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• **MORYC, Mateusz**
32 050 Skawina (PL)
• **LAS, Piotr**
32 050 Skawina (PL)

(74) Representative: **Valeo Systèmes Thermiques**
Service Propriété Intellectuelle
ZA l'Agiot, 8 rue Louis Lormand
CS 80517
La Verrière
78322 Le Mesnil-Saint-Denis Cedex (FR)

(71) Applicant: **Valeo Autosystemy SP. Z.O.O.**
32-050 Skawina (PL)

(72) Inventors:
• **WALUSIAK, Pawel**
32 050 Skawina (PL)

(54) **A HEADER-TANK ASSEMBLY**

(57) The present invention discloses a header-tank assembly for a heat exchanger. The header-tank assembly comprising a tank having a base portion and a tank foot, a baffle protruding from the base portion towards the tank foot dividing the tank into a first section and a second section, and a header configured to be fixed to

the tank in a fluid tight manner. The header tank assembly further comprises a sealing member fixed to the baffle. The sealing member is in contact at least with the baffle and the header so that the first section is fluidly isolated from the second section.

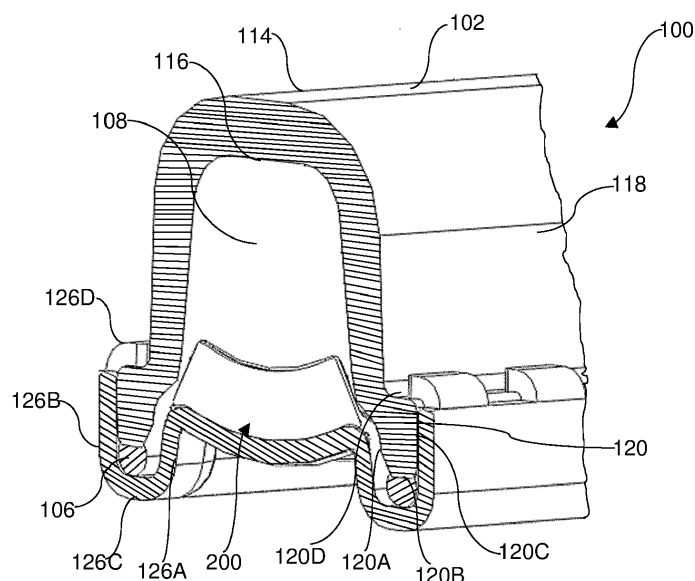


FIG. 4

Description

[0001] The present invention relates to a header-tank assembly. In particular, the present invention relates to a header-tank assembly for a heat exchanger of a motor vehicle.

[0002] The heat exchanger typically includes a pair of manifolds, and a plurality of tubes stacked between the manifolds to provide a fluid communication between the manifolds. Each manifold includes a tank joined to a header. Generally, the tank includes a chamber and a tank foot, and the header includes a base and a channel extending circumferentially around the base configured to receive the tank foot. The channel has an outer wall with a bendable end for gripping the foot. A baffle may be integrally formed in the tank to divide the chamber into two portions. The header-tank assembly further includes a gasket at a junction of the header and the tank. The gasket has a rectangular ring configuration with rounded corners. The gasket may include two opposing longer sidewalls and a bridge extending between the sidewalls. The bridge is formed such that it lies at a junction of the header and baffle to provide a fluid tight seal there between and fluidically isolate the two portions of the chamber.

[0003] During installation, the gasket is disposed within the channel of the header. A short side of the tank is received within the channel of the header and the remaining portion of the foot of the tank received within the channel by rotation of the tank. Alternatively, the header could also receive the tank parallelly within the channel. Then, the tank is retained over the header by crimping the bendable end of header over the tank foot. The gasket is clinched beneath the foot and forms a fluid tight seal between the header and tank. However, a potential problem of dislocation of the gasket and the bridge of the gasket may occur regardless of the method of securing the tank to the header. Particularly, the bridge of the gasket may be misplaced even before the completion of the clinch operation, and may create a potential leak path. The bridge is not provided with any means to perfectly align with the foot of the baffle and can slip to a side of the baffle as soon as the foot of the baffle contacts the bridge of the gasket.

[0004] Accordingly, there is a need for a sealing element for a header-tank assembly that prevents dislocation of the sealing member when the baffle contacts the header during or after assembly of the header to the tank, and ensures a fluid tight seal between the header and the baffle of the tank.

[0005] In the present description, some elements or parameters may be indexed, such as a first element and a second element. In this case, unless stated otherwise, this indexation is only meant to differentiate and name elements, which are similar but not identical. No idea of priority should be inferred from such indexation, as these terms may be switched without betraying the invention. Additionally, this indexation does not imply any order in

mounting or use of the elements of the invention.

[0006] In view of forgoing, the present invention discloses a header-tank assembly for a heat exchanger. The header-tank assembly comprises a tank having a base and a tank foot, a baffle protruding from the base towards the tank foot dividing the tank into a first section and a second section, and a header configured to be fixed to the tank in a fluid tight manner. The header tank assembly further comprises a sealing member fixed to the baffle. The sealing member is in contact at least with the baffle and the header so that the first section is fluidly isolated from the second section. The baffle comprises a first portion having a first thickness and a second portion having a second thickness. The first thickness is greater than the second thickness. The second portion is an end portion of the baffle having an edge.

[0007] In one embodiment, the sealing member comprises a base and a pair of spaced apart sidewalls extending vertically from the base defining a U-shaped channel configured to receive the baffle, and at least one rib formed within the channel and extends across the sidewalls. The baffle having at least one groove extends from the edge in a direction perpendicular to the axis of the tank. The groove is complementary to the rib and configured to receive the rib while the channel engages the second portion of the baffle. The channel may have a length substantially equal to a length of the edge of the baffle. The edge of the baffle extending in a direction perpendicular to the axis of elongation of the tank defines the length of the edge.

[0008] In another embodiment, the baffle comprises at least two apertures, and the sealing member comprises a base and a pair of spaced apart sidewalls extending vertically from the base defining the U-shaped channel and at least two bead portions. Each bead portion includes a cylindrical portion complementary to the shape of the aperture and a rounded portion. At least one bead portion extends from each sidewall towards the respective aperture in an axis parallel to an axis of elongation of tank. The apertures are formed at position where the bead portion rests on the baffle when the channel engages the edge of the baffle, and each bead portion is adapted to deform and engage around respective aperture. The channel having a length substantially equal to a length of the edge of the baffle.

[0009] In yet another embodiment, the baffle having the channel that extends along at least a portion of length of the edge. The sealing member may comprise a base formed of a concave portion having a pair of opposing ends and a protrusion extends vertically from the base. The pair of opposing ends extends angularly from the base in a direction opposite to that of the protrusion. The channel is complementary to the protrusion and configured to receive the protrusion while the concave portion engages the edge of the baffle and the opposing ends engages and extends towards the tank foot.

