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(54) **Electric heating radiator**

(57) The present invention relates to an electric heating radiator, comprising at least two horizontal conduits (1-2), a series of vertical conduits (3) running between them. The lower horizontal conduit (2) has a series of lower openings located in extension of the vertical conduits (3). A resistor (10) is housed in each horizontal conduit (1-2).

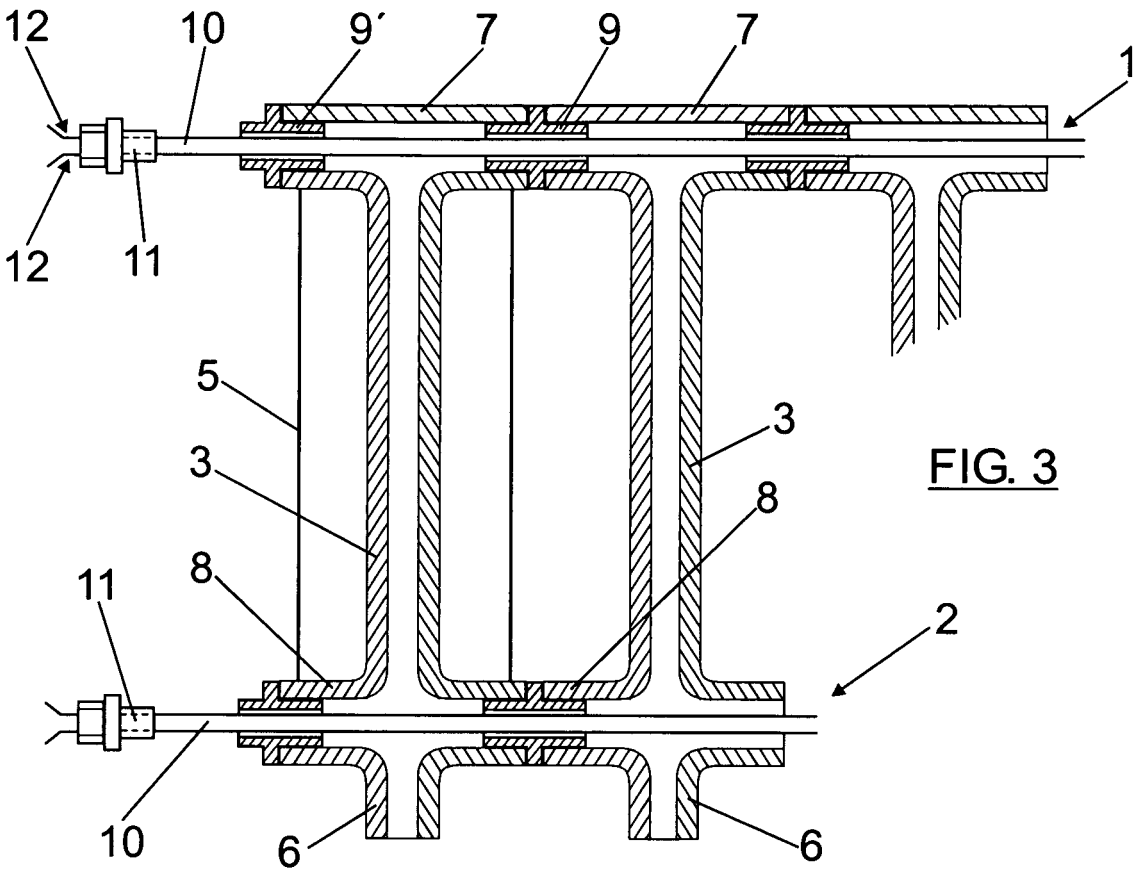

FIG. 3

EP 1 808 648 A2

Description

Field of the Invention

[0001] The present invention relates to an electric heating radiator, comprising a body made up of horizontal and vertical conduits housing resistors, and of external fins attached to said conduits, the conduits and fins being metallic, preferably of aluminum.

Background of the Invention

[0002] Radiators of the type set forth are already known in which the body is made up of at least two horizontal conduits, an upper and lower conduits, and a series of vertical conduits running between the horizontal conduits, opening into them, the horizontal conduits being closed at their ends. This body is completed with two series of external cooling fins located on either side 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.

