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(11)

EP 1 731 080 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.12.2006 Bulletin 2006/50

(51) Int Cl.:
A47L 15/42 (2006.01)

(21) Application number: 05425371.1

(22) Date of filing: 26.05.2005

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
AL BA HR LV MK YU

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(54) Device for heating water, in particular in a dishwasher

(57) A device for heating water, in particular in a dishwasher, includes a flat resistor (2) placed in contact with the outside of the tank bottom (1) and coated with two insulating layers of mica, a sheet (3) of silicone rubber arranged on said resistor (2), and a rigid metal bracket (4) suitable to block these two members (2, 3) by securing them on the tank bottom (1) at a plurality of points. This

device can have different shapes depending on the needs of the user, and therefore it can be arranged both on the tank bottom and also at other positions (e.g. on the side or back walls of the tank, on the door, etc.) always with a very small space requirement, and its production and application is very simple and easily automated, which results in significant savings in manufacturing the machine to which it is applied.

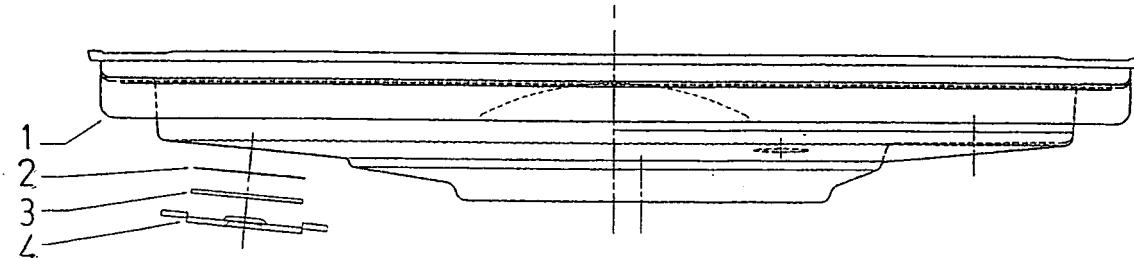


Fig. 1

Description

[0001] The present invention relates to devices for heating water, and in particular to a device typically used in dishwashers. Reference will be made hereafter to a dishwasher, while being clear that what is said can also be applied to a washing machine or to other types of similar machines.

[0002] It is known that all dishwashers are provided with a resistor in order to heat the water used for the washing cycle, said resistor being usually arranged inside the washing tank. However, other solutions are known such as a resistor spiral-wound around a metallic tube wherein the water flows, or applied to the volute of the washing pump or inside a water pipe.

[0003] All these known heating devices have a certain degree of bulkiness, cost and complexity.

[0004] Therefore the object of the present invention is to provide a heating device that overcomes the above-mentioned drawbacks.

[0005] This object is achieved by means of a heating device including a flat resistor coated by two insulating layers of mica, said resistor being secured on the outside of the tank bottom or the like by means of a sheet of silicone rubber and a rigid metal bracket.

[0006] The main advantage of the device according to the present invention is that it can have different shapes depending on the needs of the user, and therefore it can be arranged both on the tank bottom, as illustrated hereafter, and also at other positions such as on the side or back walls of the tank, on the door, etc. always with a very small space requirement.

[0007] Another advantage stems from the fact that the production and application of said device is substantially very simple and easily automated, which results in significant savings in manufacturing the machine to which it is applied.

[0008] These and other advantages and characteristics of the device according to the present invention will be clear to those skilled in the art from the following detailed description of an embodiment thereof, with reference to the annexed drawings wherein:

Fig.1 is a diagrammatic front view of the above-mentioned device applied on the outside of the tank bottom of a dishwasher;

Fig.2 is a diagrammatic top plan view of the device of fig. 1 applied on the tank bottom; and

Figs.3, 4 and 5 are perspective views of the members that make up the device.

[0009] With reference to said figures, there is seen that a heating device according to the present invention is applied on the outside of the tank bottom 1 of a dishwasher and includes a flat resistor 2, a sheet of silicone rubber 3 and a rigid metal bracket 4 to secure these two members on the tank bottom 1.

[0010] It should be noted that a fundamental necessity

for the type of resistor 2 used in this device (coated with two layers of mica) is that of being constantly kept pressed, in that the lack of compression of the surfaces leads to the breaking of the resistor.

