

(19)



(11)

EP 1 882 771 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

30.01.2008 Bulletin 2008/05

(51) Int Cl.:

D06F 37/22 (2006.01)

(21) Application number: **06117835.6**

(22) Date of filing: **25.07.2006**

(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 LV MC NL PL PT RO SE SI
SK TR**

Designated Extension States:

AL BA HR MK YU

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

1930 Zaventem (BE)

(72) Inventors:

- **Galassi, Stefano
33070 Ranzano (IT)**
- **Colombera, Giovanni
33077 Sacile (IT)**
- **Giovagnoni, Marco
33100 Udine (IT)**

(74) Representative: **Jorio, Paolo et al**

**Studio Torta S.r.l.
Via Viotti, 9
10121 Torino (IT)**

(54) **Laundry machine with a fluid balance ring**

(57) A laundry machine (1) having: a drum (5) rotating about a rotation axis (6); a rotary shaft (8) supporting the drum (5) and coaxial with the rotation axis (6); a spider (9) connected rigidly to the rotary shaft (8) and the drum

(5) to connect the rotary shaft (8) and the drum (5) mechanically; and a fluid balance ring (10) fitted to the drum (5), coaxially with the rotation axis (6), and fitted rigidly to the spider (9).

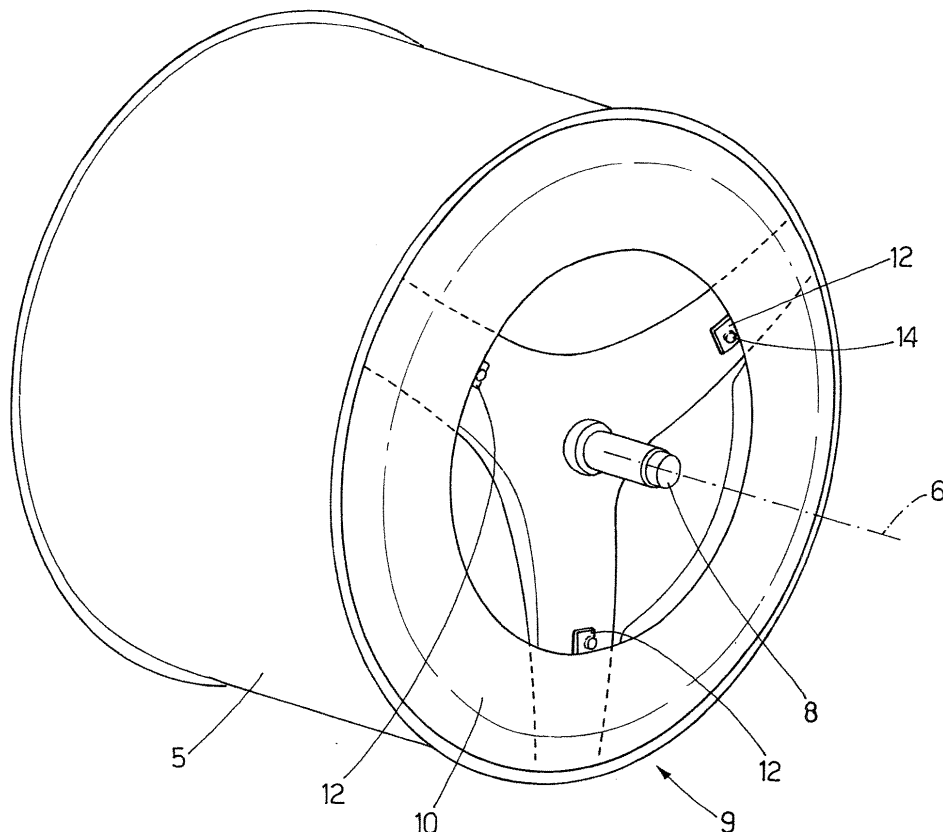


Fig.2

EP 1 882 771 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a laundry machine with a fluid balance ring.

[0002] The fluid balance ring according to the present invention may be used to particular advantage in a washing machine, to which the following description refers purely by way of example.

