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Datasheet for the decision of 11 February 2022

Case Number: T 0114/19 - 3.2.03

Application Number: 13198883.4

Publication Number: 2886996

IPC: F28D9/00, F28F9/007, F28F9/00

Language of the proceedings: EN

Title of invention:
Plate heat exchanger with mounting flange

Patent Proprietor:
Alfa Laval Corporate AB

Opponent:
Mahle International GmbH

Headword:

Relevant legal provisions:
EPC Art. 54(2), 56
RPBA 2020 Art. 13(2)

Keyword:
Novelty - (yes) - main request (yes)
Inventive step - (yes) - ex post facto analysis - problem and solution approach - common general knowledge - non-obvious modification - main request (yes)
Amendment after summons - exceptional circumstances (no) - taken into account (no)

Decisions cited:
T 1151/11, T 0972/14, T 1744/14, T 1727/15

Catchword:

Europäisches Patentamt
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Beschwerdekammern

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Case Number: T 0114/19 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 11 February 2022

Appellant: (Opponent)	Mahle International GmbH Pragstr. 26-46 70376 Stuttgart (DE)
Representative:	Grauel, Andreas Grauel IP Patentanwaltskanzlei Wartbergstrasse 14 70191 Stuttgart (DE)
Respondent: (Patent Proprietor)	Alfa Laval Corporate AB Box 73 221 00 Lund (SE)
Representative:	Alfa Laval Attorneys Alfa Laval Corporate AB Patent Department P.O. Box 73 221 00 Lund (SE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 10 December 2018 rejecting the opposition filed against European patent No. 2886996 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	C. Herberhold
Members:	R. Baltanás y Jorge
	N. Obrovski

Summary of Facts and Submissions

I. European patent No. 2 886 996 B1 relates to a plate heat exchanger with mounting flange.

II. An opposition was filed against the patent, which was based on Article 100(a) EPC in conjunction with Articles 54 and 56 EPC.

III. The appeal lies from the decision of the opposition division to reject the opposition.

The opponent (hereinafter: the appellant) filed an appeal against the above-mentioned decision of the opposition division.

In a communication pursuant to Article 15(1) of the Rules of Procedure of the Boards of Appeal 2020 (RPBA 2020), the Board indicated its preliminary opinion of the case.

Oral proceedings were held on 11 February 2022.

IV. Requests

The appellant requested that the decision of the opposition division be set aside and that the patent be revoked.

The patent proprietor (hereinafter: the respondent) requested that the appeal be dismissed and that the patent be maintained as granted.

V. Claim 1 as granted, including the numbering of its features as adopted by the opposition division in its decision, reads as follows:

M1.1 *A plate heat exchanger, comprising:*

M1.2 *a plurality of heat exchanger plates (3) which are stacked and permanently connected to form a plate package (2)*

M1.3 *that defines first and second fluid paths for a first medium and a second medium, respectively, separated by said heat exchanger plates (3),*

M1.4 *said plate package (2) defining a surrounding external wall (4) that extends in an axial direction (A) between first and second axial ends,*

M1.5 *an end plate (21; 24) permanently connected to one of the first and second axial ends so as to provide an end surface (5) that extends between first and second longitudinal ends in a lateral plane which is orthogonal to the axial direction (A), and*

M1.6 *two mounting plates (7) permanently connected to a respective surface portion of the end surface (5) at the first longitudinal end and the second longitudinal end, respectively, such that the mounting plates (7) are spaced from each other in a longitudinal direction (L) on the end surface (5),*

M1.7 *wherein the respective mounting plate (7) comprises opposing flat engagement surfaces (12, 13)*

M1.8 *connected by an edge portion that extends along the perimeter of the mounting plate (7), wherein*

M1.9 *the respective mounting plate (7) is arranged with one of its engagement surfaces (12, 13) permanently connected to the end surface (5),*

M1.10 *such that the perimeter of the mounting plate (7) partially extends beyond the surrounding external wall (4), so as to define a mounting flange (9),*

M1.11 *characterized in that the respective mounting plate (7) partially extends across the end surface (5) in contact with the same within the perimeter of the surrounding external wall (4), and*

M1.12 *the perimeter of the mounting plate (7) comprises two concave portions (15) as seen in a normal direction to the end surface (5),*

M1.13 *the concave portions (15) being located to intersect the surrounding external wall (4) at a respective intersection point (11).*

Dependent claims 2 to 19 relate to particular embodiments of the plate heat exchanger defined in claim 1.

