



Europäisches Patentamt
 European Patent Office
 Office européen des brevets



(11) **EP 0 906 984 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication: **07.04.1999 Bulletin 1999/14** (51) Int. Cl.⁶: **D06F 39/04, A47L 15/42**

(21) Application number: **98117655.5**

(22) Date of filing: **17.09.1998**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
 MC NL PT SE**
 Designated Extension States:
AL LT LV MK RO SI

(72) Inventors:
 • **Capraro, Duilio**
 c/o I.R.C.A. S.P.A.
 31020 San Vendemiano (IT)
 • **Colombo, Roberto**
 c/o I.R.C.A. S.P.A.
 31020 San Vendemiano (IT)

(30) Priority: **01.10.1997 IT VE970042**

(74) Representative: **Piovesana, Paolo**
 Corso del Popolo, 70
 30172 Venezia-Mestre (IT)

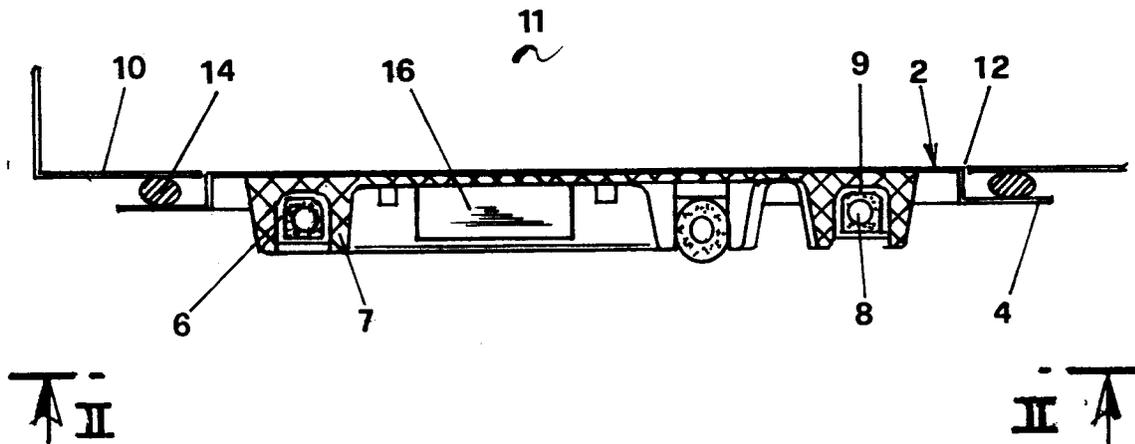
(71) Applicant:
I.R.C.A. S.p.a. Industria Resistenze
Corazzate e Affini
31020 San Vendemiano (Treviso) (IT)

(54) **Heating element for household electrical appliances**

(57) A heating element for household electrical appliances, characterised by comprising a flanged plate (2) which is fixed to one of the walls (10) of the wash tub in a corresponding aperture (12) formed therein, and is

provided on that surface not facing the tub interior with a resistive element (8).

FIG.1



EP 0 906 984 A1

Description

[0001] This invention relates to a heating element for household electrical appliances.

[0002] In a known household electrical appliances in which the operating cycle comprises a wash stage with previously heated water, this heating is achieved by an armoured resistance element housed in the lower part of the appliance. During operation the water is circulated through a suitable user circuit to be heated to the correct temperature.

[0003] In the case of dishwashers the resistance element is mounted on the base of the wash tub and is supported by support elements.

[0004] This arrangement has certain drawbacks, and in particular:

- an unpleasant appearance,
- possible corrosion of the sheath in contact with the detergent.

[0005] In the case of washing machines the resistance element is positioned to project between the tub and the rotary drum.

[0006] This arrangement also has certain drawbacks, and in particular:

- if the tub is of steel it requires a considerable level of water to ensure that the element is always immersed, resulting in increased absorbed energy and detergent consumption,
- if the tub is of plastic, it suffers not only from this drawback but also from the possibility of the tub melting due to overheating of the element if this operates outside the water.

[0007] To partially obviate these drawbacks it has been proposed to use a heating element comprising a spiral-wound armoured resistor with its turns embedded in a tube partly projecting from its inner surface lapped by the water, the tube being provided with two couplings for its connection to a water feed circuit, these being positioned outside the wash tub.

[0008] This arrangement has however the drawback of requiring a plurality of elements for connecting the tube to the feed circuit, with consequent seal problems.

[0009] In addition both types of heating element have the drawback of difficulty of replacement and insufficient protection against possible overheating of the element, as the sensor are generally in contact with the surface of the tub and not with the actual heating element.

[0010] All these drawbacks are eliminated according to the invention by a heating element for household electrical appliances as described in claim 1.

[0011] A preferred embodiment of the invention is further described hereinafter with reference to the accompanying drawings, on which:

Figure 1 is a longitudinal section through a heating element applied to the base of a dishwasher, and

Figure 2 is a plan view thereof from below.

[0012] As can be seen from the figures, the heating of the invention consists substantially of a steel disc 2 bent as a step along its circumferential edge, to form an annular portion 4.

