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

(11) EP 2 362 922 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
11.07.2012 Bulletin 2012/28

(21) Application number: **09756708.5**

(22) Date of filing: **12.11.2009**

(51) Int Cl.:
D06F 37/26 *(2006.01)*

(86) International application number:
PCT/EP2009/065040

(87) International publication number:
WO 2010/055085 (20.05.2010 Gazette 2010/20)

(54) **A HORIZONTAL AXIS WASHING MACHINE WITH RECESS IN THE TUB TO ACCOMODATE DRUM SEAM**

WASCHMASCHINE DES TYPS HORIZONTALACHSE MIT AUSNEHMUNG IM BOTTICH ZUR AUFNAHME DER TROMMELNAHT

MACHINE À LAVER À AXE HORIZONTAL COMPORTANT UNE CAVITÉ DANS LA CUVE POUR RECEVOIR UN JOINT DE TAMBOUR

(84) Designated Contracting States:
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 SE SI SK SM TR

(30) Priority: **13.11.2008 TR 200808649**

(43) Date of publication of application:
07.09.2011 Bulletin 2011/36

(73) Proprietor: **Arçelik Anonim Sirketi**
34950 Istanbul (TR)

(72) Inventors:
- **OZKAN, Hale**
  34950 Istanbul (TR)
- **YILDIRIM, Ibrahim**
  34950 Istanbul (TR)

(56) References cited:
WO-A1-2007/023453
DE-U- 1 936 017
US-A1- 2005 252 254

EP 2 362 922 B1

Description

[0001] The present invention relates to a horizontal axis washing machine having a drying function.

[0002] As is known, in washing machines having a drying function, the laundry to be washed and/or dried are loaded in a perforated drum. The said drum is rotated by being driven with a motor whereby the processes such as washing, drying and spinning are performed.

[0003] In state of the art, in order to produce these drums (T), a quadrangular shaped metal plate is bent cylindrically and the overlapping edges are folded along a line parallel to the rotational axis and clamped together thereby forming the body (G). Thereafter, the circular metal plates forming the front and rear lids (P) are joined with the body (G). The front and rear lids (P) and the overlapping edges of the body (G) are bent and folded like a hook thereby forming a circular seam (S). The seam (S) is a circular protrusion and extends towards the tub (K) on the exterior surface of the body (G). On the other hand, the drum (T) oscillates and vibrates while rotating inside the tub (K). Therefore, a distance has to be left between the drum (T) and the tub (K). Due to the said seam (S) the distance is further increased. This condition also prevents increasing the volume of the drum (T) (Figure 2).

[0004] In washing machines wherein a plastic tub is used, the distance between the drum and the tub is more, due to the resiliency of the plastic material, than the applications wherein the tub is made of metal.

[0005] The drum is beared by the tub with the roller bearings assembled on the rear wall of the tub. Accordingly, the magnitude of the relative movements between the tub and the drum is at a minimum in the center of the bearing. The amount of the movement increases as moved away from the center. And consequently, the distance of the support arms disposed on the rear wall of the drum nearest to the tub is configured to increase as moved away from the center depending on the bending motion of the drum.

[0006] The region that contains the seam joining the front and rear lids of the drum and the drum body is the region that is subjected to the maximum amount of translatory motion resulting from the bending of the drum which, as a rotating part, is most subjected to the bending moment. Accordingly, particularly in washing machines wherein a plastic tub is used, the seam contacts with and scrapes the rear wall of the tub. Therefore, the distance remaining between the tub and the drum should be adjusted properly.

[0007] In the state of the art International Patent Application no W02007023453, the explanation is given whereby the volume of the drum can be increased without changing the volume of the tub by leaving a lesser amount of distance between the drum and the tub by bending the seam extending towards the tub.

[0008] The object of the present invention is to design a washing/drying machine comprising a drum wherein the usable volume is increased by decreasing the space between itself and the tub.

[0009] The washing machine realized to fulfill the object of the present invention, defined in the first claim and the respective claims thereof, comprises a housing formed on the tub walls, coinciding with the seam along the line on the rear wall of the tub. The housing forms a recess on the surface of the tub walls facing the drum. The housing extends along a preferably circular line on the front and rear wall.

[0010] Accordingly, the depth of the drum is increased by protecting the distance between the seam and the tub and without changing the size and shape of the seam. In other words, the dimensions of the drum are increased whilst keeping the dimensions of the tub the same.