BACKGROUND ART

[0003] Washing machines are known to comprise a fluid balance ring fitted to the drum to correct unbalance of the drum. More specifically, in known solutions, the fluid balance ring is fitted to an open front surface of the drum facing the loading/unloading door, comprises at least one annular chamber filled partly with liquid (normally water or water with added salt), and provides for reducing unbalance at high speed, caused by off-centred items inside the drum. One example of such a situation is a bundle of towels located on one side of a rotating washing machine drum. When the drum rotates at high speed, the unbalance produced by the towels is counteracted by the fluid inside the balance ring.

[0004] One example of a washing machine with a fluid balance ring is described in US6327732B1, which relates to a fluid balance ring comprising a number of partitions forming a circular circumferential array of sub-chambers; and each partition has a spring-controlled valve movable, in response to the centrifugal force of the rotating balance ring, from a closed position preventing fluid flow through the partitions, to an open position permitting fluid flow through the partitions.

[0005] In known washing machines with fluid balance rings, performance of the rings is not always entirely satisfactory and is invariably below expectations.

DISCLOSURE OF INVENTION

[0006] It is an object of the present invention to provide a laundry machine with a fluid balance ring, designed to improve balancing performance, to eliminate the aforementioned drawbacks, and which is cheap and easy to produce.

[0007] According to the present invention, there is provided a laundry machine with a fluid balance ring, as claimed in the accompanying Claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic side view of a washing machine in accordance with the present invention;

Figure 2 shows a schematic view in perspective of a drum of the Figure 1 washing machine;

Figure 3 is an exploded view in perspective of the Figure 2 drum;

Figure 4 shows a schematic section of a portion of a fluid balance ring of the Figure 2 drum.

PREFERRED EMBODIMENTS OF THE INVENTION

[0009] Number 1 in Figure 1 indicates as a whole a washing machine comprising a casing 2 resting on a floor 3 on a number of feet 4. Casing 2 supports a revolving drum 5 (defining a wash tub) which rotates about a horizontal rotation axis 6 (in alternative embodiments not shown, rotation axis 6 may be tilted or vertical), and front access to which is closed by a door 7 hinged to casing 2.

[0010] As shown in Figures 2 and 3, drum 5 is supported on a rotary shaft 8, coaxial with rotation axis 6, with the interposition of a spider 9 connected rigidly to rotary shaft 8 and drum 5 to connect rotary shaft 8 and drum 5 mechanically.

[0011] A fluid balance ring 10 is fitted to drum 5, coaxially with rotation axis 6, to rotate about rotation axis 6 together with drum 5. More specifically, fluid balance ring 10 is fitted rigidly to spider 9, and is therefore located at the closed rear end of drum 5 opposite the open front end facing door 7.

[0012] Preferably, though not necessarily, spider 9 has a central hub fitted to rotary shaft 8; and three spokes 11, each of which is connected rigidly at the outer end to a portion of drum 5, e.g. by means of two screws (not shown) inserted through two holes formed through spoke 11 and screwed inside two threaded holes formed through drum 5. In an alternative embodiment not shown, spider 9 may comprise a different number of spokes 11 (e.g. 2, 4 or 5). According to a preferred embodiment, fluid balance ring 10 is connected to each spoke 11 of spider 9 by a connecting bracket 12 having at least one through hole 13, and by at least one screw 14 which is inserted through hole 13 in connecting bracket 12 and screwed inside a threaded hole 15 formed through spoke 11 of spider 9. Obviously, the fluid balance ring 10 could be connected in other ways to the spider 9.

[0013] In a preferred embodiment shown in Figure 4, fluid balance ring 10 has a number of annular chambers 16, each of which is hydraulically isolated from the other annular chambers 16, is coaxial with rotation axis 6, and is filled partly with a liquid 17 (normally water or water with added salt). Fluid balance ring 10 preferably has a large number of annular chambers 16 (e.g. eleven, as shown in Figure 4, or more generally at least nine) to reduce the noise produced by fluid balance ring 10 as it rotates.

