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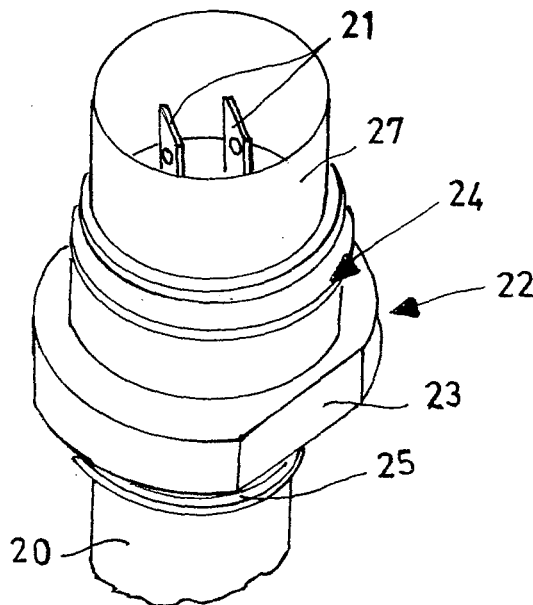
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(54) **Electric immersion resistance with a facilitated connection**

(57) An electric immersion resistance, having a tubular structure, suitable for supplying thermal power and which can be used in particular for electric radiators, essentially comprising a tubular metallic casing (20), inside which there is at least one resistor device equipped with terminations connected to electric terminals (21), suitable for connection with respective power supply wires

(26), which extend from the tubular casing (20) in correspondence with at least one supporting element (22) and/or connection; the electric terminals (21) are electrically and mechanically insulated by the use of an annular insulating support (27), situated around the terminals (21) and extending for at least the whole length of the terminals themselves (21), which is connected to a flange (24) of the supporting element (22) and/or connection.



**Fig. 4**

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## Description

**[0001]** The present invention relates, in general, to an electric device with a tubular structure for the supply of thermal power, which can be used for any means capable of dissipating heat and, in particular, for electric radiators, of the portable or wall-installable type (towel-heaters).

**[0002]** More specifically, the invention relates to an electric immersion resistance, having a tubular structure, with a facilitated connection and improved supply wires.

**[0003]** The use of electric immersion resistances is known in the field of heat exchangers, which are used for the functioning of numerous devices for heat production, devices which can be represented, for example, by water or oil radiators, electric radiators, radiating panels, etc.

**[0004]** In particular, portable or wall-installable electric radiators (towel-heaters), of the known type, use electric immersion resistances, as means for dissipating heat, which normally consist of a tubular (cylindrical) metallic body, seal at the ends and positioned inside each element or radiator column, containing a fluid (water and/or oil), which is heated by conduction and which forms the propagation and diffusion means of the thermal power (heat) available and developed.

**[0005]** The tubular metallic body, in turn, contains a sealed collector, inside which a resistor device is positioned, suitably electrically insulated by the walls of the collector.

**[0006]** The functioning of the electric resistance is generally controlled by a thermostat which is activated when the temperature of the fluid exceeds a pre-established threshold value, interrupting the electric energy supply until the temperature of the fluid has decreased to values lower than said threshold value.

**[0007]** The assembly of the electric resistance inside the user apparatus is generally effected using a threaded or flange-shaped connection, axially perforated, in which the tubular body of the electric resistance is inserted, which is fixed in position, for example by the interposition of an annular washer which forms the sealing element.

**[0008]** In particular, the collector of the resistance is axially introduced inside a suitable seat of the user apparatus, by means of the threaded connection, so that the electric contacts extend outside the seat, and the outer walls of the collector are lightly touched, inside the cylindrical tubular body, by the fluid present inside the user apparatus.

**[0009]** Figures 1 and 2 enclosed show an electric immersion resistance of the known type, comprising a tubular connector 10, which ends in a threaded portion 11, suitable for the connection of the outer tubular body of the resistance and directly connected to a connection 12 and to an insulating support 14; the insulating support 14 guides and protects the outlet of the electric terminals 13, which form the extension and are directly connected to the ends of the internal resistor, so that it is possible to connect the supply wires 16 to the above terminals 13,

by means of rapid connection devices 15 of the traditional type (so-called "Fastons").

**[0010]** Although this constructive solution allows a rapid connection of the supply wires to the electric resistance, in addition to the possibility of assembling resistances already equipped with supply wires, thanks to a cold fixing system obtained with the use of the insulating supports 14, it is subject to various drawbacks, first of all relating to limited electric safety as, in the installation phase, the electric terminals 13 are completely exposed and have no protection from the risk of accidental contact.

