BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File No.: T 0244/91 - 3.2.3

Application No.: 84 901 022.8

Publication No.: 0 137 815

Classification: F28F 3/10

Title of invention: Gasket for a plate heat exchanger

D E C I S I O N
of 1 October 1993

Proprietor of the patent: Alfa-Laval Thermal AB

Opponent: W. Schmidt GmbH & Co. KG

Headword:

EPC: Art. 56

Keyword: "Inventive step (denied)"

Headnote
Catchwords

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0 244/91 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 1 October 1993

Appellant:
(Proprietor of the patent) Alfa-Laval Thermal AB
Box 1721
S-221 01 Lund (SE)

Representative: Lerwill, John
A.A. Thornton & Co.
Northumberland House
303-306 High Holborn
London, WC1V 7LE (GB)

Respondent:
(Opponent) W. Schmidt GmbH & Co. KG
Pforzheimer Strasse 46
D-75015 Bretten (DE)

Representative: Lemcke, Rupert, Dipl.-Ing.
Patentanwälte Dipl.-Ing. R. Lemcke
Dr.-Ing. H.J. Brommer,
Postfach 40 26
D-76025 Karlsruhe (DE)

Decision under appeal: **Decision of the Opposition Division of the European Patent Office dated 12 December 1990, despatched in writing on 22 January 1991, revoking European patent No. 0 137 815 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: C.T. Wilson
Members: H. Andrä
L.C. Mancini

Summary of Facts and Submissions

I. European patent No. 0 137 815 comprising twelve claims was granted on 13 January 1988 in respect of the subject-matter contained in European patent application No. 84 901 022.8 filed on 22 February 1984.

II. A notice of opposition to the patent as granted was filed by the Respondent (Opponent)requesting that the patent in suit be revoked on the ground that its subject-matter was not patentable with regard to Article 52(1) and 56 EPC. In this statement, the Respondent referred *inter alia* to the following documents:

D1: DE-B-1 149 027
D2: DE-B-1 207 947
D3: K. Trutnovsky: "Berührungsdichtungen", Springer Verlag, 1975, pages 28,33,34,38,39,42,85,87,88,91,118.

III. The Opposition Division revoked the patent in a decision dated 12 December 1990 and despatched in writing on 22 January 1991 on the ground that the subject-matter of Claim 1 of the patent did not involve an inventive step within the meaning of Article 56 EPC in view of the documents D1 and D3.

IV. The Appellant (patent proprietor) lodged an appeal against the decision on 25 March 1991, the fee for appeal having been paid on 19 March 1991. The written statement setting out the grounds of appeal was received on 21 May 1991. In the written statement, the Appellant requested that in the event that the Board of Appeal should decide that the patent cannot be maintained with Claim 1 as granted, as a subsidiary request the patent should be upheld with an amended Claim 1.

The Appellant requested further that he be given an opportunity to request oral proceedings in the event that the Board of Appeal anticipated giving a decision upholding the decision of the Opposition Division and that an award of costs be made in his favour under the terms of Article 104 EPC should he be summoned to attend oral proceedings.

V. In a communication pursuant to Article 110(2) EPC dated 11 November 1992 and a communication pursuant to Article 11(2) R.P.B.A. dated 30 April 1993 the Board gave their provisional opinion that the subject-matter of Claim 1 according to both the main request and the subsidiary request did not seem to involve an inventive step.

VI. In the submission dated 18 January 1993, the Appellant withdrew his request for an award of costs and in the letter dated 31 August 1993, the Appellant withdrew his request for oral proceedings and asked that the oral proceedings, arranged for 16 December 1993, be cancelled.

VII. The Appellant requests according to the main request that the patent be maintained with the Claims 1 to 10 as granted and according to the subsidiary request that Claim 1 as granted be amended by adding at the end of the claim "and attaching the wire (3) to the plate (1)".

Claim 1 according to the main request reads as follows:

" A plate heat exchanger comprising a gasket sealing between two adjacent plates (1), a space (4) between the plates forming a passage for a heat exchange medium, and the gasket comprising a wire (3) of hard, essentially inelastic material, bridging a major part of the distance between the two plates (1), characterised in that the wire

forms a seal between the adjacent plates, and the wire (3) at a continuous line along the length thereof cooperates with an adjacent plate through an intervening layer (5,6) of sealing material interposed between an outermost limiting surface of the wire (3) and the adjacent plate(1) so that the heat exchange medium cannot pass between the wire (3) and plate, said sealing material (5,6) being softer than the material of the wire"

The Appellant's arguments in support of his requests can be summarised as follows:

The document D3 ("Trutnovsky") does not deal with gaskets suitable for plate heat exchangers. The directions which are needed to lead the skilled reader to select the particular form of gasket specified in Claim 1 of the patent in suit from the gamut of gaskets mentioned in "Trutnovsky" are just not there. Without the benefit of hindsight to show the route to follow, "Trutnovsky" does not provide the skilled reader with any obvious solution. To the extent that there are any helpful directions to be found in "Trutnovsky" they point to seals of different form to that stipulated in Claim 1 of the patent.

