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(54) HEADER BOX FOR HEAT EXCHANGER WITH THERMAL DECOUPLING

(57) A header box (1) intended to be used in a heat exchanger (200), said header box (1) comprising a first manifold (10) and a second manifold (20), each manifold (10,20) comprising a header plate (11,21), a cover (13,14) and a distribution plate (12,22) localized between the header plate (11,21) and the cover (13,14), the header box (1) also comprising a mechanical link (120) between the first manifold (10) and the second manifold (20), the header box (1) is characterized in that a header plate (11,21) comprises linking elements (15) configured to grab the corresponding cover (13,14), said linking elements (15) extend from the two longitudinal sides of said header plate (11,21) to the corresponding cover (13,14), said longitudinal sides extend along a main axis (X) of the header box (1). The invention also relates to a heat exchanger (200) comprising such a header box (1). Finally, the invention relates to the use of a heat exchanger (200)

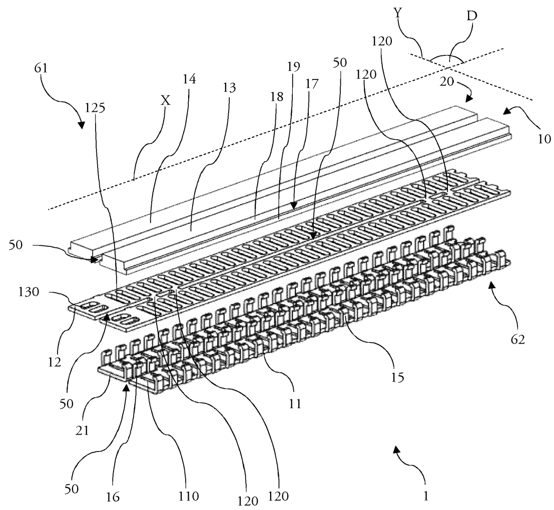

Fig. 3

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Description

[0001] The present invention relates to the field of heat exchanger and in particular to heat exchangers intended to be traversed by a fluid under high pressure. In this respect, the invention relates more particularly to air conditioning evaporators capable of being traversed by a refrigerant fluid in the supercritical state, as is the case for natural gases such as carbon dioxide, also known as CO_2 or R744. Such heat exchangers find particular application in motor vehicles. More particularly, the invention relates to a header box comprised in such a heat exchanger.

[0002] A known fluid refrigerant circuit forms a closed loop in which the refrigerant fluid flows in order to dissipate or collect calories through heat exchangers. The heat exchanger comprises a header box to connect said heat exchanger to the fluid refrigerant circuit, said header box linking pipes from the fluid refrigerant circuit to the heat exchanger core, in order for the refrigerant fluid to flow through heat exchanger tubes.

[0003] In a fluid refrigerant circuit traversed by a refrigerant fluid in the supercritical state, this refrigerant fluid remains essentially in the gaseous state and under a very high pressure, which is usually around 100 bars. As a result, heat exchangers must be able to withstand such high pressure, the recommended burst pressure being generally three times the value of the nominal operating pressure, burst pressure thus reaching around 300 bars.

[0004] This known heat exchanger comprises the header box, a tank and the heat exchange tubes allowing the refrigerant fluid to migrate between the header box and the tank. The heat exchange tubes also allow a thermal exchange between the refrigerant fluid, flowing inside said heat exchange tubes, and an air flowing outside the heat exchanger, thus capturing calories from the air flowing across the heat exchanger core. The header box comprises a first manifold intended to receive the refrigerant fluid from the fluid refrigerant circuit and a second manifold intended to inject the refrigerant fluid from the heat exchanger back into the fluid refrigerant circuit.

[0005] The header box comprises a cover, a header plate and a distribution plate localized between the cover and the header plate. The cover of the header box is configured to delimit said header box. The header plate of the header box is designed to allow the refrigerant fluid to flow between the first manifold or the second manifold and the heat exchange tubes. The distribution plate is intended to allow the refrigerant fluid to flow between a connector connected to said distribution plate and the header plate.

[0006] The cover, the distribution plate and the header plate are brazed together to insure the sealing of the header box, avoiding leaks of the refrigerant fluid. The header plate comprises teeth configured to secure the assembly of the header plate, the distribution plate and the cover together, in order to help the brazed header box to withstand the very high pressure generated into the fluid refrigerating circuit.

[0007] In this known heat exchanger, the header plate, the distribution plate and the cover are common to the first manifold and the second manifold of the header box. This configuration induces a thermal coupling between the first manifold and the second manifold of the header box, thus reducing the thermal efficiency of the heat exchanger, some thermal energy being wasted by a direct transfer from the first manifold to the second manifold, without being used through the heat exchange core of the heat exchanger.

[0008] The invention aims at proposing a header box with a specific design in order to limit the thermal coupling between its first manifold and is second manifold, while still resisting to the very high pressure resulting from the use of the super-critical refrigerant fluid.

[0009] The invention also aims at proposing a heat exchanger comprising such a header box.

[0010] The invention finally aims at proposing a fluid refrigerant circuit that comprise such a heat exchanger, as well as natural fluid refrigerant.

[0011] A first object of the invention is a header box for a heat exchanger, said header box extends along a main axis, said header box comprising a first manifold and a second manifold, each manifold comprises parts, parts being at least a header plate, a cover and a distribution plate, said distribution plate being localized between the header plate and the cover, one of the parts of the first manifold comprises a mechanical link with one of the parts of the second manifold, while the two other parts of the first manifold are separated from the two other parts of the second manifold, characterized in that a header plate comprises linking elements configured to grab the corresponding cover, said linking elements extend from two longitudinal sides of said header plate to the corresponding cover, said longitudinal sides extending along the main axis of the header box.

[0012] In this configuration, some of the linking elements of the header box are thus localized between the first manifold and the second manifold. This configuration creates a gap between said first manifold and second manifold, said gap allowing a thermal decoupling between the first manifold and the second manifold. More precisely, the header plate of the first manifold is separated from the header plate of the second manifold by the gap. Similarly, the distribution plate of the first manifold and the cover of the first manifold are separated, by the gap, from the distribution plate of the second manifold and the cover of the second manifold, respectively. Such configuration thus allows an improved thermal efficiency of the header box, less calories being transferred directly between the first manifold and the second manifold compared to a known configuration of a header box.

[0013] The mechanical link allows the first manifold to keep its relative position compared to the second manifold.

[0014] The linking elements of the header plate grab the corresponding cover of the manifold, thus securing the assembly of the parts of the header box despite the very high-pressure conditions in the fluid refrigerant circuit. Each manifold comprises two lines of linking elements, localized on each longitudinal side of the related manifold. A central line of linking element is consequently presents, in between the two manifolds, and this central line is reinforcing the brazed link that exists between the parts of the concerned manifold.

