



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
11.04.2018 Bulletin 2018/15

(51) Int Cl.:
D06F 39/08 (2006.01)

(21) Application number: **15893974.4**

(86) International application number:
PCT/CN2015/095301

(22) Date of filing: **23.11.2015**

(87) International publication number:
WO 2016/192330 (08.12.2016 Gazette 2016/49)

(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
Designated Validation States:
MA MD

- **YANG, Lin**
Qingdao
Shandong 266101 (CN)
- **WANG, Lingchen**
Qingdao
Shandong 266101 (CN)
- **ZHANG, Kaihong**
Qingdao
Shandong 266101 (CN)
- **TIAN, Yun**
Qingdao
Shandong 266101 (CN)
- **LIU, Zunan**
Qingdao
Shandong 266101 (CN)

(30) Priority: **29.05.2015 CN 201510289540**

(71) Applicant: **Qingdao Haier Washing Machine Co., Ltd.**
Qingdao, Shandong 266101 (CN)

(72) Inventors:
• **CHENG, Baozhen**
Qingdao
Shandong 266101 (CN)

(74) Representative: **Ziebig, Marlene et al**
Ziebig & Hengelhaupt
Patentanwälte PartG mbB
Leipziger Straße 49
10117 Berlin (DE)

(54) **SEALING INSTALLATION STRUCTURE OF INNER BARREL BOTTOM AND FLANGE OF WASHING MACHINE**

(57) A flange seal installation mechanism at an inner drum bottom of a washing machine comprises an inner drum bottom (1), a flange (2) and a sealing ring (3). A surface, closely contacted with the inner drum bottom, of the flange, is provided with a circular limiting sinking groove (8), and the sealing ring is arranged in the limiting sinking groove in a locating and clamping manner. The sealing ring is of a flat circular structure and at least one

ring of circular sealing convex ribs are arranged on the upper surface and/or lower surface of the sealing ring. The structure can ensure that no radial and movement deformation will be generated under the compression of a force, thereby ensuring the sealing effect between the inner drum bottom and the flange in the operating process of the washing machine.

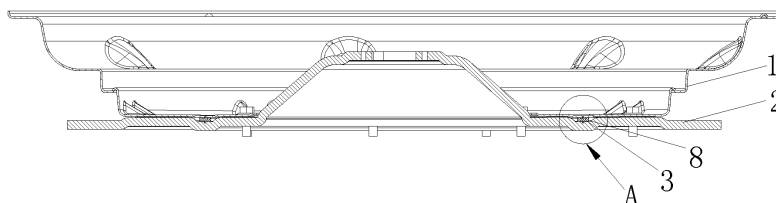


Fig. 1

Description

Technical Field

[0001] The present disclosure relates to the field of a washing machine, specifically to a sealing structure of the inner drum bottom of a washing machine, and in particular to a flange seal installation mechanism at an inner drum bottom of a washing machine.

Background

[0002] For the existing pulsator washing machine, when clothes are washed, water needs to be filled between the side walls of the inner drum and the outer drum. Therefore, the inner drum structure does not need to be sealed. Especially for the inner drum bottom, in order to rapidly discharge water, a gap is reserved between the inner drum bottom and the inner drum flange. On the basis of ensuring the intensity of the inner drum bottom, drainage holes will be added.

[0003] For the pulsator washing machine of such a structure, water between the inner drum and the outer drum does not participate in washing, and only the water in the inner drum actually participates in washing. Therefore, it causes great waste of water resources. In addition, too much water between the inner drum and the outer drum will also lower the concentration of the detergent or washing powder in the washing solution.

[0004] The improved full-automatic pulsator washing machine with a hole-free inner drum structure then solves the problem of water resource waste, and meanwhile solves the problem of pollution of clothes. No open holes used for throwing off water are available on the drum wall of the inner drum, the water used for washing or rinsing is all collected in the hole-free inner drum. Such that the inner drum is not only a washing drum for accommodating water, but also a centrifugal dewatering drum. The outer drum of the washing machine is only a channel for the water thrown off by the hole-free inner drum during dewatering. When water is discharged, the rotating speed of the inner drum is improved, the centrifugal force is utilized, the water in the drum rises along the wall of the inner drum, and is discharged from the drainage holes below the balanced ring at the upper part of the inner drum. Or a discharge opening which is available to be controlled open or closed is arranged at the lower part of the inner drum, and most of the water is discharged from the discharge opening. During centrifugal dewatering, the hole-free inner drum rotates at a high speed, the water left in the clothes rises upwards along the drum wall of the hole-free inner drum under the effect of the centrifugal force and is thrown into the outer drum through the drainage hole, and is discharged via the discharge opening and the discharge pipe arranged at the bottom of the outer drum.