[0003] It is also known that the assembly of the body is sub-divided, according to planes that are perpendicular to the horizontal conduits, into equal independent modules, each of which modules includes horizontal conduit sections, a vertical conduit running between the horizontal conduit sections, opening into them, and two vertical cooling fins running together with the vertical conduits, attached thereto. The horizontal conduit sections have an internal threading in different directions from their end sections. The attachment of consecutive modules is carried out by means of intermediate bushings which externally and after their end sections have a threading in different directions, coinciding with the inner threading of the horizontal conduit sections, such that when these intermediate bushings are turned in the corresponding direction they are screwed at the same time into the opposing ends of the horizontal tube sections of two consecutive modules.

[0004] In these radiators the body made up of the horizontal and vertical conduits is filled with oil or a similar thermal heat transfer fluid which is heated by means of resistors installed inside the body. This requires that the closure of the ends of the horizontal conduits be leak-tight for the purpose of preventing the heat transfer fluid from leaking. In addition, the weight of these radiators is relatively high since the horizontal and vertical conduit assembly is filled with oil or another similar heat transfer fluid. It must finally be indicated that the fact that the radiated is filled with oil entails an increase in the cost of the radiator.

Description of the Invention

[0005] The object of the present invention is to eliminate the problems set forth by means of a radiator of the type indicated above but which does not have oil or a similar heat transfer fluid, such that its weight corresponds only to that of the components of the body, fins, side covers of the closure and resistors, its weight thus being much lighter than that of traditional radiators.

[0006] The risk of leaks or losses of the heat transfer fluid is also reduced and the cost of the radiator is reduced as it does not have this fluid.

[0007] According to the present invention, the lower horizontal conduit of the radiator has a series of lower openings, each of which is located in extension of the vertical conduits, such that the body of the radiator is not leak-tight, but rather it opens at the lower part through the series of mentioned openings.

[0008] With this construction each of the modules forming the radiator will include the horizontal conduit sections, preferably a lower section and another upper section, a vertical conduit running between the upper and lower horizontal conduit sections into which two vertical cooling fins open, a front fin and a rear fin, and a lower opening under the horizontal conduit section and as an extension of the vertical conduit.

[0009] According to another aspect of the invention, an insulated resistor is housed in each of the horizontal conduits of the radiator, which resistor is supported by the intermediate bushings acting as connecting elements between consecutive modules. These resistors are fed through taps traversing one of the closure covers of the ends of the horizontal conduits.

[0010] The intermediate connecting bushings between consecutive modules can be internally provided with ribs determining interlocking or support points for the resistors running internally through each horizontal conduit. Each resistor is thus supported along the horizontal conduit on each and every one of the connecting bushings between consecutive modules.

[0011] The radiator further includes one or more additional resistors in an intermediate position between the resistors housed in the horizontal conduits, parallel thereto. These additional resistors traverse the vertical conduits through aligned holes made in their walls, the resistors being adjusted to the contour of the holes and electrically insulated in relation to the same.

[0012] The resistors will be single-tube resistors which are smooth or externally provided with fins, for example with a spiral fin. They can further be jacketed in an aluminum pipe in either case.

[0013] With the construction discussed, the resistors installed in the horizontal conduits of the radiator, and the additional resistors where applicable, will heat the air contained inside the same, being possible that at least part of this air will enter or exit through the lower openings. The hot air contained in the radiator will directly heat the walls of the different conduits and through these the cooling fins.

[0014] The arrangement of the resistors and the heating of the air contained in the radiator will allow the tem-

perature thereof to be uniform and the contained air to be completely dry due to the heating of the same. As indicated, the radiator does not have oil or any other similar heat transfer fluid, therefore its weight will be much lighter and the manufacture thereof more cost-efficient.

Brief Description of the Drawings

[0015] The construction and features of the radiator of the invention will be better understood with the following description made in reference to the attached drawings in which a non-limiting embodiment is shown.

[0016] In the drawings:

Figure 1 is a perspective view of a radiator constructed according to the invention.

Figure 2 is a partial cross-section view of the radiator taken according to section line II-II of Figure 1.

Figure 3 is a partial longitudinal section view of the radiator taken according to section line III-III of Figure 1.