[0013] Rigidly fixed to one of the disc surfaces there is a substantially flat aluminium member 6 constructed by pressing, and comprising a channel of U cross-section which extends as a curve.

[0014] Into said channel there is forcibly inserted an armoured resistance element 8 of aluminium construction housing internally a spiral resistor 9 separated from the aluminium sheath by dielectric material, for example magnesium dioxide.

[0015] The member 6 is bonded to the disc 2 by placing the steel disc in contact with a parallelepiped aluminium block, heating both and then subjecting them to the action of a press which deforms the aluminium block and at the same time bonds it to the disc.

[0016] The resistance element 8 is then pressed into the U-shaped channel 7 and consequently remains securely fixed to it.

[0017] The heating element assembled in this manner is fitted to the base 10 of the household electrical appliance 11 in which there has previously been provided a hole 12 of diameter corresponding to the diameter of the central part of the disc, and is then fixed to said base, for example by screws 13, after interposing an O-ring 14 for sealing purpose between the base and the annular rim 4.

[0018] Control sensors 16 can be advantageously housed in the space defined by the loop formed by the channel.

[0019] From the foregoing it is apparent that the heating element of the invention presents numerous advantages, and in particular:

- it eliminates any corrosion of the resistor sheath by being physically separated from the water,
- by virtue of its small thickness it reduces water and hence energy and detergent consumption, as it enables a lower water level to be used,
- its control sensor is more reliable as it can be positioned in direct contact with the heating surface,
- there is no danger of overheating in the case of plastic tubs as the resistance element is housed at the centre of the disc, which rests against the tub via its annular portion and is separated therefrom by the O-ring,
- it can be easily replaced if broken,
- it can be used as a traditional resistance element positioned outside the tub within a feed circuit by facing the disc with another corresponding disc to form a kind of tube.

[0020] In a different embodiment not shown in the drawings, the heating element consists of a disc to which a resistive track is sandwiched between two layers of dielectric paste.

[0021] It should be noted that these arrangements can also be advantageous for washing machines and washing-drying machines, they being very suitable for insertion into a drying air circuit as they can operate at a temperature exceeding 400°C.

10

Claims

1. A heating element for household electrical appliances, characterised by comprising a flanged plate (2) which is fixed to one of the walls (10) of the wash tub in a corresponding aperture (12) formed therein, and is provided on that surface not facing the tub interior with a resistive element (8). 15
2. A heating element as claimed in claim 1, characterised in that said plate is of substantially circular shape. 20
3. A heating element as claimed in claim 1, characterised in that said plate (2) is of steel construction. 25
4. A heating element as claimed in claim 2, characterised in that the plate (2) is provided along its edge with an annular step (4). 30
5. A heating element as claimed in claim 1, characterised in that the resistive element is an armoured resistance element (8). 35
6. A heating element as claimed in claim 5, characterised in that the armoured resistance element (8) is of aluminium construction and is housed in a channel (7) obtained by pressing an aluminium block, rigid with the plate. 40
7. A heating element as claimed in claim 1, characterised in that the resistive element consists of a resistive track sandwiched between two layers of dielectric material. 45
8. A heating element as claimed in claim 6, characterised in that the channel (7) is of curved extension. 50
9. A heating element as claimed in claim 8, characterised in that control sensors (16) are housed in the space bounded by the channel (7). 55

