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(54) **HEAT EXCHANGER**

(57) A heat exchanger comprising:
- a parting plate comprising a frame and a main body arranged within the frame and connected to the frame so as to define, between the frame and the main body, two first ports and two second ports;
- at least one first channel (37) extending from one of the first ports (12) to another one of the first ports (14) on a first face of the main body;
- first edge bars (35) extending on either sides of the at least one first channel (37) to prevent communication between the at least one first channel (37) and the second ports (16, 18);

wherein the at least one first channel (37) opens out onto a first rectilinear portion (42) of one of the first ports (12), and at least one of the first edge bars (35) extends up to the first rectilinear portion (42).

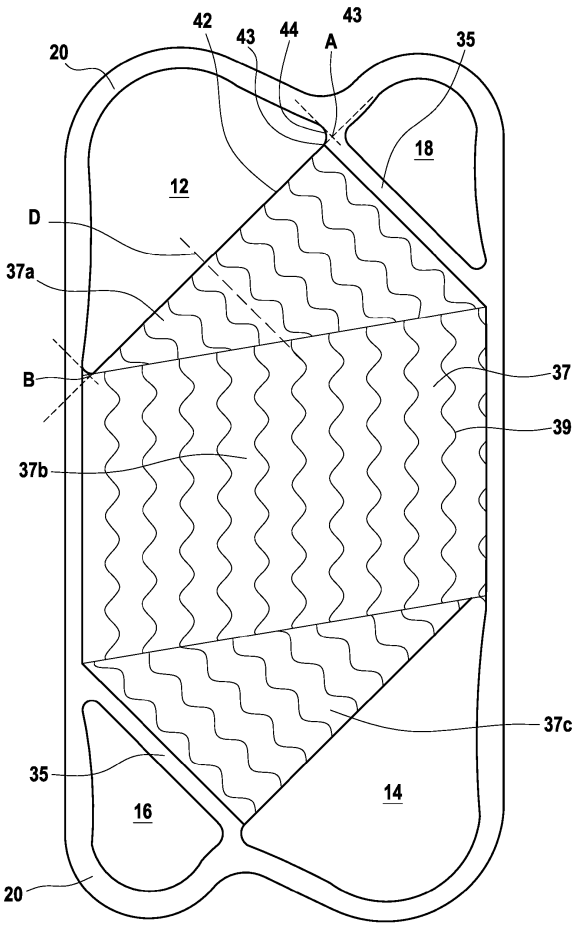

FIG. 3

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to the field of thermal transfer, in particular to a heat exchanger.

TECHNOLOGICAL BACKGROUND

[0002] Heat exchangers have been known for transferring heat from one fluid to another. The fluids enter the heat exchanger through respective ports, flow in separated channels and leave the heat exchanger through other respective ports. For efficiency or manufacturing purposes, various designs have been proposed for the ports.

[0003] Once the shape of the ports has been determined, the question arises of how the channels interface with the ports. If the channels match the shape of the ports, convoluted port shapes may lead to convoluted channel edges, which then show mechanical weaknesses. Conversely, if the channels are left in a shape simpler than that of the port for mechanical reasons, a space is generally left between the end of the channels and the beginning of the port. Due to this space, the neighboring layers of the heat exchanger lack mechanical support. This could eventually lead to stress concentration and leakage.

[0004] Therefore, there is a need for a new type of heat exchanger.

SUMMARY

[0005] In this respect, the present disclosure relates to a heat exchanger comprising: a parting plate comprising a frame and a main body arranged within the frame and connected to the frame so as to define, between the frame and the main body, two first ports and two second ports; at least one first channel extending from one of the first ports to another one of the first ports on a first face of the main body; first edge bars extending on either sides of the at least one first channel to prevent communication between the at least one first channel and the second ports; wherein the at least one first channel opens out onto a first rectilinear portion of one of the first ports, and at least one of the first edge bars extends up to the first rectilinear portion.

[0006] As used herein, for conciseness and unless the context indicates otherwise, "a", "an", and "the" are intended to refer to "at least one" or "each" and to include plural forms as well. In addition, an element (e.g. channel, port, etc.) mentioned without "first" or "second" may indicate either one or both of the first element and the second element.

[0007] The heat exchanger is configured to carry out heat transfer between a first fluid and a second fluid. The first fluid is configured to enter and leave the heat exchanger through the first ports, and to flow through the at least one first channel, on the first face of the main body. The second fluid is configured to enter and leave the heat exchanger through the second ports, and to flow on a second face of the main body.

[0008] The parting plate may be a part having the general shape of a plate. In order to efficiently separate a first fluid from the second fluid as mentioned above, the parting plate, in particular the main body, may be devoid of any opening other than the aforementioned ports. For instance, the main body may be solid. In other words, the main body solidly separates the two faces thereof.

[0009] The ports are through holes of the parting plate. The first edge bars are arranged on the first face of the parting plate in order to prevent communication between the first channels, on the first face of the main body, and the second ports.

[0010] As mentioned above, the at least one first channel opens out onto a first rectilinear portion of one of the first ports. In particular, the at least one first channel extends up to the first rectilinear portion. Therefore, the first channel can easily match the shape of said first port, thus providing appropriate flow guide and mechanical support. Besides, as at least one of the first edge bars extends up to the first rectilinear portion, the first edge bar is adjacent to the first port and supports possible non-rectilinear portions of the first port. Therefore, mechanical support is also provided for the non-rectilinear portions. In arranging the first edge bar to extend up to the first rectilinear portion, the inventors have therefore judiciously enhanced the support of the parting plate by allocating this support to both the first channels and the first edge bar.

