



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.12.2020 Bulletin 2020/53

(51) Int Cl.:
F28F 9/02 (2006.01)

(21) Application number: **19461546.4**

(22) Date of filing: **26.06.2019**

(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:
KH MA MD TN

- **JURKIEWICZ, Damian**
32-050 SKAWINA (PL)
- **BARUS, Lukasz**
32-050 SKAWINA (PL)
- **DULIBAN, Lukasz**
32-050 SKAWINA (PL)
- **ROMANSKI, Piotr**
SKAWINA (PL)

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

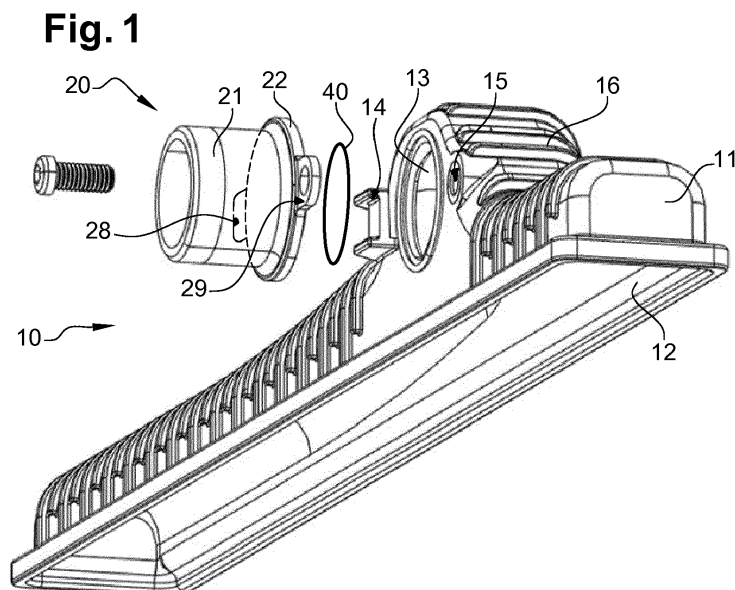
(74) Representative: **Bialkowski, Adam**
Valeo Systèmes Thermiques
Industrial Property Department
ZA L'Agiot
8 rue Louis Lormand
CS 80517 LA VERRIERE
78322 Le Mesnil Saint Denis Cedex (FR)

(72) Inventors:
• **SZOSTEK, Dawid**
32-050 SKAWINA (PL)

(54) **A TANK ASSEMBLY FOR A HEAT EXCHANGER**

(57) A tank for a heat exchanger, in particular for a motor vehicle, comprising: a distribution body for delivering a coolant fluid into the heat exchanger; a first opening disposed along the longitudinal direction of the distribution body, the first opening having a substantially rectangular shape for receiving a header with tubes; a second opening disposed on the surface of the distribution body, the second opening having a circular shape;

the second opening configured to receive a connector; at least one guiding means disposed in the vicinity of the second opening; the heat exchanger characterized in that the guiding means come into contact with the connector after rotating the connector in a plane delimited by the second opening, so that the guiding means prevent the connector from moving in the axis of the opening.



Description

FIELD OF THE INVENTION

[0001] The invention relates to a heat exchanger, in particular to a heat exchanger for a motor vehicle.

BACKGROUND OF THE INVENTION

[0002] The heat exchangers are expected to operate at a desired efficiency level, yet on the other hand, it is continuously required to aim for a size and weight reduction. One of the ways to increase available space within the engine bay is to create serviceable connections, which would enable quick connection and disconnection. One of solutions to accomplish this goal is to provide quick connectors to connect the heat exchangers to further components of the heat exchange loop. The assemblies held in place by an elastic clip secured to the connector may be disadvantageous, due their complexity and vulnerability to be damaged. The complexity of assembling system may not be favorable in financial terms, i.e. high costs of tooling for crafting complicated shapes often make the production process not feasible.

[0003] The quick connectors known in the art focus mainly on securing the connection between the heat exchanger and a hose supplying the heat exchanger fluid to the heat exchanger or receiving it from said heat exchanger. However, these applications are usually dedicated to a specific heat exchanger, i.e. they do not provide the universal connection for most of the heat exchangers. Moreover, the applications known in the art have complicated connection means, rendering the entire heat exchangers difficult to service. Further, most of the connectors need a long travel of the sub-components to effect the disassembly. This requires more space for the connector, even if the connector itself is of small dimensions.

