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Datasheet for the decision of 11 November 2008

Case Number: T 0894/05 - 3.3.10

Application Number: 98932436.3

Publication Number: 0998539

IPC: C09K 5/04

Language of the proceedings: EN

Title of invention:
Refrigerant compositions

Patentee:
E.I. DU PONT DE NEMOURS AND COMPANY

Opponent:
Solvay (Société Anonyme)

Headword:
Refrigerant compositions/DU PONT

Relevant legal provisions:
EPC Art. 54, 56, 123(2)

Keyword:
"Main request: Amendments (not allowable) - shrinking of two generic groups of compounds - singling out"
"Auxiliary request 1: Novelty (yes); Inventive step (yes) - improvement - non obvious solution"

Decisions cited:
T 0666/89, T 0565/90, T 0615/95, T 0659/97, T 0941/98

Catchword:
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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0894/05 - 3.3.10

D E C I S I O N
of the Technical Board of Appeal 3.3.10
of 11 November 2008

Appellant II: (Opponent)
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Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 3 May 2005 concerning maintenance of European patent No. 0998539 in amended form.

Composition of the Board:

Chairman: R. Freimuth
Members: J. Mercey
F. Blumer

Summary of Facts and Submissions

I. The Appellant I (Patent proprietor) and Appellant II (Opponent) lodged appeals on 4 July 2005 and 7 July 2005, respectively, against the interlocutory decision of the Opposition Division posted on 3 May 2005 which found that European patent No. 998 539 in amended form met the requirements of the EPC.

II. Notice of Opposition had been filed by Appellant II requesting revocation of the patent as granted in its entirety on the grounds of lack of novelty and inventive step (Article 100(a) EPC), insufficient disclosure (Article 100(b) EPC), and of extending the subject-matter of the patent in suit beyond the content of the application as filed (Article 100(c) EPC). *Inter alia* the following documents were submitted in opposition proceedings:

(2) N. A. Roberts and S. F. Pearson, "High efficiency R22 replacement (ISCEON 59, a mixture of R125, R134a and isobutane)", US 1996, Pap. 1996, Int. Compressor Eng. Conf., Purdue, July 23-26, 1996 and

(3) EP-A-779 352.

III. The Opposition Division held that the amendments made to the claims of the then pending auxiliary request 2 satisfied the requirements of Article 123(2) EPC. It further held that the invention was sufficiently disclosed, was novel over document (2) and involved an inventive step, document (2) being considered to represent the closest prior art.

IV. At the oral proceedings before the Board, held on 11 November 2008, Appellant I defended the maintenance of the patent in suit in amended form on the basis of a main and an auxiliary request, both submitted during these oral proceedings and thus superseding any previous requests. The main request consisted of a set of six claims, independent claims 1, 2 and 5 reading as follows:

"1. A refrigerant composition which comprises:
(a) 46% by weight based on the weight of the composition of pentafluoroethane,
(b) 50% by weight based on the weight of the composition of 1,1,1,2-tetrafluoroethane and
(c) 4% by weight based on the weight of the composition of n-butane."

"2. Use of a refrigerant composition which comprises
(i) pentafluoroethane, 1,1,1,2-tetrafluoroethane, or a mixture thereof, in an amount from 30 to 94% by weight based on the weight of the composition and
(ii) n-butane in an amount from 1 to 5% by weight based on the weight of the composition, as a replacement for chlorodifluoromethane in refrigeration equipment designed to employ chlorodifluoromethane,
(iii) pentafluoroethane in an amount from 5 to 60% by weight based on the weight of the composition, as a replacement for chlorodifluoromethane in refrigeration equipment designed to employ chlorodifluoromethane."

"5. A refrigeration apparatus containing, as refrigerant, a composition as claimed in claim 1."

The auxiliary request 1 consisted of two claims, claim 1 being identical to claim 1, and claim 2 being identical to claim 5, respectively, of the main request.

V. Appellant I argued that the claims of both requests did not contain subject-matter extending beyond the content of the application as filed, more particularly the basis for the amendments made to claim 2 of the main request being found on page 3, lines 10, 12 and 21 and page 4, lines 8 to 9 of the application as filed.

Appellant I submitted that document (2) was not novelty destroying, since it did not specifically disclose a ternary composition containing n-butane, the only ternary compositions disclosed together with weight percentages of the specific components being those in Table 3, none of these compositions containing n-butane.