- The teaching on page 28 of document D3 is that by providing a hard seal with a soft coating, the clamping force which is needed to produce the plastic deformation necessary to achieve a seal is reduced.

- The hard element (5) in document D1 is really a spacer and there is no reason for anyone to consider applying a soft coating to this member as it is not required to seal against the plates, the sealing being provided by the soft elements (3).

- The choice of a gasket as claimed was not within the customary practice of the skilled person to the extent that there was most certainly a prejudice against such a choice in application to a plate heat exchanger.

- Having regard to the subject-matter according to the auxiliary request, it is admittedly well known for traditional rubber gaskets to be attached to heat exchanger plates, by a glue. However, the glue does not fulfil any sealing function which is completely satisfied by the rubber gasket. According to the invention, the benefits of having the gasket attached to the plate are obtained without need for an adhesive composition additional to the essential elements of the gasket itself.

VIII. The Respondent requested that the appeal be rejected and the revocation of the patent be confirmed. He argued that the inherent problem to be solved had been admitted by the patentee to be known and that the skilled person starting from the prior art disclosed in document D1 and taking account of the disclosure of the document D3 forming part of the standard literature in the technical field of gaskets would find the solution according to Claim 1 of the main request in an obvious way. The subject-matter of Claim 1 according to the subsidiary request would also not involve an inventive step since it was generally known in the process of mounting heat exchanger plates to attach the gasket with an adjacent plate by gluing, an example of which would be described in document D2.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC; it is admissible.

2. Having regard to admissibility of the claims in respect of amendments the following is noted:

2.1 *Main request*

Claim 1 derives essentially from original Claim 1.

The feature of Claim 1 that the wire (3) at a continuous line along the length thereof cooperates with an adjacent plate through an intervening layer of sealing material interposed between an outermost limiting surface of the wire and the adjacent plate is based on page 5, lines 11 and 12 of the original description in combination with the figure of the original drawing.

The feature of Claim 1 that the sealing material is softer than the material of the wire can be derived from the original description on page 3, line 22 to page 4, line 2 in combination with page 4, lines 20 to 28 which discloses that the wire material may be metal or another hard and resistant material and that the sealing function can be arranged by connection of the wire with the plates by means of a soft material, e.g. rubber.

Claims 2 to 6 are based on the corresponding original claims, Claim 7 is based on original Claims 5 and 6, respectively, Claim 8 on original Claim 7, Claim 9 on original Claim 10 and Claim 10 on the drawing figure in combination with the description of the original documents.

The claims are not, therefore, open to an objection under Article 123(2) EPC.

2.2 *Subsidiary request*

Having regard to the further feature of Claim 1 "the sealing material (5,6) attaching the wire (3) to the

plate(1)", the Appellants have referred to column 3, lines 37 to 43 of the patent which corresponds to page 4, line 30 to page 5, line 1 of the original description. From this passage, the cited further feature can be derived (Article 123(2) EPC).

Since this feature is of a character limiting further the scope of granted Claim 1, the requirement of Article 123(3) EPC is also satisfied.

3. Since the existence of novelty has not been in dispute with regard to either the main or the subsidiary request, the question to be decided is whether the subject-matter set forth in the respective Claim 1 involves an inventive step.

4. *Main request*

4.1 It is not in dispute that document D1 (cf. Figure 2) reflects the nearest prior art with respect to the subject-matter of Claim 1. This citation describes a plate heat exchanger comprising a gasket sealing (3,5) between two adjacent plates, a space between the plates forming a passage for a heat exchange medium, and the gasket comprising a wire (5) of hard, essentially inelastic material bridging a major part of the distance between the two plates, whereby the wire forms a seal between the adjacent plates so that the heat exchange medium cannot pass between the wire and plate. In this known gasket, a soft sealing element (3) is arranged between two sealing elements (5) being essentially harder than the soft sealing element.

The plate heat exchanger according to Claim 1 is distinguished over the disclosure of document D1 in that the wire at a continuous line along the length thereof cooperates with an adjacent plate through an intervening layer of sealing material interposed between an

outermost limiting surface of the wire and the adjacent plate, said sealing material being softer than the material of the wire.

