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

(11) **EP 4 317 895 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
04.06.2025 Bulletin 2025/23

(21) Application number: **22188336.6**

(22) Date of filing: **02.08.2022**

(51) International Patent Classification (IPC):
F28F 9/02 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
F28D 1/05391; F28F 9/0204; F28F 9/0246; F28F 9/0253; F28F 2275/04; F28F 2275/122

(54) A TANK ASSEMBLY

TANKANORDNUNG

ENSEMBLE RÉSERVOIR

(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

(43) Date of publication of application:
07.02.2024 Bulletin 2024/06

(73) Proprietor: **VALEO SYSTEMES THERMIQUES**
78320 Le Mesnil Saint-Denis (FR)

(72) Inventors:
- **Volf, Jiri**
  Zebrak, 267 53 (CZ)
- **Forst, Jan**
  Zebrak, 267 53 (CZ)
- **Jirsa, Jakub**
  Zebrak, 267 53 (CZ)
- **Beranek, Lukas**
  Zebrak, 267 53 (CZ)
- **Hubka, Adam**
  Zebrak, 267 53 (CZ)

(74) Representative: **Valeo Systèmes Thermiques**
Service Propriété Intellectuelle
8, rue Louis Lormand
La Verrière
78320 Le Mesnil Saint Denis (FR)

(56) References cited:
WO-A1-2014/058181
DE-T5- 112019 006 476
US-A1- 2014 224 461
US-A1- 2019 120 521

EP 4 317 895 B1

Description

[0001] The present invention relates to a tank assembly. In particular, the present invention relates to a tank assembly as defined in the preamble of claim 1, and as illustrated in US 2014/224461A1.

[0002] Generally, a vehicle heat exchanger, such as for example, an inner condenser is disclosed. The inner condenser is a heat exchanger used in the heat pump systems for electric vehicles. It may be used for the heating of the passenger cabin and this heating system allows to prolong the driving distance of the electric vehicle. The inner condenser may use tetrafluoropropene (R1234yf) as refrigerant. The heat exchanger includes tank assemblies configuring a first manifold and a second manifold disposed on opposite sides of a heat exchanger core defined by tubular elements and fins. The tubular elements configure fluid communication between the first manifold and the second manifold. Separate connection conduits are connected to the first manifold and the second manifold to respectively supply heat exchange fluid to and collect heat exchange fluid therefrom. However, such configuration of the heat exchanger faces packaging, connection, routing issues, as the connection conduits are disposed on both sides of the heat exchanger.

[0003] To address the above issues, prior art suggests a heat exchanger 1, for example, a gas cooler, for a vehicle that includes a first manifold, particularly, an inlet manifold 2a and a second manifold, particularly, an outlet manifold 2b, a heat exchanger core 4 and a connector block 6 as illustrated in FIG. 1. The first manifold 2a and the second manifold 2b are disposed on same side of the heat exchanger core 4. The heat exchanger core 4 includes tubular elements 4a, 4b separated by fins 5a, 5b. The first manifold 2a is supplied heat exchange fluid from an inlet port 6a of the connector block 6 via by an inlet conduit 7a for ingress of the first heat exchange fluid into the heat exchanger 1. The second manifold 2b delivers the first heat exchange fluid to an outlet port 6b of the connector 6 via an outlet conduit 7b for egress of the first heat exchange fluid from the heat exchanger, after the first heat exchange fluid had undergone heat exchange with air surrounding the tubular elements 4a, 4b while passing through the tubular elements 4a, 4b. In such configuration, the tubular elements 4a, 4b are divided into a first set of tubular elements 4a and a second set of tubular elements 4b that are disposed adjacent to each other and interconnected and in fluid communication with each other via an intermediate manifold 2c to define a first pass and a second pass respectively. Also, the connector block 6 with the inlet port 6a and the outlet port 6b is disposed proximal to the first and second manifolds 2a and 2b. Accordingly, shorter lengths of inlet and outlet conduits 7a and 7b can be used for configuring connection and fluid communication between the inlet port 6a and the first manifold 2a and between the second manifold 2b and the outlet port 6b respectively. The first manifold 2a distributes the heat exchange fluid received thereby to the first set of tubular elements 4a. The heat exchange fluid undergoes heat exchange with a second heat exchange fluid, particularly, air around the first set of tubular elements 4a as the first heat exchange fluid flows through the first set of tubular elements 4a. The second set of tubular elements 4b receive the heat exchange fluid from the first set of tubular elements 4a via the intermediate manifold 2c and the second heat exchange fluid undergoes further heat exchange as it passes through the second set of tubular elements 4b. The second manifold 2b collects the first heat exchange fluid from the second tubular elements 4b after the first heat exchange fluid had rejected heat to the air flowing across the tubular elements 4a and 4b as it passes through the the tubular elements 4a and 4b. The second manifold 2b delivers the first heat exchange fluid collected thereby to the outlet conduit 7b for egress of the first heat exchange fluid from the heat exchanger 1 via the outlet port 6b. The tubular elements 4a are separated by fins 5a disposed there-between and the tubular elements 4b are separated by fins 5b disposed there-between. The fins 5a and 5b retard flow of the second heat exchange fluid, particularly, the air outside the tubular elements 4a and 4b to improve the heat exchange between the heat exchange fluid flowing inside and air flowing outside the tubular elements 4a and 4b.

[0004] The connector block 6 with the inlet port 6a and the outlet port 6b for ingress and egress of fluid with respect to the heat exchanger 1 is generally mounted on a vehicle frame proximal to the first and second manifolds 2a and 2b. The inlet and outlet conduits 7a and 7b configures fluid communication between the inlet port 6a and first manifold 2a and between the second manifold 2b and the outlet port 6b. However, use of inlet and outlet conduits 7a and 7b involves routing of the connecting inlet and outlet conduits 7a and 7b in limited space, particularly, in areas proximal to the lateral side of the heat exchanger 1. Moreover, the inlet an outlet conduits 7a and 7b inherently cause an unutilized space "X" along lateral side of the heat exchanger 1. The inlet and outlet conduits 7a and 7b and connections thereof with manifolds 2a and 2b on one side and with the connector block 6 on the other side cause packaging issues and pressure losses due to length of the inlet and outlet conduits 7a and 7b and bends in the inlet and outlet conduits 7a and 7b.

[0005] Accordingly, there is a need of a tank assembly for a heat exchanger that eliminates connection conduits renders the heat exchanger compact and addresses the packaging issues, particularly, along lateral sides of the heat exchanger and longitudinal direction of the first and second manifolds. Further, there is a need of a tank assembly for a heat exchanger that eliminates inlet and outlet conduits, thereby preventing problems such as energy losses and pressure drop between the inlet / outlet ports and corresponding first / second manifolds due to lengthy inlet and outlet connection conduits and

bends in the inlet and outlet connection conduits. Further, there is a need for a tank assembly for a heat exchanger that improves efficiency and reliability of the heat exchanger by preventing fluid flow losses by eliminating connection conduits. There is a need of a tank assembly for a heat exchanger that reduces the number of parts, thereby reducing maintenance and enhancing reliability of the heat exchanger.

[0006] An object of the present invention is to obviate the problems associated with conventional tank assembly for heat exchanger that require inlet and outlet connection conduits.

[0007] Another object of the present invention is that the tank assembly renders compactness to the heat exchanger and addresses the packaging issues, particularly, along lateral sides of the heat exchanger and longitudinal direction of the first and second manifolds.

[0008] Yet another object of the present invention is to provide a tank assembly for a heat exchanger that improves efficiency of the heat exchanger by reducing the pressure losses.

[0009] Still another object of the present invention is to provide a tank assembly for heat exchanger that reduces the number of parts, thereby reducing maintenance and enhancing reliability of the heat exchanger.

[0010] 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.

SUMMARY OF THE INVENTION

[0011] A tank assembly for a heat exchanger is disclosed in accordance with an embodiment of the present invention. The tank assembly incudes a tank cover and a header. The tank cover is formed with longitudinally extending first channels. The header includes portions that in conjunction with the first channels formed on tank cover define a first manifold and a second manifold when the tank cover is assembled to the header. The header further includes apertures configured on the respective portions thereof. The apertures receives the corresponding first set of tubular elements and second set of tubular elements of a heat exchanger core therein to configure fluid communication between the first manifold and the first set of tubular elements and fluid communication between the second set of tubular elements and the second manifold. At least one of the tank cover and the header includes an extension portion extending therefrom beyond the heat exchanger core to form a connection system. The connection system is formed with an inlet, an outlet and fluid flow passages that configure fluid communication between the inlet and the outlet and the respective first and second manifolds.

[0012] According to the invention, the tank cover includes the tank cover extension portion extending along the plane of the tank cover and the header includes the header extension portion extending along the plane of the header, wherein the tank cover extension portion in conjunction with the header extension portion when assembled together define the first fluid flow passage and the second fluid flow passage. The first fluid flow passage defines curved fluid flow trajectory and fluid communication between the inlet and the first manifold. The second fluid flow passage defines curved fluid flow trajectory and fluid communication between the second manifold and the outlet.

