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(54) HEAT EXCHANGER PLATE

(57) A heat exchanger plate (3) is described comprising a heat exchange area in a heat transfer plate (11) and a support bar guiding area at an edge(14) of the heat transfer plate (11), a recess (13) in the edge (14), and an insert (12) mounted in the recess (13).

It should be possible to use the same heat transfer plate independent of a support bar or support bars used during assembling of the heat exchanger plates (3).

To this end, the largest width of the recess (13) in a direction parallel to the edge (14) is located at the edge (14) and a support bar guiding section (15) is provided in the insert (12).

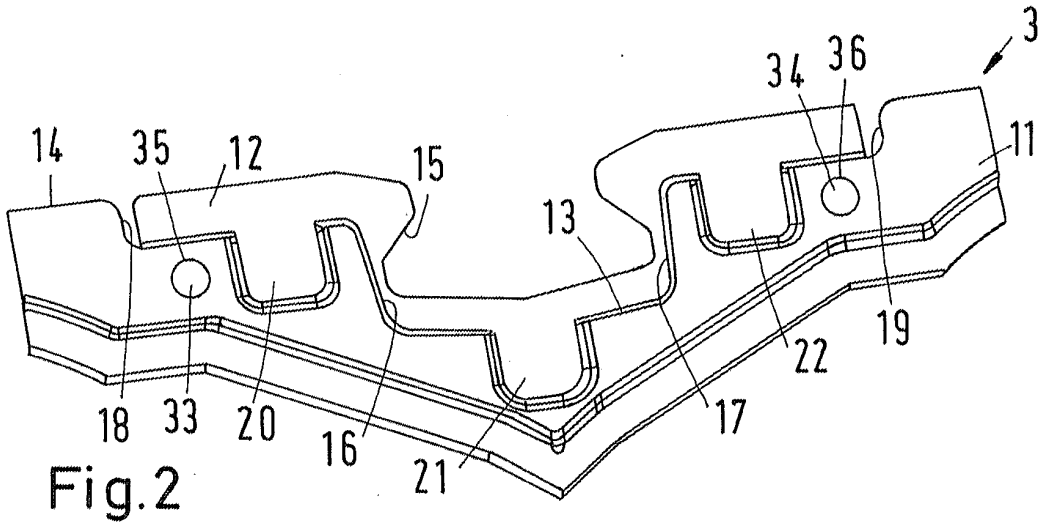

Fig.2

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Description

[0001] The present invention relates to a heat exchanger plate comprising a heat exchange area in a heat transfer plate and a mounting rail guiding area at an edge of the heat transfer plate, a recess in the edge, and an insert mounted in the recess.

[0002] Such a heat exchanger plate is used to form a plate-type heat exchanger. To this end a stack of such heat exchanger plates is arranged between two end plates. In order to facilitate the stacking of the heat exchanger plates, a support bar or two support bars are used. The heat exchanger plates are mounted on the support bar or support bars. The support bars secure the correct alignment of the heat exchanger plates.

[0003] The support bars may however have different designs or shapes. This depends, for example, on the size of the heat exchanger plates, the number of the heat exchanger plates to be assembled or on other reasons. Thus, it is necessary to chose always support bars which fit to the mounting rail guiding area.

[0004] It is an object of the present invention to be able to use the same heat transfer plate independent of the support bar or support bars.

[0005] This object is solved with a heat exchanger plate as described at the outset in that the largest width of the recess in a direction parallel to the edge is located at the edge and a mounting rail guiding section is provided in the insert.

[0006] In this way the heat exchanger plate can easily be adapted to different shapes or forms of the support bars. The only step necessary is to use the suitable insert, i.e. an insert having a support bar guiding section which is adapted to the support bar or support bars used. Since the largest width of the recess in a direction parallel to the edge is located at the edge, the heat transfer plate itself is not directly guided on the support bar, i.e. the heat transfer plate does not have a geometry engaging behind the support bar. Thus, only the insert has the guiding function. The recess is open to the edge so that the insert can easily be inserted.

[0007] In an embodiment of the invention the recess comprises a border having pairs of sections pointing away from the edge, wherein the sections of each pair are arranged parallel to each other or diverge from each other. Thus, the insert can easily be shifted into the recess without being hindered by any parts of the heat transfer plate.

[0008] In an embodiment of the invention at least one pair of sections forms an insert guide. The consequence is that the insert is guided in the width direction of the recess so that a precise positioning of the insert in the heat transfer plate is achieved.

[0009] In an embodiment of the invention the insert is in form of a click-on member. The insert can easily be mounted on the heat transfer plate simply by clicking it on the heat transfer plate.