[0011] In an embodiment of the present invention, the housing is disposed on the rear wall of the tub, at the level of the seam, where the distance between the drum and the tub rear wall is the most. In this case, the contact of the seam with the tub rear wall is prevented even in conditions wherein the drum is in the most translated positions due to unbalanced load or similar reasons.

[0012] By means of the present invention, it is possible to leave a lesser amount of space between the drum and the tub, enabling to increase the drum volume without changing the length of the seam.

[0013] A washing machine designed to fulfill the object of the present invention is illustrated in the attached figures, where:

[0014] Figure 1 - is the perspective view of a washing machine.

[0015] Figure 2 - is the cross-sectional view of the drum and the tub in the state of the art.

[0016] Figure 3 - is the cross-sectional view of a drum and a tub.

[0017] Figure 4 - is the partial rear view of the tub.

[0018] Figure 5 - is the partial view of the tub from another angle.

[0019] The elements illustrated in the figures are numbered as follows:

1. Washing machine
2. Tub
3. Drum
4. Seam
5. Housing
6. , 60. Wall
7. Body
8. , 80. Lid

[0020] The washing machine (1) of the present invention has a horizontal axis and comprises a cylindrical tub (2) having a front wall (60), a rear wall (6) and a side wall and a drum (3) assembled into the said tub (2) (Figure 1).

[0021] The drum (3) comprises:

- a cylindrical body (7),
- two circular lids (8, 80) mounted to the body (7) such

that the front and rear surfaces are formed and

- at least one seam (4) formed along a circular line by bending the side by side edges of the body (7) and the lids (8, 80), in the form of a protrusion on the exterior surface of the body (7), extending towards the tub (2) and outside the volume formed by the lids (8, 80) and the body (7).

[0022] The washing machine (1) comprises a housing (5), disposed on the front and/or the rear wall (6, 60), that extends at the level of the seam (4), along the line wherein the walls (6, 60) and the side wall join. The housing (5) preferably extends all around on the walls (6, 60). The housing (5) is disposed at the position where the seam (4) can reach on the tub (2) at the excessive displacements of the drum (3) in the horizontal plane (Figure 3).

[0023] The housing (5) is disposed opposite the seam (4) and in the same horizontal direction as the seam (4) on the portion of the walls (6, 60) whereto the seam (4) corresponds and forms a recess on the surface of the tub (2) walls (6, 60) facing the drum (3) (Figure 4 and Figure 5).

[0024] The housing (5) is sized such that it prevents the seam (4) from entering into the housing (5) and impact with the walls (6, 60) even in the excessive displacements of the drum (3) on the tub (2) in the horizontal plane.

[0025] By means of the housing (5) formed on the tub (2), described in the embodiment of the present invention, the depth of the drum (3) is increased, by protecting the distance between the seam (4) and the tub (2), without changing the length of the seam (4) formed outside the body (7) and towards the tub (2). Consequently, even if the depth of the housing (5) is not too large, a considerably wide cylindrical volume is gained behind the drum (3). This volume can be utilized for increasing the volume of the drum (3) if the dimensions of the tub (2) are kept the same.

[0026] The drum (3) is supported by the tub (2) at the center of the tub (2) rear wall (6). Accordingly, the movements of the tub (2) and the drum (3) are at minimum in this section where the drum (3) is supported by the tub (2). The amount of movement of the tub (2) and the drum (3) increases with distance from this section in the radial direction. Therefore, the distance of the drum (3) rear wall nearest the tub (2) from the tub (2) rear wall (6) is adjusted to increase with distance from the center, depending on the bending motion of the drum (3). The distance of the drum (3) farthest away from the tub (2) rear wall (6) is the section wherein the seam (4) is contained on the drum (3). The housing (5) is disposed on the rear wall (6) of the tub (2), precisely aligned with the said seam (4), and the contact of the seam (4) with the rear wall (6) of the tub (2) is prevented even in conditions wherein the drum (3) is in the most translated position due to unbalanced load or similar reasons.

[0027] In the preferred embodiment of the present invention, the tub (2) is preferably produced of a plastic material.

[0028] In another embodiment of the present invention, the tub (2) is produced of metal. In this embodiment, the housing (5) is shaped as a protuberance and is formed on the walls (6, 60) by the deep drawing method.

[0029] By means of the washing machine (1) of the present invention, it is possible to increase the drum (3) volume without changing the length of the seam (4).