[0014] Testing and analysis confirm excellent balancing of drum 5 of washing machine 1 as described above, by virtue of fluid balance ring 10 being fitted rigidly to spider 9.

[0015] More specifically, being machined, spider 9 is

precision manufactured and therefore precisely coaxial with rotation axis 6. Consequently, fluid balance ring 10 is also precisely coaxial with (of negligible eccentricity with respect to) rotation axis 6, which is indispensable for ensuring effective balance.

[0016] Moreover, being extremely rigid, spider 9 bends very little in use, and so undergoes no noticeable deformation in the opposite direction to the eccentricity of the load in drum 5 (unlike drum 5, which is made of welded and/or riveted sheet metal), thus enabling fluid balance ring 10 to operate in the best possible conditions. In other words, if fluid balance ring 10 is subjected in use to deformation in the opposite direction to the eccentricity of the load in drum 5, then the efficiency of fluid balance ring 10 is impaired. The highly rigid nature of spider 9, however, provides for eliminating or at least minimizing in-service deformation of fluid balance ring 10.

[0017] In short, the above solution allows a highly efficient fluid balance ring 10 to be fitted to spider 9 with no misalignment at either the assembly stage (precision assembly) or in working conditions (superior balancing performance) when drum 5 bends under the effect of an unbalanced load.

[0018] It should be pointed out that, by locating fluid balance ring 10 at the closed rear end of drum 5 opposite the open front end facing door 7, substantially no noise produced by liquid 17 inside fluid balance ring 10 is noticeable by the user when drum 5 is rotated manually.

[0019] Finally, another important point to note is that washing machine 1 as described above is cheap and easy to produce, by involving only minor alterations to a known washing machine and no new component parts.

[0020] Though particularly advantageous for a washing machine, the above structure also applies to any other kind of laundry machine, such as a drier or a washer-drier.

(9).

3. A laundry machine (1) as claimed in Claim 2, wherein the fluid balance ring (10) has a number of connecting brackets (12), each having at least one through hole (13); and a number of screws (14), each inserted through the through hole (13) in a respective connecting bracket (12) and screwed inside a threaded hole (15) formed through a respective spoke (11) of the spider (9).
4. A laundry machine (1) as claimed in Claim 1, 2 or 3, wherein the fluid balance ring (10) comprises a number of annular chambers (16), each of which is hydraulically isolated from the other annular chambers (16), is coaxial with the rotation axis (6), and is partly filled with a liquid (17).
5. A laundry machine (1) as claimed in Claim 4, wherein the fluid balance ring (10) has at least nine annular chambers (16).
6. A laundry machine (1) as claimed in Claim 4, wherein the fluid balance ring (10) has eleven annular chambers (16).

Claims

1. A laundry machine (1) comprising:
 - a drum (5) rotating about a rotation axis (6);
 - a rotary shaft (8) supporting the drum (5) and coaxial with the rotation axis (6);
 - a spider (9) connected rigidly to the rotary shaft (8) and the drum (5) to connect the rotary shaft (8) and the drum (5) mechanically; and
 - a fluid balance ring (10) fitted to the drum (5) and coaxial with the rotation axis (6);
 - the laundry machine (1) being **characterized in that** the fluid balance ring (10) is fitted rigidly to the spider (9).
2. A laundry machine (1) as claimed in Claim 1, wherein the spider (9) has a number of spokes (11), each of which is connected rigidly at an outer end to a portion of the drum (5); and the fluid balance ring (10) is connected to each of the spokes (11) of the spider