VI. State of the art

The following documents have been cited, both in the grounds of appeal and during the opposition proceedings, and are relevant for this decision:

D2: WO 2011/009412 A1

D5: US 2005/0121182 A1

D6: CN 201285244Y and a machine translation thereof into English

D9: DE 103 47 181 A1

VII. The appellant's arguments can be summarised as follows:

Novelty - Article 54(2) EPC

Figure 3 of document D6 disclosed mounting plates comprising concave portions which intersected the surrounding external wall of the plate package. This could be observed when the figure is enlarged, as in the annex filed with the statement setting out the grounds of appeal. Since claim 1 did not define the meaning of "concave portions", any deviation from a straight line - as in Figure 3 of D6 - anticipated this feature. More specifically, the mounting plate on the right of Figure 3 disclosed two concave portions at two intersection points with the surrounding external wall. Thus, D6 disclosed all of the features of claim 1.

New line of attack - Article 13(2) RPBA 2020

The inventive step attack based on D2 as the closest prior art document had already been raised in the statement setting out the grounds of appeal, see page 7, fourth paragraph. Moreover, this line of attack was addressed by the opposition division in the contested decision. Consequently, the line of attack should be considered in the proceedings.

Inventive step - Article 56 EPC

The objective technical problem when starting from document D6 was the reduction of weight at the portions of the mounting plate which protrude from the surrounding external wall of the plate package. Figure 5a of the patent had to be taken into account in order to interpret the differentiating features M1.12

(concave portions) and M1.13 (intersection of the concave portions with the surrounding external wall). When doing so, documents D2 (Figure 1) and D5/D9 (Figures 1 and 2) disclosed mounting plates comprising concave portions at intersection points with the surrounding external wall of the plate package within the meaning of claim 1. Even if these documents did not explicitly address the objective technical problem, the skilled person looking at the figures understood the general concept why those concave portions were used, since the reduction of weight as well as the provision of a mechanically stable connection was always an issue in the automotive industry. The adoption of the teaching of D2 or D5/D9 in the mounting plate of D6 would have resulted in the straight portions of D6 being changed into concave portions along the whole perimeter of the mounting plate, with two concave portions intersecting the surrounding external wall.

VIII. The respondent's arguments can be summarised as follows:

Novelty - Article 54(2) EPC

No concave portions were disclosed in Figure 3 of D6. The skilled person looking at this figure would merely observe convex and straight portions in the mounting plates. Moreover, according to claim 1 each mounting plate had to comprise two concave portions, each intersecting the surrounding external wall, whereas each of the mounting plates shown in Figure 3 of D6 merely disclosed one intersection of the allegedly concave portion with the surrounding external wall.

New line of attack - Article 13(2) RPBA 2020

The inventive step attack based on D2 as the closest prior art was only raised at the last possible moment of the appeal proceedings. It was late-filed and should not be admitted into the proceedings.

Inventive step - Article 56 EPC

Weight reduction was not the relevant technical problem when starting from D6; instead, it was resistance to mechanical loads. As disclosed in column 3, lines 13 to 22, of the patent, weight reduction was the problem which led to the provision of two mounting plates instead of one single one. The subsequent technical problem when having these two mounting plates was to increase resistance to mechanical loads, as disclosed in column 3, lines 23 to 40, of the patent.