[0030] It is to be understood that the present invention is not limited to the embodiments disclosed above and an expert in the technique can easily introduce different embodiments. These different embodiments should also be considered within the scope of the protection defined by the claims of the present invention.

Claims

1. A horizontal axis washing machine (1) that comprises a cylindrical tub (2) having a front (60), a rear (6) and a side wall and a drum (3) assembled into the said tub (2) having

   - a cylindrical body (7),
   - two circular lids (8, 80) mounted to the body (7) such that front and rear surfaces are formed and
   - a seam (4) formed along a circular line by bending the side by side edges of the body (7) and the lids (8, 80), in the form of a protrusion extending towards the tub (2) on the exterior surface of the body (7) and outside the volume formed by the lids (8, 80) and the body (7).
   - and **characterized by** a housing (5) in the form of a recess disposed on the front and/or the rear wall (6, 60), that extends at the level of the seam (4), along the line at which the walls (6, 60) and the side wall join.

2. A washing machine (1) as in Claim 1, **characterized by** a housing (5) that extends all around on the walls (6, 60).

3. A washing machine (1) as in Claim 1 or 2, **characterized by** a housing (5) disposed on the tub (2) rear wall (6), at the level of the seam (4).and at the point at which the drum (3) is farthest away from the tub (2) rear wall (6).

4. A washing machine (1) as in any one of the above Claims, **characterized by** a housing (5) disposed at the position whereto the seam (4) can reach on the tub (2) at the excessive displacements of the drum (3) in the horizontal plane.

5. A washing machine (1) as in any one of the above Claims, **characterized by** a tub (2) that is produced of plastic material.

Patentansprüche

1. Waschmaschine mit horizontaler Welle (1), die einen zylindrischen Waschbehälter (2) mit einer Vorderwand (60), einer Rückwand (6) und einer Seitenwand und einer Trommel (3) umfasst, die in den Waschbehälter (2) eingebaut ist, aufweisend:

   - einen zylindrischen Körper (7),
   - zwei kreisförmige Deckel (8, 80), die am Körper (7) angebracht sind, derart, dass eine Vorder- und eine Rückseitenfläche gebildet werden, und
   - eine Naht (4), die durch Biegen von die Seite an Seite angeordneten Kanten des Körpers (7) und der Deckel (8, 80) an einer kreisförmigen Linie ausgebildet ist, in der Form eines Vorsprungs, der sich an der Außenfläche des Körpers (7) zum Waschbehälter (2) hin und aus dem Raum heraus erstreckt, der durch die Deckel (8, 80) und den Körper (7) gebildet wird,
   - und **gekennzeichnet durch** ein Gehäuse (5) in der Form einer Vertiefung, das an der Vorder- und/oder Rückwand (6, 60) angeordnet ist und sich auf der Höhe der Naht (4) an der Linie, an der die Wände (6, 60) und die Seitenwand aneinander angrenzen, entlang erstreckt.

2. Waschmaschine (1) nach Anspruch 1, **gekennzeichnet durch** ein Gehäuse (5), das sich an den Wänden (6, 60) am gesamten Umfang entlang erstreckt.

3. Waschmaschine (1) nach Anspruch 1 oder 2, **gekennzeichnet durch** ein Gehäuse (5), das an der Rückwand (6) des Waschbehälters (2) auf der Höhe der Naht (4) und an einem Punkt angeordnet ist, an dem die Trommel (3) am weitesten von der Rückwand (6) des Waschbehälters (2) entfernt ist.

4. Waschmaschine (1) nach einem der vorangehenden Ansprüche, **gekennzeichnet durch** ein Gehäuse (5), das an der Position angeordnet ist, an der die Naht (4) an den übermäßigen Versetzungen der Trommel (3) in der horizontalen Ebene an den Waschbehälter (2) heranreichen kann.

5. Waschmaschine (1) nach einem der vorangehenden Ansprüche, **gekennzeichnet durch** einen Waschbehälter (2), der aus Kunststoffmaterial hergestellt ist.

