

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 683 907 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

26.07.2006 Bulletin 2006/30

(51) Int Cl.:

D06F 58/28 ^(2006.01)

(21) Application number: **05100441.4**

(22) Date of filing: **25.01.2005**

(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

(71) Applicant: **Electrolux Home Products Corporation
N.V.**

1930 Zaventem (BE)

(72) Inventor: **Sartor, Luciano**

31015 Conegliano (Treviso) (IT)

(74) Representative: **Giugni, Valter et al**

PROPRIA S.r.l.,

Via Mazzini 13

33170 Pordenone (IT)

(54) **Contact band for a moisture measuring circuit and dryer provided therewith**

(57) A contact band (1) for a moisture measuring circuit of a drying machine comprises a flexible strip (2) of an electrically conductive material, a first end (3) having at least a notch (4) and a second end (7); the contact band (1) is characterised in that the second end (7) com-

prises at least a rib (8) adapted to be inserted in the notch (4). A laundry dryer (9) comprising an improved contact band (1) is further disclosed.

EP 1 683 907 A1

Description

[0001] The present invention relates to a contact band for a moisture measuring circuit and to a dryer provided therewith.

[0002] In a laundry dryer or in the drying process of a washing/drying machine is very important to measure the degree of clothes dryness to establish the duration of the drying cycle. For this aim, a laundry dryer or a washing/drying machine is generally provided with an electric circuit for measuring the moisture content remaining in the clothes as a function of electrical conductivity or resistance.

[0003] The circuit to carry out the moisture measurement generally comprises an electrically conductive contact band supported on the annular wall of the dryer drum. The band is electrically insulated from the drum by an electrically non-conductive pad bonded to the drum and interposed intermediate the band and the drum. On the contrary, the band is electrically connected to the drum internal region where the clothes to be dried are placed by means of the vanes disposed on the drum internal surface.

[0004] A scanning arm carrying a brush is mounted on the machine cabinet such that the brush can engage the conductive band. The brush is electrically connected to a control unit which is also in contact with an electrical terminal in electrical communication with said drum internal region.

[0005] When an electrical current is supplied in the circuit it can pass through the wet clothes to be dried and the control unit can calculate the resistance and/or the conductivity of said clothes thereby determining the appropriate duration of the drying cycle.

[0006] The contact bands used in this kind of circuits is formed by a flat strip wrapped around the drum having its ends joined together. There are many ways for joining said ends. An example is shown in the Patent Application DE 19732951 A1 in which the band ends having a slant edge are joined by means of pliable joint means. This kind of junction has been found to be quite noisy in working conditions because of the periodical passage of the electrical brush from one end edge to the other. Even though the band ends are provided with a slant edge in order to make said passage less abrupt, a repetitive noise is generated because a discontinuity is always present between the two bend ends.

[0007] A further drawback of the cited contact band consists in that, even if little, a physical discontinuity is always present between the band ends and this causes the brush to chatter every time the ends pass under the brush. Brush chattering interrupts temporary and repeatedly the electric contact and the clothes moisture measurement cannot be carried out appropriately.

[0008] As a partial solution to the above mentioned problems it has been proposed to join the band ends by laser welding so that to make the bend as a single piece. Even if a reduction of the noise and a more reliable meas-

urement can be obtained this solution causes the band not to be easily dismantled from the drum when the whole dryer is assembled. In fact if a bend substitution is required the drum must be dismantled from the machine or for removing the damaged bend or for mounting the new one, being the laser welding an operation that requires appropriate equipment and that cannot be carried out during a post-sale intervention.

[0009] A further drawback of this solution is that the process of construction of a simple metallic band results complicated by the additional operation of laser welding.

[0010] It is therefore an object of the present invention to provide a contact band for a moisture measuring circuit and a dryer provided therewith avoiding the production of noise when said dryer is working.

[0011] Another object of the present invention is to provide a contact band able to ensure a reliable measurement of the clothes moisture.

[0012] A further object of the present invention is to provide a contact band easy to be mounted and dismantled without requiring the drum to be removed from the dryer cabinet.

[0013] Still another object of the present invention is to provide a contact band easy to be produced the same band preventing the wear of the electrical brush on which the band slides.

[0014] Advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objects and advantages of the invention may be realised and attained as particularly pointed out in the appended claims.

[0015] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate an embodiment of the invention and together with the description serve to explain the principles of the invention.