[0011] Optionally, the at least one first channel opens out onto the first rectilinear portion in a direction substantially orthogonal to the first rectilinear portion. When referring to an angle, "substantially" encompasses a variation of +/- 15°, preferably +/-10°, yet preferably +/-5°. In a region where the first channel opens out onto the first rectilinear portion, the first channel extends in a direction substantially orthogonal to the first rectilinear portion. The first channel may be rectilinear itself, or may form waves centered on the orthogonal direction.

[0012] Thanks to this feature, the first channel provides a stronger mechanical support for the main body of the parting plate, as compared to a situation in which the first channel would open out onto the first rectilinear portion in a more oblique direction.

[0013] Optionally, the first edge bars are substantially parallel to the at least one first channel. Therefore, the interface between the first channel and the first edge bar is mechanically strong too.

[0014] Optionally, an end portion of the at least one of the first edge bars supports a rounded corner of said one of the first ports. A rounded corner is advantageous for avoiding stress peaks, and is all the more advantageous that it is properly supported by the first edge bar. Optionally, the at least one of the first edge bar overlaps a projection of the one of the first ports orthogonal to the first

rectilinear portion. In other words, the first edge bar and the first port extend along a common segment in the direction of the first rectilinear portion. Yet in other words, the one of the first ports extends towards the first edge bar beyond the first rectilinear portion.

[0015] Optionally, the at least one of the first edge bar is flush with one of the second ports. Specifically, the first edge bar may be arranged adjacent to at least one of the second ports, and is flush thereto. The first edge bar may be arranged between the first channel and the second port. Thanks to these provisions, the first edge bar supports the parting plate in the region of the second port while not impeding the flow of the second fluid through the second port.

[0016] Optionally, an edge of the one of the first ports adjacent to the first rectilinear portion is tangent to the first rectilinear portion. Therefore, the first port can suitably guide the first fluid towards the first rectilinear portion, so towards the first channels. In addition, a tangent edge limits stress peaks.

[0017] Optionally, the at least one first channel and/or the first edge bars are assembled to the parting plate by brazing. Brazing is known per se in the art. Other techniques may be used such as welding, diffusion bonding, etc.

[0018] Optionally, the at least one first channel is formed by a corrugated plate. The corrugated plate may define a plurality of parallel channels between consecutive corrugations of the corrugated plate. The corrugated plate may be obtained by pressing or bending.

[0019] Optionally, the heat exchanger further comprises at least one second channel extending from one of the second ports to another one of the second ports on a second face of the main body, and second edge bars extending on either sides of the at least one second channel to prevent communication between the at least one second channel and the first ports. The second channel may have any of the features described herein as regards the first channel, mutatis mutandis.

[0020] In particular, optionally, the at least one second channel opens out onto a second rectilinear portion of one of the second ports, and at least one of the second edge bars extends up to the second rectilinear portion.

[0021] More generally, the second edge bar may have some or all of the features described herein as regards the first edge bar, mutatis mutandis. Optionally, the at least one of the first edge bars and the at least one of the second edge bars are superimposed with each other, on either side of a junction between the frame and the main body. Therefore, the first edge bar and the second edge bar both support the junction, which may be a mechanically weaker portion of the parting plate. Accordingly, the mechanical strength of the heat exchanger is improved.

[0022] Optionally, the at least one of the first edge bars and the at least one of the second edge bars are substantially orthogonal to each other. Correspondingly, the first and second rectilinear portions may be substantially orthogonal to each other. Correspondingly again, the first and second channels may extend substantially orthogonal to each other in a region of opening out onto the first and second ports, respectively. Besides the features already mentioned, the disclosed heat exchanger may comprise at least one of the following features, taken alone or in any technically possible combination:

- the frame forms lobes around the ports and a width of the frame from one of the lobes to an adjacent lobe is substantially constant;
- said width varies by at most 35% from a reference value;
- the frame is concave between the one of the lobes and the adjacent lobe;
- end faces of the frame in a thickness direction of the parting plate are planar;
- the first ports include a first inlet port and a first outlet port provided on opposite sides of the main body;
- the second ports include a second inlet port and a second outlet port provided on opposite sides of the main body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The invention and advantages thereof will be better understood upon reading the detailed description which follows, of embodiments given as non-limiting examples. This description refers to the appended drawings, wherein:

- Fig. 1 is a schematic exploded view of a heat exchanger according to an embodiment;
- Fig. 2 is a top view of a parting plate according to an embodiment;
- Fig. 3 is a top view of first channels and first edge bars according to an embodiment;
- Fig. 4 is a top view of second channels and second edge bars according to an embodiment.

DETAILED DESCRIPTION OF EMBODIMENTS

[0024] A heat exchanger 100 according to an embodiment is described with reference to Figs. 1-4. The heat exchanger 100 enables heat transfer between a first fluid and a second fluid. As shown in Fig. 1, which is an exploded view of the heat exchanger 100, the heat exchanger 100 comprises at least one parting plate 10 having two first ports and two second ports, namely a first inlet port 12, a first outlet port 14, a second inlet port 16 and a second outlet port 18. The parting plate 10 prevents the fluids from mixing: specifically, the first fluid is configured to flow through the first inlet port 12, circulate on a first face 21 of the parting plate 10, and exit through the first outlet port 14. Likewise, the second fluid is configured to flow through the second inlet port 16, circulate on a second face 22 of the parting plate 10, opposite the first face 21, and exit through the second outlet port 16.

Heat exchange takes place by convection of the fluids along the parting plate 10.