Revendications

1. Une machine à laver à axe horizontal (1) qui comprend une cuve cylindrique (2) ayant une paroi avant (60), une paroi arrière (6) et une paroi latérale et un tambour (3) monté dans ladite cuve (2) ayant

   - un corps cylindrique (7),
   - deux couvercles circulaires (8, 80) montés au corps (7) de telle sorte que les surfaces avant et arrière sont formées et
   - une couture (4) formée le long d'une ligne circulaire en pliant les bords situés côte à côte du corps (7) et des couvercles (8, 80), en forme de protubérance s'étendant vers le corps (2) sur la surface extérieure du corps (7) et à l'extérieur du volume formé par les couvercles (8, 80) et le corps (7)
   - et **caractérisée par** un logement (5) en forme d'évidement disposé sur la paroi avant et/ou la paroi arrière (6, 60), qui s'étend au niveau de la couture (4), le long de la ligne où les parois (6, 60) et la paroi latérale se joignent.

2. Une machine à laver (1) selon la Revendication 1, **caractérisée par** un logement (5) qui s'étend tout autour des parois (6, 60).

3. Une machine à laver (1) selon la Revendication 1 ou 2, **caractérisée par** un logement (5) disposé sur la paroi arrière (6) de la cuve (2), au niveau de la couture (4) et au point où le tambour (3) est plus éloigné de la paroi arrière (6) de la cuve (2).

4. Une machine à laver (1) selon l'une quelconque des revendications précédentes, **caractérisée par** un logement (5) disposé dans la position où la couture (4) peut atteindre la cuve (2) pendant les déplacements excessifs du tambour (3) dans le plan horizontal.

5. Une machine à laver (1) selon l'une quelconque des revendications précédentes, **caractérisée par** une cuve (2) qui est fait en matière plastique.

