(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 631 342 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.08.2013 Bulletin 2013/35

(51) Int Cl.:
D06F 37/04 *(2006.01)* ***D06F 37/06*** *(2006.01)*
D06F 37/14 *(2006.01)* ***D06F 37/20*** *(2006.01)*

(21) Application number: **12157039.4**

(22) Date of filing: **27.02.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(71) Applicant: **Electrolux Home Products Corporation N.V.**
1130 Brussel (BE)

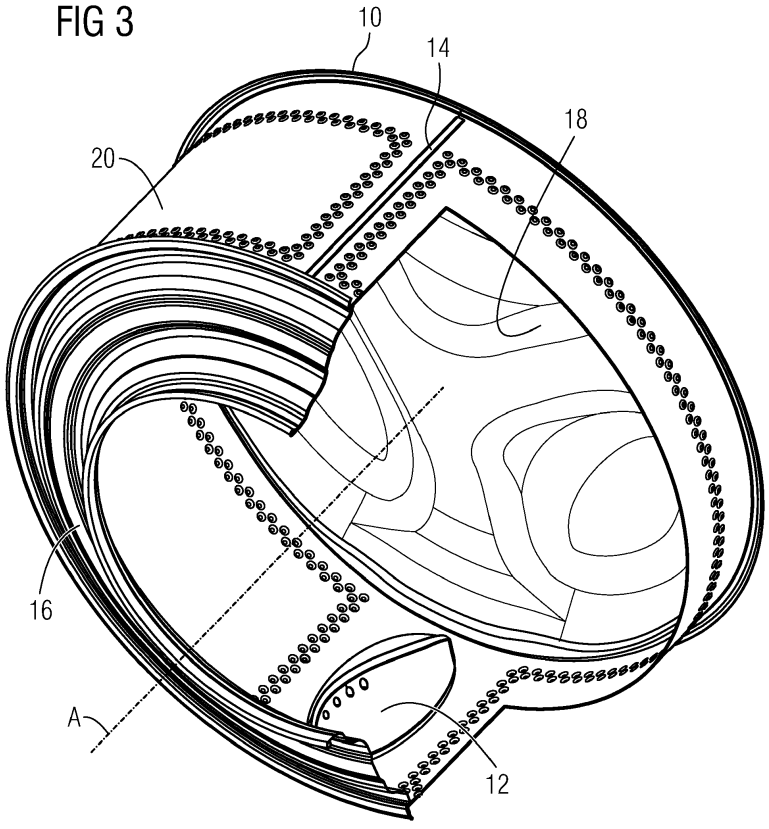
(72) Inventor: **Gruppo, Luca**
33080 Porcia (PN) (IT)

(74) Representative: **Nardoni, Andrea et al**
Electrolux Italia S.p.A.
Corso Lino Zanussi, 30
33080 Porcia (PN) (IT)

(54) **A laundry drum for a laundry treating machine**

(57) The present invention relates to a laundry drum (10) for a washing machine, a laundry dryer and/or a washer dryer. The laundry drum (10) includes a front wall (16), a rear wall (18) and a peripheral wall (20). The peripheral wall (20) is made of a flexural rectangular sheet. The edges at opposite face sides of said rectangular sheet are connected by a seam (14). The seam (14) extends perpendicular to the circumferential direction of the laundry drum (10). At least one balancing element (12) is arranged at the peripheral wall (20) of the laundry drum (10), wherein the seam (14) and the at least one balancing element (12) are equally spaced from each other along the circumferential direction of the laundry drum (10).

FIG 3



EP 2 631 342 A1

Description

[0001] The present invention relates to a laundry drum for a laundry treating machine, such as a washing machine, a laundry dryer and a washer dryer, according to the preamble of claim 1. Further, the present invention relates to a corresponding laundry treating machine like a washing machine, a laundry dryer and a washer dryer.

