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Datasheet for the decision of 13 November 2018

Case Number: T 0780/15 - 3.3.09

Application Number: 08744554.0

Publication Number: 2129712

IPC: C08J9/00, C08J9/14

Language of the proceedings: EN

Title of invention:
Blowing agent compositions of hydrochlorofluoroolefins for thermoplastic foams

Patent Proprietor:
Arkema, Inc.

Former Opponent:
Honeywell International Inc.

Headword:

Relevant legal provisions:
EPC Art. 100(c), 100(b), 54, 56
RPBA Art. 13(1)

This datasheet is not part of the Decision.
It can be changed at any time and without notice.

Keyword:
New evidence - admitted (yes)
Amendments - extension beyond the content of the application as filed (no)
Sufficiency of disclosure (yes)
Novelty (yes)
Inventive step (yes)

Decisions cited:

Catchword:

This datasheet is not part of the Decision.
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Case Number: T 0780/15 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 13 November 2018

Appellant: (Patent Proprietor)	Arkema, Inc. 900 First Avenue, Bldg. 4-2 King of Prussia, PA 19406 (US)
Representative:	Casalonga, Axel Casalonga & Partners Bayerstrasse 73 80335 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 3 February 2015 revoking European patent No. 2129712 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	W. Sieber
Members:	J. Jardón Álvarez
	A. Jimenez

Summary of Facts and Submissions

I. This decision concerns the appeal filed by the proprietor of European patent No. 2 129 712 against the decision of the opposition division to revoke it.

II. The granted patent contained 29 claims, independent claims 1, 21 and 29 reading as follows:

"1. Use of a blowing agent composition comprising a hydrochlorofluoroolefin selected from 1-chloro-3,3,3-trifluoropropene, 2-chloro-3,3,3-trifluoropropene, a dichloro-fluorinated propene, or mixtures thereof and a hydrofluorocarbon, an alkane, carbon dioxide, an atmospheric gas, an inert gas, and mixtures thereof, for thermoplastic foam."

"21. A foamable resin composition comprising a blowing agent composition of claim 1 and a thermoplastic resin."

"29. A foamed product produced using the blowing agent composition of claim 1."

The remaining claims were dependent claims.

III. The opponent had requested revocation of the patent in its entirety on the grounds of Article 100(a) (lack of novelty and lack of inventive step), (b) and (c) EPC.

The documents submitted during the opposition proceedings included:

D2: WO 2007/002625 A2;

D3: WO 2007/002703 A2;

D4: WO 2009/089511 A2; and

D6: WO 2009/067720 A2.

IV. The opposition division's decision to revoke the patent was based on a main request (claims as granted) and an auxiliary request filed on 22 January 2015 during the oral proceedings. The decision may be summarised as follows:

Concerning the main request the opposition division held that:

- The priority was not validly claimed.

- The subject-matter of the claims as granted did not contain added subject-matter (Article 100(c) EPC), and the invention was sufficiently disclosed.

- The subject-matter of claim 1 as granted lacked novelty in view of D3. In view of this finding, it was not necessary to examine the novelty objections based on documents D4 and D6.

Furthermore, the subject-matter of claim 1 of the auxiliary request lacked inventive step starting from D3 as the closest prior art.

V. This decision was appealed by the patent proprietor (in the following: the appellant), who requested that the decision under appeal be set aside and the patent be maintained as granted, or alternatively on the basis of auxiliary requests 1 to 5 filed with the statement setting out the grounds of appeal. The appellant also filed the following documents:

E4: Test report headed "Batch Foaming" (3 pages); and

E2: Thermoplastic Foam Processing: Principles and Development, edited by R. Gendron, CRC Press, 2005, 8 pages (a better copy of a document already on file).

VI. In its reply, the opponent requested that the appeal be dismissed.

VII. By letter of 6 June 2017, the opponent withdrew its opposition and is therefore no longer a party to the proceedings. It will be referred to hereinafter as "the former opponent".

VIII. In preparation for the oral proceedings, the board indicated in a communication the points to be discussed.

IX. In its reply, the appellant filed the following documents:

E5: Test report, 8 pages, undated; and

E6: C. V. Vo *et al.*, "Advances in Thermal Insulation of Extruded Polystyrene Foams", Cellular Polymers, Vol. 30, No. 3, 2011, pages 137 to 156.

X. Oral proceedings were held before the board on 13 November 2018. The only claims relevant for this decision are the claims of the main request, namely the granted claims (see point II above).

