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File Number: T 443/90 - 3.2.3

Application No.: 85 303 220.9

Publication No.: 0 169 632

Title of invention: Tank header plate connection

Classification: F28F 9/02, B23P 11/00

D E C I S I O N
of 16 September 1992

Applicant:

Proprietor of the patent: Modine Manufacturing Company

Opponent: Behr GmbH & Co.

Headword: Tank header plate connection/MODINE

EPC Article 56, 104

Keyword: "Inventive step - main request (no), subsidiary request (yes)"
"Request for awarding costs (rejected)"



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Boards of Appeal

Chambres de recours

Case Number : T 443/90 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 16 September 1992

Appellant :
(Opponent)

Behr GmbH & Co.
Mauserstrasse 3
Postfach 30 09 20
W-7000 Stuttgart 30 (DE)

Representative :

Respondent :
(Proprietor of the patent)

Modine Manufacturing Company
1500 DeKoven Avenue
Racine
Wisconsin 53401 (US)

Representative :

Allden, Thomas Stanley et al.
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Decision under appeal :

Decision of Opposition Division of the European
Patent Office dated 12 March 1990, despatched in
writing on 3 April 1990, rejecting the
opposition filed against European patent
No. 0 169 632 pursuant to Article 102(2) EPC.

Composition of the Board :

Chairman : F. Brösamle
Members : H. Andrä
L.C. Mancini

Summary of Facts and Submissions

- I. European patent No. 0 169 632 was granted on 10 February 1988 on the basis of European patent application No. 85 303 220.9 filed on 7 May 1985.

- II. A notice of opposition to this patent was filed by telecopy on 8 November 1988, confirmed by letter received on 10 November 1988, wherein the Appellants (Opponents) requested that the patent be revoked on the ground of lack of inventive step. The opposition was based on
 - D1: US-A-4 331 201
 - D2: GB-A-2 075 633
 - D3: US-A-3 399 916
 - D4: DE-A-2 021 813
 - D5: US-A-3 732 616.

- III. The opposition was rejected by the Opposition Division with a decision dated 12 March 1990, issued in writing on 3 April 1990. According to the decision, it would not have been obvious to apply the feature of a tapering tab located below a side wall edge to an apparatus according to document D1 so as to arrive at an apparatus according to Claim 1 of the patent.

- IV. The Appellants filed an appeal against this decision on 25 May 1990, the appeal fee being paid on the same day. The Statement of grounds of appeal was filed on 5 July 1990.

The Appellants requested that the patent be revoked in its entirety. As an auxiliary measure they requested oral proceedings.

V. In a communication pursuant to Article 11(2) RPBA dated 28 February 1992 the Board gave its provisional opinion, pointing out that the teaching of document D2 either alone or in combination with the relevant prior art disclosed in document D1 would not appear to lead in an obvious way to tabs in which the lower edge is the only free edge, i.e. so that the tab merges into the side wall on all sides of the tab except that defining the free edge.

VI. With letter of 4 September 1992 received on 5 September 1992 the Appellants cited for the first time

D7: FR-A-1 327 468

and stated that the subject-matter of the granted independent claim would be arrived at immediately and entirely by a combination of the documents D1 and D7, no obstacle to such a combination of teachings by the person skilled in the technical field of sheet metal processing being perceivable.

VII. In the oral proceedings held on 16 September 1992 the newly filed document D7 was admitted to the proceedings by the Board in the execution of their discretion under Article 114 EPC. The Appellants requested that the decision under appeal be set aside and that the European patent be revoked in its entirety.

The Respondents (Patentees) requested that the appeal be dismissed and that the patent be maintained on the basis of the main request (Annex A) presented at oral proceedings and of a subsidiary request (Annex B) also presented at oral proceedings in combination with drawings as granted.

The Respondents also requested with telecopy filed on 15 September 1992 that they be awarded costs.

VIII. The independent Claim 1 of the main request reads as follows:

"A heat exchanger comprising: a metal header plate (12) supporting the open ends of a plurality of tubes (16); a gasket receiving area (28) extending about the periphery of said header plate and having a bottom wall (32) surrounded by an upstanding deformable side wall (30) terminating in an edge (48); a compressible gasket (40) in said gasket receiving area; a plastics tank (10) having an opening surrounded by an outwardly extending flange (20), said flange being sized and configured to be fitted within said gasket receiving area with one side (24) of the flange abutting said gasket and another side (22) of the flange within said area and spaced from said side wall edge (48), said tank compressing said gasket so that said gasket effects a seal between said tank and said header plate; and a plurality of tabs (42) in said side wall overlying said another side (22) to hold said tank in compressing relation to said gasket, each said tab being formed by deformation and piercing of said side wall after said flange has been fitted within said gasket receiving area to have a nominally planar free edge (44) displaced from said side wall and in contact with said another side (22) of said flange, characterised in that each said tab (42) is located below the side wall edge (48) and tapers from said free edge (44) toward said side wall edge (48) to merge into said side wall (30) on all sides of said tab except that defining the free edge prior to or at said side wall edge (48)."

