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**Datasheet for the decision
of 16 October 2024**

Case Number: T 1861/22 - 3.2.07

Application Number: 16787664.8

Publication Number: 3362209

IPC: B22F3/105, B22F3/11, B22F7/06,
B22F7/08, B33Y10/00, B33Y80/00,
F16K27/02

Language of the proceedings: EN

Title of invention:
LATTICE STRUCTURE VALVE/REGULATOR BODY AND ADDITIVE
MANUFACTURING METHOD THEREOF

Patent Proprietor:
Emerson Process Management Regulator
Technologies, Inc.

Opponent:
KSB SE & Co. KGaA

Headword:

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

Keyword:

Inventive step - (no)

Amendment after notification of Art. 15(1) RPBA communication
- exceptional circumstances (no) - taken into account (no)

Decisions cited:

Catchword:



Beschwerdekammern
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Case Number: T 1861/22 - 3.2.07

D E C I S I O N
of Technical Board of Appeal 3.2.07
of 16 October 2024

Appellant: Emerson Process Management Regulator
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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
18 May 2022 concerning maintenance of the
European Patent No. 3362209 in amended form.**

Composition of the Board:

Chairman V. Bevilacqua
Members: S. Watson
E. Mille

Summary of Facts and Submissions

- I. An appeal was filed by the patent proprietor against the decision of the opposition division maintaining European patent No. 3 362 209 in amended form on the basis of auxiliary request 2.
- II. In preparation for oral proceedings, the board gave its preliminary opinion in a communication pursuant to Article 15(1) RPBA, dated 19 June 2024, according to which the appeal was likely to be dismissed.

The patent proprietor responded to this communication with submissions dated 11 October 2024.

- III. Oral proceedings before the board took place on 16 October 2024.

At the conclusion of the proceedings the decision was announced. Further details of the oral proceedings can be found in the minutes.

- IV. The final requests of the parties are as follows.

The patent proprietor ("appellant") requests

- that the decision under appeal be set aside, and
- that the patent be maintained as granted (main request) or in amended form on the basis of the set of claims of the first auxiliary request filed at the oral proceedings before the opposition division on 31 March 2022 at 13:05.

The opponent ("respondent") requests

- that the appeal be dismissed.

V. The arguments of the parties relevant for the decision are dealt with in detail in the reasons for the decision.

VI. The following documents are referred to in this decision:

D1: US 2009/0183790 A1

D6: "Introduction to additive manufacturing technology" European Powder Metallurgy Association (EPMA) 2015.

VII. Independent claim 1 of the main request reads as follows (feature labelling as used in the decision under appeal, point I.11):

- [1] "A method of manufacturing a body (112) of a fluid control apparatus (10) using additive manufacturing, the method including:
- [2] forming an inner wall (136) having an outside surface (150) and an inside surface (148), an area (138) surrounding an inlet (120), an area (140) surrounding an outlet (122), and an area (142) surrounding a fluid flow path (118), wherein the inner wall (136) provides a fluid boundary and connects the inlet (120) and the outlet (122);
- [3] forming a portion (146) of the inner wall (136) that receives a valve seat;
- [4] forming a portion (143) of the inner wall (136) that surrounds a bore (144) and receives a control stem and a control element;
- [5] forming a three-dimensional lattice structure (152) by depositing a solidifiable material onto the inner wall (136) in a predetermined pattern, wherein the lattice structure (152) includes a

plurality of connected lattice members (154)."

VIII. Independent claim 9 of the main request reads as follows (feature labelling as used in the decision under appeal, point I.11):

- [I] "A body (112) of a fluid control apparatus (10), the body comprising:
- [II] an inner wall (136) including an outside surface (150), an inside surface(148), an area (143) surrounding a bore (144) sized to receive a control stem and a control element, an area (146) sized to receive a valve seat, an area (138) surrounding an inlet (120), an area (140) surrounding an outlet (122), and an area (142) defining a fluid flow path (118) connecting the inlet (120) and the outlet (122); and
- [III] a lattice structure (152) attached to the inner wall (136), wherein the lattice structure (152) includes a plurality of connected lattice members (154)."

