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(54) GASKET FOR USE IN A LAUNDRY WASHING MACHINE

DICHTUNG ZUR VERWENDUNG BEI EINER WASCHMASCHINE

JOINT D'ÉTANCHÉITÉ DESTINÉ À ÊTRE UTILISÉ DANS UNE MACHINE À LAVER LE LINGE

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(73) Proprietor: **Arçelik Anonim Sirketi**
34445 Istanbul (TR)

(72) Inventors:
- **METIN, Ergin**
  34950 Istanbul (TR)
- **FILIZ, Coskun**
  34950 Istanbul (TR)
- **CATALTEPE, Servet**
  34950 Istanbul (TR)
- **YILDIRIM, Salih**
  34950 Istanbul (TR)
- **CETINKAYA, Bugra**
  34950 Istanbul (TR)

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Description

[0001] The present invention relates to a laundry washing machine, in particular to a front loading type laundry washing machine. The present invention more particularly relates to the gasket of the front loading type laundry washing machine that leak-tightly seals the tub from the interior of the appliance.

[0002] Front loading type laundry washing machines are commonly known. For increasing the user-convenience such laundry washing machines are also commonly provided with a drying function for drying the laundry by means of hot process air. In the present application, the term "laundry washing machine" is intended to comprise both the front loading type laundry washing machine with the drying function or without the drying function. A washing machine generally comprises a body, a tub inside the body, a drum which is rotatably disposed into the tub so as to rotate the laundry about a rotational axis, a front door which has an opening for accessing the drum. In general, the drum is connected to the shaft of an electric motor which is located behind the tub. The drum has a loading/unloading aperture which faces the opening of the front door. Also the tub has an aperture which is usually concentrically arranged with the loading/unloading aperture of the drum. Therefore, the region between the tub and the front door around the opening must be leak-tightly sealed by a gasket. In general, the gasket comprises an annual collar, an outer rim for coupling the annular collar with the periphery of the opening of the front door and an inner rim for coupling the annular collar with the periphery of the aperture of the tub. To compensate for the vibrations which are generated during the rotation of the drum, the tub is generally supported by a damping mechanism. Thus, during the operation, both the tub and the drum are in continual relative motion with respect to the opening of the front door. Therefore, the annular gasket is generally provided with a flexible annular bending section which joins the outer rim and the inner rim and thus, permits relative movement of the tub and absorbs the vibrations.

[0003] During the rotation of the drum, the laundry inside the drum is periodically moved to the region immediately between the annular collar and the flange of the loading/unloading aperture of the drum. Therefore, during the operation, the laundry is very often rubbed against the gasket. Thus, there is a risk that the laundry gets damaged, in particular receives traces of rubber. Another risk is that the laundry can move into the gap between the tub and the drum. To prevent the aforementioned undesired incidents, the gasket is generally provided with a radially extending tongue for diverting the laundry away from the region immediately between the drum and the annular collar. Such tongues are commonly referred to as diverters. TR 2003 00616 T1 discloses a washing machine which comprises a gasket having a diverter. In general, a diverter must be suffiently strong to withstand the thrust of the rotating laundry both during the washing process and the spin-drying process. Therefore, the diverters are usually manufactured as solid rubbers. However, the production of such a diverter is comparatively expensive both in terms of material costs and labor costs.

[0004] CN 201258404 describes a door seal ring for a drum washing machine which comprises an inner mouthpiece connected with an outer tube, an outer mouthpiece which butts against a glass door, a folding portion between the two mouthpieces, and a stopper.

[0005] WO 2007/017726 A1 discloses a gasket with a tongue that comprises a rigid kernel.

[0006] An objective of the present invention is to provide a gasket and a laundry washing machine having the same which overcomes the drawbacks of the prior art in a cost effective way and which enables a sufficient thrust and also gently handles the sensitive laundry.

[0007] This objective has been achieved by the gasket as defined in claim 1 and the laundry washing machine as defined in claim 10. Further achievements have been attained by the subject-matters respectively defined in the dependent claims.

[0008] In the gasket of the present invention, the axially inwardly facing surface of the tongue and the axially outwardly facing surface of the tongue each comprises a plurality of ribs and a plurality of recesses. According to the invention, the ribs on the axially opposite surfaces of the tongue extend respectively away from each other in the axial direction and are substantially parallel to each other in the radial direction.

[0009] With the present invention, particularly by virtue of the ribs and recesses, the tongue has been rendered, on the one hand, sufficiently strong to withstand the thrust of the laundry which is particularly made from heavy fabric and, on the other one hand, sufficiently flexible against the laundry which is particularly made from easily tearable fabric. Thereby, the sensitive laundry can be gently diverted away from the critical region. In particular, the risk of occurrence of any rubber traces on the laundry has been eliminated or reduced as much as possible as the contact area of the tongue has been decreased through the provision of the recesses and also as the flexibility of the exposed surface of the tongue has been increased through the provision of the ribs. With the present invention, the diverting function of the tongue has been improved. Thereby, the consumer satisfaction can be increased. With the present invention, particularly by virtue of the recesses, also the amount of rubber required for the production of the tongue has been comparatively decreased without compromising the resiliency thereof. Thereby, the manufacturing time, in particular the time required for the vulcanization process has also been comparatively shortened. With the present invention, the material costs and the labor costs have been comparatively reduced.

[0010] In the gasket of the present invention, the ribs and recesses can be arranged and aligned onto the axially opposite surfaces of the tongue in various different ways within the scope defined by the claims and can

assume various different sizes and shapes. Thereby, the resiliency of the tongue can be accurately adjusted in accordance with the thrust of the laundry and the type of the fabric.

[0011] In an embodiment, the ribs and the recesses are arranged so as to alternate.

[0012] In other alternative embodiments, the centers of the ribs on the axially opposite surfaces of the tongue are respectively located either back-to-back or, alternatively shifted with respect to each other such that the centers of the ribs and the centers of the recesses on the axially opposite surfaces of the tongue are respectively located back-to-back.

[0013] In other alternative embodiments, the ribs and the recesses have respectively same or, alternatively different widths.

[0014] In other alternative embodiments, the ribs and the recesses may have rectangular cross sections, v-shaped cross sections, arc-shaped cross sections or the like.

[0015] In another embodiment, the gasket has one or more than one flexible bending section so as to more easily permit relative movement of the tub with respect to the front door.