According to Claim 1 of the subsidiary request, the following passage is added at the end of Claim 1 according to the main request:

"and said side wall (30) in the area of said tabs (42) and above said free edge (44) is deformed towards said tank (10) to at least overlie said flange (20) to assure abutment of said free edges (44) with said another side (22)."

- IX. The arguments of the Appellants insofar as these are relevant to the present claims in support of their request can be summarised as follows:

The newly cited document D7 discloses all features according to the characterising part of Claim 1 of the main request. Although this document concerns in particular the technical field of brake boosters, its teaching has to be taken into account on designing the joint between the header plate and the tank of a heat exchanger. In solving such a problem the practitioner to be addressed is the person skilled in the art of deforming sheet metal. Moreover, prevention of leakage is an issue common to brake boosters and to heat exchangers. Thus, the subject-matter of Claim 1 of the main request would be obvious from a combination of documents D1 and D7.

Having regard to Claim 1 of the subsidiary request, the additional measure according to the granted Claim 3 follows logically from the step of deforming and piercing of the side wall in order to form the tabs. No particular advantage can be seen in this additional measure and the subject-matter of Claim 1 would therefore also not involve an inventive step.

The request that the patentees be awarded costs is not justified. The admittance of the newly filed document D7 has not caused any further costs, in particular since

remittal of the case to the first instance was not envisaged. The costs in the appeal procedure shall not, therefore, be apportioned and every party to the procedure shall bear the costs they have incurred.

X. The Respondents have argued essentially as follows:

The invention concerns a heat exchanger with a metal header plate and a plastics tank. The joint between the header plate and the tank is subjected to extended variations in temperature, no leakage at all being acceptable. The person competent with such problems is not the person skilled in the art of brake boosters but the heat exchanger specialist. Brake booster joints such as known from documents D2 and D7, respectively, do not have to withstand high pressure differences as in joints of heat exchangers which are exposed to frequent and strong variations of temperature. Moreover, according to the disclosure of document D7, the tabs are formed prior to assembly of the parts to be connected whereas according to the invention the tabs are formed after the flange of the tank has been fitted within the gasket receiving area. Even if the skilled person combined the teachings of documents D1 and D7 he would not arrive in an obvious way at the subject-matter of Claim 1 of the main request.

The subject-matter of Claim 1 of the subsidiary request leads to a further enhancement of the resistance of the tabs. The additional feature of Claim 1 corresponding to the feature of granted Claim 3 is by no means an automatic consequence of the process of forming the tab but constitutes a separate measure which is not disclosed in any of the prior art documents revealed in the proceedings.

Having regard to the reasons for the request that the patentee be awarded costs it must be considered that inadequate time was available between the date when the newly filed document D7 was received and the date fixed for oral proceedings to enable the Representatives of the Respondents to discuss the latest citation extensively with their clients. Furthermore, the late citation of document D7 had as consequence that arguments had to be forwarded by the Respondents which would have been rendered superfluous in case that the late citation had been cited earlier.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rules 1(1) and 64 EPC; it is admissible.
2. Main request
 - 2.1 Admissibility of amendments
 - 2.1.1 Claim 1 is based essentially on original Claim 6. The introductory wording of original Claim 6 "A connection for securing a tank to a header plate in a heat exchanger ..." has been eliminated in present Claim 1. This feature is, however, incorporated in Claim 1 in substance, cf. "... said tank compressing said gasket so that said gasket effects a seal between said tank and said header plate ...".

The term "opposite side of the flange" of original Claim 6 has been replaced by the term "another side of the flange" in Claim 1. It is clear from the wording of Claim 1 "... and a plurality of tabs in said side wall overlying said another side to hold said tank in compressing

relation to said gasket ..." that the "another side of the flange" corresponds with the "opposite side of the flange".

The feature of Claim 1 that the deformable side wall is "upstanding" is derivable from the original description, page 5, lines 25 to 28.

The feature that the tank is a plastics tank is disclosed on page 5, lines 13 to 17 of the original description.