[0004] In view of the problems inherent to the state of the art, it is desirable to provide a quick connector, in which travel required by its sub-components for its disassembling process would not be overly restricted by the dimensions thereof. Further, it is desired to provide a quick connector that would be easy to manufacture and easily applicable to heat exchangers of different designs.

SUMMARY OF THE INVENTION

[0005] The object of the invention is, among others, a tank assembly comprising a tank for a heat exchanger, in particular for a motor vehicle, comprising: a distribution body for delivering a coolant fluid into the heat exchanger; a first opening disposed along the longitudinal direction of the distribution body, the first opening having a substantially rectangular shape for receiving a header with tubes; a second opening disposed on the surface of the distribution body, the second opening having a circular shape; at least one guiding means disposed in the vicinity

of the second opening, and a connector comprising at least one protruding portion cooperating with the guiding means, the connector being configured to be assembled with the tank, wherein the guiding means and the protruding portion are configured to engage the connector with the tank in a first angular position to prevent the connector from moving in the axis of the second opening, and to disengage the connector from the tank in a second angular position in the plane delimited by the second opening.

[0006] Preferably, the tank comprises a tank projection bulging from the distribution body, the tank projection disposed between two far ends of the distribution body; the tank projection being adapted to accommodate the second opening.

[0007] Preferably, the second opening is disposed on the lateral side of the distribution body with respect to the first opening.

[0008] Preferably, the second opening is disposed on the opposite side of the distribution body with respect to the first opening.

[0009] Preferably, the connector comprises a connector body, the connector body being of essentially tubular shape which widens on the end adjacent to the tank, thereby forming a collar.

[0010] Preferably, the guiding means comprise a guide and the protruding portion comprise a protrusion, wherein one of them is located on a tank and a second one is located on the connector, wherein the protrusion is adapted to be engaged in the guide, thereby restricting movement of the connector in the axis of the second opening.

[0011] Preferably, the guide is configured to releasably fix the connector in the first angular position.

[0012] Preferably, the protruding portion is in a form of a winglet, the winglet being of a flatted shape and comprising a slope configured to interact with the guide.

[0013] Preferably, the protruding portion is in a form of a snap-fit protrusion comprising a spearhead tip configured to slide through the guiding means and anchor to it.

[0014] Preferably, the connector body comprises a sealing region disposed in the vicinity of the outer perimeter of the guiding means for accommodating sealing means.

[0015] Preferably, the sealing region comprises at least one set of sealing guides, the sealing guide comprising at least two protrusions on the inner perimeter of the sealing region and at least one protrusion on the outer perimeter of the sealing region, so that a sealing means are preserved from rotating against the connector body after insertion into the sealing region.

[0016] Preferably, the sealing means is in a form of a rubber seal.

[0017] Preferably, there is a plurality of protrusions which are located on the opposite sides of the connector.

[0018] The object of the invention is also a heat exchanger comprising a tank assembly as described above.

BRIEF DESCRIPTION OF DRAWINGS

[0019] Examples of the invention will be apparent from and described in detail with reference to the accompanying drawings, in which:

Fig. 1 shows an exploded view of a connector- distribution body assembly in one of the examples.

Fig. 2 shows a perspective view of boltless connection in one of the examples.

Fig. 3 shows a perspective view of a front side of a connector with two different protruding portions.

Fig. 4 shows a perspective view of a back side of a connector configured to be assembled using a bolt.

Fig. 5 shows a perspective view of a tank assembly in a configuration from Fig. 1.

Fig. 6 shows a perspective view of a tank assembly with a single guiding means.

DETAILED DESCRIPTION OF EMBODIMENTS

[0020] Fig. 1 presents a tank 10 for a heat exchanger 1, in particular for a motor vehicle. The tank 10 comprises a distribution body 11 responsible for distributing a coolant fluid across the heat exchanger 1 and a connector 20 that introduces the coolant fluid into the distribution body 11. Accordingly, in case of a reversed direction of the flow, the distribution body 11 and the connector 20 can play a role of the collecting devices. Both connector 20 and distribution body 11 can be made either of metal or synthetic material.

