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(54) **HIGH THERMAL EFFICIENCY TOWEL HEATER CONSTRUCTION**

(57) A high thermal efficiency towel heater construction comprises a pair of tubular uprights coupled by a plurality of tubular cross-members; an electric resistance conductor being arranged in said tubular construction; said tubular construction comprising moreover at least a

bottom air inlet and at least top air outlet, said air inlet and outlet allowing air to circulate in said construction under a stack effect; said conductor heating said uprights and cross-members contacted thereby, and heating moreover a radiator inner air.

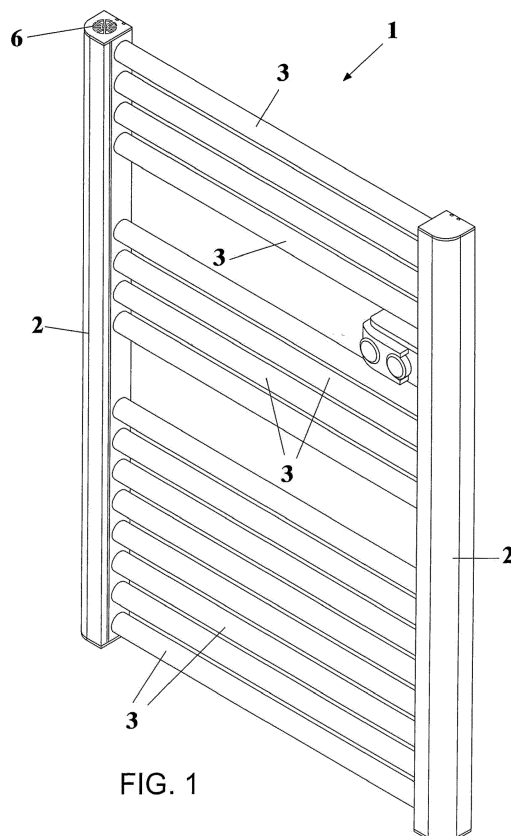


FIG. 1

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a high thermal efficiency towel heater construction.

[0002] As is known, a towel heater is substantially a radiator having an electric resistance arranged in a tubular body of the device.

[0003] Said tubular bodies have a closed construction and are optionally filled in by a heat conveying liquid, that is a liquid having a high heat conductivity, and being an unflammable and antifreeze material.

[0004] A temperature adjusting switch allows the device to safely operate and provides a power saving by switching off the power supply as the device achieves a preset temperature.

SUMMARY OF THE INVENTION

[0005] The aim of the present invention is to provide a towel heater construction having a thermal efficiency greater than that of prior towel heaters.

[0006] Within the scope of the above aim, an object of the invention is to provide such a towel heater construction which is very simple from a structural standpoint and which may be made at a low making cost.

[0007] Another object is to provide such a towel heater construction able of efficiently operating even if fully covered by towels or bathrobes and so on.

[0008] Yet another object of the present invention is to provide such a towel heater construction which may be made starting from easily commercially available elements and materials and which, moreover, is very competitive from a mere economic standpoint.

[0009] Yet another object of the present invention is to provide such a towel heater construction which is very reliable and safe in operation.

[0010] According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by an enhanced thermal efficiency towel heater construction characterized in that said towel heater construction comprises a pair of tubular uprights coupled by a plurality of tubular cross-members.

[0011] Within the tubular construction an electric resistance conductor is arranged.

[0012] The heater construction comprises moreover at least a bottom air inlet and at least a top air outlet, allowing air to circulate within the construction by a stack effect type of circulation.