[0025] As shown in Fig. 1, the heat exchanger 100 may have a layered structure. Besides the parting plate 10, the heat exchanger 100 may comprise at least one first plate 31 and at least one second plate 32. The first plate 31 and the second plate 32 may be stacked in an alternate manner, with a parting plate 10 being provided between each first plate 31 and each second plate 32 adjacent thereto. In other words, a minimum stacking may comprise, in order, one first plate 31, one parting plate 10 and one second plate 32, as shown in the top portion of Fig. 1. However, for sizing purposes, it may be desired to add further layers, in which case a further subset comprising, in order, a parting plate 10, a first plate 31, a parting plate 10 and a second plate 32, may be stacked next to the minimum stacking, N times as shown in the bottom portion of Fig. 1 (N being zero or a non-zero positive integer).

[0026] In this example, each one of the first and second plates 31, 32 is provided with first and second ports 12, 14, 16, 18 respectively in fluid communication with the first and second ports 12, 14, 16, 18 of the adjacent parting plates 10.

[0027] The resulting stack may be flanked by end plates, for instance an open end plate 33 and a closed end plate 34. The end plates may be made of one or several elements. The open end plate 33 is provided with first and second ports 12, 14, 16, 18 respectively in fluid communication with the first and second ports 12, 14, 16, 18 of the adjacent parting plate 10. Conversely, the closed end plate 34 is solid and forms a closed bottom 12a, 14a, 16a, 18a for the first and second ports 12, 14, 16, 18 of the stack. In this way, when entering the heat exchanger 100 through the first inlet port 12, the first fluid must cross one of the first plates 31 in order to access the first outlet port 14. The same applies, mutatis mutandis, to the second fluid.

[0028] In a variant, instead of the open end plate 33 and the closed end plate 34, the heat exchanger could include a first end plate having a first inlet port 12 and a first outlet port 14 and a closed bottom 16a, 18a for the second inlet port 16 and the second outlet port 18 of the stack, and a second end plate having a second inlet port 16 and a second outlet port 18 and a closed bottom 12a, 14a for the first inlet port 12 and the first outlet port 14 of the stack. Further arrangements are possible, as long as the fluids do not mix with each other and flow along the parting plate 10 in order to exchange heat with each other.

[0029] Ports of the end plates 33, 34 may have a different shape than the shape of the ports of the parting plate 10 in order to interface with systems external to the heat exchanger 100.

[0030] For instance, the first fluid may be a gaz. For instance, the second fluid may be a gaz. The first fluid may flow at a pressure less than the second fluid; for this reason, the first ports 12, 14 may be bigger than the second ports 16, 18. Of course, the opposite situation is envisaged as well.

[0031] The components of the heat exchanger 100 may be metallic, e.g. made of stainless steel or nickel-based alloys.

[0032] A parting plate 10 according to an embodiment is described in more details with reference to Fig. 2.

[0033] The parting plate 10 comprises a frame 20 and a main body 24. The frame 20 may be formed by a rim forming a closed contour. The main body 24 is arranged within the frame 20 and connected to the frame 20 so as to define, between the frame 20 and the main body 24, the aforementioned first inlet port 12, first outlet port 14, second inlet port 16 and second outlet port 18.

[0034] In this embodiment, in order to maximize heat exchange between the fluids and the main body 24, the first inlet port 12 and the first outlet port 14 are provided on opposite sides of the main body 24. Likewise but independently, the second inlet port 16 and the second outlet port 18 are provided on opposite sides of the main body 24. The main body 24 forms a main heat transfer area of the parting plate 10.

[0035] The main body 24 is connected to the frame 20 at one or more localized junctions 26. Between two consecutive junctions 26, the space between the frame 20 and the main body 24 defines one of the ports.

[0036] More generally, the frame 24 forms lobes 28 (respectively 282, 284, 286, 288) around the ports. The lobes 28 project from the main body 24 and may have a rounded shape.

[0037] In this embodiment, a width W of the frame 20 from one of the lobes 28 to an adjacent lobe 28 is substantially constant. Specifically, Fig. 2 shows that the width W of the frame 20 does not vary by more than 35% from a reference value, from the lobe 282 including the first inlet port 12 to an adjacent lobe, here the lobe 288 including the second outlet port 18. The width W is measured as the smallest dimension of the frame 20 in the plane in which the lobe 28 protrudes from the main body 24.

[0038] Besides, the frame 20 is concave between the lobe 282 and the adjacent lobe 288. Thus, the frame 20 forms a concave portion 30 where the frame 20 gets inwards with respect to the lobes 28 and closer to the main body 24. The concave portion 30 helps keeping a substantially constant width W while ensuring a good junction with the main body 24.

[0039] As illustrated in Fig. 2, at least one of the first inlet port 12, the first outlet port 14, the second inlet port 16 and the second outlet port 18 of the parting plate 10 has a substantially triangular shape, with three main sides and corners (here rounded corners) in-between. However, other port shapes are contemplated, in particular polygonal-like port shapes.

[0040] A first plate 31 according to an embodiment is now described in more details with reference to Fig. 3.

[0041] The first plate 31 comprises a frame 20 similar to the frame 20 of the parting plate 10. When the first plate 31 is stacked next to a parting plate 10, the respec-

tive frames 20 of the first plate 31 and the parting plate 10 superimpose in order to form a continuous wall for the heat exchanger 100.

[0042] As described above, the first plate 31 has ports 12, 14, 16, 18 corresponding to the respective ports 12, 14, 16, 18 of the parting plate 10. In particular, like the frame 20, the ports of the first plate 31 superimpose to the ports of the parting plate 10: they may be identical in shape.

[0043] In the first plate 31, the second inlet port 16 and the second outlet port 18 are each isolated by a first edge bar 35. Specifically, the first edge bar 35 extends between two distant portions of the frame 20. Thus, each of the second inlet port 16 and the second outlet port 18 is defined between the frame 20, and more particularly a lobe 28 thereof, and a first edge bar 35.

[0044] The first edge bar 35 may be formed integrally with the frame 20 of the first plate 31.

