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D E C I S I O N
of 9 September 1994

Case Number: T 0505/92 - 3.2.3

Application Number: 86906970.8

Publication Number: 0277138

IPC: F28F 3/10

Language of the proceedings: EN

Title of invention:
PLATE HEAT EXCHANGER

Patentee:
ALFA-LAVAL THERMAL AB

Opponent:
W. Schmidt-Bretten GmbH

Headword:
-

Relevant legal norms:
EPC Art. 56

Keyword:
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0505/92 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 9 September 1994

Appellant: (Opponent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office dated 18 March 1992 with the written grounds sent on 9 April 1992 rejecting the opposition filed against European patent No. 0 277 138 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: C. T. Wilson
Members: J. du Pouget de Nadaillac
W. Moser

Summary of Facts and Submissions

I. The present appeal contests the decision of the Opposition Division of the EPO dated 18 March 1992 with the written grounds sent on 9 April 1992. In this decision, the Opposition Division rejected an opposition filed against all the claims of European patent No. 0 277 138 (Application No. 86 906 970.8) and maintained the patent as granted.

II. Claim 1 of this patent, as granted, reads as follows:

"Plate heat exchanger having a number of heat exchange plates, a gasket applied between two adjacent plates in the heat exchanger defining a flow passage between the plates for a heat exchange medium, the gasket being composed partly by a metal strip and partly of a softer material, characterized in that the said metal strip (5) is fastened to one of the plates (1, 2) and bridges at least 50% but less than the whole distance between the plates, and a layer (7) of the softer material is applied to a surface of the metal strip directed towards the other of said two plates (1, 2), the said layer (7) bridging the remaining part of said distance between the plates".

Dependent Claims 2 to 8 are directed to further details of the plate heat exchanger according to Claim 1.

III. The patent was opposed by the Appellant (Opponent) on the grounds that the subject-matter of all claims lacks inventive step in view of the following prior art documents:

(1) GB-A-2 080 930

(2) WO 84/03354 (corresponding to EP-B-0 137 815, this last document being published after the priority date of the patent).

IV. The Appellant lodged the appeal on 29 May 1992 and paid the appeal fee on the same date. The Statement of Grounds of Appeal was filed on 6 August 1992.

In this Statement, the Appellant raised the same ground as in the opposition procedure, namely the lack of inventive step, however in view of the above mentioned document (1) and of two of the prior art documents considered in the examining proceedings, namely:

(3) GB-A-2 117 890
(4) EP-A-0 024 195

The Respondent (Proprietor of the patent), in a letter received on 23 December 1992, challenged the Appellant's arguments.

V. Both parties made auxiliary requests for oral proceedings. Therefore, the Board of Appeal summoned them to such proceedings to be held on 26 June 1994 and simultaneously, in a communication dated 14 March 1994 in preparation of these proceedings, the Board indicated its provisional opinion, particularly on the interpretation of Claim 1.

In response to this communication, the Respondent sent two auxiliary requests, in each one of which a few amendments are brought to the wording of Claim 1.

By a telefax sent on 6 June and conveyed by the Respondent, the Appellant withdrew his request for oral proceedings. The Board decided, therefore, to cancel these planned proceedings.

VI. The Appellant argued as follows:

It cannot be said that document (2), which solves the same problem as the contested invention according to granted Claim 1, goes in a different direction than the present invention. In this prior art, the need for providing different supports for the sealing materials according to different sizes or forms of the heat exchange plates is disclosed and the present invention does nothing other than follow this solution. Document (2) teaches that "the wire (of hard material) at least at certain places along its extension is connected with the plates in such a way that the heat exchanging medium cannot pass the wire". Thus, the teaching of a wire, which "bridges at least 50% but less than the whole distance between the plates", is given. No difference can be seen, in such a case, between a wire and a strip, when the idea of choosing the dimensions of the hard support in accordance with the type of exchange plates and of keeping the same seal for all kinds of plates is given in document (2).