[0005] However, for the above full-automatic pulsator washing machine with a hole-free inner drum, the sealing

mechanism between the inner drum bottom and the flange is an O-shaped sealing ring which is directly clamped between the lower side of the inner drum bottom and the upper surface of the flange. Therefore, the sealing effect is extremely poor, and after long-term use, the sealing ring will be separated as the inner drum bottom and the flange are subjected to a force. Or as in a utility model entitled Centrifugal Sealing Structure of a Floating-valve Inner Drum of a Washing Machine with the application number of 201120552457.5, it provides a flat circular sealing mechanism which cannot effectively prevent the movement deformation along the radial or peripheral direction when the sealing mechanism is compressed under a force, thereby influencing the sealing effect.

[0006] In view of this, the present disclosure is hereby proposed.

Summary

[0007] The objective of the present disclosure is to overcome the shortcomings of the prior art, and provides a flange seal installation mechanism at an inner drum bottom of a washing machine, then when the sealing function is satisfied, no movement deformation is generated along the radial direction and peripheral direction under the compression of a force, thereby further ensuring the sealing effect.

[0008] In order to realize the present objective, the present disclosure adopts the following technical solution.

[0009] A flange seal installation mechanism at an inner drum bottom of a washing machine includes an inner drum bottom, a flange and a sealing ring. A surface, closely contacted with the inner drum bottom, of the flange, is provided with a circular limiting sinking groove, and the sealing ring is located in the limiting sinking groove.

[0010] Furthermore, the sealing ring is of a flat circular structure, and at least one circular sealing convex rib is respectively arranged on the upper surface and/or lower surface of the sealing ring.

[0011] Furthermore, the sealing ring and the flange are provided with matched locating structures. Preferably, the locating structures include a locating convex arranged on the sealing ring and a locating groove arranged on the flange, and the locating groove matches with the locating convex. More preferably, the locating convex protrudes out of the periphery of the sealing ring in an integrated manner, and the locating groove is constituted by a notch formed in an integrated manner on a periphery of the limiting sinking groove.

[0012] Furthermore, a circular groove is arranged on the upper surface and/or lower surface of the sealing ring, a circular sealing convex rib is arranged inside the circular groove, and the height of the circular sealing convex rib is higher than the depth of the circular groove.

[0013] Furthermore, the radial width of the circular

groove is 1/6-1/2 times the radial width of the sealing ring, the depth of the circular groove is 1/6-1/2 times the height of the sealing ring, the height of the circular sealing convex rib is 1.1-2 times the depth of the circular groove, and the radial width of the circular sealing convex rib is 1/4-1/2 times the radial width of the circular groove.

[0014] Furthermore, the sealing ring is of a flat circular structure, and includes a circular supporting part which is supported in the limiting sinking groove and a circular sealing part which is compressed and fit with the flange and/or the inner drum bottom, and the circular sealing part is arranged on the surface of the circular supporting part in a protruding manner.

[0015] Furthermore, a section of the circular supporting part is of a rectangular structure, and the circular sealing part is arranged on an upper surface and a lower surface of the circular supporting part in a protruding manner.

[0016] Furthermore, a circular groove is respectively arranged at the two sides of the circular sealing part on the surface of the circular supporting part, and the circular groove constitutes an accommodation space for compression deformation of the circular sealing part.

[0017] Furthermore, the sealing ring further includes at least one locating part arranged on a periphery of the circular supporting part, and a locating groove is molded in an integrated manner in the periphery of the limiting sinking groove corresponding to the locating part.

[0018] The present disclosure relates to a full-automatic washing machine which includes an outer drum and an inner drum arranged inside the outer drum. Drainage holes are arranged on the upper part of the inner drum, and a water accommodation chamber structure with the peripheral wall and the bottom wall both being sealed are arranged below the drainage holes of the inner drum.

[0019] In the washing machine of the present disclosure, only the upper part of the inner drum is provided with a drainage hole, the lower part is free of holes and is sealed. Such that the washing water does not need to enter the area between the inner drum and the outer drum, only a proper amount of water needs to be injected into the inner drum, thereby realizing the aim of dramatically saving the washing water, with the water saving rate reaching 30% to 40%. Meanwhile, during each washing process, the pouring amount of such additives as detergent and assistant agents is reduced, thereby saving the washing cost. In addition, the area between the inner drum and the outer drum does not participate in washing, the dirt remained and the bacteria in the area between the inner drum and the outer drum will not be in water flow contact with the clothes inside the inner drum, thereby effectively avoiding cross infection of bacteria, and enabling the use of the washing machine to be more hygienic, environment-friendly and safe. During dehydration, the inner drum rotates at a high speed to drive the water flow to flow upwards and the water is discharged from the drainage hole. And finally, the floating line chips will not remain on the clothes and will be dis-

charged completely. Therefore, the washing is cleaner.