[0021] The tank 10 distributes a coolant fluid by a first opening 12 disposed along the longitudinal direction of the distribution body 11. The first opening 12 has a substantially rectangular cross-section for receiving a header with tubes. The shape of the distribution body 11 presented in the Fig. 1 is proven to ensure a homogenous distribution of coolant, yet other shapes of distribution body 11 that will provide similar or better performance are also allowed. The distribution body 11 comprises a plurality of transverse ribs deployed alternately in a direction perpendicular to the longitudinal direction of the distribution body 11. Ribs provide rigidity of distribution body 11 at high pressures and ensure reduced deformations of the tank 10. The distribution body 11 widens at the side of the opening to enable tight connection with the header (not shown).

[0022] The tank 10 comprises a protrusion 16 bulging from the distribution body 11. The protrusion 16 is disposed between two far ends of the distribution body 11. This enables forming a second opening 13 either on the lateral side of the distribution body 11 or on the upper side thereof. The diameter of the second opening 13 dis-

posed on the lateral side of the distribution body 11 is limited by the size of protrusion 16, whereas the diameter of the second opening 13 disposed on the upper side of the distribution body 11 is limited by the width of the distribution body 11, i.e. the diameter of the second opening 13 disposed on the upper side of the distribution body 11 is substantially equal to the length of the shorter side of the first opening 12. Hence, the protrusion 16 is of a greater dimensions than the second opening 13. In the preferred embodiment of an invention, the second opening 13 is disposed on the lateral side of the distribution body 11, as presented in the Figs 1, 2, 5 and 6.

[0023] The second opening 13 is configured to receive a connector 20.

[0024] The connector 20 is configured to assume at least two distinct angular positions with respect to the second opening 13. A second angular position allows connector 20 to be assembled to or disassembled from the tank 10, whereas a first angular position prevents the connector 20 from moving in the axis of the second opening 13 of the tank 10. In other words, the connector 20 in the first angular position is blocked from moving in the axis of the second opening 13, and is allowed to move in the axis of the second opening 13 in the second angular position.

[0025] The tank assembly comprises guiding means 14, 15 and at the protruding portions 28, 29. The guiding means 14, 15 and the protruding portions 28, 29 are configured to cooperate with each other so as to engage the connector 20 with the tank 10 in a first angular position to prevent the connector 20 from moving in the axis of the second opening 13, and to disengage the connector 20 from the tank 10 in a second angular position in the plane delimited by the second opening 13. The guiding means 14, 15 comprise a guide 17a, 17b, 17c, 17d and the protruding portion 28, 29 comprise a protrusion 23a, 23b, 23c, 23d, wherein one of them is located on a tank 10 and a second one is located on the connector 20. The protrusion 23a, 23b, 23c, 23d is adapted to be engaged in the guide 17a, 17b, 17c, 17d, thereby restricting movement of the connector 20 in the axis of the second opening 13.

[0026] Fig. 2 presents a tank 10 assembly comprising a distribution body 11 and the connector 20. The assembly is carried out by introducing the connector 20 to the second opening 13 and rotating it from second angular position to the first angular position, so that the connector is immobilized with respect to the tank 10.

[0027] Immobilizing the connector 20 is carried out by the guiding means 14, 15 which are deployed in the vicinity of the second opening 13. In the preferred embodiment of an invention, the tank 10 comprises two guiding means 14, 15 deployed on the opposite sides of the second opening 13. The guiding means come into contact with the connector 20 after rotating it in the plane delimited by the second opening 13, so that the guiding means 14, 15 prevent the connector from moving outwardly from the distribution body 11. However, the embodiments

comprising only one or more than two guiding means 14, 15 are also executable. To evenly distribute mechanical and thermal stress around the connector 20, the guiding means 14, 15 and the protruding portions 28, 29 shall also be distributed evenly at the circumference of the second opening 13.

[0028] The guiding means 14, 15 comprise at least one guide 17a, 17b, 17c, 17d and the protruding portions 28, 29 comprise at least one protrusion 23a, 23b, 23c, 23d. In the basic embodiment of an invention, the guides 17a, 17b, 17c, 17d are deployed on the tank 10 and the protrusions 23a, 23b, 23c, 23d are deployed on the connector 20. However, the guides 17a, 17b, 17c, 17d being deployed on the connector 20 and the protrusions 23a, 23b, 23c, 23d being deployed on the tank 10 are also envisaged.

[0029] For example, the guides 17a and 17b presented in the Fig. 2 protrude from the tank 10. Several examples of guides are hereby presented.