XI. The arguments of the appellant, where relevant for the present decision, may be summarised as follows:

- Claim 1 as granted was novel over D3 because multiple selections from various parts of D3 had to be made in order to arrive at the subject-matter of the claim. It was necessary to select (i) 1-chloro-3,3,3-trifluoropropene or 2-chloro-3,3,3-trifluoropropene as hydrochlorofluoroolefin, (ii) a co-blowing agent and (iii) the use for thermoplastic foams.

- The same argument applied to the disclosure of D2, D4 and D6. In all cases, multiple selections were necessary in order to arrive at an embodiment according to claim 1 as granted. Additionally, the priority of D4 and D6 was not validly claimed, so that these documents were not prior art according to Article 54(3) EPC.

- D3 represented the closest prior art. It disclosed various uses of C2 to C6 fluoroalkenes in a variety of applications, including their use as blowing agents. D3 did not disclose the use of a blowing agent comprising a hydrochlorofluoroolefin and a co-blowing agent as defined in claim 1. The closest embodiment disclosed in D3 was example 1C, using a mixture of trans-1,3,3,3-tetrafluoropropene and 1,1,1,3,3-pentafluoropropane (50/50 weight%) as blowing agent to produce a polystyrene foam.

- Starting from this embodiment, the problem to be solved by the patent was to provide blowing agents which were able to produce foams with lower density but with a cell size that was still acceptable. This problem was solved by the use of a blowing agent composition according to claim 1. The experiments in the patent and the results in E4 and

E5 convincingly showed that the density of foams could be reduced while maintaining an acceptable cell size. This result was surprising, as the prior art indicated that the cell size would be reduced when lowering the density.

XII. The appellant requested that the decision under appeal be set aside and the patent be maintained as granted (main request), or that the patent be maintained on the basis of the claims of any of auxiliary requests 1 to 5 filed by letter of 15 June 2015.

Reasons for the Decision

1. Admission of E4 to E6

1.1 Document E4

This document was submitted as a direct reaction to the finding in the appealed decision that the evidence then on file failed to show a technical effect resulting from the claimed blowing agent compositions. Since E4 was filed at the earliest stage in appeal proceedings, namely with the statement setting out the grounds of appeal, the board saw no reason to hold the document inadmissible under Article 12(4) RPBA.

1.2 Documents E5 and E6

These documents were filed in reaction to the board's communication. Taking into account that these documents further support arguments already on file, the board, exercising its discretion under Article 13(1) RPBA, decided to admit E5 and E6 into the proceedings.

MAIN REQUEST

2. Amendments (Article 100(c) EPC)

2.1 The board agrees with the finding in the appealed decision that the subject-matter of claim 21 as granted does not extend beyond the content of the application as filed.

2.2 Claim 21 is directed to "A foamable resin composition comprising a blowing agent composition of claim 1 and a thermoplastic resin".

2.3 This claim is supported by claims 1, 2 and 5 as filed. Claim 1 as filed was directed to a blowing agent composition for thermoplastic foaming comprising a hydrochlorofluoroolefin. Claim 5 further specified that the "hydrochlorofluoroolefin is selected from 1-chloro-3,3,3-trifluoropropene, 2-chloro-3,3,3-trifluoropropene, a dichloro-fluorinated propene or mixtures thereof", and claim 2 disclosed that the composition "further comprises a hydrofluorocarbon, an alkane, carbon dioxide, an atmospheric gas, an inert gas, and mixtures thereof", i.e. a co-blowing agent. Thus, claims 1, 2 and 5 as filed teach that the blowing agent composition as defined in granted claim 1 is suitable for thermoplastic foaming.

This intended use also supports the subject-matter of claim 21, since thermoplastic foaming presupposed the use of a thermoplastic resin and a blowing agent or agents, i.e. a foamable resin composition.

2.4 For these reasons, claim 21 does not contain subject-matter which extends beyond the content of the application as filed.

3. Sufficiency of disclosure

3.1 The opposition division held that the requirements of sufficiency of disclosure were met.

3.2 In its reply to the statement of grounds of appeal, the former opponent stated that it maintained its arguments set out in the opposition statement with regard to sufficiency. However, it did not provide any reasons why the finding of the opposition division was wrong.

3.3 Under these circumstances, the board sees no reason to revise the finding of the opposition division that the invention is sufficiently disclosed.

4. Novelty

4.1 The finding in the appealed decision that the valid date of the patent is its filing date has not been contested by the appellant.

4.2 The opposition division denied novelty of the subject-matter of claim 1 in view of the disclosure of D3. In its reply to the grounds of appeal, the former opponent maintained that the subject-matter of the claims of the main request lacked novelty also in the light of D2, D4 and D6 as well.