[0016] In another embodiment, the entire gasket is molded from rubber as a single piece.

[0017] In another embodiment, the tongue is located on the inner periphery of the annular collar, particularly in close proximity to the loading/unloading aperture of the drum and extends a predetermined distance radially across the flange of the drum. Thereby, the laundry which is moved towards the critical region can be more reliably diverted back towards the center of the drum.

[0018] In another embodiment, the gasket is fixed onto the laundry washing machine such that tongue is located at the top side of the tub aperture and extends radially downwards. Additional advantages of the gasket and the laundry washing machine of the present invention will become more apparent with the detailed description of the embodiments with reference to the accompanying drawings in which:

Figure 1 - is a partial perspective view of a laundry washing machine which has a gasket according to an embodiment of the present invention;

Figure 2 - is a partial front view of the laundry washing machine which has the gasket according to an embodiment of the present invention;

Figure 3 - is a partial sectional view of the laundry washing machine which has the gasket according to an embodiment of the present invention, taken along the line A-A of Fig. 2;

Figure 4 - is an enlarged view of the detail B of Fig. 3;

Figure 5 - is a partial perspective view of the gasket which has a tongue according to an embodiment of the present invention;

Figure 6 - is another partial perspective view of the gasket which has the tongue according to an embodiment of the present invention;

Figure 7 - is a partial radial view of the gasket which has the tongue according to an embodiment of the present invention;

Figure 8 - is a partial axial view of the gasket which has the tongue according to an embodiment of the present invention;

Figure 9 - is another partial sectional view of the gasket which has the tongue according to an embodiment of the present invention, taken along the line C-C of Fig. 8.

[0019] The reference signs appearing on the drawings relate to the following technical features.

1. Gasket
2. Laundry washing machine
3. Body
4. Tub
5. Front door
6. Opening
7. Annular collar
8. Tongue
9. Inward surface
10. Outward surface
11. Rib
12. Recess
13. Outer rim
14. Inner rim
15. Aperture
16. Bending section

[0020] The gasket (1) is suitable for use in a front loading type laundry washing machine (2) with the drying function or without the drying function.

[0021] The front loading type laundry washing machine (2) comprises a body (3), a tub (4) which is disposed into the body (3), a drum (not shown) which is rotatably disposed into the tub (4) about a rotational axis, a front door (5) which has an opening (6) for accessing the drum (Fig. 1 to 9).

[0022] The gasket (1) comprises a flexible annular collar (7) for leak-tightly sealing the region between the tub (4) and the front door (5) around the opening (6) and a radially extending tongue (8) for diverting the laundry (not shown) inside the drum away from the region immediately between the drum and the annular collar (7).

[0023] In the gasket (1) of the present invention, each of the axially inwardly facing surface (9) and the axially outwardly facing surface (10) of the tongue (8) comprises a plurality of ribs (11) and a plurality of recesses (12). The ribs on the axially opposite surfaces of the tongue extend respectively away from each other in the axial direction and are substantially parallel to each other in the radial direction.

[0024] The laundry washing machine (2) of the present invention comprises the gasket (1) according to the present invention.

[0025] In an embodiment, the plurality of ribs (11) and the plurality of recesses (12) are alternately disposed onto each of the axially inwardly facing surface (9) and the axially outwardly facing surface (10) of the tongue (8).

[0026] In another embodiment, the centers of the ribs (11) on the axially inwardly facing surface (9) of the tongue (8) and the centers of the recesses (12) on the axially outwardly facing surface (10) of the tongue (8) are respectively located back-to-back.

[0027] In another embodiment, the ribs (11) and the recesses (12) have respectively different widths in the transverse direction along which they are alternately arranged (Fig. 1 to 9). The transverse direction is perpendicular to the axial direction, namely the rotational axis of the drum.

[0028] In another embodiment, the widths of the ribs (11) are respectively larger than the widths of the recesses (12) in the transverse direction along which they are alternately arranged.

[0029] The ribs (11) on the axially inwardly facing surface (9) and the axially outwardly facing surface (10) of the tongue (8) extend respectively in opposing axial directions.

[0030] In another embodiment, the gasket (1) comprises a flexible outer rim (13), a flexible inner rim (14) and one or more than one flexible annular bending sections (16). The flexible outer rim (13) is suitable for coupling the annular collar (7) with the periphery of the opening (6) of the front door (5). The flexible inner rim (14) is suitable for coupling the annular collar (8) with the periphery of an aperture (15) of the tub (4). The flexible annular bending sections (16) serially join the outer rim (13) and the inner rim (14).

[0031] In another embodiment, the annular collar (7), the tongue (8), the ribs (11), the recesses (12), the rims (13, 14) and the bending sections (16) are molded as a single piece gasket (1). In another embodiment, the single piece gasket (1) is molded from rubber.

[0032] In another embodiment, the tongue (8) has a size such that it extends a predetermined distance radially across the flange (not shown) of the loading/unloading aperture of the drum when the gasket (1) is assembled with the laundry washing machine (2).

[0033] In another embodiment, the tongue (8) points radially downwards when the gasket (1) is assembled with the laundry washing machine (2).

Claims

1. A gasket (1) for use in a front loading type laundry washing machine (2) comprising a body (3), a tub (4) which is disposed into the body (3), a drum which is rotatably disposed into the tub (4) about a rotational axis, a front door (5) which has an opening (6) for accessing the drum, the gasket (1) comprising a flexible annular collar (7) for leak-tightly sealing the region between the tub (4) and the front door (5) around the opening (6) and a radially extending tongue (8) for diverting the laundry inside the drum away from the region immediately between the drum and the annular collar (7),
the gasket (1) being **characterized in that** each of the axially inwardly facing surface (9) and the axially outwardly facing surface (10) of the tongue (8) comprises a plurality of ribs (11) and a plurality of recesses (12), wherein said ribs (11) and recesses (12) extend respectively away from each other in the axial direction and are parallel to each other in the radial direction.

2. The gasket (1) according to claim 1, **characterized in that** the plurality of ribs (11) and the plurality of recesses (12) are alternately disposed onto each of the axially inwardly facing surface (9) and the axially outwardly facing surface (10) of the tongue (8).

3. The gasket (1) according to claim 2, **characterized in that** the centers of the ribs (11) on the axially inwardly facing surface (9) of the tongue (8) and the centers of the recesses (12) on the axially outwardly facing surface (10) of the tongue (8) are respectively located back-to-back.

