervenes when the temperature of the thermal-vector fluid exceeds a pre-set value, interrupting the feed of electricity until the temperature thereof returns to safe values, as well as switches apt to disconnect or connect the radiator to the electrical system.

[0007] As is known, the installation of the resistance within an element of a radiator for room heating, is usually performed, because of its simplicity, through a joint, threaded (or flanged) and axially pierced for inserting and housing the tubular body forming the sheath. Elastic gaskets in appropriate seats of the threaded joint ensure then the hydraulic seal between the joint thereof and the heating element. In operating position, the sheath of said resistance is thus immersed in the thermal-vector fluid to be heated, while the electric contacts for the connection thereof, through known means, to the electric network remain outside the heating element.

[0008] It is clear, therefore, that the insertion of such

electric resistances in the one or more heating elements of a radiator for room heating requires additional parts apt to ensure its fastening and its keeping in operating position.

[0009] The gradual deterioration of the elastic sealing gasket is possible and this could lead to leaks of thermal-vector fluid from the heating element and to the need of a periodic preventive maintenance.

[0010] The object of the present invention is to eliminate at least a part of the drawbacks cited hereinabove.

[0011] Namely, the main object of the invention hereof is to show an electric radiator for room heating with simplified and cost effective insertion and housing of the electric resistance within at least one heating element thereof.

[0012] These and other objects, which will be clear hereinafter, can be achieved with a radiator for room heating according to the claims herein appended.

[0013] Further features of the present invention will appear more clearly from the following description of some preferred embodiments thereof, according to the claims and illustrated, by way of a non-limiting example, in the annexed drawings, wherein:

- Fig. 1 shows a schematic view of a known electric resistance for electric radiators for room heating according to the invention.
- Fig. 2 shows an axonometric and simplified view of the heating element of an electric radiator for room heating according to the invention.
- Fig. 3 shows a section view of the heating element of fig. 2.

[0014] The features of the finding shall now be described using the references contained in the figures. Prior to the description of the invention, it is useful to clarify that, by way of non limiting example, reference shall be made to a heating element being an elongated body, whereas elongated body shall mean, from now on, a body whereof longitudinal dimension L is considerably greater than the cross dimensions T thereof (see, for example, figure 2): namely, a body with $L \geq 2T$.

[0015] In relation with figure 2, reference numeral 1 indicates, as a whole, said heating element, extruded or die-cast, of an electric radiator for room heating wherein is inserted, as shown hereinafter, an electric resistance 2 of known type (see also fig. 1) and whereon there is no need to dwell too much.

[0016] Herein and referring to what has been already said about the prior art, it is in fact sufficient to clarify that said electric resistance 2 is preferably of the cartridge type, or comprising a tubular element 21, the sheath, wherein are contained, although not shown, a spiral of an electric resistance filament (usually Nickel/Chromium) and a dielectric in form of lamination pressed Magnesium Oxide apt to ensure an excellent transmission of the heat generated by the resistance filament.

[0017] As shown in figure 1 and/or 2, said electric resistance is connected to the electrical system of the user

to be heated through known means and provides, preferably, also a thermostating system comprising at least one thermostat 22 for manual and/or electronic adjustment of the developed thermal power and/or a safety thermal fuse (not shown) for the interruption of electricity feed to the resistance in case it reaches temperature levels which are dangerously high or harmful for the resistance thereof.

[0018] Coming back to the heating element 1 of the invention, more precisely, reference numeral 11 indicates the emitting body (from now on named simply emitter) substantially arranged at the centre of the heating element 1 and provided with a seat 111 for said resistance 2 crossed by electrical current and capable to yield heat to the emitter 11 thereof. Said seat 111 substantially develops along the whole longitudinal dimension L of the emitter 11 and has, preferably, a circular section.

[0019] Said emitter 11 heats the surrounding room by natural convection and by infra-red radiation.

[0020] Reference numeral 112 indicates then fins suitable for increasing, as known, the exchanging surface of said emitter 11 and thus, the efficiency of heat exchange by natural convection.

[0021] According to a preferred embodiment, reference numeral 14 indicates instead the external cover of the heating element 1 that encloses and surrounds the emitter 11 and apt to prevent the direct and accidental contact therewith and to grant a more pleasant aesthetic look to the heating element 1 thereof.

[0022] The cover 14, having any shape and section (in the example of fig. 3 with elliptical section), can consist of an appropriately pierced shield (an embodiment however not shown) so as to ensure a sufficient free surface for the passage of the infra-red radiation without substantial attenuations of the emission. As an alternative, the cover 14 can be made, as known, of materials transparent to said infra-red radiation.

[0023] According to the invention, the electric resistance 2 is inserted and constrained in operating position within the described heating element 1 through interference coupling between the sheath 21 thereof and said seat 111 of the emitter 11, as shown in fig. 3.