[0013] Particularly, the first channels extend to free end of the tank cover extension portion to define a first set of profiles at free end thereof. The header extension portion includes second channels corresponding to the first channels that extend to free end thereof to define a second set of profiles at the free end thereof. The profiles of the second set of profiles are complementary to the respective profiles of the first set of profiles. As the tank cover extension portion is assembled to the header extension portion, the first set of profiles get aligned to the second set of profiles and the sleeves hold the first set of profiles aligned to the corresponding second set of profiles to define the inlet and outlet respectively.

[0014] Particularly, the second channels are integrally formed with the header, whereas the first set of profiles are inherently formed at the free end of the respective first channels integrally formed with the tank cover.

[0015] Specifically, the first and second fluid flow passages are formed by the second channels formed on and extending to the free end of the header extension portion and portions of the respective first channels extending to free end of the tank extension portion.

[0016] Preferably, the inlet and the outlet are disposed along an axis extending orthogonally to the longitudinal axis of the first and second manifolds and the longitudinal axis of the tubular elements.

[0017] Generally, the first channels are separated by a first intermediate gap that extends along the tank cover extension portion.

[0018] Further, the second channels are separated by a second intermediate gap.

[0019] Specifically, the tank cover extension portion and the header extension portion extends along a curve and along a plane at the interface between the tank cover and the header.

[0020] Specifically, at least one of the tank cover and the header is formed with respective tabs disposed along longitudinal sides thereof to configure crimping connection there-between.

[0021] More specifically, at least one of the tank cover extension portion and the header extension portion is also formed with respective tabs disposed along peripheral portion thereof to configure crimping connection there-between.

[0022] Generally, the inlet and the outlet are symmetrical with respect with respect to each other about a plane passing through center of the second intermediate gap at extreme end of the second intermediate gap.

[0023] Alternatively, the inlet and the outlet are asymmetrical with respect with respect to each other about a plane passing through center of the second intermediate gap at extreme end of the second intermediate gap.

[0024] Generally, the first and second fluid flow passages are of varying cross section along the length thereof.

[0025] Also is disclosed a heat exchanger in accordance with an embodiment of the present invention. The heat exchanger includes a heat exchanger core, a tank assembly and an intermediate manifold. The heat exchanger core includes a first set of tubular elements and second set of tubular elements disposed adjacent to the first set of tubular elements and respectively defining a first pass and a second pass. The tank assembly includes a first manifold and a second manifold disposed on same side of the heat exchanger core. The first manifold delivers fluid to the first set of tubular elements and the second manifold collects fluid from and the second set of tubular elements after the fluid had undergone heat exchange while passing through the first and the second set of tubular elements. The tank assembly extends beyond the heat exchanger core to configure a connection system formed with an inlet and an outlet and fluid flow passages. The first fluid flow passage configures fluid communication between the first manifold and the inlet whereas the second fluid flow passage configure fluid communication between the second manifold and the outlet. The intermediate manifold configures fluid communication between the first set of tubular elements and the second set of tubular elements to define U-flow trajectory of the fluid flow there-between to enable configuring of the first and second manifolds on the same side of the heat exchanger core.

BRIEF DESCRIPTION OF DRAWINGS

[0026] 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 illustrates an isometric view of a conventional tank assembly for heat exchanger forming inlet and second manifolds, wherein a separate connector block is connected to and fluid communication with the manifolds by means of inlet an outlet conduits;

FIG. 2 illustrates a front view of the conventional tank assembly, depicting unused space inherently created at the lateral side of the heat exchanger core because of the inlet and outlet conduits;

FIG. 3 illustrates an assembled view of a heat exchanger configured with a tank assembly of the present invention forming a connection system;

FIG. 4 illustrates an exploded view of the heat exchanger of FIG. 3;

FIG. 5 illustrates a side view of a header tank assembly of FIG. 3;

FIG. 6 illustrates a top view of the header tank assembly of FIG. 3;

FIG. 7 illustrates a sectional view of the header tank assembly along sectional plane B-B depicted in FIG. 6;

FIG. 8 illustrates an isometric view of a tank cover of the tank assembly of FIG. 3; and

FIG. 9 illustrates an isometric view of a header of the tank assembly of FIG. 3.

DETAILED DESCRIPTION

[0027] The present invention envisages a tank assembly for a heat exchanger, wherein the tank assembly configures a first manifold and a second manifold on same side of the heat exchanger to render compact configuration to the heat exchanger. Particularly, the tank assembly includes a tank cover and a header that extend beyond the heat exchanger core along lateral side of the heat exchanger core. The tank cover and the header are assembled to configure the manifolds and a connector system. Particularly, portions of tank cover and header aligned with respect to the heat exchanger core and secured to each other configure the manifolds, whereas portions of the tank cover and the header extending beyond the heat exchanger core and secured to each other configure the connection system. The header and the tank cover are secured to each other by crimping and brazing. The connection system is formed with an inlet, an outlet and fluid flow passages. The fluid flow passage configures fluid communication between the inlet for ingress of fluid into the heat exchanger and the first manifold, whereas the second fluid flow passage configures fluid communication between the second manifold and the outlet for egress of fluid from the heat exchanger. Such configuration of fluid flow passages formed in the tank assembly avoids inlet and outlet conduits and packaging, connection and routing issues faced due to the inlet and outlet conduits. The first flow passage configures a curved fluid flow trajectory and fluid communication between the inlet and the first manifold. The second fluid flow passage also configures curved flow

trajectory and fluid communication between the second manifold and the outlet. Accordingly, the inlet and the outlet extend orthogonally to the longitudinal axis of the manifold and the longitudinal axis of the tubular elements, thereby rendering the heat exchanger compact, particularly, along longitudinal side of the manifolds, thereby addressing packaging issues. Although, the present invention is explained in the forthcoming description and accompanying drawings with example of tank assembly for a condenser for use in vehicle air conditioning system, however, the tank assembly of the present invention is also applicable in any other heat exchanger used in vehicular or non-vehicular applications, where the first and the second manifold are required to be on same side of the heat exchanger and the heat exchanger is required to be compact, particularly, along longitudinal side of the manifold by eliminating connection conduits to address packaging issues.

[0028] A tank assembly 100 configured on a vehicle heat exchanger 200, particularly, an air conditioning gas coolers, gas coolers or evaporators is disclosed. FIG. 3 illustrates an isometric view of the heat exchanger 200 configured with the tank assembly 100 of the present invention in the assembled configuration. FIG. 4 illustrates an exploded view of the heat exchanger 200. The header tank-assembly 100 includes a tank cover 10 and a header 20.

[0029] FIG. 5 and FIG. 6 illustrates side view and top view of the tank assembly 100. The FIG. 7 illustrates a sectional view of the tank assembly 100 along sectional plane B-B' depicted in FIG. 6. Referring to FIG. 8, the tank cover 10 includes longitudinally extending first channels 10a and 10b. The first channels 10a and 10b are separated by a first intermediate gap 10d that extends to free end of the tank cover extension portion 10c.

[0030] Further, referring to FIG. 9, the header 20 includes portions 20a and 20b along longitudinal sides thereof. The first and the second portions 20a and 20b of the header 20 in conjunction with the corresponding first channels 10a and 10b of the tank cover 10 define a first manifold 30a and a second manifold 30b when the tank cover 10 is secured to the header 20. The first and the second manifolds are depicted in the sectional view of the tank assembly 100 depicted in the FIG. 7. Generally, the tank cover 10 and the header 20 are secured to each other by crimping and brazing. However, the tank cover 10 and the header 20 can be secured to each other by any other means that can form secure connection between the tank cover 10 and the header 20. The header 20 includes apertures 22a and 22b configured on the respective first and second portions 20a and 20b thereof. The apertures 22a and 22b receives corresponding first set of tubular elements 42a and second set of tubular elements 42b of a heat exchanger core 40 therein to configure fluid communication between the first manifold 30a and the first set of tubular elements 42a and fluid communication between the second set of tubular elements 42b and the second manifold 30b. The first and the second manifolds 30a and 30b are disposed on one side of the heat exchanger core 40.

[0031] Such configuration of the heat exchanger 200 with the first manifold 30a and the second manifold 30b disposed adjacent to each other and on same side of the heat exchanger core 40 provides certain advantages. For example, such configuration renders the heat exchanger 200 compact and addresses the packaging issues, connection issues and prevents clutter due to manifolds being disposed on opposite sides and connection conduits connected to opposite sides of the heat exchanger core. Further, such configuration reduces the number of connection parts and hence reduces maintenance and improves reliability. However, such configuration requires the heat exchange fluid entering the heat exchanger to follow a U-turn trajectory within the heat exchanger core 40 that is achieved by providing first and second sets tubular elements 42a and 42b disposed side by side and an intermediate manifold 30e configuring fluid communication between the first and the second set of tubular elements 42a and 42b. More specifically, the intermediate manifold 30e interconnects and configures fluid communication between the first set of tubular elements 42a defining the first pass and the second set of tubular elements 42b defining the second pass or return pass.