[0002] In a laundry drum of a laundry treating machine, such as a washing machine, a laundry dryer, and a washer dryer, an unbalance during rotation may occur. If the mass distribution of the laundry drum components and/or the mass distribution of laundry inside said drum is not rotationally symmetric, then the unbalance occurs when the drum rotates. The unbalance may effect vibrations of the laundry drum and an increased wear of the laundry treating machine. In general, the unbalance due to laundry mass distribution inside the drum, which is rather intense in machines suitable to carry out a washing/spinning process on laundry, is normally compensated through appropriate counterweights arranged on a tub wherein the laundry drum is rotatably mounted.

[0003] The unbalance due to the laundry drum mass distribution around its axis of rotation involves any kind of rotating drum in a laundry treating machine and requires an appropriate design of the drum and provision of balancing elements at the laundry drum. For example, three balancing elements are arranged at the peripheral wall of the laundry drum, wherein said balancing elements are equally spaced from each other. The balancing elements may be massive elements with constant masses. Further, the balancing elements may be hollow and fillable by water or liquid. However, the peripheral wall of the laundry drum is not homogenous. The thickness of the peripheral wall is not equal all around the drum rotational axis. For example, the peripheral wall is made of a flexural, rectangular sheet and comprises a seam extending perpendicular to the peripheral direction of the laundry drum, i.e. in a direction parallel to the drum rotational axis. The seam includes several overlapping layers of the sheet for the circumferential wall, thereby making the seam protruding radially from said circumferential wall. The mass of the circumferential wall at the seam is bigger than at other positions of the circumferential wall out of the seam. Thus, the seam causes also an unbalance of the laundry drum when the latter rotates. In the known art, in order to hide the seam region of the drum, a cover is installed onto the seam on its side facing the laundry receiving chamber defined by the drum. Such cover, generally, is in the form of a lifter for agitating laundry during its treatment.

[0004] It is an object of the present invention to provide a laundry drum for a laundry treating machine, like a washing machine, laundry dryer and a washer dryer, which overcomes the unbalance due to the seam and /or any other mass connected to the circumferential wall of the drum.

[0005] The object of the present invention is achieved by the laundry drum according to claim 1.

[0006] According to the present invention at least one balancing element for compensating rotational unbalances of the drum, caused by the seam and /or any other mass connected to the circumferential wall of the drum, is arranged, preferably releasably fixed, at the peripheral wall of the laundry drum.

[0007] According to the present invention, the seam and the balancing element(s) together result in an at least approximately systematic mass distribution and/or in a balanced rotation by compensating each other. The seam has a higher mass than the rest of the circumferential wall of the laundry drum. So, the seam acts, in other words, as an additional compensating element. The masses of the one or more balancing elements as well as the mass of the seam are considered for the determination of the mass centre of the laundry drum to be close to or at the rotational centre or axis of the drum.

[0008] In particular, the front wall of the laundry drum comprises an opening for allowing a user to introduce laundry inside the drum, wherein the laundry drum is provided for a front load washing machine, a front load laundry dryer and/or a front load washer dryer.

[0009] Alternatively, the laundry drum may be provided for a top loading washing machine, a top loading laundry dryer and/or a top loading washer dryer. In this case a closable opening is arranged at the peripheral wall. The masses of said closable opening as well as the mass of the seam might be considered for the determination of the position and mass for the balancing element or the positions and masses for the balancing elements, respectively.

[0010] Preferably, the at least one balancing element is arranged at an inner side of the peripheral wall of the laundry drum.

[0011] For example, the at least one balancing element is formed as a massive element with a constant mass.

[0012] Alternatively, the at least one balancing element is formed as a hollow piece with one or more openings, wherein the balancing element is filled or fillable by water or liquid. In this case, the mass of the balancing element is variable.

[0013] The balancing element is in a preferred embodiment designed as a lifter inside the peripheral wall of the drum for lifting laundry during rotation of the drum.

[0014] According to a preferred embodiment of the present invention the laundry drum comprises one balancing element arranged at the peripheral wall and opposite to the seam. So, the balancing element, in a particular lifter, and the seam form a set of two balancing elements. This corresponds in a particular to an embodiment with just one lifter, which is possible since the one lifter and the seam compensate each other unbalance effect.