[0020] After the technical solution of the present disclosure is adopted, the following beneficial effects are brought about:

1. In the present disclosure, the flange seal installation mechanism at an inner drum bottom of a washing machine has advantages such as a good sealing effect, convenient installation and long service life.
2. In the present disclosure, the circular sealing convex rib/circular sealing part of the sealing ring can ensure the sealing reliability. The circular groove structure can ensure the sealing reliability when the sealing convex rib/circular sealing part are deformed under compression, and the locating structure can ensure no generation of displacement or radial deformation.

Brief Description of the Drawings

[0021]

Fig. 1 is a schematic diagram of the flange seal installation mechanism at an inner drum bottom of a washing machine in the present disclosure.

Fig. 2 is an enlarged schematic diagram of the part A in Fig. 1.

Fig. 3 is a schematic diagram of the structure of a sealing ring in the present disclosure.

Fig. 4 is a schematic diagram of another flange seal installation mechanism at an inner drum bottom of a washing machine in the present disclosure.

Fig. 5 is an enlarged schematic diagram of the part B in Fig. 4.

Fig. 6 is a schematic diagram of the structure of another sealing ring in the present disclosure.

[0022] Reference numerals: 1, inner drum bottom, 2, flange, 3, sealing ring, 4, circular sealing convex rib, 5, locating convex, 6, circular groove, 7, circular supporting part, 8, limiting sinking groove, 9, locating part, 91, flange, 92, locating column.

Detailed Description of the Embodiments

[0023] In order to make the above objectives, features and advantages of the present disclosure be more apparent and understandable, a brief detailed description will be given below on the present disclosure in combination with the accompanying drawings and specific embodiments.

[0024] As shown in Fig. 1 to Fig. 6, the present disclosure provides a flange seal installation mechanism at an inner drum bottom of a washing machine, including an inner drum bottom 1, a flange 2 and a sealing ring 3. A surface, closely contacted with the inner drum bottom 1, of the flange 2, is provided with a circular limiting sinking groove 8, and the sealing ring 3 is arranged in the limiting

sinking groove 8 in a locating and clamping manner.

[0025] The bottom surface of the inner drum bottom 1 of the washing machine and the bottom surface of the flange 2 are both arc-shaped surfaces. To better ensure the sealing effect, the inner surface of the bottom of the limiting sinking groove 8 is a plane, and the lower surface of the inner drum bottom 1 corresponding to the upper part of the limiting sinking groove is also a plane. This structure enables the distances between the inner drum bottom 1 and the flange 2 in the position in which the limiting sinking groove is located to be consistent, so that the sealing ring is subjected to uniform force on the circular clamping surface, thereby preventing the sealing ring from being subjected to a non-uniform force which may lead to incomplete sealing, and avoiding influencing the sealing effect due to the deformation and displacement of the part of the sealing ring which is subjected to a larger force.

Embodiment 1

[0026] As shown in Fig. 2 and Fig. 3, the sealing ring 3 in the present disclosure is of a flat circular structure, and a circular sealing convex rib 4 is arranged on the upper surface and/or lower surface of the sealing ring 3. Since the sealing ring installed in the position has a relative large radius, during installation, common sealing rings are easily displaced or turned over and deformed under the compression of a force, thereby being incapable of reaching the sealing effect. In the present disclosure, by adopting the above flat circular structure, the stability of the sealing ring during installation is improved, thereby avoiding deformation and displacement. Meanwhile, the circular sealing convex ribs on the surface are utilized to effectively achieve the sealing effect.

Embodiment 2

[0027] As shown in Fig. 5 and Fig. 6, two circular sealing convex ribs 4 are respectively arranged on the upper surface and/or lower surface of the sealing ring 3.

Embodiment 3

[0028] As shown in Fig. 3, the sealing ring 3 and the flange 2 in the present embodiment are provided with matched locating structures.

[0029] The locating structures include a locating convex 5 arranged on the sealing ring 3 and a locating groove (not shown in the figure) matched with the locating convex and arranged on the flange 2.

[0030] More preferably, the locating convex 5 protrudes out of the periphery of the sealing ring 3 in an integrated manner, and a notch formed in an integrated manner on the periphery of the limiting sinking groove 8 constitutes the locating groove.

[0031] Under the condition that the sealing ring 3 is subjected to the extrusion force of the inner drum bottom

1 and the flange 2 and the acting force of the torque when the washing machine is in operation, the locating structure can ensure that the sealing ring 3 will not generate radial and peripheral displacement, and further ensures the sealing effect of the sealing ring 3.