4. The gasket (1) according to claim 2, **characterized in that** the centers of the ribs (11) on the axially inwardly facing surface (9) and the axially outwardly facing surface (10) of the tongue (8) are respectively located back-to-back.

5. The gasket (1) according to any one of claims 1 to 4, **characterized in that** the ribs (11) and the recesses (12) have respectively different widths in the transverse direction along which they are alternately arranged.

6. The gasket (1) according to any one of claims 1 to 4, **characterized in that** the ribs (11) and the recesses (12) have respectively same widths in the transverse direction along which they are alternately arranged.

7. The gasket (1) according to any one of claims 1 to 6,**characterized in that** the gasket (1) further comprises a flexible outer rim (13) for coupling the annular collar (7) with the periphery of the opening (6) of the front door (5) and a flexible inner rim (14) for coupling the annular collar (8) with the periphery of the aperture (15) of the tub (4) and one or more than one flexible annular bending section (16) which joins the outer rim (13) and the inner rim (14).

8. The gasket (1) according to claim 7, **characterized in that** the annular collar (7), the tongue (8), the ribs (11), the recesses (12), the rims (13, 14) and the bending sections (16) are molded as a single piece.

9. The gasket (1) according to any one of claims 1 to 8, **characterized in that** the tongue (8) has a size such that it extends a predetermined distance radially across the flange of the loading/unloading aperture of the drum when the gasket (1) is assembled with the laundry washing machine (2).

10. A laundry washing machine (2) comprising a body (3), a tub (4) which is disposed into the body (3), a drum which is rotatably disposed into the tub (4) about a rotational axis, a front door (5) which has an opening (6) for accessing the drum, **characterized in that** the laundry washing machine (2) further comprises a gasket (1) as defined in any one of claims 1 to 9.

11. The laundry washing machine (2) according to claim 10, **characterized in that** the gasket (1) is assembled with the laundry washing machine (2) such that the tongue (8) points radially downwards.

Patentansprüche

1. Eine Dichtung (1) zur Verwendung in einer Frontlader-Waschmaschine (2), **umfasst** einen Körper (3), eine Wanne (4), die im Körper (3) angeordnet ist, eine Trommel, die um eine Drehachse drehbar in der Wanne (4) angeordnet ist, eine Fronttür (5), die eine Öffnung (6) für den Zugang zur Trommel aufweist, wobei die Dichtung (1) einen flexiblen ringförmigen Kragen (7) zum leckdichten Abdichten des Bereichs zwischen der Wanne (4) und der Fronttür (5) um die Öffnung (6) herum und eine sich radial erstreckende Zunge (8) zum Ableiten der Wäsche im Inneren der Trommel weg von dem Bereich unmittelbar zwischen der Trommel und dem ringförmigen Kragen (7) umfasst, die Dichtung (1) ist **dadurch gekennzeichnet, dass** die axial nach innen weisende Fläche (9) und die axial nach außen weisende Fläche (10) der Zunge (8) jeweils mehrere Rippen (11) und mehrere Aussparungen (12) aufweisen , wobei sich die Rippen (11) und Aussparungen (12) jeweils in axialer Richtung voneinander weg erstrecken und in radialer Richtung parallel zueinander verlaufen.

2. Die Dichtung (1), wie in Anspruch 1 aufgeführt, **ist dadurch gekennzeichnet, dass** die mehreren Rippen (11) und die mehreren Aussparungen (12) abwechselnd jeweils auf der axial nach innen weisenden Fläche (9) und der axial nach außen weisenden Fläche (10) der Zunge (8) angeordnet sind.

3. Die Dichtung (1), wie in Anspruch 2 aufgeführt, **ist dadurch gekennzeichnet, dass** die Mittelpunkte der Rippen (11) auf der axial nach innen weisenden Fläche (9) der Zunge (8) und die Mittelpunkte der Aussparungen (12) auf der axial nach außen weisenden Fläche (10) der Zunge (8) jeweils Rücken an Rücken liegen.

4. Die Dichtung (1), wie in Anspruch 2 aufgeführt, **ist dadurch gekennzeichnet, dass** die Mittelpunkte der Rippen (11) auf der axial nach innen weisenden Fläche (9) und der axial nach außen weisenden Fläche (10) der Zunge (8) jeweils Rücken an Rücken liegen.

5. Die Dichtung (1), wie in einem der Ansprüche 1 bis 4 aufgeführt, **ist dadurch gekennzeichnet, dass** die Rippen (11) und die Aussparungen (12) in Querrichtung, entlang derer sie abwechselnd angeordnet sind, jeweils unterschiedliche Breiten aufweisen.

6. Die Dichtung (1), wie in einem der Ansprüche 1 bis 4 aufgeführt, **ist dadurch gekennzeichnet, dass** die Rippen (11) und die Aussparungen (12) in Querrichtung, entlang derer sie abwechselnd angeordnet sind, jeweils gleiche Breiten aufweisen.

7. Die Dichtung (1), wie in einem der Ansprüche 1 bis 6 aufgeführt, **ist dadurch gekennzeichnet, dass** die Dichtung (1) ferner einen flexiblen äußeren Rand (13) zum Verbinden des ringförmigen Kragens (7) mit dem Umfang der Öffnung (6) der Fronttür (5) und einen flexiblen inneren Rand (14) zum Verbinden des ringförmigen Kragens (8) mit dem Umfang der Öffnung (15) der Wanne (4) sowie einen oder mehrere flexible ringförmige Biegeabschnitte (16) umfasst, die den äußeren Rand (13) und den inneren Rand (14) miteinander verbinden.

8. Die Dichtung (1), wie in Anspruch 7 aufgeführt, **ist dadurch gekennzeichnet, dass** der ringförmige Kragen (7), die Zunge (8), die Rippen (11), die Aussparungen (12), die Ränder (13, 14) und die Biegeabschnitte (16) aus einem einzigen Stück geformt sind.

9. Die Dichtung (1), wie in einem der Ansprüche 1 bis 8 aufgeführt, **ist dadurch gekennzeichnet, dass** die Zunge (8) eine solche Größe hat, dass sie sich um eine vorbestimmte Strecke radial über den Flansch der Be-/Entladeöffnung der Trommel erstreckt, wenn die Dichtung (1) mit der Waschmaschine (2) zusammengebaut ist.