[0015] According to another embodiment of the present invention the laundry drum comprises two balancing elements arranged at the peripheral wall and equally spaced from each other and from the seam. Ef-

fectively, the two balancing elements and the seam form a set of three balancing elements.

[0016] The present invention relates further to a washing machine, wherein said washing machine comprises a laundry drum mentioned above.

[0017] Moreover, the present invention relates to a laundry dryer, wherein said laundry dryer comprises a laundry drum as described above.

[0018] At last, the present invention relates to a washer dryer, wherein said washer dryer comprises a laundry drum mentioned above.

[0019] The novel and inventive features believed to be the characteristic of the present invention are set forth in the appended claims.

[0020] The invention will be described in further detail with reference to the drawings, in which

FIG 1 shows a schematic sectional front view of a laundry drum according to a first embodiment of the present invention,

FIG 2 shows a schematic sectional front view of the laundry drum according to a second embodiment of the present invention, and

FIG 3 shows a perspective view of the laundry drum according to the first embodiment of the present invention.

[0021] FIG 1 illustrates a schematic sectional front view of a laundry drum 10 according to a first embodiment of the present invention. The laundry drum 10 includes a peripheral wall and it is suitable for being rotated around an axis A.

[0022] A seam 14 is arranged at the top of the peripheral wall. The seam 14 connects two edges of a preferably flexural, rectangular sheet forming the peripheral wall. A balancing element 12 is attached at the inner side of the peripheral wall. The balancing element 12, here a lifter, is, in the rotational positions shown, arranged at the bottom of the peripheral wall. Thus, the balancing element 12 and the seam 14 are arranged at opposite positions of the peripheral wall of the laundry drum 10. Preferably, the balancing element 12 and the seam 14 are arranged at opposite positions of the peripheral wall of the laundry drum 10 relative to the rotational axis A. The arrangement of the balancing element 12 in relation to the seam 14 allows a reduced unbalance of the laundry drum 10.

[0023] In FIG 1 the seam 14 is additionally shown by an enlarged scale, wherein the detailed cross-section of the seam 14 is illustrated. In this example the seam 14 includes four layers of the sheet overlapped one another and protruding from the outer surface of the peripheral wall. In general, the seam 14 includes a number of layers of the sheet in order to obtain a leak-proof connection between the edges of said sheet. In either case the mass of the peripheral wall at the position of the seam 14 is higher than at the other positions of said peripheral wall.

[0024] At the positions of the balancing element 12 and the seam 14 the masses of the peripheral wall are higher than the masses at other positions of said peripheral wall. Since the balancing element 12 and the seam 14 are arranged at opposite positions of the peripheral wall, the balancing element 12 and the seam 14 contribute that the mass centre of the laundry drum 10 is within or very close to the rotational axis A of said laundry drum 10.

[0025] The balancing element 12 may be formed as a massive element with a constant mass.

[0026] Alternatively, the balancing element 12 may be a hollow piece with one or more openings, so that the balancing element 12 is filled or fillable by water or liquid.

[0027] Preferably the or each balancing element 12 is formed as a lifter for lifting laundry during rotation, esp. slow rotation, which lifter is arranged at the inside of the peripheral wall of the drum 10.

[0028] FIG 2 illustrates a schematic sectional front view of the laundry drum 10 according to a second embodiment of the present invention.

[0029] The seam 14 is also arranged at the top of the peripheral wall. The seam 14 connects the two edges of the sheet forming the peripheral wall. Two balancing elements 12, in particular lifters, are attached at the inner side of the peripheral wall. The balancing elements 12 are arranged at the peripheral wall, so that said balancing elements 12 and the seam 14 are equally spaced from each other. Thus, the balancing elements 12 and the seam 14 are arranged at positions of the peripheral wall spaced by an angle of 120°. The arrangement of the balancing element 12 in relation to the seam 14 allows a reduced unbalance of the laundry drum 10 or an even mass distribution is achieved.

