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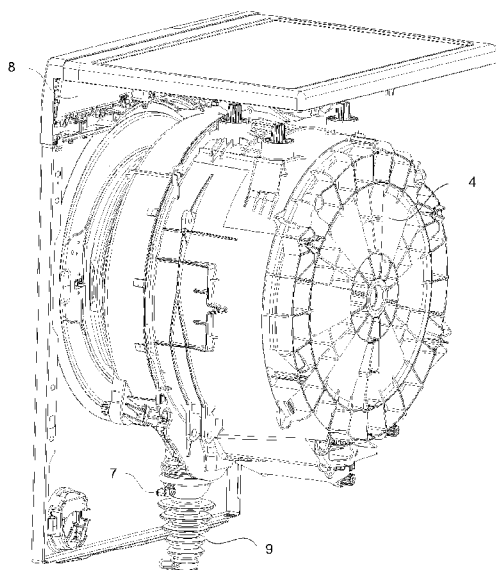
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(54) Title: A WASHING MACHINE

Figure 3



(57) Abstract: The present invention relates to a washing machine (1) comprising a body (2); a drum (3) that is disposed in the body (2) and wherein the laundry is placed; a tub (4) wherein the drum (3) moves; a door (5) that provides access into the drum (3); a window (6) that is disposed on the door (5) and that is produced from a transparent material, and a pressure sensor (7) that is disposed in the body (2) and that detects the pressure of the air inside the tub (4).

Description**A WASHING MACHINE**

- [0001] The present invention relates to a washing machine with increased safety.
- [0002] The door of the washing machines is generally composed of an inner frame, an outer frame and a window that is disposed between the said two frames, that enables the laundry to be viewed and that is produced from a transparent material such as glass. While being fixed between the frames, the window can be subjected to tensions and impacts, which may cause the window produced from a delicate material to be damaged. Moreover, external factors such as nonhomogeneous stress tensions occurring on the surface during production, foreign materials in the composition and cracks occurring on the surface as a result of utilization also cause damage and breaking of the window. The breaking of the window during the washing process may cause the washing machine and the laundry in the drum to be damaged. Therefore, a washing machine is required, that minimizes the possible damages in case of the breaking of the window.
- [0003] In the state of the art International Patent Document No. WO2015165532, a washing machine wherein the breaking of the window can be detected by means of a conductive element disposed on the window. In case of the breaking of the window, security measures such as stopping the washing mode, informing the user and discharging the wash water are taken.
- [0004] The aim of the present invention is the realization of a washing machine with improved security.
- [0005] The washing machine realized in order to attain the aim of the present invention, explicated in the claims, comprises a body; a drum wherein the laundry to be washed is placed; a tub wherein the drum is rotated; a door that provides access into the drum; a window that is disposed on the door and that is produced from a transparent material so as to allow the laundry in the drum to be viewed, and a pressure sensor that is positioned in the body so as to contact the air in the tub and that measures the pressure of the air in the tub.
- [0006] The washing machine of the present invention comprises a control unit that detects that the window has been broken in case there is a sudden

change in the pressure of the air in the tub by means of the data received from the pressure sensor. Thus, the breaking of the window can be easily detected and the control unit controls the operational status of the washing machine and takes the necessary security measures. The pressure sensor can be mounted onto any structure disposed in the body so as to be in fluid communication with the tub and thus, the production limitations are eliminated.

- [0007] In an embodiment of the present invention, the pressure sensor is disposed on the tub. Thus, the pressure sensor is disposed in the body so as not to be seen by the user and does not disrupt the outer appearance of the washing machine and especially of the door. Thereby, esthetic concerns are prevented.
- [0008] In another embodiment of the present invention, the pressure sensor is disposed on a water conduit that enables the water to be used in the washing process to be delivered into the tub or enables the water used in the washing process to be discharged from the tub. Thus, the mounting of the pressure sensor is facilitated.
- [0009] In another embodiment of the present invention, the pressure sensor enables the height of the water taken into the tub to be determined. Thus, the breaking of the window can be detected by means of the existing pressure sensor that determines the level of the water in the tub and the need for installing an additional pressure sensor into the body is eliminated.
- [0010] In another embodiment of the present invention, the control unit enables the drum to be kept stationary when the breaking of the window is detected during the washing process. Thus, the laundry is prevented from hitting the window, the shattering of the window and the deformation of the laundry are prevented.
- [0011] In another embodiment of the present invention, the control unit enables the water in the tub to be discharged when the breaking of the window is detected during the washing process. Thus, the water is prevented from flowing out of the broken window.
- [0012] By means of the present invention, without the need for a complex and

costly sensor structure, the breaking of the window is detected and ease of production and cost savings are provided.