With regard to inventive step, Appellant I submitted that starting from document (2), which disclosed a composition in Table 3 on page 4 consisting of 50 wt.% 1,1,1,2-tetrafluoroethane, 46 wt.% pentafluoroethane and 4 wt.% isobutane for use as a replacement for R22 in refrigerant compositions, the problem to be solved by the patent in suit was the provision of a refrigerant composition with reduced flammability upon initial leakage. The comparison of Examples 1 and 2 in the Table on page 5 of the specification of the patent in suit demonstrated that the fractionated vapour obtained from the composition according to the invention was non-flammable, whereas a composition according to document (2) was flammable, said examples differing only in that n-butane in Example 1 was replaced by isobutane in (comparative) Example 2. There

was no motivation in document (2), nor in any of the other cited art, to replace isobutane by n-butane in the expectation of reducing the flammability. With regard to document (3), although this taught that n-butane was preferred to isobutane in refrigerant compositions which also contained 1,1,1,2-tetrafluoroethane and pentafluoroethane, it was in relation to the azeotropic behaviour of the compositions, document (3) teaching that ternary compositions containing 1,1,1,2-tetrafluoroethane, pentafluoroethane and n-butane and/or isobutane were non-flammable. Furthermore, in view of the very significant differences in the weight percentages of the components 1,1,1,2-tetrafluoroethane and pentafluoroethane in the mixtures of document (3) (see page 3, lines 41 to 43) as compared to the closest prior art composition of document (2), its teaching could not be simply combined with that of document (2). Thus the claimed composition was inventive.

VI. Appellant II objected to the novelty of the claimed subject-matter, since the second composition in Table 3 on page 4 of document (2) in combination with the disclosure in Table 1 on page 2 thereof of n-butane as a possible blend component anticipated the claimed subject-matter.

Appellant II argued that the claimed composition was not inventive over the teaching of document (2), which taught (see page 2, third sentence) that the inclusion of hydrocarbons in minor quantities, n-butane and isobutane being specifically listed in Table 1, did not compromise the non-flammability of refrigerant blends. Furthermore, document (3) taught that in refrigerant

mixtures comprising 1,1,1,2-tetrafluoroethane and pentafluoroethane, those which additionally contained n-butane were preferred to those containing isobutane (see page 3, lines 44 to 45). Document (3) also provided hints as to how to improve the characteristics of non-flammability (see page 2, lines 30 to 32, page 3, lines 57 to 59 and page 4, lines 52 to 54), which would have led the skilled person to replace isobutane by n-butane. Appellant II further argued that the problem as formulated by Appellant I had not been successfully solved, since the test procedure in the specification of the patent in suit did not reflect the flammability of the mixture at a later stage of leakage, nor did it reflect the regulatory non-flammability requirements.

With letter dated 13 September 2005, Appellant II submitted the following document:

(14) Kühn Birett, Merkblätter Gefährliche Arbeitsstoffe, 94. Erg.-Lfg. 12/96, B037, B060

wherein the lower flammability limits of n- and isobutane were given. Appellant II also submitted other documents with said letter, but did not rely upon them any further during the course of the proceedings.

At the oral proceedings before the Board, Appellant II no longer maintained that the invention was insufficiently disclosed.

Appellant II did not object to the late filing of the main and auxiliary requests on which the present decision is based.

VII. Appellant I requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request, or subsidiarily, on the basis of the auxiliary request 1, both requests submitted during the oral proceedings before the Board.

Appellant II requested that the decision under appeal be set aside and that the patent be revoked.

VIII. At the end of the oral proceedings, the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.

Main request

1. *Amendments*

1.1 Claim 2 has been amended *vis-à-vis* claim 1 as originally filed *inter alia* in that components (ii) and (iii), which correspond to the components (c) and (a), respectively, in original claim 1, have each been restricted to a single compound. More particularly component (ii) has been restricted from an unsubstituted hydrocarbon of the formula C_nH_m in which n is at least 4 and m is at least 2n-2 to n-butane and component (iii) has been restricted from a list of several compounds to pentafluoroethane.

1.2 It is established jurisprudence of the Boards of Appeal that an amendment to a claim offends against Article 123(2) EPC, if the amended subject-matter is not directly and unambiguously derivable from the application as filed.

1.3 According to Appellant I, the basis for these amendments was to be found on page 3, line 21 and page 4, lines 8 to 9 of the application as filed, where preferences for component (a) being pentafluoroethane and component (c) being n-butane were expressed. Appellant I did not dispute that the original application contains no literal disclosure of a group of compositions containing these two specific individual components (ii) and (iii) in combination.

1.4 The Board holds that said passages cannot provide a basis for these amendments, since this shrinking of two generic groups of compounds results in singling out of a particular combination of specific meanings, leading to a hitherto not specifically disclosed group of compositions (see T 615/95, point 6 of the reasons and T 659/97, point 4 of the reasons, neither published in OJ EPO).