[0030] In FIG 2 the seam 14 is also additionally shown by an enlarged scale, wherein the detailed cross-section of the seam 14 is illustrated. In this example the seam 14 includes also four layers of the sheet.

[0031] At the positions of the balancing elements 12 and the seam 14 the masses of the peripheral wall are higher than at the masses at other positions of said peripheral wall. Since the balancing elements 12 and the seam 14 are arranged at equally spaced positions of the peripheral wall, the balancing elements 12 and the seam 14 contribute that the mass centre of the laundry drum 10 is within or very close to the rotational axis of said laundry drum 10.

[0032] Although in Figure 2 the balancing elements 12 and the seam 14 are shown as located at positions of the peripheral wall spaced by an angle of 120°, such positions may be at angles different from 120° depending on the mass of the seam 14 and of each balancing element 12. So, different configurations of balancing elements 12 and the seam 14 may be obtained. For example, each of the two balancing elements 12 may be placed on the peripheral wall of the drum 10 at a position forming with the seam 14 an angle greater than 120°, and the angle formed between the two balancing elements 12 in

the part of the peripheral wall not including the seam 14 being lower than 120°. The positions of the balancing elements 12 and the seam 14 are chosen such that the mass centre of the laundry drum 10 is within or very close to the rotational axis of said laundry drum 10.

[0033] The balancing elements 12 may be formed as massive elements with constant masses. Alternatively, the balancing elements 12 may be hollow pieces with one or more openings in each case, so that the balancing elements 12 are filled or fillable by water or liquid.

[0034] FIG 3 illustrates a perspective view of the laundry drum 10 according to the first embodiment of the present invention. The laundry drum 10 includes a front wall 16, a rear wall 18 and the peripheral wall 20.

[0035] The front wall 16 comprises an opening for allowing a user to introduce laundry inside the drum, wherein the laundry drum 10 is provided for a front load washing machine, a front load laundry dryer and/or a front load washer dryer. However, the laundry drum 10 may be also provided for a top loading washing machine, a top loading laundry dryer and/or an open top washer dryer. In that latter case a closable opening is arranged at the peripheral wall 20. The masses of said closable opening and the seam 14 might be considered for the determination of the position and mass for the balancing element 12 or the positions and masses for the balancing elements 12, respectively.

[0036] The seam 14 is positioned at the top of the peripheral wall 20. The seam 14 connects two edges at the face side of the sheet forming the peripheral wall 20. The balancing element 12 is arranged at the inner side of the peripheral wall 20. The balancing element 12 is positioned at the bottom of the peripheral wall 20. The balancing element 12 and the seam 14 are positioned at opposite sides of the peripheral wall 20 of the laundry drum 10. Preferably, the balancing element 12 and the seam 14 are arranged at opposite positions of the peripheral wall of the laundry drum 10 relative to the rotational axis A. This arrangement of the balancing element 12 in relation to the seam 14 allows the reduced unbalance of the laundry drum 10.

[0037] Moreover, the peripheral wall 20 may be made of a number of flexural, rectangular sheets and comprises a corresponding number of seams 14. In this case, the positions of said seams 14 might be considered for the determination of the position and mass for the balancing element 12 or the positions and masses for the balancing elements 12, respectively.

[0038] Although illustrative embodiments of the present invention have been described herein with reference to the accompanying drawings, it is to be understood that the present invention is not limited to those precise embodiments, and that various other changes and modifications may be affected therein by one skilled in the art without departing from the scope or spirit of the invention. All such changes and modifications are intended to be included within the scope of the invention as defined by the appended claims.

List of reference numerals

[0039]

10	laundry drum
12	balancing element
14	seam
16	front wall
18	rear wall
20	peripheral wall

Claims

1. A laundry drum (10) for a laundry treating machine, wherein

- the laundry drum (10) includes a peripheral wall (20) extending around a drum rotational axis A,
- the peripheral wall (20) is made of a flexural, in particular rectangular, sheet,
- the edges at opposite face sides of said sheet are connected by a seam (14), and
- the seam (14) extends at least approximately perpendicular to the circumferential direction of the laundry drum (10),

characterized in, that

at least one balancing element (12) for compensating rotational unbalance of the drum, caused by the seam (14) which is arranged at the peripheral wall (20) of the laundry drum (10).