[0045] The first edge bar 35 may be flush with the corresponding second port 16, 18, so that the respective second ports 16, 18 of the first plate 31 and of the parting plate 10 are identical in shape, as mentioned above. Conversely, in the first plate 31, the first inlet port 12 and the first outlet port 14 are in fluid communication with one another. This enables the first fluid to flow from the first inlet port 12 to the first outlet port 14 across the first plate 31. As illustrated, the first fluid may flow between the two first edge bars 35. In other words, the first edge bars 35 form, between them, a first channel 37 extending from one of the first ports (here the first inlet port 12) to another one of the first ports (here the first outlet port 14) on a first face 21 of the main body 24. In addition, as described above, the first edge bars 35 extend on either sides of the first channel 37 to prevent communication between the first channel 37 and the second ports 16, 18.

[0046] In order to enhance heat exchange, the first plate 31 may be provided with a plurality of first channels 37, as illustrated. In this embodiment, a plurality of fins 39 extend from the first inlet port 12 to the first outlet port 14. A first channel 37 is defined between two consecutive fins 39. In an embodiment, the first channels 37 may be formed by a corrugated plate. The corrugated plate may form, in cross-section, the fins 39.

[0047] The first edge bars 35 may be substantially parallel to the first channels 37. Specifically, the first channels 37 may extend between the first ports 12, 14 in a piecewise linear manner. For instance, the first channels 37 comprise an inlet segment 37a, an intermediate segment 37b and an outlet segment 37c, communicating with each other in this order. The inlet segment 37a extends substantially parallel to the first edge bar 35 adjacent thereto (in this case, the first edge bar 35 adjacent to the second outlet port 18). The intermediate segment 37b is angled with respect to the inlet segment 37a. The intermediate segment 37b may extend substantially parallel to portions of the frame 20 adjacent thereto. Finally, the outlet segment 37c is angled with respect to the intermediate segment 37b. The outlet segment 37c extends substantially parallel to the first edge bar 35 adjacent thereto (in this case, the first edge bar 35 adjacent to the second inlet port 16).

[0048] As the first edge bars 35 are parallel to each other, the inlet segment 37a and the outlet segment 37c may be parallel to each other too.

[0049] As regards the direction of a first channels 37, it should be noted that the first channels 37 may be rectilinear or not. In the example of Fig. 3, the first channels 37, specifically the inlet segment 37a, mainly extend along a direction D which is rectilinear. Optionally, the first channels 37 may undulate about the direction D. The direction D is a direction with respect to which the undulations have a zero average.

[0050] As mentioned above, at least one of the first ports has a rectilinear portion. In the following, the case of the first inlet port 12 will be detailed, but the present description applies mutatis mutandis to the first outlet port 14, in this example. In other embodiments, the first outlet port 14 may be different.

[0051] The first inlet port 12 has a rectilinear portion 42 onto which the first channels 37, in particular the inlet segment 37a, open. The first channels, in particular the inlet segment 37a, may extend up to the rectilinear portion 42, as illustrated. Besides, the first edge bar 35 is designed to extend up to the first rectilinear portion 42. As shown in Fig. 3, the first edge bar 35 extends towards the first channels 37 enough to reach the first rectilinear portion 42 of the first inlet port 12.

[0052] For instance, an end portion of the first edge bars 35 may support a rounded corner 44 of the first inlet port 12. The end portion of the first edge bar 35 may be provided such that the rounded corner 44 is fully surrounded, either by the frame 20, the junction 26 or the first edge bar 35.

[0053] Besides, let us consider a projection of the first inlet port 12 orthogonal to the first rectilinear portion 42. As depicted in Fig. 3, the projection extends between point A and point B. In this embodiment, the first edge bar 35 overlaps the projection of the first inlet port 12 orthogonal to the first rectilinear portion 42.

[0054] Besides, an edge 43 of the first inlet port 12 adjacent to the first rectilinear portion 42 is tangent to the first rectilinear portion 42. Here, the edge 43 is the edge of the rounded corner 44, which starts tangent to the first rectilinear portion and progressively turns in order to define a rounded corner 44 for the first inlet port 12.

[0055] The first channels 37 may open out onto the first rectilinear portion 42 in a direction substantially orthogonal to the first rectilinear portion 42. In other words, the above-defined direction D is orthogonal to the first rectilinear portion 42. In view of the above description, the first edge bar 35 may be orthogonal to the first rectilinear portion 42.

[0056] Figure 4 illustrates a top view of the second plate 32. In this embodiment, the second plate 32 is identical, mutatis mutandis, to the first plate 31, except for the following aspects. However, in general, the second plate

32 could differ more broadly from the first plate 31.

[0057] In the second plate 32, the first inlet port 12 and the first outlet port 14 are each isolated by a second edge bar 36, which may be flush with these ports, respectively. Conversely, the second inlet port 16 and the second outlet port 18 are in fluid communication with one another.

[0058] The second plate 32 defines at least one second channel 38 extending from the second inlet port 16 to the second outlet port 18 on a second face 22 of the main body 24, the second edge bars 36 extending on either sides of the second channels 38 to prevent communication between the second channels 38 and the first ports 12, 14.

[0059] Like the first channels 37, the second channels 38 may extend between the second ports 12, 14 in a piecewise linear manner. Specifically, the second channels 38 comprise an inlet segment 38a, an intermediate segment 38b and an outlet segment 38c, communicating with each other in this order. The inlet segment 38a extends substantially parallel to the second edge bar 36 adjacent thereto (in this case, the second edge bar 36 adjacent to the first outlet port 14). The intermediate segment 38b is angled with respect to the inlet segment 38a. The intermediate segment 38b may extend substantially parallel to portions of the frame 20 adjacent thereto. Finally, the outlet segment 38c is angled with respect to the intermediate segment 38b. The outlet segment 38c extends substantially parallel to the second edge bar 36 adjacent thereto (in this case, the second edge bar 36 adjacent to the first inlet port 12).