If weight reduction alone was considered to be the technical problem, D2 provided a stepped construction as a solution for this, and this was what the skilled person would have provided in the mounting plate of D6 as a result of combining the two documents. D5/D9 did not address the problem of weight reduction, and the disclosure of Figure 2 was not unambiguous with respect to the alleged intersection of the concave portions with the surrounding external wall of the plate package. Finally, regardless of the objective technical problem considered, there was no guidance to arrange concave portions in the mounting plates of D6 precisely at the intersection points of the surrounding external wall. A general concept in this respect was neither mentioned in the documents nor derivable from the drawings. Moreover, the provision of concave portions on the mounting plates of D6 would have been a

complicated modification. Contrary to the opponent's allegations, Figure 5a of the patent explicitly confirmed that the mounting plate shown therein was concave at the intersection point with the surrounding external wall and gave no indication that straight sub-parts of a contour had to be considered "concave portions" within the meaning of the patent.

Reasons for the Decision

1. Novelty, D6 - Article 54(2) EPC

1.1 It is common ground that document D6 discloses a plate heat exchanger (feature M1.1; see page 1, abstract), comprising:

a plurality of heat exchanger plates (3) which are stacked and permanently connected to form a plate package (feature M1.2; see Figure 2)

that defines first and second fluid paths for a first medium (oil) and a second medium (water), respectively, separated by said heat exchanger plates (feature M1.3; see page 1, abstract),

said plate package defining a surrounding external wall (see Figures 2 and 3) that extends in an axial direction (see Figure 2, vertical direction) between first and second axial ends (feature M1.4),

an end plate (see Figure 2, bottom and top plates) permanently connected to one of the first and second axial ends so as to provide an end surface that extends between first and second longitudinal ends in a lateral

plane which is orthogonal to the axial direction (feature M1.5; see Figure 2, horizontal direction), and

two mounting plates (4) permanently connected to a respective surface portion of the end surface (see Figures 2 and 3) at the first longitudinal end and the second longitudinal end, respectively, such that the mounting plates (4) are spaced from each other in a longitudinal direction on the end surface (feature M1.6; see Figures 2 and 3),

wherein the respective mounting plate (4) comprises opposing flat engagement surfaces (feature M1.7; see Figures 2 and 3)

connected by an edge portion that extends along the perimeter of the mounting plate (feature M1.8; see Figure 2), wherein

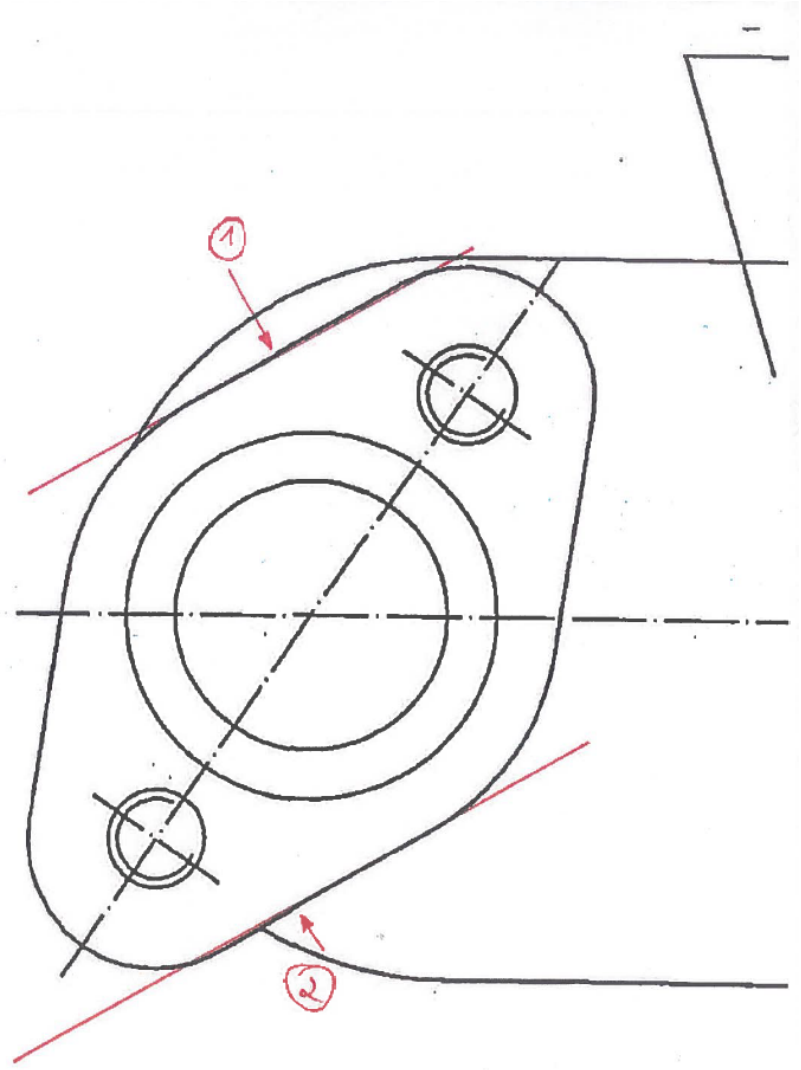
the respective mounting plate (4) is arranged with one of its engagement surfaces permanently connected to the end surface (feature M1.9; see Figure 2),