Figure 4 is a profile view of one of the intermediate connecting bushings between consecutive modules.

Figure 5 is a view similar to that of Figure 1, showing an embodiment variant.

Figure 6 shows a perspective view of one of the modules forming the radiator of Figure 5.

Figures 7 to 10 show perspective views of other embodiment variants of the resistors.

Detailed Description of an Embodiment

[0017] Figure 1 shows a radiator including a body made up of two horizontal conduits, upper conduit 1 and a lower conduit 2, between which a series of vertical conduits 3 runs, opening into said horizontal conduits. The radiator further includes two series or assemblies of cooling fins, front fins with reference number 4 and rear fins with reference number 5, which are parallel and coincide with the vertical conduits 3.

[0018] This radiator assembly is sub-divided into modules, according to planes perpendicular to the horizontal conduits 1 and 2, all this as can best be seen in Figure 3.

[0019] The lower horizontal conduit 2 has openings 6 thereunder which are located as an extension of the vertical conduits 3.

[0020] With this construction, each of the modules forming the radiator comprises an upper horizontal conduit section having reference number 7 in Figure 3, a lower horizontal conduit section having reference number 8, a vertical conduit 3 running between and opening into the horizontal sections 7 and 8, a front fin 4 and rear fin 5. The attachment between consecutive modules is carried out by means of intermediate bushings 9. To that end the horizontal sections 7 and 8 have inner threads in different directions after their end sections. The intermediate bushings 9 externally have threads in different after their end sections which are equal to the inner threads of sections 7 and 8. Therefore, when the bushings 9 are turned in the corresponding direction, they will be screwed into the end sections of the horizontal sections corresponding to consecutive modules. When the different modules are attached, sections 7 form the conduit upper 1, while sections 8 form the lower horizontal conduit 2.

[0021] Each of the discussed modules will further include a lower opening 6, opposite to the corresponding vertical conduit 3.

[0022] The horizontal conduit 1 and 2 and vertical conduit 3 assembly will thus open to the exterior through the lower openings 6.

[0023] A resistor 10 is installed through each of the conduits 1 and 2, which resistor is mounted in an end cap 11 which can be screwed onto the free end of the end bushing 9', acting as an upper closure cap. The electrical connections 12 will project from this cap 11.

[0024] For the resistor to be perfectly positioned, the intermediate bushings 9 may internally have ribs 12, Figure 4, which will be used as interlocking and support points for the resistor 10, said resistor thus being in a centered position along conduits 1 and 2.

[0025] The radiator shown in Figure 1 can be completed with two closure covers which would cover the vertical sides and hide the connections 12, one of the covers further bearing the control elements or means, such as a switch, thermostats, operation signaling pilot lamp, etc.

[0026] With the discussed construction, the body of the radiator, made up of the vertical and horizontal conduits, opens to the exterior through the openings 6 and is completely empty, such that its weight is lighter in relation to traditional radiators of the same type which are filled with oil as the heat transfer fluid.

[0027] The heating of the resistors 10 causes the heating of the air contained in the radiator, with freedom of expansion through the opening 6, causing the heating of the walls of the horizontal conduits 1 and 2 and vertical conduits 3 and through the latter the heating of the cooling fins 4 and 5.

[0028] Like the radiator of Figure 1, the radiator shown in Figure 5 is made up of independent modules that can be placed against and fixed to one another in a manner similar to that described in reference to Figure 3. One of these modules is shown in Figure 6.

[0029] As in the case of Figure 1, the radiator of the Figure 5 comprises an upper horizontal conduit 1 and a lower horizontal conduit 2, with vertical conduits, which are not shown, running between them. The radiator is completed with front fins 4 and rear fins 5.

[0030] As can be seen in Figure 6, the modules forming this radiator include an upper horizontal conduit section 7, a lower horizontal conduit section 8, a vertical conduit 3 running between and opening into the horizontal sections 7 and 8, and a front fin 4 and rear fin 5. The walls of the vertical conduit 3 have opposing holes 14 which, in the radiator of Figure 5, will be aligned to receive other additional resistors 15, which will be located parallel to

the resistors mounted in horizontal positions 1 and 2. The module of Figure 6 further has external fins 16 along the vertical conduits 3.