[0032] Generally, at least one of the tank cover 10 and the header 20 includes an extension portion 10c, 20c extending therefrom beyond the heat exchanger core 40 to form a connection system. The connection system is formed with an inlet 50a, an outlet 50b and fluid flow passages 30c and 30d configuring fluid communication between the inlet and the outlet 50a and 50b and the respective first and second manifolds 30a and 30b. The connection system can be configured by the tank cover extension portion 10c alone or header extension portion 20c alone or by assembling the tank cover extension portion 10c and the header extension portion 20c.

[0033] According to a preferred embodiment, the tank cover 10 includes the tank cover extension portion 10c extending along the plane of the tank cover 10 and the header 20 includes the header extension portion 20c extending along the plane of the header 20. The first channels 10a and 10b extend along the tank cover extension portion 10c. The header extension portion 20c includes second channels 23a and 23b formed thereon. The second channels 23a and 23b are integrally formed with the header 20. The first set of profiles 12a and 12b are inherently formed at the end of the respective first channels 10a and 10b integrally formed with the tank cover 10. The second channels 23a and 23b are complementary to the portion of the first channels 10a and 10b extending to the tank extension portion 10c. The portions 10a and 10b of tank cover 10 and portions 20a and 20b of the header 20 aligned with respect to the heat exchanger core 40 and secured to each other configure the manifolds 30a and 30b. Particularly, portions of at least one of the tank cover 10 and the header 20 forming the manifolds is formed with respective tabs 14 and 24

disposed along longitudinal sides thereof to configure crimping connection between the tank cover 10 and the header 20. The portions of the tank cover 10 and the header 20 forming the manifolds are further secured to each other by brazing.

[0034] The tank cover extension portion 10c and header extension portion 20c of the tank cover 10 and the header 20 respectively extend beyond the heat exchanger core 40 and are secured to each other to configure the connection system. At least one of the tank cover extension portion 10c and the header extension portion 20c is also formed with respective tabs 14a and 24a disposed along peripheral portion thereof to configure crimping connection between tank cover extension portion 10c and the header extension portion 20c. The tank cover extension portion 10c and the header extension portion 20c are further secured to each other by brazing. The tank cover extension portion 10c in conjunction with the header extension portion 20c when assembled together define the first fluid flow passage 30c and the second fluid flow passage 30d of the connection system. More specifically, the first and second fluid flow passages 30c and 30d are formed by assembly between the second channels 23a and 23b formed on the header extension portion 20c and extending to free end thereof and portions of the respective first channels 10a and 10b extending to the free end of the tank cover extension portion 10c. The first flow passage 30c and the second flow passage 30d are of variable cross section. The first flow passage 30c and the second flow passage 30d are both diverging from the manifold side to the inlet and outlet side respectively. The second channels 23a and 23b are separated by a second intermediate gap 23c. The second intermediate gap 23c between the second channels 23a and 23b is corresponding to and complementary to the first intermediate gap 10d between portions of the first channels 10a and 10b extending to the free end of the tank cover extension portion 10c. The first intermediate gap 10d between portion of the channels 10a and 10b extending to the tank cover extension portion 10c is aligned to the second intermediate gap 23c, when the header 20 and the tank cover 10 are assembled to each other. Such configuration facilitates alignment of a first set of profiles 12a and 12b at extreme end of the tank cover 10 with a second set of profiles 26a and 26b at extreme end of the header 20 for configuring the inlet 50a and the outlet 50b. The first fluid flow passage 30c defines curved fluid flow trajectory and fluid communication between the inlet 50a and the first manifold 30a. Similarly, the second fluid flow passage 30d defines curved fluid flow trajectory and fluid communication between the second manifold 30b and the outlet 50b. With the portions of the tank cover 10 and the header 20 forming the connection system, the need for connection conduits is eliminated and pressure losses are avoided, thereby improving the efficiency and performance of the heat exchanger 200. Further, with the elimination of the connection conduits, the reliabity of the heat exchanger is increased.

[0035] Again referring to the FIG. 8, the first channels 10a and 10b extends along the tank cover extension portion 10c to free end of the tank cover extension portion 10c to define the first set of profiles 12a and 12b at free end thereof. The header extension portion 20c includes the second set of profiles 26a and 26b at the free end thereof. The profiles of the second set of profiles 26a and 26b are complementary to the respective profiles of the first set of profiles 12a and 12b. As the tank cover extension portion 10c is assembled to the header extension portion 20c, the first set of profiles 12a and 12b get aligned to the second set of profiles 26a and 26b and sleeves 52a and 52b hold the first set of profiles 12a and 12b aligned to the corresponding second set of profiles 26a and 26b to define the inlet 50a and the outlet 50b respectively. The tank cover extension portion 10c and the header extension portion 20c extends along a curve along a plane at the interface between the tank cover 10 and the header 20. Accordingly, the first and the second fluid flow passages 30c and 30d follow such curved profile that the inlet 50a and the outlet 50b are disposed along an axis extending orthogonally to the longitudinal axis of the first and second manifold 30a and 30b and the longitudinal axis of the tubular elements 42a and 42b. Such configuration of the tank assembly 100 renders compactness to the heat exchanger 200 and addresses the packaging issues, particularly, along lateral sides of the heat exchanger core 40 and longitudinal direction of the first and second manifolds 30a and 30b.

[0036] Also is disclosed the heat exchanger 200 in accordance with an embodiment of the present invention. Referring to the FIG. 3 and FIG. 4, the heat exchanger 200 includes a heat exchanger core 40, a tank assembly 100 and an intermediate manifold 30e. The heat exchanger core 40 includes a first set of tubular elements 42a and second set of tubular elements 42b disposed adjacent to the first set of tubular elements 42a and respectively defining a first pass and a second pass. The tank assembly 100 includes a first manifold 30a and a second manifold 30b disposed on same side of the heat exchanger core 40. The first manifold 30a delivers fluid to the first set of tubular elements 42a and the second manifold 30b collects fluid from and the second set of tubular elements 42b after the fluid had undergone heat exchange while passing through the first and the second set of tubular elements 42a and 42b. The tank assembly 100 extends beyond the heat exchanger core 40 to configure a connection system formed with an inlet 50a, an outlet 50b and fluid flow passages 30c and 30d. The first fluid flow passage 30c configures fluid communication between the first manifold 30a and the inlet 50a whereas the second fluid flow passage 30d configures fluid communication between the second manifold 30b and the outlet 50b. The intermediate manifold 30e configures fluid communication between the first set of tubular elements 42a and the second set of tubular elements 42b to define U-flow trajectory of the fluid flow there-between to enable configuring of the first and second manifolds 30a and 30b

on the same side of the heat exchanger core 40.

[0037] 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 is defined by the appended claims.

Claims

1. A tank assembly (100) for a heat exchanger (200), the tank assembly (100) comprising:

- a tank cover (10) formed with longitudinally extending first channels (10a) and(10b);
- a header (20) comprising portions (20a) and (20b) that in conjunction with the first channels (10a) and (10b) formed on tank cover (10) adapted to define a first manifold (30a) and a second manifold (30b) when the tank cover (10) is assembled to the header (20) , the header (20) further comprising apertures (22a) and (22b) configured on the respective portions (20a) and (20b) thereof, the apertures (22a) and (22b) are adapted to receive corresponding first set of tubular elements (42a) and second set of tubular elements (42b) of a heat exchanger core (40) therein to configure fluid communication between the first manifold (30a) and the first set of tubular elements (42a) and fluid communication between the second set of tubular elements (42b) and the second manifold (30b),

wherein at least one tank cover (10) and the header (20) comprise an extension portion (10c, 20c) extending therefrom beyond the heat exchanger core (40) to form a connection system formed with an inlet (50a), an outlet (50b) and fluid flow passages (30c) and (30d) configuring fluid communication between the inlet and the outlet (50a) and (50b) and the respective first and second manifolds (30a) and (30b), wherein the tank cover (10) comprises the tank cover extension portion (10c) extending along the plane of the tank cover (10) and the header (20) comprises the header extension portion (20c) extending along the plane of the header (20), the tank cover extension portion (10c) in conjunction with the header extension portion (20c) when assembled together is adapted to define the first fluid flow passage (30c) and the second fluid flow passage (30d), the tank assembly being **characterized in that** the first fluid flow passage (30c) defines curved fluid flow trajectory and fluid communication between the inlet (50a) and the first manifold (30a), whereas the second fluid flow passage (30d) defines curved fluid flow trajectory and fluid communication between the second manifold (30b) and the outlet (50b).

2. The tank assembly (100) as claimed in any of the preceding claims, wherein

- the first channels (10a) and a (10b) extend to free end of the tank cover extension portion (10c) to define a first set of profiles (12a) and (12b) at free end thereof;
- the header extension portion (20c) comprises second channels (23a) and (23b) corresponding to the first channels (10a) and (10b) that extend to free end thereof to define a second set of profiles (26a) and (26b) at the free end thereof, the profiles of the second set of profiles (26a) and (26b) are complementary to the respective profiles of the first set of profiles (12a) and (12b),

as the tank cover extension portion (10c) is assembled to the header extension portion (20c), the first set of profiles (12a) and (12b) get aligned to the second set of profiles (26a) and (26b) and sleeves (52a) and (52b) hold the first set of profiles (12a) and (12b) aligned to the corresponding second set of profiles (26a) and (26b) to define the inlet and outlet (50a) and (50b) respectively.