Embodiment 4

[0032] As shown in Fig. 2, a circular groove 6 is arranged on the upper surface and/or lower surface of the sealing ring 3. A circular sealing convex rib 4 is arranged inside the circular groove 6, and the height of the circular sealing convex rib 4 is higher than the depth of the circular groove 6.

[0033] The circular groove 6 constitutes an accommodation space for compression deformation of the circular sealing convex rib 4, ensuring that the circular sealing convex rib 4 is still in close contact with the inner drum bottom 1 and the flange 2 when the sealing ring 3 is deformed under the compression of a force, and further ensuring the sealing effect.

[0034] Preferably, the circular sealing convex ribs 4 are arranged in the central position of the circular groove 6 in a concentric manner.

[0035] More preferably, the radial width of the circular groove 6 is 1/6-1/2 times the radial width of the sealing ring 3, the depth of the circular groove 6 is 1/6-1/2 times the height of the sealing ring 3, the height of the circular sealing convex rib 4 is 1.1-2 times the depth of the circular groove 6, and the radial width of the circular sealing convex rib 4 is 1/4-1/2 times the radial width of the circular groove 6.

Embodiment 5

[0036] As shown in Fig. 2 and Fig. 3, the sealing ring 3 is of a flat circular structure, and includes a circular supporting part 7 which is supported in the limiting sinking groove 8 and a circular sealing part which is in compression faying with the flange 2 and/or the inner drum bottom 1. The circular sealing part is arranged on the surface of the circular supporting part 7 in a protruding manner. The circular supporting part 7 plays a role of stabilizing the sealing ring 3, thereby further ensuring the sealing effect and facilitating the installation. The circular sealing part of the present embodiment is a circular sealing convex rib 4.

[0037] Preferably, the section of the circular supporting part 7 is of a rectangular structure, and the circular sealing part is arranged on the upper surface and the lower surface of the circular supporting part 7 in a protruding manner.

[0038] More preferably, a circular groove 6 is respectively arranged at the two sides of the circular sealing part 9 on the surface of the circular supporting part 7, and the circular groove 6 constitutes the accommodation space for compression deformation of the circular sealing part 9.

[0039] As shown in Fig. 5 and Fig. 6, the circular sealing part includes inner and outer rings of circular sealing convex ribs 4 arranged on the upper surface of the circular supporting part 7 and inner and outer rings of circular sealing convex ribs 4 arranged on the lower surface of the circular supporting part 7. The circular sealing convex ribs 4 are directly arranged on the surface of the circular supporting part 7. The gap between the inner and outer rings of circular sealing convex ribs 4 on the same surface constitutes an accommodation space for compression deformation of the circular sealing convex ribs 4.

Embodiment 6

[0040] As shown in Fig. 6, the sealing ring 3 of the present embodiment further includes at least one locating part 9 arranged on the periphery of the circular supporting part 7, and a locating groove (not shown in the figure) is molded in an integrated manner in the periphery of the limiting sinking groove 8 corresponding to the locating part 9.

[0041] Specifically, the locating part 9 includes a flange 91 arranged on the periphery of the circular supporting part 7 and a locating column 92 protruding out of the surface of the flange 91. And a matched locating hole is arranged corresponding to the locating column 92 in the locating groove on the periphery of the limiting sinking groove 8. The locating part 9 and the circular supporting part 7 are formed in an integrated manner.

[0042] In the installation process of the inner drum bottom of the washing machine, the sealing ring 3 is installed in the limiting sinking groove 8 of the flange 2, after ensuring that the sealing ring 3 is in good contact with the inner drum bottom 1 and the flange 2, the inner drum bottom 1 and the flange 2 are fixedly connected via a bolt. The sealing ring 3 is arranged between the inner drum bottom 1 and the flange 2 in a clamping manner, such that the sealing ring 3 is in close contact with the inner drum bottom 1 and the flange 2. By adopting such a structure, the sealing ring 3 will not be deformed under compression in the fixed process of the bolt, thereby preventing the sealing ring 3 from being compressed out of the limiting sinking groove 8. Meanwhile, the circular supporting part 7 and the locating part 9 enable the matching process of the sealing ring 3 and the limiting sinking groove 8 to be more convenient, thereby saving time and workload, and avoiding unnecessary mistake in the process. In the operating process of the washing machine, the sealing ring 3 will be subjected to the acting force of the torque between the inner drum bottom 1 and the flange 2, the circular grooves 6 of the sealing ring 3 or the gap between the inner and outer circular sealing convex ribs 4 can accommodate the deformation of the circular sealing convex rib 4 under the acting force of the torque, thereby further ensuring the sealing effect of the sealing ring 3. The sealing ring adopted in the present disclosure can effectively solve the problem of flange sealing at the inner drum bottom of a washing machine,

and meanwhile ensure the sealing effect and the service life.