[0013] The washing machine realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

[0014] Figure 1 – is the perspective view of the washing machine related to an embodiment of the present invention.

[0015] Figure 2 – is the partial perspective view of the washing machine related to an embodiment of the present invention.

[0016] Figure 3 – is the partial perspective view of the washing machine related to another embodiment of the present invention.

[0017] Figure 4 – is the partial perspective view of the washing machine related to another embodiment of the present invention.

[0018] The elements illustrated in the figures are numbered as follows:

1. Washing machine
2. Body
3. Drum
4. Tub
5. Door
6. Window
7. Pressure sensor
8. Control unit
9. Water conduit

[0019] The washing machine (1) comprises a body (2); a drum (3) that is disposed in the body (2) and wherein the laundry is placed; a tub (4) wherein the drum (3) moves; a door (5) that provides access into the drum (3); a window (6) that is disposed on the door (5) and that is produced from a transparent material, and a pressure sensor (7) that is disposed in the body (2) and that detects the pressure of the air inside the tub (4). The laundry to be washed is placed into the drum (3) through an opening arranged on the body (2) and the door (5) leak-proofingly closes the opening.

[0020] The washing machine (1) of the present invention comprises a control unit (8) that detects whether the window (6) has been broken by monitoring the

data received from the pressure sensor (7). The pressure sensor (7) can be disposed on the bellows or the window (6) so as to contact the air inside the tub (4) or on components such as detergent drawer that are connected in fluid communication with the tub (4). By means of the data received from the pressure sensor (7), the control unit (8) monitors the change in the air pressure in the tub (4). In case the window (6) breaks, the door (5) loses its leak-proofing feature and a sudden pressure change occurs in the drum (3). Upon detecting a sudden decrease in the air pressure in the tub (4) within a predetermined time period during the washing process, the control unit (8) determines that the window (6) has been broken and prevents the laundry and the washing machine (1) from being damaged by stopping the ongoing washing process. Thus, the breaking of the window (6) can be easily detected by means of the pressure sensor (7).

- [0021] In another embodiment of the present invention, the pressure sensor (7) is disposed on the tub (4) (Figure 2). The pressure sensor (7) is preferably disposed on the upper side of the tub (4) so as not to contact with the water during the washing process. Thus, the pressure sensor (7) is positioned in the body (2) at a region that cannot be accessed by the user and measurement errors that may arise due to usage errors such as covering the pressure sensor (7), etc. are prevented.
- [0022] In another embodiment of the present invention, the pressure sensor (7) is disposed on a water conduit (9) that provides the delivery of water into the tub (4) or the discharge of the water inside the tub (4) (Figure 3). Since the water conduit (9) is connected to the tub (4) in fluid communication, the pressure of the air inside the tub (4) can be measured by means of the pressure sensor (7) disposed on the water conduit (9). Thus, the mounting of the pressure sensor (7) is facilitated.
- [0023] In another embodiment of the present invention, the pressure sensor (7) measures the level of the water inside the tub (4) (Figure 4). The water inside the tub (4) fills into a channel connected to the tub (4). The level of the water inside the channel is measured by means of the pressure sensor (7) and thus, the amount of water taken into the tub (4) is determined.

Since the channel is connected to the tub (4) in fluid communication, the pressure of the air inside the tub (4) can be measured by means of the pressure sensor (7) measuring the water level. Thus, the need for disposing an additional pressure sensor (7) into the body (2) to detect the breaking of the window (6) is eliminated.

- [0024] In another embodiment of the present invention, the control unit (8) enables the drum to be stopped when the breaking of the window (6) is detected during the washing process. As the drum (3) is rotated in the tub (4), the laundry hits the walls of the drum (3) and the window (6) to be mechanically cleaned. The control unit (8) enables the drum (3) to be kept stationary thus preventing the laundry from hitting the window (6) upon detection of the breaking of the window (6) during the washing process.
- [0025] In another embodiment of the present invention, the control unit (8) enables the water in the tub (4) to be discharged when the breaking of the window (6) is detected during the washing process. Thus, the pressure applied by the water inside the drum (3) on the window (6) is eliminated and the window (6) is prevented from cracking more with the effect of the pressure.
- [0026] In another embodiment of the present invention, the control unit (8) enables the user to be warned audibly and/or visually when the breaking of the window (6) is detected. Upon detecting the breaking of the window (6), the control unit (8) enables the user to be warned by means of notification means such as LED, display, etc. disposed on the body (2). Thus, the washing machine (1) is prevented from being operated again when the window (6) is broken.
- [0027] In another embodiment of the present invention, the pressure sensor (7) is a micromanometer.
- [0028] In the washing machine (1) of the present invention, the breaking of the window (6) can be detected by means of the pressure sensor (7) that measures the water level inside the tub (4). Thus, the safety of the washing machine (1) is improved without any additional costs.