[0010] Other characteristics, details and advantages of the invention can be inferred from the description of

the invention hereunder. A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying figures, wherein:

FIG. 1 exemplarily illustrates a header-tank assembly of a heat exchanger, according to an embodiment of the present invention;

FIG. 2 exemplarily illustrates an exploded, cross sectional view of the header-tank assembly of FIG. 1 having a sealing member;

FIG. 3 exemplarily illustrates a bottom perspective view of a tank of the header-tank assembly of FIG. 1;

FIG. 4 exemplarily illustrates a cross-sectional view of the header-tank assembly of FIG. 1;

FIG. 5 exemplarily illustrates a perspective view of the sealing member of FIG. 2;

FIG. 6 exemplarily illustrates another perspective view of the sealing member of FIG. 2;

FIG. 7 exemplarily illustrates a cross-sectional view of the sealing member of FIG. 2;

FIG. 8 exemplarily illustrates the sealing member of FIG. 2 in engagement with the baffle;

FIG. 9 exemplarily illustrates an exploded view of the sealing member of FIG. 2 and the baffle;

FIG. 10 exemplarily illustrates a perspective view of a sealing member, according to another embodiment of the present invention;

FIG. 11 exemplarily illustrates another perspective view of a sealing member of FIG. 10;

FIG. 12 exemplarily illustrates the sealing member of FIG. 10 in engagement with the baffle;

FIG. 13 exemplarily illustrates an exploded view of the sealing member of FIG. 10 and the baffle;

FIG. 14 exemplarily illustrates a perspective view of a sealing member, according to another embodiment of the present invention;

FIG. 15 exemplarily illustrates another perspective view of a sealing member of FIG. 14;

FIG. 16 exemplarily illustrates the sealing member of FIG. 14 in engagement with the baffle; and

FIG. 17 exemplarily illustrates an exploded view of the sealing member of FIG. 14 and the baffle.

[0011] It must be noted that the figures disclose the invention in a detailed enough way to be implemented, said figures helping to better define the invention if needs be. The invention should however not be limited to the embodiment disclosed in the description.

[0012] The present invention discloses a header-tank assembly for a heat exchanger, which may be implemented, for example, in automobiles. The header-tank assembly may comprise a tank joined to a header and a baffle integrally formed in the tank to divide the tank into a first section and a second section. The header-tank assembly further includes a gasket at a junction of the header and the tank and a sealing member at a junction of the baffle and the header. The provision of the sealing member as a separate element and the configuration of the sealing member prevents dislocation of the sealing member when the baffle contacts the header during or after assembly of the header to the tank, and ensures a fluid tight seal at the junction of the baffle and the header.

[0013] FIG. 1 exemplarily illustrates a header-tank assembly 100 of a heat exchanger, according to an embodiment of the present invention. FIG. 2 exemplarily illustrates an exploded, cross-sectional view of the header-tank assembly 100. The header-tank assembly 100 may comprise a tank 102 joined to a header 104 and a gasket 106 disposed at a junction of the header 104 and the tank 102. FIG. 3 exemplarily illustrates a bottom perspective view of the tank 102. Referring to FIG. 2 and FIG. 3, the header tank assembly 100 further comprises a baffle 108 and a sealing member 200. The baffle 108 is integrally formed in the tank 102 to divide the tank 102 into a first section 122A and a second section 122B. The gasket 106 is disposed at the junction of the baffle 108 and the header 104.

[0014] FIG. 4 exemplarily illustrates a cross sectional view of the header-tank assembly 100 of FIG. 1. Referring to FIG. 2 and FIG. 4, the tank 102 includes a base portion 114 having an inner surface 116. A wall 118 circumferentially surrounds the base portion 114 and depends generally perpendicularly to the plane of the base portion 114 defining a chamber 122. A flange portion or tank foot 120 is circumferentially disposed on the terminating end of the wall 118. Further, the baffle 108 extends from the inner surface 116 towards the tank foot 120 and divides the chamber 122 into the first section 122A and the second section 122B. The sealing member 200 is disposed in contact at least with the baffle 108 and the header 104 so that the first section 122A is fluidically isolated from the second section 122B.

[0015] The header 104 is substantially equal in length to the length of the tank 102 and includes a generally planar base 124 having a plurality of tube-receiving apertures 130 therein for receiving the ends of the fluid conducting tubes (not shown) of the heat exchanger there-through. The base 124 of the header 104 circumferen-

tially surrounded by a channel 126 sized to receive the foot 120 of the tank 102 along with the gasket 106. In an example, the gasket 106 may have a rectangular ring configuration with rounded corners. The channel 126 includes a first sidewall 126A, an opposing second sidewall 126B, and a base wall 126C extending between the first sidewall 126A and the second sidewall 126B. The opposing second sidewall 126B includes bendable end 126D for gripping the tank foot 120. The tank foot 120 has an inner wall surface 120A, outer wall surface 120C, a lower surface 120B and a top grip surface 120D.

[0016] Referring to FIG. 4, during installation, the gasket 106 is disposed within the channel 126, and the sealing member 200 is mounted to the baffle 108. After placing the gasket 106 and the sealing member 200, the tank foot 120 is received over the gasket 106 so that the lower surface 120B of the tank foot 120 contacts the upper surface of the gasket 106 and the sealing member 200 in contact at least with the baffle 108 and the header 104. Further, the inner wall surface 120A opposes the first sidewall 126A of the channel 126 and the outer wall surface 120C opposes the second sidewall 126B of the channel 126. Then, the bendable end 126D is clinched over the top grip surface 120D of the tank foot 120 joining the tank 102 to the header 104 along with the gasket 106. As the bendable ends 126D crimped over the tank foot 120, the gasket 106 and the sealing member 200 deforms to fill the junction of the header 104 and tank foot 120, and the junction of the baffle 108 and header 104 and creates a fluid tight seal. Similar to the installation of sealing member 200, the sealing member 300, 400 (shown in FIG. 10 and FIG. 14) can be mounted to the header-tank assembly 100. In one embodiment, the gasket 106 and the sealing member 200, 300, 400 (shown in FIG. 5, FIG. 10, FIG. 14) may be formed of elastomeric material such as rubber or analogous plastics material.

[0017] FIG. 5 exemplarily illustrates a perspective view of the sealing member 200 of FIG. 2. FIG. 6 exemplarily illustrates another perspective view of the sealing member 200 of FIG. 2. FIG. 7 exemplarily illustrates a cross-sectional view of the sealing member 200 of FIG. 2. The sealing member 200 comprises a base 202 and a pair of spaced apart sidewalls 204A, 204B integrally extending from the base 202. The pair of sidewalls 204A, 204B extends vertically from the base 202. The pair of sidewalls 204A, 204B is perpendicular to the plane of the base 202. The base 202 and the pair of sidewall 204A, 204B together defines a channel 206. In an example, the channel 206 has a U-shaped cross-section. The channel 206 having a length substantially equal to a length of the edge 112A of the baffle 108. The edge 112A of the baffle 108 extending in a direction perpendicular to the axis of elongation of the tank 102 defines the length of the edge 112A. In other words, the length of edge 112A is a measure of length between two opposing ends 128A, 128B (shown in FIG. 9) of the edge 112A that extend towards the tank foot 120. The sealing member 200 further comprises at least one rib 208A, 208B formed within the chan-

nel 206 and extends between the sidewalls 204A, 204B. In this embodiment, the sealing member 200 includes at least two ribs 208A, 208B.

