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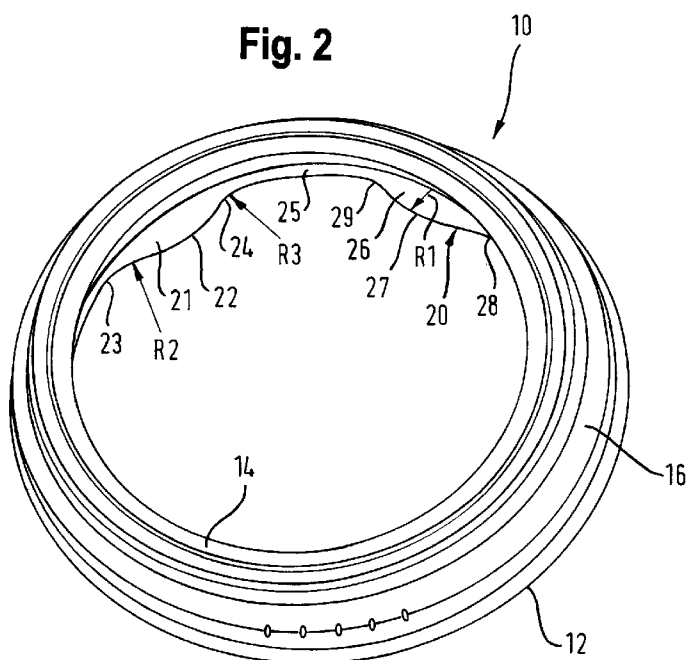
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(54) Title: FRONT LOADING WASHING MACHINE HAVING A GASKET



(57) Abstract: The present invention relates to a front loading washing machine 1 comprising a front panel 4 with a door opening 3 providing access to a rotating drum 6 where clothes to be washed are placed; a tub 5 which encompasses the periphery of the drum 6 and which has an outlet 8 facing the door opening 3; a gasket 10 providing sealing between the tub and the door opening 4 by encompassing the door opening 4 from a front flange 14 and by encompassing the outlet 8 from a rear flange 12 peripherally; at least one first flap 21 which extends radially inwards from the rear flange 12 of the gasket 10; and at least one curvilinear edge 22 which forms a radial inward end of the first flap 21.



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FRONT LOADING WASHING MACHINE HAVING A GASKET

The present invention relates to front loading washing machines/drying machines which has a gasket providing sealing between the front door and the washing drum.

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In front loading washing machines/drying machines, there are gaskets providing sealing between the door opening the front panel has, and the washing drum. The gasket prevents the water coming from the drum and the front panel to run over outwardly together with the help of the front door closing the door opening. The gasket has front and rear flanges which are fixed to an outlet facing the door opening of a tub encompassing the drum and which are fixed to the door opening. Between the front and the rear flanges, there is an elastic part which compensates the movement of the drum during processes like washing or drying. During the cloth washing process, since the drum rotates, the clothes may advance towards the gasket and they may get stuck. In order to eliminate this situation, kickers are formed on the gasket's rear flange which is fixed to the tub. Kickers are described in the US patent US7357006. A flap of the kicker pushes a stuck cloth back inside the drum using the rotation movement of the drum.

The object of the subject matter invention is to decrease the damage given to the cloth by the gasket in a front loading washing machine.

In order to reach said object, the present invention is a front loading washing machine comprising a front panel with a door opening which provides access to a rotating drum where the clothes to be washed are placed; a tub which encompasses the periphery of the drum and which has an outlet facing the door opening; a gasket providing sealing between the tub and the door opening by encompassing the door opening from a front flange and by encompassing the outlet from a rear flange peripherally; at least one first flap which extends radially inwards from the rear flange of the gasket and which provides the pushing of the clothes to be washed towards the drum during the rotation of the drum; and at least one curvilinear edge which forms the radial inward end of the first flap. Since the curvilinear edge prevents the clothes from being caught, during rotation, the clothes which advance from the drum to the gasket or which get stuck between the drum and the gasket are not torn when they are passing from the flap's curvilinear edge which is on the

radial inward end. Thus, the first flap sends the cloth back inside the drum by means of a soft response. In a preferred embodiment, the first flap is made of for instance, plastic, rubber, etc. material which is flexible so as to form an arc.