[0013] The resistance conductor heats the uprights and the cross-members contacted thereby, and moreover heats the radiator inner air.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Further characteristics and advantages of the

present invention will become more apparent hereinafter from the following disclosure of a preferred, though not exclusive, embodiment of the invention, which is illustrated, by way of an indicative but not limitative example, in the accompanying drawings, where:

Figure 1 is a perspective view of the front side of the towel heater construction according to the present invention;

Figure 2 is a perspective view of the back or rear side of the inventive construction;

Figure 3 is a perspective view of a detail of the inventive construction at a top air outlet zone;

Figure 4 is a perspective view showing a rear air outlet zone;

Figure 5 is a perspective view of a bottom part of an upright thereat a probe is applied;

Figure 6 is a front elevation view of the towel heater construction;

Figure 7 is a top plan view of the towel heater construction;

Figure 8 is a bottom view of the towel heater construction;

Figure 9 is a longitudinally cross-sectioned front view of the towel heater construction;

Figure 10 is a cross-sectioned side view of the towel heater construction;

Figure 11 is a schematic view showing an operating step sequence for installing the electric resistance within the towel heater construction; and

Figure 12 is a broken-away perspective view of a length of a resistive cable.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] With reference to the number references of the above mentioned figures, the high thermal efficiency towel heater construction according to the present invention, which has been generally indicated by the reference number 1, comprises a pair of tubular uprights 2 coupled by a plurality or series of tubular cross-members 3.

[0016] In said tubular construction an electric resistance conductor 4 is arranged.

[0017] According to the present invention, the construction 1 comprises furthermore at least a bottom air inlet 5 and at least a top air outlet 6, allowing air to circulate in said construction by a stack effect circulation type.

[0018] The conductor 4 heats the metal bodies, that is the uprights and cross-members, contacted thereby, and moreover heats the radiator inner air.

[0019] Differently from prior towel heaters, which have a closed structure, the towel heater construction according to the present invention comprises plug elements, preferably made of a plastic material, having air inlet and outlet openings, said air, also due to a specifically designed configuration of each said upright, moving from downward to upward under a stack effect, thereby en-

hancing the towel heater construction thermal efficiency.

[0020] The subject construction comprises moreover rear slots 7, arranged through the rear wall of each upright 2, provided for allowing air to exit even in a case in which the heater construction is fully covered, for example by towels or bathrobes.

[0021] The electric resistance conductor 4 advantageously comprises a silicone + silicone resistive cable, being schematically shown in Figure 12, which is cut to a desired size based on the power to be provided and on the towel heater construction size.

[0022] More specifically, said conductor 4 is arranged in the heater construction 1 by a set assembling operating step, being schematically shown in Figure 11, wherein the word "START" means the conductor 4 inlet point, and the word "END" means the conductor 4 end point.

[0023] In order to prevent the cable temperature from achieving critical values, an aluminium adhesive tape strip 8 is applied, having a double operating function: it holds the conductor 4 in contact with the upright 2, thereby dissipating heat, and conducts heat so as to hold constant the convection motion generated within the towel heater construction.

[0024] To properly control the radiator inner temperatures, NTC probes, controlled by an electronic control unit, are therein used, and, furthermore, a THS system operating as a mechanical safety assembly being also provided.

[0025] It has been found that the invention fully achieves the intended aim and objects.

[0026] In fact, the invention has provided a towel heater construction which, owing to specifically designed air inlet and outlet arrangements, is well ventilated, thereby the inner resistance conductor, besides heating the metal material contacted thereby, also heats air circulating under a stack effect, thereby greatly increasing the towel heater construction thermal efficiency.