The measure concerning the forming of each tab by deformation and piercing of the side wall after the flange of the tank has been fitted within the gasket receiving area, is based on page 6, paragraph 1 and page 7, paragraph 1 of the original description.

The feature that the tab tapers from the free edge toward the side wall edge to merge into the side wall on all sides of the tab except that defining the free edge prior to or at the side wall edge can be derived from Figures 3 and 4 in combination with page 6, paragraph 2 of the original drawings and description, respectively.

Claim 1 is not, therefore, objectionable under Article 123(2) EPC.

The same consideration applies to the dependent Claims 2 to 4 in the granted version which are based on the original description, page 6, paragraph 2 (cf. Claim 2) and page 7, paragraph 2 (cf. Claims 3 and 4).

- 2.1.2 Claim 1 differs in essence from Claim 1 of the patent only in the sense that the above-cited additional features (cf. section 2.1.1) concerning
- the material of the tank

- the order of the steps of forming the tabs and mounting the assembly parts
- the shape of the tabs

have been introduced. Thus, obviously the scope of protection conferred has not been extended and the claims also meet the requirement of Article 123(3) EPC.

2.2 Novelty

No document is available which describes in combination all features of Claim 1. The subject-matter of Claim 1 is therefore novel and meets the requirements of Article 54 EPC. Since novelty has, in fact, not been disputed by the Appellants in the appeal proceedings no further discussion of this issue is necessary.

2.3 Inventive step

- 2.3.1 The closest state of the art is described in document D1 on which the precharacterising portion of Claim 1 is based. This document discloses (cf. in particular Figures 1 to 3 and 7 with appertaining description) a heat exchanger comprising: a metal header plate supporting the open ends of a plurality of tubes; a gasket receiving area extending about the periphery of said header plate and having a bottom wall surrounded by an upstanding deformable side wall terminating in an edge; a compressible gasket in said gasket receiving area; a plastics tank having an opening surrounded by an outwardly extending flange, said flange being sized and configured to be fitted within said gasket receiving area with one side of the flange abutting said gasket and another side of the flange within said area and spaced from said side wall edge, said tank compressing said gasket so that said gasket effects a seal between said tank and said header

plate; and a plurality of tabs in said side wall overlying said another side to hold said tank in compressing relation to said gasket, each said tab being formed by deformation and piercing of said side wall after said flange has been fitted within said gasket receiving area to have a nominally planar free edge displaced from said side wall and in contact with said another side of said flange.

The subject-matter of Claim 1 is distinguished from the heat exchanger known from document D1 by the following features:

- (a) each tab is located below the side wall edge
- (b) each tab tapers from the free edge toward the side wall edge to merge into the side wall on all sides of the tab except that defining the free edge prior to or at the side wall edge.

2.3.2 In the heat exchanger known from document D1, the tabs arranged in the upstanding deformable side wall (8) of the gasket receiving area have the shape of corrugated bulges (7) which only laterally, i.e. in circumferential direction of the header plate, merge into the side wall. Consequently, pressure of liquid and gas within the space formed by the tank and the header plate acting during operation of the system upon the corrugated bulges may tend to deform the material back towards its original configuration whereby leakage of the system may occur.

The problem to be solved by the subject-matter of Claim 1 may therefore be seen in eliminating the above-cited disadvantage of the known heat exchanger and providing an improved resistance of the tabs to deformation.

The features according to the characterising portion of Claim 1 have the effect that each tab merges into the upstanding side wall not only in lateral direction but, due to its tapering configuration, also upward, i.e. in a direction in which the forces generated by the system pressure from within the space confined by the tank and the header plate act primarily. The location of the tabs below the side wall edge safeguards that a sufficient amount of side wall material is provided above the upper outline or merging region of the tab to transfer the forces acting on the tabs to the side wall. Thus, an improved distribution of the forces imposed on the tabs to the side wall may be obtained reducing thereby the risk of deformation of the tabs by such forces.

- 2.3.3 In his search of solutions to the above-cited underlying problem the person skilled in the art may come across document D7. This document concerns the assembly of tubular or hollow pieces of whatever type fitted together and deals in particular with the assembly of servo boosters consisting of two pressed parts between which a flexible diaphragm is provided (cf. page 1, right-hand column, penultimate paragraph). The citation also tackles the problem of obtaining a reliable connection of the parts to be assembled whereby fluid tightness of the assembly is safeguarded (cf. page 1, left-hand column, paragraph 1 and "Résumé" on page 2).

Although document D7 does not concern the particular field of heat exchangers it relates to a non-specific general field in which a problem similar to that underlying the invention is to be solved.