- 5 In a preferred embodiment of the present invention, there is at least one second flap which has a distance with the first flap the kicker has and which extends radially inwards. The second flap increases the total flap distance and it provides the pushing of the clothes in a bigger part at the rear flange outlet.
- 10 In a preferred embodiment of the present invention, the second flap comprises at least one second curvilinear edge forming the radial inward end. By means of this, there is also no obstacle on the second flap which will lead to the clothes to get caught and the second flap realizes the pushing function in a similar manner to the first flap.
- 15 In a preferred embodiment of the present invention, there is a bridge which joins the first flap's edge and the second flap's edge facing each other. The bridge provides the cloth load arriving to the first or second flap to be shared by the other flap. In this case, the bridge provides a serially connected arc characteristic for a flexible flap structure.
- 20 In a preferred embodiment of the present invention, the first and the second flap are symmetrical with respect to an axis dividing the bridge in two parts from the middle thereof. Thus, by means of the structure joint by the bridge, the forces coming from the clothes are distributed to the flaps proportionally with the distance.
- 25 In a preferred embodiment of the present invention, the curvilinear edge is in the form of a circle arc. Thus, in case the cloth, which advances from the outlet to the gasket because of the rotation of the drum, contacts to the flap from the curvilinear edge thereof, the cloth is pushed towards the drum by means of a force increasing along the circle arc.
- 30 In a preferred embodiment of the present invention, there is a first ring in circle arc form which exists at the first flap's transverse end adjacent to the rear flange, and/or there is a second ring in circle arc form which exists at the opposite end thereof. Since the ring parts where the flap joins with the rear flange is in the form of a circle arc, the clothes which are

rotated by the drum are prevented from being caught between the flap and the rear part, and said clothes slide on the circle arc and they return to the drum.

In a preferred embodiment of the present invention, said second flap comprises a first ring
5 in circle arc form which exists at the second flap's end adjacent to the rear flange, and/or there is a second ring in circle arc form which exists at the opposite end thereof. By means of this, cloth is prevented from being caught between the second flap and the rear flange.

10 In a preferred embodiment of the present invention, the radial length of the bridge is smaller than the radial length of the first and/or second flap. Thus, the edges of the flaps' parts which are longer than the bridge can realize the pushing function separately.

15 In a preferred embodiment of the present invention, the circle arc diameter of the curvilinear edge and/or the second curvilinear edge is greater than the diameter of the first and/or second ring diameter. By means of this, the flaps flex in a simpler manner.

In a preferred embodiment of the present invention, the length of said curvilinear edge and/or said second curvilinear edge is substantially equal to the length of the
20 corresponding first and/or second flap. In other words, the curvilinear edge extends along the flap's end close to the cloth. Therefore, the clothes are prevented from being caught along the edge thereof which contacts with the clothes. In a probable embodiment of the subject matter invention, said circular edge has a C shaped cross section. Thus, the cloth advancing from the drum towards the outlet is prevented from being caught, and
25 moreover, it is prevented from being torn.

The additional characteristics and advantages of the subject matter invention are disclosed from the example embodiments giving reference to the accompanied figures.

30 In Figure 1a, the lateral cross section a front loading washing machine comprising a representative embodiment of the subject matter gasket is given.

In Figure 1b, the frontal perspective view of a gasket is given which is used in the front loading washing machine illustrated in Figure 1.

In Figure 2, a frontal perspective view of an alternative embodiment of the subject matter gasket is given.