[0031] As in the case of Figures 1 to 3, the vertical conduits 3 are open at the bottom through the opening 6.

[0032] Otherwise, the assembly of the radiator based on the modules of Figure 6 and the mounting of the resistors is similar to that described in reference to Figures 1 to 3.

[0033] Figures 7 to 10 show other variants of resistors for the radiators of the Figures 1 and 5.

[0034] In the case of Figure 7 the resistor is a single-tube type resistor 17, with a head 18 configured to be coupled on the opening of the horizontal conduits 1 and 2 or on the holes 14 of the additional resistors 15.

[0035] In Figure 8 the resistor is similar to that of Figure 7 but with an external spiral fin 19.

[0036] The resistors of Figures 9 and 10 correspond with the construction of resistors 7 and 8, incorporating an external aluminum jacket 20.

Claims

1. An electric heating radiator, comprising at least two horizontal conduits, an upper conduit and a lower conduit, closed at their ends; a series of vertical conduits running between the horizontal conduits, opening into them; two series of external cooling fins located on either side of the horizontal and vertical conduit assembly in coplanar positions on each side; and two closure covers that can be coupled and fixed on the sides of the assembly; said assembly being sub-divided, according to planes perpendicular to the horizontal conduits, into equal independent modules, each of which includes horizontal conduit sections, a vertical conduit running between the horizontal conduit sections, opening into them, and two vertical cooling fins running in coinciding positions with the vertical conduits and horizontal sections; said horizontal conduit sections having an internal threading in different directions after their end sections for connecting them by means of an intermediate bushing with an equal external threading con in a different direction, also after its end sections, **characterized in that** the lower horizontal conduit has a series of lower openings, each of them located in extension of one of the vertical conduits; and **in that** an insulated resistor is housed in each of the horizontal conduits, which resistor is supported by the mentioned intermediate bushings.

2. A radiator according to claim 1, **characterized in that** the mentioned intermediate bushings internally have two diametrically opposed ribs determining interlocking or support points for the resistor running through the inside of each horizontal conduit.

3. A radiator according to claim 1, **characterized in that** it further includes one or more additional resistors, which are parallel to the resistors housed in the horizontal conduits and traverse the different modules through aligned holes made in the walls of the vertical conduits, between the two horizontal conduits.

