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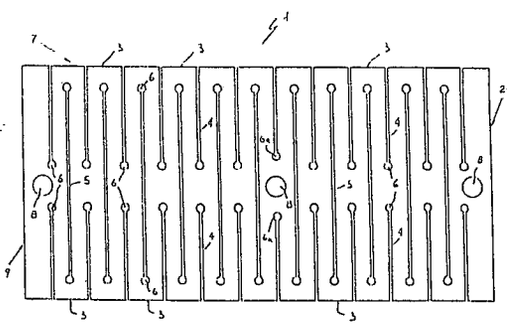
The title of the invention has been amended (Guidelines for Examination in the EPO, A-III, 7.3).

(54) Electric power resistor.

(57) The electric power resistor (1) particularly usable for electric resistances in general comprises a metallic plate (2) which has a plurality of cutouts (4,5) defining a plurality of non-encapsulated and mutually co-planar coils (3); the cutouts are arranged symmetrically with respect to the metallic plate and have, at their ends, an expanded region (6) having a substantially circular configuration adapted to allow an increase in the cross section affected by the flow of current between one coil and the next, drastically reducing the temperature of the so-called "hotpoints" together with the uniform longitudinal expansion of said metallic plate.



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Description

ELECTRIC POWER RESISTOR PARTICULARLY USABLE FOR ELECTRIC RESISTANCES IN GENERAL

As is known, in power resistors the resistive electric element is generally defined by a metallic plate or grid constituted by a plurality of cutouts in turn defining a plurality of coils which increase the length of the resistive path without changing its dimensions and therefore determine the value of the electrical resistance of the resistor.

In electric power resistors, in order to obtain the range of ohmic values required by the technical design of the systems which employ them, it is necessary to considerably increase the number of coils, the cross section whereof decreases proportionally for an equal thickness.

Obviously from the above it is easily understandable that the metallic plate becomes increasingly mechanically weak and practically unusable if not conveniently reinforced.

It is furthermore important to consider the fact that resistors often reach high temperatures as the balance between the heat produced during each second and the heat simultaneously released by the surface of the resistor to the outer environment is no longer maintained.

The temperature increase of the resistor, which causes the expansion of the material which composes it, determines the disadvantage that the coils, by deformating, may make mutual contact, causing a short circuit which disables the resistor, with the consequence of inactivating the entire circuit to which it belongs.

In order to solve the problem of the stiffening and non-deformability of the metallic plate of the resistor, various solutions have been attempted, such as e.g. stiffening the coils with ridges or encapsulating them with lateral reinforcement elements which mechanically strengthen the grid and reduce the phenomenon of deformation when high temperatures are reached.

These solutions, though they considerably improve the operation of the resistors, entail, especially in particular conditions of use and orientation of the resistor in use, the deposition of dirt, dust and/or water or other matter on the step determined by the reinforcement elements which encapsulate the coils and the metallic plate or grid. This fact is extremely dangerous, since a loss of insulation between one or more coils often occurs, thus producing a short circuit which, as in the case of deformation of the coils, disables the resistor.

The aim proposed by the present invention is to eliminate the disadvantages described above by providing an electric power resistor particularly usable for electric resistances in general which is capable of working without trouble even at high temperatures without being subject to short circuits which cause the interruption of the operation of the electric circuit in which it is interposed and without having reinforcement elements which encapsulate the coils.

Within this aim, an important object of the invention is to provide an electric power resistor the grid whereof is adapted to excellently withstand electric power overloads during its operation.

Not least object of the invention is to provide an electric power resistor which has optimum operation even if subject to any vibrations due to external factors.

This aim, as well as these and other objects, are achieved by an electric power resistor particularly usable for electric resistances in general, comprising a metallic plate having a plurality of cutouts defining a plurality of non-encapsulated and co-planar coils, characterized in that said cutouts are arranged symmetrically on said metallic plate and have, at their ends, an expanded region having a substantially circular configuration adapted to allow an increase in the cross section affected by the flow of the current between one coil and the next, drastically reducing the temperature of the so-called "hotpoints", together with the uniform longitudinal expansion of said plate.

Further characteristics and advantages of the invention will become apparent from the description of a preferred but not exclusive embodiment of the electric power resistor particularly usable for electric resistances in general according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

the only figure is a plan view of the electric power resistor illustrating the symmetrical arrangement of the cutouts on its surface according to the invention.