2. The laundry drum according to claim 1, **characterized in, that** the laundry drum (10) includes a front wall (16) comprising an opening, wherein the laundry drum (10) is provided for a front load washing machine, a front load laundry dryer and/or a front load washer dryer.

3. The laundry drum according to claim 1, **characterized in, that** the laundry drum (10) is provided for a top loading washing machine, a top loading laundry dryer and/or a top loading washer dryer, wherein a closable opening is arranged at the peripheral wall (20) of said laundry drum (20).

4. The laundry drum according to any one of the preceding claims, **characterized in, that** the at least one balancing element (12) is arranged at an inner side of the peripheral wall (20) of the laundry drum (10).

5. The laundry drum according to any one of the preceding claims,
characterized in, that
the at least one balancing element (12) is formed as a massive element with a constant mass.

6. The laundry drum according to any one of the preceding claims,
characterized in, that
the at least one balancing element (12) is formed as a hollow piece with one or more openings, wherein the balancing element (12) is filled or fillable by water or liquid.

7. The laundry drum according to any one of the preceding claims,
characterized in, that
the laundry drum (10) comprises one balancing element (12) arranged at the peripheral wall (20) and opposite to the seam (14) .

8. The laundry drum according to any one of the claims 1 to 6,
characterized in, that
the laundry drum (10) comprises two balancing elements (12) arranged at the peripheral wall (20) and equally spaced from each other and from the seam (14) along the circumferential direction of the laundry drum (10).

9. The laundry drum according to any one of the claims 1 to 6,
characterized in, that
the laundry drum (10) comprises two balancing elements (12) arranged at the peripheral wall (20) and spaced from each other at an angle lower than 120° along the circumferential direction of the laundry drum (10).

10. The laundry drum according to any of the claims 1 to 9, wherein each balancing element (12) is designed as a lifter for lifting laundry inside the rotating drum (10).

11. The laundry drum according to any of the claims 1 to 10, wherein each balancing element is releasably fixed to the inner side of the peripheral wall of the drum.

12. A laundry treating machine **characterized by** comprising a laundry drum (10) according to any one of the claims 1 to 11.

