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(54) **HEAT EXCHANGER PLATE**

WÄRMETAUSCHERPLATTE

PLAQUE D'ÉCHANGEUR DE CHALEUR

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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, the edge and a mounting rail guiding section is provided in the insert. 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.

[0002] GB 2 054 818 A, which discloses the features of the preamble of claim 1, shows a heat exchanger plate having a support member in form of a hanging eye. A plate comprises an edge having a recess and a support bar guiding area at an edge of the heat transfer plate. The largest width of the recess in relation parallel to the edge is located at the edge.

[0003] US 3 360 034 A shows a heat exchanger plate having suspension means which is hinged to the plate by means of a protrusion which is riveted to the plate. The member consists of a simple sheet of metal. Furthermore, the member is not mounted in the recess of the plate.

[0004] 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 choose always support bars which fit to the mounting rail guiding area.

[0005] 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.

[0006] 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 heat insert is made of plastic material.

[0007] 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. Since the insert is outside of a fluid flow path and therefore does not come in contact with any fluid, it is made of plastic material.

[0008] 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.

[0009] 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.

[0010] 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.

[0011] 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.

[0012] 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.

[0013] 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.

[0014] 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.

[0015] 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.

[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 exchanger 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), wherein 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), **characterized in that** the insert (12) is made of a plastic material.

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).

Patentansprüche

1. Wärmetauscherplatte (3), umfassend einen Wärmetauschbereich in einer Wärmeübertragungsplatte (11) und einen Stützstangenführungsbereich an einer Kante (14) der Wärmeübertragungsplatte (11), eine Ausnehmung (13) an der Kante (14) und einen in der Ausnehmung (13) angebrachten Einsatz (12), wobei sich die größte Breite der Ausnehmung (13) in einer Richtung parallel zu der Kante (14) an der Kante (14) befindet und ein Stützstangenführungsabschnitt (15) in dem Einsatz (12) vorgesehen ist, **dadurch gekennzeichnet, dass** der Einsatz (12) aus einem Kunststoffmaterial gefertigt ist.

2. Wärmetauscherplatte nach Anspruch 1, **dadurch gekennzeichnet, dass** die Ausnehmung (13) einen Rand mit Paaren von Abschnitten (16, 17; 18, 19) umfasst, die von der Kante (14) wegweisen, wobei die Abschnitte (16, 17; 18, 19) jedes Paares parallel zueinander angeordnet sind oder auseinander verlaufen.

3. Wärmetauscherplatte nach Anspruch 2, **dadurch gekennzeichnet, dass** mindestens ein Paar von Abschnitten (16, 17) eine Einsatzführung ausbildet.

4. Wärmetauscherplatte nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** der Einsatz (12) in Form eines Einrastelements vorliegt.

5. Wärmetauscherplatte nach Anspruch 4, **dadurch gekennzeichnet, dass** Teile (20-22; 23-26) des Einrastelements auf beiden Seiten der Wärmeübertragungsplatte (11) angeordnet sind.

6. Wärmetauscherplatte nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** die Wärmetauscherplatte (11) mindestens eine Vertiefung (30-32; 35, 36) umfasst und das Einrastelement mindestens einen Vorsprung (27-29; 33, 34) umfasst, der sich in die Vertiefung (30-32; 35, 36) erstreckt.

7. Wärmetauscherplatte nach Anspruch 6, **dadurch gekennzeichnet, dass** die Vertiefung (30-32; 35, 36) als eine durchgehende Öffnung ausgebildet ist.

8. Wärmetauscherplatte nach Anspruch 6 oder 7, **dadurch gekennzeichnet, dass** die Vertiefung (30-32) in einem vertieften Bereich (38-40) angeordnet ist.

9. Wärmetauscherplatte nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** die Wärmeübertragungsplatte (11) im Stützstangenführungsbereich mindestens eine Stufe (37) umfasst, wobei der Einsatz (12) an der Stufe (37) anliegt.