Figure 1

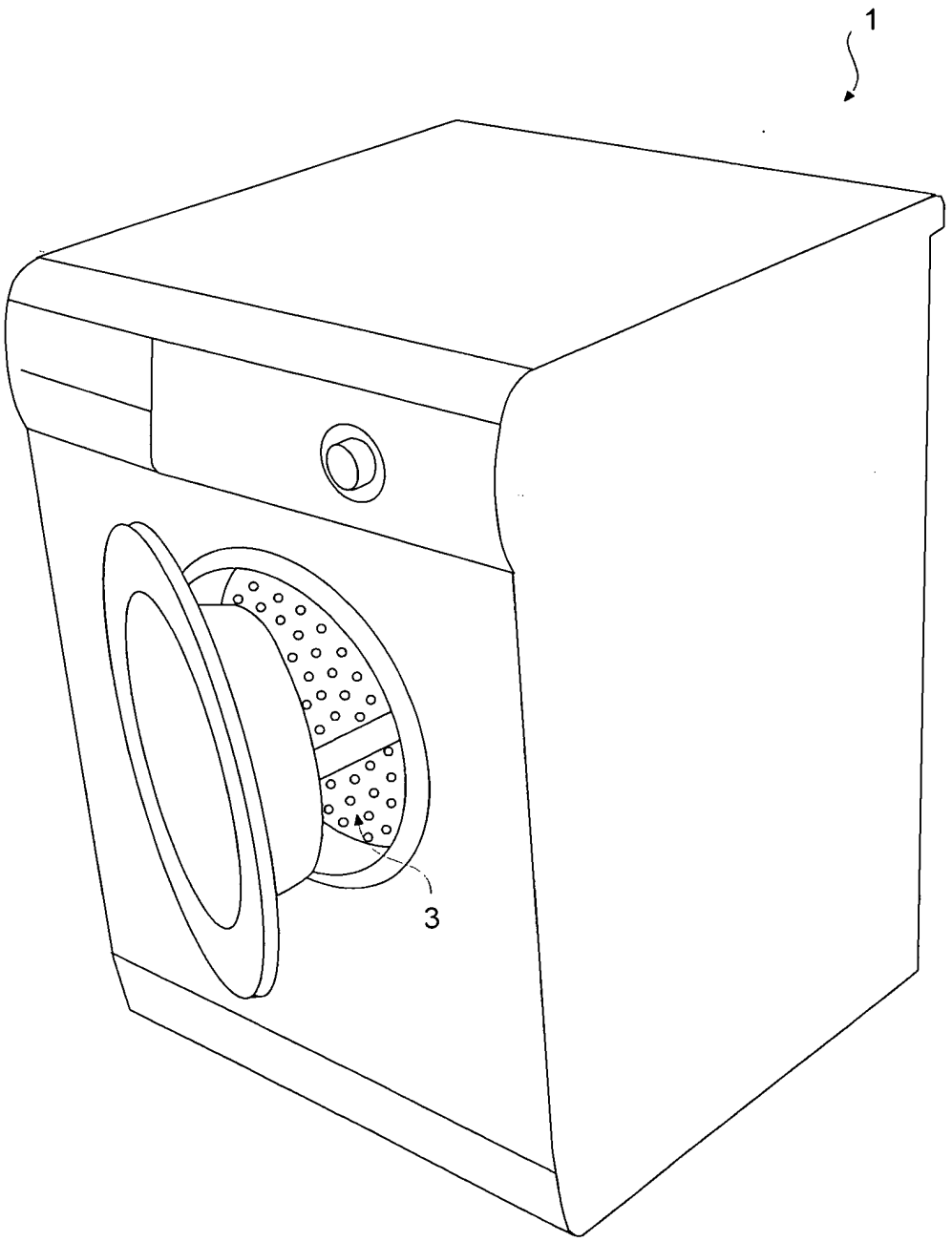
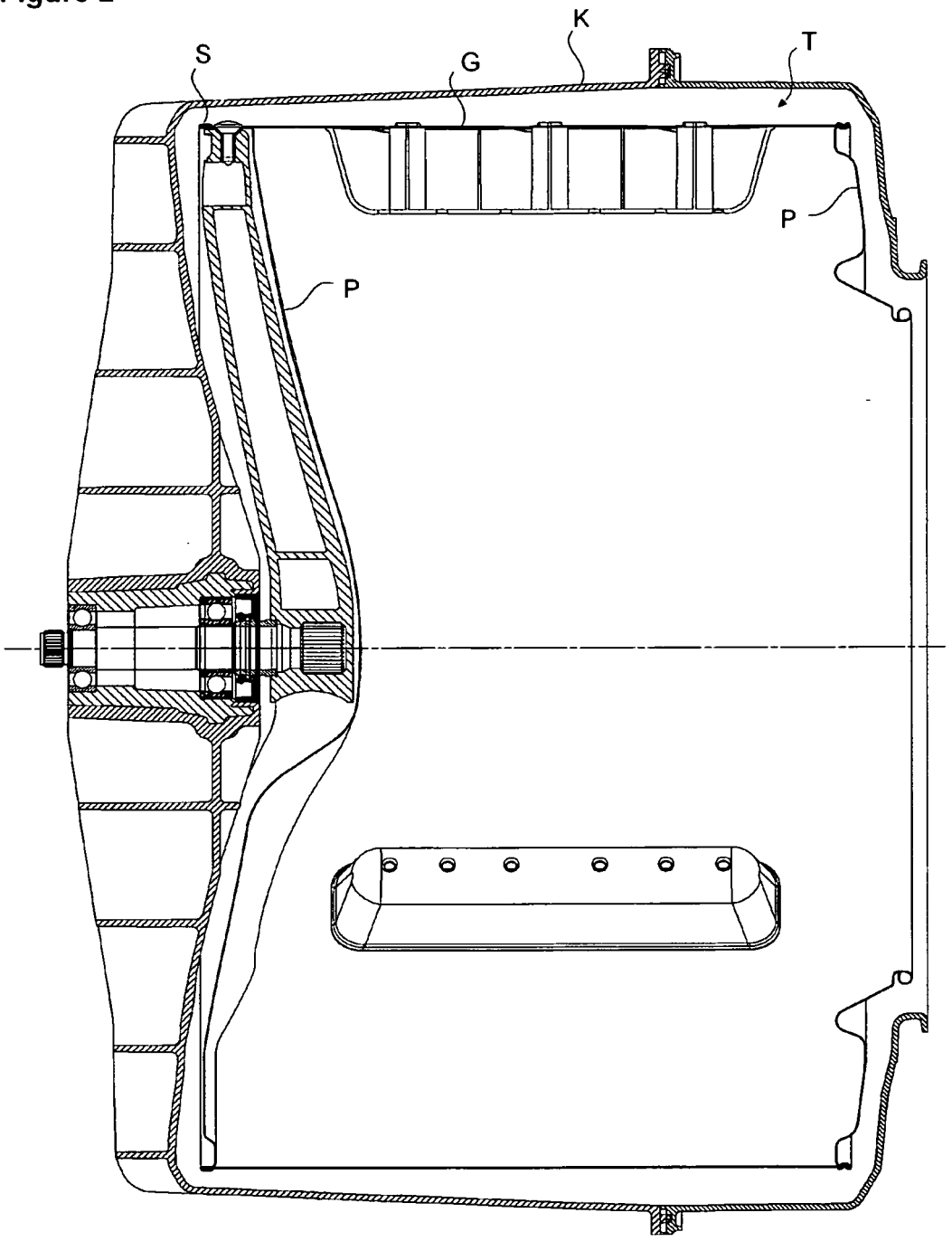


