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(71) Applicant: **HT S.p.A.**
31058 Susegana (TV) (IT)

(72) Inventor: **DALL'ANESE, Costante**
31058, SUSEGANA (Treviso) (IT)

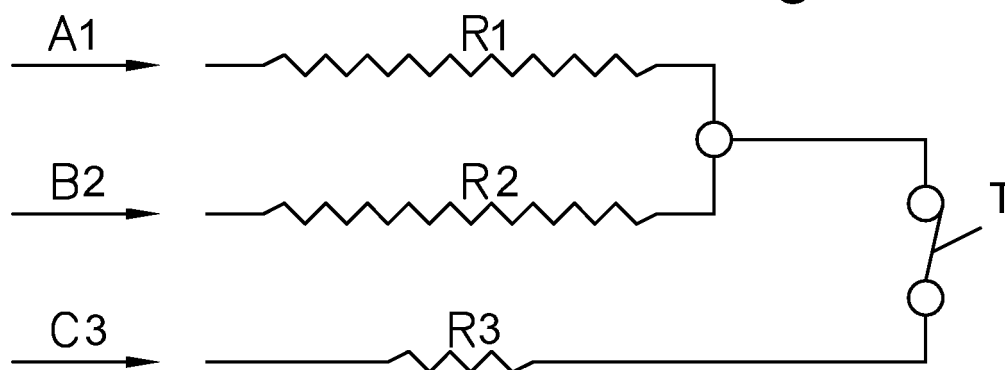
(74) Representative: **Coppo, Alessandro et al**
Ing. Barzanò & Zanardo Milano S.p.A.,
Via Borgonuovo, 10
20121 Milano (IT)

(54) **Improved electric circuit for the supply of thermal power, in particular for radiators**

(57) An improved electric circuit for the supply of thermal power, which can be used in particular for electric radiators, comprising at least two resistor elements (R1, R2), positioned in parallel, connected, in turn, in series to a further resistor element (R3) and closed on a switch device, such as a thermostat and/or thermo-fuse (T); the resistor elements (R1, R2) and the thermostat and/or

thermo-fuse (T) are contained inside a single heating unit having a tubular structure. It is therefore possible to use a double electric circuit, thus allowing an increase in the thermal power supplied, with the same length of the circuit, and reducing the heating times. The commutation between the two types of circuit is effected by means of a commutator of the manual type, such as a switch, or of the automatic type, such as an electronic pilot circuit.

Fig. 2



Description

[0001] The present invention relates to an improved electric circuit for the supply of thermal power, which can be used, in general, for any means capable of dissipating heat and, in particular, for electric radiators.

[0002] More specifically, the invention relates to an improved electric circuit, whereby it is possible to increase the thermal power to be supplied and therefore reduce the heating times, with respect to traditional solutions, with the same length of circuit; the electric device according to the invention thus improves, in a simple and functional manner, the operating conditions of a typical resistance generally used in electric radiators or towel-heaters.

[0003] It is known that in electrically fed appliances for the production of heat, such as portable electric radiators, or wall radiators (towel-heaters), an electric immersion resistance is used as heating element, normally positioned inside one of the columns of the radiator, immersed in the fluid (water and/or oil), which represents the propagation and diffusion means of the thermal power (heat) which is available and developed.

[0004] The correct functioning of the electric resistance is normally controlled by at least one thermostat and/or thermo-fuse, which intervenes when the temperature of the fluid is in excess with respect to a pre-established threshold value, by interrupting the electric power supply until the temperature of the fluid decreases to lower values.

[0005] The thermostat is normally assembled in the body also containing the heating element (usually consisting of a resistor or resistive coil) and is positioned at a certain distance from the resistor, so that the operating temperature of the fluid can be measured, without alterations due to the direct action of the heating element.

[0006] In most operating conditions, this thermostat-regulation system works correctly and the heat exchangers controlled do not in fact require particular maintenance or attention.

[0007] Due to the overheating of the resistance, however, it is not possible to supply thermal power over a certain limit, at the same time maintaining a certain length of the electric circuit which provides said power (i.e. considering the limited housing spaces of the above circuit inside the structure of an electric radiator, whether it be portable, of the wall or radiating plate type).

[0008] An objective of the present invention is therefore, in general, to provide an improved electric circuit for the supply of thermal power, in particular for radiators, which allows the thermal power available to be increased, with respect to the traditional structures, with the same length of circuit, avoiding any possibility of overheating of the resistance and thus guaranteeing the maximum safety of the plant.