FIG 1

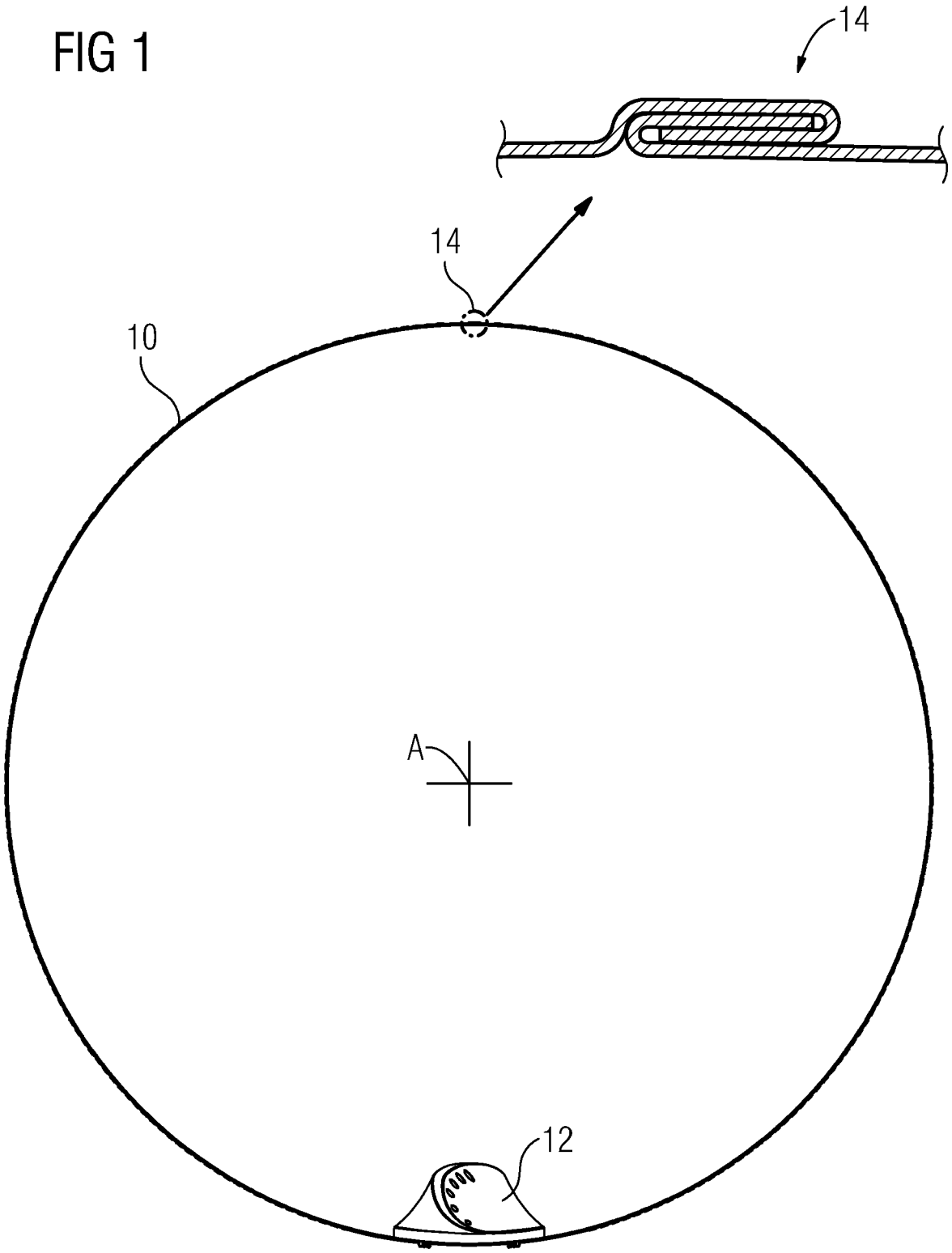


FIG 2