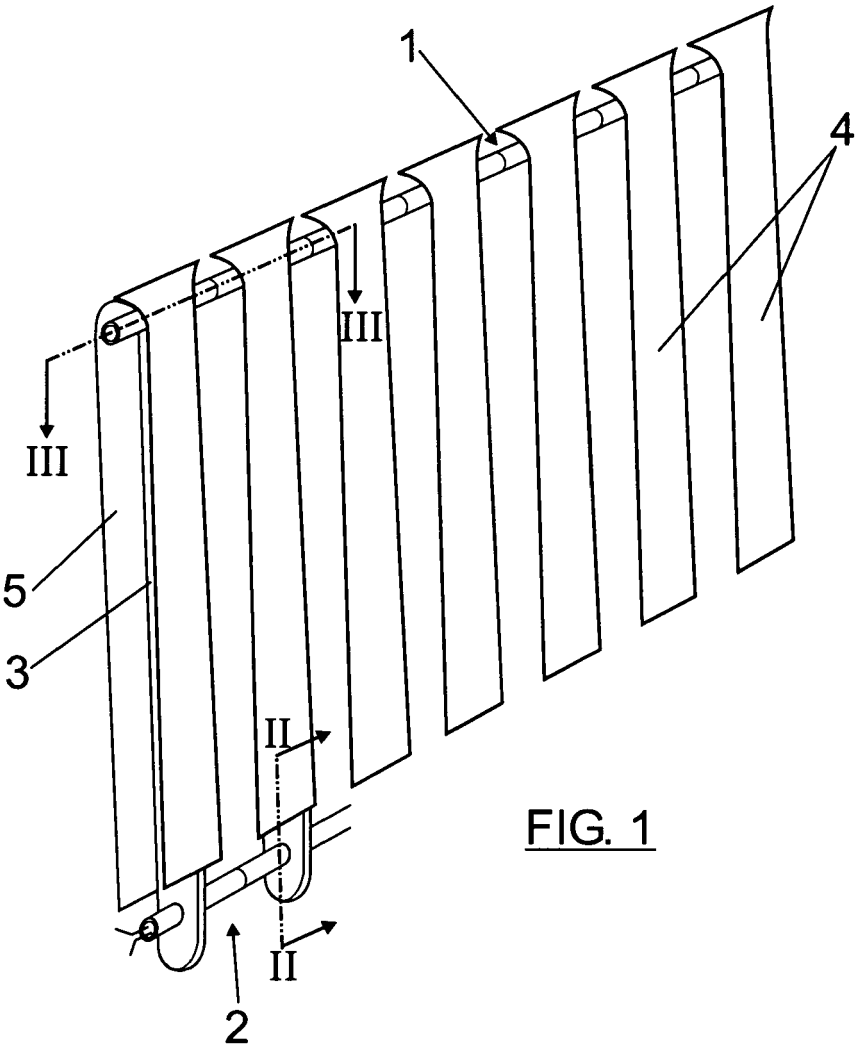

FIG. 1

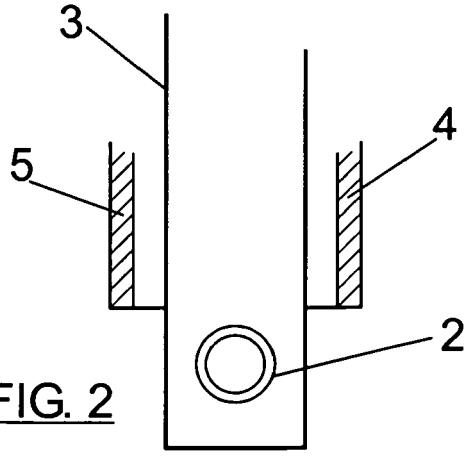

FIG. 2

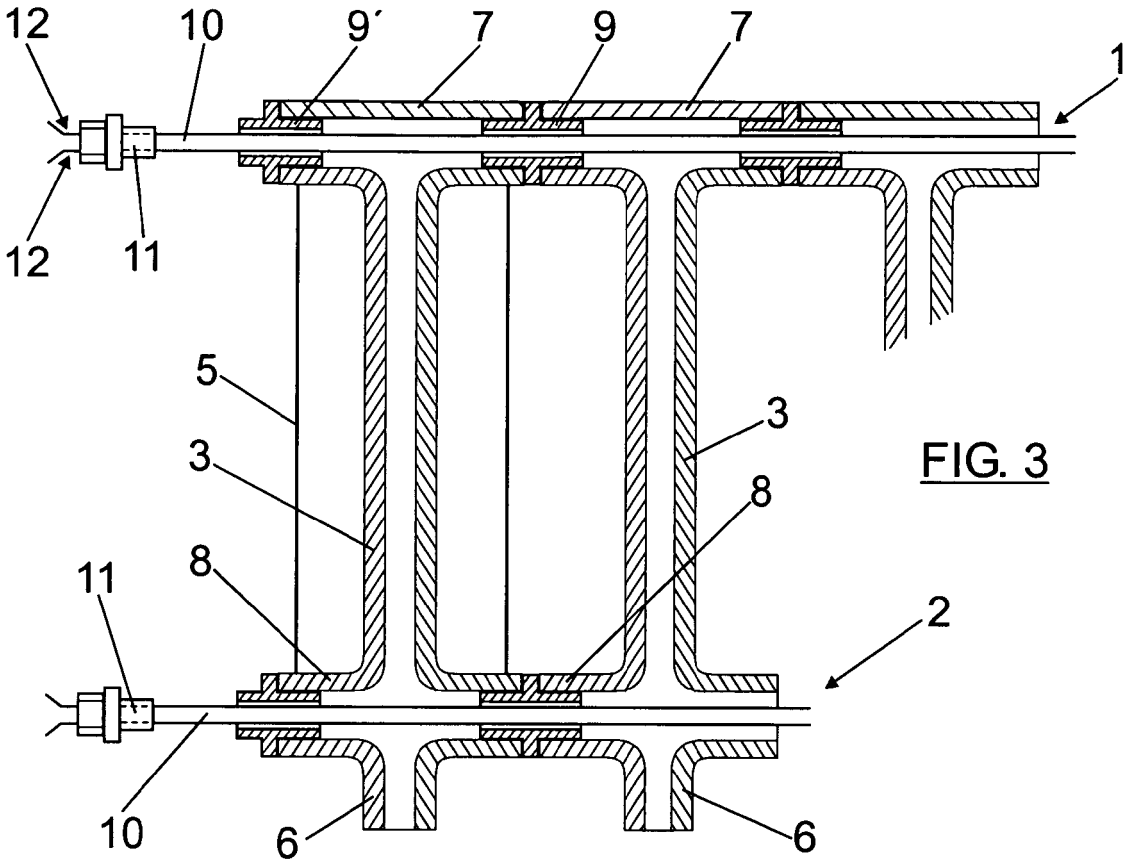

FIG. 3