[0010] In an embodiment of the invention parts of the click-on member are arranged on both sides of the heat transfer plate. The insert is reliably held on both sides of the heat transfer plate. This reduces the risk of a separation of heat transfer plate and insert even when the heat exchanger plate is stacked on the support bar or support bars.

[0011] In an embodiment of the invention the heat transfer plate comprises at least one indentation and the click-on member comprises at least one protrusion extending into the indentation. Preferably, more than one indentation is provided. When the insert is mounted to the heat transfer plate, the protrusion comes initially into contact with a surface of the heat transfer plate and upon further movement of the insert towards the heat transfer plate enters the indentation. In this situation, the protrusion and the indentation form a positive locking.

[0012] In an embodiment of the invention the indentation is in form of a through-going opening. Thus, it is possible to check whether the protrusion has correctly entered the indentation and has locked the insert with the heat transfer plate.

[0013] In an embodiment of the invention the indentation is arranged in a deepened area. A movement of the protrusion in a direction away from the surface of the heat transfer plate can then be kept small.

[0014] In an embodiment of the invention the heat transfer plate comprises at least one step in the support bar guiding area, wherein the insert rests against the step. The step can be formed by deforming the heat transfer plate or simply by providing another protrusion. The step allows a precise positioning of the insert with respect to the heat transfer plate.

[0015] In an embodiment of the invention the heat insert is made of plastic material. Since the insert is outside of a fluid flow path and therefore does not come in contact with any fluid, it can be made of any suitable cheep material, in particular plastic material.

[0016] The invention will now be described in more detail with reference to the drawing, wherein:

Fig. 1 shows schematically a mounting of a plate-type heat exchanger,

Fig. 2 shows a part of a heat transfer plate with insert from one side and

Fig. 3 shows the part of the heat transfer plate with insert from the other side.

[0017] Fig. 1 schematically shows an arrangement for mounting a plate-type heat exchanger. The heat exchanger comprises a front plate 1 and a rear plate 2. A number of heat exchanger plates 3 is arranged between the front plate 1 and the rear plate 2. The heat exchanger plates 3 are finally arranged in a plate set 4. Gaskets 5 are positioned between adjacent heat exchanger plates 3.

[0018] In order to facilitate the stacking of the heat ex-

changer plates 3, the front plate 1 and the rear plate 2, support bars are used, i.e. a top support bar 6 and a bottom support bar 7.

[0019] Once all heat exchanger plates 3 have been stacked between the front plate 1 and the rear plate 2, tie bars 8 are used together with a base profile 9 in order to tighten the stack of plates.

[0020] The front plate 4 comprises four connections 10, two of the connections 10 belong to a first fluid flow path and the other two of the connections 10 belong to a second fluid flow path. The two fluid flow paths are separated by the heat exchanger plates 3.

[0021] In order to thread the heat exchanger plates 3 onto the support bars 6, 7, the heat exchanger plates 3 need a geometry which is adapted to the support bars 6, 7. Thus, when the geometry of the support bars 6, 7 changes or when other support bars 6, 7 are used, it would be necessary to change the corresponding geometry of the heat exchanger plates 3.

[0022] In order not to be limited by the requirement to adapt the complete heat exchanger plate 3 to the respective support bars 6, 7, the heat exchanger plate 3 comprises a heat transfer plate 11 (parts of which are shown in Fig. 2 and 3) and an insert 12.

[0023] The insert 12 is mounted in a recess 13 of the heat transfer plate 11. The recess 13 is arranged at an edge 14 of the heat transfer plate 11. The recess 13 has the largest width in a direction parallel to the edge 14 at the edge 14. A support bar guiding section 15 is provided in the insert 12.

[0024] Fig. 2 and 3 show the insert provided for the top support bar 6. However, the same arrangement can be provided at the lower part of the heat exchanger plate 3 in order to adapt the heat exchanger plate 3 to the lower support bar 7.

[0025] Thus, only the insert 12 is used to guide the heat exchanger plate 3 on the support bars 6. The heat transfer plate 11 does not need any parts engaging with the support bars 6, 7, so that the same geometry of the heat transfer plates 11 can be used independently of the form of the support bars 6, 7. It is only necessary to change the insert 12 when another support bar 6, 7 is used.

[0026] The recess 13 comprises a first pair of sections 16, 17 pointing away from the edge 14 and a second pair of sections 18, 19 pointing likewise away from the edge 14. The sections 16, 17; 18, 19 of each pair are arranged parallel to each other or diverge slightly from each other. Thus, it is possible to insert the insert 12 into the recess 12 without being hindered by any parts of the heat transfer plate 11.

[0027] The sections 16, 17 form an insert guide, so that the insert 12 is guided at these sections 16, 17 when the insert 12 is mounted to the heat transfer plate 11.