[0043] What are described above are merely preferred embodiments of the present disclosure. It should be noted that, for those of ordinary skill in the art, under the premise of not departing from the present disclosure, various transformations and improvements can still be made, and such transformations and improvements shall also be deemed as falling within the protection scope of the present disclosure.

Claims

1. A flange seal installation mechanism at an inner drum bottom of a washing machine, comprising an inner drum bottom, a flange and a sealing ring, wherein a surface, closely contacted with the inner drum bottom, of the flange, is provided with a circular limiting sinking groove, and the sealing ring is located in the limiting sinking groove.
2. The flange seal installation mechanism at an inner drum bottom of a washing machine according to claim 1, wherein the sealing ring is of a flat circular structure, and at least one circular sealing convex rib is respectively arranged on an upper surface and/or a lower surface of the sealing ring.
3. The flange seal installation mechanism at an inner drum bottom of a washing machine according to claim 2, wherein the sealing ring and the flange are provided with locating structures matched with each other, preferably, the locating structures include a locating convex arranged on the sealing ring and a locating groove arranged on the flange, and the locating groove matches with the locating convex, and more preferably, the locating convex protrudes out of a periphery of the sealing ring in an integrated manner, and the locating groove is constituted by a notch formed in an integrated manner on a periphery of the limiting sinking groove.
4. The flange seal installation mechanism at an inner drum bottom of a washing machine according to claim 1 or 2, wherein a circular groove is arranged on an upper surface and/or lower surface of the sealing ring, the circular sealing convex rib is arranged inside the circular groove, and a height of the circular sealing convex rib is higher than a depth of the circular groove.
5. The flange seal installation mechanism at an inner drum bottom of a washing machine according to claim 4, wherein a radial width of the circular groove

is 1/6-1/2 times a radial width of the sealing ring,
 a depth of the circular groove is 1/6-1/2 times a height
 of the circular sealing ring,
 a height of the circular sealing convex rib is 1.1-2
 times the depth of the circular groove, and
 a radial width of the circular sealing convex rib is
 1/4-1/2 times the radial width of the circular groove.

5

6. The flange seal installation mechanism at an inner drum bottom of a washing machine according to claim 1, wherein the sealing ring is of a flat circular structure,
 the sealing ring includes a circular supporting part supported in the limiting sinking groove, and a circular sealing part which is compressed and fit with the flange and/or the inner drum bottom, and the circular sealing part is arranged on a surface of the circular supporting part in a protruding manner. 10
7. The flange seal installation mechanism at an inner drum bottom of a washing machine according to claim 6, wherein a cross section of the circular supporting part is of a rectangular structure, and the circular sealing part is arranged on an upper surface and a lower surface of the circular supporting part in a protruding manner. 15 20 25
8. The flange seal installation mechanism at an inner drum bottom of a washing machine according to claim 6, wherein a radial width of the circular sealing part is decreased from one end of the circular supporting part to another end, the radial width of a top part of the circular sealing part is minimum, and preferably, a cross section of the top part of the circular sealing part is of an arc chamfer structure. 30 35
9. The flange seal installation mechanism at an inner drum bottom of a washing machine according to any one of claims 6-8, wherein a circular groove is respectively arranged at two sides of the circular sealing part on the surface of the circular supporting part, and the circular groove constitutes an accommodation space for the compression deformation of the circular sealing part. 40 45
10. The flange seal installation mechanism at an inner drum bottom of a washing machine according to any one of claims 6-9, wherein the sealing ring further comprises at least one locating part arranged on a periphery of the circular supporting part, and a locating groove is molded in an integrated manner in a periphery of the limiting sinking groove corresponding to the locating part. 50 55