**[0011]** Furthermore, the solution described makes it necessary for the body of the resistance and relative electric terminals 13 to protrude to a certain distance from the connection 12 and from the user apparatus and, even if this limits the heat transmission and overheating of the supply wires 16, it causes a certain longitudinal encumbrance which should be limited to the maximum, in order to simplify the installation and assembly of the resistance, also in restricted areas and spaces and/or which are difficult to reach.

**[0012]** An objective of the present invention is therefore, in general, to overcome the disadvantages mentioned above and, in particular, to provide an electric immersion resistance with a facilitated connection which allows the installer to effect the electric connections simply and safely, thanks to the high electric protection degree reached, at the same time limiting the heat transmission and overheating of the supply wires which are thus protected, insulated and integrally preserved.

**[0013]** A further objective of the present invention is to provide an electric immersion resistance with a facilitated and rapid connection, which is particularly efficient and reliable and which allows the overall encumbrance of the structure to be limited to the maximum, in order to simplify the installation also in restricted areas and spaces and/or which are difficult to reach.

**[0014]** Another objective of the invention is to provide an electric immersion resistance with a facilitated connection, which simplifies the installation phases and consequently limits production and operating costs, with respect to devices of the traditional type.

**[0015]** These and other objectives are achieved by an electric immersion resistance with a facilitated connection, according to claim 1 enclosed.

**[0016]** Further detailed technical characteristics are contained in the dependent claims.

**[0017]** Additional objectives, characteristics and advantages of the present invention appear evident from the following description, relating to a preferred embodiment example, provided for purely illustrative and preferred but non-limiting purposes, and from the enclosed drawings, in which:

- figure 1 is a first partial side view of an electric immersion resistance of the known type;
- figure 2 is a further partial side view of the electric immersion resistance according to figure 1, com-

- plete with supply wires;
- figure 3 is a partial side view of an electric immersion resistance with a facilitated connection, according to the invention, drawn to scale with respect to the view of figure 1;
- figure 4 is a partial and perspective view from above of the electric immersion resistance with a facilitated connection, according to the invention;
- figure 5 is a partial side view of an electric immersion resistance with a facilitated connection, according to the invention, complete with supply wires and drawn to scale with respect to the view of figure 2.

**[0018]** With particular reference to figures 3-5 mentioned above, the electric immersion resistance illustrated herein, according to the invention, can be applied to electric radiators, such as towel-heaters, or radiating panels in general; in any case, the above resistance, produced according to the description, can evidently be analogously and indifferently used for any other application in which a heating device with fluid circulation is adopted.

**[0019]** The immersion resistance according to the invention comprises a collector, produced in the form of a metallic cylindrical tube, sealed at the ends and containing a convective fluid.

**[0020]** The resistance also comprises, inside the collector, a cylindrical conductor element 20, immersed in the convective fluid, containing at least one electrically insulated resistor, which is charged in order to heat the fluid circulating outside the cylindrical tube 20.

**[0021]** The resistor is surrounded by insulating material and normally also includes one or more thermostats (not visible in the enclosed figures), connected in series with the resistor, which can be positioned in correspondence with one and/or both of the ends of the cylindrical tube 20.

**[0022]** The resistor contained in the tubular metallic casing 20 also comprises two outer terminals 21, which are connected, with the interposition of the above thermostats, to the inner terminals of the resistor, suitable for supplying the necessary power (heat), whereas the thermostats can be contained inside a connection 22, which can also be used as a supporting element which can also include, possibly produced in a single piece, a bush 23 and a substantially cylindrical portion or flange 24, assembled inside the bush 23.

**[0023]** The connection 22 is integrally welded or crimped to the metallic casing 20, which also has a threaded part 25, suitable for the fixing of the heating collector of the user device.

**[0024]** The resistor contained inside the metallic casing 20 is charged by the supply voltage, thanks to the electric connection of the terminals 21 with respective supply wires 26, effected, for example, by means of connection devices 28 of the "Faston" type, and controlled in its functioning, as already mentioned, by one or more thermostats which may or may not activate the electric current to the user device on the basis of pre-established

minimum and/or maximum temperature values.

**[0025]** According to the invention, the supporting flange 24 has a central perforation from which electric terminals 21 extend, and is coupled, by the part in correspondence with which the above terminals 21 emerge, with an annular insulating support 27, which contemporaneously forms a sealing element, in correspondence with the bottom of the resistance, and protection element as it allows the mechanical and electric insulation of the terminals 21 from the rest of the structure and from possible dangerous external connections.

**[0026]** The insulating support 27, situated around electric the terminals 21, extends for at least the whole length of the electric terminals themselves 21 and is fixed or screwed to the connection 22.

