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

(11) **EP 2 673 411 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
24.12.2014 Bulletin 2014/52

(21) Application number: **12702475.0**

(22) Date of filing: **25.01.2012**

(51) Int Cl.:
D06F 37/04 *(2006.01)* ***D06F 37/02*** *(2006.01)*

(86) International application number:
PCT/EP2012/051090

(87) International publication number:
WO 2012/107282 (16.08.2012 Gazette 2012/33)

(54) DRUM TYPE FRONT LOADING LAUNDRY TREATING MACHINE

VON VORN BESCHICKBARES TROMMELARTIGES WÄSCHEBEHANDLUNGSGERÄT

MACHINE DE TRAITEMENT DU LINGE A CHARGEMENT FRONTAL DU TYPE A TAMBOUR

(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

(30) Priority: **08.02.2011 TR 201101157**

(43) Date of publication of application:
18.12.2013 Bulletin 2013/51

(73) Proprietor: **BSH Bosch und Siemens Hausgeräte GmbH**
81739 München (DE)

(72) Inventor: **ÖZKAN, Süleyman**
59500 Tekirdag (TR)

(56) References cited:
EP-B1- 1 520 067
WO-A1-2007/023453
DE-A1- 4 445 731
DE-A1-102004 025 354
US-A- 2 214 131
US-A1- 2005 252 254

EP 2 673 411 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention relates to front loading laundry machine with a drum comprising a cylindrical wall; a rear wall secured to the cylindrical wall and a seam between an edge of the cylindrical wall and a rim of the rear wall, wherein at least one depression is provided at a predetermined distance between a distal end and proximal end of the seam, and wherein the depression is formed along the seam. The invention also relates to a method of drum production for a front loading laundry machine.

[0002] A front loading laundry machine of this generic type is disclosed in EP 1 520 067 B1.

[0003] In a known domestic type front loading laundry washing/drying machine, a cylindrical drum is used. The drum stores the laundry in the inner volume thereof and treats the laundry. In order for the rotation of the drum, the drum is connected by means of a drive means from a rear wall thereof. Moreover, a similar lateral wall is fixed to the drum so as to have an inlet for taking the laundry inside the cylindrical wall. The rear wall is secured to the cylindrical wall in a peripheral manner by folding of the peripheral edge of the cylindrical wall onto the rear wall rim so as to form a seam and by the engagement thereof.

[0004] In document EP 1 520 067 B1, such seam is illustrated. Accordingly, when the drum is rotated in a loaded manner with revolutions over 1200 rev/min, the resistance is increased by means of an impression region, and the damages which may be formed in the seam region are prevented. However, such an impression forms a different height between the two ends of the seam and the outer diameter of the drum is modified.

[0005] The object of the present invention is to provide a safe operation of laundry machine with a drum in high rotation speeds.

[0006] In order to realize the abovementioned object, the present invention provides a front loading laundry machine and a procedure according to the respective independent claim attached. Preferred embodiments are subjects of dependent claims, the subsequent description and the drawing attached.

[0007] In accordance with the invention, there is provided a front loading laundry machine with a drum comprising a cylindrical wall; a rear wall secured to the cylindrical wall and a seam between an edge of the cylindrical wall and a rim of the rear wall, wherein at least one depression is provided at a predetermined distance between a distal end and proximal end of the seam, and wherein the depression is formed along the seam. Further, the depression forms a bulge out at a direction towards inside the rim.

[0008] This can be realized with the formation of the depression after the formation of the seam. Since there is depression along the seam, the tension distribution on the whole of the seam is centered on the depression part.

[0009] In accordance with the invention, there is also provided a method of drum production for a front loading laundry machine comprising the steps of securing a rear wall to a cylindrical wall at the edge thereof in a sealed manner by means of folding at least a rim of the rear wall and the cylindrical wall adjacent to the corresponding edge which define a seam; forming at least one depression along the seam at a predetermined distance between a distal end and proximal end of the seam, wherein the depression is formed as a bulge out at a direction towards inside the rim.

[0010] The predetermined distance can be greater at the distal end of the seam, it can be smaller at the proximal end of the seam or it can be smaller at the distal end of the seam and it can be greater at the proximal end of the seam or it can be at equal distances from both ends.

[0011] The depression forms a bulge out at a direction towards inside the rim. Thus, during the rotation of the drum, a factor which can lead to the unfixing of the seam by means of the outward centrifugal force is overcome by means of the depression which is in opposite direction.