With reference to the single described figure, the electric power resistor according to the invention, generally indicated by the reference numeral 1, comprises a metallic plate, generally indicated by the reference numeral 2, having a plurality of cutouts defining a plurality of coils 3 which are advantageously not encapsulated and are mutually co-planar.

More in detail, the plurality of mutually equidistant cutouts comprises a first set of cutouts and a second set of cutouts respectively indicated by the reference numerals 4 and 5.

Both the first set of cutouts 4 and the second set of cutouts 5 have, at their ends, an expanded region 6 having a substantially circular configuration, adapted to allow an increase in the cross section affected by the flow of current between one coil and the next so as to allow, in the so-called "hotpoints", a drastic decrease in temperature.

The expanded regions 6 furthermore advantageously allow a uniform longitudinal expansion of the metallic plate 2 since their arrangement, together with the arrangement of the cutouts 4 and 5 on the metallic plate, determines a configuration which allows equal elasticity in expansion and displacement for each coil.

The first set of cutouts 4 extends from the longest edges 7 of the metallic plate towards the interior thereof and each cutout has, at its facing ends, the expanded region 6.

The second set of cutouts 5 is instead defined in a

substantially central region of the metallic plate and has the expanded region 6 at both ends.

The expanded regions 6 of the cutouts of the first set 4 and of the second set 5 are conveniently all mutually aligned except for the expanded regions 6a which are proximate to, and aligned with, at least one hole 8, not an end one, adapted for one or more central stiffenings of the metallic plate, according to its longitudinal extension, adapted to prevent its concave or convex deformation during its operation.

More precisely, the expanded regions 6a aligned with the holes 8 are spaced from each of said holes by an extent equal to half the distance occurring between two expanded regions 6 of two aligned cutouts 4 in the absence of holes 8.

It should be furthermore specified that the expanded regions 6 of the cutouts 5 are spaced from the edges 7 of the metallic plate by an amount which is substantially equal to half the spacing of the facing expanded regions 6 of the cutouts 4.

In practice it has been observed that the electric power resistor, particularly usable for resistances in general, is particularly advantageous in that it allows a uniform longitudinal expansion of the coils, allowing the latter to remain mutually co-planar without having to be encapsulated in reinforcement elements and therefore in that it prevents the occurrence, also due to these last, of a contact between coils which would cause a short circuit which would disable said resistor.

The invention thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept; furthermore all the details may be replaced with other technically equivalent elements.

In practice, the materials employed, as well as the dimensions, may be any according to the requirements and to the state of the art.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Electric power resistor (1) particularly usable for electric resistances in general, comprising a metallic plate (2) having a plurality of cutouts (4,5) defining a plurality of non-encapsulated and mutually co-planar coils (3), characterized in that said cutouts (4,5) are arranged symmetrically on said metallic plate and have, at their ends, an expanded region (6) having a substantially circular configuration adapted to allow an increase in the cross section affected by the flow of current between one coil and the next, drastically reducing the temperature of the so-called "hotpoints" together with the uniform longitudinal expansion of said metallic plate.

2. Electric power resistor according to claim 1, characterized in that said plurality of mutually equidistant cutouts comprises a first set of cutouts and a second set of cutouts (4,5), said first set of cutouts (4) extending parallel to one another from the longest edges (7) of said plate towards the interior thereof and having said expanded regions (6) at their facing ends.

3. Electric power resistor according to claims 1 and 2, characterized in that said second set of cutouts (5) has said expanded regions (6) at both opposite ends.

4. Electric power resistor according to one or more of the preceding claims, characterized in that said expanded regions of said first set of cutouts and of said second set of cutouts are respectively mutually aligned.

5. Electric power resistor according to one or more of the preceding claims, characterized in that it comprises, in a portion comprised between said expanded regions of said first set of cutouts (4), at least one hole (8) for a central stiffening element.

6. Electric power resistor according to one or more of the preceding claims, characterized in that said expanded regions (6a) of said first set of cutouts (4) aligned with said at least one hole are spaced therefrom by an extent substantially equal to half the spacing of said aligned expanded regions of the remaining cutouts of said first assembly.

7. Electric power resistor according to one or more of the preceding claims, characterized in that said expanded regions (6) of said second set of cutouts (5) have a distance from said longest edges of said metallic plate which is substantially identical to the spacing of said aligned expanded regions of said cutouts of said first set.