[0018] FIG. 8 exemplarily illustrates the sealing member 200 of FIG. 2 in engagement with the baffle 108. FIG. 9 exemplarily illustrates an exploded view of the sealing member 200 of FIG. 2 and the baffle 108. The baffle 108 comprises a first portion 110 and a second portion 112. In one embodiment, the first portion 110 may have a first thickness and the second portion 112 may have a second thickness. The second portion 112 is an end portion of the baffle 108 having an edge 112A. The term end portion and the second portion 112 are interchangeably used throughout the specification. The baffle 108 includes at least one groove 210A, 210B extending from the edge 112A of the second portion 112 towards a direction perpendicular to the axis of elongation of the tank 102. In this embodiment, at least two grooves 210A, 210B are formed at the second portion 112. The position and shape of the grooves 210A, 210B are complementary to the shape and position of the ribs 208A, 208B of the sealing member 200. At least two ribs 208A, 208B in the channel 206 engages with the pair of grooves 210A, 210B formed on the end portion of the baffle 108. The pair of sidewalls 204A, 204B and the ribs 208A, 208B prevents displacement of the sealing member 200 during or after installation of the sealing member 200 and provides a fluid tight seal between the baffle 108 and the header 104.

[0019] Further, the ribs 208A, 208B of the sealing member 200 and the complementary groove 210A, 210B on the baffle 108 acts as a means to maintain the position of the sealing member 200. Further, the second portion 112 of the baffle 108 may be debossed to complement the shape of the sealing member 200. The debossed surface 212 may act as a guide while positioning the sealing member 200 to the baffle 108 and also a means to maintain the position of the sealing member 200.

[0020] FIG. 10 exemplarily illustrates a perspective view of a sealing member 300, according to another embodiment of the present invention. FIG. 11 exemplarily illustrates another perspective view of a sealing member 300 of FIG. 10. The sealing member 300 comprises a base 302 and a pair of spaced apart sidewalls 304A, 304B integrally extends from the base 302. The pair of sidewalls 304A, 304B extends vertically from the base 302. The pair of sidewalls 304A, 304B are perpendicular to the plane of the base 302. The base 302 and the pair of sidewalls 304A, 304B together defines a channel 306. In an example, the channel 306 has a U-shaped cross-section. The channel 306 having a length substantially equal to a length of the edge 112A of the baffle 108. The sealing member 300 further comprises at least two bead portions 308, 310 including a first bead portion 308 and a second bead portion 310. At least one bead portion 308, 310 extends from each sidewall 304A, 304B.

[0021] FIG. 12 exemplarily illustrates the sealing member 300 in engagement with the baffle 108 of FIG. 11. FIG. 13 exemplarily illustrates an exploded view of the

sealing member 300 of FIG. 11 and the baffle 108. The baffle 108 includes at least two spaced apart apertures 312A, 312B at one of the second portion 112 or first portion 110 of the baffle 108. Further, at least one bead portion 308, 310 extends from each sidewall 304A, 304B towards the respective aperture 312A, 312B in an axis parallel to an axis of elongation of tank 102. The apertures 312A, 312B are formed at position where the bead portion 308, 310 rests on the baffle 108 when the channel 306 engages the edge 112A of the baffle 108.

[0022] On assembly of the sealing member 300, the channel 306 engages the end portion 112 of the baffle 108 and the bead portions 308, 310 engages at least two apertures 312A, 312B formed on the baffle 108. Each bead portion 308, 310 includes a cylindrical portion 308A, 310A that extends from the respective sidewall 304A, 304B and ends with a rounded portion 308B, 310B. The cylindrical portion 308A, 310A has a shape and length complementary to that of the shape and length of the apertures 312A, 312B. The bead portion 308, 310 extends towards the respective aperture 312A, 312B in an axis parallel to an axis of elongation of tank 102. The rounded portion 308B, 310B of each bead portion 308, 310 is adapted to deform and engage around the respective aperture 312A, 312B. The bead portion 308, 310 may be formed from a material that may be elastic, resistant to compression and deformable under pressure.

[0023] The pair of sidewalls 304A, 304B and the bead portions 308, 310 engaging the baffle 108 prevents displacement of the sealing member 300 during or after installation of the sealing member 300 and provides a fluid tight seal between the baffle 108 and the header 104. Further, the second portion 112 of the baffle 108 may be debossed to complement the shape of the sealing member 300. The debossed surface 314 may act as a guide while positioning the sealing member 300 to the baffle 108 and a means to maintain the position of the sealing member 300.

[0024] FIG. 14 exemplarily illustrates a perspective view of a sealing member 400, according to another embodiment of the present invention. FIG. 15 exemplarily illustrates another perspective view of the sealing member 400 of FIG. 14. The sealing member 400 comprises a base 402 and a protrusion 406 extending from the base 402. In an example, the base 402 is a concave surface having two opposing end portions 404A, 404B. The two opposing end portions 404A, 404B extend angularly with respect to the base 402 towards the foot 120 of the tank 102. The protrusion 406 extends perpendicularly to the plane of the base 402.

[0025] FIG. 16 exemplarily illustrates the sealing member 400 in engagement with the baffle 108 of FIG. 14. FIG. 17 exemplarily illustrates an exploded view of the sealing member 400 of FIG. 14 and the baffle 108. The edge 112A of the second portion 112 of the baffle 108 includes a channel 408 complementary to protrusion 406 of the sealing member 400. The channel 408 extends along at least a portion of length of the edge 112A of the

second portion 112. The protrusion 406 is received within the channel 408 while the concave portion engages the edge 112A of the baffle 108 and the opposing ends 404A, 404b engages and extends towards the tank foot 120.

[0026] The engagement of the protrusion 406 with the channel 408 prevents displacement of the sealing member 400 during or after installation of the sealing member 400. Further, it acts as a guide while positioning the sealing member 400 to the baffle 108 and a means to maintain the position of the sealing member 400. Thus, the provision of the sealing member 200, 300, 400 as a separate element and the configuration of the sealing member 200, 300, 400 prevents displacement of the sealing member 200, 300, 400 when the baffle 108 contacts the header 104 during or after assembly of the header 104 to the tank 102, and ensures a fluid tight seal at the junction of the baffle 108 and the header 104.

[0027] In any case, the invention cannot and should not be limited to the embodiments specifically described in this document, as other embodiments might exist. The invention shall spread to any equivalent means and any technically operating combination of means.