**[0027]** In this case, the insulating support 27, represented by the analogous insulating support indicated with 14 (in figures 1 and 2) in resistances of the traditional type, and the same electric terminals 21 are practically englobed inside the same structure of the resistance, preventing the structure from protruding along the longitudinal section corresponding to the height of the insulating support 14, with respect to the body of the flange 24 and thus allowing the direct connection and protection of the supply wires 26 to the terminals 21.

**[0028]** The annular insulating support 27 also limits overheating near the connection of the terminals 21 with the electric supply wires 26 and separates the portion of the electric connections from the high temperature fluid circulating in the plant of the user device.

**[0029]** Finally, the use of the insulating support 27 assembled on the bottom of the flange 24 allows the assembly phases of the resistance to be simplified, which no longer require the laborious welding processes necessary in the known solutions, as it is sufficient to position the resistor inside the hole situated in the flange 24 and in the casing 20, after applying the specific insulating protection support 27 of the external electric terminals 21.

**[0030]** The characteristics of the electric immersion resistance with a facilitated connection, object of the present invention, as also the advantages, are evident from the above description.

**[0031]** Finally, it is evident that numerous other variants can be applied to the electric immersion resistance in question, all included in the novelty principles inherent in the inventive idea, and also that, in the practical embodiment of the invention, the materials, forms and dimensions of the details illustrated can differ according to requirements and can be substituted with other technically equivalent alternatives.

## Claims

1. An electric immersion resistance with a facilitated connection, having a tubular structure, suitable for supplying thermal power and which can be used in particular for electric radiators, essentially compris-

ing a tubular metallic casing (20), inside which there is at least one resistor device and whose walls are lightly touched by at least one convective fluid circulating inside a collector, said tubular metallic casing (20) being equipped with terminations connected to electric terminals (21), suitable for connection with respective power supply wires (26), which extend from the tubular casing (20) in correspondence with at least one supporting element (22) and/or connection, **characterized in that** said electric terminals (21) are electrically and mechanically insulated by the use of at least one insulating support (27), situated around the terminals (21) and extending for at least the whole length of the terminals themselves (21), which is connected to said supporting element (22) and/or connection.

2. The electric immersion resistance according to claim 1, **characterized in that** said insulating support (27) is fixed to at least one flange (24) of said supporting element (22) and/or connection.
3. The electric immersion resistance according to claim 1, **characterized in that** said resistance can be applied to electric radiators, such as towel-heaters, or radiating panels in general, or to heating devices with the circulation of at least one convective fluid.
4. The electric immersion resistance according to claim 1, **characterized in that** said resistor is surrounded by insulating material.
5. The electric immersion resistance according to claim 1, **characterized in that** said resistor is connected to at least one thermostat and/or thermofuse, which can be positioned in correspondence with one and/or both ends of said cylindrical metallic casing (20).
6. The electric immersion resistance according to claim 1, **characterized in that** said external terminals (21) are connected to respective supply wires (26) by means of relative connection devices (28).
7. The electric immersion resistance according to claim 1, **characterized in that** said electric terminals (21) are englobed inside the structure of the resistance, thus allowing the direct connection and protection of the supply wires (26) to said electric terminals (21).

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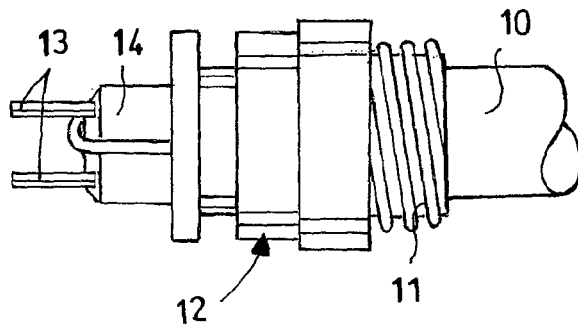