8. Electric power resistor according to one or more of the preceding claims, characterized in that said plurality of cutouts starts from the shortest edges (9) of said plate with said first set of cutouts.

9. Electric power resistor particularly usable for electric resistances in general, characterized in that it comprises one or more of the described and/or illustrated characteristics.

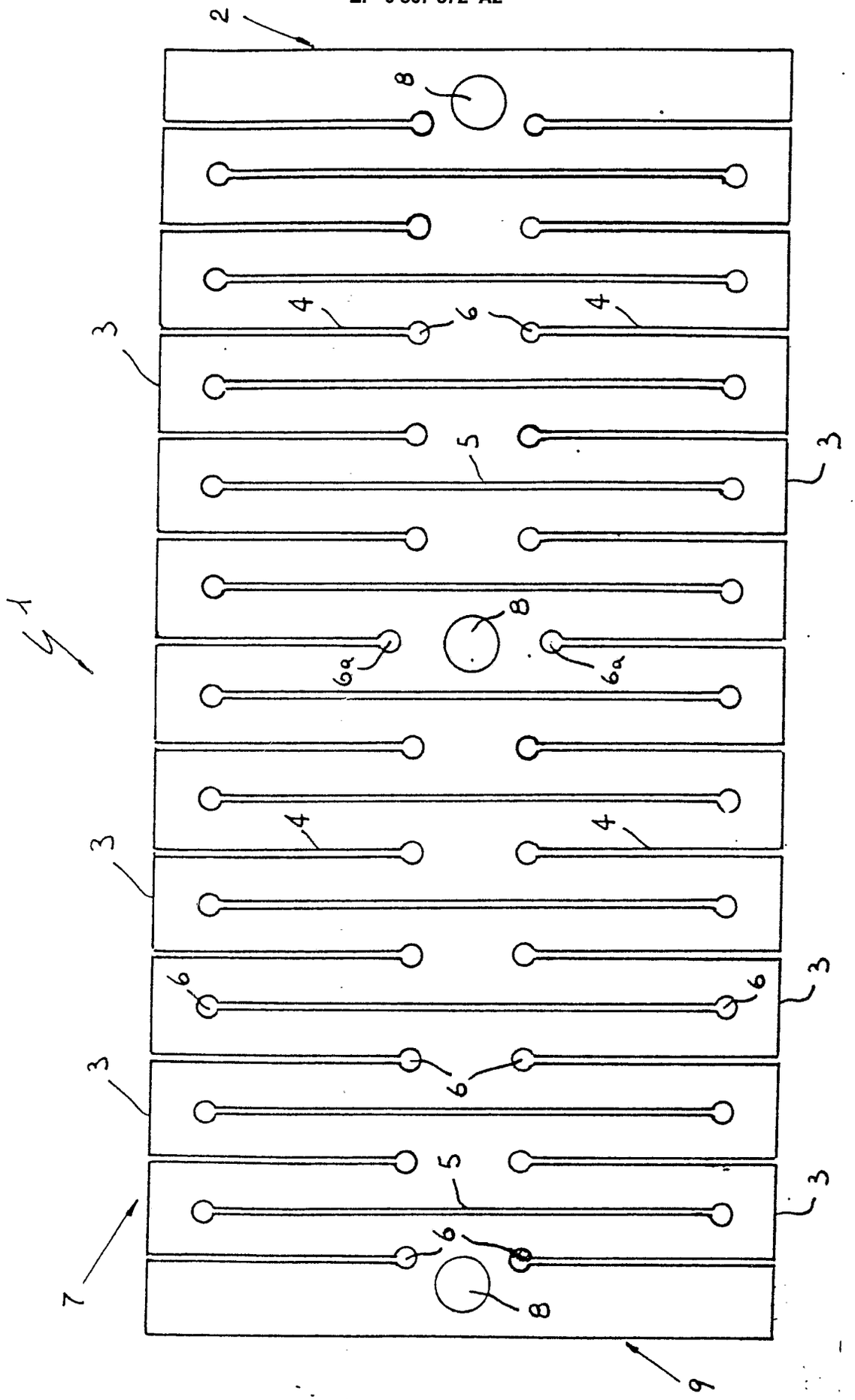

Fig 1