10. Eine Waschmaschine (2) umfasst einen Körper (3), eine Wanne (4), der im Körper (3) angeordnet ist, eine Trommel, die drehbar in der Wanne (4) angeordnet ist, eine Trommel, die um eine Drehachse drehbar in der Wanne (4) angeordnet ist, eine Fronttür (5), die eine Öffnung (6) für den Zugang zur Trommel aufweist, **gekennzeichnet ist sie dadurch,** dass die Waschmaschine (2) außerdem eine Dich-

tung (1) gemäß einem der Ansprüche 1 bis 9 umfasst.

11. Eine Waschmaschine (2), wie in Anspruch 10 aufgeführt, **ist dadurch gekennzeichnet, dass** die Dichtung (1) so mit der Waschmaschine (2) zusammengebaut ist, dass die Zunge (8) radial nach unten zeigt.

Revendications

1. Un joint (1) pour utilisation dans une machine à laver le linge du type à chargement frontal (2) comprenant un corps (3), une cuve (4) qui est disposée dans le corps (3), un tambour qui est disposé de manière rotative dans la cuve (4) autour d'un axe de rotation, une porte avant (5) qui a une ouverture (6) pour l'accès au tambour, le joint (1) comprenant une collerette annulaire flexible (7) pour sceller de manière étanche la région entre la cuve (4) et la porte avant (5) autour de l'ouverture (6) et une languette s'étendant radialement (8) pour détourner le linge à l'intérieur du tambour de la région située immédiatement entre le tambour et la collerette annulaire (7), le joint (1) est **caractérisé en ce que** chacune des surfaces (9) et (10) de la languette (8) tournée axialement vers l'intérieur comprend une pluralité de nervures (11) et une pluralité d'évidements (12), dans lesquels lesdites nervures (11) et lesdits évidements (12) s'étendent respectivement à l'écart les uns des autres dans la direction axiale et sont parallèles les uns aux autres dans la direction radiale.

2. Le joint (1) selon la déclaration 1, **caractérisé en ce que** la pluralité de nervures (11) et la pluralité d'évidements (12) sont disposées alternativement sur chacune des surfaces (9) et (10) de la languette (8), tournées respectivement vers l'intérieur et vers l'extérieur.

3. Le joint (1) selon la déclaration 2, **caractérisé en ce que** les centres des nervures (11) sur la surface tournée axialement vers l'intérieur (9) de la languette (8) et les centres des évidements (12) sur la surface tournée axialement vers l'extérieur (10) de la languette (8) sont respectivement situés dos à dos.

4. Joint (1) selon la revendication 2, **caractérisé en ce que** les centres des nervures (11) sur la surface axialement tournée vers l'intérieur (9) et la surface axialement tournée vers l'extérieur (10) de la languette (8) sont respectivement situés dos à dos.

5. Joint (1) selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** les nervures (11) et les évidements (12) ont respectivement des largeurs différentes dans la direction transversale le long de laquelle ils sont disposés en alternance.

6. Joint (1) selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** les nervures (11) et les évidements (12) ont respectivement les mêmes largeurs dans la direction transversale le long de laquelle ils sont disposés en alternance.

7. Le joint (1) selon l'une quelconque des déclarations 1 à 6, **caractérisé en ce que** le joint (1) comprend en outre un bord extérieur flexible (13) pour coupler le collet annulaire (7) avec la périphérie de l'ouverture (6) de la porte avant (5) et un bord intérieur flexible (14) pour coupler le collet annulaire (8) avec la périphérie de l'ouverture (15) de la cuve (4) et une ou plusieurs sections flexibles de flexion annulaire (16) qui joint le bord extérieur (13) et le bord intérieur (14).

8. Le joint (1) selon la déclaration 7, **caractérisé en ce que** la collerette annulaire (7), la languette (8), les nervures (11), les évidements (12), les rebords (13, 14) et les sections de flexion (16) sont moulés en une seule pièce.

9. Le joint (1) selon l'une quelconque des déclarations 1 à 8, **caractérisé en ce que** la languette (8) a une taille telle qu'elle s'étend sur une distance prédéterminée radialement à travers la bride de l'ouverture de chargement/déchargement du tambour lorsque le joint (1) est assemblé avec le lave-linge (2).

10. Une machine à laver le linge (2) comprenant un corps (3), une cuve (4) qui est disposée dans le corps (3), un tambour qui est disposé de manière rotative dans la cuve (4) autour d'un axe de rotation, une porte avant (5) qui a une ouverture (6) pour accéder au tambour, **caractérisée en ce que** la machine à laver le linge (2) comprend en outre un joint (1) tel que défini dans l'une quelconque des revendications 1 à 9.

11. La machine à laver le linge (2) selon la déclaration 10, **caractérisée en ce que** le joint (1) est assemblé avec la machine à laver le linge (2) de manière à ce que la languette (8) soit orientée radialement vers le bas.