4.3 Document D3

4.3.1 In general terms, D3 relates to various uses of fluoroalkenes, including tetrafluoropropenes, in a variety of applications, including as blowing agents (abstract). More specifically, D3 aims at the provision of new compounds and compositions that are attractive

alternatives to, and are considered environmentally safer substitutes for, compositions so far used as blowing agents (page 4, lines 26 to 28).

4.3.2 This object is said to be achieved by compositions comprising at least one fluoroalkene compound and optionally other ingredients (page 9, first paragraph). D3 then describes various fluoroalkenes (pages 9 to 13) and the other ingredients that can optionally be added to the blowing agent compositions (pages 13 to 18). The examples describe the preparation of polystyrene foams (examples 1A to 1F) and polyurethane foams (examples 2 to 6) using various blowing agents.

4.3.3 Although D3 does not disclose any specific embodiment using a blowing agent composition as defined in claim 1 as granted for the preparation of a thermoplastic foam, the opposition division denied novelty of the subject-matter of claim 1 because in its view the subject-matter could be directly and unambiguously derived from the disclosure of D3 by a single selection.

4.3.4 The board disagrees, because in order to arrive at an embodiment falling within the scope of claim 1 as granted, a multiple selection from the teaching of D3 has to be made. In particular, it is necessary to make the following selections:

- 1-chloro-3,3,3-trifluoropropene, 2-chloro-3,3,3-trifluoropropene and/or dichloro-fluorinated propene from the long list of C2 to C6 fluoroalkenes disclosed on pages 9 to 13 of D3.

- The mandatory presence of a further blowing agent, a feature which in D3 is merely optional (page 13, lines 20 to 23).

- The specific co-blowing agents, hydrofluorocarbon, alkane, carbon dioxide, an atmospheric gas and/or an inert gas from the list of optional additional compounds given on pages 13 to 18.

- To use the blowing composition for a thermoplastic foam (and not for a thermosetting foam, also embraced by the teaching of D3 as disclosed, for instance, on page 19, lines 1 to 3).

4.3.5 Such a multiple selection is neither disclosed nor hinted at in D3. The only example in D3 using a hydrochlorofluoroolefin as defined in claim 1 as granted is example 6, where 1-chloro-3,3,3-trifluoropropene is apparently used as the sole blowing agent in the preparation of a polyurethane foam.

4.3.6 According to EPO practice, in the case of a "multiple selection", it is necessary, in order to deny novelty, to show that the "combined selection" emerges from the prior art, or that there is at least a pointer towards such a combination. In the present case, however, a person skilled in the art would have no reason to focus on the combination of features set out in claim 1 as granted when reading the disclosure of D3.

4.3.7 In the present case, the claimed combination is neither explicitly disclosed nor hinted at in D3, and is therefore not clearly and unambiguously derivable from this document. In fact, for each of these selections there are several equally possible alternatives mentioned in D3.

4.3.8 Therefore, the board concludes that the subject-matter of claim 1 is novel over D3.

4.4 Documents D2, D4 and D6

4.4.1 D2, D4 and D6 relate to compositions containing fluorine substituted olefins in a variety of applications, including as blowing agents (see abstract of each document). None of D2, D4 or D6 discloses a specific embodiment falling within the scope of claim 1 of the patent.

4.4.2 As with D3, to arrive at an embodiment falling within the scope of claim 1 several selections (the specific chlorofluoropropenes, the use as blowing agent, the specific co-blowing agents, the use for thermoplastic foams) within the broad teaching of each of these documents need to be made.

4.4.3 The board also cannot see a pointer in any of these documents to the combination of features of claim 1 as granted, so that the claimed subject-matter of claim 1 as granted is novel over D2, D4 and D6.

4.5 In summary, the subject-matter of claim 1 is novel over the cited prior art.

4.6 For the same reasons, the subject-matter of claim 21 (a foamable resin composition comprising a blowing agent composition of claim 1), claim 29 (a foamed product produced using the blowing agent of the composition of claim 1) and the dependent claims is also novel over the cited prior art.

4.7 In view of the fact that the subject-matter of claim 1 as granted is in any case novel over D4 and D6, there is no need for the board to decide whether D4 and/or D6

are entitled to a valid priority date before the filing date of the patent in suit.

5. Inventive step

5.1 The patent relates to the use of blowing agent compositions with negligible ozone-depletion potential and low global warming potential for thermoplastic foams. The invention is based on the finding that blowing agent compositions comprising a specific hydrochlorofluoroolefin and a further co-blowing agent permit the production of low-density, closed-cell foams with enlarged, controlled cell size (paragraph [0003] of the specification).