[0060] Thus, in the intermediate region of the channels, the first channels 37 and the second channels 38 may define a counter flow of the first fluid and the second fluid in the intermediate segments 37b, 38b. Besides, in the inlet and outlet region of the channels, the first channels 37 and the second channels 38 may define cross flow of the first fluid and the second fluid in the inlet segments 37a, 38a and the outlet segments 37c, 38c.

[0061] As mentioned above, the second channels 38 open out onto a second rectilinear portion 46 of the second inlet port, and at least one of the second edge bars 36 extends up to the second rectilinear portion 46.

[0062] In view of the above description, in the present embodiment, the first edge bar 35 and the second edge bar 36 are superimposed with each other, on either side of a junction between the frame 20 and the main body 24. For instance, Fig. 4 illustrates, in phantom, the position of a first edge bar 35 when the first plate 31 and the second plate 32 are stacked on either sides of a parting plate 10. The hatched portion illustrates an area where the first edge bar 35 and the second edge bar 36 overlap. This area is further superimposed with the junction portion 26 of the parting plate 10. Therefore, the first edge bars 35 and the second edge bars 36 provide strong support for the parting plate 10.

[0063] Besides, the first edge bar 35 and the second edge bar 36 may be substantially orthogonal to each other, as best shown in Fig. 4. This facilitates orthogonality of the first channels 37 and/or second channels 38 with the first rectilinear portions 42 and/or second rectilinear portion 46, respectively.

[0064] Back to Fig. 1, the parting plate 10, the first plate 31 and the second plate 32 may be stacked as described above.

[0065] In order to facilitate stacking, the end faces of the frame 20 of the parting plate 10, but also optionally of the first plate 31 and the second plate 32, may be planar in a thickness direction of the parting plate. That is, each end face of the frame 20 may be included in a single plane, this plane being preferably transverse to the stacking direction of the plates. Besides, in order to assemble these plates together, a variety of techniques may be used, including welding, brazing (such as MIG-MAG brazing) or diffusion bonding. These techniques are known per se in the art. Thus, in an example, the first channels 37 (e.g. the fins 39) or the first edge bars 35 may be assembled to the parting plate 10 by brazing. The same may apply to the second plate 32.

[0066] The above described features may apply to a wide variety of heat exchangers, including so-called gasket plate heat exchangers, in which adjacent plates are separated by a gasket, or so-called plate-fin heat exchangers, where no gasket is provided and the plates and fins (e.g. the above mentioned corrugated plate) are directly assembled to one another. Although the present disclosure refers to specific exemplary embodiments, modifications may be provided to these examples without departing from the general scope of the invention as defined by the claims.

[0067] For instance, although described with reference to a first plate 31 and a second plate 32 respectively, the first and second channels, the first and second edge bars and the like may be formed otherwise and/or do not need to be in a plate form, as long as the two fluids are separated by a parting plate.

[0068] Instead of the particular structure of channels described above, the heat exchanger 100 may comprise, more generally, a plurality of stacked parting plates 10, and, between consecutive ones of the parting plates 10, alternately, at least one first channel 37 extending from the first inlet port 12 to the first outlet port 14 and at least one second channel 38 extending from the second inlet port 16 to the second outlet port 18. In case only the parting plates 10 are provided, with integrated edge bars and channels as the case may be, the respective parting plates 10 may be directly assembled to one another, e.g. by welding, brazing or diffusion bonding.

[0069] More generally, individual characteristics of the different illustrated/mentioned embodiments may be combined in additional embodiments.

[0070] Besides, although the provision of the first edge bar extending up to the first rectilinear portion has been described in a context in which the frame forms lobes around the ports and a width of the frame from one of the lobes to an adjacent lobe is substantially constant, it should be understood that these aspects are independ-

ent. That is, the first edge bar could extend up to the first rectilinear portion even if the frame had a different shape or thickness. Likewise, the width of the frame could be as defined earlier even if the first edge bar was arranged in a different manner, or even if the first port had no rectilinear portion at all. The same applies to the other ports or edge bars, as the case may be. Therefore, the description and the drawings should be considered in an illustrative rather than in a restrictive sense.

Claims

1. A heat exchanger (100) comprising:

- a parting plate (10) comprising a frame (20) and a main body (24) arranged within the frame (20) and connected to the frame (20) so as to define, between the frame (20) and the main body (24), two first ports (12, 14) and two second ports (16, 18);
- at least one first channel (37) extending from one of the first ports (12) to another one of the first ports (14) on a first face (21) of the main body (24);
- first edge bars (35) extending on either sides of the at least one first channel (37) to prevent communication between the at least one first channel (37) and the second ports (16, 18);

wherein the at least one first channel (37) opens out onto a first rectilinear portion (42) of one of the first ports (12), and at least one of the first edge bars (35) extends up to the first rectilinear portion (42).

2. The heat exchanger of claim 1, wherein the at least one first channel (37) opens out onto the first rectilinear portion (37) in a direction (D) substantially orthogonal to the first rectilinear portion (42).

3. The heat exchanger of claim 1 or 2, wherein the first edge bars (35) are substantially parallel to the at least one first channel (37).

4. The heat exchanger of any one of claims 1 to 3, wherein an end portion of the at least one of the first edge bars (35) supports a rounded corner (44) of said one of the first ports (12).

5. The heat exchanger of any one of claims 1 to 4, wherein the at least one of the first edge bar (35) overlaps a projection of the one of the first ports (12) orthogonal to the first rectilinear portion (42).

6. The heat exchanger of any one of claims 1 to 5, wherein the at least one of the first edge bar (35) is flush with one of the second ports (16, 18).