such that the perimeter of the mounting plate (4) partially extends beyond the surrounding external wall, so as to define a mounting flange (feature M1.10; see Figure 3),

and wherein the respective mounting plate (4) partially extends across the end surface in contact with the same within the perimeter of the surrounding external wall (feature M1.11; see Figure 3).

The perimeter of each mounting plate (4) of D6 intersects the surrounding external wall at two intersection points (see Figure 3).

1.2 The appellant filed an enlarged copy of the left portion of Figure 3 of document D6 (reproduced below) with the statement setting out the grounds of appeal. The appellant argued that a concave portion as defined in features M1.12 and M1.13 could be seen in this enlarged image.



This argument is not persuasive.

First of all, Figure 3 of D6 is a schematic patent drawing from which no precise conclusions about small details or proportions can be deduced. Secondly, the

Board is not convinced that there are any concave portions at all present at the outer contour of mounting plates (4). Rather, the outer contour consists of straight lines interrupted by convex portions. Even if the appellant's argument of there being small deviations from the added straight red lines allegedly representing concave portions were to be accepted, these had - if indeed they existed at all - such small dimensions even in the **enlarged version** of the figure that they appear to be nothing more than the usual tolerances of a printing or enlargement process when reproducing straight lines.

In view of the above, features M1.12 (concave portions) and M1.13 (intersection of the concave portions with the surrounding external wall) are not disclosed in D6.

1.3 Thus, the subject-matter of claim 1 is novel over D6.

2. Inventive step - Article 56 EPC

2.1 New line of attack - Article 13(2) RPBA 2020

The appellant raised an inventive step objection based on D2 as the closest prior art for the first time during the oral proceedings.

The argument that this line of attack had already been raised in the statement setting out the grounds of appeal is not convincing since the fourth paragraph of page 7 (to which the appellant referred in this respect) merely formulates an alternative for the combination with common general knowledge when starting from D6 as the closest prior art.

This is evident from the structure of the inventive step argument in the statement setting out the grounds of appeal. On page 5, first paragraph, it is argued that claim 1 is not inventive in the light of document **D6** combined with common general knowledge (first line of attack) **or** with one of documents D2, D5 or D9 (second line of attack).

The first line of attack (D6 combined with common general knowledge) is discussed first, up to the concluding statement on page 7, third paragraph, according to which the subject-matter of claim 1 is supposedly not inventive over D6 in combination with common general knowledge.

Then, the disclosure of D2, D5 and D9 is discussed (page 7, fourth paragraph), leading to the conclusion (page 7, last paragraph) that the person skilled in the art would modify **D6** by providing concave portions, and therefore (page 8, first paragraph) the provision of a concave portion was not only rendered obvious by common general knowledge but also by documents D2, D5 and D9.