[0015] A header box according to the invention comprises optionally at least one of the following characteristics, taken alone or in combination :

- the first manifold and the second manifold extend parallel to each other along the main axis of the header box, said first manifold and second manifold thus define a plane, called main plane of the header box ;

- the first manifold and the second manifold are symmetrical between them along an axis of symmetry defined by the main axis of the header box ;

- the linking elements are crimping elements. For example, said crimping elements can be teeth, extending from the header plate to the corresponding cover of the header box. Alternatively, the linking elements can be any known fixation mean, for example screws, bolts or rivets ;

- both header plates of the header box comprise crimping elements that extend from the two longitudinal sides of said header plates towards their respective cover;

- the teeth of the header are regularly interspaced between each other along the main axis of the header box. This configuration allows the regular repartition of the pressure of the fluid refrigerant circuit along the header box, securing the assembly of the parts of the header box ;

- the crimping elements localized between the two manifolds, called inner crimping elements, are arranged in staggered rows. In other words, the inner crimping elements of the first manifold are facing the header plate of the second manifold. Advantageously, a line goes through at least one inner crimping element of each header plate, said line extending parallel to the first axis of the header box. This configuration allows a more compact design of the header box. Advantageously, said line goes through all the crimping element of each header plate. Alternatively, the inner crimping elements of the first manifold are facing the inner crimping elements of the second manifold. This configuration allows a larger gap between the first manifold and the second manifold, increasing the thermal decoupling of the two manifolds of the header box ;

- the mechanical link comprises at least one mechanical bridge connecting the first manifold to the second manifold of the header box. Advantageously, the header box comprises at least two mechanical bridges. This configuration allows the first manifold and the second manifold to keep their relative position to each other ;

- advantageously, the header box comprises two mechanical bridges, a first mechanical bridge localized at a first longitudinal end of the heat exchanger collector box, and a second mechanical bridge localized at a second longitudinal end of the heat exchanger collector box, said second end being localized at the opposite of heat exchanger collector along the main axis of the heat exchanger collector box compared to the first end. This configuration allows a minimal thermal coupling by the mechanical bridges between the first manifold and the second manifold ;

- the mechanical bridge is an extension of material of the header box ;

- the mechanical bridge extends from a part of the first manifold to a functionally identical part of the second manifold. For example, the mechanical bridge links the header plate of the first manifold to the header plate of the second manifold. Alternatively, the mechanical bridge links the distribution plate of the first manifold to the distribution plate of the second manifold. Alternatively, the mechanical bridge links the cover of the first manifold to the cover of the second manifold. This configuration allows a simple design of said mechanical bridge ;

- the cover comprises at least one groove extending along the main axis of the header box, said groove being configured to distribute the refrigerant fluid along the cover;

- the cover of the header box comprises two separate plates. More particularly, the cover of the header box comprises a covering plate and an intermediate plate localized between the covering plate and the distribution plate ;

- the header box comprises a connector connecting a fluid refrigerant circuit to a header box as described above, said connector comprising a housing defining a first chamber and a second chamber, the first chamber communicating with the first manifold and the second chamber communicating with the second manifold, the housing of the connector comprises a decoupling gap between the first chamber and the second chamber;

- the decoupling gap extends through the housing of the connector along the main axis of the header box ;

- the connector comprises attaching elements grabbing a cover of the header box. This configuration allows to secure the assembly of the header box thanks to the connector ;

- the distribution plate is localized between the cover and the connector, said connector being in contact with said distribution plate ;

- the connector comprises inner attaching elements localized between the first chamber and the second chamber of the connector ;

- the mechanical link of the header box is the connector. This configuration allows to decrease the number of thermal links between the two manifolds, thus improving the thermal decoupling of the header box ;

- the header box comprises aluminum. This configuration allows the header box to be made of a material that has high thermal dissipation capabilities.

[0016] A second object of the invention is a heat exchanger comprising a header box as described above, said heat exchanger also comprising a tank and heat exchange tubes connecting said header box to the tank. This configuration allows said heat exchanger to have an improved thermal efficiency thanks to the header box according to the invention. Indeed, the header box according to the invention reduces the thermal coupling between the first manifold and the second manifold. Thus, more heat can be captured through heat exchange tubes of the heat exchanger.

[0017] A heat exchanger according to the invention comprises optionally at least one of the following characteristics, taken alone or in combination :

- the heat exchange tubes extend along a plane, called secondary plane, said secondary plane being perpendicular to the main plane of the header box. This configuration allows the maximal thermal efficiency for the heat exchanger;

- a first series of heat exchange tubes extend between the first manifold and the tank, and a second series of heat exchange tubes extend between the second manifold and the tank, said tank fluidically linking the first series of heat exchange tubes and the second series of heat exchange tubes. This configuration allows the refrigerant fluid to flow from the first manifold to the second manifold while flowing through the heat exchange tubes.

[0018] A third object of the invention is a fluid refrigerant circuit comprising a heat exchanger as described above, the fluid refrigerant circuit comprising a natural refrigerant fluid. The natural refrigerant fluid can be, for example, carbon dioxide, also known as CO2 or R744.

[0019] Other characteristics, details and advantages of the invention will stand out more clearly in the reading of the description given below for information purposes in connection with drawings in which :

- the figure 1 is a view in perspective of an example of a heat exchanger according to the invention ;

- the figure 2 is a view in perspective of an example of a header box according to the invention;

- the figure 3 is a view in perspective of an example of the header box shown in figure 2, the header box being shown before assembly of the parts composing said header box;

- the figure 4 is a view from the top of the header box shown if figure 2 ;

- the figure 5 is a view in perspective on an example of a connector of a header box according to the invention ;

- the figure 6 is a view in perspective of an example of a header box according to the invention, said header box comprising a connector ;

- the figure 7 is a view in perspective of the header box shown in the figure 6, the header box being shown before its assembly.

[0020] The figure 1 shows a heat exchanger 200 intended to be used in a fluid refrigerant circuit. The heat exchanger 200 comprises a header box 1, a tank 100 and heat exchange tubes 150 connecting the header box 1 and the tank 100. The heat exchanger 200 is used as an evaporator or as a condenser.

[0021] The header box 1 extends along a first axis X and a second axis Y perpendicular to the first axis X, the first axis X and the second axis Y defining a plane D. The tank 100 extends parallel to the header box 1 along the same plane D.

[0022] The heat exchanger tubes 150 extend between the header box 1 and the tank 100 along a third axis Z, said third axis Z being perpendicular to the plane D.

[0023] The header box 1 comprises a first manifold 10, a second manifold 20 and a connector 30. The connector 30 is intended to fluidically connect the header box 1 to the fluid refrigerant circuit. The connector 30 comprises a first pipe 39 and a second pipe 40, the first pipe 39 being connected to the first manifold 10 and the second pipe 40 being connected to the second manifold 20.

[0024] The connector 30 comprises attaching elements 35 grabbing the first manifold 10 and the second manifold 20 of the header box 1, thus securing the attachment of the connector 30 onto the header box 1, said securing being needed due to the very high pressure in the fluid refrigerant circuit.