4.2 In the description of the patent in suit it is stated that the gasket assembly known from document D1 suffers from the drawbacks that it is complicated and expensive due to an arrangement of three separate elements, that it requires a broad gasket groove which reduces the useful area of the heat exchanger plates and that the sealing capability of the gasket assembly is expected to deteriorate rapidly if the heat exchanging medium has a high temperature since the elastic sealing gasket will lose its elasticity.

It follows from these drawbacks that the inherent problem to be solved by the subject-matter of Claim 1 in view of the prior art described in document D1 is to provide a plate heat exchanger which is simple and economical in construction and disposes of an increased area of the plates available for heat exchange whilst safeguarding an extended service life of the gaskets in case of heat exchange fluids of high temperature.

The arrangement of a wire, i.e. a single wire, which at a continuous line along the length thereof cooperates with an adjacent plate through an intervening layer of sealing material interposed between an outermost limiting surface of the wire and the adjacent plate, the sealing material being softer than the material of the wire, avoids the constructionally expensive arrangement of the prior art which comprises for each passage to be sealed a series of three sealing elements in juxtaposition. Besides, the width of the space needed for sealing is reduced which increases the plate area available for heat exchange, and service life may be maintained or even extended since the wire of hard

substantially inelastic material acts as the main sealing element.

Therefore, the Board has no doubt that the problem as cited above can be regarded as being solved by Claim 1.

4.3 Simplicity of the contraction and an extended service life are goals aimed at by the skilled person not only in the technical field of heat exchangers, but in general. For reason of obtaining a high efficiency of heat exchange, the skilled person will also endeavour to design the heat exchanger with regard to achieving the maximum heat exchange area in respect of the available space.

As conceded by the Appellant in his letter of 18 January 1993, the recognition of the underlying problem cannot, therefore, be regarded as contributing to the existence of an inventive step.

4.4 An issue disputed in the proceedings by the Appellant was the question of whether the document D3 ("Trutnovsky") was part of the prior art to be considered by the skilled person faced with the inherent problem.

As already outlined in section 3.1.5 of the communication of the Board dated 11 November 1992, the jurisprudence of the Boards (cf. e.g. Decision T195/84, OJ EPO 1986, 121 and Decision T 176/84, OJ EPO 1986, 50) has set up principles with regard to this question which are generally acknowledged. The essential point is that the state of the art to be considered when examining for inventive step includes the state of any relevant art in neighbouring fields and /or a broader general field of which the specific field is part, that is to say any field in which the same problem or one similar to it

arises and of which the person skilled in the art of the specific field must be expected to be aware.

The field "gaskets for machine parts" which is dealt with in document D3 constitutes a non-specific field in relation to the field "gaskets of plate heat exchangers" The inherent problem to be solved by the patent in suit concerns the improvement of the gasket arrangement in respect of the simplicity of construction and of the service life, a further aspect residing in the choice of a gasket which is appropriate for use in a plate heat exchanger with high temperature heat exchange fluids. Since the aspects of a simple construction and an extended service life are not restricted to gaskets of heat exchangers but must be observed with gaskets provided for various machine parts, the Board is convinced that the person skilled in the art of heat exchangers will take account of the publication D3 or will at least consult a specialist in the non-specific field of gaskets who must be expected to be familiar with such standard literature.

4.5 The skilled person is taught by the document D3 (cf. page 28, first paragraph and section "Vorteil von weichen Beschichtungen") that the bearing element can be coated with a soft material of plastics or metal, the soft material constituting the real sealing element. On page 33, last paragraph of document D3 it is disclosed that an increase of the sealing force may be obtained if a surface sealing is replaced by a linear sealing, that is, the sealing element cooperates with its counterpart at a continuous line along the length thereof. The gasket may have the form of a hollow or solid metal ring coated with plastics or relatively soft metals as disclosed in section 9.4.2 (page 118) of document D3. As an alternative to the ring, the gasket may be a wire as shown in document D1 (reference sign "5" in Figure 2)

In document D3 (cf. the above-cited passage on page 28) gaskets consisting of hard material coated with softer material are described to be advantageous in so far as also in the case of a decreasing gasket load the adaptation of the sealing areas and hence the sealing effect is maintained. This property is said in the cited passage to allow the use of materials which in the operating temperature range suffer already a substantial loss of strength.

Due to these benefits the skilled person would be motivated to substitute the above-indicated type of gasket known from document D3 for the gasket described in the plate heat exchanger according to document D1.