3. The tank assembly as claimed in Claim 2, wherein the second channels (23a) and (23b) are integrally formed with the header (20), whereas the first set of profiles (12a) and (12b) are inherently formed at the free end of the respective first channels (10a) and (10b) integrally formed with the tank cover (10).

4. The tank assembly (100) as claimed in the previous claim, wherein the first and second fluid flow passages (30c) and (30d) are formed by the second channels (23a) and (23b) formed on and extending to free end of the header extension portion (20c) and portions of the respective first channels (10a) and (10b) extending to free end of the tank cover extension portion (10c).

5. The tank assembly (100) as claimed in any of the preceding claims, wherein the inlet (50a) and the outlet (50b) are disposed along an axis extending orthogonally to the longitudinal axis of the first and second manifold (30a) and (30b) and the longitudinal axis of the tubular elements (42a) and (42b).

6. The tank assembly (100) as claimed in any of the preceding claims, wherein the first channels (10a) and (10b) are separated by a first intermediate gap (10d) that extends along the tank cover extension portion (10c).

7. The tank assembly (100) as claimed in any of the claim 3, wherein the second channels (23a) and (23b) are separated by a second intermediate gap (23c).

8. The tank assembly (100) as claimed in any of the preceding claims wherein the tank cover extension portion (10c) and the header extension portion (20c) extends along a curve along a plane at the interface between the tank cover (10) and the header (20).

9. The tank assembly (100) as claimed in any of the preceding claims, wherein at least one of the tank cover (10) and the header (20) is formed with respective tabs (14) and (24) disposed along longitudinal sides thereof and adapted to configure crimping connection there-between.

10. The tank assembly (100) as claimed in any of the preceding claims, wherein at least one of the tank cover extension portion (10c) and the header extension portion (20c) also formed with respective tabs (14a) and (24a) disposed along peripheral portion thereof to configure crimping connection there-between.

11. The tank assembly (100) as claimed in claim 7, wherein the inlet (50a) and the outlet (50b) are symmetrical with respect with respect to each other about a plane "A" passing through center of the second intermediate gap (23c) at extreme end of the second intermediate gap (23c).

12. The tank assembly (100) as claimed in claim 7, wherein the inlet (50a) and the outlet (50b) are asymmetrical with respect with respect to each other about a plane passing through center of the second intermediate gap (23c) at an extreme end at extreme end of the second intermediate gap (23c).

13. The tank assembly (100) as claimed in any of the preceding claims, wherein the first and second fluid flow passages (30c) and (30d) are of varying cross section along the length thereof.

14. A heat exchanger (200) comprising :

- a heat exchanger core (40) comprising first set of tubular elements (42a) and second set of tubular elements (42b) disposed adjacent to the first set of tubular elements and respectively defining a first pass and a second pass;
- a tank assembly (100) as claimed in any of the preceding claims comprising a first manifold (30a) and a second manifold (30b) disposed on same side of the heat exchanger core, the first manifold (30a) is adapted to deliver fluid to the first set of tubular elements (42a) and the second manifold (30b) adapted to collect fluid from and the second set of tubular elements (42b) after the fluid had undergone heat exchange while passing through the first and the second set of tubular elements (42a) and (42b), the tank assembly (100) extending beyond the heat exchanger core (40) and adapted to configure a connection system formed with an inlet (50a) and an outlet (50b) and fluid flow passages (30c) and (30d), wherein the first fluid flow passage (30c) configures fluid communication between the first manifold (30a) and the inlet (50a) whereas the second fluid flow passage (30d) configures fluid communication between the second manifold (30b) and the outlet (50b); and
- an intermediate manifold (30e) configuring fluid communication between the first set of tubular elements (42a) and the second set of tubular elements (42b) to define U-flow trajectory of the fluid there-between to enable configuring of the first and second manifolds (30a) and (30b) on the same side of the heat exchanger core (40).

Patentansprüche

1. Tankanordnung (100) für einen Wärmetauscher (200), wobei die Tankanordnung (100) Folgendes umfasst:

- eine Tankabdeckung (10), die mit sich in Längsrichtung erstreckenden ersten Kanälen (10a) und (10b) ausgebildet ist;
- einen Sammler (20), der Abschnitte (20a) und (20b) umfasst, die in Verbindung mit den an der Tankabdeckung (10) ausgebildeten ersten Kanälen (10a) und (10b) dazu ausgelegt sind, einen ersten Verteiler (30a) und einen zweiten Verteiler (30b) zu definieren, wenn die Tankabdeckung (10) mit dem Sammler (20) zusammengebaut ist, wobei der Sammler (20) ferner Öffnungen (22a) und (22b) umfasst, die an den jeweiligen Abschnitten (20a) und (20b) davon konfiguriert sind, wobei die Öffnungen (22a) und (22b) dazu ausgelegt sind, einen entsprechenden ersten Satz rohrförmiger Elemente (42a) und zweiten Satz rohrförmiger Elemente (42b) eines Wärmetauscherkerns (40) darin aufzunehmen, um eine Fluidverbindung zwischen dem ersten Verteiler (30a) und dem ersten Satz rohrförmiger Elemente (42a) und eine Fluidverbindung zwischen dem zweiten Satz rohrförmiger Elemente (42b) und dem zweiten Verteiler (30b) zu konfigurieren,

wobei mindestens eine Tankabdeckung (10) und der Sammler (20) einen Verlängerungsabschnitt (10c, 20c) umfassen, der sich davon über den Wärmetauscherkern (40) hinaus erstreckt, um ein Verbindungssystem auszubilden, das mit einem Einlass (50a), einem Auslass (50b) und Fluidströmungsdurchgängen (30c) und (30d) ausgebildet ist, die

eine Fluidverbindung zwischen dem Einlass und dem Auslass (50a) und (50b) und dem jeweiligen ersten und zweiten Verteiler (30a) und (30b) konfigurieren, wobei die Tankabdeckung (10) den Tankabdeckungsverlängerungsabschnitt (10c) umfasst, der sich entlang der Ebene der Tankabdeckung (10) erstreckt, und der Sammler (20) den Sammlerverlängerungsabschnitt (20c) umfasst, der sich entlang der Ebene des Sammlers (20) erstreckt, wobei der Tankabdeckungsverlängerungsabschnitt (10c) in Verbindung mit dem Sammlerverlängerungsabschnitt (20c) im zusammengebauten Zustand dazu ausgelegt ist, den ersten Fluidströmungsdurchgang (30c) und den zweiten Fluidströmungsdurchgang (30d) zu definieren, wobei die Tankanordnung **dadurch gekennzeichnet ist, dass** der erste Fluidströmungsdurchgang (30c) eine gekrümmte Fluidströmungsbahn und eine Fluidverbindung zwischen dem Einlass (50a) und dem ersten Verteiler (30a) definiert, während der zweite Fluidströmungsdurchgang (30d) eine gekrümmte Fluidströmungsbahn und eine Fluidverbindung zwischen dem zweiten Verteiler (30b) und dem Auslass (50b) definiert.

2. Tankanordnung (100) nach einem der vorhergehenden Ansprüche, wobei

- sich die ersten Kanäle (10a) und (10b) zu einem freien Ende des Tankabdeckungsverlängerungsabschnitts (10c) erstrecken, um einen ersten Satz von Profilen (12a) und (12b) am freien Ende davon zu definieren;
- der Sammlerverlängerungsabschnitt (20c) zweite Kanäle (23a) und (23b) umfasst, die den ersten Kanälen (10a) und (10b) entsprechen, die sich zu einem freien Ende davon erstrecken, um einen zweiten Satz von Profilen (26a) und (26b) am freien Ende davon zu definieren, wobei die Profile des zweiten Satzes von Profilen (26a) und (26b) komplementär zu den jeweiligen Profilen des ersten Satzes von Profilen (12a) und (12b) sind,

wobei, wenn der Tankabdeckungsverlängerungsabschnitt (10c) mit dem Sammlerverlängerungsabschnitt (20c) zusammengebaut ist, der erste Satz von Profilen (12a) und (12b) mit dem zweiten Satz von Profilen (26a) und (26b) ausgerichtet wird und Hülsen (52a) und (52b) den ersten Satz von Profilen (12a) und (12b) ausgerichtet mit dem entsprechenden zweiten Satz von Profilen (26a) und (26b) halten, um den Einlass und den Auslass (50a) bzw. (50b) zu definieren.

3. Tankanordnung nach Anspruch 2, wobei die zweiten Kanäle (23a) und (23b) integral mit dem Sammler (20) ausgebildet sind, während der erste Satz von Profilen (12a) und (12b) inhärent am freien Ende der jeweiligen ersten Kanäle (10a) und (10b) integral mit der Tankabdeckung (10) ausgebildet ist.

4. Tankanordnung (100) nach dem vorhergehenden Anspruch, wobei der erste und der zweite Fluidströmungsdurchgang (30c) und (30d) durch die zweiten Kanäle (23a) und (23b), die am freien Ende des Sammlerverlängerungsabschnitts (20c) ausgebildet sind und sich zu diesem erstrecken, und Abschnitte der jeweiligen ersten Kanäle (10a) und (10b), die sich zum freien Ende des Tankabdeckungsverlängerungsabschnitts (10c) erstrecken, ausgebildet sind.