[0012] The seam extends at an oblique direction to the rear wall. This provides the formation of the seam only with folding of the rear wall's corresponding rim and without folding of the cylindrical wall's edge part.

[0013] The seam comprises an inner layer pair and an outer layer pair arranged adjacent to each other. The layer pairs are obtained as a result of the folding of the rim or the edge onto each other or onto themselves respectively.

[0014] The depression is arranged at the inner layer pair. The inner layer pair comprises a fold of the seam close to the cylindrical wall; in other words, the inner layer pair comprises a fold of the seam facing inwardly.

[0015] Depression is imaged in both inner layer pair and outer layer pair. In this case, the part which exists between all of the two ends of all the layers comprising rim and edge is reinforced against the tensions which are in the seam unfixing direction.

[0016] The depression comprises an arc form. In this case, during the rotation of the drum, the tensions on the seam can be eliminated in the most effective manner.

[0017] There are spaced auxiliary impressions which are formed in the spring cross section form depth inside the depression.

[0018] In a preferred application of the method according to the invention, there is the process step of forming a depression between two opposite ends of the seam while providing axial alignment of the opposite ends.

[0019] Additional characteristics and advantages of the present invention will now be detailed with reference to the preferred and exemplary embodiments shown in the figures of the attached drawing.

[0020] In Figure 1, the perspective view of a front loading laundry machine drum whose rim and edge are seamed is given.

[0021] In Figure 2, the upper part view of the transverse cross section of a front loading laundry machine drum comprising seam's representative embodiment whose upper layer is flat is given.

[0022] In Figure 3, the upper part view of the transverse cross section of a front loading laundry machine drum comprising a representative embodiment of the seam, where the depression is folded onto itself and where it is imaged onto all of the spaced layers, is given.

[0023] In Figure 4, the upper part view of the transverse cross section of a front loading laundry machine drum comprising a representative embodiment of the subject matter seam, where the depression is imaged onto the layers which are folded onto themselves, is given.

[0024] In Figure 5, the perspective view of a drum, where an embodiment of the subject matter seam with an auxiliary impression which exists on the depression, is given.

[0025] In Figure 1, the perspective view of a drum which is used in a laundry machine and which comprises a representative embodiment of the subject matter seam 30 is given. A cylindrical wall 10, which is obtained as a result of the rounding and folding of a planar sheet, is joined by forming a seam 30 and a rear wall 20 from the circular edge 12 of the cylindrical wall 10. The seam 30 has a clamped engagement structure. The rear wall 20 comprises a rim 22 adjacent to the edge 12 of the cylindrical wall 10; and a cover 23 which covers the edge of the cylindrical wall 10. There are pluralities of spaced holes 40 on the cylindrical wall 10. The holes 40 provide the water inside the tube to reach inside the drum in the laundry machine (not illustrated in the figure).

[0026] In Figure 2, the zoomed cross sectional view of a representative embodiment of the seam 30 is given. Accordingly, along the periphery of the rear wall 20, the rim 22 is folded in a U like form towards the cylindrical wall 10. Afterwards, the corresponding edge 12 of the cylindrical wall 10 is joined with the rim 22. In the joined part, depression 35 is formed towards inside the cylindrical wall 10 with the help of a press member (not illustrated in the figure). The extension, which is positioned outwards from the depression 35, is folded onto itself in inverse "e" form and afterwards, it is engaged to the rim 22. Thus, the seam 30 is formed. The depression 35 is provided between the seam's 30 proximal end 31 which is close to the cylindrical wall 10 and a distal end 33 which is in the opposite direction.

[0027] The seam 30 is obtained by folding of the edge 12 and the rim 22 in U form so as to be adjacent to each other. Between the arms of the U form, the adjacent edge 12, facing outwardly, and the rim 22 extension provide an inner layer pair 34, and the outward facing extension thereof provides an outer layer pair 32. The depression 35 is provided at the inner layer pair 34. By means of this, the outer layer pair 32 of the seam 30 preserves a flat form and hides the seam 30 from outside.

[0028] In Figure 3, a different embodiment of the seam 30 is illustrated. Accordingly, for the formation of the seam 30, the peripheral edge 12 of the cylindrical wall 10 is folded from the end thereof in the form of a short hook. Accordingly, the rim 22 is firstly folded in a U like form and it encircles the hook form; and afterwards, the rim 22 extends towards the part where the rim 22 is folded from the cover 23, and it is folded inwardly on itself, and afterwards, the rim 22 enters inside the hook. By means of this, the distal end 33 has a five layer cross section. On the other hand, the proximal end 31 has a total of four layers, where one of the layers belongs to the edge 12 and where three of the layers belong to the rim 33. After the seam 30 is formed, the depression 36 is applied between the proximal end 31 and the distal end 33 so as to be closer to the proximal end 31. The depression 35 is imaged and thereby treated to all of the layers of the seam 30.