Consequently, documents D2, D5 and D9 have been used as further sources of information in a second line of attack still starting, however, from document **D6** as the closest prior art document.

According to established case law, general references to submissions made in proceedings before the departments of first instance are generally not taken into account in appeal proceedings (cf. T 1151/11, Reasons 3; T 972/14, Reasons 7; T 1744/14, Reasons 4.4; T 1727/15, Reasons 2.9). Thus, the appellant's general reference to arguments presented in the opposition proceedings in the first sentence of the fourth

paragraph on page 7 ("*siehe die Argumentation im Einspruchsverfahren*") does not lead to these arguments being included in the appeal proceedings. Rather, these arguments have not been considered by the Board due to a lack of substantiation under Article 12(2) and (4) RPBA 2007. Moreover, the appellant's reference to arguments presented in the opposition proceedings was only made in the context of discussing the disclosure of concave portions in documents D2, D5 and D9 when starting from document D6 as the closest prior art (and not in the context of a line of attack starting from document D2 as the closest prior art).

Thus, the line of attack starting from D2 as the closest prior art was not included in the statement of grounds of appeal and was presented for the first time at the oral proceedings before the Board. It is an amendment to the appellant's appeal case within the meaning of Article 13(2) RPBA 2020, and it is within the discretion of the Board whether to admit that amendment, irrespective of whether that line of attack was addressed in the contested decision or not.

The appellant has not provided any arguments concerning possible exceptional circumstances which could justify the late filing of the new line of attack, and the Board cannot identify any such circumstances either.

Consequently, the Board has decided not to admit the new line of attack starting from document D2 as the closest prior art, exercising its discretion under Article 13(2) RPBA.

2.2 Starting from D6

2.2.1 The subject-matter of claim 1 differs from the plate heat exchanger of D6 by way of features M1.12 and M1.13 (see point 1.2 above), i.e.:

the perimeter of the mounting plate comprises two concave portions as seen in a normal direction to the end surface (M1.12) and

the concave portions being located to intersect the surrounding external wall at a respective intersection point (M1.13).

2.2.2 Technical effect and problem solved

The appellant argued that the technical effect of the differentiating features was that a portion of material was removed from the mounting plate, the objective technical problem thus being to reduce the weight of the mounting plate at the portions which protrude from the surrounding external wall of the plate package.

This reasoning appears to be incorrect since the distinguishing feature is not merely the provision of a concave portion at any location of the mounting plate, but rather at a very specific location, i.e. at the two intersection points of the mounting plate with the surrounding external wall.

Even though the problem of reducing the weight of the mounting plate is mentioned in the patent specification, this relates to the replacement of a single mounting plate (as in the prior art) by two smaller and separated mounting plates (see column 3,

lines 18 to 23), and not to the claimed concave portions.

The technical effect of the differentiating features is thus the distribution of stress along a longer contact surface of the end plate of the heat exchanger (see column 3 of the patent specification, lines 31 to 40). Therefore, the corresponding objective technical problem is to improve resistance to mechanical loads.

2.2.3 The appellant has not provided any arguments as to why or how the skilled person would arrive at the claimed invention when trying to address the objective technical problem of improving resistance to mechanical loads in D6.

2.2.4 Even if the technical problem mentioned by the appellant were considered, a combination with common general knowledge, D2 or D5/D9 would not have led the skilled person to the invention for the following reasons:

Figure 3 of D6 - reproduced below - discloses two mounting plates. A **straight portion** of each of these mounting plates intersects with the surrounding external wall of the plate package (see intersection at the lower half of the mounting plate). The mounting plate on the left comprises only a further intersection point on the left of its upper half. In this case, a **convex portion** of the mounting plate intersects the surrounding external wall. The mounting plate on the right shows three further intersection points coinciding with **convex portions** of the plate.