- 5 In Figure 1a, the lateral representative view of a front loading washing machine 1 is given. There is a front panel 2 which forms the front face of the rectangular washing machine's 1 body, which is planar and which has a door opening 3 with a circular hole form thereon. A circular front door 4 closes the door opening 3. The door opening 3 opens to a washing drum 6 carried inside the washing machine 1 body. The drum 6 is in the form of a
- 10 horizontal cylinder which is perforated and which has a circular opening on a front face thereof facing the door opening 3. The other rear surface of the drum 6 is connected to a motor 7 from the center thereof. The motor 7 rotates the drum 6 in the horizontal axis during processes like washing, rinsing and drying. A tub 5 encompasses the drum 6 peripherally so that there is a space in between and so that an outlet 8 thereof facing the
- 15 door opening 3 is open. The washing and rinsing liquids and the liquids formed during drying are inside the tub 5. Therefore, in order to prevent the leakage of the washing or drying liquids through the space between the door 4 and the door opening 3, a gasket 10 is fixed between the door opening 3 and the tub 5 outlet 8.
- 20 According to Figure 1b, the gasket 10 has a similar circular form to the door opening 3 and the tub's 5 outlet 8 facing the door opening 3. In order for the gasket 10 to be fixed to the front door 4, there is a front flange 14 bent outwardly. The front flange 14 has two extensions. The front flange 14 is fixed to the front panel 2 from the outside by means of the outer extension and from inside by means of the inner extension. In order for the
- 25 gasket 10 to hold onto the tub 5, there is a rear flange 12 bent outwardly on the rear end of the tub 5. The rear flange 12 has three extensions. The rear flange 12 is fixed to the tub 5 from the outlet's 8 outer edge by means of the outermost extension and it is fixed from the inner edge thereof by means of the adjacent extension. The rear flange's extension which is far away from the outlet 8 and which is close to the door opening 3 forms a
- 30 circular flange and prevents the clothes to go out. Though, the clothes can get stuck between the gasket 10 and the drum's 6 peripheral edge close to the outlet 8.

A kicker 20 formed at the upper part of the rear flange 12 is illustrated in Figures 1b and 2. The kicker 20 is formed so as to comprise a first flap 21 extending radially inwards the tub

5 from the rear flange 12 edge thereof on the upper part of a horizontal axis dividing the circular gasket 20 in the middle, and so as to comprise an auxiliary second flap 26 similar to said first flap 21. The first and the second flaps 21, 26 are sequenced adjacently so as to have a distance in between. A bridge 25 joins the first and second flap's 21, 26 edges facing each other. The gasket 1 and the kicker 20 which is the extension of the gasket 10 are made of a flexible material.

The first flap 21 has a curvilinear edge 22 extending inwards the rear flange 12 in other words, extending radially inwards. The first flap 21 is tab with a curvilinear edge 22 which changes radially in the form of an arc of a circle whose center is on the rear flange 12 plane. The first ring 23 and the second ring 24 which exist on the two ends where the first flap 21 contacts with the rear flange 12 are formed as a circle arc with opposite direction to the circle arc of the curvilinear edge 22 of the first flap 21, however, the first ring 23 and the second ring 24 are formed with recesses.

The second flap 26 is symmetric to the first flap 21 with respect to an orthogonal axis passing in the middle of the distance between the first flap 21 and the second flap 26. The second flap 26 is a tab which forms the second curvilinear edge 27 and which extends radially inwards. The second curvilinear edge 27 is in the form of a circle arc. The two edges of the second flap 26 intersecting with the rear flange 12 form the first ring 28 and the second ring 29 respectively. The first and the second rings 28 are formed with one each recess in circle arc form which both have opposite direction with the second curvilinear edge 27.

In the present embodiment, the first and the second flaps 21, 26 have equal edge radius R1. The edge radius R1 center is on the rear flange 12 plane, however, it is outside of the covered area. The first and the second ring radiuses R2, R3 which the circular recess forming the first and second rings 28, 29 has is on the rear flange 12 plane and they are inside the covered area. In the present embodiment, the first and second ring radiuses R2, R3 of both the first and the second flaps 21, 26 are equal to each other.

After the front door 4 is opened, the clothes (not illustrated in the figure) to be washed are taken into the drum 6 through the door opening 3. The washing liquid is transferred from the tub 5 to the drum 6 by means of the perforated surface. During the rotation of the