55

FIG.1

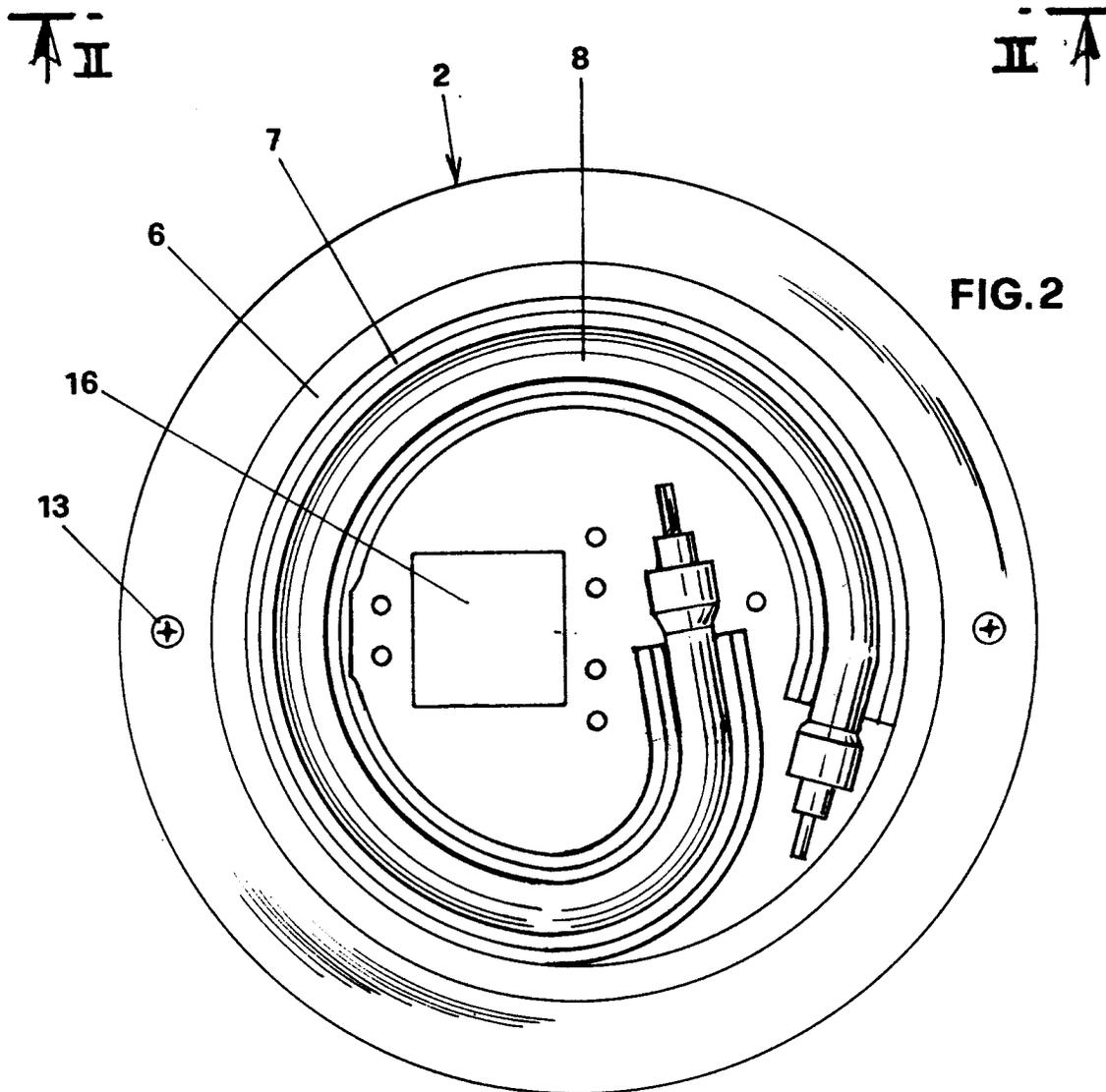
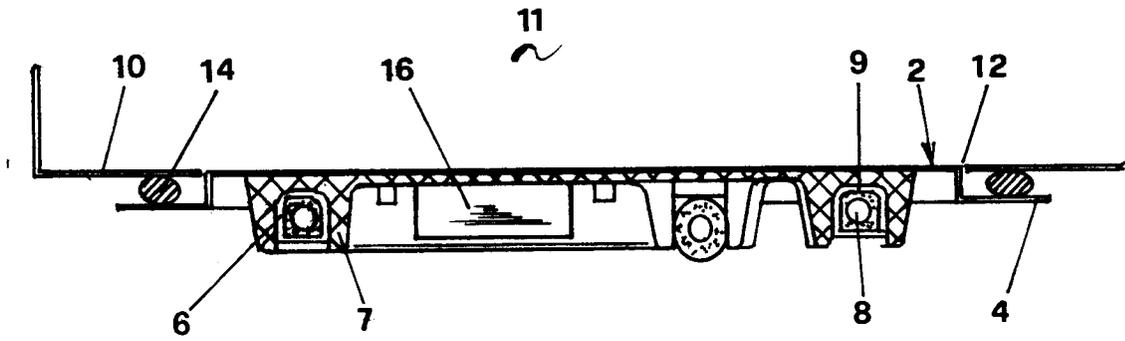


FIG.2



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 11 7655

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X A	DE 91 00 476 U (E.G.O. ELEKTRO-GERÄTE BLANC U. FISCHER) 4 April 1991 * the whole document * ---	1-5 9	D06F39/04 A47L15/42
X A	EP 0 539 917 A (BOSCH-SIEMENS HAUSGERÄTE GMBH) 5 May 1993 * the whole document * ---	1-3,5 4,9	
X A	FR 2 534 438 A (BOSCH-SIEMENS HAUSGERÄTE GMBH) 13 April 1984 * claims; figures 4,5 * ---	1-3,5 4,9	
X	DE 18 98 429 U (CONSTRUCTA-WERKE GMBH) * claims; figures * ---	1-5	
X A	DE 41 04 450 A (M. STOLL) 20 August 1992 * column 8, line 14 - line 34; figure 3 * -----	1,2,4,5 3,7	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6) D06F A47L
Place of search THE HAGUE		Date of completion of the search 12 January 1999	Examiner Courier, G
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	

EPO FORM 1503 03/82 (P04/C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 11 7655

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-01-1999

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 9100476	U	04-04-1991	NONE	
EP 539917	A	05-05-1993	DE 4135540 A DE 59207716 D ES 2098414 T	29-04-1993 30-01-1997 01-05-1997
FR 2534438	A	13-04-1984	DE 3237825 A	12-04-1984
DE 1898429	U		NONE	
DE 4104450	A	20-08-1992	NONE	