[0011] To this purpose, resistor 2 is placed in contact with the tank bottom 1, then a sheet 3 of silicone rubber (or of other resilient material with heat and electric insulation capacity) is arranged thereon and the assembly is blocked by a rigid metal bracket 4 secured to the tank bottom 1, e.g. through weld or clinch spots 5 whose position is indicated by broken circles.

[0012] In this way, resistor 2 is pressed between the tank bottom 1 and the rubber sheet 3, that is in turn pushed by the rigid metal bracket 4. An effective compression, and therefore the correct operation of resistor 2, is guaranteed by the fact that possible small deformations of the tank bottom 1, usually very thin, are compensated for thanks to the resilience of the rubber sheet 3 that acts as a spring.

[0013] Said sheet 3 also performs a second heat insulation function, namely it prevents the heat from being dispersed outwards, so that all the heat generated by resistor 2 is transmitted to the tank bottom 1 and therefore to the washing water flowing thereon.

[0014] Since the securing of bracket 4 to the tank bottom 1 requires a direct contact between said members, resistor 2 and rubber sheet 3 are preferably provided with respective apertures 6, 6' to allow the securing of bracket 4 also at a central position. Moreover, resistor 2 is powered through suitable electrical connections 7 and a safety thermostat is usually connected thereto, whereby rubber sheet 3 and bracket 4 are preferably provided with respective apertures 8, 8' to house said thermostat. Finally, bracket 4 is provided with inner projections 9 to reach contact with the tank bottom 1 at the above-mentioned securing points 5.

[0015] It is clear that the above-described and illustrated embodiment of the device according to the invention is just an example susceptible of various modifications.

[0016] In particular, size and shape of the members making up the device may be changed according to specific needs while retaining the above-mentioned arrangement, and the securing of bracket 4 may be achieved through other known means (e.g. threaded pegs welded on the tank bottom, glueing, etc.) as long as such means are suitable to perform a rigid connection that provides the necessary compression.

50 Claims

1. A device for heating water, **characterized in that** it includes a first member consisting of a flat resistor (2) coated with two insulating layers of mica and shaped so as to be placed in contact with a metal support surface, a second member consisting of a sheet (3) of resilient material with heat and electric insulation capacity arranged on said resistor (2), and

a third member consisting of a rigid metal bracket (4) suitable to block said first two members (2, 3) by securing them on said metal support surface through securing means suitable to perform a rigid connection. 5

2. A heating device according to claim 1, **characterized in that** said sheet (3) is a sheet of silicone rubber. 10

3. A heating device according to claim 1 or 2, **characterized in that** the means for securing the rigid metal bracket (4) on the metal support surface are weld or clinch spots (5) achieved at inner projections (9) formed on said bracket (4). 15

4. A heating device according to one or more of the preceding claims, **characterized in that** the resistor (2) and the sheet (3) are provided with respective apertures (6, 6') suitable to allow the securing of the bracket also at a central position. 20

5. A heating device according to one or more of the preceding claims, **characterized in that** the sheet (3) and the bracket (4) are provided with respective apertures (8, 8') suitable to allow the housing of a safety thermostat applied to the resistor (2). 25

6. A dishwasher **characterized in that** it includes a heating device according to one or more of the preceding claims. 30

7. A dishwasher according to claim 6, **characterized in that** said heating device is arranged on the outside of the bottom (1) of the washing tank. 35

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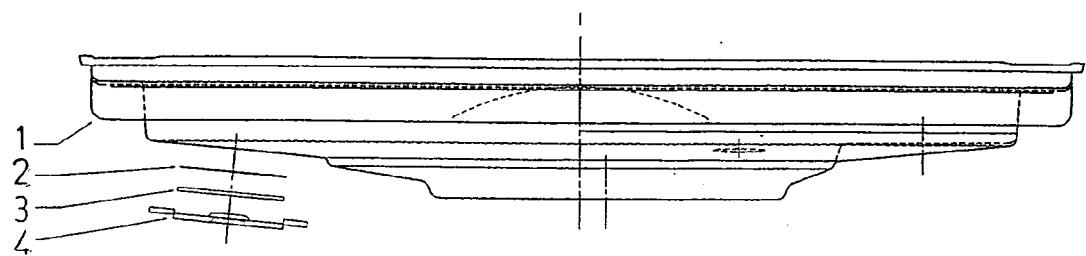