The Board follows in the present case the principle laid down in Decision T 195/84 - 3.2.1 dated 10 October 1985 published in the OJ EPO 5/1986, 121. According to said

Decision (cf. section 8.4) the state of the art dealing with the solution of a general engineering problem in a non-specific field must be considered to form part of the general engineering knowledge which a priori is to be attributed to any mechanical engineer versed in any one specific field so that it is to be expected that he is either aware of these teachings or will look for suggestions for solving his general engineering problem in that non-specific field.

In the present case, the prior art disclosed by document D7 has therefore to be considered as technical knowledge attributable to the skilled person.

Document D7 discloses the features (cf. in particular Figures 2 and 3) that each tab (26) is located below the side wall edge (24) and tapers from the free edge (28) toward the side wall edge to merge into the side wall at the side wall edge (24). Due to the semi-conically tapering configuration of the tab, merging thereof into the side wall also occurs prior to the side wall edge as indicated alternatively in Claim 1.

The skilled person is induced to apply these features to the heat exchanger joint known from document D1 since he can expect an improved resistance of the tabs to deformation. By this way he will arrive at the subject-matter of Claim 1 without any inventive considerations being required.

- 2.3.4 The Respondents argue in support of an inventive step that the tabs known from document D7 are formed prior to assembly whereas according to the invention the tabs are formed after the flange of the tank has been fitted within the gasket receiving area. The Board notes that this feature is contained with good reason in the preamble of

Claim 1, since it is known from the relevant prior art document D1. Thus, it is not taken account of on establishing the problem objectively solved by Claim 1 in relation to the prior art. It cannot, therefore, contribute to the acknowledgement of an inventive step, either in respect of the inherent problem or of its solution. The Respondents argue further that joints of brake boosters such as are known from document D2 or document D7 do not have to withstand as high pressures as joints of heat exchangers. Even if this were true it would not change anything in respect of the fact that joints comprising tabs being formed by deformation and piercing of the side wall of a hollow assembly element are known both in the field of heat exchangers (document D1) and in the field of brake boosters (documents D2 and D7) as well as in a non-specific field of mechanical joints (document D7), such that the use of such tabs in any specific field of mechanical connections is considered as available knowledge for the skilled person. It can only be regarded as a routine measure to design the tab connections in a particular case such that these withstand the respective forces to be transferred, e.g. by appropriate dimensioning of the loaded elements and choice of material.

The arguments put forward by the Respondents are not, therefore, convincing.

2.3.5 For the foregoing reasons, the subject-matter of Claim 1 lacks an inventive step as required by Article 56 EPC. Therefore, it cannot be allowed having regard to Article 52(1) EPC.

2.3.6 The other Claims 2 to 4 are dependent on Claim 1 and must receive the same treatment.

3. Subsidiary request

3.1 Admissibility of amendments

3.1.1 Claim 1 incorporates additionally to the subject-matter of Claim 1 of the main request the feature of granted Claim 3 which can be derived from page 7, paragraph 2 of the original description.

Claim 2 corresponds with granted Claim 2 and Claim 3 with granted Claim 4. These claims are based on page 6, paragraph 2 and page 7, paragraph 2 of the original description. The claims meet therefore the requirement of Article 123(2) EPC.

3.1.2 The additional feature of Claim 1 indicated in above section 3.1.1 leads to a further limitation of the scope of the claim such that obviously the protection conferred has not been extended.

Thus, the claims also meet the requirement of Article 123(3) EPC.

3.2 Novelty

Since Claim 1 of the subsidiary request differs from Claim 1 of the main request only by incorporation of a further feature (cf. above section 3.1.1), the comment given with regard to the issue of novelty in above section 2.2 applies also to Claim 1 of the subsidiary request.

3.3 Inventive step

3.3.1 The considerations having regard to Claim 1 of the main request (cf. above section 2.3.1) relating to the closest state of the art are also valid for Claim 1 of the subsidiary request. The subject-matter of Claim 1 is

distinguished from the heat exchanger known from document D1 by the above-cited features (a) and (b) and by the following further feature:

(c) the side wall (30) in the area of the tabs (42) and above the free edge (44) is deformed towards the tank (10) to at least overlie the flange (20) to assure abutment of the free edges (44) with said another side (22).

3.3.2 The further feature (c) leads to the result that due to bending of the upper portion of the side wall towards the tank the resistance of the side wall and the tabs to deformation is further enhanced whereby at the same time compressive forces can be exerted on the gasket by abutment of the free edges of the tabs with the flange of the tank.