[0024] Said electric resistance 2 is thence capable to yield the heat produced directly by the emitter 11, where-with is in close contact, without the need of a thermal-vector fluid (water or oil) intended for the "transport" thereof (as instead happens, as seen, in fluid circulation heating appliances).

[0025] For optimal coupling, and thence heat transmission, it is vital that the level of finish of the surfaces of the sheath 21 of the electric resistance 2 and of the seat 111 of the emitter 11 is as good as possible: in fact, the presence of possible scratches or grooves creates zones wherein stagnate small quantities of air that, even if minimal, thermally insulate the resistance 2. The thermal contact between the sheath 21 and the inner walls of the seat 111 of the emitter 11 and the relative heat transmission can be possibly improved by inserting a good heat

conductive material, so as to fill the unavoidable cavities that are created between said sheath 21 and seat 111.

[0026] As shown in figure 2, of the electric resistance 2, interference inserted within the heating element 1 and in operating position, only the thermostat for manual and/or automatic (in function of the room temperature pre-set and desired by the user) adjustment of the developed thermal power and the mains cable for the connection thereof to the electric network, remain therefore accessible and in view.

[0027] It is obvious that several embodiments are possible to the man skilled in the art without, for this reason, departing from the scope of the invention. Namely, nothing prevents the cartridge electric resistance 2 from being replaced by other known resistances suitably shaped for coupling with the seat 111, such as, by way of non limiting example, armoured resistances. Moreover, nothing prevents said resistance 2, instead of being equipped with a thermostat for the adjustment of the dispensable thermal power, from providing a simpler and more cost effective bipolar ON/OFF switch for the sole switch-on or switch off in function of the user's needs (namely the desired room temperature).

[0028] It is also clear that more heating elements 1 of the invention can be combined between them and arranged side by side in order to form a set apt to meet the thermal need of a specific room.

[0029] It is lastly useful to clarify that, according to the prior art, said heating element 1 can be made, preferably, of aluminium alloys or whatever suitable metal material.

[0030] It is therefore clear that the intended objects are achieved with a radiator for room heating as described herein, namely the possibility to directly couple electric resistance 2 and heating element 1 without additional fastening means such as the threaded and axially pierced joints of the prior art. The close contact between electric resistance 2 and emitter 1 and the consequent direct transmission of the produced heat, entails the complete absence of a thermal vector fluid for the propagation of said heat, saving therefore the use of fluid tight elements, in particular elastic gaskets placed between said resistance 2 and emitter 11.

Claims

1. Heating element (1) for room heating, comprising:

- an emitter (11) suitable for yielding heat to the room wherein is located both by natural convection and by infra-red radiation,
- an electric resistance (2) crossed by electrical current, said electric resistance (2) being housed in a seat (111) of said emitter (11) and being connected, through known means, to the electric system of the user to be heated,

characterised in that

said electric resistance (2) is of the type com-

prising an outer tubular element (21) containing at least one electric resistance filament and is inserted and kept in operating position within said heating element (1) through interference coupling between said outer tubular element (21) and said seat (111), said electric resistance (2) being thence capable to yield the heat produced directly by the emitter (11), wherewith is in close contact.

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the adjustment of the developed thermal power and/or a safety thermal protector and/or ON/OFF switches for the switching-on or switching-off thereof.

**10. Room heating set
characterised in that**

it comprises one or more heating elements (1) according to one or more of the previous claims.

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**2. Heating element (1) according to the previous claim
characterised in that**

it consists in an elongated body whose longitudinal dimension (L) is at least equal to twice the cross dimensions thereof (T), said seat (111) substantially developing by the whole said longitudinal dimension (L).

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3. Heating element (1) according to any one of the previous claims characterised in that

said emitter (11) is provided with fins (112) increasing the thermal exchange surface by natural convection and thus the efficiency of the thermal exchange with the surrounding room.

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4. Heating element (1) according to any one of the previous claims characterised in that

it further comprises a cover (14) apt to surround said emitter (11), said cover (14) preventing, therefore, the direct and accidental contact with said emitter (11) and granting a more pleasant aesthetic look to said heating element (1).

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**5. Heating element (1) According to the previous claim
characterised in that**

said cover (14) can be a pierced screen so as to allow a sufficient free surface for the passage of the infra-red radiation.

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6. Heating element (1) according to any one of the previous claims except for 5 characterised in that

said cover (14) is constructed in a material transparent to said infra-red radiation.

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7. Heating element (1) according to any one of the previous claims characterised in that

said electric resistance (2) is of the cartridge type.

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8. Heating element (1) according to any one of the previous claims except for 7 characterised in that

said electric resistance (2) is an armoured resistance or similar.

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9. Heating element (1) according to any one of the previous claims characterised in that

said electric resistance (2) comprises, integral, a thermostating system, said thermostating system comprising, in turn, at least one thermostat (22) for

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