Revendications

1. Plaque d'échangeur de chaleur (3) comprenant une zone d'échange de chaleur dans une plaque de transfert de chaleur (11) et une zone de guidage de barre de support sur un bord (14) de la plaque de transfert de chaleur (11), un évidement (13) dans le bord (14), et un insert (12) monté dans l'évidement (13), la plus grande largeur de l'évidement (13) dans une direction parallèle au bord (14) étant située sur le bord (14) et une section de guidage de barre de support (15) étant prévue dans l' insert (12), **caractérisé en ce que** l'insert (12) est en matière plastique.

2. Plaque d ' échangeur de chaleur selon la revendication 1, **caractérisée en ce que** l'évidement (13) comprend une bordure comportant des paires de sec-

tions (16, 17 ; 18, 19) s'éloignant du bord (14), les sections (16, 17 ; 18, 19) de chaque paire étant agencées parallèlement les unes aux autres ou s'écartant les unes des autres.

3. Plaque d ' échangeur de chaleur selon la revendication 2, **caractérisée en ce qu'**au moins une paire de sections (16, 17) forme un guide d'insertion.

4. Plaque d'échangeur de chaleur selon l'une quelconque des revendications 1 à 3, **caractérisée en ce que** l' insert (12) se présente sous la forme d'un élément encliquetable.

5. Plaque d ' échangeur de chaleur selon la revendication 4, **caractérisée en ce que** les parties (20-22 ; 23-26) de l'élément encliquetable sont agencées des deux côtés de la plaque de transfert de chaleur (11).

6. Plaque d ' échangeur de chaleur selon la revendication 4 ou 5, **caractérisée en ce que** la plaque de transfert de chaleur (11) comprend au moins une indentation (30-32 ; 35, 36) et l'élément encliquetable comprend au moins une protubérance (27-29 ; 33, 34) s' étendant dans l'indentation (30-32 ; 35, 36).

7. Plaque d ' échangeur de chaleur selon la revendication 6, **caractérisée en ce que** 1 ' indentation (30-32 ; 35, 36) se présente sous la forme d' une ouverture traversante.

8. Plaque d ' échangeur de chaleur selon la revendication 6 ou 7, **caractérisée en ce que** 1 ' indentation (30-32) est agencée dans une zone plus profonde (38-40).

9. Plaque d'échangeur de chaleur selon l'une quelconque des revendications 1 à 8, **caractérisée en ce que** la plaque de transfert de chaleur (11) comprend au moins une marche (37) dans la zone de guidage de barre de support, l'insert (12) s'appuyant sur la marche (37) .