drum 6 by means of the motor 7, the washing process is executed. Meanwhile, the drum 6 moves and the liquid in the tub 5 has a trend to go outwardly from the front door 4. The gasket 10 extending between the front door 4, the door opening 3 and the tub 23 prevents this. The movement of the drum 6 in the three axes does not give damage to the gasket 10 by means of the flexing part 16 of the gasket 10. During rotation, when the clothes inside the drum 6 direct outwardly or when they are caught by the gasket, if they are in the bottom part of the rear flange 12, they are pushed back into the drum by means of the rear flange's 12 flange structure belonging to the kicker 20. However, when the clothes lifted up by the drum 6 reach the rear flange 12, in this part they are pushed back into the drum 6 by means of the first and second flaps 21, 26 which extend into the rear flange 12 and by means of the bridge 25 in between. The pushing process is realized by flexing and thereby by applying opposite force, since the kicker 20 has a flexible structure like plastic and rubber. The clothes contact to the curvilinear edge 22, 27 at the first and second flap's 21, 26 end part extending into the rear flange 12, thereby the clothes contact to the circular form and they are pushed into the drum. Since the curvilinear edge 22 does not comprise any cornered form, the clothes are not caught by the first or second flap 21, 26. The curvilinear edge 22 forms curved structures similar to an S, where one of the curved structures is formed with the following first ring 23 and the other curved structure is formed with the following second ring 24, and one curved structure is wide and the other curved structure is narrow. In alternative embodiments, more than two flaps can be used, for instance, three or four flaps can be used. Besides, the curvilinear edge 22 may be formed of different curves, for instance hyperbolic etc. curves instead of circle arc or the curvilinear edge 22 may comprise these curves. Some part of the first and/or second flap 21, 26 can be formed so as not to face the outlet 8, however, it can be formed so as to face inside the gasket 10 or face inside the drum 6.

REFERENCE NUMERALS

1 Washing machine	20 Kicker
2 Front panel	21 First flap
3 Door opening	22 Curvilinear edge
4 Front door	23 First lap
5 Tub	24 Second lap
6 Drum	25 Bridge
7 Motor	26 Second flap
8 Outlet	27 Second curvilinear edge
10 Gasket	28 First ring
12 Rear flange	29 Second ring
14 Front flange	R1 Edge radius
16 Flexing part	R2 First ring radius
	R3 Second ring radius

CLAIMS

- 5 1. A front loading washing machine (1) comprising a front panel (4) with a door opening (3) providing access to a rotating drum (6) where clothes to be washed are placed; a tub (5) which encompasses the periphery of the drum (6) and which has an outlet (8) facing the door opening (3); a gasket (10) providing sealing between the tub (5) and the door opening (4) by encompassing the door opening
- 10 (4) from a front flange (14) and by encompassing the outlet (8) from a rear flange (12) peripherally; at least one first flap (21) which extends radially inwards from the rear flange (12) of the gasket (10) and which provides pushing the clothes to be washed towards the drum (6) during the rotation of the drum (6), **characterized by** comprising at least one curvilinear edge (22) which forms a radial inward end of
- 15 the first flap (21).
2. A front loading washing machine (1) according to claim 1, wherein at least one second flap (26) is provided which has a distance with the first flap (21) and which extends radially inwards through the rear flange (12).
- 20 3. A front loading washing machine (1) according to claim 2, wherein the second flap (26) comprises at least one second curvilinear edge (27) forming the radial inward end.
- 25 4. A front loading washing machine (1) according to one of claims 2 and 3, wherein a bridge (25) is provided which joins the first flap's (21) edge and the second flap's (26) edge facing each other.
- 30 5. A front loading washing machine (1) according to claim 4, wherein the first and the second flap (21, 26) are symmetrical with respect to an axis dividing the bridge (12) in two parts from the middle thereof.
6. A front loading washing machine (1) according to any of the preceding claims, wherein the curvilinear edge (22) is in the form of a circle arc.

7. A front loading washing machine (1) according to any of the preceding claims, wherein a first ring (23) in circle arc form is provided at the first flap's (21) transverse end adjacent to the rear flange (12) and/or a second ring (24) in circle arc form is provided at the opposite end thereof.

8. A front loading washing machine (1) according to claim 3, wherein said second flap (21) comprises a first ring (28) in circle arc form which exists at the second flap's (21) end adjacent to the rear flange (12) and/or a second ring (29) in circle arc form which exists at the opposite end thereof.

9. A front loading washing machine (1) according to claim 4, wherein the radial length of the bridge (25) is smaller than the radial length of the first and/or second flap (21, 26).

10. A front loading washing machine (1) according to one of claims 6 and 8, wherein the circle arc diameter of the curvilinear edge (22) and/or the second curvilinear edge (27) is greater than the diameter of the first and/or second ring (24, 29) diameter.