[0025] The heat exchange tubes 150 fluidically connect the header box 1 to the tank 100. More precisely, the first manifold 10 is fluidically connected to the tank 100 by heat exchange tubes 150 extending from the first manifold 10 to the tank 100. The tank 100 is connected to the second manifold 20 by heat exchange tubes 150 extending from the tank 100 to the second manifold 20. This configuration allows the refrigerant fluid to flow into the heat exchanger 200 from the first manifold 10 to the second manifold 20, through the tank 100 and the heat exchange tubes 150, thus favoring the thermal dissipation of the refrigerant fluid through the heat exchanger 200.

[0026] The header box 1 also comprises a gap 50 between the first manifold 10 and the second manifold 20, said gap 50 extends all along the header box 1 along the first axis X. This configuration allows the header box 1 to limit the heat exchange between the first manifold 10 and the second manifold 20. In other words, the gap 50 reduces the thermal coupling of the first manifold 10 and the second manifold 20. Thus, this configuration allows an improved efficiency of the heat exchanger 200.

[0027] The figure 2 shows an example of a header box 1 according to the invention. The first manifold 10 comprises a first cover 13, a first distribution plate 12 and a first header plate 11. Similarly, the second manifold 20 comprises a second cover 14, a second distribution plate 22 and a second header plate 21. In this example, the first cover 13 is separated from the second cover 14. The first header plate 11 is also separated from the second header plate 21. In this context, separated means that there is no direct contact between those parts, the latest being thermally decoupled.

[0028] The first distribution plate 12 is localized between the first header 11 and the first cover 13 of the first manifold 10. In a similar way, the second distribution plate 22 is localized between the second header plate 21 and the second cover 14 of the second manifold 20.

[0029] Each cover 13, 14 comprises a first portion 18 and a second portion 19, said first portion 18 and second portion 19 extending all along the cover 13, 14 on the second axis Y of the header box 1. The second portion 19 is localized between the first portion 18 and the distribution plate 12, 22 of the corresponding cover 13, 14, said second portion 19 having a larger dimension along the second axis Y of the header box 1 compared to the first portion 18, thus creating a step 17.

[0030] Each manifold 10, 20 comprises crimping elements 15 extending from the first header plate 11 or the second header plate 21 to the first cover 13 or the second cover 14, respectively. These crimping elements 15 secure the assembly of the components of the first manifold 10 and the second manifold 20 by grabbing the step 17 of the corresponding cover 13, 14, in order for said assembly to withstand the very high pressure inside the heat exchanger 200.

[0031] The crimping elements 15 are regularly interspaced between each other along the first axis X of the header box 1, thus allowing an equal securing of the assembly of the components from the header box 1.

[0032] In the example shown on the figure 2, these crimping elements 15 are teeth, but they can be replaced, according to the invention, by any fixation mean, for example screws, blots, or rivets.

[0033] The header box 1 comprises inner crimping elements 16 localized between the first manifold 10 and the second manifold 20. This configuration with inner crimping elements 16 localized between the first manifold 10 and the second manifold 20 of the header box 1 allows the creation of the gap 50, thus improving the thermal decoupling of the first manifold 10 versus the second manifold 20.

[0034] The figure 3 is a view of an example of a header box 1 according to the invention said header box 1 being shown before the assembly of its components.

[0035] The header box 1 comprises the first header plate 11 and the second header plate 21 identical to the first header plate 11. Similarly, the header box 1 comprises the first cover 13 and the second cover 14 identical to the first cover 1.

[0036] The header box 1 comprises the distribution plate 12, said distribution plate being common to the first manifold 10 and to the second manifold 20.

[0037] In this example, the distribution plate 12 comprises four mechanical bridges 120 along the first axis X of the header box 1, two mechanical bridges 120 being localized at a first longitudinal end 61 of the distribution plate 12, and two mechanical bridge 120 being localized at a second longitudinal end 62 of the distribution plate 12, the first longitudinal end 61 and the second longitudinal end 62 being at opposite sides along the first axis X of the header box 1. The first longitudinal end 61 of the distribution plate 12 is the extremity of the distribution plate 12 intended to receive the connector 30 of the header box 1, and the second longitudinal end 62 is localized at the opposite of the distribution plate 12 compared to the first longitudinal end 61.

[0038] The mechanical bridges 120 extend between parts of the first manifold 10 and the second manifold 20, allowing said first manifold 10 and said second manifold 20 to keep their relative position to each other. Said parts can be the covers 13, 14 or the distribution plate 12, 22 or the header plate 11, 21.

[0039] In this example, the mechanical bridge 120 is made on the distribution plate 12, linking a first part of the distribution plate 12 and a second part of the distribution plate 12, said first part being localized between the first header plate 11 and the first cover 13, said second part being localized between the second header plate 21 and the second cover 14. According to the invention, the mechanical bridge 120 can also be made between the first header plate 11 and the second header plate 21 and/or between the first cover 13 and the second cover 14 of the header box 1.

[0040] The mechanical bridges 120 are designed to reduce the thermal coupling between the first manifold

10 and the second manifold 20, thus enabling the gap 50 to realize an efficient thermal decoupling between the first manifold 10 and the second manifold 20.

[0041] The distribution plate 12 comprises openings 130 configured to fluidically connect the connector 30 and the header box 1, the openings 130 extending along the first axis X of the header box 1. The distribution plate 12 also comprises windows 125 intended to fluidically connect the header box 1 to the heat exchange tubes 150 of the heat exchanger 200, said windows 125 extends perpendicular to the first axis X of the header box 1.

[0042] In a similar way, the first header plate 11 and the second header plate 21 comprise apertures 110 configured to fluidically connect the distribution plate 12 and the heat exchanger tubes 150 of the heat exchanger 200, said apertures 110 extending perpendicular to the first axis X of the header box 1. Thus, each aperture 110 of the first header plate 11 or the second header plate 21 is fluidically connected to one window 125 of the distribution plate 12.

[0043] The figure 4 shows a view from the top of an example of a header box 1 according to the invention.

[0044] The inner crimping elements 16 of the header box 1 are localized between the first manifold 10 and the second manifold 20, allow the formation of the gap 50 along the first axis X of the header box 1. The inner crimping elements 16 of the first header plate 11 grab the first cover 13, and the inner crimping elements of the second header plate 21 grab the second cover 14.

[0045] The inner crimping elements 16 are arranged in staggered rows. In other words, the inner crimping elements 16 of the first header plate 11 grab the first cover 13 in alternance with the inner crimping elements 16 of the second header plate 21, along the first axis X of the header box 1.

[0046] The gap 50 extends between the first manifold 10 and the second manifold 20. More particularly, the gap 50 extends between the inner crimping elements 16 and the opposite cover, along the first axis X of the header box 1.

[0047] The header box 1 comprises a connector 30 mounted on the first manifold 10 and the second manifold 20. The connector comprises inner attaching elements 36 localized between the first manifold 10 and the second manifold 20. Each inner attaching elements 36 grab the first cover 13 of the first manifold 10 or the second cover of the second manifold 20.

[0048] The connector 30 and at least two of the four mechanical bridges described above are the only components of the header box physically linking the first manifold 10 to the second manifold 20, thus improving the thermal decoupling and reducing the heat transfer between said first manifold 10 and said second manifold 20.