[0030] The friction guide 17a, as shown in Fig. 1, 2 and 5, prevents the connector 20 from moving in an outward direction with respect to the tank 10 and it prevents rotation of the connector 20 in one direction after assembling it with the tank 10. The inner wall of the friction is sloping towards the outer wall of the tank 10, so that the distance between the adjacent walls of the friction is steadily reduced and consequently the friction between the connector 20 and the tank 10 inhibits movement of the connector 20 with respect to the tank 10. To make the connection more rigid, the outer wall of the friction guide 17a comprises ribs configured to prevent outward movement of the friction guide 17a with respect to the distribution body 11.

[0031] A snap-fit guide 17b, located opposite the friction guide 17a, as shown in Fig. 2, prevents the connector 20 from moving in an outward direction in reference to the tank 10 and it prevents rotation of the connector 20 in two directions after assembling it with the tank 10. The snap-fit guide 17b may be L-shaped. The snap-fit guide 17b is configured as the hitching point for the connector 20. Similarly to the previous example, to make the connection more rigid, the outer wall of the snap-fit guide 17b comprises ribs configured to prevent outward movement of the snap-fit guiding means 17b with respect to the distribution body 11.

[0032] The bolt-in guide 17c shares the functionality of the snap-fit guide 17b, i.e. it prevents the connector 20 from moving in an outward direction in reference to the tank 10 and it prevents rotation of the connector 20 in two directions after assembling it with the tank 10. The bolt-in guide 17c is in a form of the blind opening, which is configured to receive the threaded bolt, as shown in Fig. 1 and 5. Moreover, it allows adjusting the tightness of the connection between the connector 20 and the tank 10. The bolt-in guide 17c cooperates with the bolt in order to immobilize the connector 20.

[0033] The arched guide 17d presented in the Fig. 6 is providing enough tightness to keep the connector 20

properly assembled with the tank 10. The arched guide 17d is in a form of a rounded portion that extends along the outer perimeter of the second opening 13. The arched guide 17d comprises a blocking-locking portion on one end to minimize the risk of disassembling the connector 20 from the tank 10.

[0034] Apart from the embodiments presented in the Figs 1 - 6, the invention includes different combinations of guiding means, i.e. the guiding means 14, 15 may be of different kind and/or different number. For example, the distribution body 11 may comprise one snap-fit guide 17b and two friction guides 17a.

[0035] In the basic embodiment of an invention, the connector 20 comprises the connector body 21 and the collar 22 that comprises at least one protruding portion 28, 29 and a guiding means 26. However, the collar 22 is optional and an embodiment, wherein at least one protruding portion deployed directly on the connector body 21 is also feasible. The connector 20 comprises an essentially tubular connector body 21 extending in a longitudinal direction. The connector 20 may be beveled on both ends to facilitate assembling to other elements of the system. The inner diameter of the connector 20 remains constant, while its outer diameter may vary while comparing different cross-sections. The opening with a smaller cross-section is configured to receive the hose and the opening with a larger cross-section forms a collar 22 of the connector 20. The collar 22 is a portion of a circular shape protruding from the collector body 21 that is in a physical contact with the distribution body 11 when assembled. It plays multiple roles - for example, it makes the whole connector 20 more resistant to diagonal forces, provides even force distribution on the surface of the tank 10, prevents the hose from being introduced too far over the connector 20 and aligns the connector 20 for proper sealing.

[0036] In the basic embodiment of an invention, the collar 22 comprises at least one protrusion 23a, 23b, 23c, 23d. The protrusions 23a, 23b, 23c, 23d are configured to ensure firm connection between the tank 10 and the connector 20. The protrusion 23a, 23b, 23c, 23d cooperate with the guides 17a, 17b, 17c, 17d of the tank 10.

[0037] A winglet protrusion 23a protruding from the collar 22 may have the shape of a cut rectangle with rounded corners, as presented in the Figs 3 and 4. The winglet protrusion 23a is coupled with the friction guiding means 17a. The shape of the winglet protrusion 23a enables precise alignment before coupling it with the guiding means. The winglet protrusion 23a comprises also an outer wall sloping towards the shorter edge of the winglet protrusion 23a. The sloping wall causes the connector 20 to be tightened to the tank 10. Further rotation of the connector 20 is blocked by the shorter wall of the winglet portion 23a leaning against the inner wall of the friction guiding means 17a.