Figure 2



PRIOR ART

Figure 3

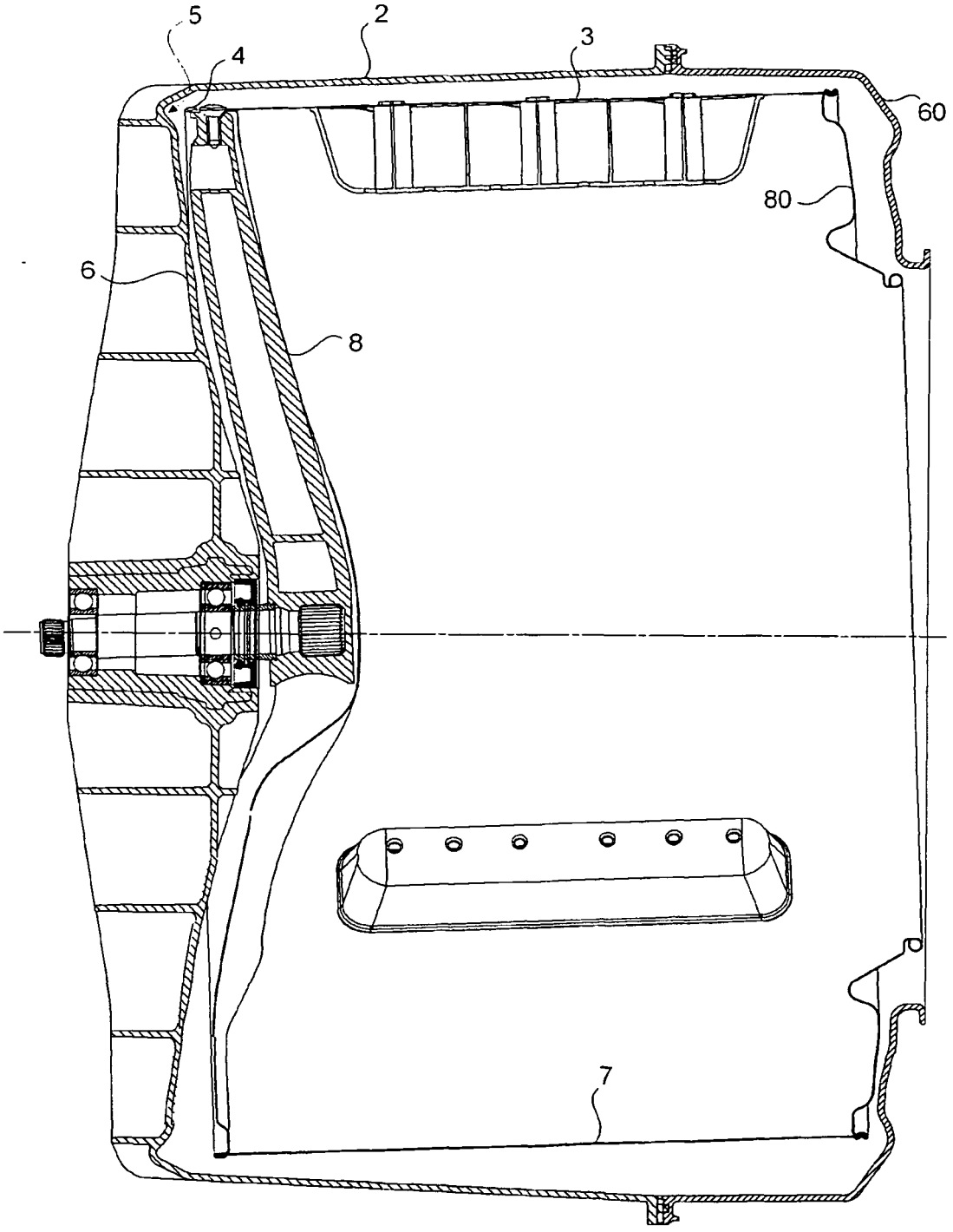


Figure 4

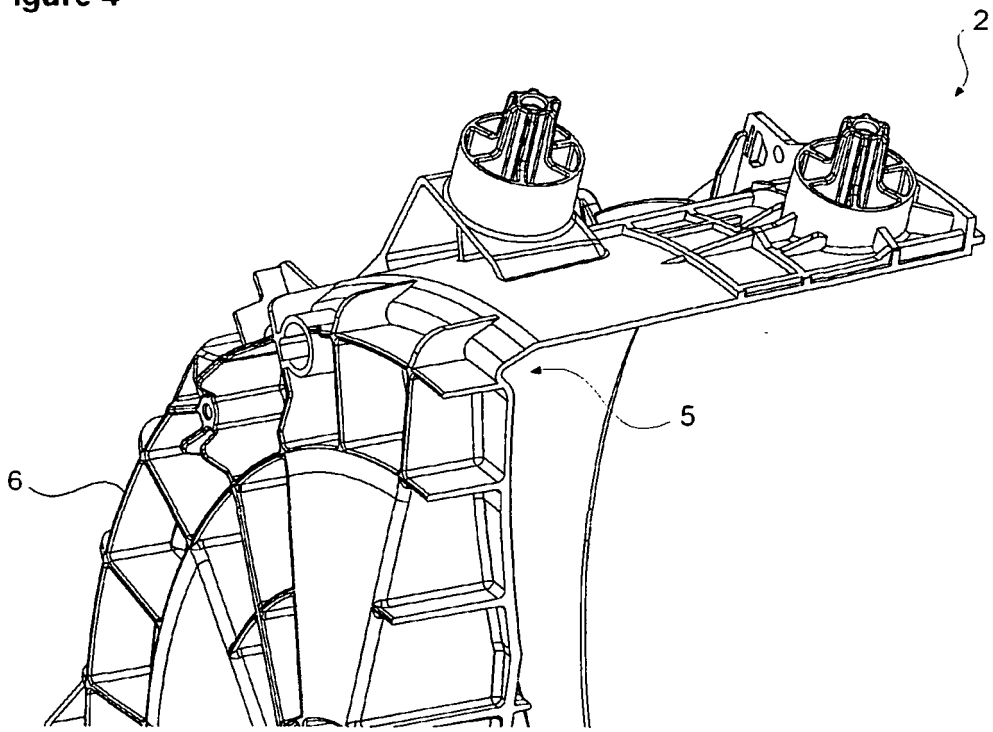