[0049] The figure 5 shows a view in perspective of an example of a connector 30 used in a header box 1 according to the invention.

[0050] The connector 30 comprises a housing 33, the connector 30 being machined into a material block. The housing 33 comprises a first face A and a second face B, the first face A extending in the plane D and the second face B being perpendicular to the first face A and extending along the second axis Y. The connector 30 comprises also a first side S perpendicular to the first face A and the second face B.

[0051] The first face A of the connector 30 comprises a first surface 37 and a second surface 38. The first surface 37 is intended to be in contact against the first distribution plate 12 of the connector 30. In a similar way, the second surface 38 is intended to be in contact against the second distribution plate 22 of the connector 30.

[0052] The first pipe 39 and the second pipe 40 are housed into the connector 30 thanks to a first hole 41 and a second hole 42 respectively, the first hole 41 and the second hole 42 being formed into the second face B of the connector 30.

[0053] The connector 30 comprises a first chamber 31 formed in the housing 33 of said connector 30, the first chamber 31 extending perpendicular to the plane D of the header box 1. The first chamber 31 is fluidically connected to the first hole 41 and the first pipe 39 in order to connect the first chamber 31 to the fluid refrigerant circuit. In a similar way, the connector comprises a second chamber 32 formed in the housing 33 of the connector 30, the second chamber 32 extending perpendicular to the plane D of the header box 1. The second chamber 32 is fluidically connected to the second hole 42 and the second pipe 40 in order to connect the second chamber 32 to the fluid refrigerant circuit.

[0054] The first chamber 31 is configured to fluidically communicate with the openings 130 of the distribution plate 12 in order to fluidically connect the connector 30 and the first manifold 10. Similarly, the second chamber 32 is configured to fluidically communicate with the openings 130 of the distribution plate 12 in order to fluidically connect the connector and the second manifold 20.

[0055] The inner attaching elements 36 of the connector 30 are disposed in a staggered rows configuration along the first axis X of the header box 1. In other words, the inner attaching elements 36 of the connector 30, said inner attaching elements 36 being localized on the first face A of the connector 30 between the first surface 37 and the second surface 38, are configured to grab alternately the first cover 13 of the first manifold 10 and the second cover 14 of the second manifold 20 along the first axis X.

[0056] The housing 33 of the connector 30 comprises a decoupling gap 60, said decoupling gap 60 extending along the first axis X through the connector 30, the decoupling gap 60 being localized between the first chamber 31 and the second chamber 32 of the connector 30. Thus, the decoupling gap 60 extends parallel to the first side S of the housing 33 of the connector 30. This decoupling gap 60 allows to reduce the thermal coupling between the first chamber 31 and the second chamber 32 of the connector 30, thus improving the thermal efficiency of the header box 1 comprising such a connector

30.

[0057] The figure 6 shows an example of a header box 1 according to the invention, said header box 1 comprising a connector 30.

[0058] The connector 30 is localized on the first longitudinal end 61 of the header box 1 along the first axis X of said header box 1. The connector 30 is touching the distribution plate 12 of the header box 1, said distribution plate 12 being localized between the first cover 13 and the connector 30. This configuration allows the refrigerant fluid to flow between the connector 30 and the header box 1 through the first chamber 31 and the second chamber 32 and through the openings 130 of the distribution plate 12.

[0059] In the configuration illustrated on the figure 6, the connector 30 is used in the header box 1 as an example of the mechanical bridge, insuring the mechanical link between the first manifold 10 and the second manifold 20, the connector 30 being made of one housing 33, reducing the need of supplementary mechanical bridges 120 to insure the link between the first manifold 10 and the second manifold 20, thus reducing the thermal coupling of said first manifold 10 and said second manifold 20.

[0060] The crimping elements 35 of the connector 30 are in contact with the first cover 13 and the second cover 14 of the first manifold 10 and the second manifold 20, respectively. Similarly, the inner crimping elements 36 of the connector 30 are in contact with the first cover 13 and the second cover 14 of the first manifold 10 and the second manifold 20, respectively. This configuration allows the gap 50 of the header box 1 to extend between the first manifold 10 and the second manifold 20 all along the header box 1 along the first axis X.

[0061] The figure 7 is a view in perspective of the header box 1 shown in the figure 6, the header box 1 being shown before its assembly with covers in a reversed position.

[0062] The first cover 13 of the first manifold 10 and the second cover 14 of the second manifold 20 are both shown upside down along the third axis Z in order to visualize the specific design of the inside of the first cover 13 and the second cover 14.

[0063] The first cover 13 and the second cover 14 each comprises for example two grooves 140 extending parallel to the first axis X of the header box 1. The grooves 140 of the first cover 13 and of the second cover 14 allow a distribution of the refrigerant fluid all along said first cover 13 or second cover 14, respectively. More particularly, the grooves 140 of the first cover 13 and of the second cover 14 allow the openings 130 of the distribution plate 12 to be fluidically connected to the windows 125 of the distribution plate 12 from the first longitudinal end 61 to the second longitudinal end 62 of the distribution plate 12, thus creating the fluid refrigerant circulation inside the header box 1.

[0064] Several modifications and improvements might be applied by the person skilled in the art to a header box 1 as defined above.

[0065] 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 mean and any technically operating combination of means.

[0066] The invention is not limited by the shape of organs or elements as described here, and covers any shape as long as described here, and covers any shape as long as a header box comprises a gap between a first manifold and a second manifold in order to reduce the thermal coupling between the first manifold and the second manifold, while keeping a mechanical link between the two manifolds.

Claims

1. Header box (1) for a heat exchanger (200), said header box (1) extends along a main axis (X), said header box (1) comprising a first manifold (10) and a second manifold (20), each manifold (10,20) comprises parts, parts being at least a header plate (11,21), a cover (13,14) and a distribution plate (12,22), said distribution plate (12,22) being localized between the header plate (11,21) and the cover (13,14), one of the parts of the first manifold (10) comprises a mechanical link (120) with one of the parts of the second manifold (20), while the two other parts of the first manifold (10) are separated from the two other parts of the second manifold (20), **characterized in that** at least a header plate (11,21) comprises linking elements (15) configured to grab the corresponding cover (13,14), said linking elements (15) extend from two longitudinal sides of said header plate (11,21) to the corresponding cover (13,14), said longitudinal sides extending along the main axis (X) of the header box (1).

2. Header box (1) according to the previous claim, wherein the linking elements (15) are crimping elements (15).

3. Header box (1) according to the claim 2 wherein the crimping elements (16) localized between the two manifolds (10, 20), called inner crimping elements (16), are arranged in staggered rows.

4. Header box (1) according to one of the previous claim wherein the mechanical link (120) comprises at least one mechanical bridge (120) connecting the first manifold (10) to the second manifold (20) of the header box (1).

5. Header box (1) according to one of the previous claims wherein the mechanical bridge (120) extends from a part of the first manifold (10) to an identical part of the second manifold (20).