11. A front loading washing machine (1) according to any of the preceding claims, wherein the length of said curvilinear edge (22) and/or said second curvilinear edge (27) is substantially equal to the length of the corresponding first and/or second flap (21).

12. A front loading washing machine (1) according to any of the preceding claims, wherein said curvilinear edge (22) has a C shaped cross section.

Fig. 1a

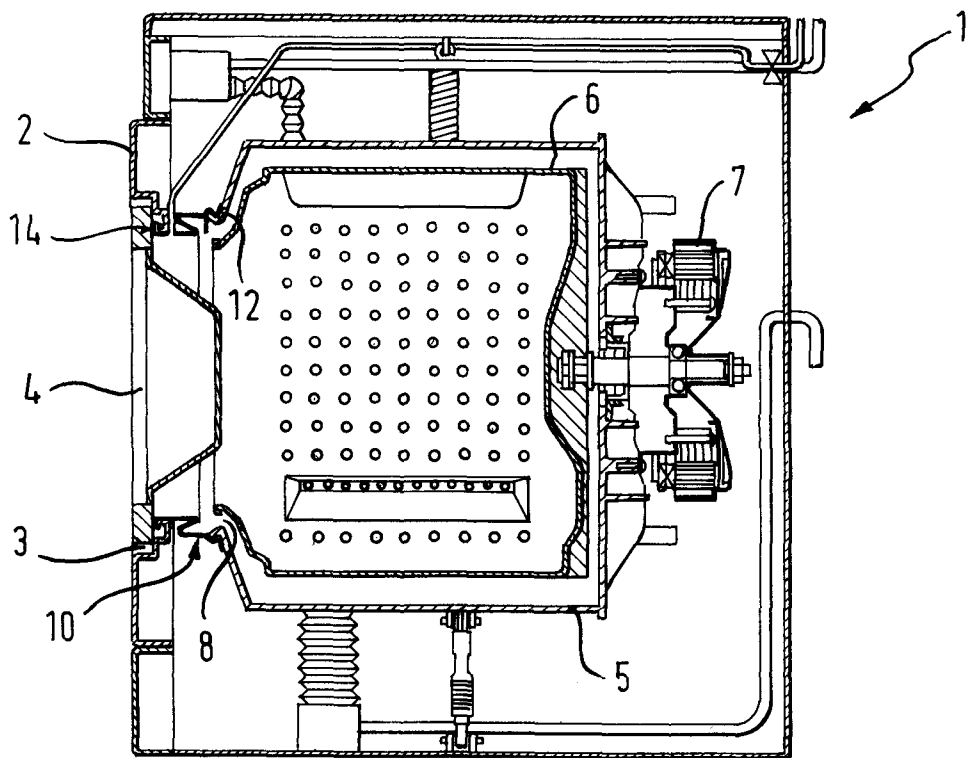


Fig. 1b

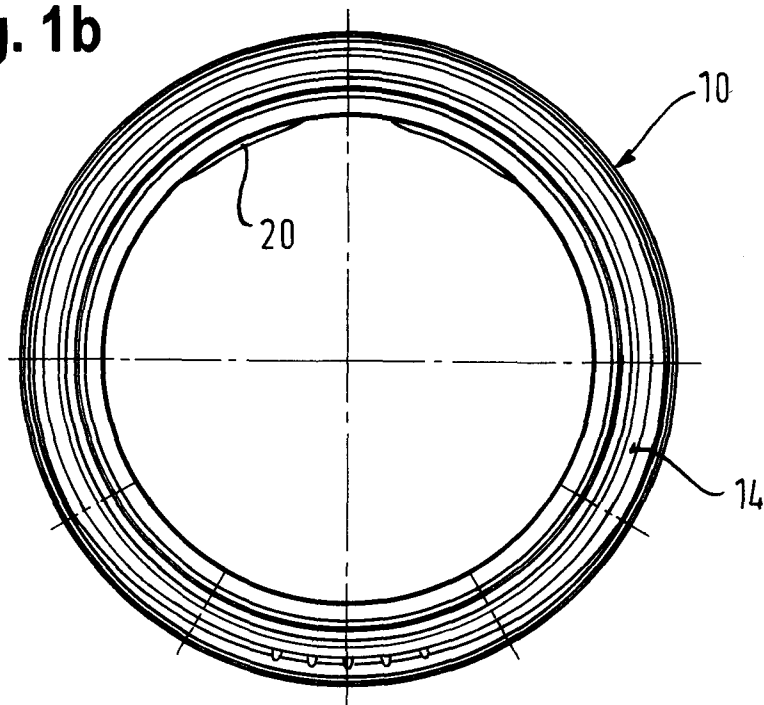
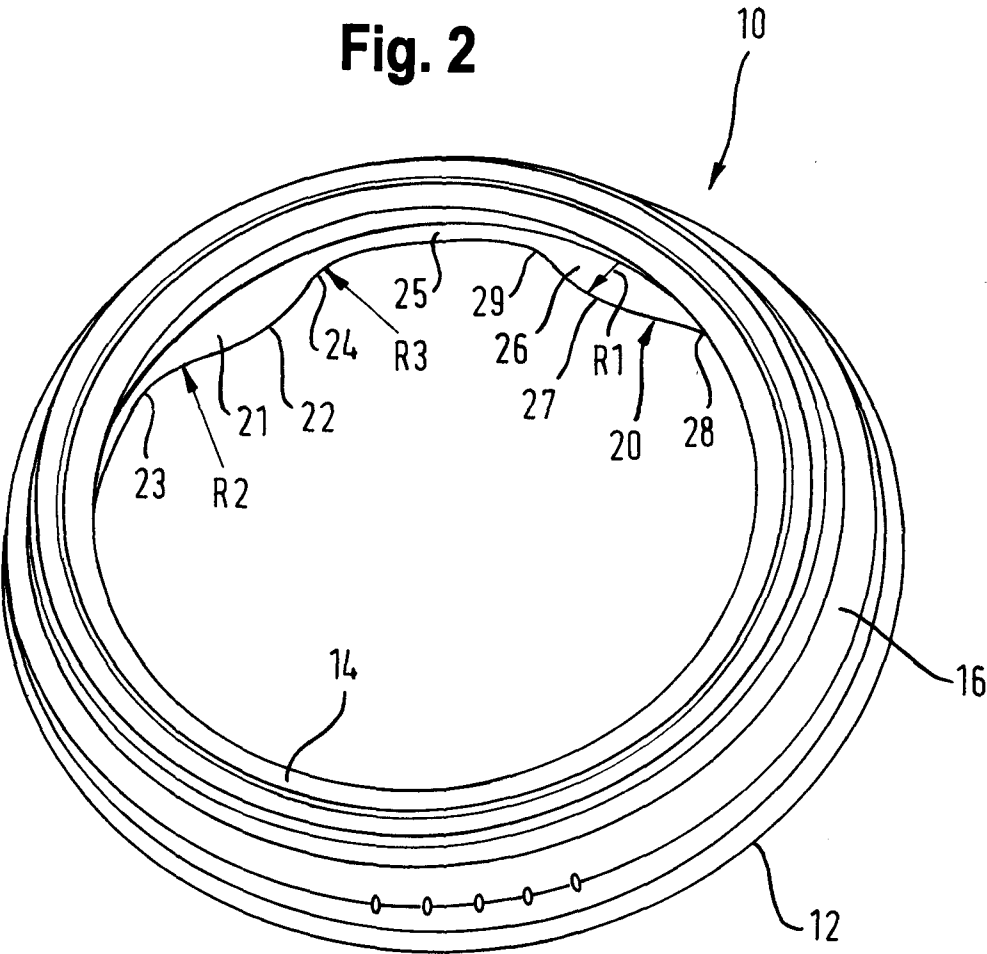


Fig. 2



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/070206

A. CLASSIFICATION OF SUBJECT MATTER
INV. D06F37/26
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 078 777 A1 (ELECTROLUX HOME PROD CORP [BE]) 15 July 2009 (2009-07-15) paragraphs [0018] - [0020]; figures -----	1
A	US 2005/178169 A1 (KIM JAE K [KR] ET AL KIM JAE KYUM [KR] ET AL) 18 August 2005 (2005-08-18) paragraphs [0034] - [0036]; figures -----	1-12
A	WO 2007/063072 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]; GRACIA BOBED ISMAEL [ES]) 7 June 2007 (2007-06-07) paragraph [0013]; figure 2 -----	1-12



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2010/070206

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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