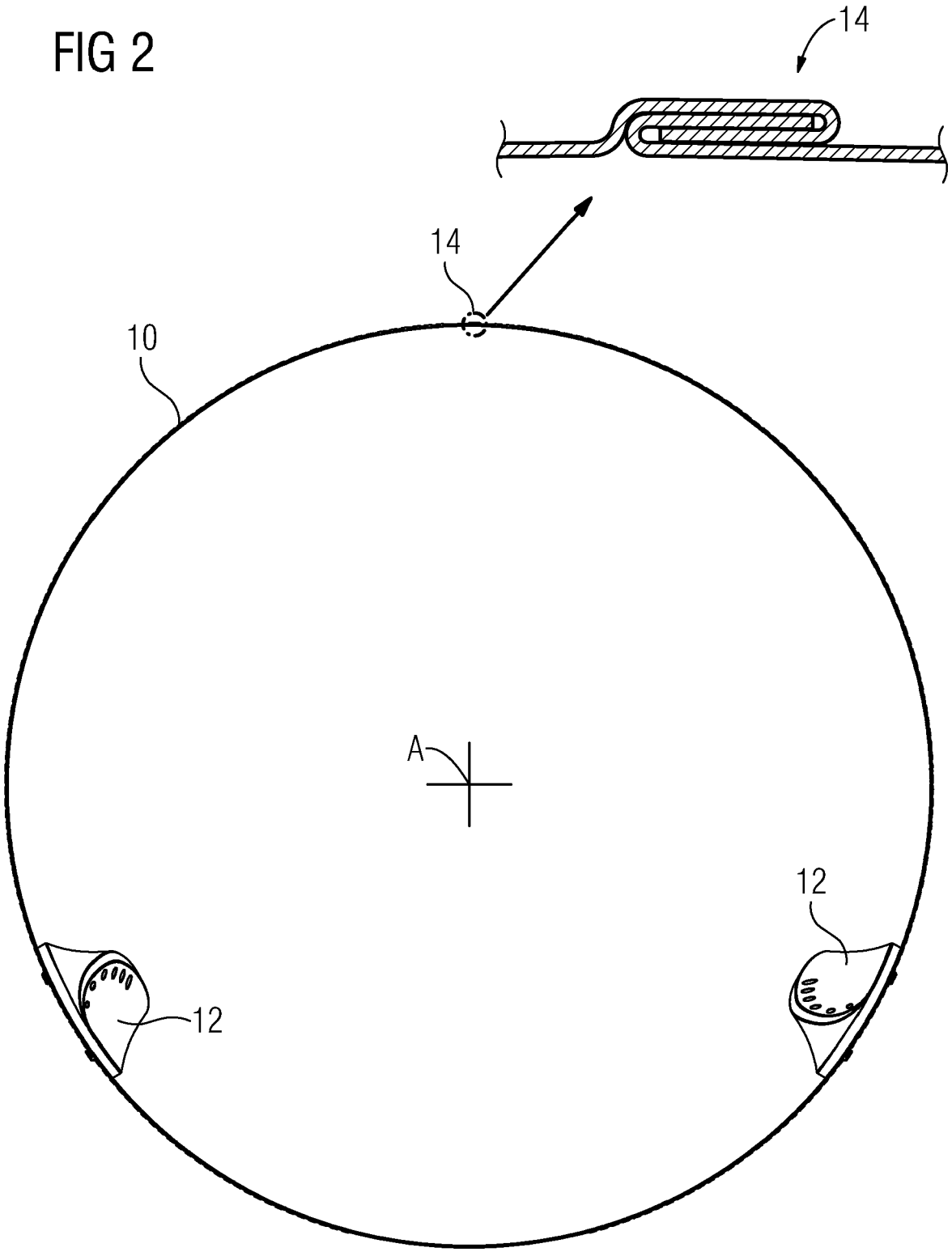
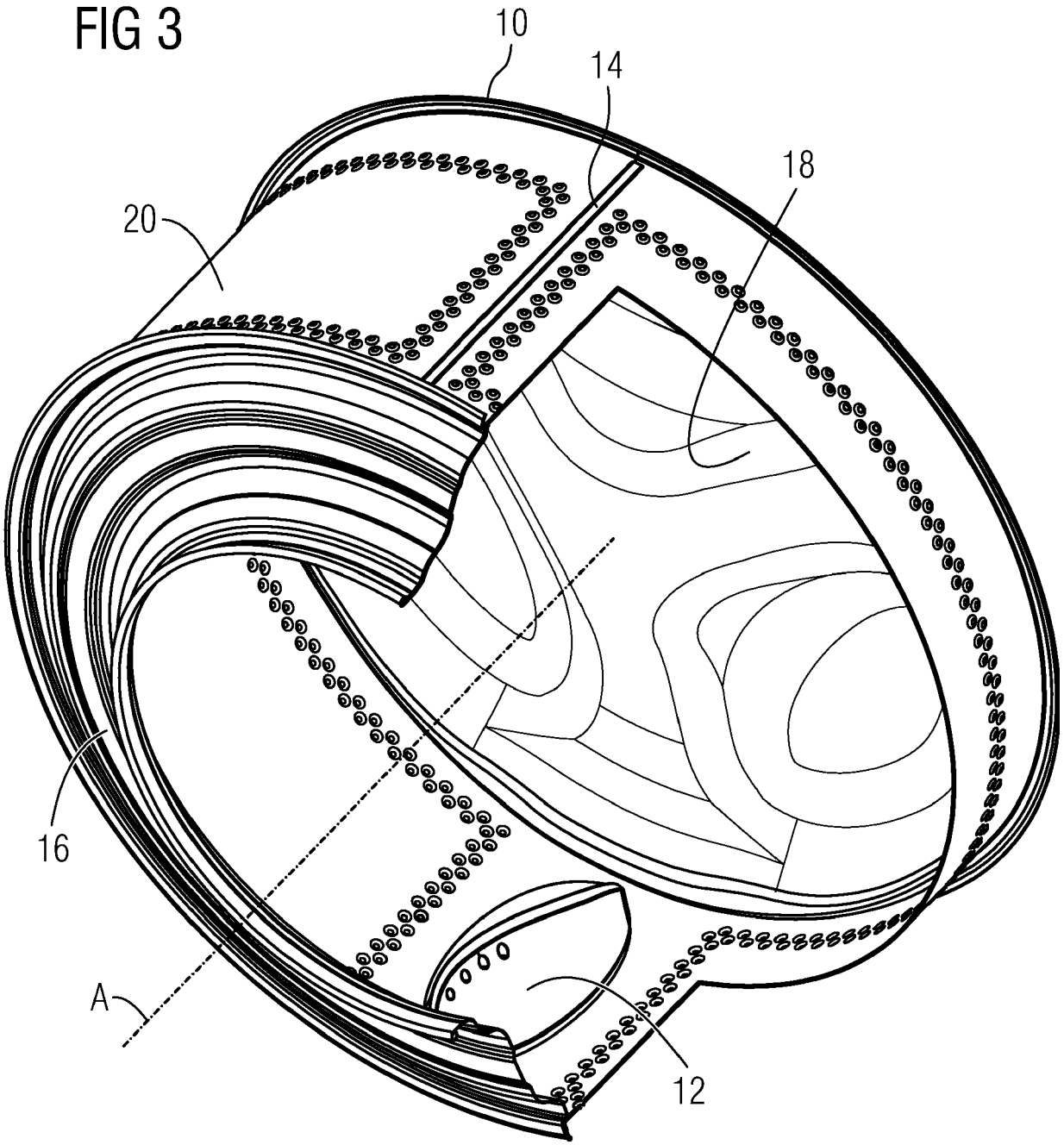