Claims

1. A header-tank assembly (100) for a heat exchanger, comprising:
a tank (102) comprising a base portion (114) and a tank foot (120); a baffle (108) protruding from the base portion (114) towards the tank foot (120) dividing the tank (102) into a first section (122A) and a second section (122B); and a header (104) configured to be fixed to the tank (102) in a fluid-tight manner, **characterized in that** the header-tank assembly (100) further comprises a sealing member (200, 300, 400) fixed to the baffle (108), wherein the sealing member (200, 300, 400) is in contact at least with the baffle (108) and the header (104) so that the first section (122A) is fluidly isolated from the second section (122B).
2. The header-tank assembly (100) of claim 1, wherein the sealing member (200) comprises a base (202) and a pair of spaced apart sidewalls (204A, 204B) extending vertically from the base (202) defining a channel (206) configured to receive the baffle (108), and at least one rib (208A, 208B) formed within the channel (206) and extends across the sidewalls (204A, 204B).
3. The header-tank assembly (100) of claim 1, wherein the baffle (108) comprises a first portion (110) having a first thickness and a second portion (112) having a second thickness, and the first thickness is greater than the second thickness.
4. The header-tank assembly (100) of claim 3, wherein

the second portion (112) is an end portion of the baffle (108) having an edge (112A).

5. The header-tank assembly (100) as claimed in any of the preceding claims, wherein the baffle (108) having at least one groove (210A, 210B) extends from the edge (112A) in a direction perpendicular to the axis of the tank (102), the groove (210A, 210B) is complementary to the rib (208A, 208B) and configured to receive the rib (208A, 208B) while the channel (206) engages the second portion (112) of the baffle (108). 5
6. The header-tank assembly (100) of claim 1, wherein the baffle (108) comprises at least two apertures (312A, 312B), and the sealing member (300) comprises a base (302) and a pair of spaced apart sidewalls (304A, 304B) extending vertically from the base (302) defining a channel (306), and at least two bead portions (308, 310). 10
7. The header-tank assembly (100) of claim 6, wherein at least one bead portion (308, 310) extends from each sidewall (304A, 304B) towards the respective aperture (312A, 312B) in an axis parallel to an axis of elongation of tank (102), and each bead portion (308, 310) includes a cylindrical portion (308A, 310A) complementary to the shape of the aperture (312A, 312B) and a rounded portion (308B, 310B). 15
8. The header-tank assembly (100) of claim 6 and 7, wherein the apertures (312A, 312B) are formed at position where the bead portion (308, 310) rests on the baffle (108) when the channel (206) engages the edge (112A) of the baffle (108), and each bead portion (308, 310) is adapted to deform and engage around respective aperture (312A, 312B). 20
9. The header-tank assembly (100) of claim 2 and 6, wherein the channel (206, 306) having a length substantially equal to a length of the edge (112A) of the baffle (108). 25
10. The header-tank assembly (100) of claim 3, wherein the baffle (108) having a channel (408) that extends along at least a portion of length of the edge (112A). 30
11. The header-tank assembly (100) of claim 1, wherein the sealing member (400) having a base (402) formed of a concave portion having a pair of opposing ends (404A, 404B) and a protrusion (406) extends vertically from the base (402), the pair of opposing ends (404A, 404B) extends angularly from the base (402) in a direction opposite to that of the protrusion (406). 35
12. The header-tank assembly (100) of claim 10 and 11, wherein the channel (408) is complementary to the 40

protrusion (406) and configured to receive the protrusion (406) while the concave portion engages the edge (112A) of the baffle (108) and the opposing ends (404A, 404B) engages and extends towards the tank foot (120). 45