Fig. 1

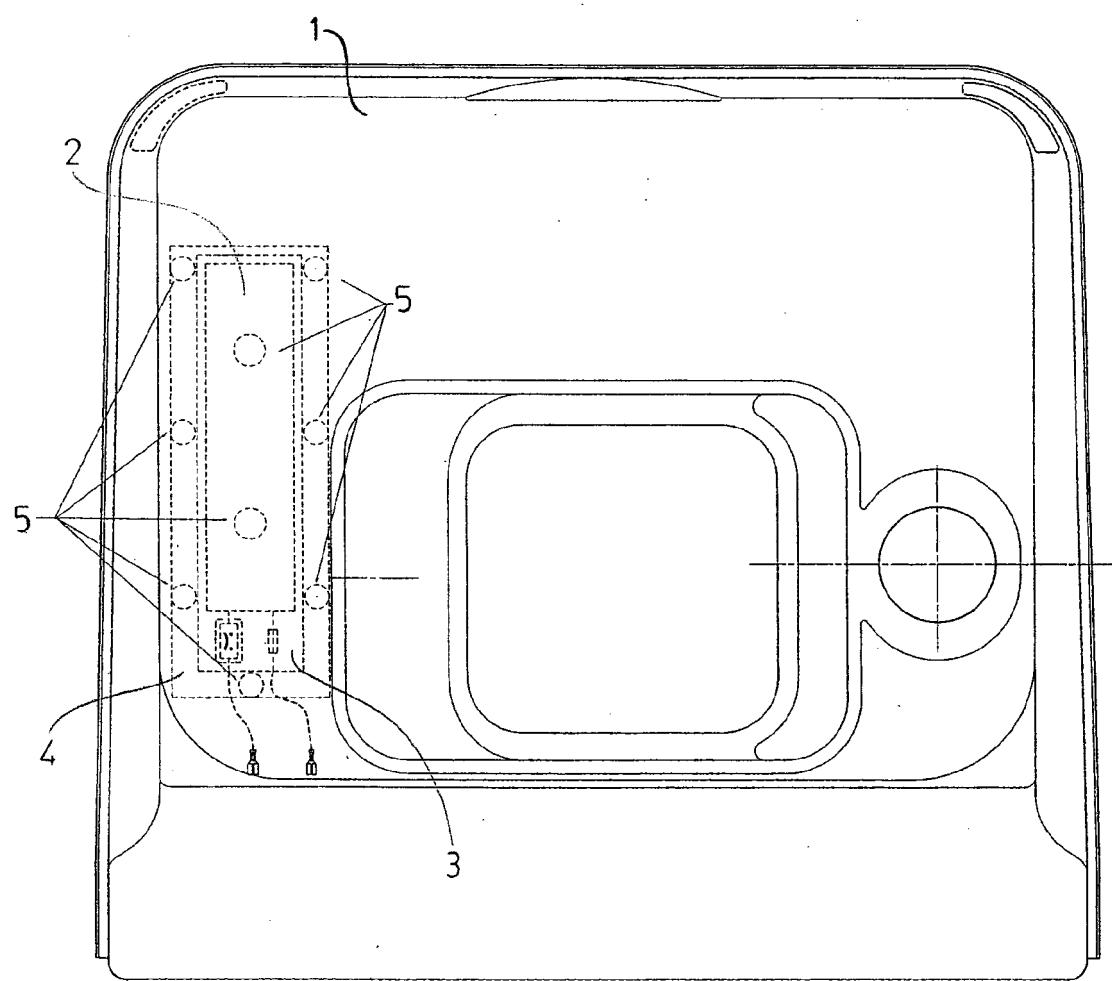


Fig. 2

Fig. 3

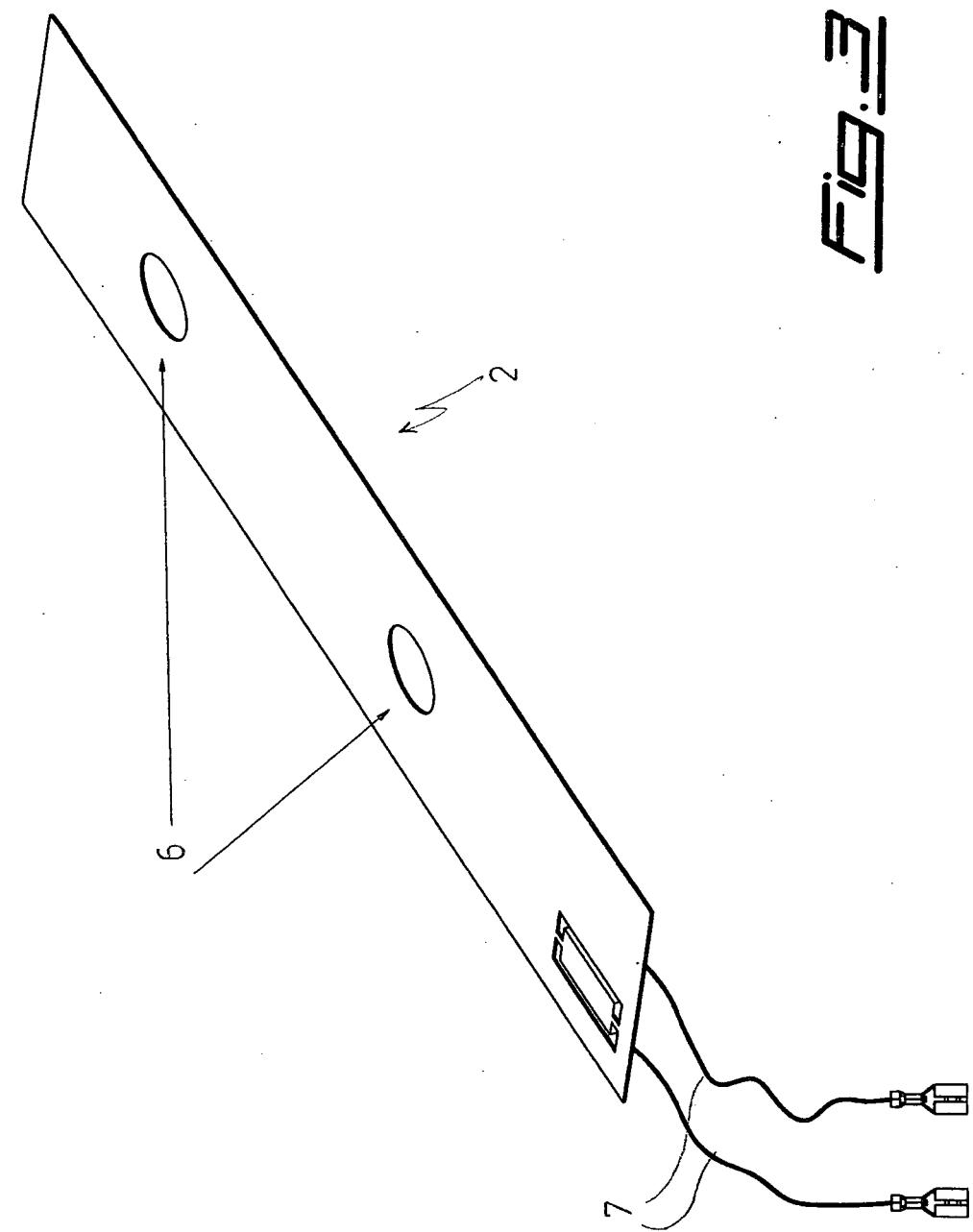


Fig. 4

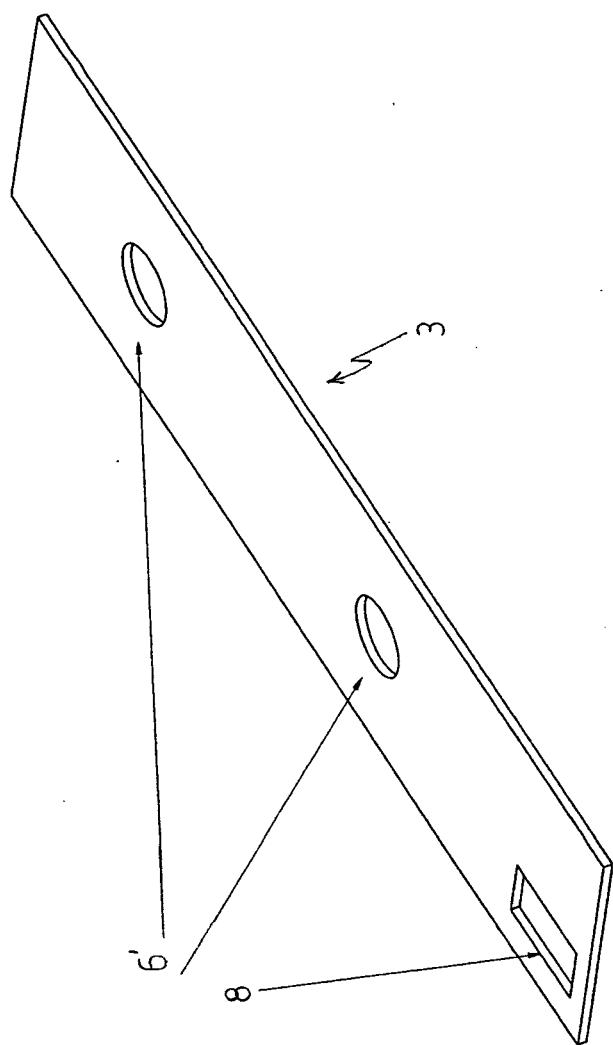
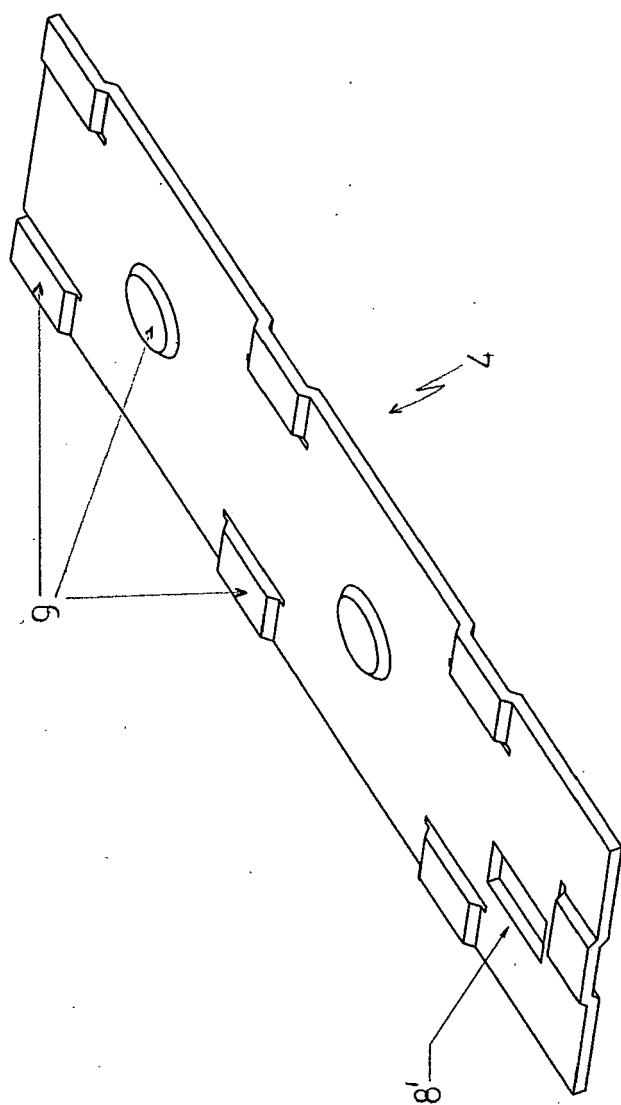


FIG. 5





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Category	Citation of document with indication, where appropriate, of relevant passages			
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The present search report has been drawn up for all claims				
1	Place of search Munich	Date of completion of the search 21 October 2005	Examiner Redelsperger, C	
CATEGORY OF CITED DOCUMENTS		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		
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				

**ANNEX TO THE EUROPEAN SEARCH REPORT
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