5. Tankanordnung (100) nach einem der vorhergehenden Ansprüche, wobei der Einlass (50a) und der Auslass (50b) entlang einer Achse angeordnet sind, die sich orthogonal zur Längsachse des ersten und zweiten Verteilers (30a) und (30b) und zur Längsachse der röhrenförmigen Elemente (42a) und (42b) erstreckt.

6. Tankanordnung (100) nach einem der vorhergehenden Ansprüche, wobei die ersten Kanäle (10a) und (10b) durch einen ersten Zwischenspalt (10d) getrennt sind, der sich entlang des Tankabdeckungsverlängerungsabschnitts (10c) erstreckt.

7. Tankanordnung (100) nach einem des Anspruchs 3, wobei die zweiten Kanäle (23a) und (23b) durch einen zweiten Zwischenspalt (23c) getrennt sind.

8. Tankanordnung (100) nach einem der vorhergehenden Ansprüche, wobei sich der Tankabdeckungsverlängerungsabschnitt (10c) und der Sammlerverlängerungsabschnitt (20c) entlang einer Kurve entlang einer Ebene an der Grenzfläche zwischen der Tankabdeckung (10) und dem Sammler (20) erstrecken.

9. Tankanordnung (100) nach einem der vorhergehenden Ansprüche, wobei die Tankabdeckung (10) und/oder der Sammler (20) mit jeweiligen Laschen (14) und (24) ausgebildet ist, die entlang von Längsseiten davon angeordnet und dazu ausgelegt sind, eine Crimpverbindung dazwischen zu konfigurieren.

10. Tankanordnung (100) nach einem der vorhergehenden Ansprüche, wobei der Tankabdeckungsverlängerungsabschnitt (10c) und/oder der Sammlerverlängerungsabschnitt (20c) auch mit jeweiligen Laschen (14a) und (24a) ausgebildet ist, die entlang des Umfangsabschnitts davon angeordnet sind, um eine Crimpverbindung dazwischen zu konfigurieren.

11. Tankanordnung (100) nach Anspruch 7, wobei der Einlass (50a) und der Auslass (50b) in Bezug in Bezug zueinander um eine Ebene "A" symmetrisch

sind, die durch eine Mitte des zweiten Zwischenspalts (23c) an einem äußersten Ende des zweiten Zwischenspalts (23c) verläuft.

12. Tankanordnung (100) nach Anspruch 7, wobei der Einlass (50a) und der Auslass (50b) in Bezug in Bezug zueinander um eine Ebene asymmetrisch sind, die durch eine Mitte des zweiten Zwischenspalts (23c) an einem äußersten Ende an einem äußersten Ende des zweiten Zwischenspalts (23c) verläuft.

13. Tankanordnung (100) nach einem der vorhergehenden Ansprüche, wobei der erste und der zweite Fluidströmungsdurchgang (30c) und (30d) entlang der Länge davon einen variierenden Querschnitt aufweisen.

14. Wärmetauscher (200), der Folgendes umfasst:

• einen Wärmetauscherkern (40), der einen ersten Satz röhrenförmiger Elemente (42a) und einen zweiten Satz röhrenförmiger Elemente (42b) umfasst, die angrenzend an den ersten Satz röhrenförmiger Elemente angeordnet sind und jeweils einen ersten Durchlass und einen zweiten Durchlass definieren;
• eine Tankanordnung (100) nach einem der vorhergehenden Ansprüche, die einen ersten Verteiler (30a) und einen zweiten Verteiler (30b) umfasst, die auf derselben Seite des Wärmetauscherkerns angeordnet sind, wobei der erste Verteiler (30a) dazu ausgelegt ist, Fluid zum ersten Satz rohrförmiger Elemente (42a) zu liefern, und der zweite Verteiler (30b) dazu ausgelegt ist, Fluid von und dem zweiten Satz rohrförmiger Elemente (42b) aufzufangen, nachdem das Fluid einem Wärmeaustausch unterzogen wurde, während es durch den ersten und den zweiten Satz rohrförmiger Elemente (42a) und (42b) hindurchgeht, wobei sich die Tankanordnung (100) über den Wärmetauscherkern (40) hinaus erstreckt und dazu ausgelegt ist, ein Verbindungssystem zu konfigurieren, das mit einem Einlass (50a) und einem Auslass (50b) und Fluidströmungsdurchgängen (30c) und (30d) ausgebildet ist, wobei der erste Fluidströmungsdurchgang (30c) eine Fluidverbindung zwischen dem ersten Verteiler (30a) und dem Einlass (50a) konfiguriert, während der zweite Fluidströmungsdurchgang (30d) eine Fluidverbindung zwischen dem zweiten Verteiler (30b) und dem Auslass (50b) konfiguriert; und
• einen Zwischenverteiler (30e), der eine Fluidverbindung zwischen dem ersten Satz röhrenförmiger Elemente (42a) und dem zweiten Satz röhrenförmiger Elemente (42b) konfiguriert, um eine U-Strömungsbahn des Fluids dazwischen zu definieren, um ein Konfigurieren des ersten und des zweiten Verteilers (30a) und (30b) auf derselben Seite des Wärmetauscherkerns (40) zu ermöglichen.

Revendications

1. Ensemble réservoir (100) pour un échangeur de chaleur (200), l'ensemble réservoir (100) comprenant :

• un couvercle de réservoir (10) formé avec des premiers canaux (10a) et (10b) s'étendant longitudinalement ;
• un collecteur (20) comprenant des parties (20a) et (20b) qui, conjointement avec les premiers canaux (10a) et (10b) formés sur le couvercle de réservoir (10), sont adaptées pour définir une première tubulure (30a) et une seconde tubulure (30b) lorsque le couvercle de réservoir (10) est assemblé avec le collecteur (20), le collecteur (20) comprenant en outre des ouvertures (22a) et (22b) configurées sur les parties respectives (20a) et (20b) de celui-ci, les ouvertures (22a) et (22b) sont adaptées pour recevoir un premier groupe d'éléments tubulaires (42a) et un second groupe d'éléments tubulaires (42b) correspondants d'un faisceau d'échangeur de chaleur (40) dans celles-ci pour configurer une communication fluidique entre la première tubulure (30a) et le premier groupe d'éléments tubulaires (42a) et une communication fluidique entre le second groupe d'éléments tubulaires (42b) et la seconde tubulure (30b),

dans lequel au moins un couvercle de réservoir (10) et le collecteur (20) comprennent une partie d'extension (10c, 20c) s'étendant depuis ceux-ci au-delà du faisceau d'échangeur de chaleur (40) pour former un système de raccordement formé avec une entrée (50a), une sortie (50b) et des passages d'écoulement fluidique (30c) et (30d) configurant une communication fluidique entre l'entrée et la sortie (50a) et (50b) et les première et seconde tubulures (30a) et (30b) respectives, dans lequel le couvercle de réservoir (10) comprend la partie d'extension de couvercle de réservoir (10c) s'étendant le long du plan du couvercle de réservoir (10) et le collecteur (20) comprend la partie d'extension de collecteur (20c) s'étendant le long du plan du collecteur (20), la partie d'extension de couvercle de réservoir (10c), conjointement avec la partie d'extension de collecteur (20c) lorsqu'elles sont assemblées ensemble, est adaptée pour définir le premier passage d'écoulement fluidique (30c) et le second passage d'écoulement fluidique (30d), l'ensemble réservoir étant

caractérisé en ce que le premier passage d'écoulement fluidique (30c) définit une trajectoire d'écoulement fluidique courbée et une communication fluidique entre l'entrée (50a) et la première tubulure (30a), alors que le second passage d'écoulement fluidique (30d) définit une trajectoire d'écoulement fluidique courbée et une communication fluidique entre la seconde tubulure (30b) et la sortie (50b).

2. Ensemble réservoir (100) tel que revendiqué dans de quelconques des revendications précédentes, dans lequel

• les premiers canaux (10a) et (10b) s'étendent jusqu'à une extrémité libre de la partie d'extension de couvercle de réservoir (10c) pour définir un premier groupe de profils (12a) et (12b) à une extrémité libre de ceux-ci ;
• la partie d'extension de collecteur (20c) comprend des seconds canaux (23a) et (23b), correspondant aux premiers canaux (10a) et (10b), qui s'étendent jusqu'à une extrémité libre de celle-ci pour définir un second groupe de profils (26a) et (26b) à l'extrémité libre de ceux-ci, les profils du second groupe de profils (26a) et (26b) sont complémentaires aux profils respectifs du premier groupe de profils (12a) et (12b),

quand la partie d'extension de couvercle de réservoir (10c) est assemblée avec la partie d'extension de collecteur (20c), le premier groupe de profils (12a) et (12b) est aligné avec le second groupe de profils (26a) et (26b) et des manchons (52a) et (52b) maintiennent le premier groupe de profils (12a) et (12b) aligné avec le second groupe correspondant de profils (26a) et (26b) pour définir l'entrée et la sortie (50a) et (50b) respectivement.