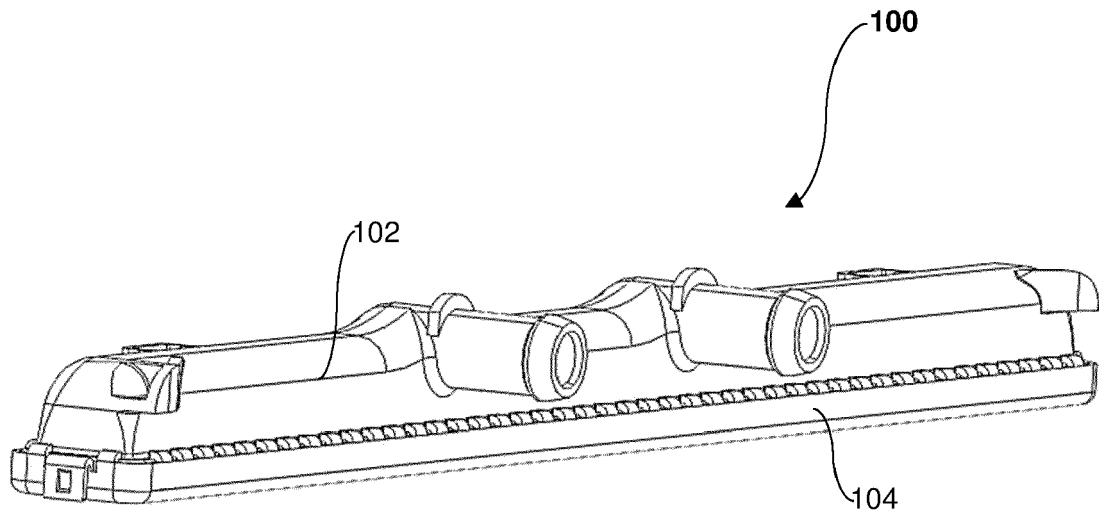


FIG. 1

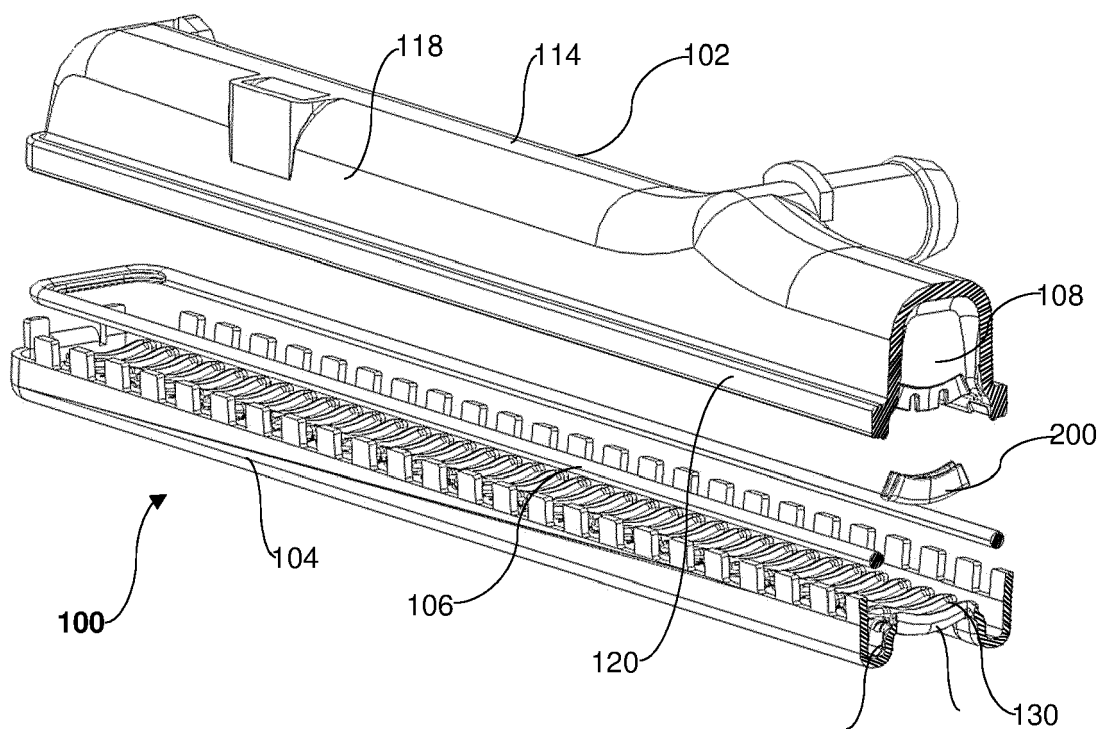


FIG. 2

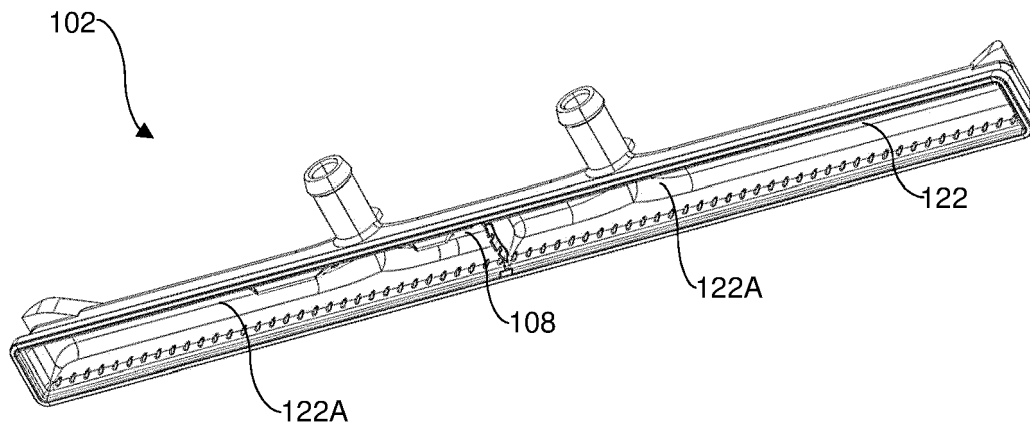


FIG. 3

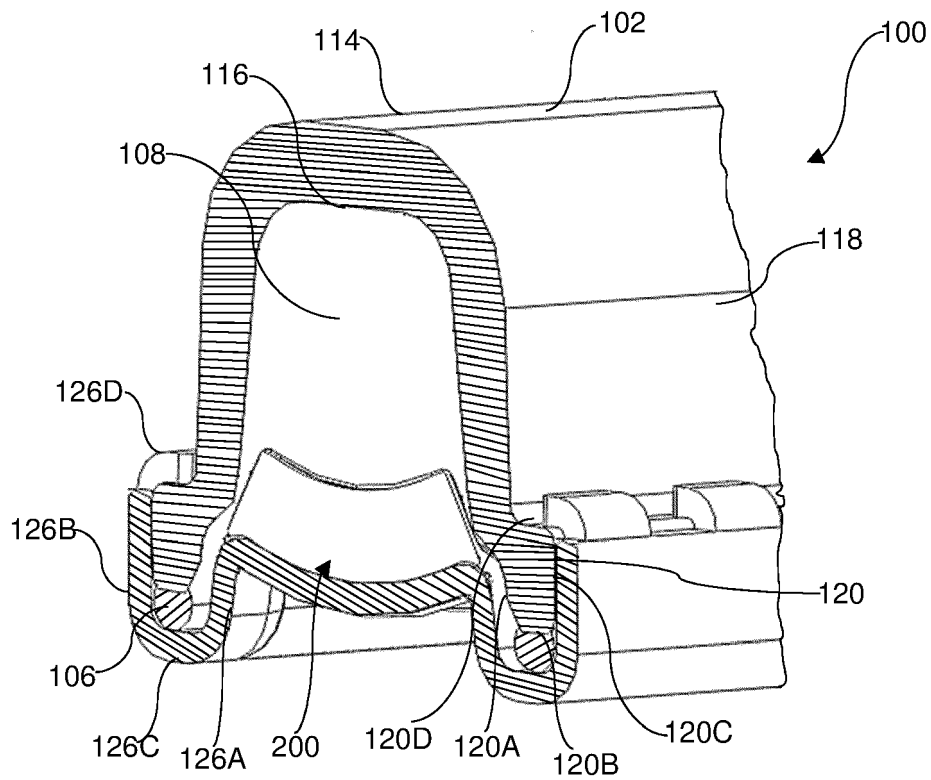


FIG. 4

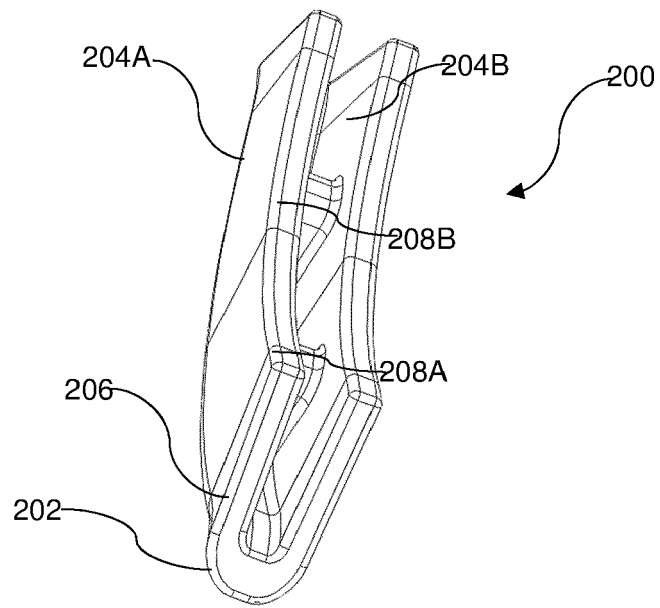


FIG. 5