The problem objectively solved by the subject-matter of Claim 1 is therefore to be seen in eliminating the disadvantages of the heat exchanger known from document D1 (cf. above section 2.3.2), particularly in providing a connection between the header plate and the tank which is highly resistant to deformation and avoids leakage.

3.3.3 In the prior art discussed in the proceedings the deformable side wall of the header plate is upstanding whereby the upper part of the side wall in the area of the tabs continues essentially in the direction defined by the lower part of the side wall (cf. e.g. document D1, D2 or D7). There is no suggestion in any of these documents as to deforming the side wall in the area of the tabs and above the free edge towards the tank to at least overlie the flange of the tank to assure abutment of the free edges with the flange in accordance with feature (c) of Claim 1 (cf. above section 3.3.1).

The argument of the Appellants that the measure according to granted Claim 3 follows logically from the step of deforming and piercing of the side wall in order to form the tabs, is based, in the view of the Board, on an ex post facto analysis. No source has been cited in the state of the art or in the general knowledge of the skilled person from which such a measure could be derived in an obvious way. The further argument of the Appellants that no particular advantage can be seen in the measure according to Claim 3 of the patent, is also not convincing. Apart from the circumstance that obtaining an advantageous effect is not a prerequisite for the grant of a European patent (Article 52(1), Rule 27(1)(c) EPC), the Board has no reason to question the statement of the Respondents that the aforesaid measure further enhances the resistance of the tabs to deformation. Moreover, it is clear that by bending the upper portion of the side wall towards the tank and bringing the free edges of the tabs into abutment with the flange of the tank, the gasket in the gasket receiving area of the header plate can be subjected to a defined compression force which constitutes an optimum as regards tightness and durability of the joint.

3.3.4 The Board has also considered the further available documents cited in the proceedings and found them not prejudicial to the present Claim 1 either alone or in combination with the documents cited above.

3.3.5 Summarising, the Board comes to the conclusion that the subject-matter of present Claim 1 cannot be derived in an obvious manner from the cited prior art and accordingly involves an inventive step (Articles 52(1) and 56 EPC). It is, therefore, patentable and the patent may be maintained on the basis of this Claim 1 and the dependent Claims 2

and 3 which relate to preferred features of the heat exchanger according to Claim 1.

4. Costs

- 4.1 The Respondents have requested that "they be awarded costs".

A decision awarding costs under Article 104(1) EPC, being an exception to the norm that all parties meet their own costs, only arises if the special circumstances of the case call for it. In the present case, the Appellants cited a document for the first time approximately one week prior to the date of oral proceedings before the Board. The Respondents, taking account of the disclosure of the new citation, submitted new requests during oral proceedings.

- 4.2 In the opinion of the Board, the type of costs being the subject of the request can only be any additional costs incurred by the late filing of the new citation.

Such additional costs have not, however, been substantiated. The statement of the Respondents that the late citation of the new document had as a consequence that arguments had to be forwarded which would have been superfluous in case the new document had been cited earlier, is too general for determining whether the Respondents have incurred any additional costs at all. Furthermore, no "fresh case" was raised by the late filing as had been the case in the circumstances of Decision T 611/90 - 3.3.3 of 21 February 1991 (cf. section 4), such that it did not prove to be necessary to remit the case for further prosecution to the first instance which could have caused an undue increase of costs.

The disclosure of the newly filed document concerns a particular detail of an element, i.e. the shape of the tab, to be protected and is therefore regarded by the Board as a complement to citations already considered by the first instance.

Moreover, only by way of example, it may be regarded as a mitigating circumstance for the "late" submission that the document introduced does not concern the field of heat exchangers but a general mechanical field with particular application to hydraulic brake systems and was therefore difficult to get hold of. Any carelessness or abusive behaviour on the part of the Respondents in "late" filing of the citation which might justify an apportionment of costs must therefore be excluded.

- 4.3 From the above factual circumstances it derives that no reason of equity can be recognised to make an exception to the principle that each party has to bear the costs they have incurred for the appeal proceedings (Article 104 and Rule 66(1) EPC).

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.
2. The main request is rejected.
3. The case is remitted to the first instance with the order to maintain the patent according to the subsidiary request, i.e. Claims 1 to 3 and description filed on 16 September 1992, and drawings with Figures 1 to 4 according to the patent.

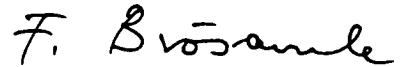
4. The request for awarding costs to the Respondents is rejected.

The Registrar:



N. Maslin

The Chairman:



F. Brösamle