3. Ensemble réservoir tel que revendiqué dans la revendication 2, dans lequel les seconds canaux (23a) et (23b) sont formés de façon monobloc avec le collecteur (20), alors que le premier groupe de profils (12a) et (12b) est formé de façon inhérente à l'extrémité libre des premiers canaux (10a) et (10b) respectifs formés de façon monobloc avec le couvercle de réservoir (10).

4. Ensemble réservoir (100) tel que revendiqué dans la revendication précédente, dans lequel les premier et second passages d'écoulement fluidique (30c) et (30d) sont formés par les seconds canaux (23a) et (23b) formés sur et s'étendant jusqu'à une extrémité libre de la partie d'extension de collecteur (20c) et des parties des premiers canaux (10a) et (10b) respectifs s'étendant jusqu'à une extrémité libre de la partie d'extension de couvercle de réservoir (10c).

5. Ensemble réservoir (100) tel que revendiqué dans de quelconques des revendications précédentes, dans lequel l'entrée (50a) et la sortie (50b) sont disposées le long d'un axe s'étendant orthogonalement à l'axe longitudinal des première et seconde tubulures (30a) et (30b) et à l'axe longitudinal des éléments tubulaires (42a) et (42b).

6. Ensemble réservoir (100) tel que revendiqué dans de quelconques des revendications précédentes, dans lequel les premiers canaux (10a) et (10b) sont séparés par un premier espace intermédiaire (10d) qui s'étend le long de la partie d'extension de couvercle de réservoir (10c).

7. Ensemble réservoir (100) tel que revendiqué dans une quelconque de la revendication 3, dans lequel les seconds canaux (23a) et (23b) sont séparés par un second espace intermédiaire (23c).

8. Ensemble réservoir (100) tel que revendiqué dans de quelconques des revendications précédentes, dans lequel la partie d'extension de couvercle de réservoir (10c) et la partie d'extension de collecteur (20c) s'étendent le long d'une courbe le long d'un plan à l'interface entre le couvercle de réservoir (10) et le collecteur (20).

9. Ensemble réservoir (100) tel que revendiqué dans de quelconques des revendications précédentes, dans lequel au moins un du couvercle de réservoir (10) et du collecteur (20) est formé avec des pattes respectives (14) et (24) disposées le long de côtés longitudinaux de celui-ci et adaptées pour configurer un raccordement par sertissage entre celles-ci.

10. Ensemble réservoir (100) tel que revendiqué dans de quelconques des revendications précédentes, dans lequel au moins une de la partie d'extension de couvercle de réservoir (10c) et de la partie d'extension de collecteur (20c) est également formée avec des pattes respectives (14a) et (24a) disposées le long de partie périphérique de celle-ci pour configurer un raccordement par sertissage entre celles-ci.

11. Ensemble réservoir (100) tel que revendiqué dans la revendication 7, dans lequel l'entrée (50a) et la sortie (50b) sont symétriques l'une par rapport à l'autre relativement à un plan « A » passant à travers le centre du second espace intermédiaire (23c) à une extrémité terminale du second espace intermédiaire (23c).

12. Ensemble réservoir (100) tel que revendiqué dans la revendication 7, dans lequel l'entrée (50a) et la sortie (50b) sont asymétrique l'une par rapport à l'autre relativement à un plan passant à travers le centre du

second espace intermédiaire (23c) à une extrémité terminale à une extrémité terminale du second espace intermédiaire (23c).

13. Ensemble réservoir (100) tel que revendiqué dans de quelconques des revendications précédentes, dans lequel les premier et second passages d'écoulement fluidique (30c) et (30d) sont de section transversale variée le long de la longueur de ceux-ci.

14. Échangeur de chaleur (200), comprenant :

• un faisceau d'échangeur de chaleur (40) comprenant un premier groupe d'éléments tubulaires (42a) et un second groupe d'éléments tubulaires (42b), disposé de façon adjacente au premier groupe d'éléments tubulaires, et définissant respectivement un premier chemin et un second chemin ;
• un ensemble réservoir (100) tel que revendiqué dans de quelconques des revendications précédentes comprenant une première tubulure (30a) et une seconde tubulure (30b) disposées sur un même côté du faisceau d'échangeur de chaleur, la première tubulure (30a) est adaptée pour distribuer un fluide au premier groupe d'éléments tubulaires (42a) et la seconde tubulure (30b) est adaptée pour collecter un fluide provenant et le second groupe d'éléments tubulaires (42b) après que le fluide a subi un échange de chaleur tout en passant à travers le premier et le second groupes d'éléments tubulaires (42a) et (42b), l'ensemble réservoir (100) s'étendant au-delà du faisceau d'échangeur de chaleur (40) et étant adapté pour configurer un système de raccordement formé avec une entrée (50a) et une sortie (50b) et des passages d'écoulement fluidique (30c) et (30d), dans lequel le premier passage d'écoulement fluidique (30c) configure une communication fluidique entre la première tubulure (30a) et l'entrée (50a) alors que le second passage d'écoulement fluidique (30d) configure une communication fluidique entre la seconde tubulure (30b) et la sortie (50b) ; et
• une tubulure intermédiaire (30e) configurant une communication fluidique entre le premier groupe d'éléments tubulaires (42a) et le second groupe d'éléments tubulaires (42b) pour définir une trajectoire d'écoulement en U du fluide entre ceux-ci pour permettre la configuration des première et seconde tubulures (30a) et (30b) sur le même côté du faisceau d'échangeur de chaleur (40).

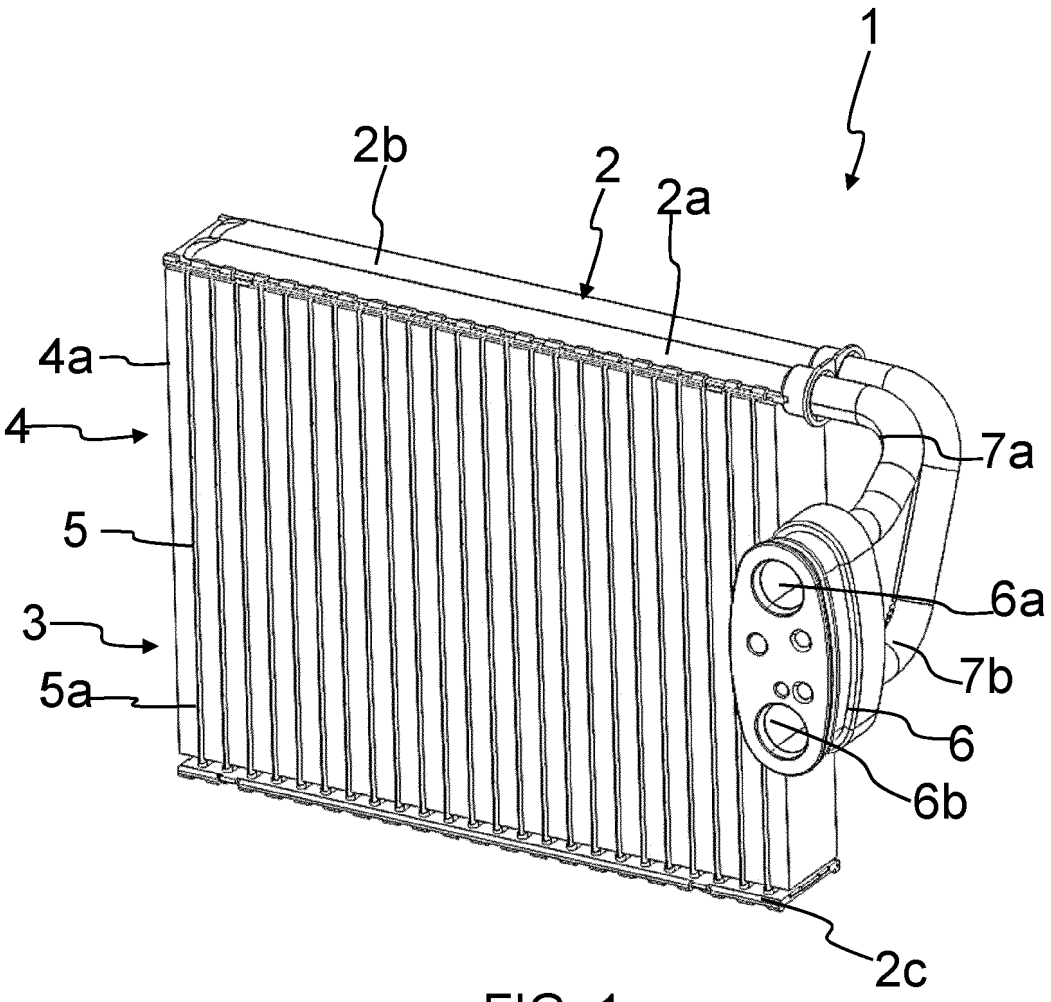

FIG. 1
(PRIOR ART)