Fig. 1

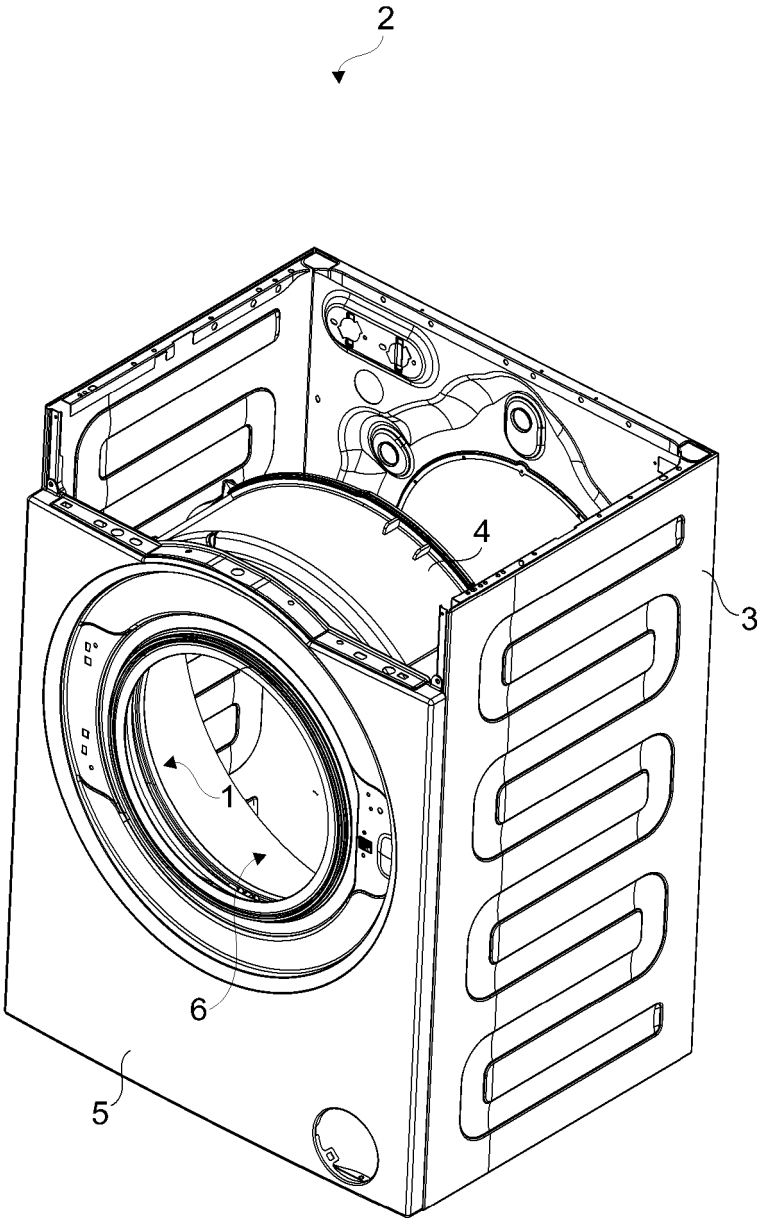


Fig. 2

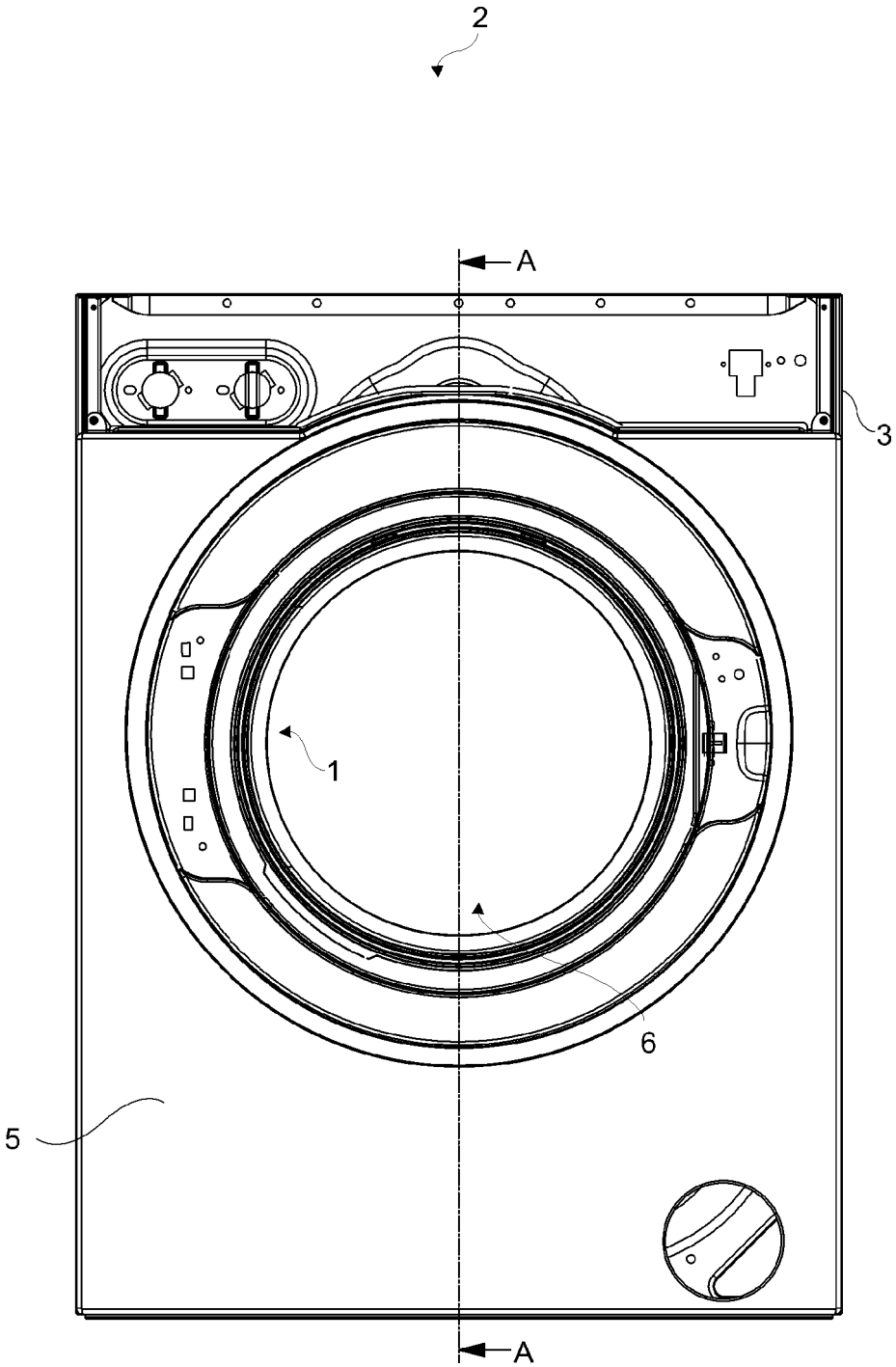


Fig. 3

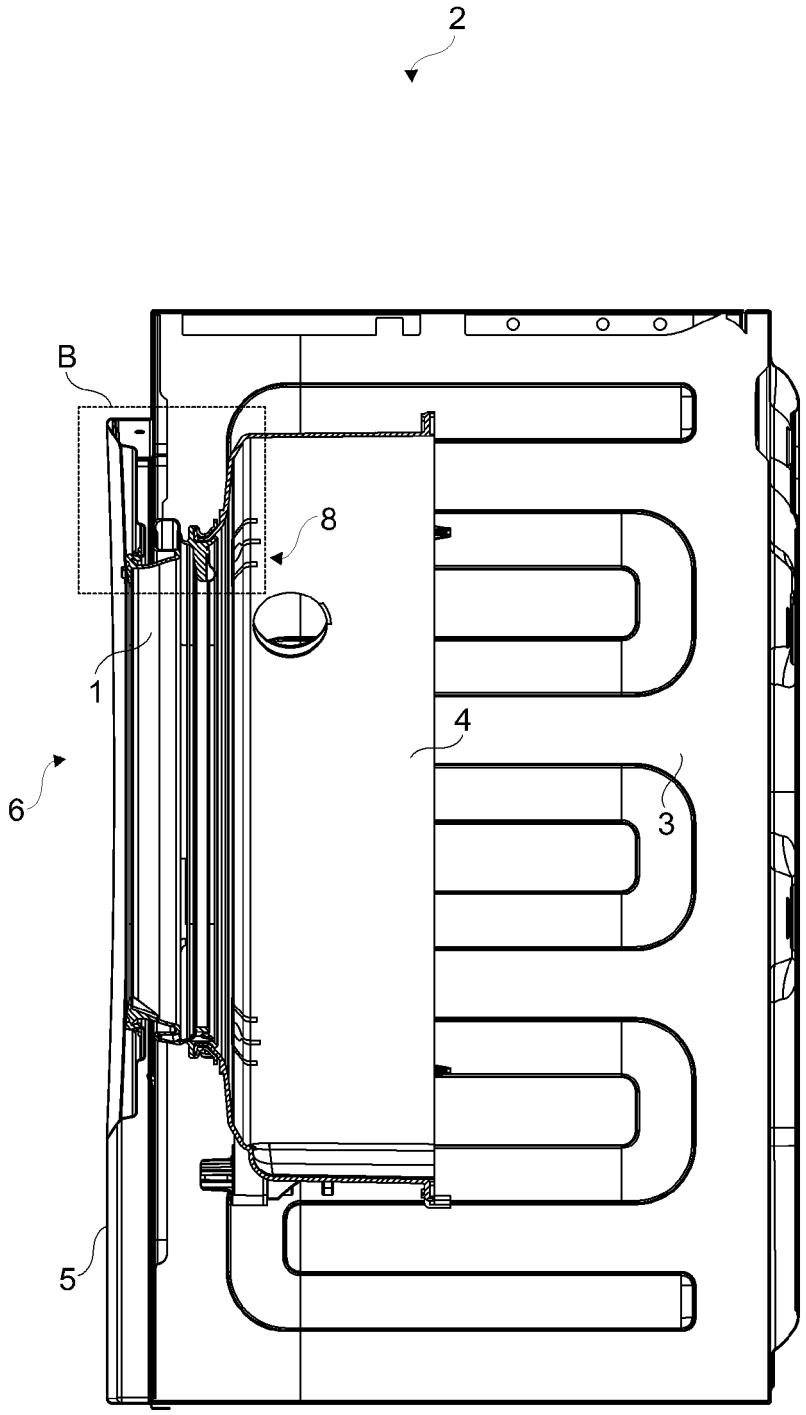