Claims

1. A washing machine (7) **comprising** a body (2); a drum (3) that is disposed in the body (2) and wherein the laundry is placed; a tub (4) wherein the drum (3) moves; a door (5) that provides access into the drum (3); a window (6) that is disposed on the door (5) and that is produced from a transparent material, and a pressure sensor (7) that is disposed in the body (2) and that detects the pressure of the air inside the tub (4), **characterized by** a control unit (8) that detects whether the window (6) has been broken by monitoring the data received from the pressure sensor (7).
2. A washing machine (1) as in Claim 1, **characterized by** the pressure sensor (7) that is disposed on the tub (4).
3. A washing machine (1) as in Claim 1, **characterized by** a water conduit (9) that provides the delivery of water into the tub (4) or the discharge of the water inside the tub (4) and the pressure sensor (7) that is disposed on the water conduit (9).
4. A washing machine (1) as in Claim 1, **characterized by** the pressure sensor (7) that measures the water level inside the tub (4).
5. A washing machine (1) as in Claim 1, **characterized by** the control unit (8) that enables the drum to be stopped when the breaking of the window (6) is detected during the washing process.
6. A washing machine (1) as in Claim 1 or Claim 5, **characterized by** the control unit (8) that enables the water inside the tub (4) to be discharged when the breaking of the window (6) is detected during the washing process.
7. A washing machine device (1) as in any one of the above claims, **characterized by** the control unit (8) that enables the user to be warned audibly and/or visually when the breaking of the window (6) is detected.
8. A washing machine (1) as in any one of the above claims, characterized by the pressure sensor (7) that is micromanometer.