7. The heat exchanger of any one of claims 1 to 6, wherein an edge (43) of the one of the first ports (12) adjacent to the first rectilinear portion (42) is tangent to the first rectilinear portion (42).

8. The heat exchanger of any one of claims 1 to 7, wherein the at least one first channel (37) and/or the first edge bars (35) are assembled to the parting plate (10) by brazing.

9. The heat exchanger of any one of claims 1 to 8, wherein the at least one first channel (37) is formed by a corrugated plate.

10. The heat exchanger of any one of claims 1 to 9, further comprising at least one second channel (38) extending from one of the second ports (16) to another one of the second ports (18) on a second face (22) of the main body (24), and second edge bars (36) extending on either sides of the at least one second channel (38) to prevent communication between the at least one second channel (38) and the first ports (12, 14).

11. The heat exchanger of claim 10, wherein the at least one second channel (38) opens out onto a second rectilinear portion (46) of one of the second ports (16), and at least one of the second edge bars (36) extends up to the second rectilinear portion (46).

12. The heat exchanger of claim 11, wherein the at least one of the first edge bars (35) and the at least one of the second edge bars (36) are superimposed with each other, on either side of a junction (26) between the frame (20) and the main body (24).

13. The heat exchanger of claim 11 or 12, wherein the at least one of the first edge bars (35) and the at least one of the second edge bars (36) are substantially orthogonal to each other.

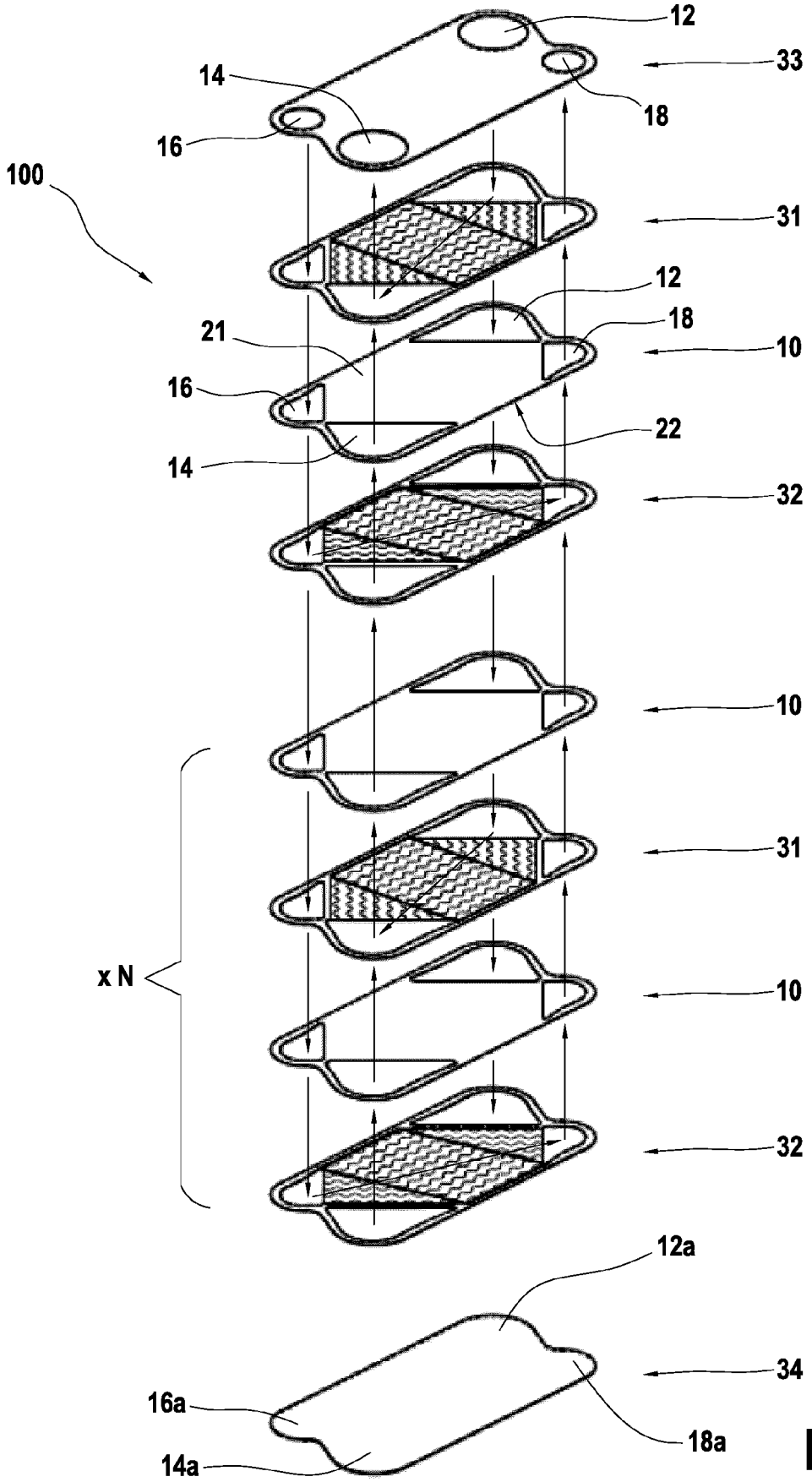
12
33
14
18
16
100
31
12
18
21
10
16
22
14
32
10
x N
31
10
32
12a
34
16a
18a
14a