It is also not possible to consider as inventive the feature according to which the softer material is located on only one side of the hard material. Document (3), for example, teaches to provide the seal on both opposite sides of a hard support.

Moreover, document (2) is not limited to the form of a wire and suggests to use other forms, see in this respect pages 3 and 4. In any way, it is clear for a person skilled in the art that, in view of the sealing function to be fulfilled, rectangular as well as round forms can be applied and, since he knows very well that, with a round form, the soft sealing layer is likely to tear easily when subjected to strong clamping forces, he is led to choose another form, which avoids this danger.

It is not a question of thickness, as argued in the contested decision, since in document (2) as in the present invention the soft material has a constant thickness, its function being identical in both cases, namely to bridge the remaining part between the plates, whereby the adaptability of the gasket to different types of plates is achieved by the metal support.

Document (2), indeed, teaches to apply the soft material around the wire, so that both sides of the wire, which are pressed against the plates, are covered. However, it is well-known to apply such a layer on only one contacting surface of the metal support with the other contacting surface being fastened to its adjacent plate (see in this respect document (3)). It is only a question of choice.

For all these reasons, the subject-matter of Claim 1 is obvious.

VII. The Respondent argued that, if indeed document (2) teaches to make the wire with different sizes in order to cater for different distances between the plates, the wire in this prior art bridges **essentially** the distance between the plates. Thus, the soft material in this prior art performs the sealing function in a quite different way than the present invention. It mainly fills the small triangular spaces defined between the wire and plate adjacent the main contact area and, therefore, is not subjected to the strong clamping forces. Document (3) cannot be combined with document (2), since it concerns a different kind of gasket.

VIII. The Appellant requested that the decision of the Opposition Division be set aside and that the patent be revoked in its entirety.

The Respondent requested the appeal to be dismissed or the patent to be maintained according to one of the auxiliary requests.

Reasons for the Decision

1. The appeal is admissible.

2. *Main request: Patent as granted*

As may be seen from points IV and VI above, the only question to be answered in this appeal is whether or not the patent in suit involves an inventive step.

3. The gasket disclosed in document (2) represents the closest prior art. This known gasket is intended to be applied between two adjacent plates forming part of a heat exchanger, the space between the plates forming a passage for a heat exchange medium. These plates are usually rectangular and are sealed off from each other by means of edge gaskets.

The gasket according to this closest prior art comprises a wire of hard material, namely metal, and this wire has a diameter, which mainly corresponds to the distance between the two plates. Thus, the wire **essentially bridges** the distance between the two plates. Since, however, the sealing function of the metal wire is not good enough, this sealing is improved at least in certain places by means of a soft material, like rubber, teflon or plastics, which coats either the wire or the sealing surfaces of the plates (Embodiments A and B). In a third embodiment (c), the wire is connected with the plates by means of a glue or by welding or soldering.

4. The gasket according to Claim 1 of the contested patent differs from this prior art in that:

i) the hard material is in the form of a **strip**, which bridges at least 50%, but **less than** the whole distance between the plates;

ii) the strip is fastened to one of the two plates; and

iii) the softer layer is applied to the surface of the strip directed towards the other of said two plates and bridges the remaining part of said distance between the plates.

Since the softer layer is applied to a surface of a strip, it can fulfil a complete sealing function on one side of the strip, while this function is achieved by the fastening means on the other opposite side. The softer material, which bridges a part of the distance between the plates, has a certain, although limited, thickness and can, therefore, support the clamping force, which is transmitted through it. Moreover, high resistant material, such as graphite, having low elasticity in comparison with rubber, can be used as softer material, although being expensive.

5. According to the description of the patent in suit, it is the object of the present invention to increase the working life of the gaskets and their adaptability. These two problems are also addressed in the above mentioned closest prior art, but they are solved in a different way as explained hereafter, even if certain similarities apparently appear. Therefore, starting from the gasket known from document (2), the objective problem underlying the present invention is to be seen in the search for an alternative solution to the same problems.