[0038] A snap-fit protrusion 23b is presented in the Figs 2 and 3 comprises a protrusion that is configured to be inserted into the snap-fit guide 17b. The connector 20 is

assembled with the tank 10 by the means of the snap-fit protrusion 23b comprising a spearhead tip configured to slide through the opening of the snap-fit guide 17b and anchor to it.

[0039] In Fig. 4 and 5, a bolt-in opening protrusion 23c is configured to receive the bolt that tightens the connector 20 to the tank 10. The bolt-in opening protrusion 23c is preferably of a circular shape, yet a semicircular or D-shaped opening is also possible. D-shape is defined by cutting out a part of the material from circular opening visible in the Fig. 4 along the plane defined essentially by the diameter thereof. D-shaped opening will immobilize the connector 20 in a transverse and outward direction and prevent its rotation as good as the opening of a fully circular shape.

[0040] In Fig. 6, an arched protrusion 23d protrudes from the collar 22. The protrusion extends along the outer perimeter of the collar 21 so as to be coupled with the arched guide 17d. The arched protrusion 23d occupies from 30% to 50% of the perimeter of the collar 22. In the basic embodiment of an invention, the arched protrusion occupies about 40% of the outer perimeter of the collar 22.

[0041] Apart from the embodiments presented in the Figs. 1-6, the invention includes different combinations of protruding portions 28, 29, i.e. the protruding portions 28, 29 may be of different kind and/or different number, for example, the connector 20 may comprise one snap-fit protrusion 23b and two winglet protrusions 23a. Preferably, all of the protruding portions 28, 29 should be equally spaced.

[0042] The connector 20 must be tightly connected to the tank 10 in order to provide a sealing that will sustain pressure and temperature variations. The tight connection may be carried out by the guiding means 26 that protrude from the connector body 11. The guiding means 26 may have an inner diameter equal to the inner diameter of the connector body 11 and the outer diameter of the guiding means 26 may be slightly smaller than the diameter of the second opening 13. The difference in dimensions is selected so as to enable play between the connector 20 in reference to the tank 10, but enable smooth rotation of these two elements.

[0043] In various embodiments, the connector 20 comprises a sealing region 27 located in the vicinity of the outer perimeter of guiding means 26, on the bottom of the connector body 21. The sealing region 27 is essentially a groove in the connector body 21 configured to receive a sealing means 40 (e.g. gasket). The sealing region 27 comprises at least one sealing guide 41. The sealing guide 41 comprises two protrusions deployed on the inner perimeter of the sealing region 27 and one protrusion on the outer perimeter of the sealing region 27. The sealing guide 41 preserves pinching and rotating the sealing means 40 in reference to the connector body 21. Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of drawings,

the disclosure, and the appended claims. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to the advantage.

Claims

1. A tank assembly comprising a tank (10) for a heat exchanger, in particular for a motor vehicle, comprising:

- a distribution body (11) for delivering a coolant fluid into the heat exchanger;
- a first opening (12) disposed along the longitudinal direction of the distribution body (11), the first opening (12) having a substantially rectangular shape for receiving a header with tubes;
- a second opening (13) disposed on the surface of the distribution body (11), the second opening (13) having a circular shape;
- at least one guiding means (14, 15) disposed in the vicinity of the second opening (13), and
- a connector (20) comprising at least one protruding portion (28, 29) cooperating with the guiding means (14, 15), the connector (20) being configured to be assembled with the tank (10),

characterised in that

the guiding means (14, 15) and the protruding portion (28, 29) are configured to engage the connector (20) with the tank (10) in a first angular position to prevent the connector (20) from moving in the axis of the second opening (13), and to disengage the connector (20) from the tank (10) in a second angular position in the plane delimited by the second opening (13).

2. The tank assembly according claim 1, wherein the tank (10) comprises a tank projection (16) bulging from the distribution body (11), the tank projection (16) disposed between two far ends of the distribution body (11); the tank projection (16) being adapted to accommodate the second opening (13).
3. The tank assembly according to any preceding claim, wherein the second opening (13) is disposed on the lateral side of the distribution body (11) with respect to the first opening (12).
4. The tank assembly according to any preceding claim, wherein the second opening (13) is disposed on the opposite side of the distribution body (11) with respect to the first opening (12).
5. The tank assembly according to any of preceding claims, wherein the connector (20) comprises a connector body (21), the connector body (21) being of

essentially tubular shape which widens on the end adjacent to the tank (10), thereby forming a collar (22).

ing to all preceding claims.