IX. Independent claim 1 of the first auxiliary request reads as follows (amendments shown with respect to claim 1 of the main request):

"A method of manufacturing a valve or regulator body (112) of a fluid control apparatus (10) using additive manufacturing, the method including: forming an inner wall (136) of the valve or regulator body, the inner wall (136) having an outside surface (150) and an inside surface (148), an area (138) surrounding an inlet (120), an area (140) surrounding an outlet (122), and an area (142) surrounding a fluid flow path (118), wherein

the inner wall (136) provides a fluid boundary and connects the inlet (120) and the outlet (122); forming a portion (146) of the inner wall (136) that receives a valve seat; forming a portion (143) of the inner wall (136) that surrounds a bore (144) and receives a control stem and a control element; forming a three-dimensional lattice structure (152) by depositing a solidifiable material onto the inner wall (136) in a predetermined pattern, wherein the lattice structure (152) includes a plurality of connected lattice members (154); and identifying at least one of stress, pressure, and force of a localized area of the inner wall (136) by finite element analysis, and providing the lattice structure (152) to the localized area, wherein the lattice structure (152) includes structural support suited to the at least one stress, pressure, and force of the localized area, wherein the localized area is a portion of the valve or regulator body (112) that is subject to the at least one stress, pressure, and force."

- X. Independent claim 8 of the first auxiliary request reads as follows (amendments shown with respect to claim 9 of the main request):

"A valve or regulator body (112) of a fluid control apparatus (10), the valve or regulator body comprising: an inner wall (136) including an outside surface (150), an inside surface (148), an area (143) surrounding a bore (144) sized to receive a control stem and a control element, an area (146) sized to receive a valve seat, an area (138) surrounding an inlet (120), an area (140) surrounding an outlet (122), and an area (142)

defining a fluid flow path (118) connecting the inlet (120) and the outlet (122); and
a lattice structure (152) attached to the inner wall (136), wherein the lattice structure (152) includes a plurality of connected lattice members (154),
wherein the lattice structure (152) is attached to a localized area of the inner wall (136),
wherein the lattice structure (152) includes structural support suited to at least one of stress, pressure, and force of the localized area identified by finite element analysis, and
wherein the localized area is a portion of the valve or regulator body (112) that is subject to the at least one stress, pressure, and force."

Reasons for the Decision

Main request - claims 1 and 9 - inventive step (Articles 100(a) and 56 EPC)

1. *Admittance of document D6*

1.1 Document D6 was filed by the respondent on 31 January 2022 and admitted into the opposition proceedings by the opposition division.

The opposition division then found that the subject-matter of claims 1 and 9 as granted was obvious in view of the combination of document D1 and the skilled person's common general knowledge, reflected in document D6 (see decision under appeal, point 3.).

1.2 The appellant argued that document D6 should not be considered in the appeal proceedings as it had been filed after the nine month opposition period, the

publication date was unclear and the document was not *prima facie* relevant.

1.3 The board notes that the opposition division found that as document D6 was filed in response to the opposition division's assessment of common general knowledge in the annex to the summons to oral proceedings it was not considered to be late filed.

1.4 In any case, and irrespective of whether the opposition division in fact had any discretion not to admit document D6, the board follows the line of case law that boards of appeal do not have the power to disregard documents admitted by the opposition division in exercise of its discretion, in particular when the decision has been based on them.

Document D6 therefore forms part of the appeal proceedings (Case Law of the Boards of Appeal, 10th edition 2022 ("CLB"), V.A.3.4.4).

1.5 The appellant also argued in its statement of grounds of appeal and its submissions of 11 October 2024 that the disclosure of document D6 alone, which was post-published, was not sufficient to demonstrate that the content of document D6 formed part of the skilled person's common general knowledge at the priority date of the contested patent.