Fig. 4

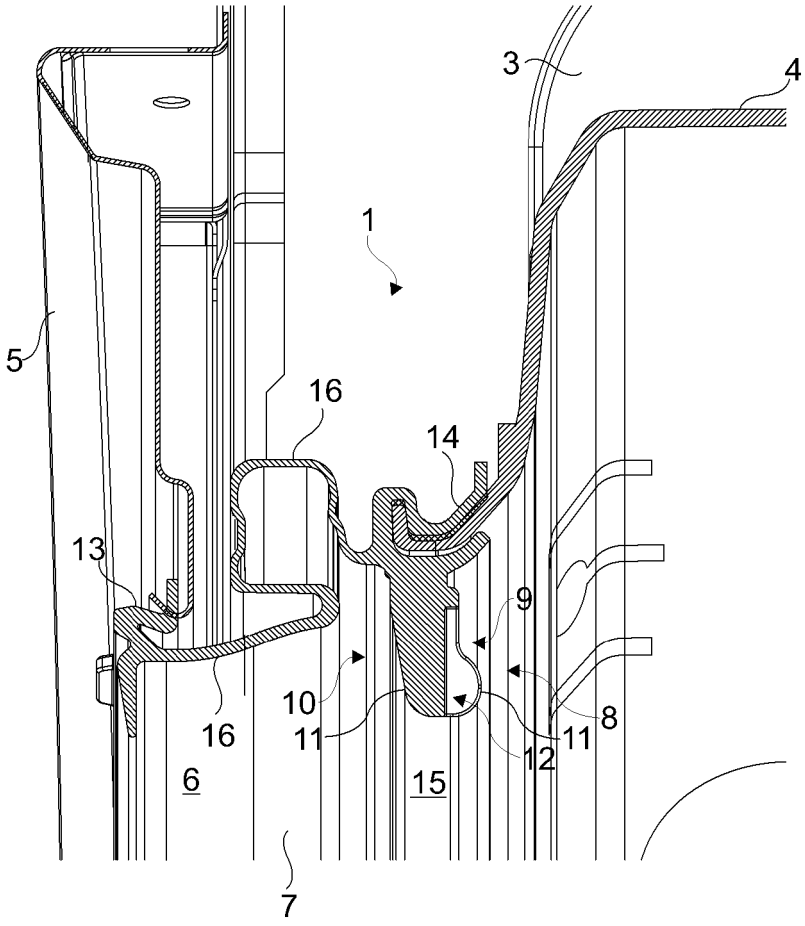


Fig. 5

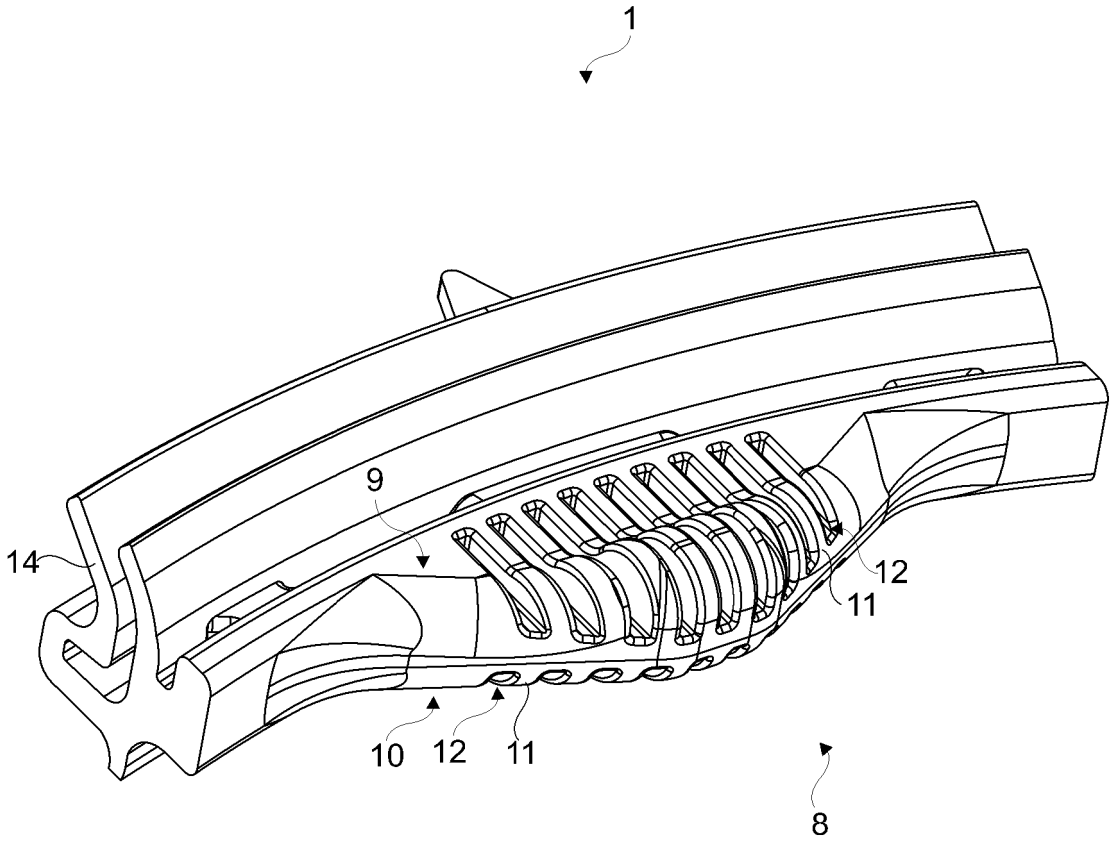


Fig. 6