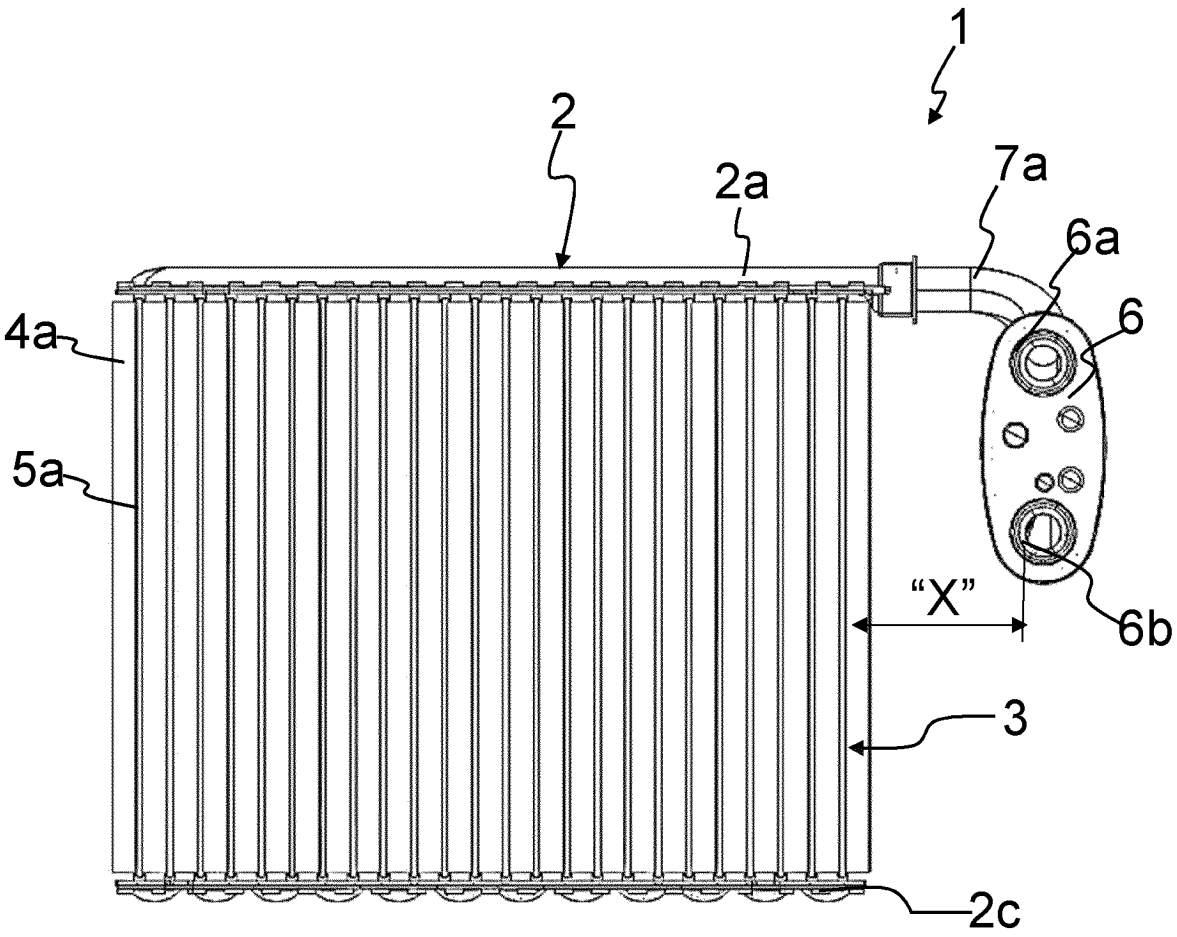

FIG. 2
(PRIOR ART)

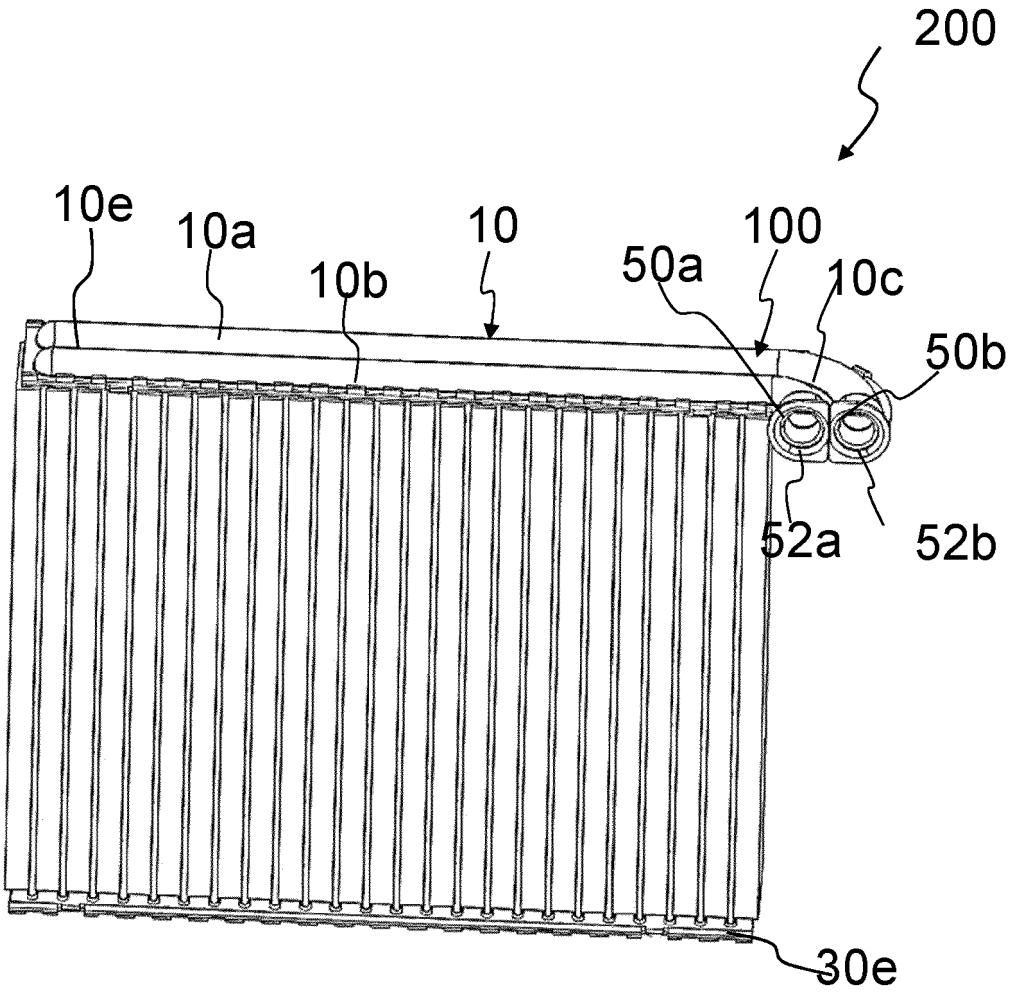

FIG. 3

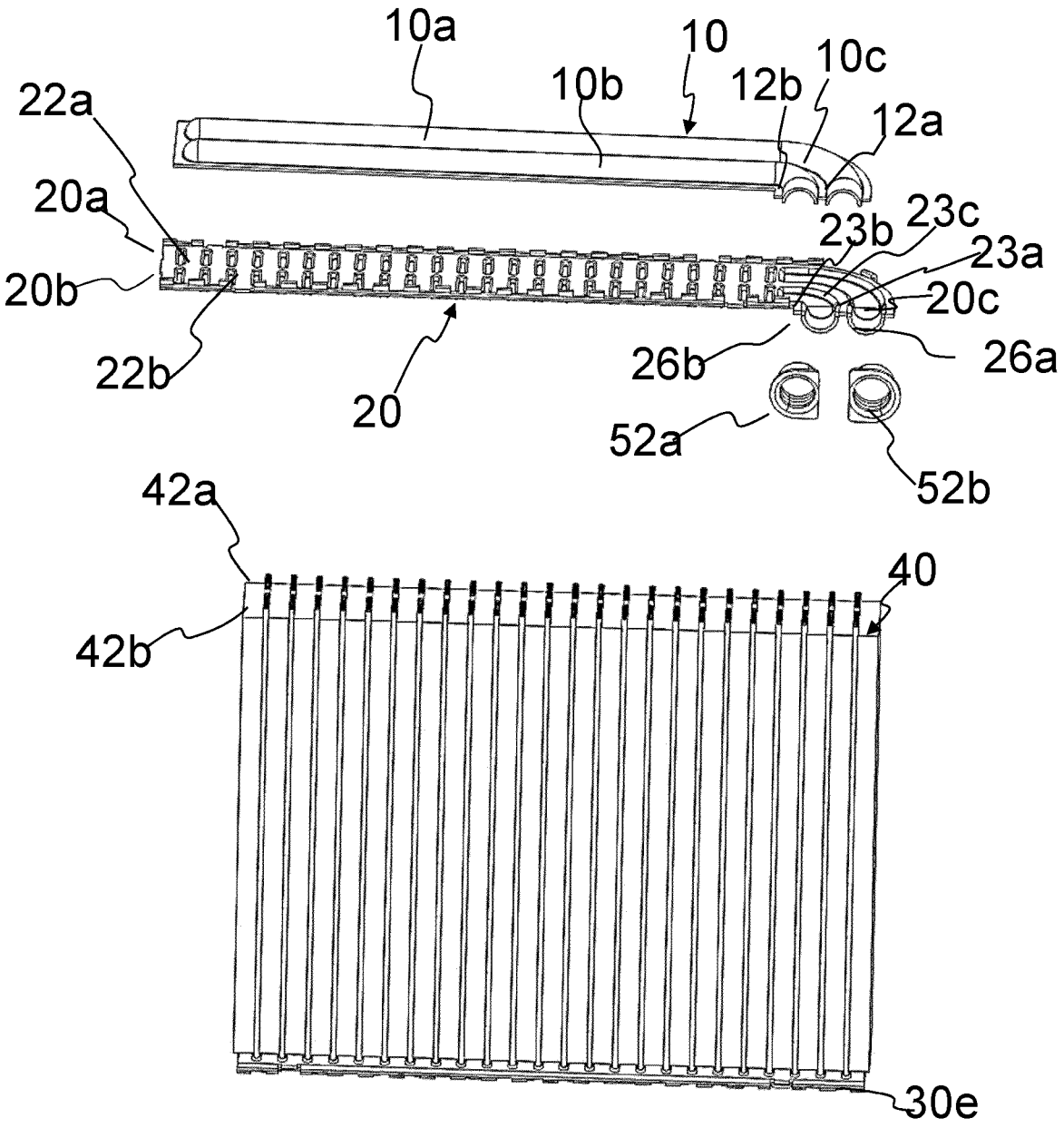
10a
10
10b
12b
10c
12a
22a
20a
23b
23c
23a
20b
20c
22b
20
26b
26a
52a
52b
42a
40
42b
30e