1.6 It was not disputed by the respondent that document D6 may have been published one or two months after the priority date of the contested patent of 12 October 2015.

However, as reasoned by the opposition division and argued by the respondent, document D6 is an

introductory guide written by an industry group, the European Powder Metallurgy Association, with the purpose of illustrating general knowledge in the field of additive manufacturing.

The knowledge contained in document D6 must therefore necessarily have already existed some time before D6 was written, and as such it is not relevant that D6 may have been post-published.

It is established case law that common general knowledge can be inferred from a number of sources and proof that something is general knowledge does not depend on any particular document being published on a specific date. This does not mean that more than one source is required to prove that something is common general knowledge, but that the proof of common general knowledge may come from various sources (see CLB, I.C. 2.8.1, fourth paragraph and T 766/91, Reasons 8.1).

1.7 The appellant also argued that document D6 related to a different technical area and was therefore *prima facie* not relevant.

1.8 These arguments are also not convincing.

It is established case law that, when reviewing a decision taken by an opposition division in exercise of its discretion, it is not for a board to review all the facts and circumstances of the case and decide whether or not it would have exercised its discretion in the same way (see CLB, V.A.3.4.1 b)).

The opposition division considered document D6 and found it *prima facie* relevant as it illustrated general knowledge in the field of additive manufacturing.

1.9 For the above reasons document D6 forms part of the appeal proceedings.

2. *Distinguishing features with respect to document D1*

2.1 It is common ground that document D1 does not show feature 5 of claim 1 and feature III of claim 9.

2.2 At the oral proceedings before the board, at the conclusion of the debate on inventive step, the appellant raised the issue that document D1 did not disclose feature 1 of claim 1, and confirmed that this issue had not previously been raised in the appeal proceedings.

2.2.1 The respondent requested that this amendment to the appellant's appeal case not be considered in the appeal proceedings as it was made after notification of the communication under Article 15(1) RPBA and no exceptional circumstances were present as required by Article 13(2) RPBA 2024.

2.2.2 The appellant did not provide any reasons relating to exceptional circumstances in the present appeal case but argued that the issue was not new as the novelty of feature 1 of claim 1 is discussed in the decision under appeal, and in any case, new arguments must always be admitted.

2.2.3 The board does not find the appellant's arguments on admissibility convincing for the following reasons.

It is incumbent on an appellant when filing its statement of grounds of appeal to present its complete case (Article 12(3) RPBA). In particular, an appellant

must set out clearly and concisely the reasons why the decision under appeal should be set aside. Submissions which were made during the opposition proceedings do not automatically form part of the appeal case (see Case Law of the Boards of Appeal, 10th edition 2022 ("CLB"), V.A.4.2.2 b)).

In the present case, the opposition division found, and gave reasons why, feature 1 of claim 1 of the main request was disclosed in document D1, contrary to the arguments made by the appellant during the opposition proceedings.

By not setting out any reasons in its statement of grounds of appeal on this point, the appellant gave the respondent no opportunity to consider and respond to this issue, allowing the board to give a reasoned preliminary opinion on this point.

By raising the issue for the first time in appeal proceedings at the oral proceedings, the respondent and the board were faced with an amendment of the appellant's case, because a new reason why the appellant regarded the decision under appeal as incorrect has been submitted at the latest possible stage of the proceedings.

The purpose of Article 13(2) RPBA is to ensure fair proceedings without detriment to procedural economy (see CLB, V.A.4.5.1). Parties must be able to rely on having sufficient time to respond to issues raised by other parties or the board.

In the present case, if the board had decided to consider the question of whether document D1 disclosed feature 1 or not, at such a late stage of the

proceedings, the respondent would have been at a significant disadvantage. Alternatively, in order to allow the respondent sufficient time to prepare, interruption or postponement of the oral proceedings would have been necessary, which would have been detrimental to procedural economy.