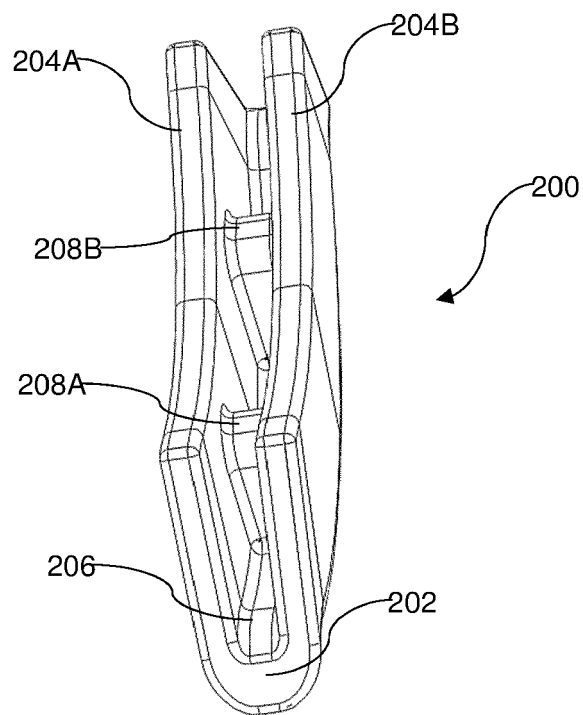


FIG. 6

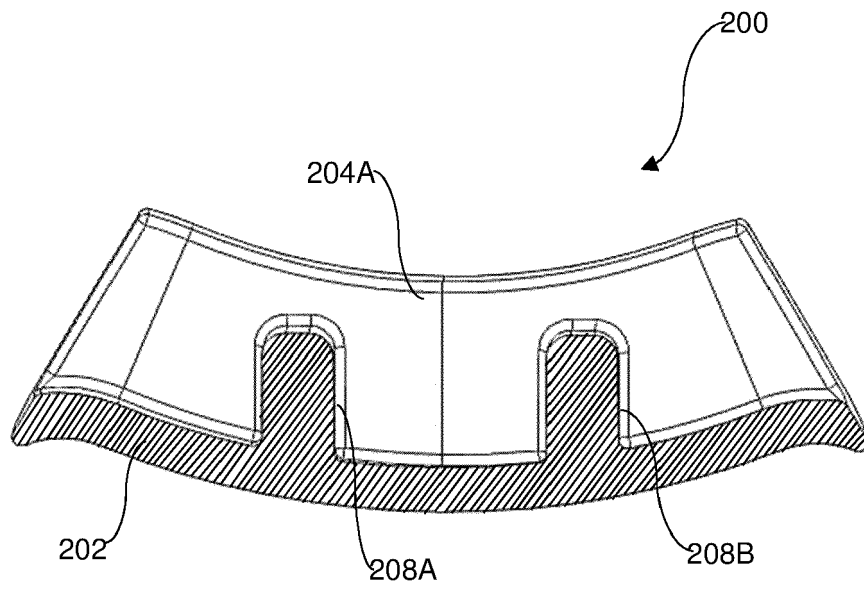


FIG. 7

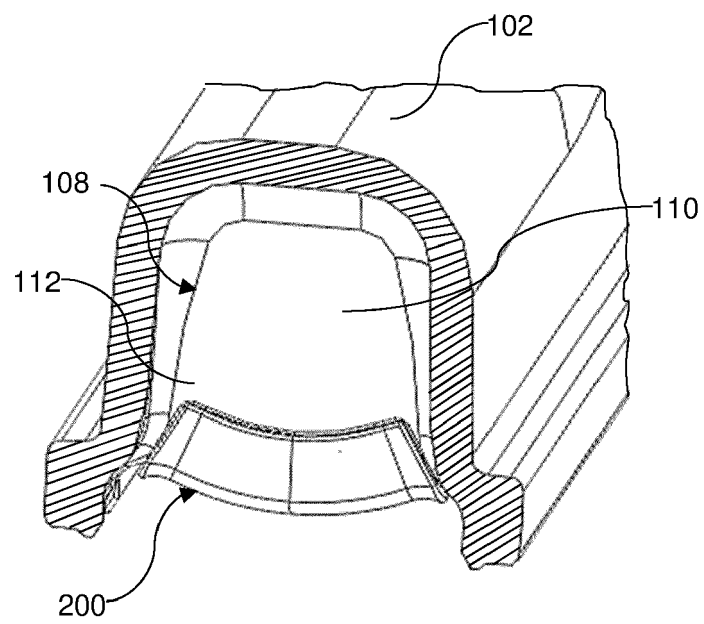


FIG. 8

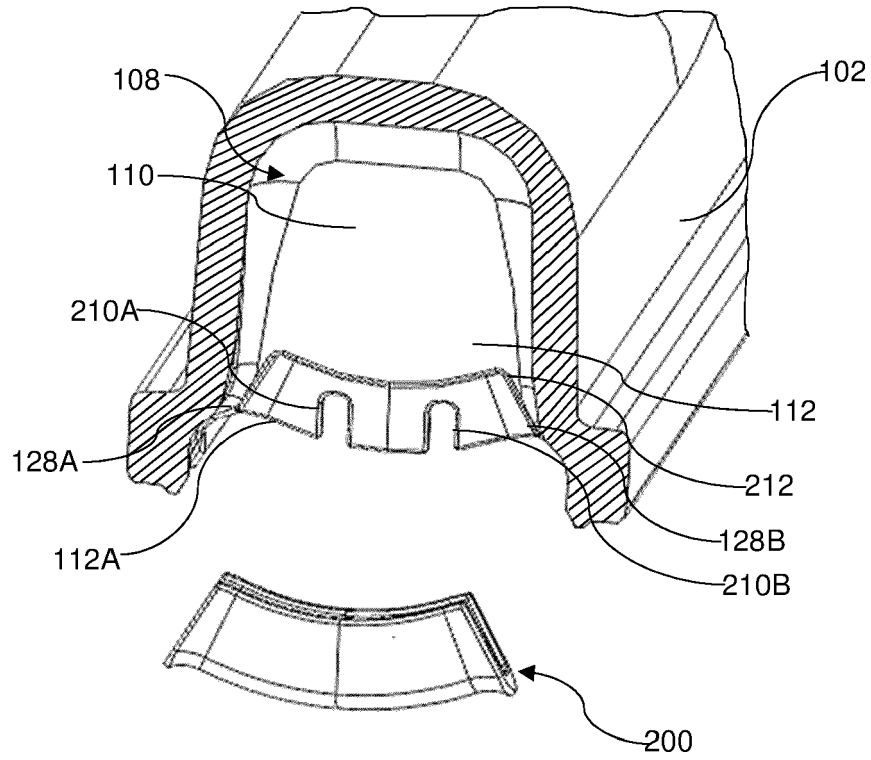


FIG. 9

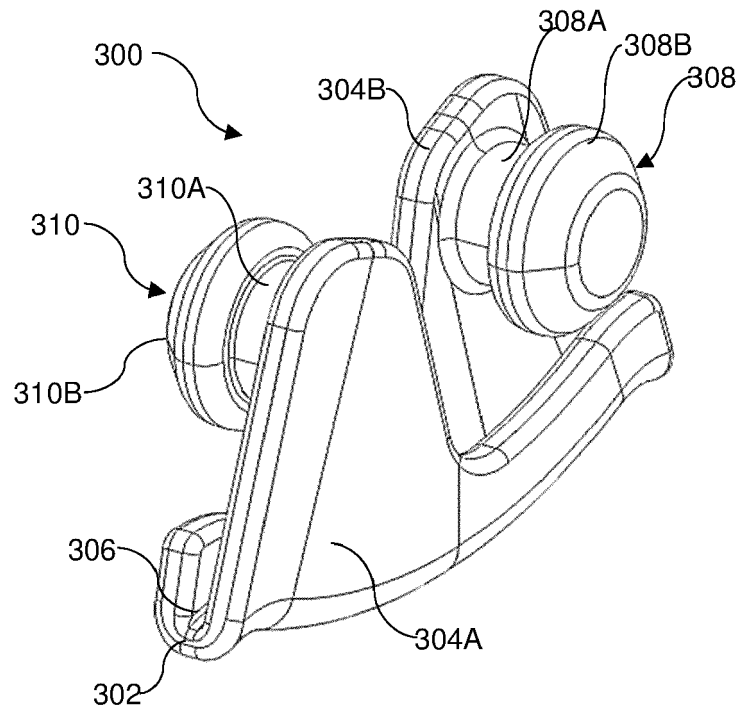


FIG. 10