6. The feature i) of Claim 1 makes clear that the metal strip bridges at least 50% but **less than the whole distance** between the plates. A figure of at least 5% of the distance being filled by the soft layer is given as an example in the description. From Claim 1, it is therefore clear that the soft material has to fill a certain gap between the metal strip and the plate to which the strip is not fastened. It has, therefore, a significant thickness, so that it is clear that it is the soft material which essentially fulfils the sealing function, whereas the function of the metal strip is to make the gasket adaptable to different spaces between the plates. The fact that a strip, and not a wire, is provided for the metal component of the gasket emphasizes this difference between the functions of both components, since the strip form provides a broad contact surface between the soft material and the plate, "perfect sealing being achieved by the fact that the plate is pressed against the layer" (Description column 2, lines 46 to 47).

7. Document (2) does not provide the same teaching. It is indeed true that this closest prior art, also, teaches to adapt the dimension of the metal component in accordance with the distance between the plates, as is the case in the present invention, but in this prior art it is said that the metal wire of the gasket bridges **substantially the entire distance** between the plates. Page 4 of this prior art indicates that "the bridging metal wire shall have a diameter that **mainly** corresponds to the distance between two adjacent plates", and, a few lines further, that the **sealing function of the metal wire** ought to be improved at least in certain places, where the metal wire cannot independently manage the sealing.

The metal wire according to this closest prior art fulfils therefore two functions, namely the sealing function and the distance adapting function. The soft material is only taught as means for **improving** the sealing function of the wire, when necessary. The figures of this prior art show that only a thin layer of soft material coats either the wire or the plates. Rubber is mentioned as soft material and it is known that, at high temperatures, a thick rubber layer rapidly deteriorates, so that usually only a thin layer is used. Such a thin layer cannot support the clamping force, which in fact is supported by the wire, and the soft material enhances the sealing function of the wire by packing the small spaces on either sides of the main contact region. Document (2), with its embodiment (c), describes as equivalent a joint connection in the form of glue, soldering seam or weld joints, which also fill the same spaces.

Thus, in this prior art, the sealing function is not fulfilled in the same way as in the present invention, so that it cannot be argued that this prior art gives a hint in the direction of providing a layer of soft material, which alone fulfils the sealing function on at least one side of the gasket.

8. Moreover,no suggestion can be found in document (2) for applying the soft layer on the surface of a metal **strip**. The document, indeed, mentions the fact that "the wire profile can have another form than round", but such a suggestion does not lead the specialist to use a strip, since it still puts the emphasis on a **wire** profile, which implies a "round" form.

9. Document (3) teaches a gasket made of a plastic or metal insert having on its sides, which face the plates, grooves for receiving elastomeric seals, such as O-ring

type seals. The teaching of this document is the same as that of document (2), since the insert extends the whole distance between the plates as shown by the figures of this prior art.

10. To summarize, two features of Claim 1 of the granted patent, namely features i) and iii), as referenced in point 4, work together and are not suggested by either document (2) or document (3), nor by any of the other documents cited in the previous proceedings. It is therefore of no significance whether feature ii) per se is suggested or not by the prior art.

It is noticed, however, that this last feature, even if it solves a particular other problem, namely an easy dismantling of the plates, contributes also to the solution of the problem solved by features i) and iii), since it also fulfils a sealing function. Therefore, a real combination of features is obtained and is not suggested by the prior art.

11. Thus, the subject-matter of Claim 1, as granted, involves an inventive step as required by Articles 52 and 56 EPC. The dependent Claims 2 to 8 defining embodiments of the subject-matter of Claim 1 are, therefore, also patentable and it is not necessary, under these circumstances, to consider the auxiliary requests of the Respondent.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

N. Maslin C. T. Wilson