2.2.4 The new submission that feature 1 of claim 1 was not disclosed in document D1 was therefore not considered by the board (Article 13(2) RPBA 2024).

2.3 The distinguishing features of claims 1 and 9 of the main request with respect to the disclosure of document D1 are thus regarded, in agreement with the findings of the opposition division (see II.3.5), as features 5 and III respectively.

3. *Objective technical problem*

3.1 The opposition division found that the objective technical problem to be solved was to reduce the weight of the body of a fluid control apparatus while maintaining its mechanical properties. This problem was based on paragraph [0006] of the contested patent.

3.1.1 The appellant argued that the problem should be more broadly formulated as how to manufacture a valve body where the manufacturing process is driven by design, rather than the design of the body being driven by the manufacturing process.

3.1.2 The board however follows the arguments of the respondent that this problem is posed in the contested patent in comparison with conventional manufacturing methods such as casting and that the problem has already been solved in document D1 as it discloses the

use of additive manufacturing which allows more complex designs to be manufactured than by conventional methods, for example in paragraphs [0013] and [0014].

- 3.1.3 The appellant's argument that document D1 does not show manufacture of a valve body using additive manufacturing but rather only a flow control element made by additive manufacturing is also not convincing as document D1 discloses that the valve assembly as well as the flow control element may be made by additive manufacturing (paragraph [0069]).

Therefore, the board is not convinced that the objective technical problem posed by the opposition division is incorrect.

4. *Obviousness of the combination of document D1 with the common general knowledge reflected in document D6*

- 4.1 The appellant argued that the skilled person would not have been prompted to modify the body of D1 because document D1 makes no mention of the objective technical problem to be solved. In addition, document D6 is directed to different technical fields and does not represent the common general knowledge in valve body manufacture.

Further, even if the skilled person were to combine the teaching of documents D1 and D6, they would only be prompted to make the flow control element 24 of D1 with a lattice structure and D6 does not disclose using a lattice structure in specific portions of the body.

- 4.2 The board notes that for the skilled person to modify the closest prior art it is unnecessary that the

closest prior art itself mentions the objective technical problem to be solved.

Although the closest prior art should have the same "use" in general as the claimed invention, it is not required to have the same effect as the distinguishing features (see CLB, I.D.3.2, first and final paragraphs).

D1 discloses a method of manufacturing a body of a fluid control apparatus using additive manufacturing (see D1, paragraph [0069]) as well as disclosing a body of a fluid control apparatus (D1, figure 12 (64)), therefore it is directed to the same use as the claimed invention.

4.3 The appellant argued that the skilled person would only view document D6 as confirming that additive manufacturing forms part of the skilled person's common general knowledge, or at most that a lattice structure may be used in the aerospace or transportation fields as mentioned in D6, page 30, where weight is of prime importance.

4.4 The board however agrees with the reasoning of the opposition division and the arguments of the respondent that the cited passage on page 30 of document D6 confirms that the use of lattice structures to allow part weight to be reduced without reducing strength, forms part of the skilled person's common general knowledge.

The mention of aerospace and transportation is clearly meant to show possible, but not exhaustive, examples of fields where the lattice structure may be useful. The pictorial examples shown on page 30 illustrate a

variety of uses. In particular, the very general statement on page 30 that "[l]attice structures offer the major advantage of reducing part weight without reducing part strength..." is a clear indication that lattice structures as such are generally known.

The further statements on page 30 of document D6 describe how powder bed additive manufacturing technologies allow the manufacture of complex lattice structures which were previously impossible to produce.

The skilled person, trying to solve the objective technical problem therefore finds the solution in document D6 to be the provision of a lattice structure in general, which can be manufactured using additive manufacturing technologies.

- 4.5 The board is also of the view that when combining documents D1 and D6 the skilled person would not consider that the teaching of D6 should only be applied to the control element 24 in document D1, as suggested by the appellant.

The disclosure of document D1 also teaches that the valve assembly as a whole may be formed by additive manufacturing (paragraph [0069]), and the skilled person, using their common general knowledge would form the body by additive manufacturing with a lattice structure to reduce weight.