[0028] The insert 12 is in form of a click-on member. To this end, the insert comprises taps 20, 21, 22 on one side of the heat transfer plate 11 (Fig. 2) and taps 23-26 on the other side of the heat transfer plate 11 (Fig. 3).

[0029] The taps 20-22 are provided with protrusions 27-29 which are visible in Fig. 3. The heat transfer plate 11 comprises a number of indentations 30-32 which are in form of through-going openings so that it is possible to check whether the protrusions 27-29 have entered the indentations 30-32.

[0030] The taps 23, 26 comprise protrusions 33, 34 which in the mounted state of the insert 12 at the heat transfer plate 11 have entered indentations 35, 36 which are likewise in form of through-going openings, so that it can be checked whether the protrusions 33, 34 have entered the indentations 35, 36.

[0031] The insert 12 is made of a plastic material. Thus, the taps 20-22, 23-26 are slightly deformable, so that the taps 20-22, 23, 26 are pushed away from the heat transfer plate 11 when the insert 12 is pushed onto the heat transfer plate 11. The protrusions 27-29, 33, 34 move along the surfaces of the heat transfer plate 11 until they reach the indentations 30-32, 35, 36 to snap into the indentations 30-32, 35, 36.

[0032] The heat transfer plate 11 comprises a step 37 (or any other protrusion) against which the insert 12 comes to rest when the insert 12 is mounted on the heat transfer plate 11. Furthermore, the heat transfer plate 11 comprises deepened areas 38-40 in which the indentations 30-32 are arranged. The deepened areas 38-40 are slightly deformed out of the plane of the heat transfer plate 11.

[0033] In a way not shown, deepened areas can be provided on the other side of the heat transfer plate 11. The "deepening" is in this case directed to the other direction.

Claims

1. Heat exchanger plate (3) comprising a heat exchange area in a heat transfer plate (11) and a support bar guiding area at an edge (14) of the heat transfer plate (11), a recess (13) in the edge (14), and an insert (12) mounted in the recess (13), **characterized in that** the largest width of the recess (13) in a direction parallel to the edge (14) is located at the edge (14) and a support bar guiding section (15) is provided in the insert (12).

2. Heat exchanger plate according to claim 1, **characterized in that** the recess (13) comprises a border having pairs of sections (16, 17; 18, 19) pointing away from the edge (14), wherein the sections (16, 17; 18, 19) of each pair are arranged parallel to each other or diverge from each other.

3. Heat exchanger plate according to claim 2, **characterized in that** at least one pair of sections (16, 17) form an insert guide.

4. Heat exchanger plate according to any of claims 1

to 3, **characterized in that** the insert (12) is in form of a click-on member.

5. Heat exchanger plate according to claim 4, **characterized in that** parts (20-22; 23-26) of the click-on member are arranged on both sides of the heat transfer plate (11).

6. Heat exchanger plate according to claim 4 or 5, **characterized in that** the heat transfer plate (11) comprises at least one indentation (30-32; 35, 36) and the click-on member comprises at least one protrusion (27-29; 33, 34) extending into the indentation (30-32; 35, 36).

7. Heat exchanger plate according to claim 6, **characterized in that** the indentation (30-32); 35, 36) is in form of a through-going opening.

8. Heat exchanger plate according to claim 6 or 7, **characterized in that** the indentation (30-32) is arranged in a deepened area (38-40).

9. Heat exchanger plate according to any of claims 1 to 8, **characterized in that** the heat transfer plate (11) comprises at least one step (37) in the support bar guiding area, wherein the insert (12) rests against the step (37).

10. Heat exchanger plate according to any of claims 1 to 9, **characterized in that** the insert (12) is made of a plastic material.