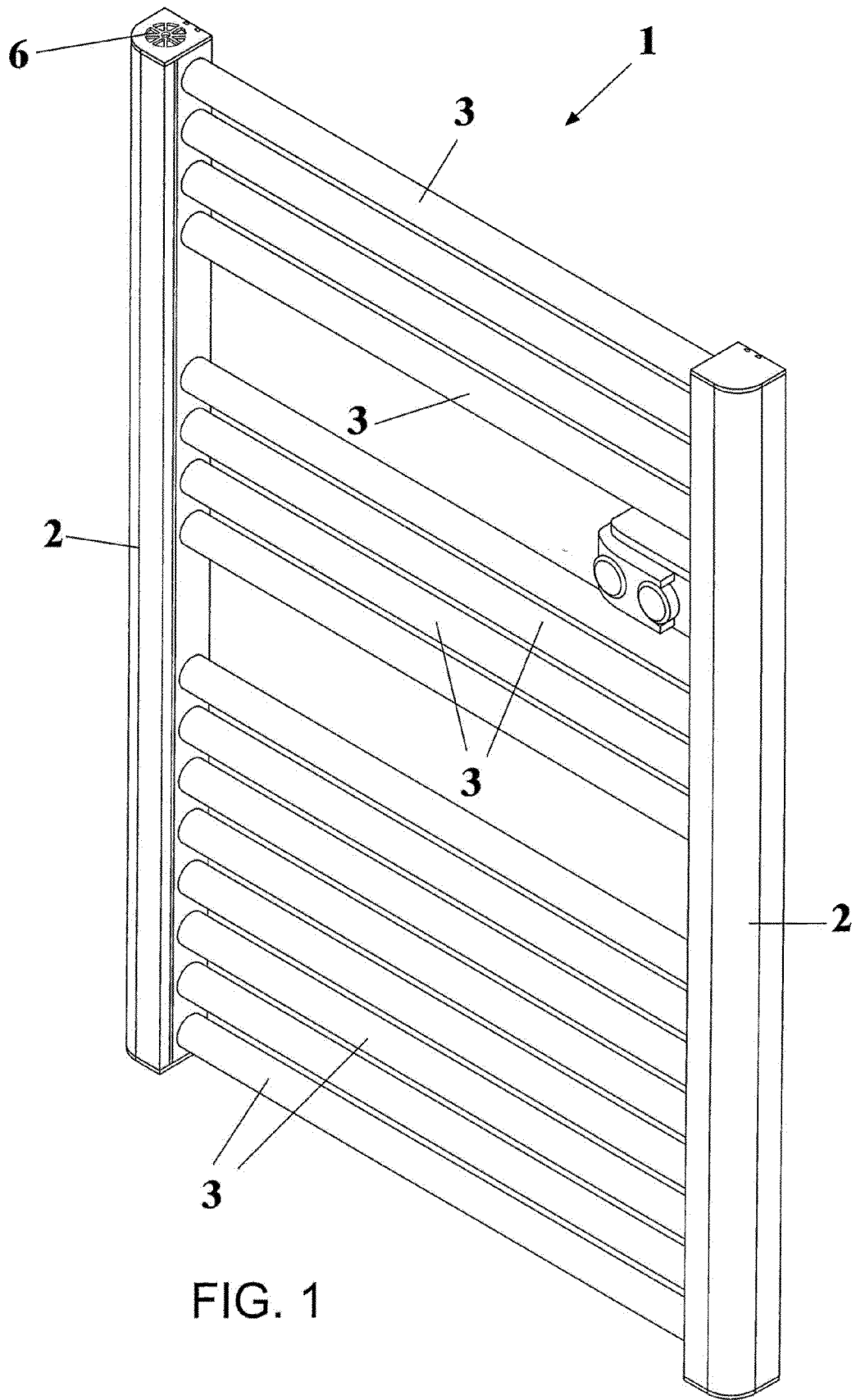
[0027] In practicing the invention, the materials used, as well as the contingent size and shapes can be any, depending on requirements.