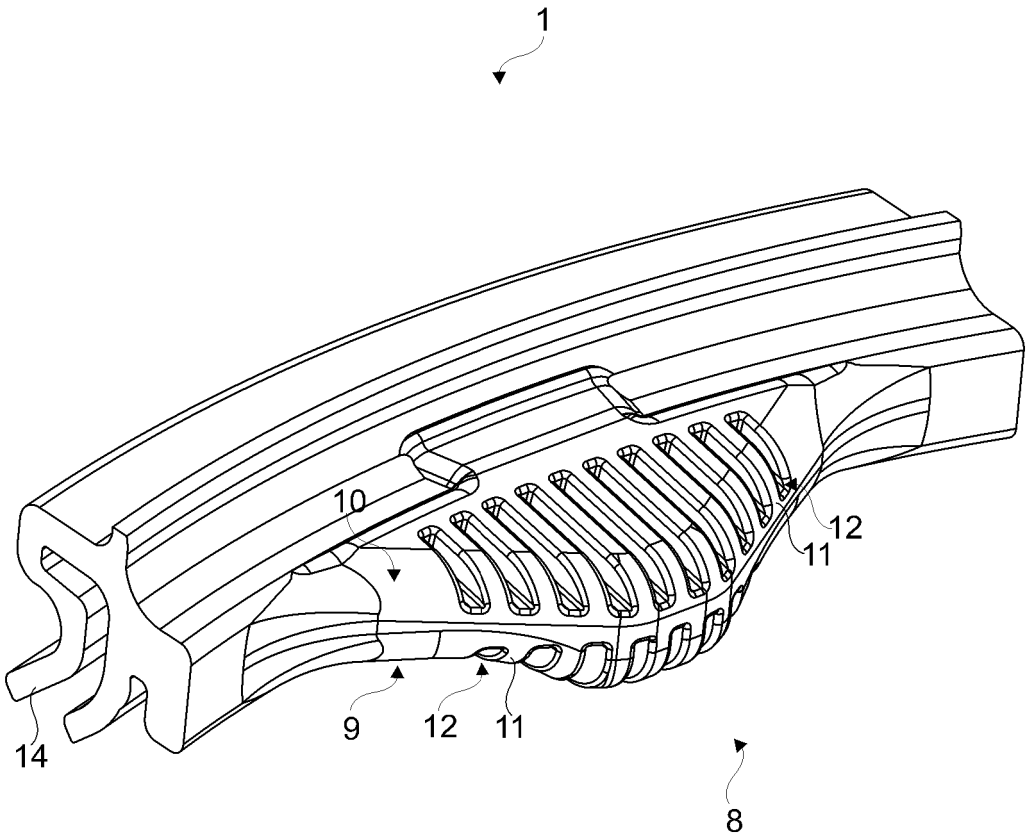


Fig. 7

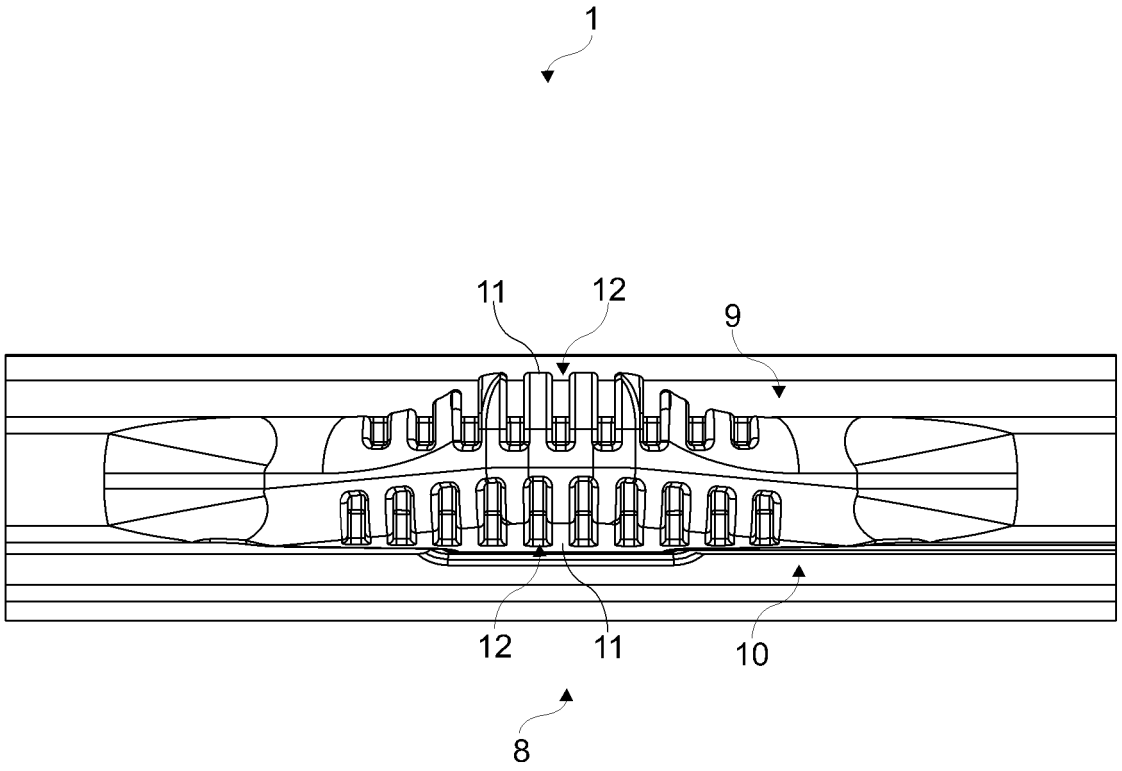


Fig. 8

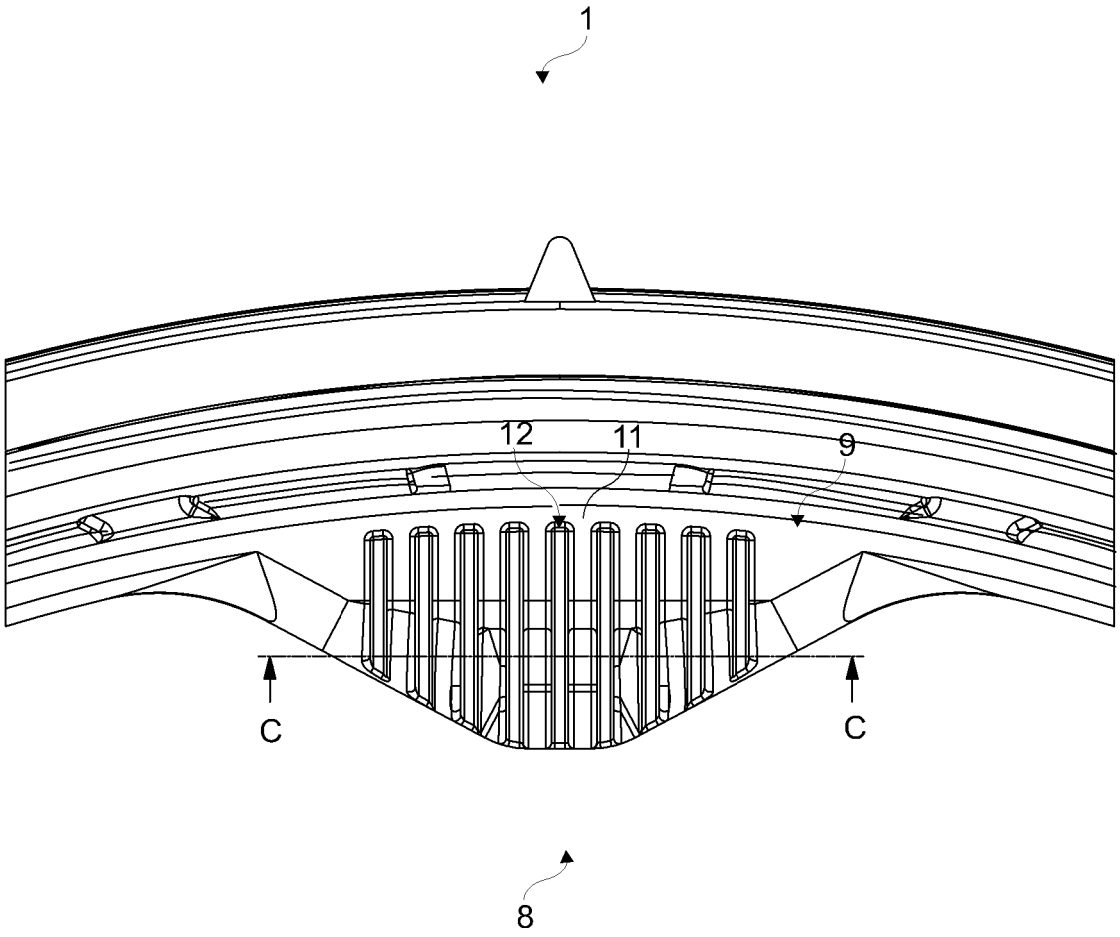