[0029] In Figure 4, the hook end where the rim 22 is formed is extended. Thus, the seam 30 comprises an edge 12 and a rim 22 folding respectively. The depression 35 is formed between the proximal end 31 and the distal end 33 so as to be closer to the proximal end 31.

[0030] In Figure 5, the perspective and zoomed view of the drum is given, where the rear wall 20 of the drum is viewable. Here, the rear wall 20 has a circular inlet 24 through which the laundry (not illustrated in the figure) is taken inside a cylindrical wall 10. On the seam 30, auxiliary impression 37 is applied in one each seal form so as to follow each other in a spaced manner. The auxiliary impression 37 is applied inside a semi-circular depression 35 in a prismatic form and it is applied orthogonally so as to be in opposite direction to the concavity thereof.

[0031] While the drum is being produced, spaced holes 40 are formed onto a flat sheet and afterwards, the flat sheet is folded until the front surfaces join so as to form the cylindrical wall 10. The circular rear wall 20 is folded outwardly so as to form a rim 22. The peripheral edge 12 of the cylindrical wall 10 is joined with the rim 22 and at least one of these 12, 22 is folded one above the other so as to form a U form. Thus, the rim 22 is engaged with the edge. Afterwards, the press member 50, which is a wheel-like member, applies pressure to the seam 30 between the proximal and distal ends 31, 33 along the peripheral edge 12 and thereby the depression 35 is formed. After this process, the seam 30 can be formed by the folding of the end of the rim 22 or the edge 12 once more onto itself.

[0032] The auxiliary impression 37 can be formed in pluralities of geometric shapes (for instance, rectangular, spherical, etc.) which are in the same direction with or in opposite direction to the depression 35.

LIST OF REFERENCE NUMERALS

10	Cylindrical wall	33	Distal end
12	Edge	34	Inner layer pair
20	Rear wall	35	Depression
22	Rim	37	Auxiliary impression
23	Cover	40	Hole
24	Inlet	50	Press member
30	Seam		
31	Proximal end		

(continued)

32	Outer layer pair

Claims

1. A front loading laundry machine with a drum comprising a cylindrical wall (10); a rear wall (20) secured to the cylindrical wall (20) and a seam (30) between an edge (12) of the cylindrical wall (10) and a rim (22) of the rear wall (20), wherein at least one depression (35) is provided at a predetermined distance between a distal end (33) and proximal end (31) of the seam (30), and wherein the depression (35) is formed along the seam (30), **characterized in that** the depression (35) forms a bulge out at a direction towards inside the rim (22).

2. A front loading laundry machine according to any of the preceding claims, wherein the seam (30) extends at an oblique direction to the rear wall (20).

3. A front loading laundry machine according to any of the preceding claims, wherein the seam (30) comprising an inner layer pair (34) and outer layer pair (32) arranged adjacent to each other.

4. A front loading laundry machine according to claim 3, wherein the depression (35) is arranged at the inner layer pair (34).

5. A front loading laundry machine according to one of claims 3 and 4, wherein depression (35) is imaged in both inner layer pair (34) and outer layer pair (32).

6. A front loading laundry machine according to any of the preceding claims, wherein the depression (35) comprises an arc form.

7. A front loading laundry machine according to claim 6, wherein spaced auxiliary impressions (37) are provided which are formed in the spring cross section form depth inside the depression (35).

8. A method of drum production for a front loading laundry machine comprising the steps of securing a rear wall (20) to a cylindrical wall (10) at the edge (12) thereof in a sealed manner by means of folding at least a rim (22) of the rear wall (20) and the cylindrical wall (10) adjacent to the corresponding edge (12) which define a seam (30); forming at least one depression (35) along the seam (30) at a predetermined distance between a distal end (33) and proximal end (31) of the seam (30), **characterized in that** the depression (35) is formed as a bulge out at a direction towards inside the rim (22).