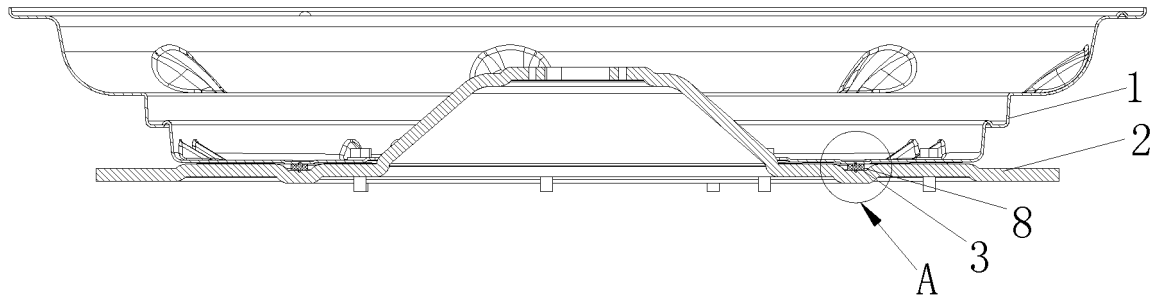


Fig. 1

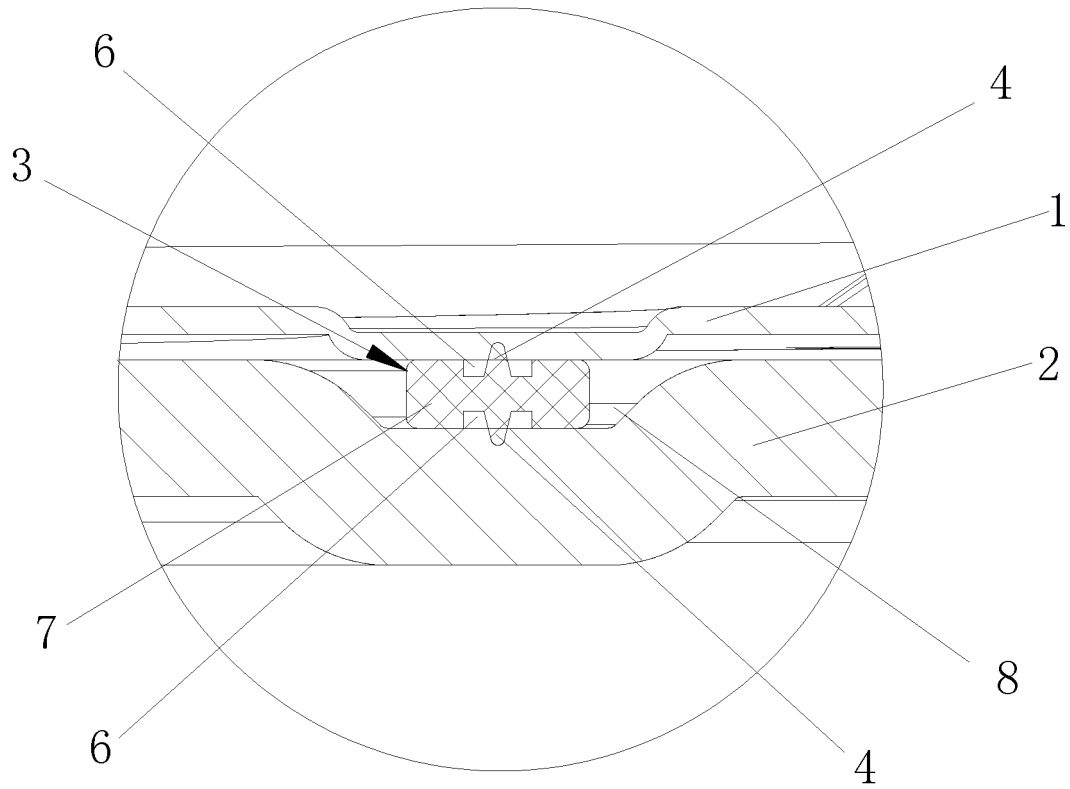


Fig. 2

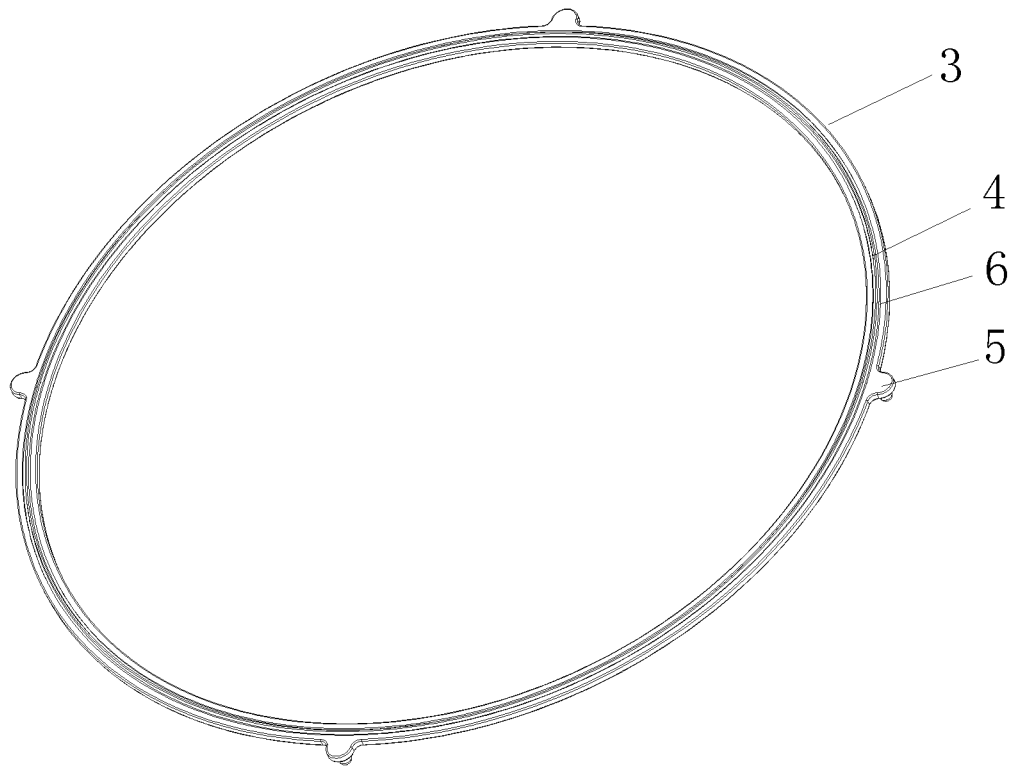


Fig. 3

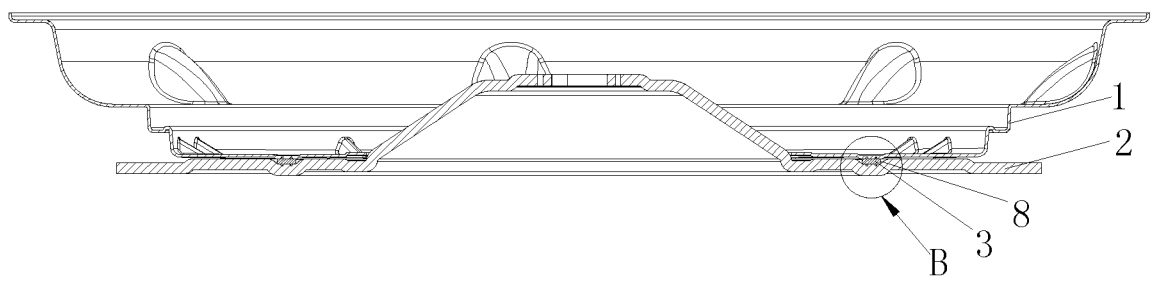


Fig. 4

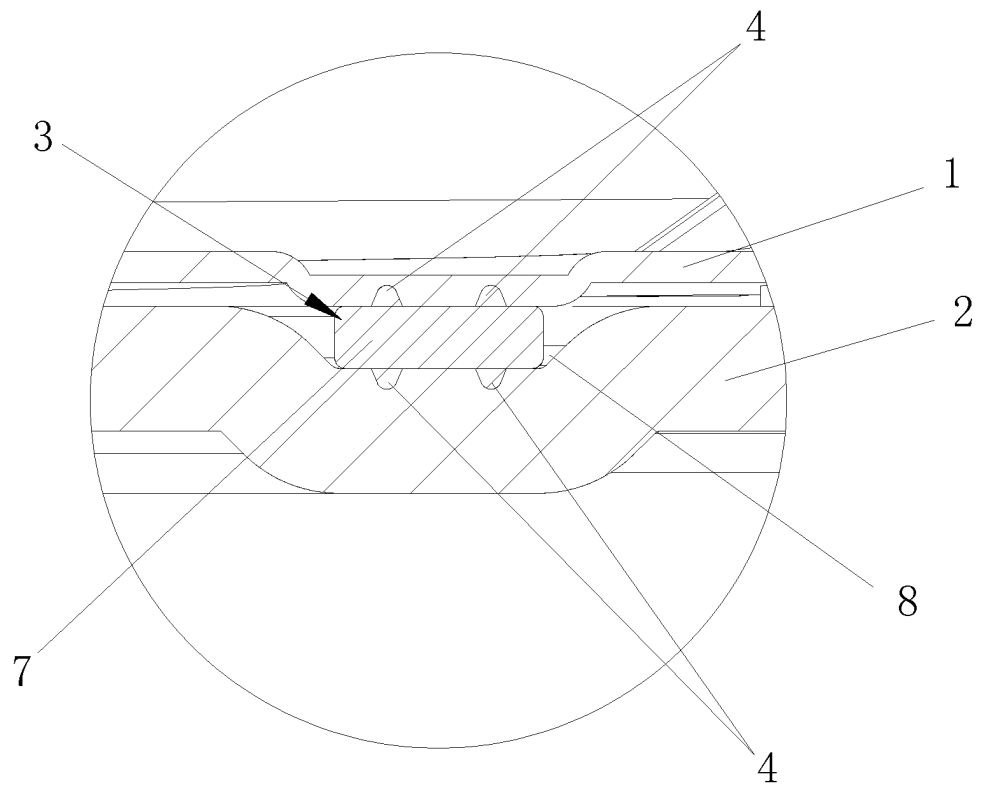


Fig. 5

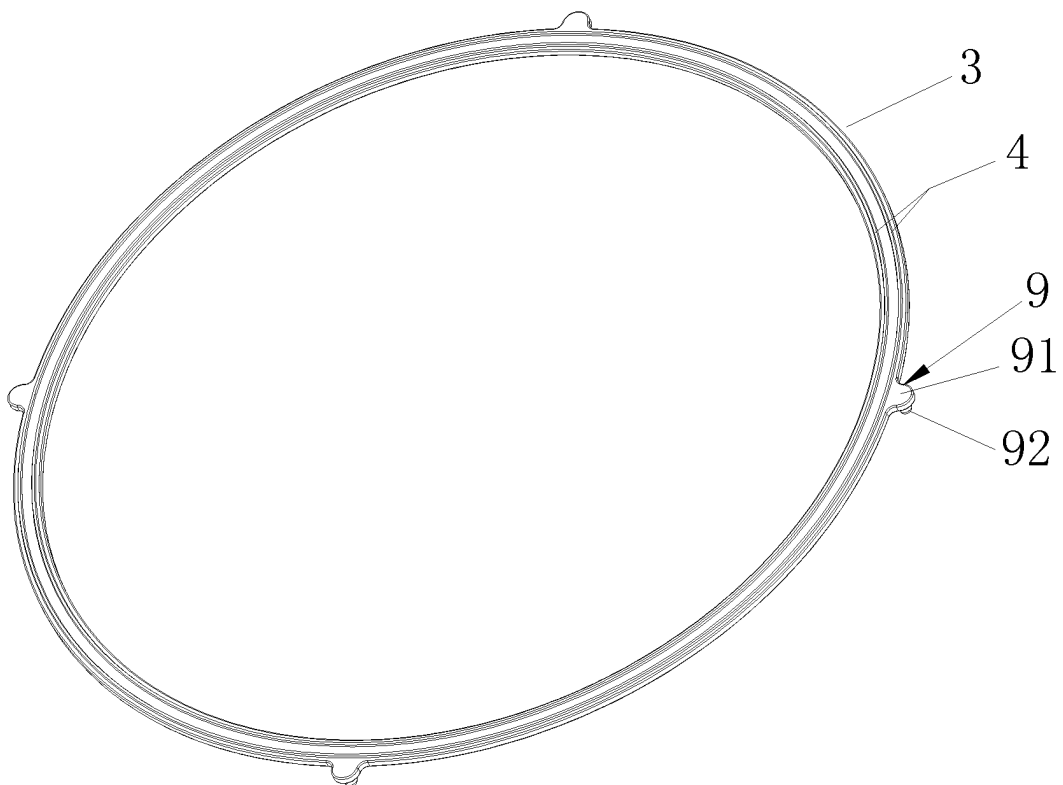


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2015/095301

A. CLASSIFICATION OF SUBJECT MATTER

D06F 39/08 (2006.01) i

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)

CNABS, CNTXT, CNKI, DWPI, SIPOABS: inner drum, waterproof, bulge, washing machine, seal, flange, rib

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 2592690 Y (YE, Xiaozhou), 17 December 2003 (17.12.2003), description, page 4, paragraphs 12-25, and figure 1	1