4.6 The Appellant argues that the teaching on page 28 of document D3 is that by providing a hard seal with a soft coating, the clamping force which is needed to produce the plastic deformation necessary to achieve a seal is reduced.

This teaching is, indeed, provided in the above-cited passage of document D3 and it is further added that coatings with slightly plastically deformable materials have the same purpose and should only be as thick as absolutely required in order to avoid unnecessary creep deformations during operation.

These passages of document D3 cannot, however, be said to contradict the general recommendation of the citation (cf. above section 4.5) to make use of gaskets consisting of hard material coated with softer material, but provide rather an explanation as to the operation and the effects to be achieved by such gaskets.

The Appellant argues further that a prejudice was to be overcome to choose a gasket as claimed in application to

a plate heat exchanger and to turn away from gaskets comprising elastomeric sealing members.

In this respect, attention is drawn to the fact that Claim 1 of the patent in suit does not exclude elastomeric sealing members, the only limitation stipulated in the claim with regard to the sealing material being "...said sealing material being softer than the material of the wire".

Having regard to the alleged prejudice in the art it is observed that gaskets being composed of a hard inelastic material and of a softer material in application to a plate heat exchanger are basically known, cf. e.g. document D1 (Figure 2, "soft gaskets 3"; "harder gasket elements 5"). Furthermore, no evidence has been submitted by the Appellant in support of his point that the solution as claimed was contrary to the prevailing thinking in the field of plate heat exchangers.

The existence of a prejudice in the art against the choice of the type of gasket as claimed cannot therefore, be recognised.

4.7 For the above reasons, the subject-matter according to Claim 1 of the main request is obvious and does not involve an inventive step within the meaning of Article 56 EPC; therefore it lacks patentability and cannot be allowed.

4.8 Since dependent claims can only be allowed if there is an acceptable independent claim to which they are appended and since this condition is not fulfilled, Claims 2 to 10 cannot be maintained either.

5. *Subsidiary request*

5.1 Claim 1 is distinguished from Claim 1 according to the main request by the wording added at the end of the claim "and attaching the wire (3) to the plate (1)".

5.2 According to the Appellant, employing the layer of soft material to attach the wire to the plate secures the significant technical advantage that gasket replacement is facilitated without need to dismantle the plates from the supporting frame of the heat exchanger which is very inconvenient when large plates are involved (cf. page 7, last paragraph of the Statement of Grounds of Appeal).

The Board is not convinced that the feature that the sealing material attaches the wire to the plate leads to facilitating the gasket replacement without the need to dismantle the plates from the supporting frame. The effect obtained by applying said feature consists rather in a rigid connection between the wire and the adjacent plates so that the position of the wire relative to the plates is fixed.

Hence, the problem underlying the subject-matter of Claim 1 comprises the additional aspect in relation to the problem underlying Claim 1 of the main request that movement of the sealing element relative to the adjacent plates should be avoided.

5.3 Document D2 (cf. Figure 1 and Column 1, lines 12 to 16) discloses a plate heat exchanger in which sealing strips of a resilient material are arranged between the plates in grooves thereof and are attached by means of a glue.

In this context, the Appellant puts forward the following argument:

> "Admittedly, it is well-known for traditional rubber gaskets to be attached to heat exchanger

plates by a glue. However, the glue does not fulfil any sealing function...".

In the view of the Board, there can be no doubt that the glue as employed in the plate heat exchanger known from document D2 fulfils a sealing function since it attaches the sealing strip to the surface of the plate to be sealed. The glue employed in this known plate heat exchanger performs as a sealing material in basically the same manner as according to the patent in suit (cf.column 3,lines 37 to 43) which teaches that the glue to be selected should be temperature and liquid resistant. It is clear that such properties of the glue are only required because contact of the glue with the heat exchange medium is to be expected which means that the glue interposed between the gasket and the plate contributes to sealing and constitutes therefore a sealing element.

With the arrangement of a resilient sealing strip attached to the plates by means of a glue as described in document D2, it can be expected that any movement between the sealing strips and the plates can be avoided. The prior art would therefore suggest to the skilled person to take the additional measure of attaching the wire of hard material to the plates by means of the sealing material and to arrive thus at the subject-matter of Claim 1.

5.4 It follows from the above considerations that also the subject-matter of Claim 1 of the subsidiary request is obvious (Article 56 EPC) and lacks therefore patentability.

5.5 Claims 2 to 10 being dependent on an unacceptable Claim 1 cannot be maintained either.

Order

For these reasons, it is decided that:

1. The appeal is dismissed.

The Registrar: The Chairman:

N. Maslin C.T. Wilson