[0009] A further objective of the present invention is to provide an improved electric circuit for the supply of thermal power, in particular for radiators, which allows the

heating times to be reduced with respect to the traditional structures, with the same electric parameters and dimensioning of the circuit.

[0010] Another objective of the invention is to provide an improved electric circuit for the supply of thermal power, in particular for radiators, which is particularly efficient and reliable and suitable for effectively dissipating the heat produced by the resistive element contained inside the tubular structure of the resistance assembled inside the radiator.

[0011] An additional objective of the invention is to provide an improved electric circuit for the supply of thermal power, in particular for radiators, which allows the production and running costs to be limited with respect to the known art.

[0012] These objectives are achieved by an improved electric circuit for the supply of thermal power, in particular for radiators, according to claim 1 enclosed; other technical characteristics are contained in the dependent claims.

[0013] The electric pilot circuit, according to the present invention, advantageously uses a commuting device (electronic or manual), to allow the circuit to be used for the supply of a nominal thermal power value and, alternatively, for the supply of a higher value, up to a maximum value, of thermal power which can be supplied.

[0014] Further objectives, characteristics and advantages of the present invention will appear more evident from the following description, referring to a preferred embodiment provided for purely illustrative and preferred, but non-limiting, purposes and from the enclosed drawings, in which:

- figure 1 shows a schematic view of an electric circuit for the supply of thermal power, in particular for radiators, produced according to the known art;
- figure 2 is a schematic view of an improved electric circuit for the supply of thermal power, in particular for radiators, produced according to the invention.

[0015] With particular reference to figure 1 enclosed, which shows an electric circuit for the supply of electric power, of the traditional type, fed by a central supply current and voltage, R indicates generic resistor elements, situated on the respective circuit branches A and B, whereas T generically indicates a switch device, such as a thermostat, suitable for activating or deactivating the electric current supply in relation to the pre-established operating temperature value.

[0016] The circuit is normally inserted in a column of the radiator or electric towel-heater, in which a certain fluid flows (water and/or oil) and is fed by the central power supply with the control of the thermostat T.

[0017] Furthermore, each resistor element R can be produced in different materials, which have a sufficiently high resistivity, or in PTC, whose resistance has a positive temperature coefficient, in order to ensure controlled

current intensity inside the heating tubular element of the electric radiator, following the intervention of the bimetallic switch of the thermostat T.

[0018] With particular reference to figure 2 enclosed, which shows a particular type of electric circuit for the supply of thermal power, in particular for radiators, produced according to the present invention, R1, R2, R3 indicate relative resistor elements, positioned on the respective branches A1, B2, C3 of the electric circuit.

[0019] In particular, the resistor elements R1 and R2 are positioned in parallel to each other and the resistor element R3 is situated in series with the above parallel circuit; furthermore, the parallel circuit formed by the resistor elements R1, R2 and the resistor element R3, are connected to a switch device, such as a thermostat and/or thermofuse T.

[0020] The resistor elements R1, R2 and the thermostat and/or thermofuse T are contained inside a single heating element having a tubular structure.

[0021] The type of electric circuit, such as that shown in figure 2, according to the present invention, allows two different powers to be obtained, according to the connection procedure and preselected resistance values for each resistor R1, R2, R3 (preferably, $R1=R2=2 \cdot R3$).

[0022] In particular, a first connection procedure can allow the connection of the electric circuit made up of branches A1 and C3 on the thermostat T, whereas a second connection procedure can allow the electric circuit made up of branches A1+B2 and C3, connected to the thermostat T, to be obtained.

[0023] In this way, it is possible to obtain two different powers at the outlet (a nominal power and a maximum power, respectively), which can be evaluated according to the type of application and demands of the single users.

[0024] The commutation from maximum power to nominal power can be effected using a manual commutating device, such as a switch, or automatic, such as an electronic pilot circuit.

[0025] The double electric circuit described therefore allows the construction of a double power resistance; in this way, with respect to standard resistances, constructed with a single electric circuit, it is possible to increase the thermal power available, with the same length of circuit, thus reducing the heating times.

[0026] The characteristics of the improved electric circuit for the supply of thermal power, in particular for radiators, object of the present invention, appear evident from the description, as also its advantages.

[0027] Finally, it is evident that numerous other variants can be applied to the electric circuit 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 demands and can be substituted by other technically equivalent alternatives.