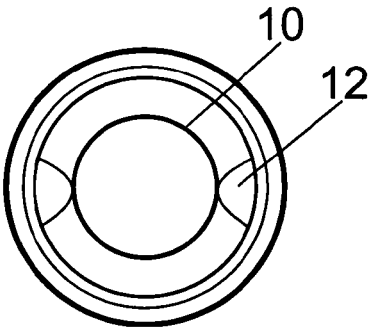

FIG. 4

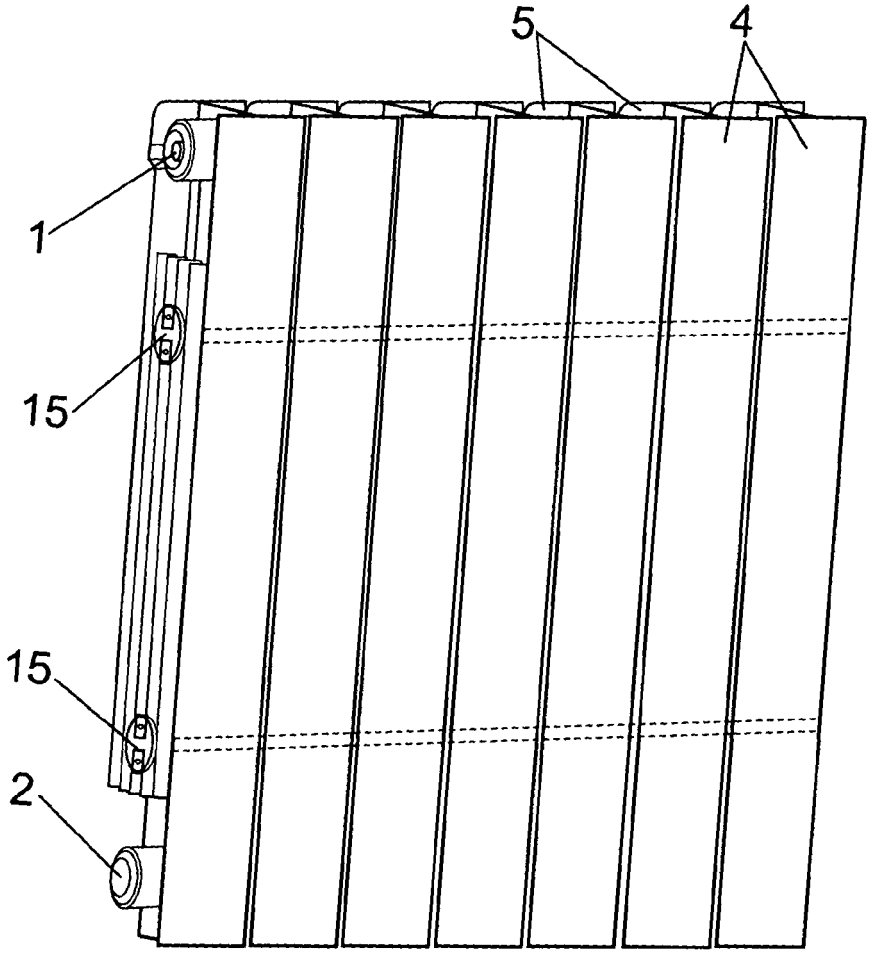

FIG. 5

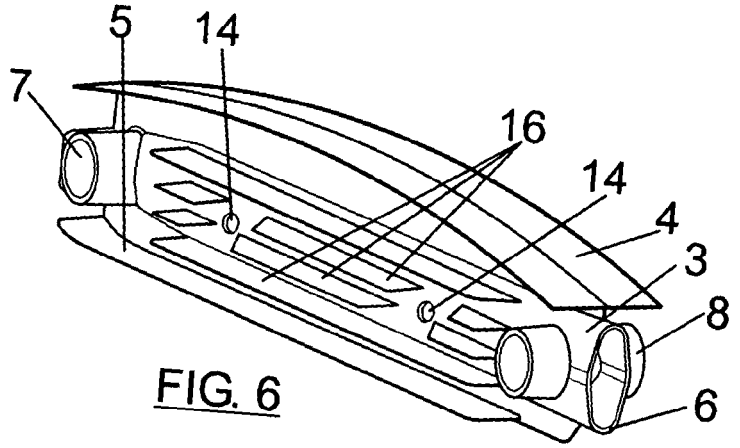

FIG. 6

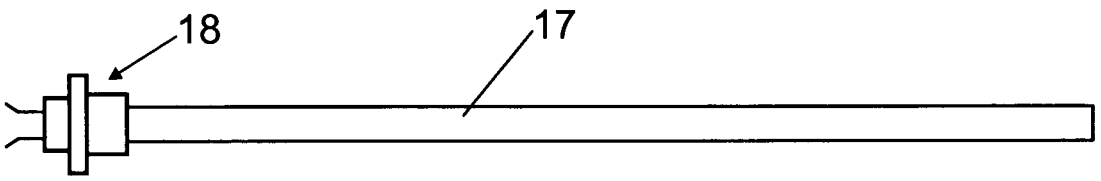