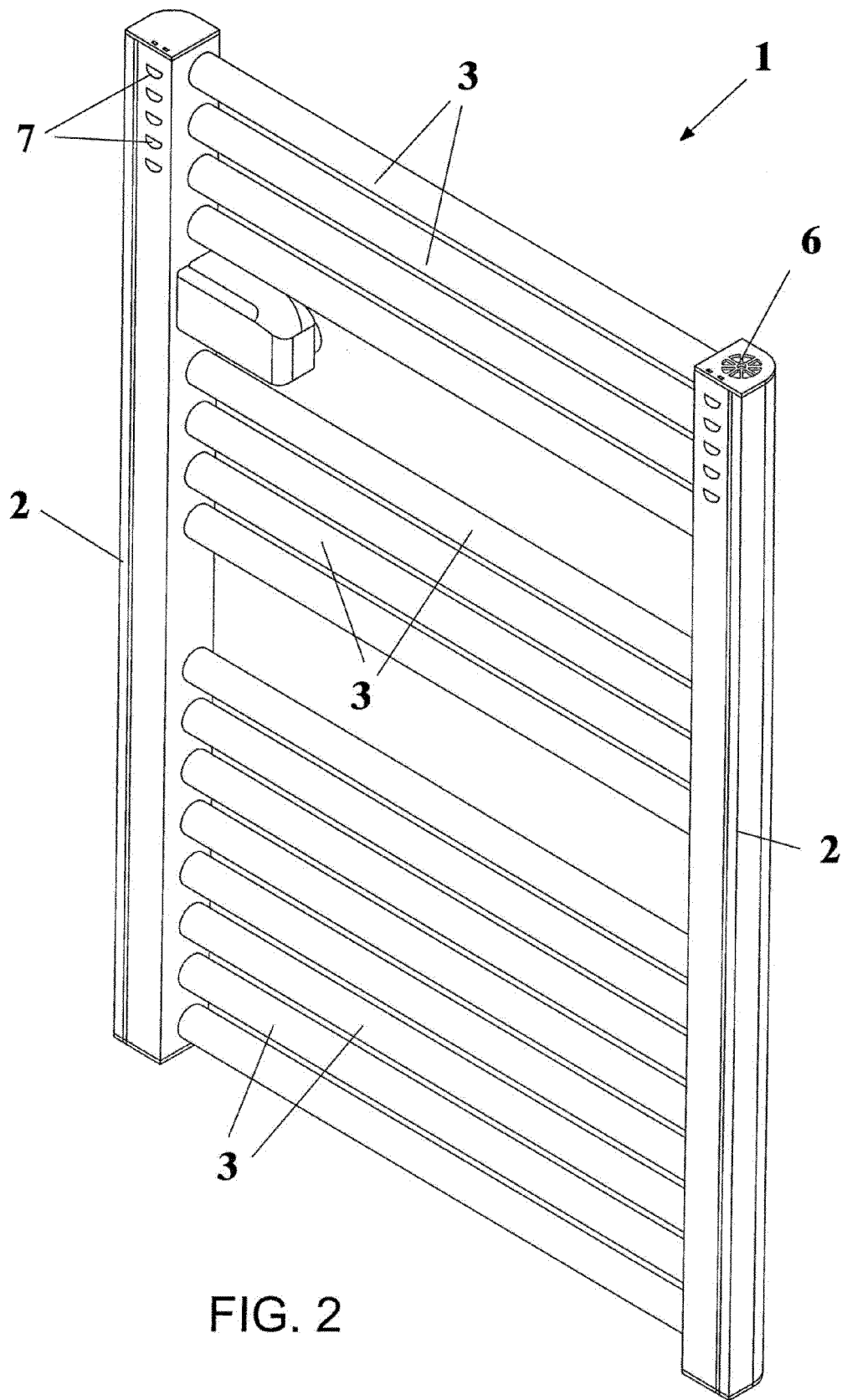
ings are formed through plug elements being applied to bottom and top end portions of said uprights.

3. A towel heater construction, according to claim 1, **characterized in that** said construction comprises moreover rear slots, arranged through a rear wall of each said upright, said rear slots allowing air to exit said construction even if said construction is fully covered by towels or bathrobes.
4. A towel heater construction, according to claim 1, **characterized in that** said conductor comprises a silicone + silicone resistive cable which is cut to a set size based on a power to be generated and a size of said towel heater construction.
5. A towel heater construction, according to one or more of the preceding claims, **characterized in that**, to prevent a temperature of said conductor from achieving a critical value, an aluminium adhesive tape material is applied within each said upright.
6. A towel heater construction, according to one or more of the preceding claims, **characterized in that** said construction comprises a plurality of NTC probes to control the radiator inner temperatures; said NTC probes being controlled by an electronic control unit.
7. A towel heater construction, according to one or more of the preceding claims, **characterized in that** said construction comprises a THS system operating as a mechanical safety arrangement.