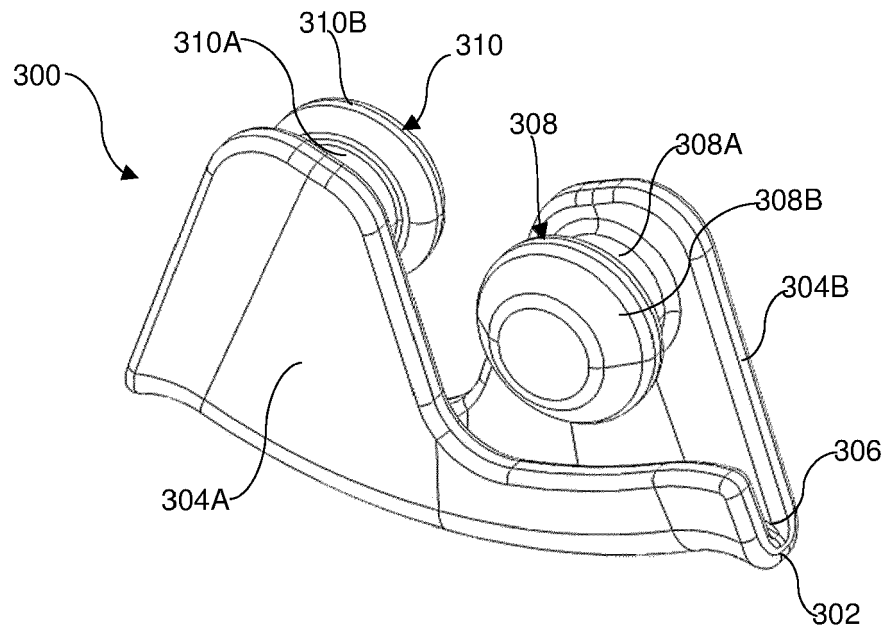


FIG. 11

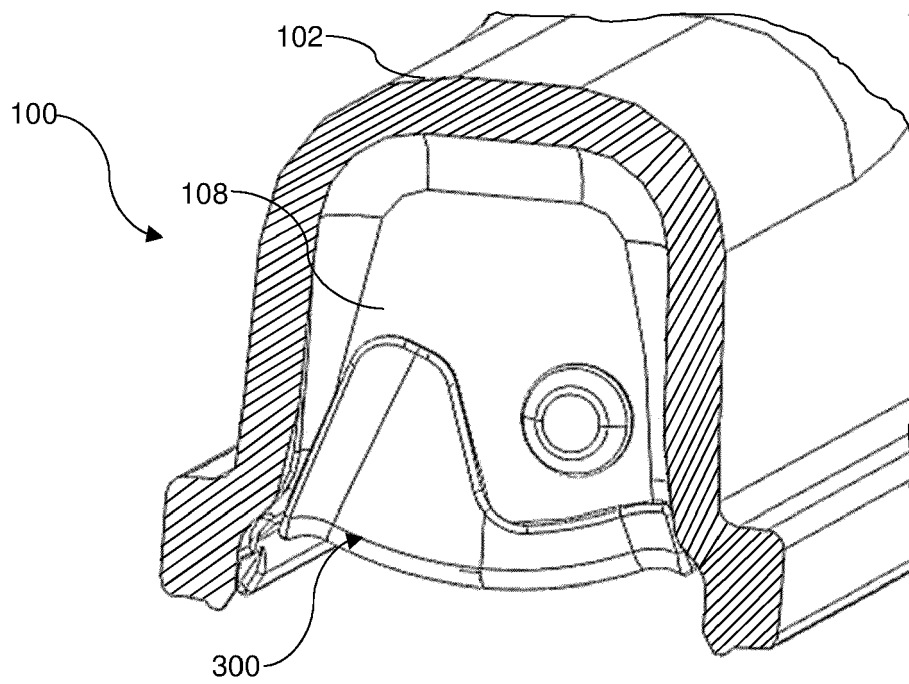


FIG. 12

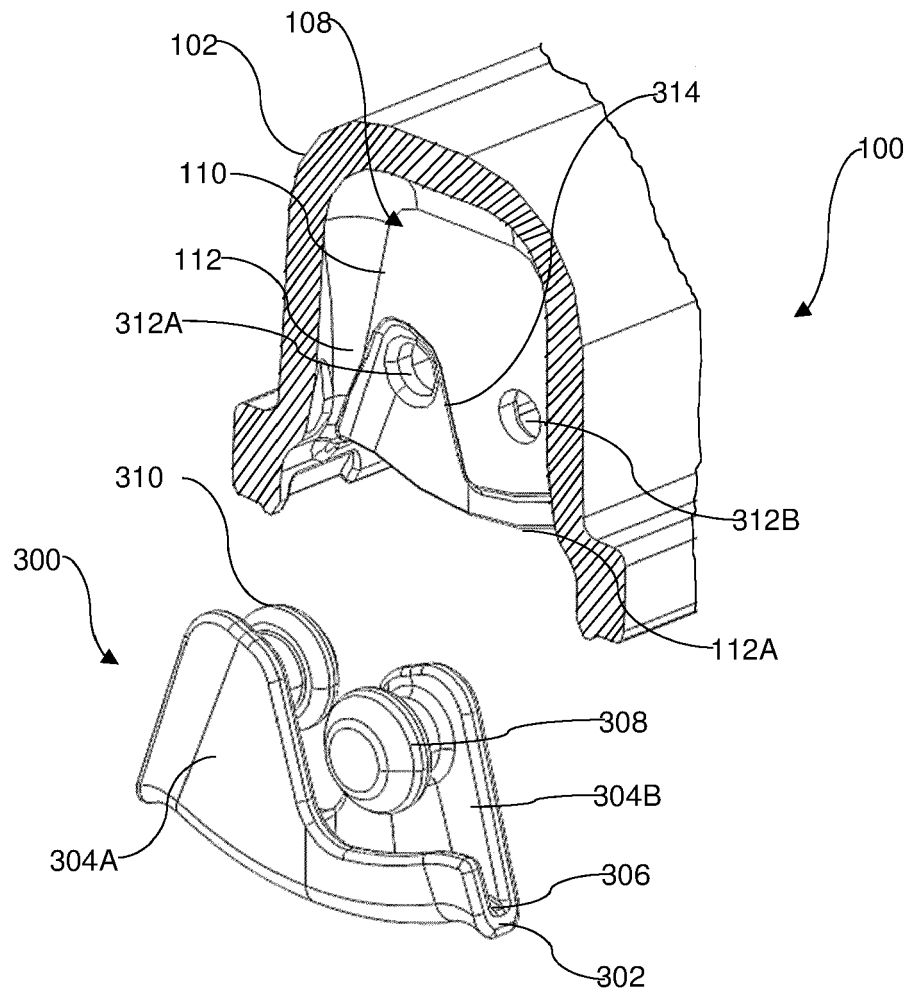


FIG. 13

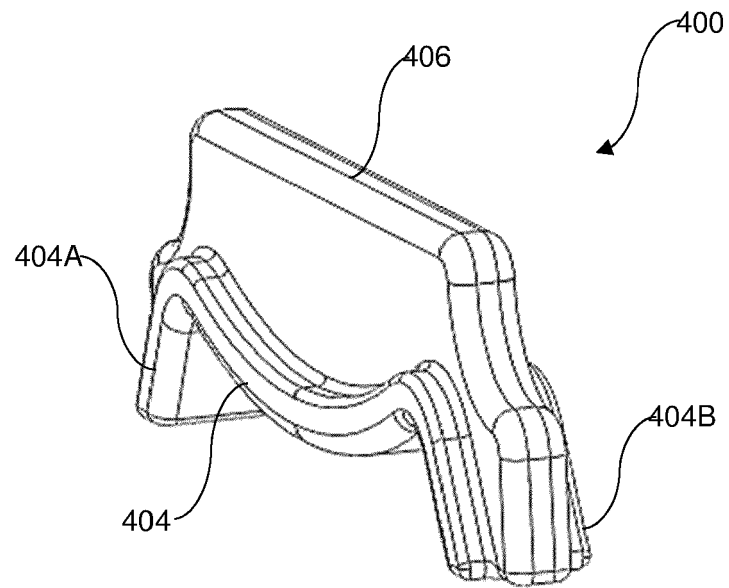


FIG. 14

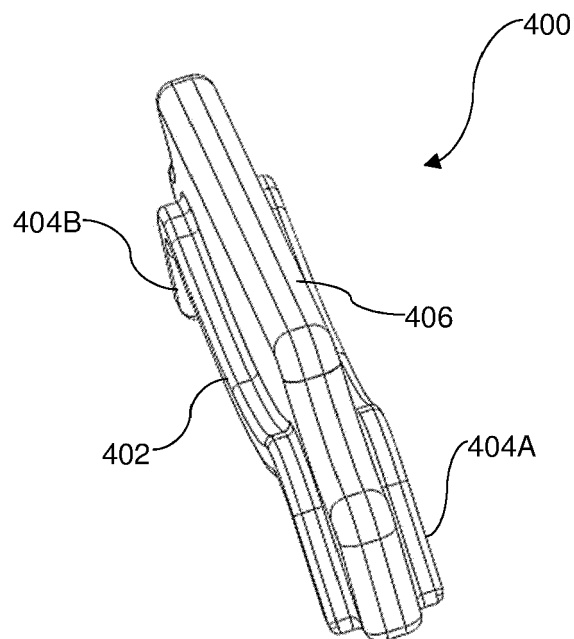


FIG. 15

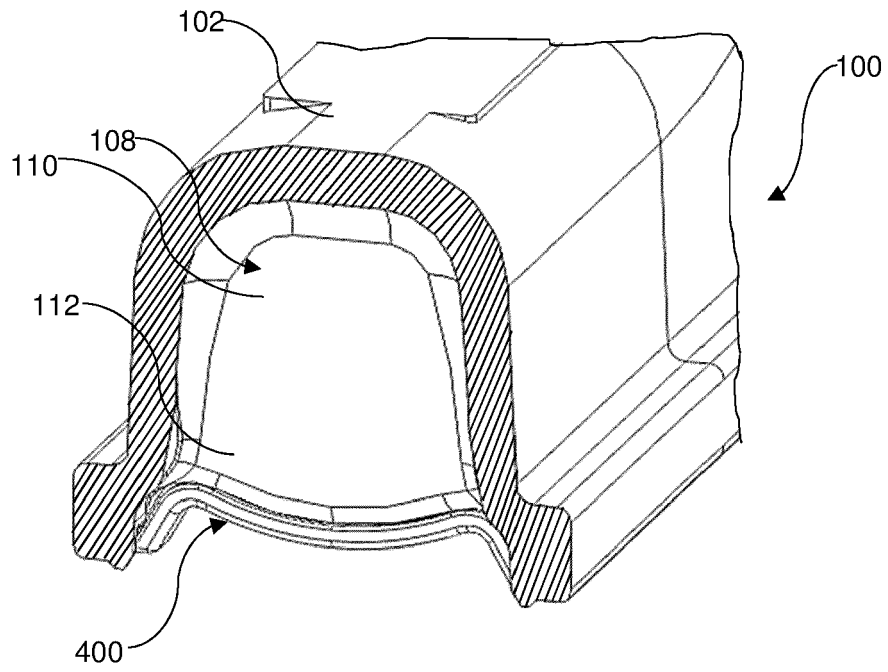