FIG. 1

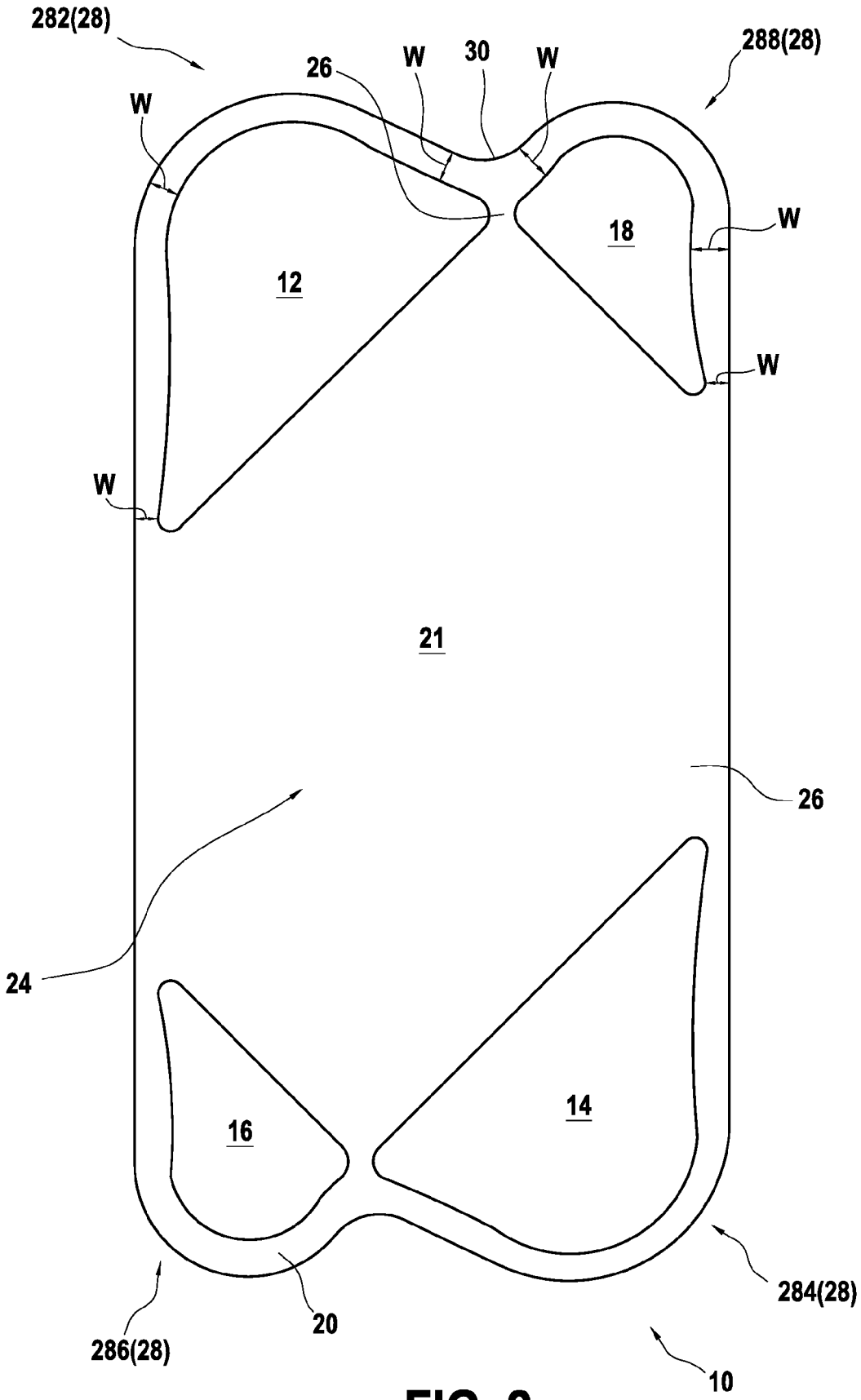

FIG. 2

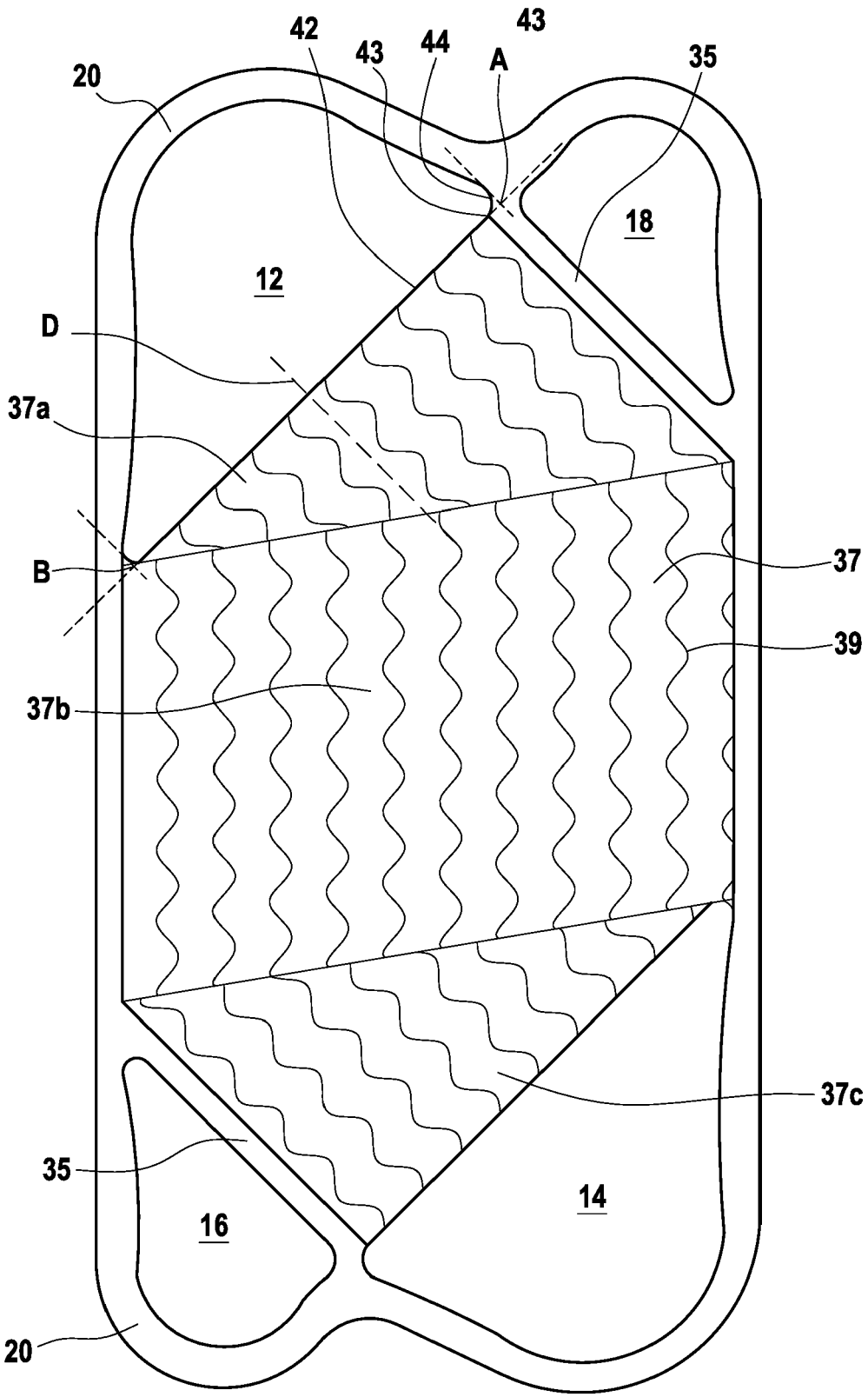

FIG. 3

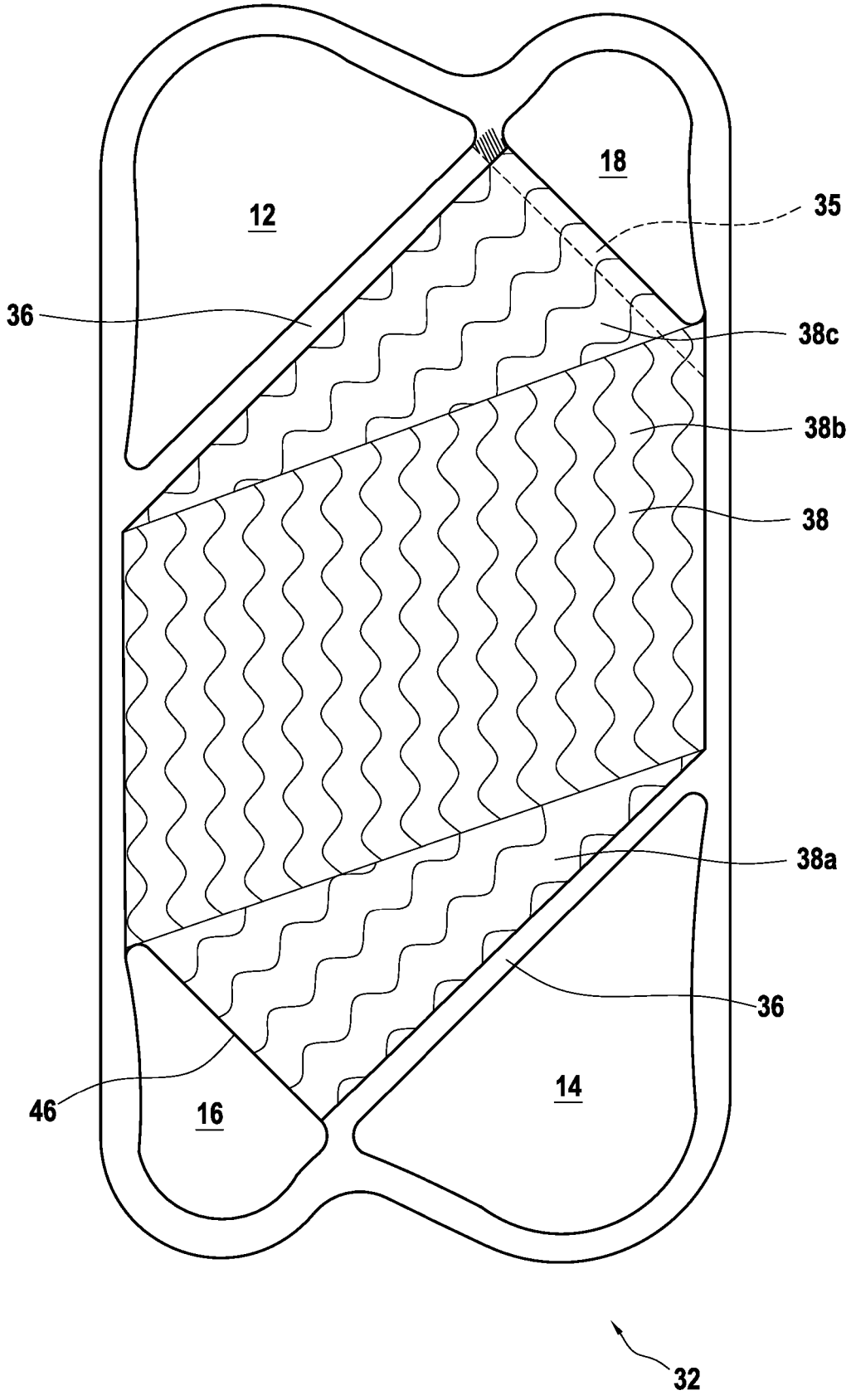

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 22 19 6562

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC) F28D F28F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 March 2023	Vassoille, Bruno

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03-03-2023

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