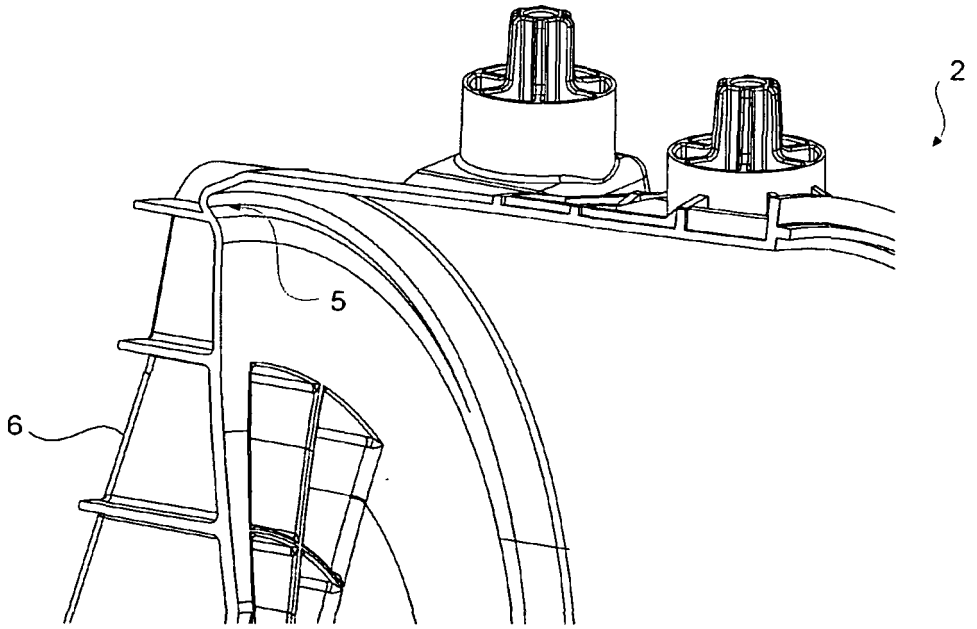


Figure 5



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

- WO 2007023453 A **[0007]**