6. Header box (1) comprising a connector (30) connecting a fluid refrigerant circuit to the header box (1), said connector (30) comprising a housing (33) defining a first chamber (31) and a second chamber (32), the first chamber (31) communicating with the first manifold (10) and the second chamber (32) communicating with the second manifold (20), wherein the housing (33) of the connector (30) comprises a decoupling gap (60) between the first chamber (31) and the second chamber (32).

7. Header box (1) according to the claim 6, wherein the connector (30) comprises attaching elements (35) grabbing at least one of the cover (13,14) of the header box (1).

8. Header box (1) according to one of the claims 6 or 7 wherein the distribution plate (12,22) is localized between the cover (13,14) and the connector (30), said connector (30) being in contact with said distribution plate (12,22).

9. Header box (1) according to one of the claims 6 to 8 wherein the connector (30) comprises inner attaching elements (36) localized between the first chamber (31) and the second chamber (32) of the connector (30).

10. Header box (1) according to one of the claim 6 to 9 wherein the mechanical link (120) of the header box (1) is the connector (30).

11. Heat exchanger (200) comprising a header box (1) according to one of the previous claims, said heat exchanger (200) also comprising a tank (100) and heat exchange tubes (150) connecting said header box (1) to the tank (100).

12. Fluid refrigerant circuit comprising a heat exchanger (200) according to the previous claim, the fluid refrigerant circuit comprising a natural refrigerant fluid.