6. The tank assembly according to any of the preceding claims, wherein the guiding means (14, 15) comprise a guide (17a, 17b, 17c, 17d) and the protruding portion (28, 29) comprise a protrusion (23a, 23b, 23c, 23d), wherein one of them is located on a tank (10) and a second one is located on the connector 20, wherein the protrusion (23a, 23b, 23c, 23d) is adapted to be engaged in the guide (17a, 17b, 17c, 17d), thereby restricting movement of the connector (20) in the axis of the second opening (13).

5
10
15
7. The tank assembly according to the preceding claim, wherein the guide (17a, 17b, 17c, 17d) is configured to releasably fix the connector (20) in the first angular position.

20
8. The tank assembly according to claim 7, wherein the protruding portion (28, 29) is in a form of a winglet (23a), the winglet (23a) being of a flatted shape and comprising a slope configured to interact with the guide (14, 15).

25
9. The tank assembly according to claim 7, wherein the protruding portion (28, 29) is in a form of a snap-fit protrusion (23b) comprising a spearhead tip configured to slide through the guiding means (14, 15) and anchor to it.

30
10. The tank assembly according to any of the preceding claims, wherein the connector body (21) comprises a sealing region (27) disposed in the vicinity of the outer perimeter of the guiding means (26) for accommodating sealing means (40).

35
11. The tank assembly according to claim 9, wherein the sealing region (27) comprises at least one set of sealing guides (41), the sealing guide (41) comprising at least two protrusions on the inner perimeter of the sealing region (27) and at least one protrusion on the outer perimeter of the sealing region (27), so that a sealing means (40) are preserved from rotating against the connector body (21) after insertion into the sealing region (27).

40
45
12. The assembly according to any preceding claim, wherein the sealing means (40) is in a form of a rubber seal.

50
13. The tank assembly according to any of the preceding claims, wherein there is a plurality of protrusions (23a, 23b, 23c, 23d) which are located on the opposite sides of the connector (20).

