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**Datasheet for the decision
of 23 July 2013**

Case Number: T 0096/10 - 3.2.03

Application Number: 04020494.3

Publication Number: 1630510

IPC: F28D 9/00, F28F 3/04

Language of the proceedings: EN

Title of invention:
A plate heat exchanger

Patent Proprietor:
SWEP International AB

Opponent:
ONDA S.p.A. (Withdrawn)

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
"Novelty, inventive step (yes)"

Decisions cited:
-

Catchword:
-



Case Number: T 0096/10 - 3.2.03

D E C I S I O N
of the Technical Board of Appeal 3.2.03
of 23 July 2013

Appellant: SWEP International AB
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Respondent: ONDA S.p.A.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 20 November 2009
revoking European patent No. 1630510 pursuant
to Article 101(3) (b) EPC.

Composition of the Board:

Chairman: U. Krause
Members: C. Donnelly
E. Kossonakou

Summary of Facts and Submissions

- I. The appeal lies from the decision of the opposition division dated 20 November 2009 revoking European Patent no. 1630510.

- II. In its decision the opposition division held that the subject-matter of claim 1 as granted was not new in view of Italian patent document VR2001U000049, laid open on 5 March 2003, and its English translation (E1). In particular, the opposition division argued that although in figure 4 of E1 only a partial view of the plates is shown, since there is an explicit mention of the term "herring-bone" at page 4, line 1 of the translation (corresponding to page 5, line 18 of the Italian text "lisca di pesce"), a heat-exchanger plate displaying a herring bone pattern is unambiguously and directly derivable from E1.

- III. The patent proprietor (hereinafter: the appellant) appealed against this decision on 20 January 2010. The grounds of appeal were filed on 30 March 2010.

- IV. The opponent withdrew its opposition by letter of 21 July 2010.

- V. In a communication dated 19 April 2013, pursuant to Article 15(1) RPBA annexed to the summons to oral proceedings, the Board informed the appellant of its provisional opinion. In particular, the Board indicated that, in addition to novelty, it would also be necessary to discuss the question of inventive step with respect to E1, even in the absence of the opponent, since the opposition division dealt with an almost

identical question when dealing with the third auxiliary request in its decision.

VI. Oral proceedings before the Board were held on 23 July 2013.

At the conclusion of the debate, the appellant (patent proprietor) requested that the decision under appeal be set aside and that the patent no. 1630510 be maintained according to the new main request filed at the oral proceedings.

VII. Claim 1 according to the new main request reads:

"A plate heat exchanger comprising at least two separate flow paths for primary and secondary fluids to exchange heat, the said two flow paths being substantially defined by heat exchanger plates (4-7) provided with a herring bone pattern of ridges and depressions (2,3), the herringbone pattern of two plates being mirror images of each other, wherein each other plate should be turned 180 degrees in its plane relative the adjacent plates, and offering different pressure drops at equal mass flows of the two fluids, wherein the depressions in at least some pairs of plates defining the flow path having the lower pressure drop at least partly are alternatively of two different press depths (D1,D2) measured from the plane defined by the tops of the ridges of the herring bone pattern of the heat exchanger plate, the smaller (D2) being located between two tops of the herring bone pattern and being at least 40% of the greater (D1), characterised in that the heat exchanger plates (4-7) are interconnected by soldering and in that the tops of the ridges engaging

the tops of a neighbouring plate to define a flow channel having high pressure drop substantially contact each other along points defined by crossing lines."

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

E1 does not disclose a herring-bone pattern. Figures 2 and 3 show a section from one side of the heat-exchanger to the other, so if a herring-bone pattern had been present it would have been shown in the exploded view of figure 4. The skilled person would assume that the herring bone pattern mentioned in the description applies to the pattern that would be seen from above when two plates are stacked on top of each other, as shown for example in figure 2 of the pattern. The only other alternative would be for the herring-bone pattern to have its centre-line at the mid-point of the longitudinal distance between the ports, but this would not make technical sense and would be dismissed by the skilled person.

The side portions 4 are designed to provide a sealing connection when every other plate is turned upside down with respect to its neighbouring plates. The space between the plates is best formed with straight lines extending obliquely to the axis of the plates since this shape is much easier to press than a herring-bone due to increased material stress in the tip of the herring-bone "arrows". In heat-exchangers where every other plate is turned upside down, there is no reason to use plates having a herring-bone pattern. However, where every other plate is instead turned through 180 degrees in its plane, the herring-bone feature is essential.