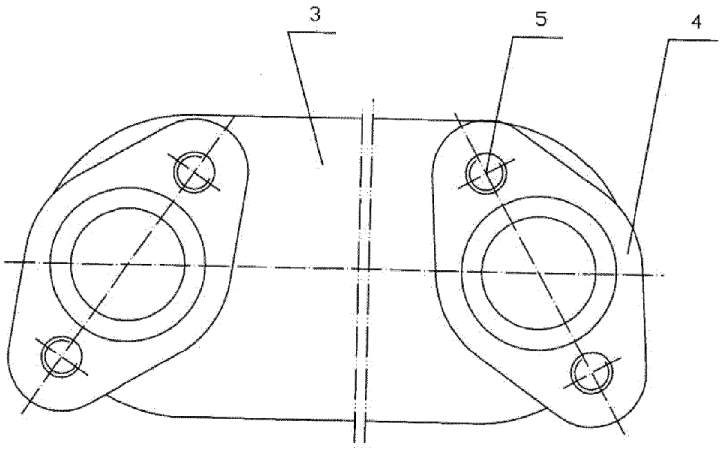


图3

In order to arrive at the invention, the skilled person would have had to modify the mounting plates of D6 by providing concave portions not only at the straight portions intersecting the surrounding external wall, but also on convex portions intersecting the same wall on the right and left mounting plates, respectively. The modification of these convex portions is particularly problematic given their proximity to the openings for the fluid in the mounting plates and to the bolts (5). Replacing the convex portions by concave portions would either result in a reduction of the section of the mounting plate at these regions, which the skilled person would recognise as compromising the stability and integrity of the mounting plate, or it would require the addition of material, which would be contrary to achieving the alleged objective of reducing weight.

Therefore, the skilled person does not have any motivation to carry out such a modification.

The common general knowledge of the skilled person would not provide such a motivation either. In order to arrive at the claimed invention, the skilled person

would first of all have to select the option of reducing the perimeter of the mounting plate among all of the possible solutions for reducing the weight of the mounting plates, and then they would have to choose to do so by providing concave portions at some locations along the perimeter (instead of flattening or increasing the radius of the convex portions), and then they would finally have to provide those concave portions at the specific locations where the mounting plate 4 of D6 intersects the surrounding external wall, including the above-mentioned problematic locations corresponding to a convex portion of the perimeter.

Common general knowledge does not suggest carrying out such multiple successive selections among the different available options, in particular in view of the existing technical constraints. In particular, contrary to the appellant's arguments, there is no evidence of a general concept of reducing weight by material cut-outs which - in order to reduce peak stresses at the intersection points - were to have a concave shape at these intersection points.

That such a concept is not disclosed in the description of document D2, D6 or D5/D9 has not been contested. Even when considering the figures, D6 does not provide a concave portion at an intersection point. D5/D9 (Figure 2) have several concave formed cut-outs, the majority of which, however, do not intersect the surrounding wall. Even for those which in Figure 2 appear to intersect with a further contour, due to the presence of further parts (not explicitly described but visible in Figure 1, e.g. below arrow 22), there is no clear and unambiguous disclosure of them intersecting the surrounding external wall. D2 shows a first mounting plate (on the right of Figure 1) having no

concave portion at all, whereas the concave portion on the left appears to rather tangentially join than intersect the surrounding external wall.

There is thus no evidence of the "general concept" referred to by the opponent.

In the context of weight reduction, document D2 proposes a stepped shape of the mounting plates (see paragraph [0023], last sentence), with no mention of any concave portions in this respect.

Concerning D5/D9, the skilled person would not consult these documents when addressing the alleged technical problem of weight reduction, since this issue is not even discussed therein.

2.2.5 In view of the above, the subject-matter of claim 1 involves an inventive step.

3. Since none of the invoked grounds for opposition prejudices the maintenance of the patent, the appeal against the rejection of the opposition must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

G. Nachtigall C. Herberhold

Decision electronically authenticated