FIG. 4

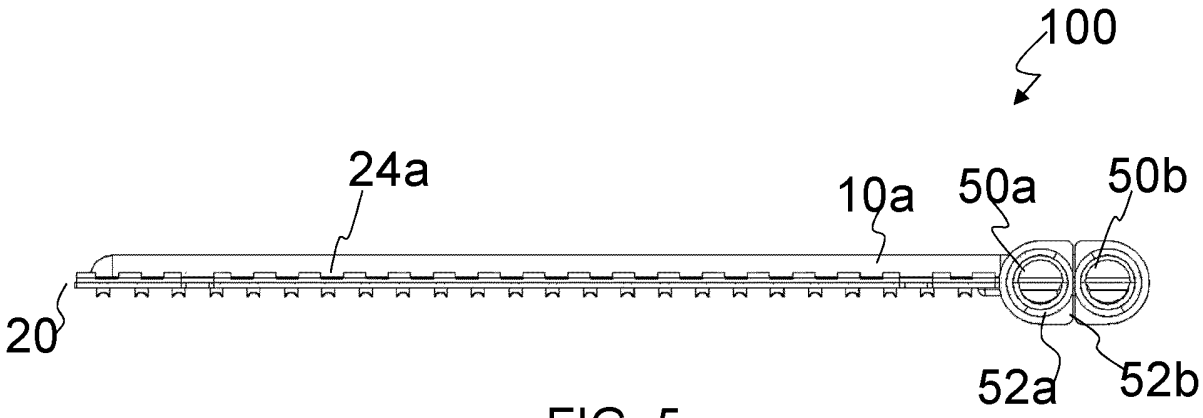

FIG. 5

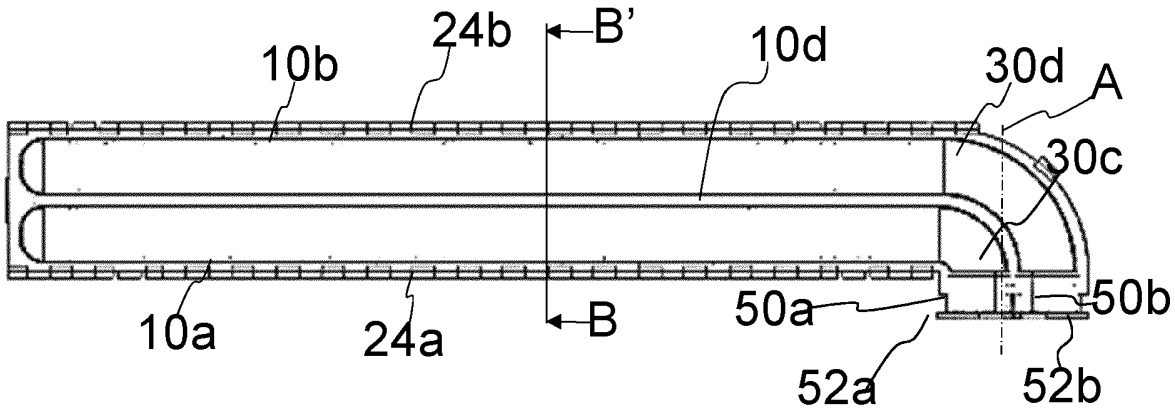

FIG. 6

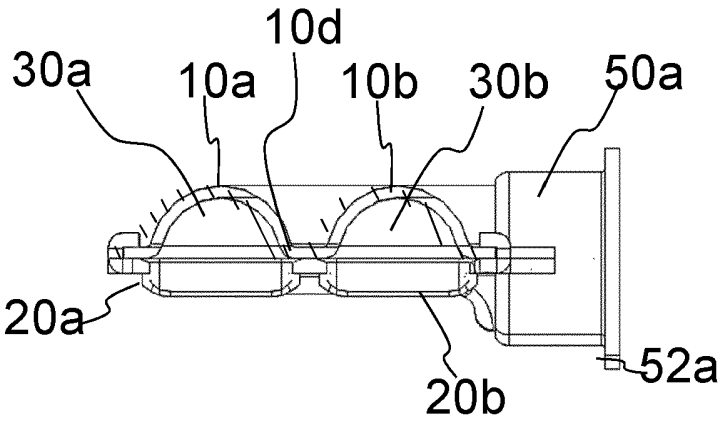

FIG. 7

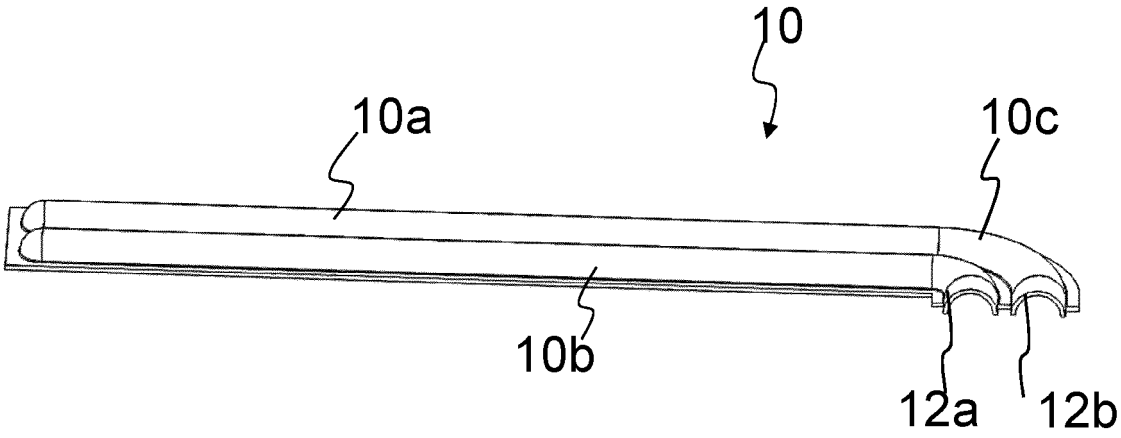

FIG. 8

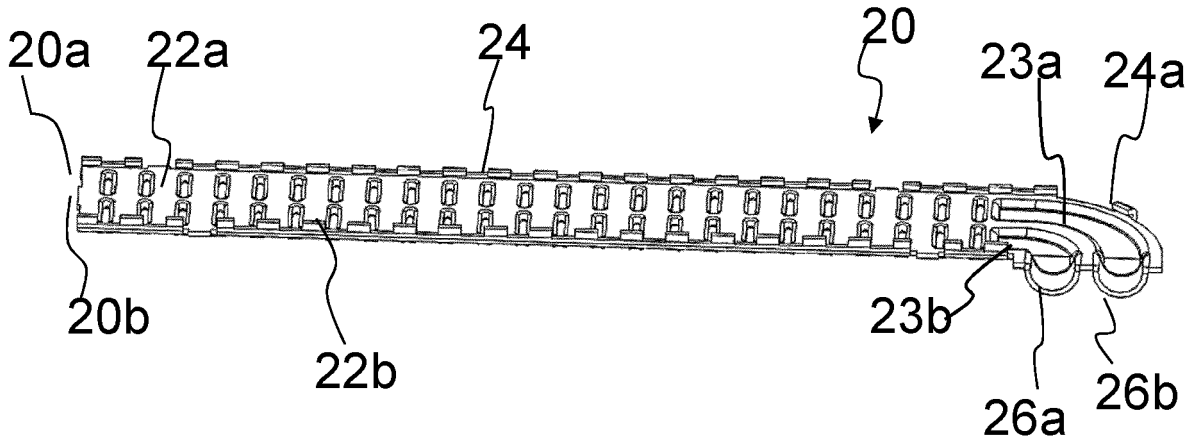

FIG. 9

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

- US 2014224461 A1 **[0001]**