Y	CN 2592690 Y (YE, Xiaozhou), 17 December 2003 (17.12.2003), description, page 4, paragraphs 12-25, and figure 1	2-3, 6-7
Y	CN 200955100 Y (LIN, Xiupeng), 03 October 2007 (03.10.2007), description, page 3, lines 15-20, and figure 2	2-3, 6-7
X	CN 204199044 U (QINGDAO HAIER WASHING MACHINE CO., LTD.), 11 March 2015 (11.03.2015), description, paragraphs 43-45, and figures 4-6	1
A	CN 1378004 A (YE, Linsen), 06 November 2002 (06.11.2002), the whole document	1-10
A	DE 3333345 A1 (LICENTIA GMBH), 28 March 1985 (28.03.1985), the whole document	1-10

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search
04 February 2016 (04.02.2016)

Date of mailing of the international search report
04 March 2016 (04.03.2016)

Name and mailing address of the ISA/CN:
State Intellectual Property Office of the P. R. China
No. 6, Xitucheng Road, Jimenqiao
Haidian District, Beijing 100088, China
Facsimile No.: (86-10) 62019451

Authorized officer
DING, Yafei
Telephone No.: (86-10) **01062085360**

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2015/095301

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 2592690 Y	17 December 2003	None	
CN 200955100 Y	03 October 2007	None	
CN 204199044 U	11 March 2015	None	
CN 1378004 A	06 November 2002	None	
DE 3333345 A1	28 March 1985	DE 3333345 C2	08 July 1993

Form PCT/ISA/210 (patent family annex) (July 2009)

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

- WO 201120552457 A [0005]