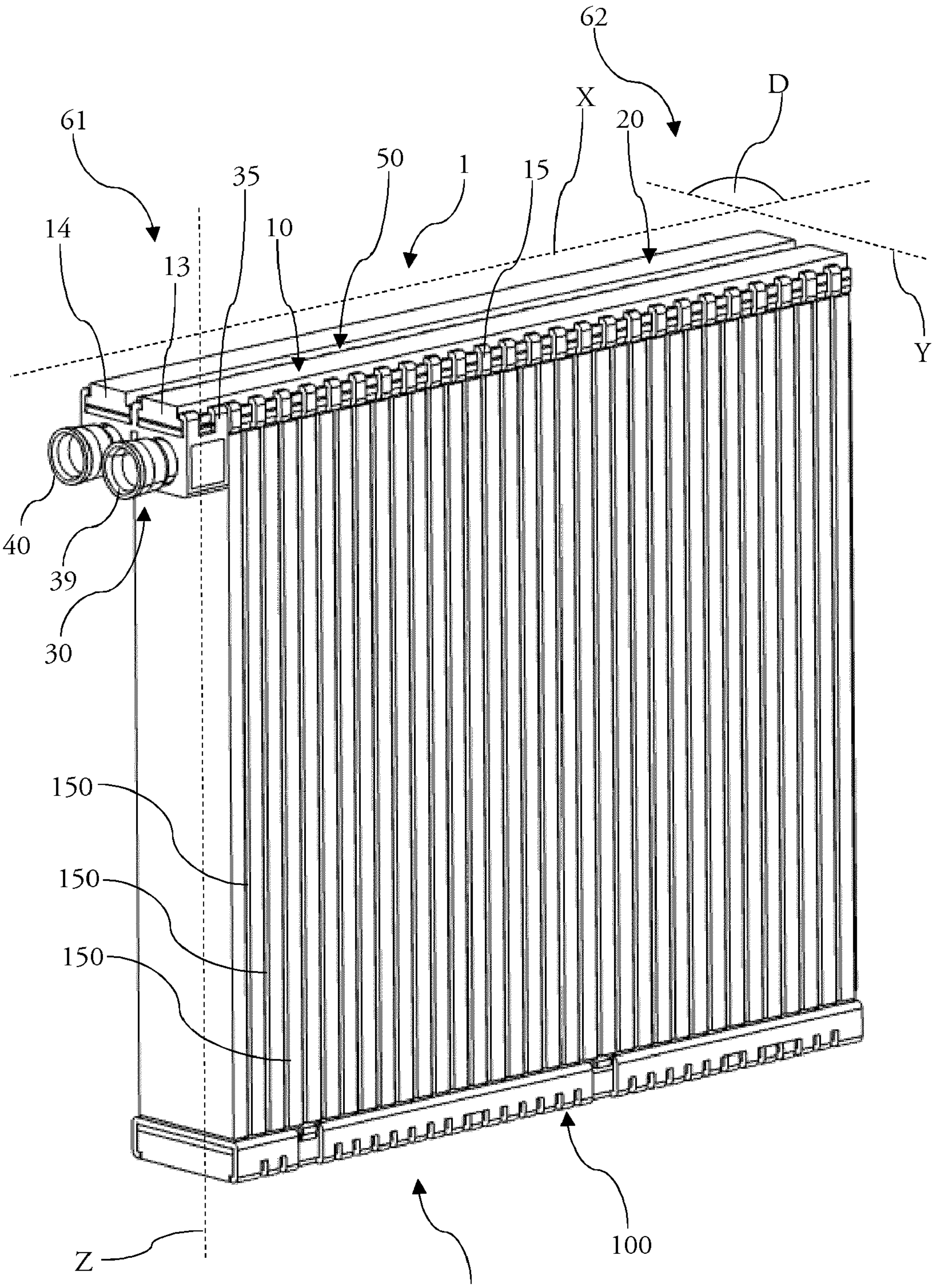

Fig. 1

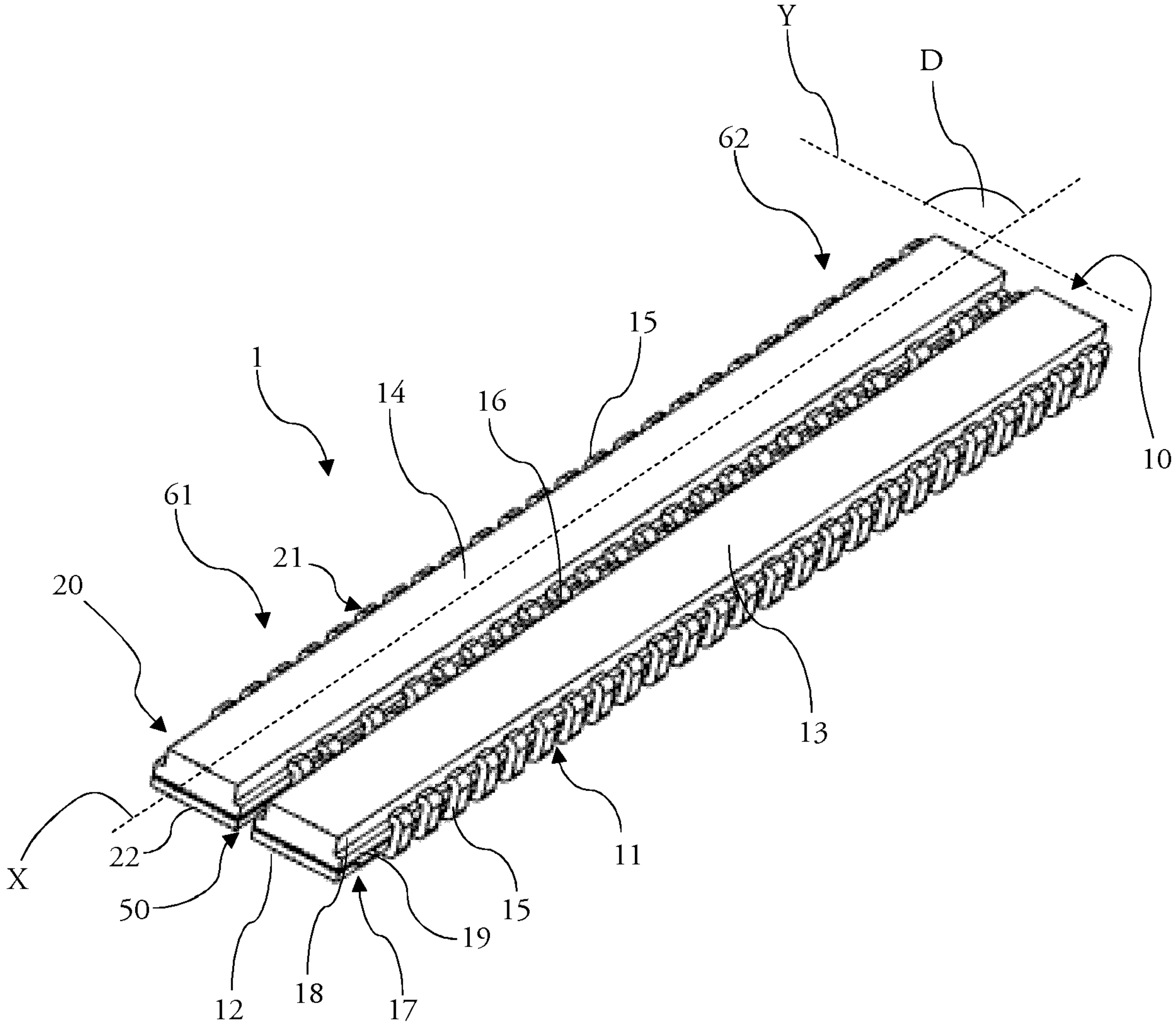

Fig. 2

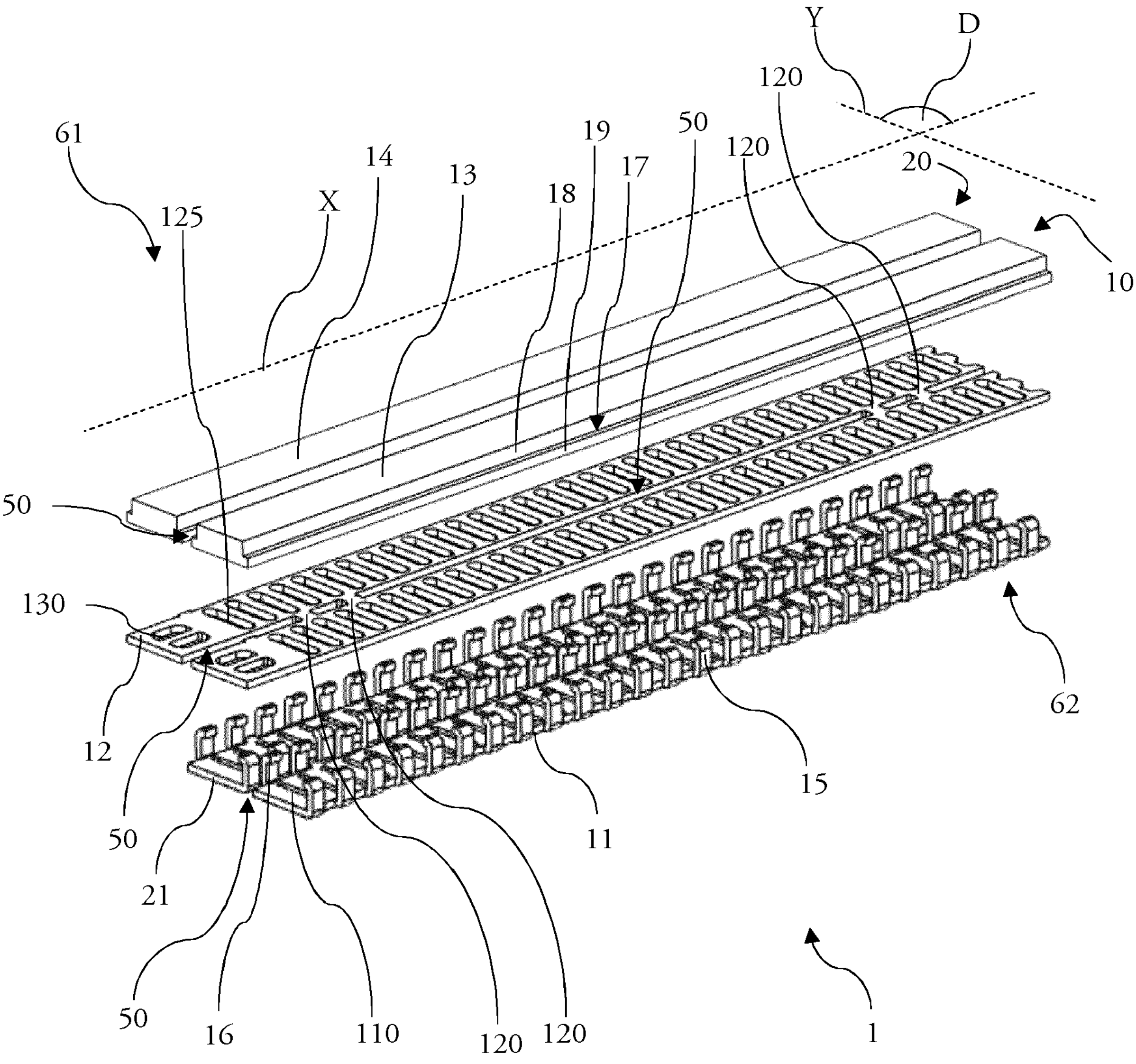
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Fig. 3