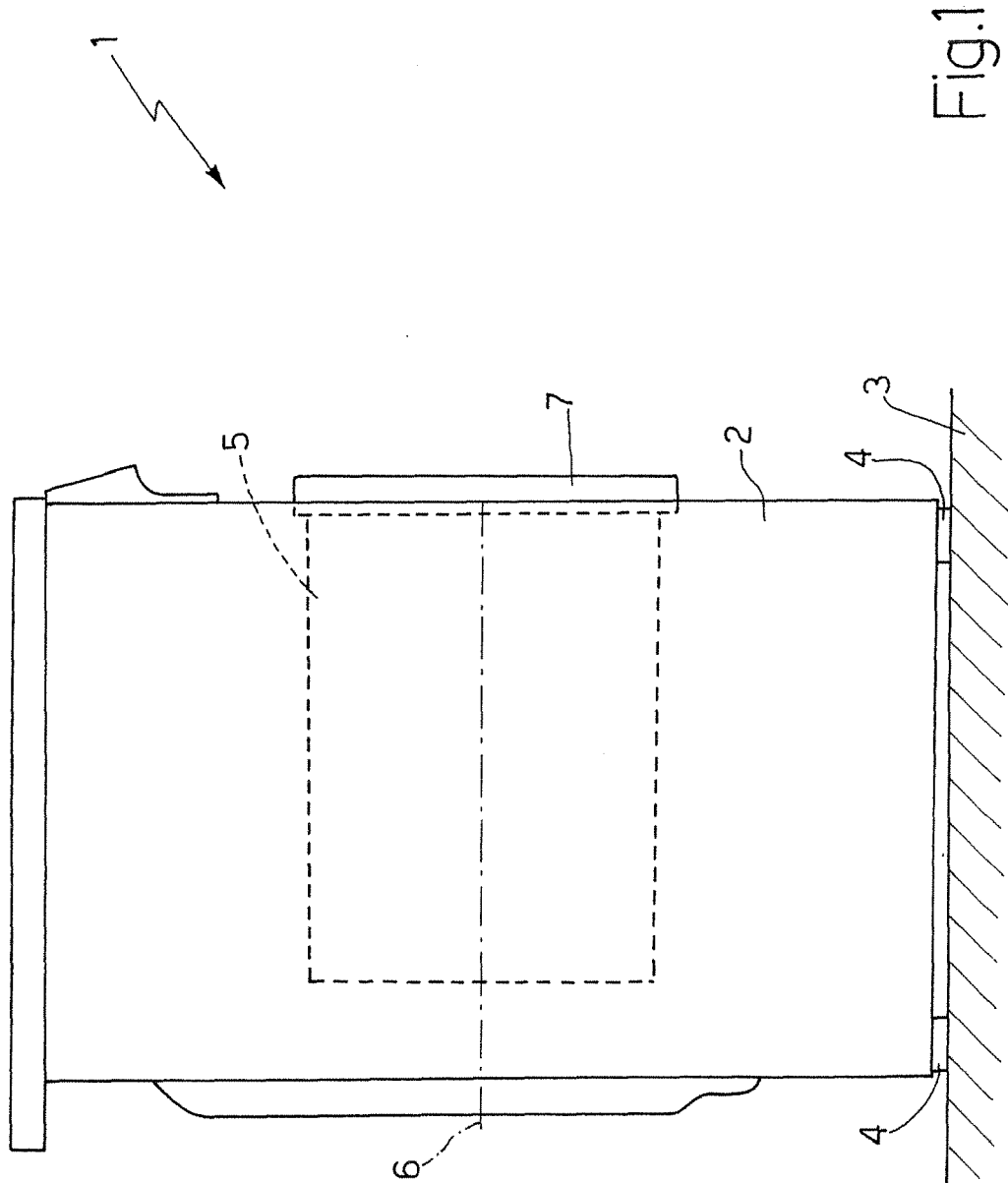