55
14. Heat exchanger comprising a tank assembly accord-

Fig. 3

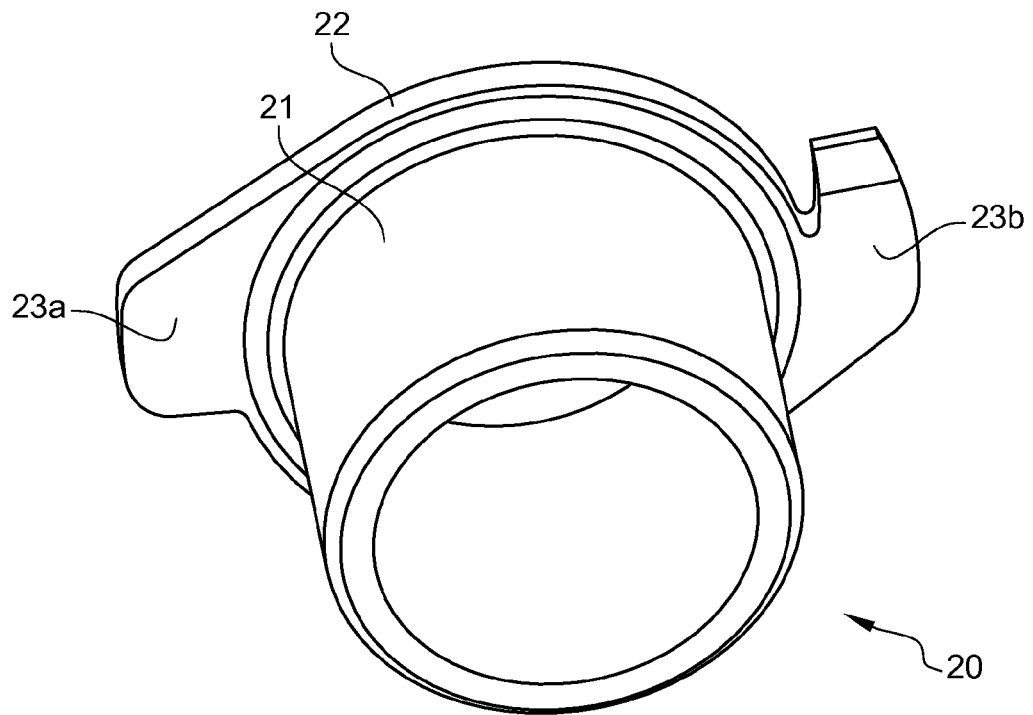


Fig. 4

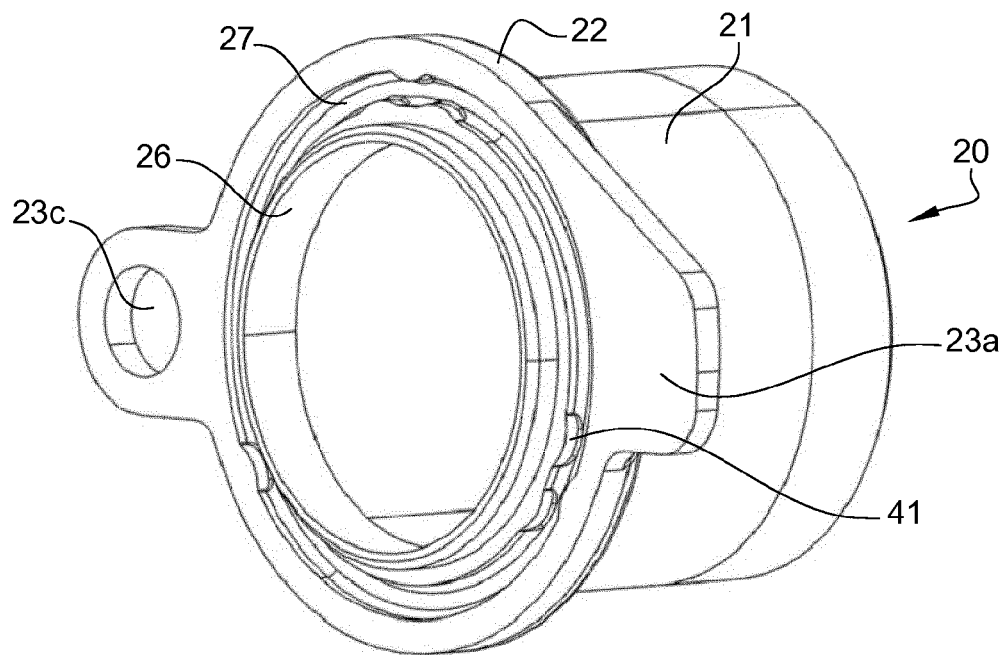


Fig. 5

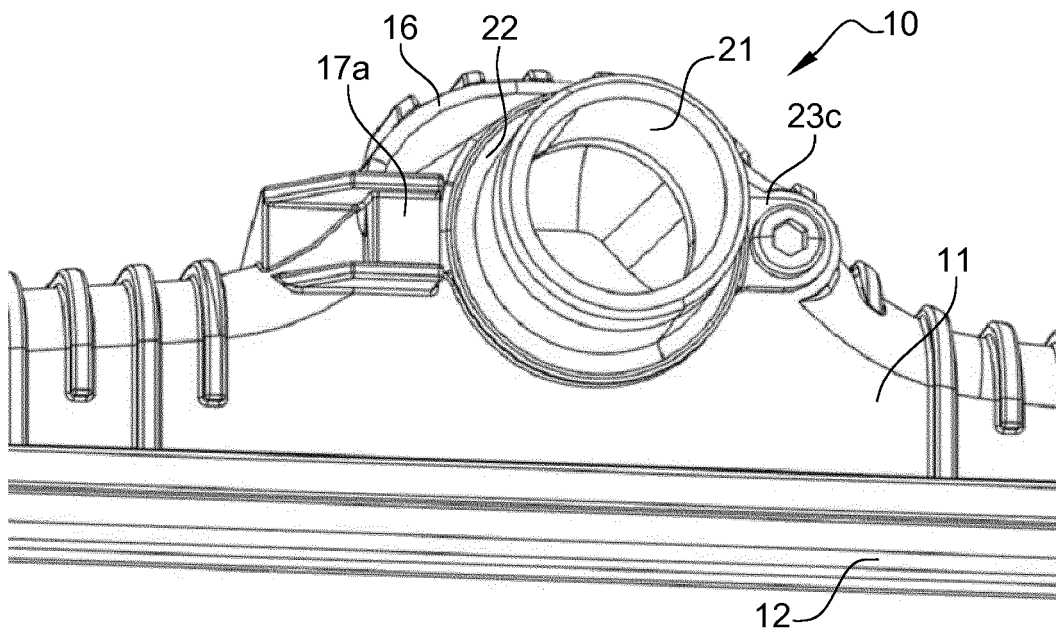
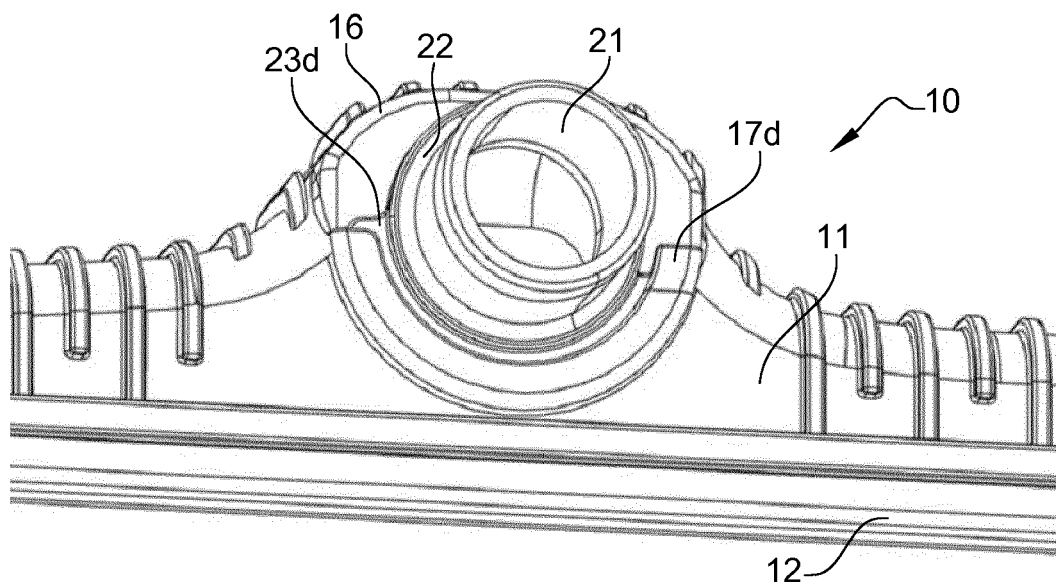


Fig. 6





EUROPEAN SEARCH REPORT

Application Number
EP 19 46 1546

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 01/92807 A1 (VALEO THERMIQUE MOTEUR SA [FR]; GILLE GERARD [FR]) 6 December 2001 (2001-12-06) * page 1, line 6 - page 8, line 29; figures 1-4 *	1-14	INV. F28F9/02
X	US 2002/134453 A1 (CHIKUMA H; NAKAGOME T ET AL.) 26 September 2002 (2002-09-26) * paragraphs [0028], [0040]; figures 1, 3, 4-8 *	1-14	
X	US 5 318 332 A (HOHMANN RALF [DE] ET AL) 7 June 1994 (1994-06-07) * column 2, lines 35-66; figure 3 * * column 7, line 16 - column 9, line 2; figures 2-3 *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			F28F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 December 2019	Examiner Delaitre, Maxime
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 46 1546

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-12-2019

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
15	WO 0192807 A1	06-12-2001	DE 60100862 T2	15-07-2004
			EP 1285212 A1	26-02-2003
			JP 4718752 B2	06-07-2011
			JP 2003535304 A	25-11-2003
			WO 0192807 A1	06-12-2001

20	US 2002134453 A1	26-09-2002	DE 60218076 T2	31-05-2007
			EP 1248065 A2	09-10-2002
			EP 1754947 A2	21-02-2007
			JP 4689065 B2	25-05-2011
			JP 2002282934 A	02-10-2002
	US 2002134453 A1	26-09-2002		

25	US 5318332 A	07-06-1994	DE 4129397 C1	11-03-1993
			FR 2680856 A1	05-03-1993
			GB 2259342 A	10-03-1993
			IT 1256953 B	27-12-1995
			JP 2794365 B2	03-09-1998
			JP 3582950 B2	27-10-2004
			JP H05215286 A	24-08-1993
			JP H09170690 A	30-06-1997
	US 5318332 A	07-06-1994		

35				
40				
45				
50				
55				

ORM P0459