Figure 1

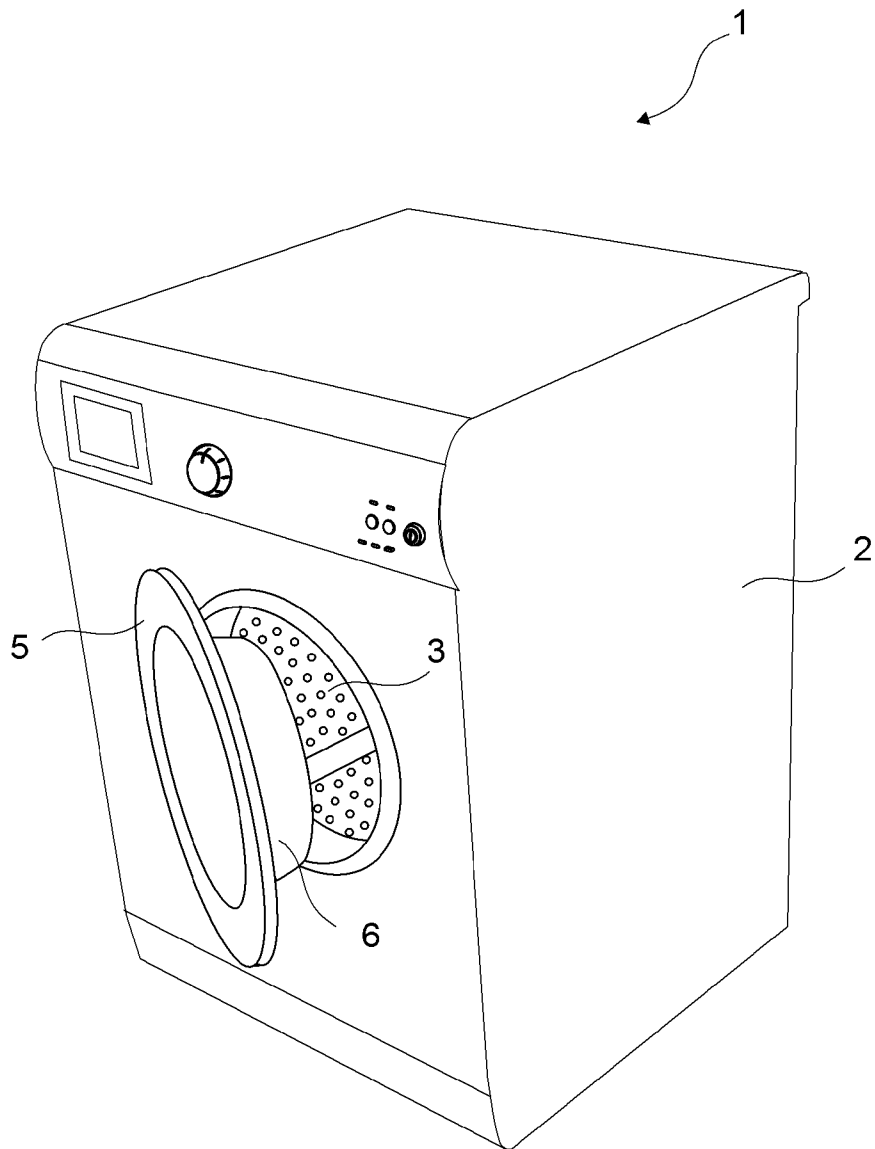


Figure 2

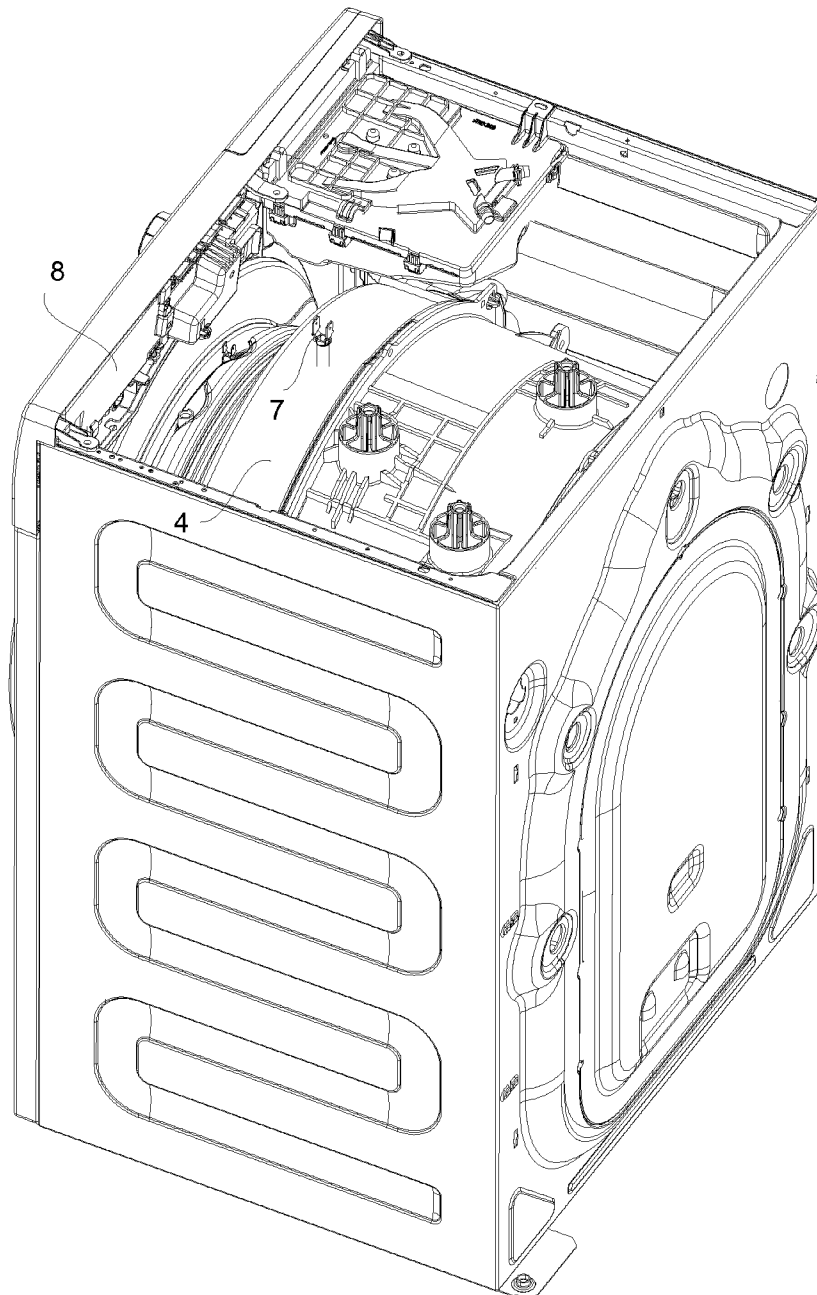


Figure 3

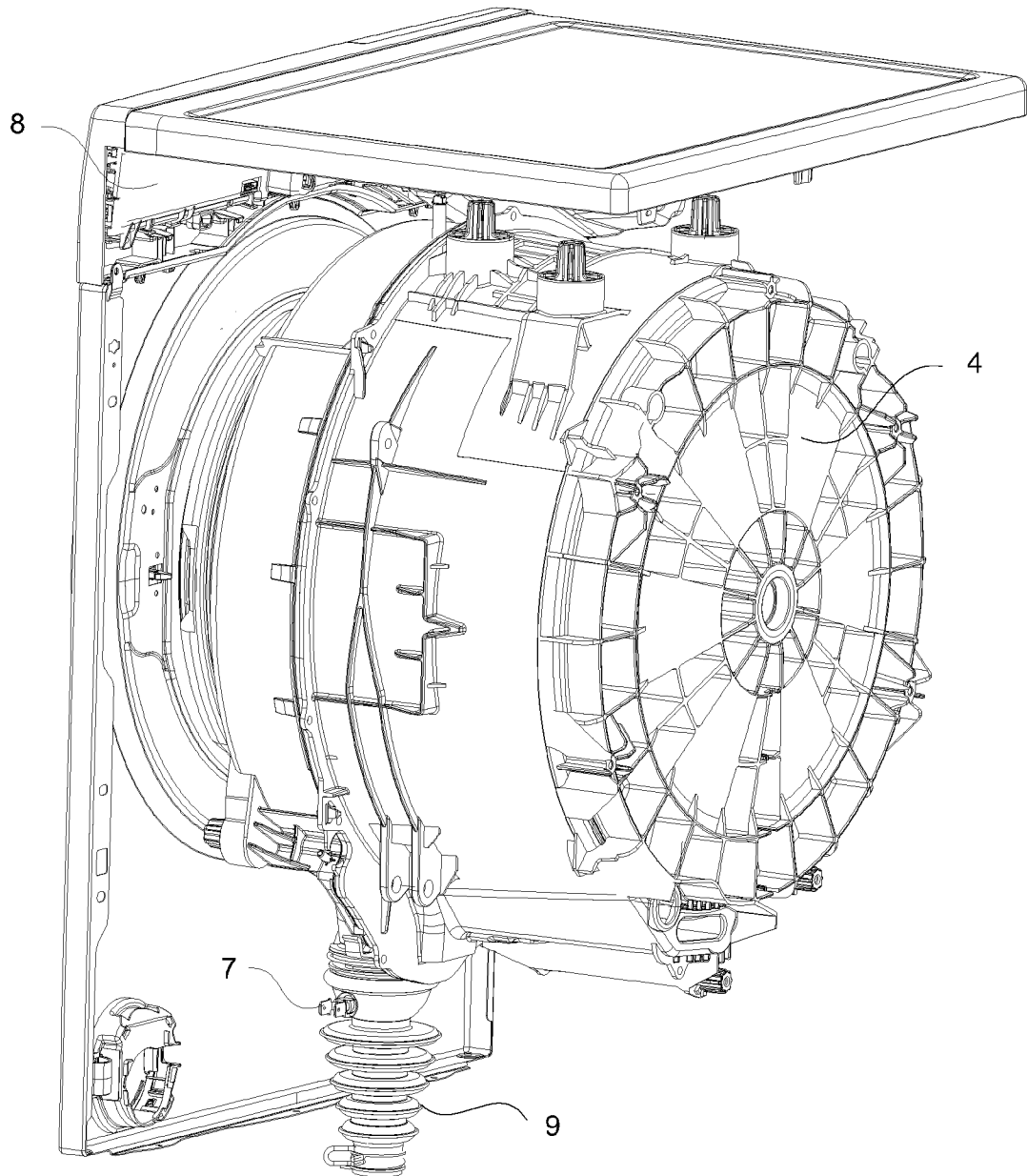
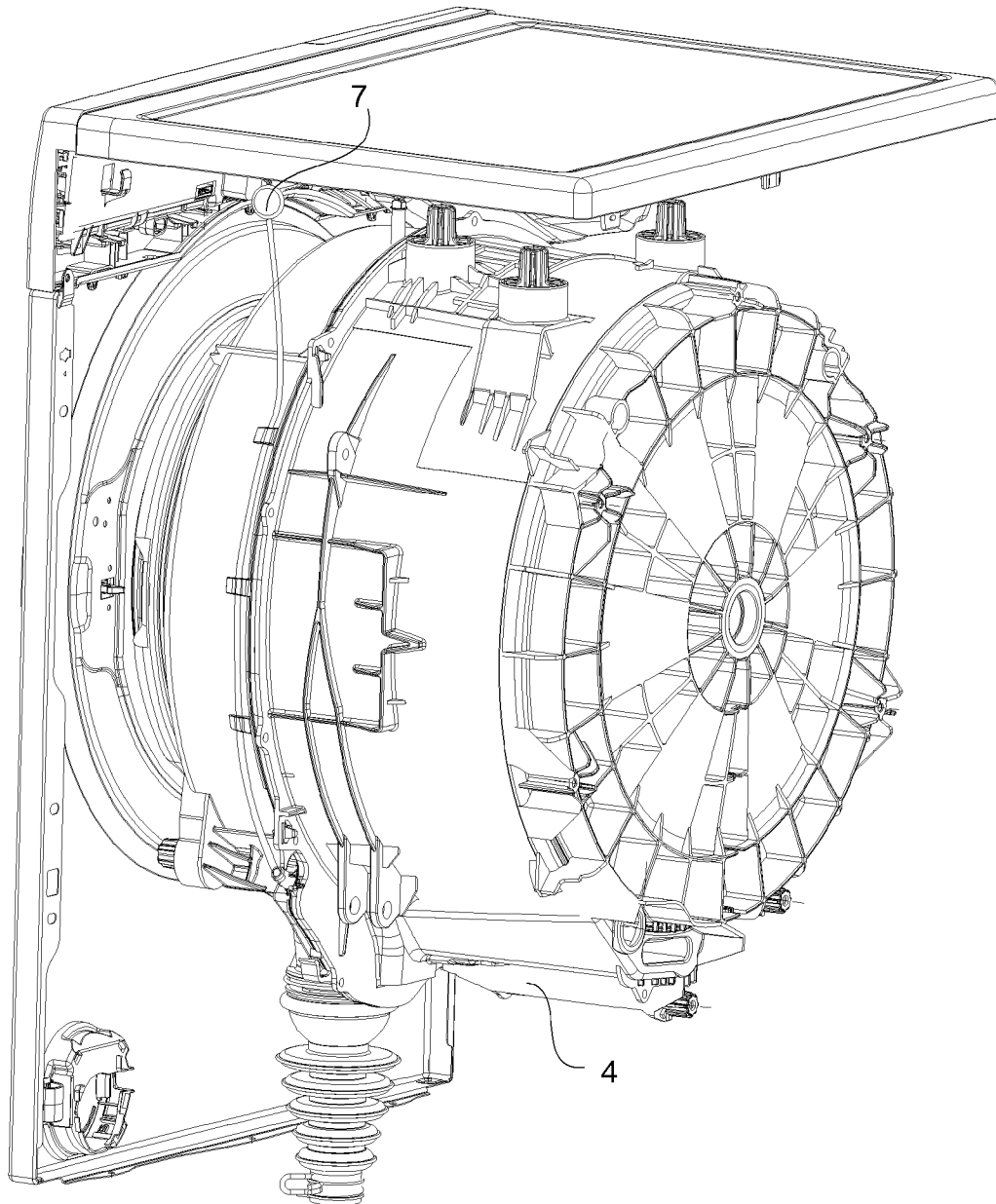


Figure 4



INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2017/054889

A. CLASSIFICATION OF SUBJECT MATTER

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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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2015/165532 A1 (ARCELIK AS [TR]) 5 November 2015 (2015-11-05) cited in the application paragraphs [0002] - [0013] figures 1-6	1-8
A	----- EP 2 657 392 A1 (ELECTROLUX HOME PROD CORP [BE]) 30 October 2013 (2013-10-30) paragraph [0019] - paragraph [0020] paragraph [0068] - paragraph [0071] figure 1 -----	1-4



Further documents are listed in the continuation of Box C.



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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2015165532 A1	05-11-2015	EP 3137673 A1 WO 2015165532 A1	08-03-2017 05-11-2015
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