Claims

1. A high thermal efficiency towel heater construction, **characterized in that** said construction comprises a pair of tubular uprights coupled by a plurality of tubular cross-members; an electric resistance conductor being arranged in said tubular construction; said construction comprising moreover at least a bottom air inlet and at least top air outlet, said air inlet and outlet allowing air to circulate in said construction under a stack effect; said conductor heating said uprights and cross-members contacted thereby, and heating moreover a radiator inner air.
2. A towel heater construction, according to claim 1, **characterized in that** said air inlet and outlet open-





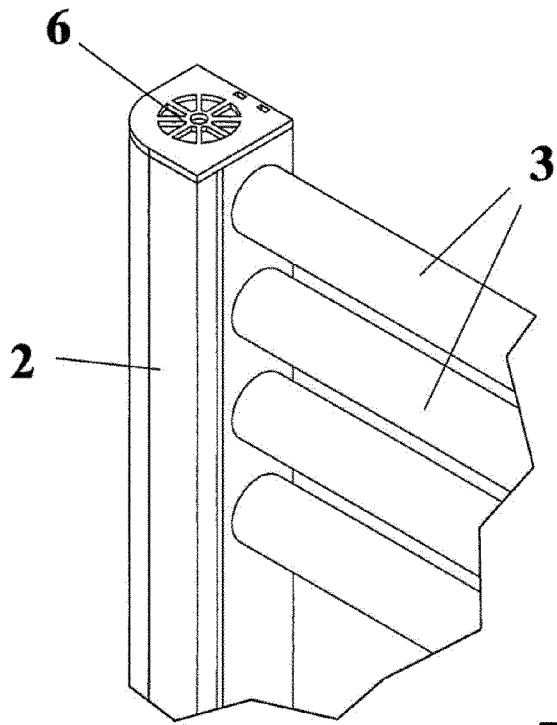


FIG. 3

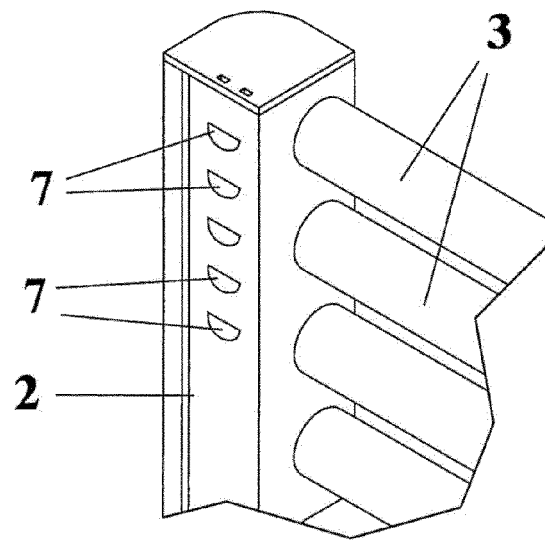


FIG. 4

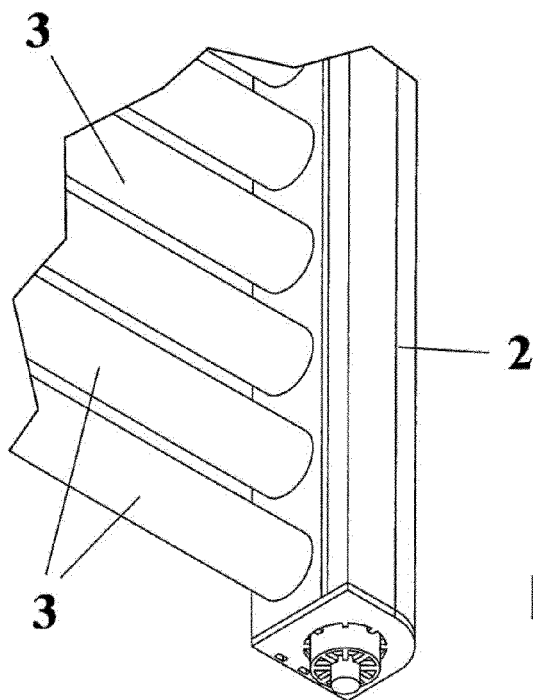
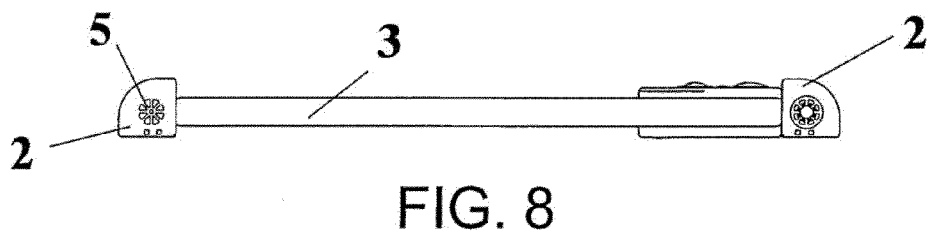
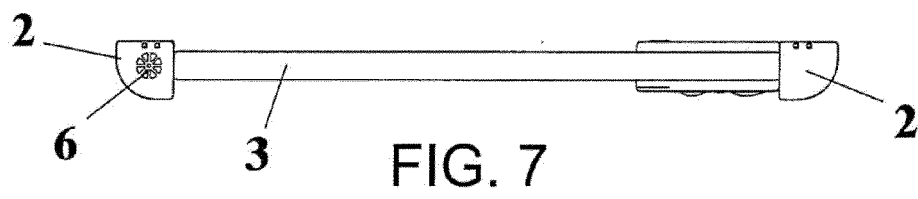
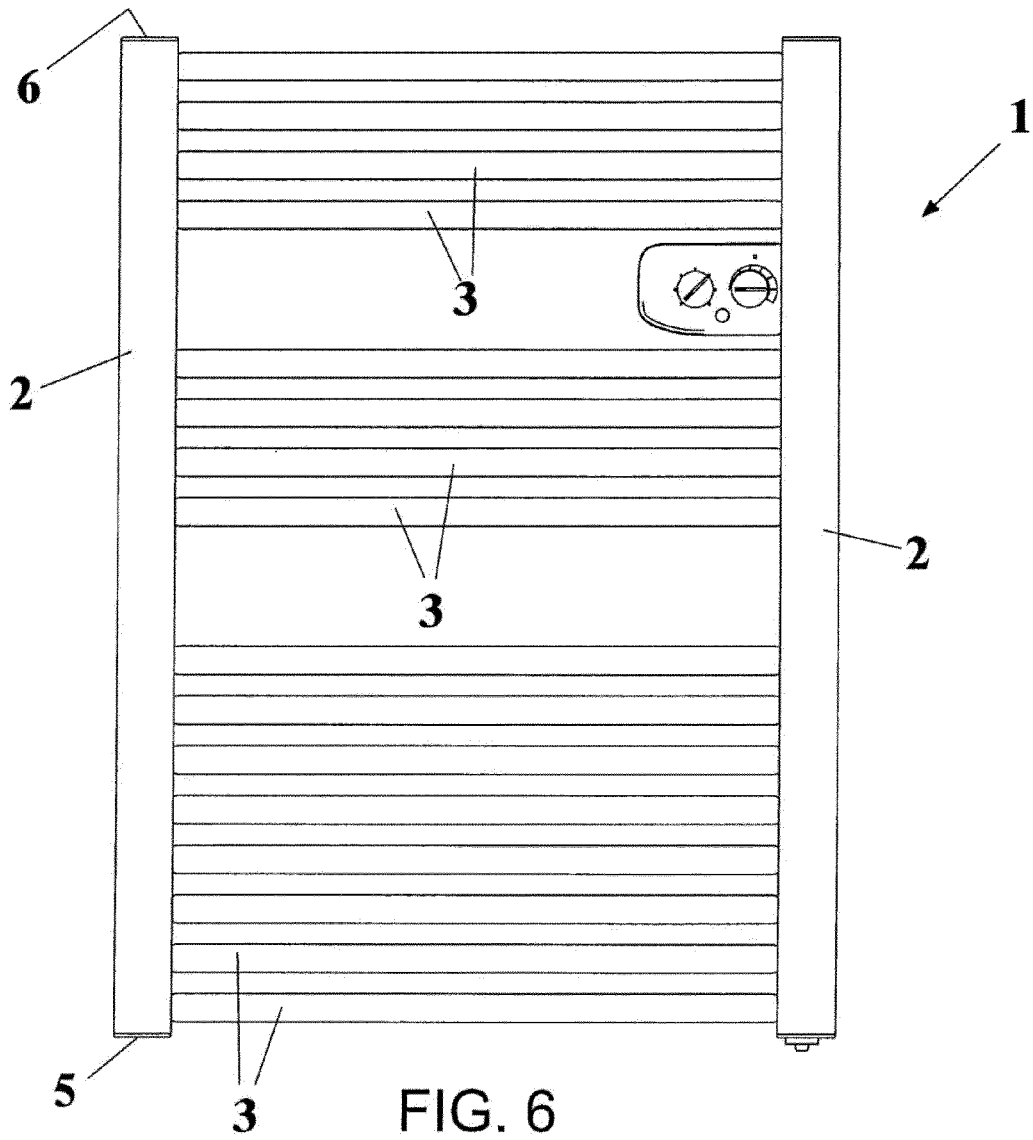