FIG. 16

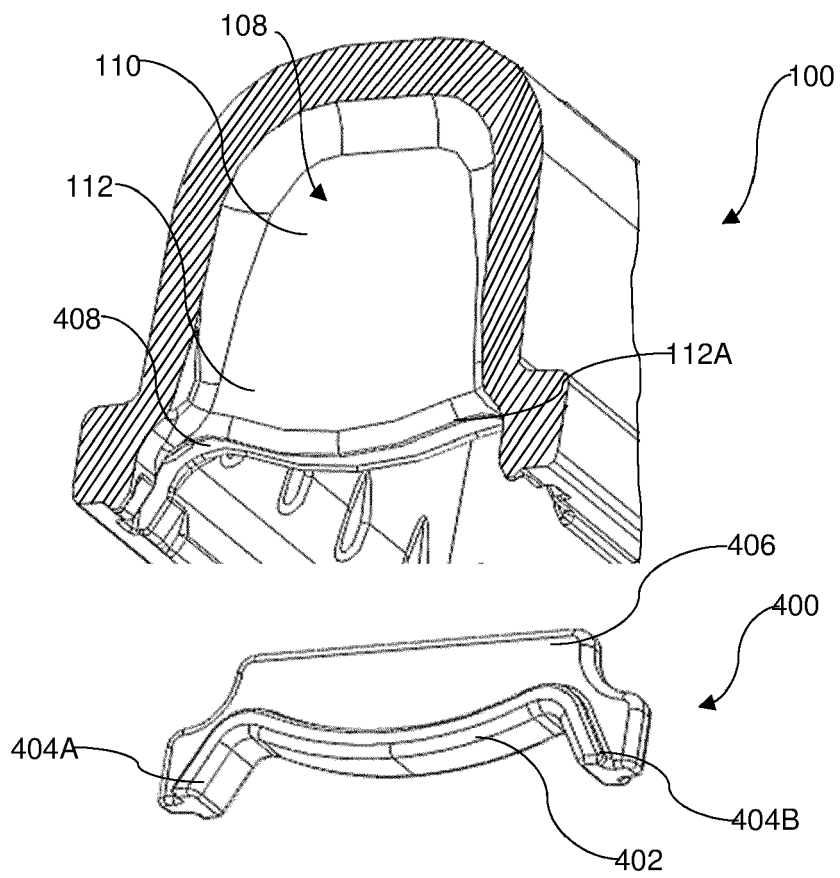


FIG. 17



EUROPEAN SEARCH REPORT

Application Number

EP 21 21 3844

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* figure 8 *	2-12	

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