- 4.6 The appellant's argument that document D6 did not teach the skilled person where specifically to place the lattice structure is also not followed as the wording of claim 1 does not require the lattice structures to be formed in any specific position.

The appellant, at the oral proceedings before the board, interpreted the features "depositing a solidifiable material onto the inner wall in a predetermined pattern" in claim 1 and "a lattice structure attached to the inner wall" in claim 9 as requiring that the lattice structure was placed in specific locations.

The board however agrees with the arguments made by the respondent that any form of lattice structure must have been deposited "in a predetermined pattern". The term "predetermined pattern" would be understood by the skilled person as relating only to the form of the lattice, not to its position in the body.

The feature in claim 9 that the lattice structure is attached to the inner wall does not limit the form of the lattice structure nor its position on the inner wall.

Even when taking into account the description and drawings, the skilled person would not interpret these features differently. The term "predetermined pattern" is not used in any other manner than to describe that the lattice is formed in a certain way which has been decided on prior to commencing the depositing of the solidifiable material.

The drawings of the contested patent show the lattice structure in a number of different locations, including examples where the lattice structure is formed within the whole inner wall (see figures 2, 3, 4a and 4b of the contested patent).

4.7 The appellant's final argument was that if the skilled person combined the teaching of D6 with that of D1 they

would add the lattice structure to the wall of D1 with the result that the body would be heavier than the wall without lattice.

The board is not convinced and follows the arguments of the respondent, that the skilled person, from their common general knowledge, is aware that adding a lattice structure in addition to an existing wall would not result in a weight reduction and that the lattice structure must replace at least some solid material, as exemplified in the handle shown on page 30 of document D6.

4.8 In conclusion, the appellant has not convincingly demonstrated that the decision under appeal was incorrect in finding that the subject-matter of claims 1 and 9 as granted was obvious in view of document D1 and the common general knowledge reflected in document D6.

5. *First auxiliary request - claims 1 and 8 - inventive step (Article 56 EPC)*

5.1 The opposition division found that the additional features added to claims 1 and 8 of the first auxiliary request were disclosed in document D1 (D1, paragraphs [0019] and [0067]) so that the subject-matter of these claims was also obvious in view of document D1 and the skilled person's common general knowledge reflected in document D6.

5.2 The appellant argued that for the same reasons as for the main request the subject-matter of the claims of the first auxiliary request was also inventive.

The appellant argued further that claims 1 and 8 of the first auxiliary request required that the lattice structure was applied to a localized area of the inner wall, and this feature was disclosed in neither document D1 nor D6.

The appellant also argued at the oral proceedings before the board that the disclosure in document D1 of finite element analysis applied only to the control element 24, but not to the valve body, in particular not to the valve body of figure 12, which was an alternative embodiment.

- 5.3 The board does not find these arguments convincing and agrees with the opposition division's reasoning and the arguments of the respondent that as document D1 indicates that direct metal laser sintering should also be used to manufacture the valve assembly, and not only the flow control element (D1, paragraph [0069]), the skilled person would use the same design process including finite element analysis, mentioned in D1, paragraph [0019] taking a flow control element as an example, when designing the valve assembly, including the body. This would necessarily lead to the lattice structure being positioned in localized areas as necessary, depending on the results of the analysis.

The skilled person would understand that the general references made to finite element analysis (see D1, paragraphs [0019] and [0067]) would apply to the manufacture of any components of the fluid control apparatus disclosed therein made by the direct metal laser sintering method.

- 5.4 The appellant has therefore not convincingly demonstrated that the opposition division was incorrect

in finding that the subject-matter of claims 1 and 8 of the first auxiliary request was obvious in view of document D1 and common general knowledge.

6. *Conclusion*

As neither the main request nor the first auxiliary request is allowable, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



G. Nachtigall

V. Bevilacqua

Decision electronically authenticated