[0016] In the drawings:

[0017] Figure 1 shows a schematic view of the contact band according to the present invention;

[0018] Figure 2 shows a sectional view taken along the line II-II of figure 1 of an end portion of the contact band;

[0019] Figure 3 shows the contact band of figure 1 mounted on a dryer drum;

[0020] Figure 3a shows an enlarged perspective view of the particular III of figure 3;

[0021] Figure 4 shows the contact band of figure 1 in a first operative moment;

[0022] Figure 5 shows the contact band of figure 1 in a second operative moment;

[0023] In figure 1 a contact band 1 for a moisture measuring circuit is shown. According to the present invention the contact band 1 comprises a flexible strip 2 made of an electrically conductive material obtained by cutting a

metallic sheet. The strip 2 has a first end 3 provided with a notch 4 extending prevalently along the longitudinal direction of the strip 2 starting from its transversal edge 5. Since the strip 2 must be associated to a rotating drum of a laundry dryer, as it will be described in grater detail below, the contact band 1 is provided with apertures 6 through which fastening means of know type can pass.

[0024] A second end 7 of the contact band 1 has a rib 8 extending along the longitudinal direction of the strip 2. The rib 8 is formed so as to be inserted in the notch 4. Even if the embodiment presented in the attached figures shows a single rib 8 partly received within the notch 4 it is possible to provide a contact band 1 having more than one rib 8 where a corresponding number of notches 4 can be placed.

[0025] In order to join the first and the second end 3 and 7 after having wrapped the contact band 1 around a drum 12 of a dryer machine 9, as shown in figures 3 and 3a, the first end 3 comprises seats 10 that are engaged by pliable tabs 11 formed in the second end 7 of the strip 2. If desired the seats 10 can be formed on the second end 7 and the tabs 11 on the first end 3.

[0026] When the contact band 1 has been wrapped around a drum 12 of a laundry dryer 9, the two ends 3, 7 of the strip 2 are, at least partly, overlapped placing the rib 8 in the notch 4. For making the insertion of the rib 8 in the notch 4 easier and ensuring their right alignment, the contact band 1 comprises aligning means 13, preferably in the form of a plurality of lugs 14 formed on either of the first and second end 3, 7 and a corresponding number of slots 15 provided on the other of said end 3, 7 that receive the lugs 14.

[0027] The pliable tabs 11 are folded onto themselves receiving the seats (10) in-between. Folding the tabs 11 a traction is exerted on the strip 2 thereby allowing the contact band 1 to be tightly wrapped around the dryer drum 12. Further fastening means of known type will be passed through the apertures 6 and fixed on the drum 12. Said fastening means will be appropriately insulated in order not to put the band 1 in electrical contact with the drum.

[0028] Referring to figures 3 and 3a it can be seen that between the contact band 1 and the surface of the dryer drum 12 there is an electrically non-conductive pad 16 for electrically insulating the band 1 from the drum 12. The band 1 is electrically connected to the drum internal region 18 where the clothes to be dried are placed by means of the vanes 17 disposed on the drum internal surface 19, in this way an electrical current supplied to the drum 12 by means of an electrical circuit 20 passes through the wet clothes to be dried and can return to the power supplying means by the contact band 1 sliding on a brush 22. A processing unit 21 is electrically connected between the drum 12 and the brush 22 for measuring an electrical quantity such as a voltage, a resistance or a current intensity. In this way the degree of dryness of the laundry can be known during the whole operation of the drying machine 9.

[0029] While the drum 12 rotates, in order to avoid a repetitive noise and any interruption in the electrical contact when the connection between the ends 3 and 7 of the contact band 1 passes under the brush 22, the rib 8 provided on the second end 7 of the strip 2 comprises a curved profile 23. The curved profile 23 has one or more radii of curvature R_1 and R_2 which are substantially perpendicular to the plane defined by the strip 2, as shown in figure 2. The most appropriate radii of curvature can be chosen as desired, provided that the rib 8 rises from the strip 2 and draws into the latter progressively forming a portion 28 where the distance of the curved profile surface from the strip plane is maximum. If the strip 2 comprises more than one rib 8, each of them can have the same curved profile 23 or even different profiles having each the most appropriate radii of curvature in order to allow a smooth passage of the connection between the ends 3 and 7 under the brush 22.