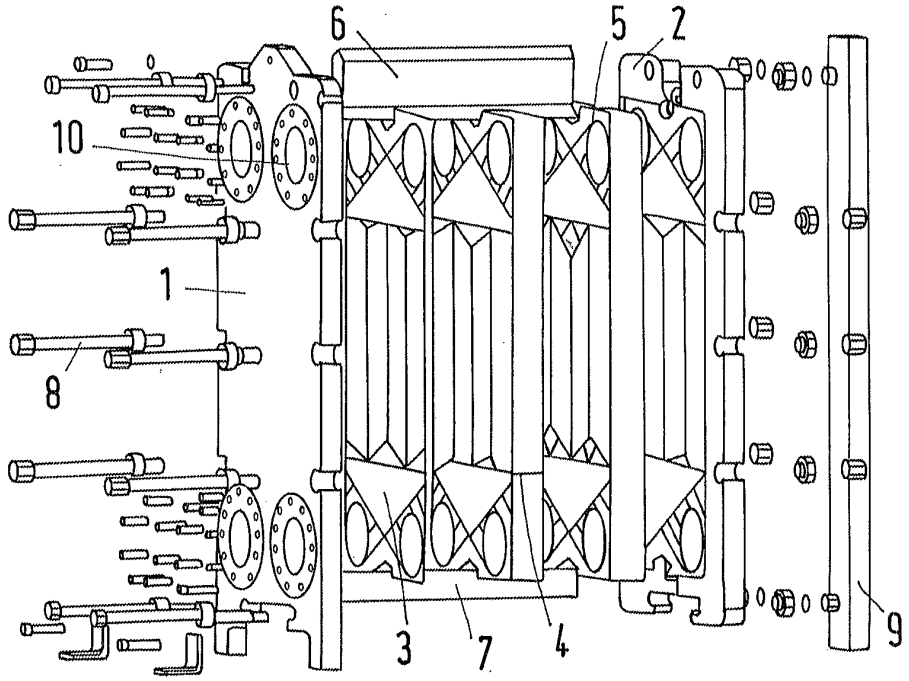

Fig.1

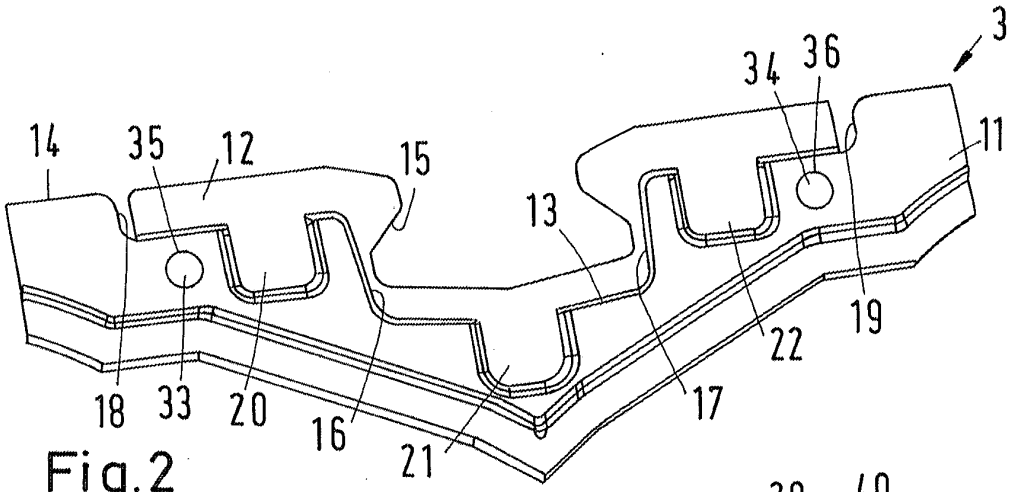

Fig.2

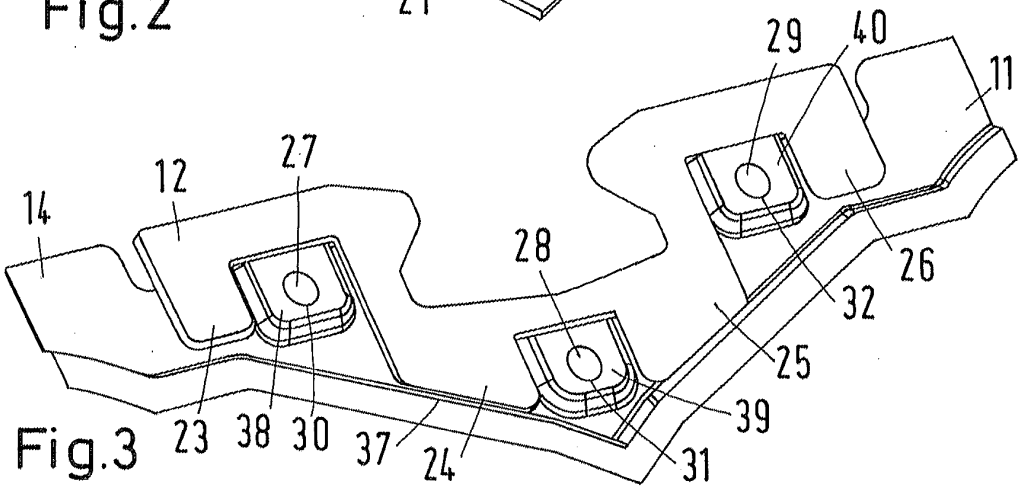

Fig.3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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