FIG. 7

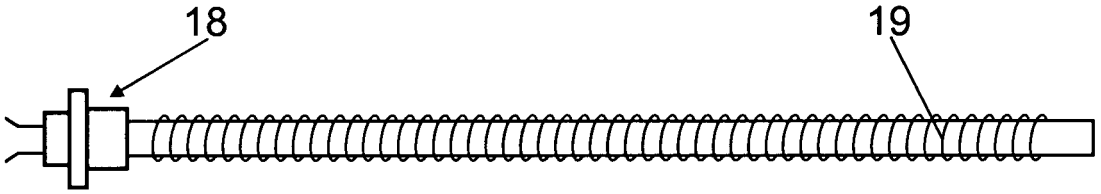

FIG. 8

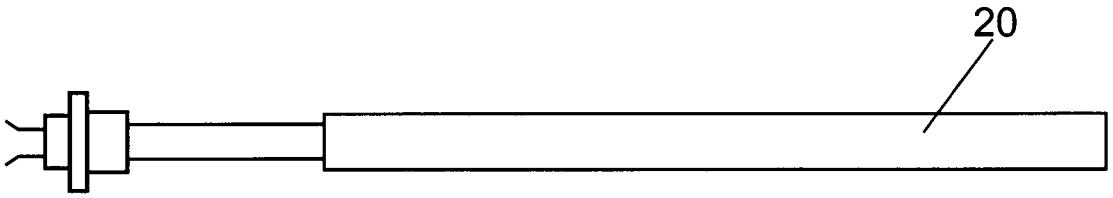

FIG. 9

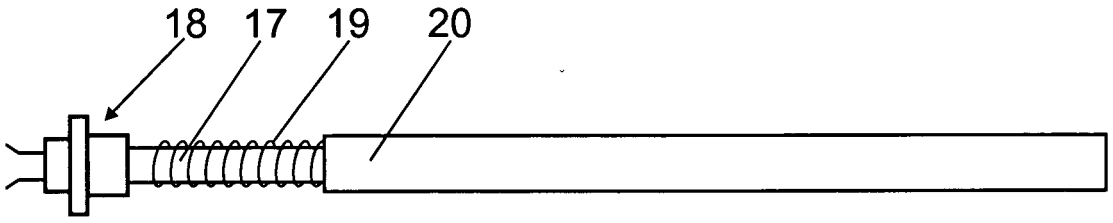

FIG. 10