Fig. 1

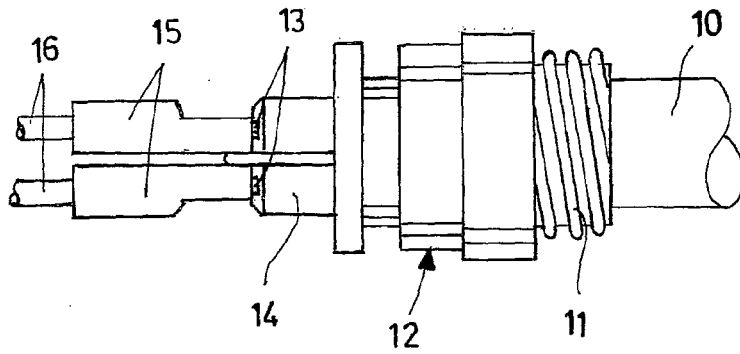


Fig. 2

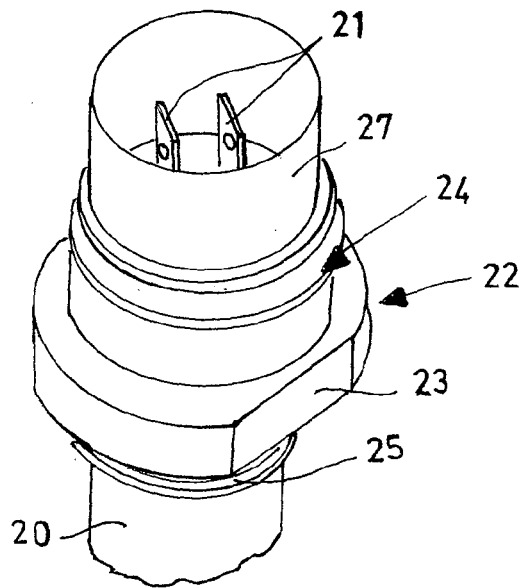


Fig. 4

Fig. 3

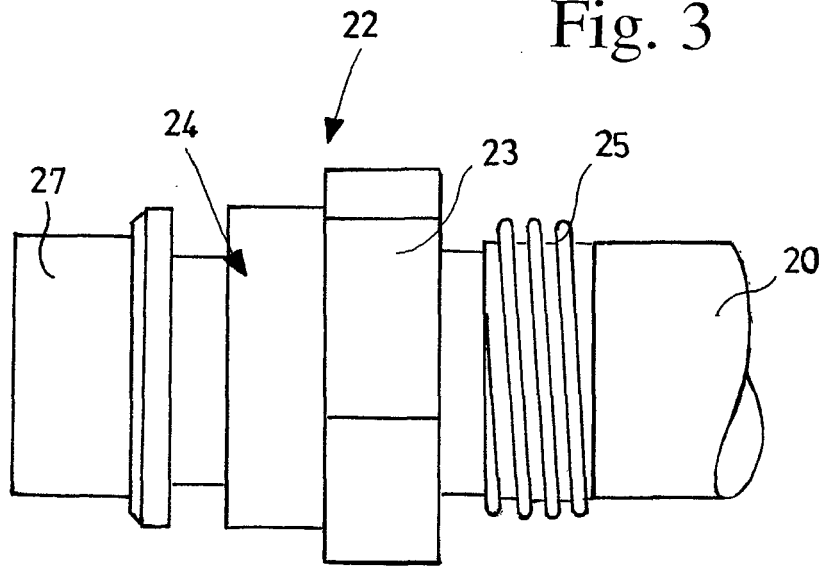
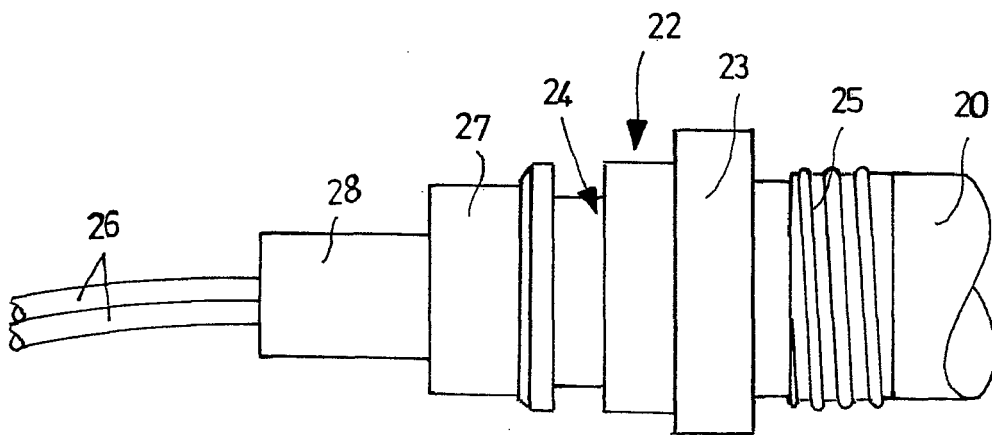


Fig. 5





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 3 769 493 A (ZEITLIN E,US ET AL) 30 October 1973 (1973-10-30) * the whole document *	1-7	INV. H05B3/06 H05B3/80
Y	DE 15 40 988 A1 (NEUERER,HANS) 29 January 1970 (1970-01-29) * the whole document *	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			H05B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		24 April 2007	TACCOEN, J
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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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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24-04-2007

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82