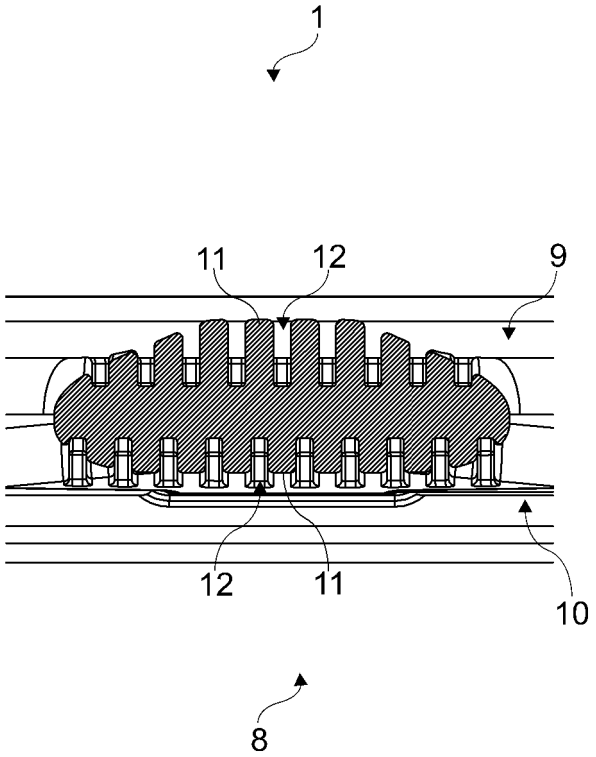


Fig. 9



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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