FIG 3



Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 12 15 7039

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 37 43 657 A1 (BOSCH SIEMENS HAUSGERAETE [DE]) 6 July 1989 (1989-07-06) * column 1, line 43 - column 2, line 64; figures 1-4 *	1-12	INV. D06F37/04 D06F37/06 D06F37/14 D06F37/20
X	US 2007/157677 A1 (TATSUMI HISAO [JP] ET AL) 12 July 2007 (2007-07-12) * paragraph [0025]; figure 2 *	1-5,12	
X	EP 1 840 256 A1 (LG ELECTRONICS INC [KR]) 3 October 2007 (2007-10-03) * paragraphs [0009], [0012], [0003]; figure 1 *	1-5,12	
A	EP 1 431 438 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 23 June 2004 (2004-06-23) * figure 4 *	1,2,12	
A	EP 2 270 272 A1 (ELECTROLUX HOME PROD CORP [BE]) 5 January 2011 (2011-01-05) * figure 2 *	1,2,6,12	

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	17 September 2012	Kising, Axel

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 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 15 7039

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.

17-09-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3743657 A1	06-07-1989	DE 3743657 A1	06-07-1989
		DE 8718047 U1	21-01-1993
US 2007157677 A1	12-07-2007	CN 1906348 A	31-01-2007
		JP 4387812 B2	24-12-2009
		JP 2005204969 A	04-08-2005
		KR 20060114367 A	06-11-2006
		TW I260356 B	21-08-2006
		US 2007157677 A1	12-07-2007
		WO 2005071155 A1	04-08-2005
EP 1840256 A1	03-10-2007	CN 101046050 A	03-10-2007
		EP 1840256 A1	03-10-2007
		US 2007261513 A1	15-11-2007
EP 1431438 A1	23-06-2004	AT 422004 T	15-02-2009
		DE 10259059 A1	22-07-2004
		EP 1431438 A1	23-06-2004
		PL 364096 A1	28-06-2004
		US 2004129036 A1	08-07-2004
EP 2270272 A1	05-01-2011	EP 2270272 A1	05-01-2011
		EP 2489773 A1	22-08-2012

EPO FORM P0459

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