Patentansprüche

1. Von vorne beschickbares Wäschebehandlungsgerät mit einer Trommel, die umfasst: eine zylindrische Wand (10), eine Rückwand (20), die an der zylindrischen Wand (10) gesichert ist, sowie eine Naht (30) zwischen einer Kante (12) der zylindrischen Wand (10) und einem Rand (22) der Rückwand (20), wobei mindestens eine Vertiefung (35) in einer vorbestimmten Distanz zwischen einem distalen Ende (33) und einem proximalen Ende (31) der Naht (30) vorgesehen ist, und wobei die Vertiefung (35) entlang der Naht (30) ausgebildet ist, **dadurch gekennzeichnet, dass** die Vertiefung (35) in einer Richtung hin zum Inneren des Randes (22) eine Auswölbung bildet.

2. Von vorne beschickbares Wäschebehandlungsgerät nach Anspruch 1, wobei sich die Naht (30) in einer schräg verlaufenden Richtung zur Rückwand (20) erstreckt.

3. Von vorne beschickbares Wäschebehandlungsgerät nach einem der vorstehend aufgeführten Ansprüche, wobei die Naht (30) ein Innenschichtpaar (34) und ein Außenschichtpaar (32) umfasst, die angrenzend aneinander angeordnet sind.

4. Von vorne beschickbares Wäschebehandlungsgerät nach Anspruch 3, wobei die Vertiefung (35) am Innenschichtpaar (34) angeordnet ist.

5. Von vorne beschickbares Wäschebehandlungsgerät nach einem der Ansprüche 3 und 4, wobei die Vertiefung (35) sowohl im Innenschichtpaar (34) als auch im Außenschichtpaar (32) abgebildet ist.

6. Von vorne beschickbares Wäschebehandlungsgerät nach einem der vorstehend aufgeführten Ansprüche, wobei die Vertiefung (35) eine Bogenform aufweist.

7. Von vorne beschickbares Wäschebehandlungsgerät nach Anspruch 6, wobei beabstandete Hilfseindrücke (37) vorgesehen sind, die in der Tiefe der vorspringenden Querschnittsform im Inneren der Vertiefung (35) ausgebildet sind.

8. Verfahren zur Trommelherstellung für ein von vorne beschickbares Wäschebehandlungsgerät, das folgende Schritte umfasst: Sichern einer Rückwand (20) an einer zylindrischen Wand (10) an der Kante (12) davon in einer abgedichteten Weise, indem mindestens ein Rand (22) der Rückwand (20) und die zylindrische Wand (10) angrenzend an die entsprechende Kante (12) durch Falzung miteinander verbunden werden, so dass dadurch eine Naht (30) definiert wird; und Bilden von mindestens einer Vertie-

fung (35) entlang der Naht (30) in einer vorbestimmten Distanz zwischen einem distalen Ende (33) und einem proximalen Ende (31) der Naht (30), **dadurch gekennzeichnet, dass** die Vertiefung (35) als eine Auswölbung in einer Richtung hin zum Inneren des Randes (22) ausgebildet wird.

Revendications

1. Machine à laver à chargement frontal munie d'un tambour comprenant une paroi cylindrique (10) ; une paroi arrière (20) fixée à la paroi cylindrique (10) et un joint (30) entre un bord (12) de la paroi cylindrique (10) et un rebord (22) de la paroi arrière (20), dans laquelle au moins une dépression (35) est disposée à une distance prédéterminée entre une extrémité distale (33) et une extrémité proximale (31) du joint (30), et dans laquelle la dépression (35) est formée le long du joint (30), **caractérisée par le fait que** la dépression (35) forme une protubérance dirigée vers l'intérieur du rebord (22).

2. Machine à laver à chargement frontal selon l'une quelconque des revendications précédentes, dans laquelle le joint (30) s'étend dans une direction oblique par rapport à la paroi arrière (20).

3. Machine à laver à chargement frontal selon l'une quelconque des revendications précédentes, dans laquelle le joint (30) comprend une paire de couches internes (34) et une paire de couches externes (32) disposées adjacentes entre elles.

4. Machine à laver à chargement frontal selon la revendication 3, dans laquelle la dépression (35) est disposée sur la paire de couches internes (34).

5. Machine à laver à chargement frontal selon l'une quelconque des revendications 3 et 4, dans laquelle une dépression (35) est figurée autant dans la paire de couches internes (34) que dans la paire de couches externes (32).

6. Machine à laver à chargement frontal selon l'une quelconque des revendications précédentes, dans laquelle la dépression (35) comprend une forme d'arc.

7. Machine à laver à chargement frontal selon la revendication 6, dans laquelle des empreintes auxiliaires (37) espacées entre elles sont fournies, qui sont formées dans la profondeur de forme de la section de ressort à l'intérieur de la dépression (35).