Claims

1. An improved electric circuit for the supply of thermal power, which can be used in particular for electric radiators, comprising at least a first resistor element (R1), connected in series to at least one switch device (T), suitable for activating or deactivating the electric current supply in relation to an operating temperature value, and to at least a second resistor element (R3), **characterized in that** said first resistor element (R1) is also connected in parallel to at least a third resistor element (R2), said parallel circuit being positioned in series with said switch device (T) and with said second resistor element (R3), so that it is possible to use a double electric circuit and therefore increase the thermal power supplied, with respect to traditional electric circuits, with the same length of circuit, said resistor elements (R1, R2, R3) and said switch device (T) being contained inside a single heating element.
2. The improved electric circuit according to claim 1, **characterized in that** said heating element has a tubular structure.
3. The improved electric circuit according to claim 1, **characterized in that** said resistor elements (R1, R2, R3) are made of different materials, with a sufficiently high resistivity, or of PTC, whose resistance has a positive temperature coefficient, so as to ensure a controlled current intensity, following the intervention of said switch device (T).
4. The improved electric circuit according to claim 1, **characterized in that**, in a first functioning procedure, whereby a nominal thermal power value can be supplied, the circuit branch (A1) comprising said first resistor element (R1) is connected in series to the circuit branch (C3) comprising said second resistor element (R3).
5. The improved electric circuit according to claim 1, **characterized in that**, in a second functioning procedure, whereby a maximum thermal power value can be supplied, the circuit branch (A1) comprising said first resistor element (R1) is connected in parallel to the circuit branch (B2) comprising said third resistor element (R2) and the circuit branch comprising said resistors (R1, R2) connected in parallel, is connected in series to the circuit branch (C3) comprising said second resistor element (R3).
6. The improved electric circuit according to claim 1, **characterized in that** it envisages at least one commutating device, suitable for commutating the electric connections of the circuit between at least two different types of circuit.

7. The improved electric circuit according to claim 6, **characterized in that** said commutating device is of the manual type, such as a switch, or of the automatic type, such as an electronic pilot circuit.

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Fig. 1
Prior Art

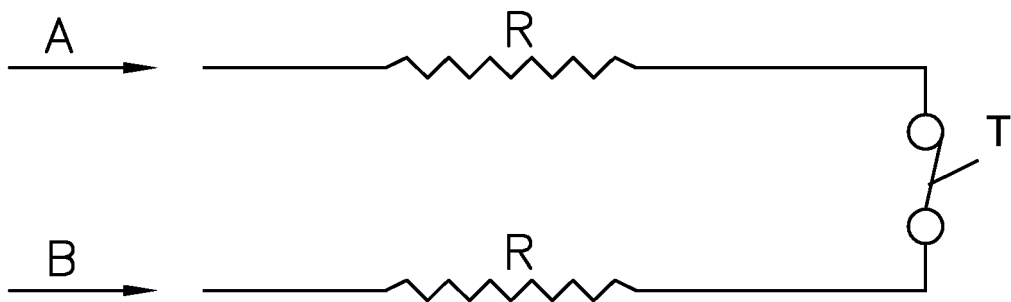
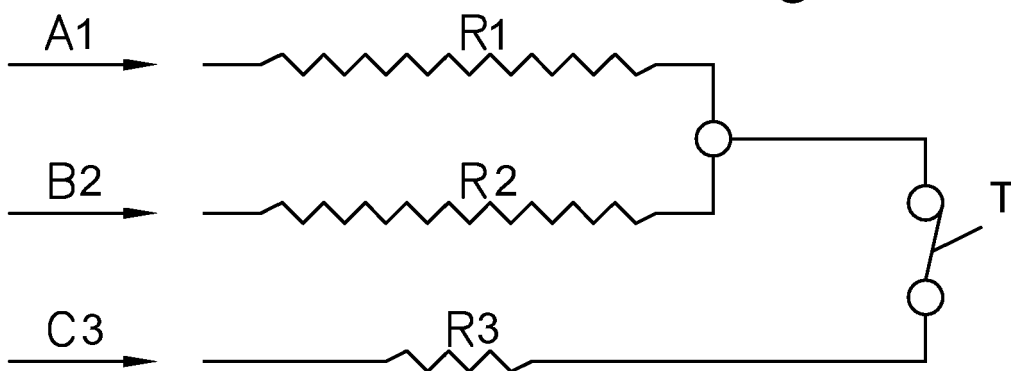


Fig. 2





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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	----- "The circuit"[Online] July 1997 (1997-07), XP002378219 Retrieved from the Internet: URL:http://library.thinkquest.org/10796/ch 14/ch14.htm> [retrieved on 2006-04-24] * the whole document *	1,4,5	
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			TECHNICAL FIELDS SEARCHED (IPC)
			F24H F24C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 27 March 2007	Examiner van Gestel, Harrie
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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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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