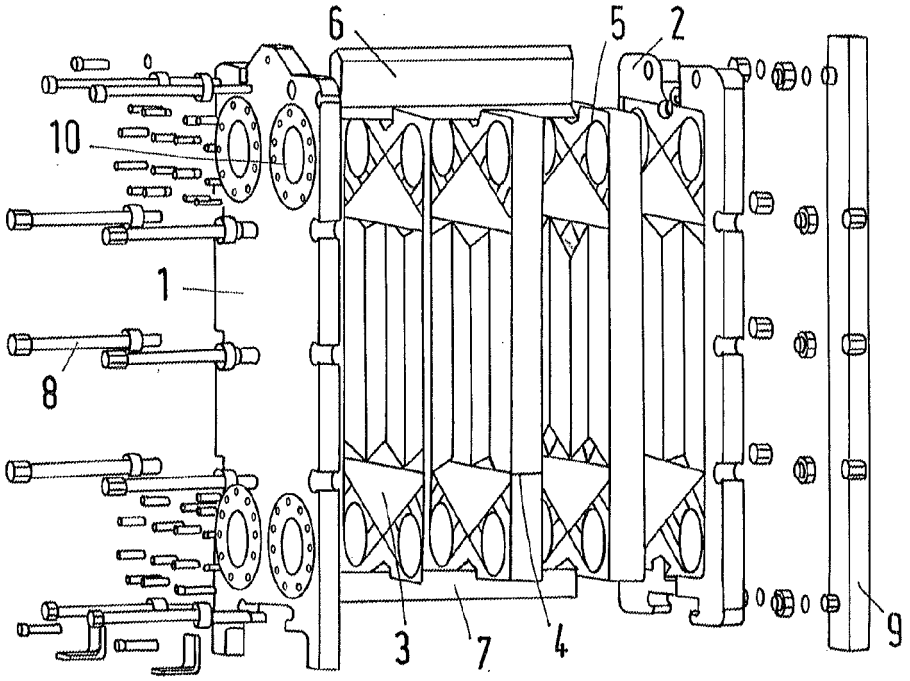

Fig.1

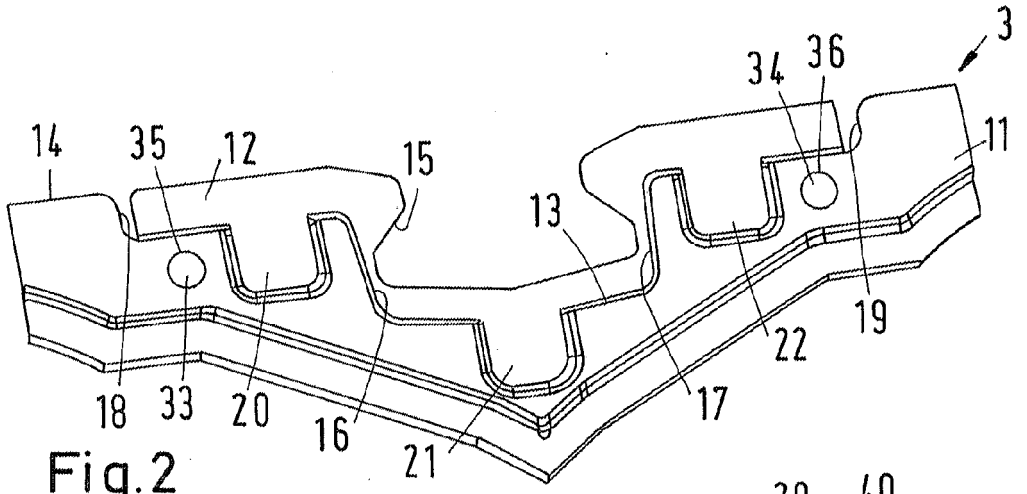

Fig.2

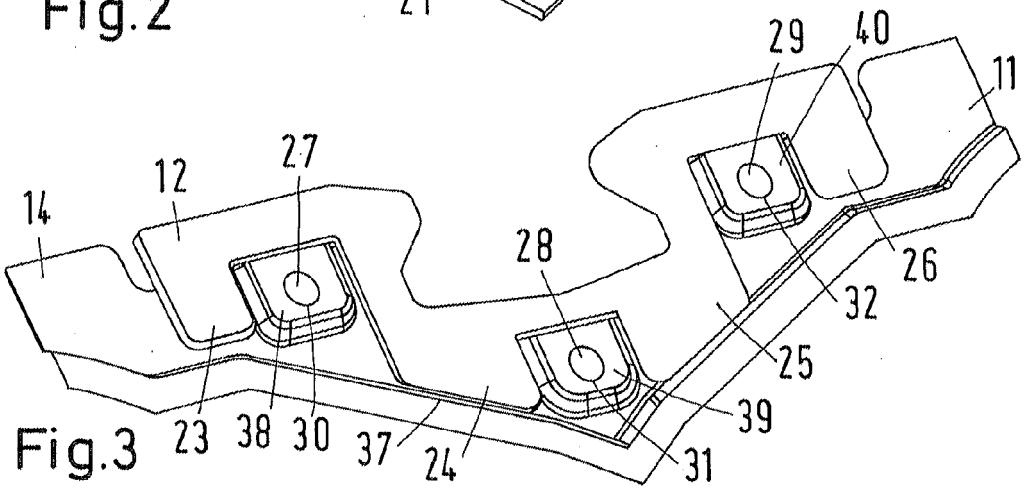

Fig.3

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EUROPEAN SEARCH REPORT

Application Number
EP 20 20 6124

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 054 818 A (APV CO LTD) 18 February 1981 (1981-02-18) * figures 1-2 * -----	1-3,9	INV. F28F9/007 F28F21/06
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A	GB 528 223 A (SEPARATOR AB) 24 October 1940 (1940-10-24) * figures 3-5 * -----	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

F28F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 March 2021	Vassoille, Bruno

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 20 20 6124

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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