8. Procédé de production de tambour pour une machine à laver à chargement frontal comprenant les étapes de fixer une paroi arrière (20) à une paroi cylindrique (10) au bord (12) de cette dernière de manière étanche en pliant un rebord (22) de la paroi arrière (20) et de la paroi cylindrique (10) adjacentes au bord correspondant (12) qui définissent un joint (30), former au moins une dépression (35) le long du joint (30) à une distance prédéterminée entre une extrémité distale (33) et une extrémité proximale (31) du joint (30), **caractérisé par le fait que** la dépression (35) a la forme d'une protubérance dirigée vers l'intérieur du rebord (22).

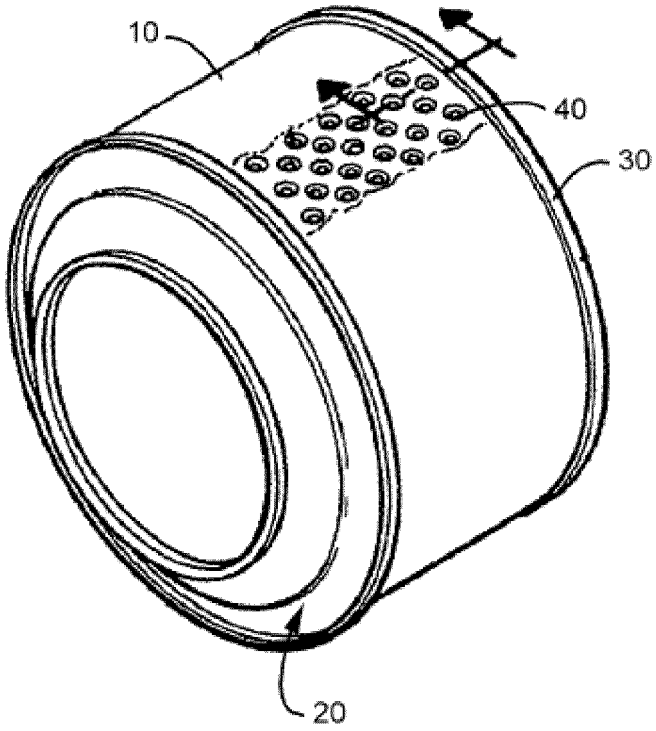

FIG 1

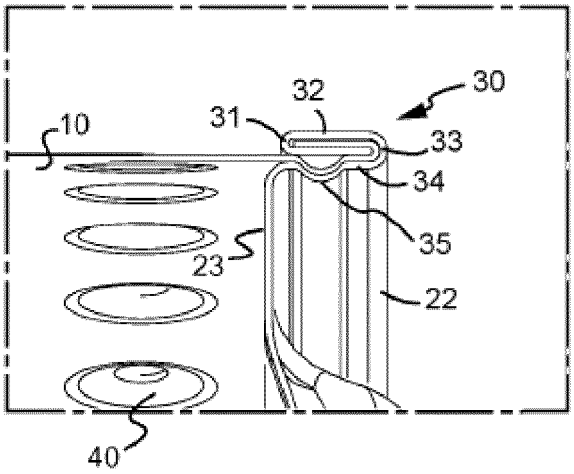

FIG 2

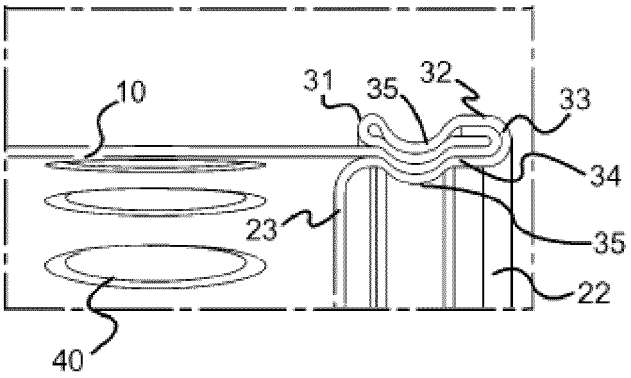

FIG 3

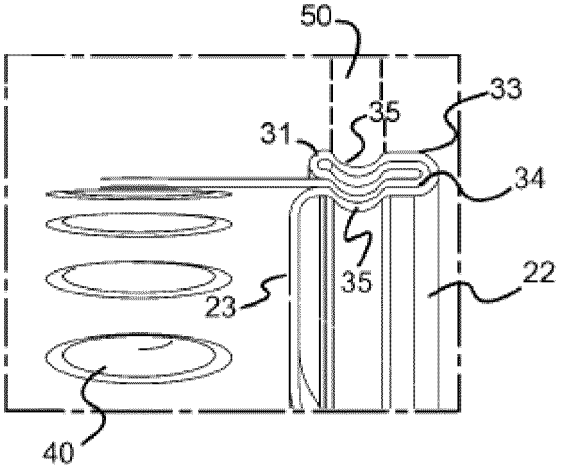

FIG 4

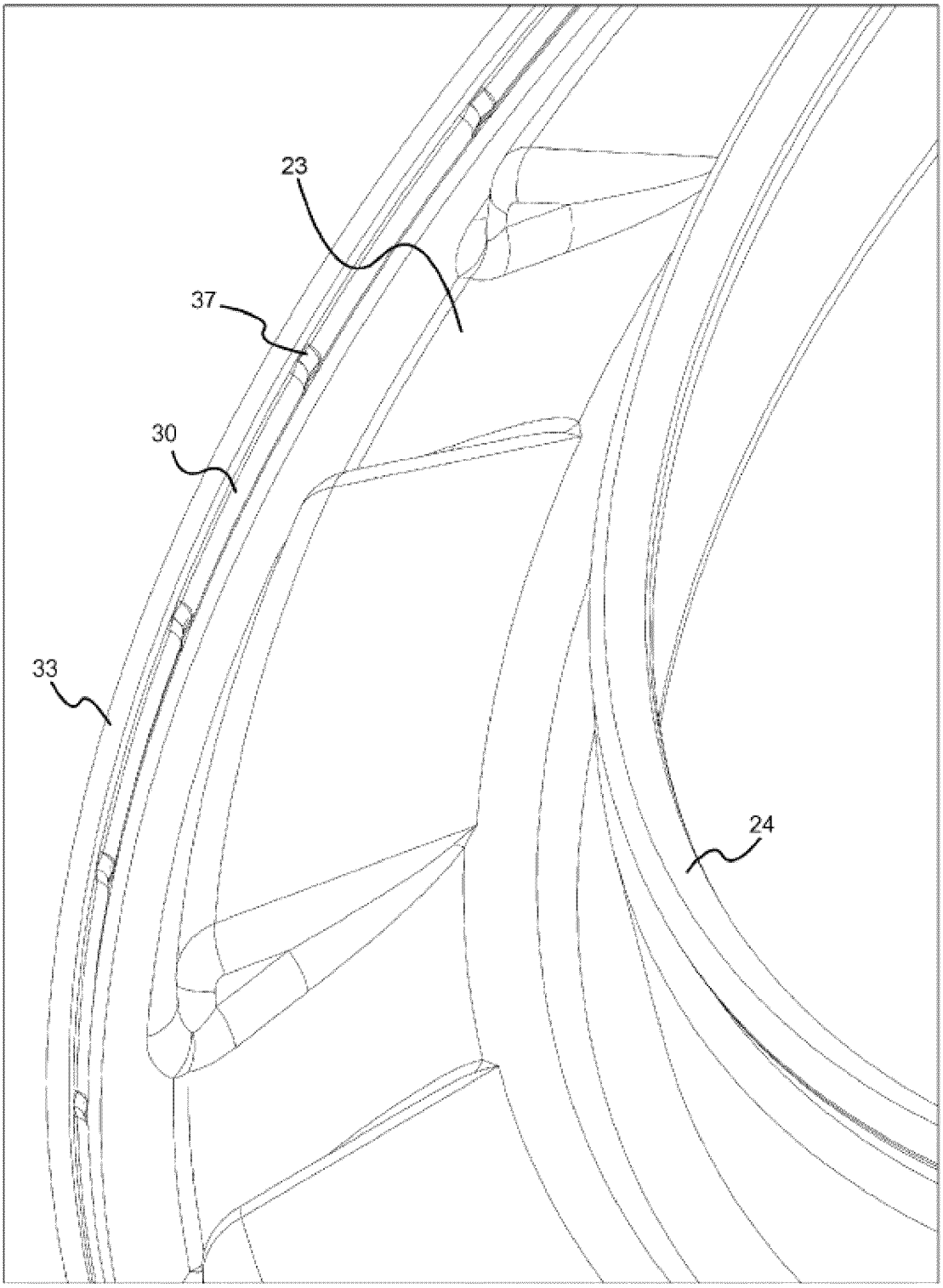

FIG 5

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

- EP 1520067 B1 **[0002] [0004]**