5.2 Closest prior art

5.2.1 Document D3 was agreed during the opposition proceedings to represent the closest prior art. The disclosure of this document has already been discussed in point 4.3 above in relation to novelty.

5.2.2 The board agrees with the appellant that example 1C represents the closest embodiment of D3 with regard to the claimed subject-matter. In this example a polystyrene foam is prepared using a blowing agent composition containing 50% by weight of 1,3,3,3-tetrafluoropropene and 50% by weight of 1,1,1,3,3-pentafluoropropane.

The subject-matter of claim 1 differs from this disclosure in that 1,3,3,3-tetrafluoropropene is replaced by a hydrochlorofluoroolefin selected from the list given in claim 1 as granted.

5.3 Problem to be solved and its solution

5.3.1 According to the appellant, the problem to be solved by the patent in view of D3 is to provide a blowing agent composition that permits the production of thermoplastic foams having a lower density without degrading the cell size.

5.3.2 To show that this problem is solved, the appellant relied on the examples in the patent in suit and the additional test reports E4 and E5. In E4, the blowing agent composition used in example 1C of D3 was compared with two blowing compositions according to claim 1 as granted, namely a blowing agent composition of 60 wt% 1,3,3,3-tetrafluoropropene, 20 wt% 1,1,1,3,3-pentafluoropropane and 20 wt% *trans*-1-chloro-3,3,3-trifluoropropene (example 11 of E4) and a blowing agent composition of 50 wt% 1,1,1,3,3-pentafluoropropane and 50 wt% t of *trans*-1-chloro-3,3,3-trifluoropropene (example 12 of E4).

The results in Table 2 of E4 show that the claimed combination of blowing agents, i.e. examples 11 and 12 of E4, leads to foams of lower density without degrading the cell size compared with a foam obtained with the blowing agent used in example 1C of D3.

5.3.3 The opposition division did not recognize a technical effect of the claimed combination of blowing agents because, in its view, the evidence then on file did not compare the claimed compositions with those of D3 and it was not credible that all embodiments covered by the claims would show the technical effect.

5.3.4 These objections have been overcome by the appellant with the evidence submitted during the appeal

proceedings. E4 discussed above provides a direct comparison of the invention with the closest embodiment of D3. Moreover, E5 provides further examples using other co-blowing agents such as carbon dioxide and difluoromethane, showing that the technical effect is achieved with other blowing agents of the invention (see E5, Tables 2, 3 and 5).

5.3.5 In view of this new experimental evidence, and the absence of any experimental evidence to the contrary, the board concludes that the problem underlying the patent in suit has been credibly solved over the whole scope claimed.

5.4 Obviousness

5.4.1 It remains to be decided whether, in view of the available prior art, it would have been obvious for the skilled person to solve this problem by the means claimed.

5.4.2 D3 itself does not give any hint to the claimed solution. D3 mainly aims to provide blowing compositions which are environmentally safe substitutes for chlorofluorocarbons and hydrochlorofluorocarbons with low or no toxicity (paragraph bridging pages 4 and 5) and non-flammable (page 5, first full paragraph). D3 is entirely silent on foam density, in particular on lowering the foam density. Thus, D3 does not point towards the claimed combination of blowing agents in order to solve the posed problem.

5.4.3 Moreover, the finding that the use of the claimed blowing agent compositions leads to lower foams density compared with the use of the blowing agent of D3 without degrading its cell size is unexpected in view

of the teaching of E2 that indicates that low density is usually achieved at the expense of cell size reduction (page 157, lines 1 to 2).

5.4.4 No other documents have been cited in the appealed decision that could have given a hint to the use of the combination of selected blowing agents to solve the above problem.

5.4.5 In view of this, the board concludes that there is no incentive in the prior art for the skilled person to select the blowing agent compositions now claimed from the broad teaching of D3 to solve the above technical problem. Thus, the subject-matter of claim 1 involves an inventive step.

5.4.6 For the same reasons, the subject-matter of claim 21 (a foamable resin composition comprising a blowing agent composition of claim 1), claim 29 (a foamed product produced using the blowing agent of the composition of claim 1) and the dependent claims also satisfies the requirements of Article 56 EPC.

AUXILIARY REQUESTS 1 TO 5

Since the main request is allowable, there is no need for the board to deal with these requests.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained unamended.

The Registrar: The Chairman:

M. Cañueto Carbajo W. Sieber

Decision electronically authenticated