Fig.1

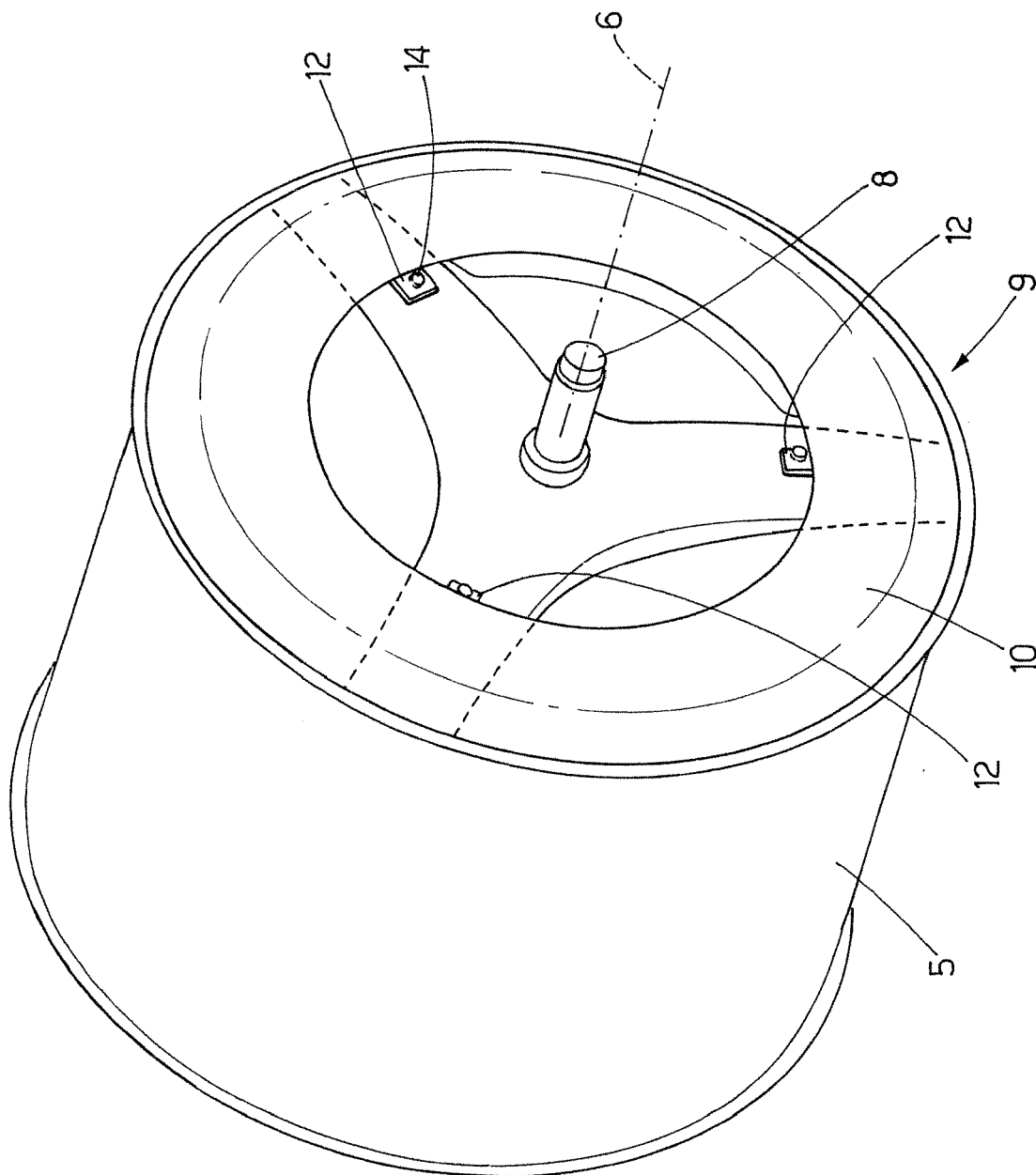