FIG. 5



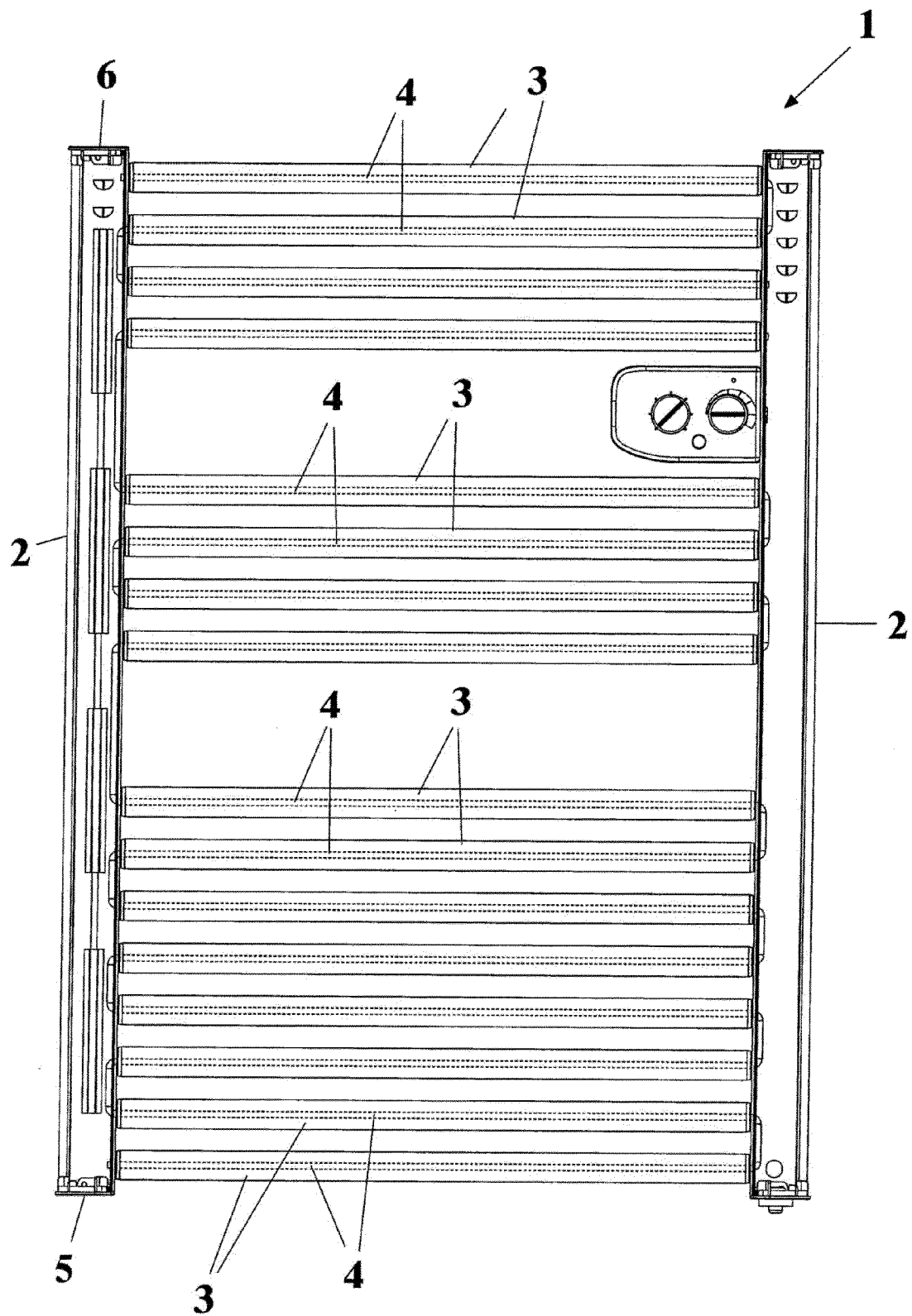


FIG. 9

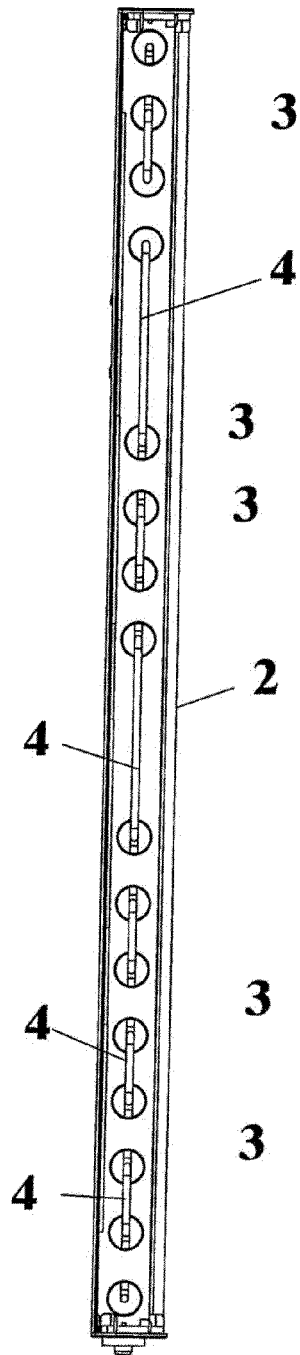


FIG. 10

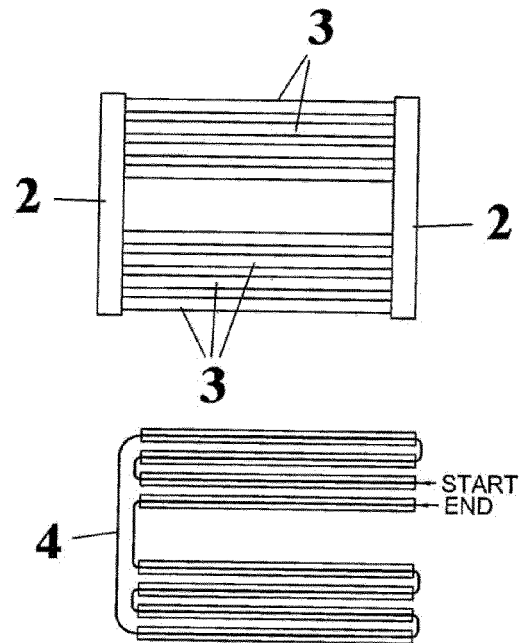


FIG. 11

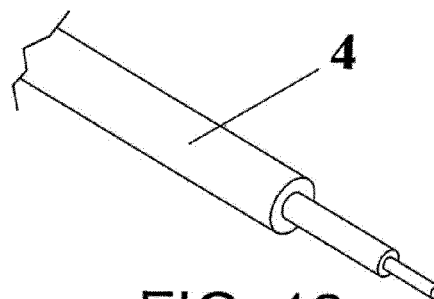


FIG. 12



EUROPEAN SEARCH REPORT

 Application Number
 EP 15 02 0186

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Place of search Munich		Date of completion of the search 29 February 2016	Examiner García Moncayo, O
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 15 02 0186

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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