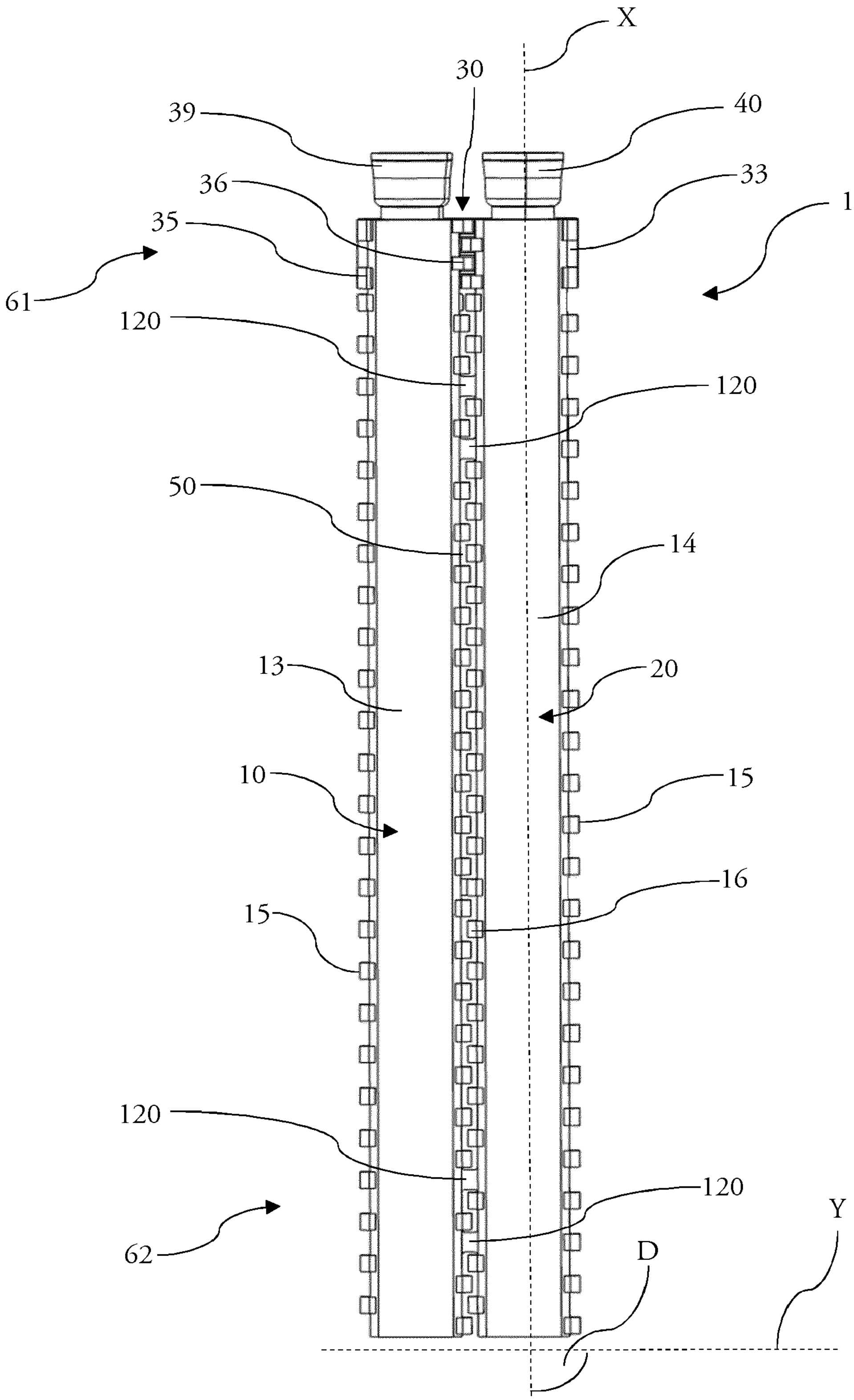

Fig. 4

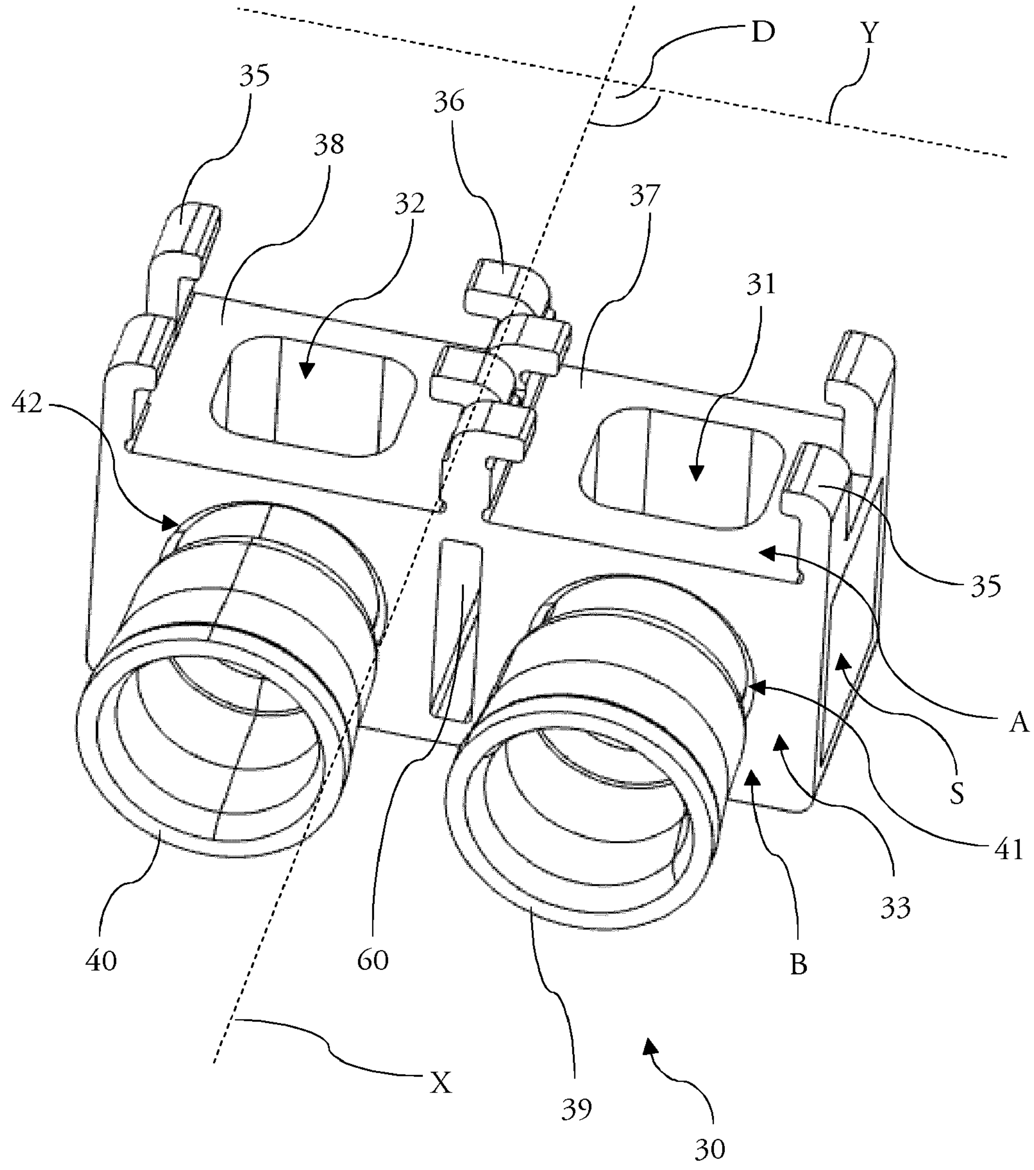

Fig. 5

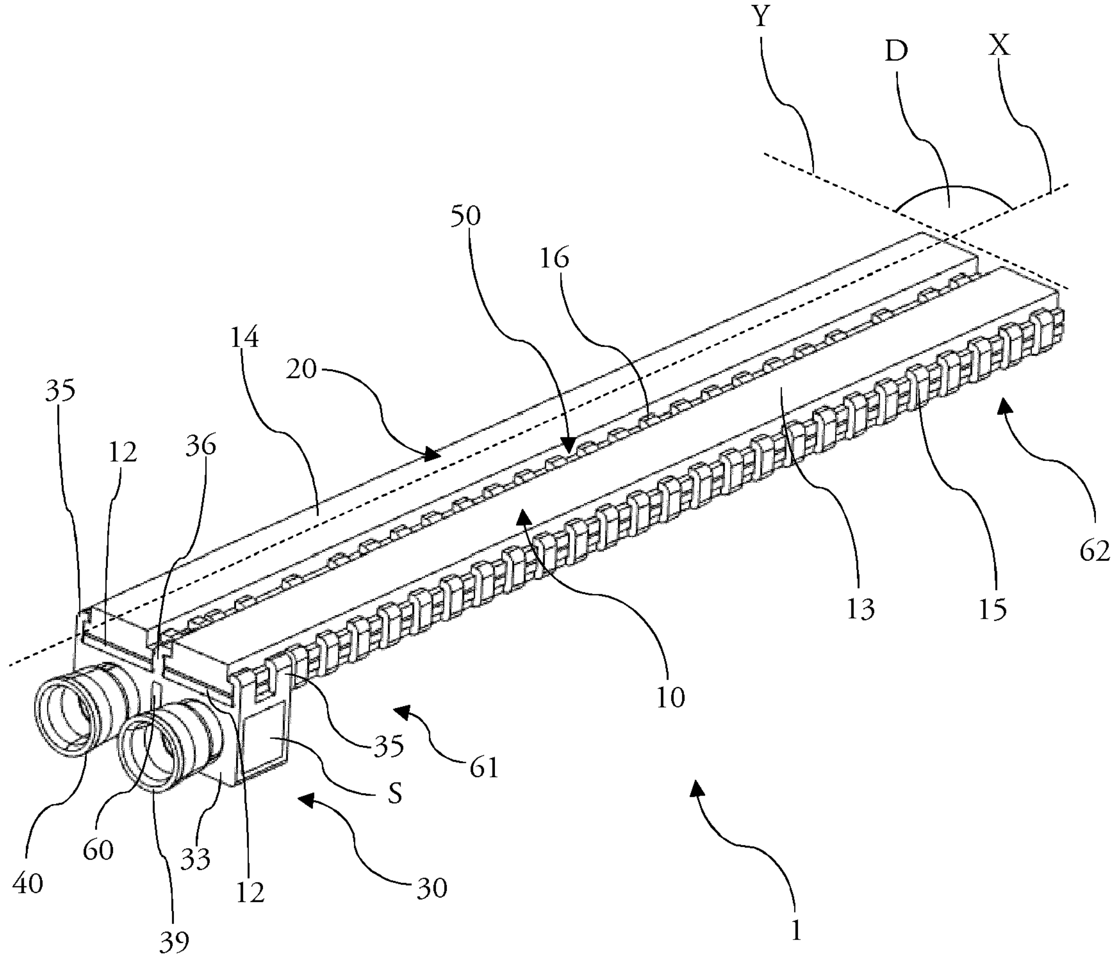

Fig. 6

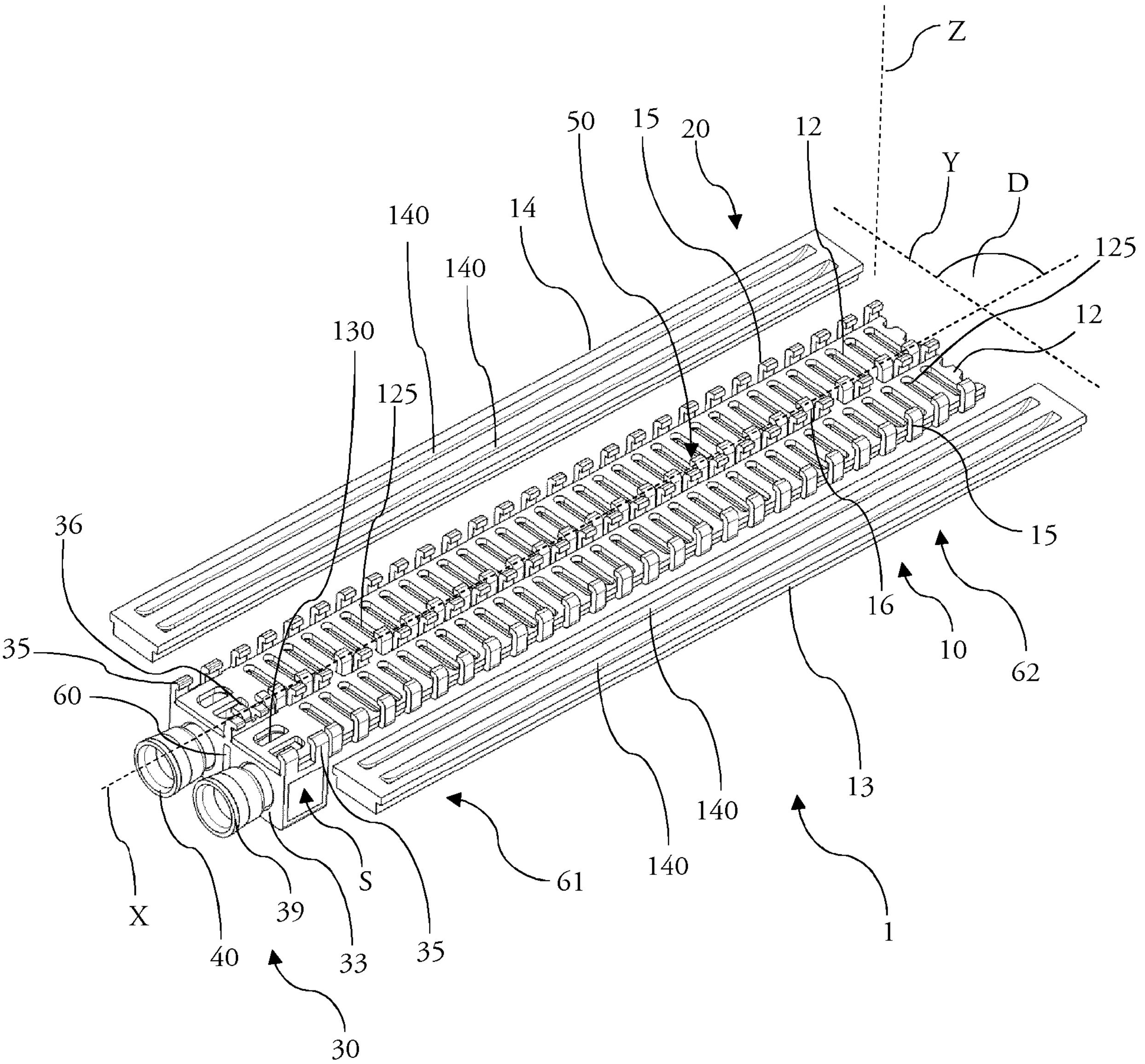
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Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 18 17 9279

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Place of search	Date of completion of the search	Examiner
Munich	18 October 2018	Bain, David

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