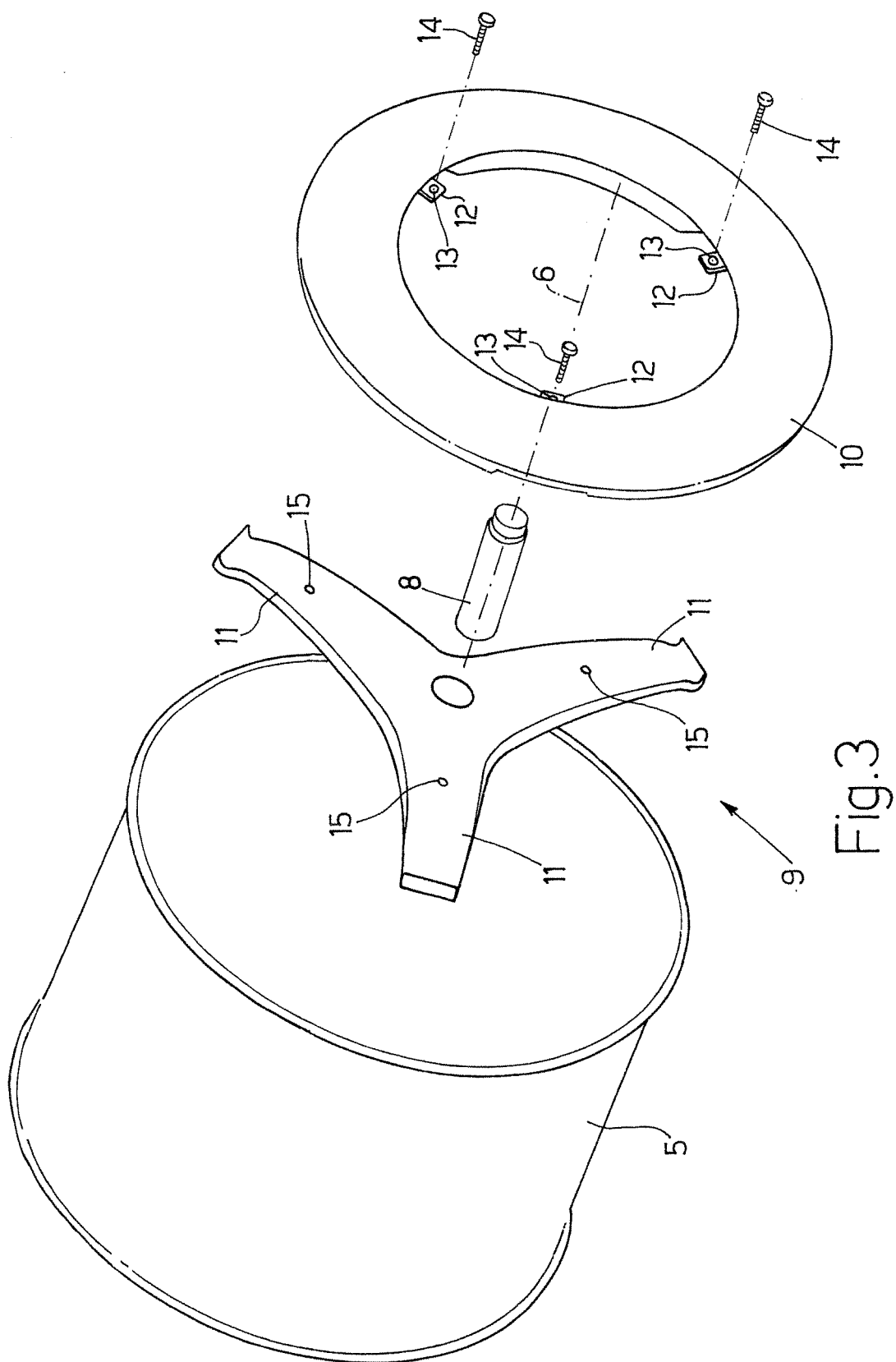