This means that the peripheral portions of the plates used in the heat-exchanger according to claim 1 are completely different to those of E1 since they are designed to overlap when the heat-exchanger plates are stacked onto one another, hence creating a tight seal at edge portions of the plates. Heat-exchangers according to E1 are much less efficient since there is a large flow area just inside the edge portions 4 that is excluded from heat exchange.

Reasons for the decision

1. Novelty - Main Request

- 1.1 Figure 1 of E1 shows a section line II across the width of the exchanger plates; the skilled person would normally understand this also to be the view depicted in figure 4 as well as figures 2 and 3. Thus, the skilled person would understand figure 4 to show a full width, but only partial length view of the plates since just one set of edge seals (4) is shown and the ports are absent. However, despite what is indicated in the description at page 4, line 1 of the English translation of E1, the plate sections illustrated in figure 4 do not exhibit a complete herring-bone pattern. Hence, there is some degree of ambiguity as to exactly what pattern is applied to the plates since, as the appellant has pointed out, a herring-bone pattern could be interpreted to mean that created by two plates stacked of top of one another when viewed from above. Consequently, it is not directly and unambiguously derivable from E1 that each plate is provided with a complete herring bone pattern since what is shown in figure 4 and the corresponding part of the description

do not entirely concur allowing other interpretations to be made.

1.2 E1 does not explicitly explain how the plates 2 are stacked together to make up the heat exchanger device. However, the skilled person would conclude that in the case of adjacent plates being substantially identical as specified by claim 2, alternate plates must then be turned over in order to obtain a seal at the periphery as shown in figures 2 to 4. In the device of E1, it is not possible to use two plates which are mirror images of each other, wherein each other plate is turned 180 degrees in its plane relative the adjacent plates since the sealing portions 4 would not contact.

1.3 Thus, the subject-matter of claim 1 is new since it differs from the device disclosed in E1 at least in that the plates of the heat-exchanger are provided with a herring bone pattern of ridges and depressions and the herringbone pattern of two plates are mirror images of each other, wherein each other plate should be turned 180 degrees in its plane relative the adjacent plates.

2. Inventive Step

2.1 It is still necessary for the Board to examine the question of inventive step with respect to E1 and the skilled person's general knowledge since the opposition division dealt with this matter with respect to the third auxiliary request in the contested decision (see paragraph 9.4) and it is therefore subject to review by the Board, even in the absence of the opponent.

- 2.2 The feature of providing a complete herring-bone pattern on a heat-exchanger plate would not in itself merit the recognition of an inventive step since such a provision is commonplace in the art of plate heat-exchangers.
- 2.3 The feature wherein each other plate should be turned 180 degrees in its plane relative the adjacent plates might at first sight be deemed to relate only to a method. However, it does in fact determine the nature of the plate edge construction to ensure correct sealing and optimal heat exchange performance since the requirements for symmetry are different depending on whether the plates are turned through 180 degrees in the horizontal plan or simply turned over.
- 2.4 Thus, starting out from E1 the problem to be solved can be seen to be one of how to maintain ease of manufacture, whilst improving the heat exchange performance.
- 2.5 By requiring that the plates are turned through 180 degrees in the horizontal plane relative to the adjacent plates it is implicit that the edge sealing design used in E1 is no longer suitable since it relies on a large surface contact area created by turning over alternate plates which is then either brazed or welded to provide a seal. Such a design directs a large amount of plate area to the sealing function and, as a result, is not optimal from a heat exchange aspect. As is shown in the description of the contested patent, turning the plates with a herring bone pattern through 180 degrees allows the flow channel requirement to be met and a more efficient peripheral seal design.

2.6 It would not be obvious for the skilled person faced with the above problem to modify the heat-exchanger of E1 in the manner specified in claim 1 on the basis of common general knowledge alone since it requires a complete rethink of how the plates in the exchanger should be stacked.

2.7 Thus, within the scope of the Board's possibility to review the contested decision, the subject-matter of claim 1 involves an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to maintain the patent as amended in the following version:
 - description pages 2 and 3 as filed at the oral proceedings before the Board of Appeal
 - claim 1 of the new main request filed at the oral proceedings
 - drawings: figures 1 to 9 as granted.

Registrar:

Chairman:

A. Counillon

U. Krause