[0030] In figures 4 and 5 the contact band 1 and the brush 22 are shown in a first and second consecutive moments of operation. In figure 4 the drum 12, rotating in the direction of the arrow A, leads the notch 4 in the first end 3 of the strip 2 to encounter the brush 22. Starting from the moment in which the notch 4 has encountered the brush 22, for a small angle of rotation of the drum, only the lateral regions 24, 25 of the latter remains in contact with the strip 2, while the central region 26 does not touch the strip 2.

[0031] Upon a further rotation of the drum 12 the notch 4 goes on and leaves the brush 22 while the rib 8 begins to touch the central region 26 of the brush 22. In order to make the passage of the electrical contact from the lateral regions 24, 25 of the brush 22 to its central region 26 practically continuous, the curved profile 23 is dimensioned such that for some degrees of drum rotation all the regions 24, 25, 26 of the brush 22 are in electrical contact with the strip 2. This is obtained providing that, when the contact band 1 is wrapped around the drum 12 and the ends 3, 7 are joined together, the portion 28 of the curved profile 23 rests at a position within the notch 4. Preferably the length of the rib 8 is at least two times the length of the notch 4.

[0032] In figure 5 it is shown the moment in which the brush 22 has left the first end 3 of the contact band 1 and has passed to the second end 7 carrying the rib 8. From this moment on, the curved profile 23, drawing into the strip 2 progressively, drives the brush 22 to complete the passage across the connection between the end 3, 7 of the strip 2 without chattering.

[0033] Conclusively it can be stated that the contact band 1 according to the present invention provides significant advantage of ensuring a reliable measurement of the clothes moisture avoiding the production of noise when the laundry dryer is working. In addition the contact band of the present invention is very easy to be produced and to be mounted in a drying machine without requiring complicate operations.

Claims

1. A contact band (1) for a moisture measuring circuit of a drying machine comprising a flexible strip (2) of an electrically conductive material, a first end (3) having at least a notch (4) and a second end (7) **characterised in that** said second end (7) comprises at least a rib (8) adapted to be inserted in said notch (4). 5
2. A contact band (1) according to claim 1 wherein said rib (8) comprises a curved profile (23). 10
3. A contact band (1) according to claim 2 wherein said curved profile (23) has one or more radii of curvature (R_1 , R_2) substantially perpendicular to said strip (2). 15
4. A contact band (1) according to any preceding claim wherein said rib (8) comprises a portion (28) in which the distance of the curved profile surface from the strip plane is maximum, said portion (28) resting within the notch (4) when the first and the second ends (3, 7) are joined. 20
5. A contact band (1) according to any preceding claim wherein said rib (8) and said notch (4) extend along the longitudinal direction of said strip (2). 25
6. A contact band (1) according to claim 4 wherein the length of said rib (8) is at least two times the length of said notch (4). 30
7. A contact band (1) according to any preceding claim further comprising means (13) for aligning said rib (8) and said notch (4). 35
8. A contact band (1) according to claim 6 wherein the aligning means (13) comprise a plurality of lugs (15) provided on either of said first and second end (3, 7) and a corresponding plurality of slots (15) provided on the other of said first and second end (7) for receiving the lugs (14). 40
9. A contact band (1) according to any preceding claim wherein either of said first and second end (3, 7) comprises one or more pliable tabs (11) adapted to be engaged in a corresponding seat (10) provided on the other of said first and second end (3, 7). 45
10. A contact band (1) according to any preceding claim wherein said first and second end (3, 7) are overlapped. 50
11. A laundry dryer (9) comprising an electric circuit for measuring the moisture content in the laundry to be dried **characterised by** comprising a contact band (1) according to any claim 1 to 10. 55