Fig. 2



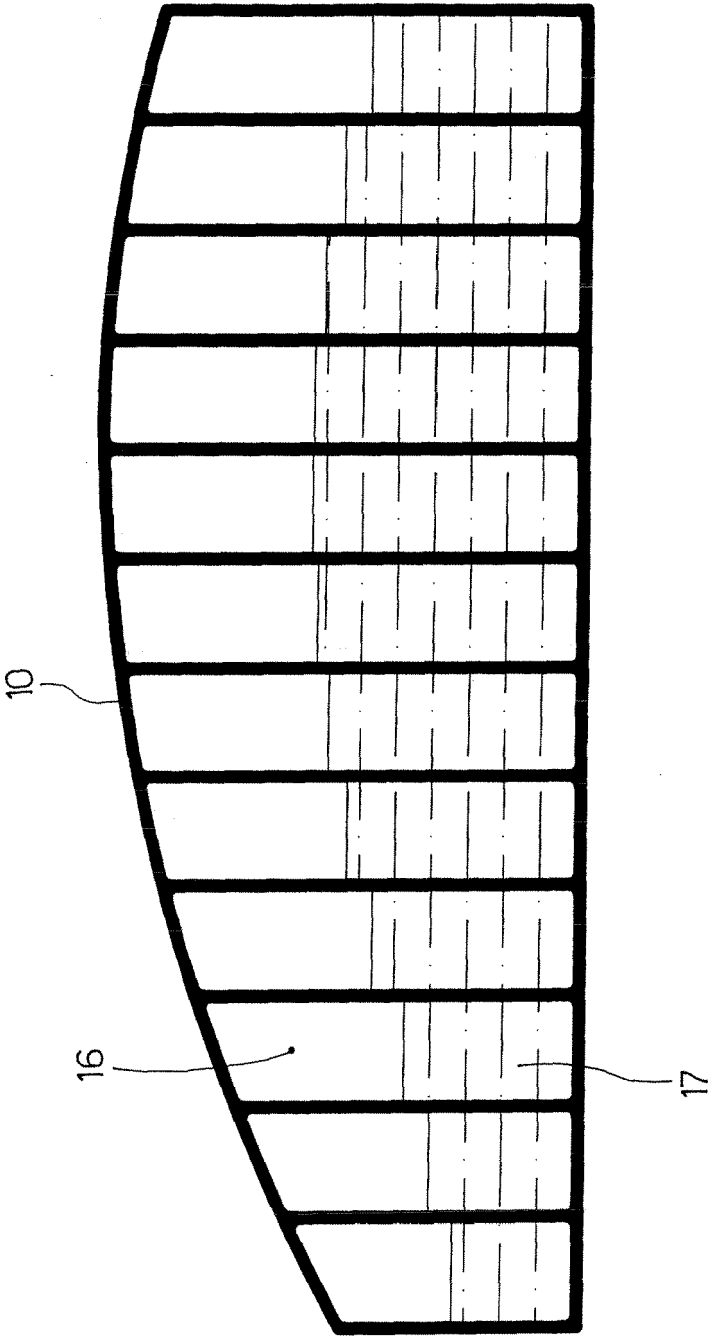


Fig.4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 11 7835

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
E	EP 1 722 025 A (LG ELECTRONICS INC [KR]) 15 November 2006 (2006-11-15) * column 6, paragraph 62 - column 8, paragraph 85; figures 4,5 *	1-3	INV. D06F37/22
X	EP 1 605 088 A (LG ELECTRONICS INC [KR]) 14 December 2005 (2005-12-14) * column 6, paragraph 44 - column 7, paragraph 58; figures 4,6 *	1-3	
Y		4	
X	DE 298 05 563 U1 (AEG HAUSGERAETE GMBH [DE]) 5 August 1999 (1999-08-05) * page 2, line 25 - page 4, line 23; figures 1-4 *	1,2	
Y	US 5 735 006 A (VANDE HAAR EVAN R [US]) 7 April 1998 (1998-04-07) * column 2, line 58 - line 67; figure 5 *	4	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		9 January 2007	Lodato, Alessandra
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			

2
EPO FORM 1503 03.82 (P04C01)

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

EP 06 11 7835

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.

09-01-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1722025	A	15-11-2006	CN 1861892 A 15-11-2006
		JP 2006314797 A 24-11-2006	
		US 2006254321 A1 16-11-2006	
EP 1605088	A	14-12-2005	CN 1707010 A 14-12-2005
		JP 2005349208 A 22-12-2005	
		KR 20050117004 A 14-12-2005	
		US 2005274159 A1 15-12-2005	
DE 29805563	U1	05-08-1999	NONE
US 5735006	A	07-04-1998	CA 2203987 A1 05-12-1997

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 6327732 B1 [0004]