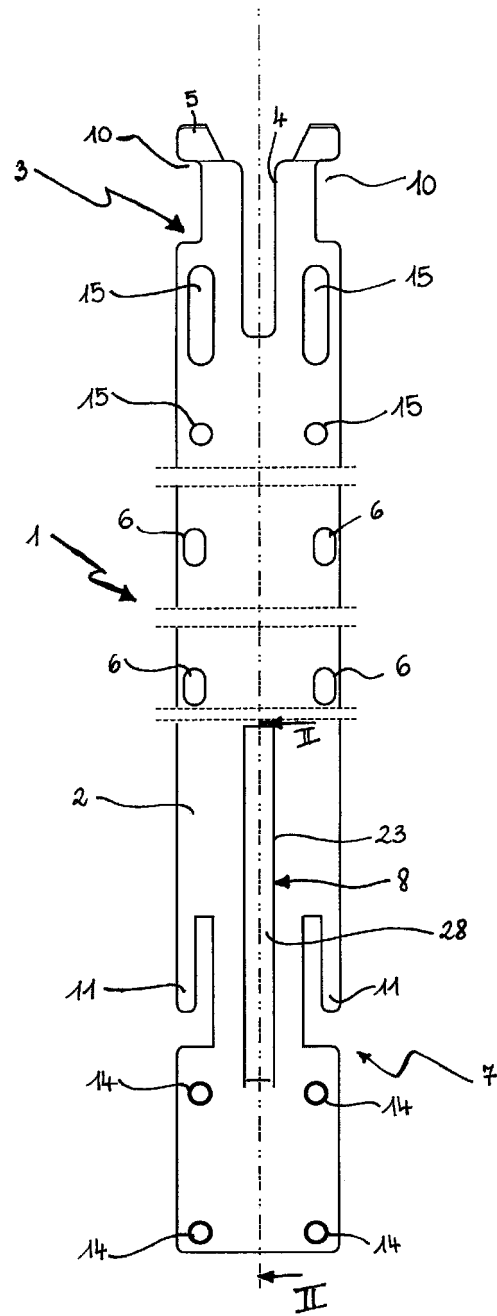


Fig. 1

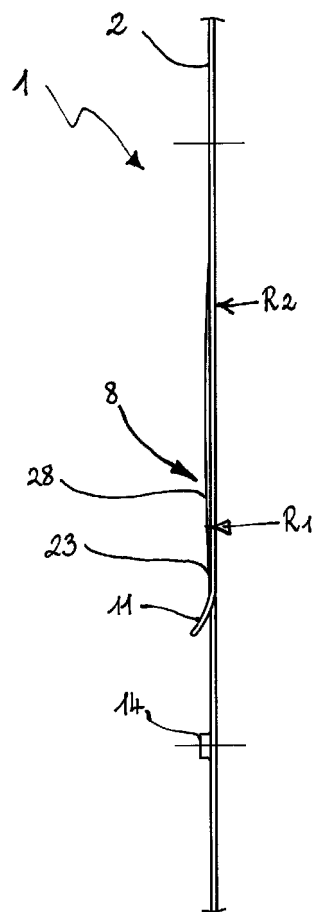


Fig. 2

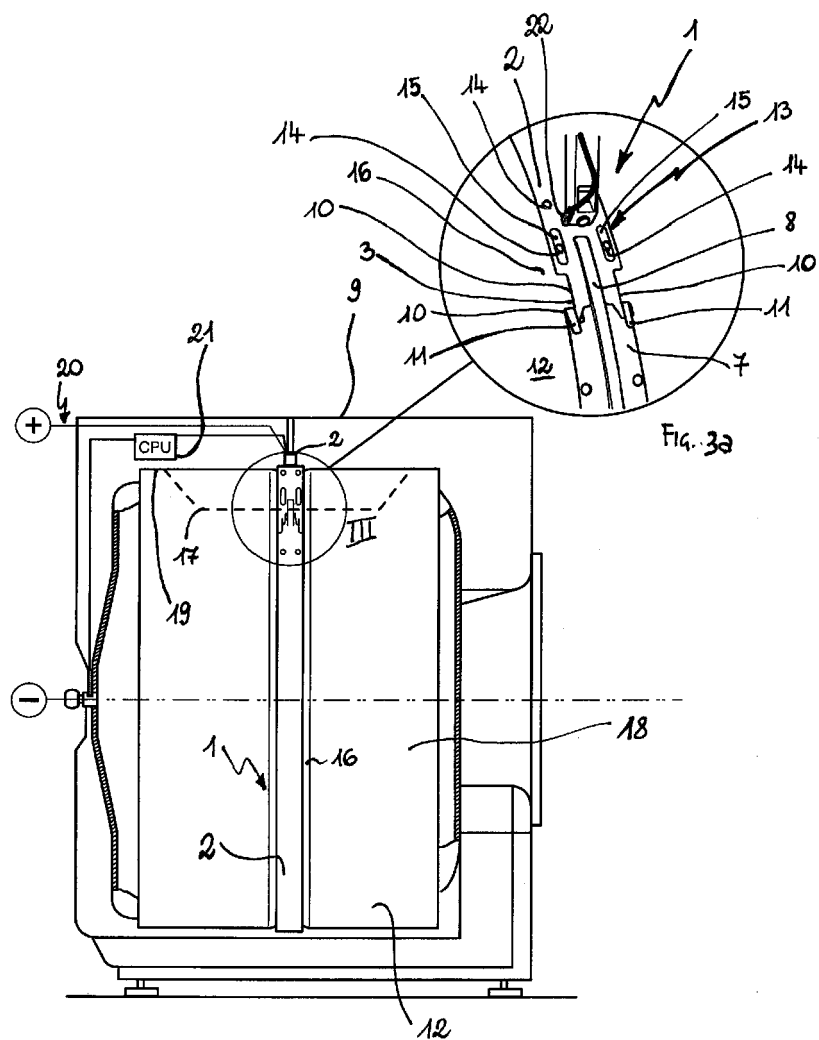


Fig. 3

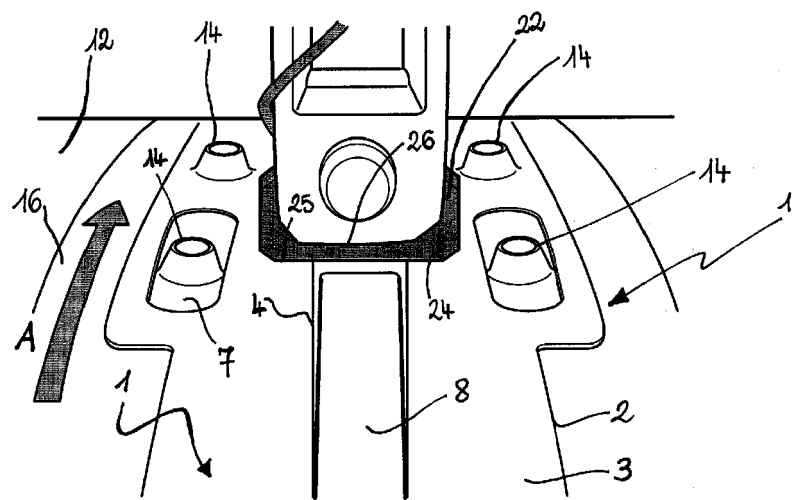


Fig. 4

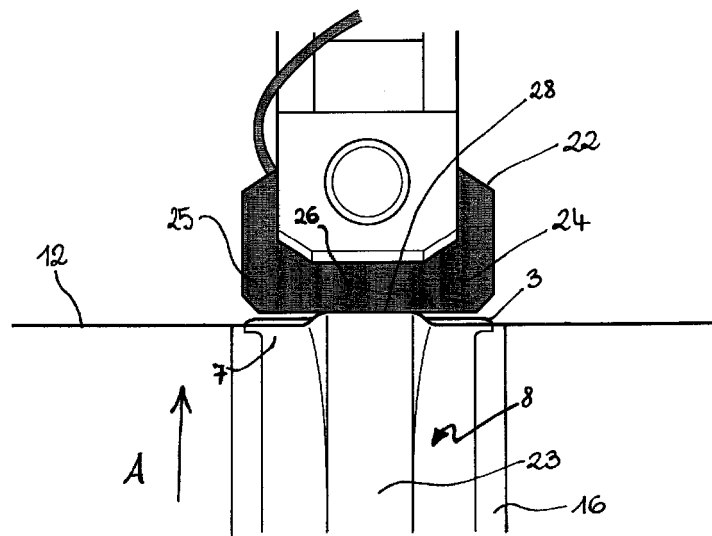


Fig. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 10 0441

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.7)
A,D	DE 197 32 951 A1 (AEG HAUSGERAETE GMBH, 90429 NUERNBERG, DE) 4 February 1999 (1999-02-04) * claims; figures *	1	D06F58/28
A	DE 195 25 778 A1 (BOSCH-SIEMENS HAUSGERAETE GMBH, 81669 MUENCHEN, DE) 16 January 1997 (1997-01-16) * claims; figures *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			D06F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 24 June 2005	Examiner Courrier, 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			

1
EPO FORM 1503 03.82 (P04C01)

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

EP 05 10 0441

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.

24-06-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19732951	A1	04-02-1999	NONE

DE 19525778	A1	16-01-1997	NONE

EPO FORM P0459

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