1.5 For these reasons, the Board holds that the group of compositions wherein component (iii) is pentafluoroethane and component (ii) is n-butane according to claim 2 has no adequate support in the application as filed. Thus, claim 2 of the main request is amended in such a way that subject-matter extending beyond the application as filed is added, contrary to the requirements of Article 123(2) EPC, with the consequence that the main request is not allowable.

Auxiliary request 1

2. *Amendments*

Claim 1 is based on the composition (a) on page 4, lines 12 to 16 of the application as filed. Claim 2 is based on claim 17 as originally filed. The amendments restrict the scope of granted claims 13 and 19, such that the requirements of both Article 123(2) and (3) EPC are satisfied.

3. *Sufficiency of Disclosure*

The appealed decision found the invention to be sufficiently disclosed (cf. point III supra). Sufficiency of disclosure was no longer contested during the appeal proceedings, nor does the Board see any reason to take a different view to the Opposition Division. Hence, it is unnecessary to go into more detail in this respect.

4. *Novelty*

4.1 Appellant II bases its objection of lack of novelty with respect to document (2) on the combination of the second composition in Table 3 on page 4 of document (2) with the disclosure in Table 1 on page 2 thereof of n-butane as a possible blend component.

4.2 In this context, the Board firstly notes that according to the established case law of the Boards of Appeal regarding the examination of novelty, the teaching of a document is indeed not confined to the detailed

information given in the examples, but embraces the disclosure of that document as a whole. However, in deciding what can be directly and unambiguously derived from a document, its different passages can only be combined if the skilled reader is given a clear indication to combine them (see e.g. T 666/89, OJ EPO 1993, 495; T 565/90 and in particular T 941/98, point 5 of the reasons; neither published in OJ EPO).

4.3 In the present case, the second composition in Table 3 on page 4 of document (2) is a refrigerant composition consisting of 46 wt.% pentafluoroethane, 50 wt.% 1,1,1,2-tetrafluoroethane and 4 wt.% isobutane. Table 1 on page 2 of document (2) lists ten possible compounds which may be used to formulate a refrigerant blend with similar properties to R22.

4.4 Thus, having regard to these relevant passages, there is no specific disclosure in document (2) to combine the composition in Table 3 with a particular compound from Table 1, let alone to specifically replace the isobutane of said composition by any of the compounds listed in Table 1, since said composition does not disclose more than a particular combination of specific components in specific weight amounts. More particularly, the skilled reader of document (2) does not have any indication to select n-butane from Table 1, which also indicates other possible blend components to be equally suitable, and to combine them specifically with the composition in Table 3. The composition claimed in the patent in suit is therefore not specifically disclosed in document (2).

4.5 Consequently, document (2) is not novelty-destroying for the subject-matter of claim 1 (Article 54 EPC).

5. *Inventive step*

5.1 According to the established jurisprudence of the Boards of Appeal it is necessary, in order to assess inventive step, to establish the closest state of the art, to determine in the light thereof the technical problem which the invention addresses and successfully solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art. This "problem-solution approach" ensures assessing inventive step on an objective basis and avoids an *ex post facto* analysis.

5.2 The patent in suit is directed to a refrigerant composition as a replacement in refrigeration equipment designed to employ R22. A similar refrigerant composition is known from Table 3 of document (2), namely a composition which consists of 46 wt.% pentafluoroethane, 50 wt.% 1,1,1,2-tetrafluoroethane and 4 wt.% isobutane (see point 4.3 above) as a replacement for R22 (see Conclusions on page 6 of document (2)). Thus the Board considers, in agreement with both Appellants and the Opposition Division, that the second composition in Table 3 of document (2) represents the closest state of the art and, hence, takes it as the starting point when assessing inventive step.

5.3 In view of this state of the art, the problem underlying the patent in suit, as formulated by Appellant I at the oral proceedings, was the provision

of a refrigerant composition with reduced flammability upon initial leakage.

5.4 As the solution to this problem, the patent in suit proposes the composition as defined in claim 1, characterised in that the iso-isomer of butane is replaced with its n-isomer.

5.5 The comparison of Examples 1 and 2 in the Table on page 5 of the specification of the patent in suit demonstrates that under a worst case fractionation study, the fractionated vapour obtained from the claimed composition, namely that of Example 1, was non-flammable, whereas the second composition listed in Table 3 on page 4 of document (2), namely that of (comparative) Example 2 in the patent specification, was flammable, said examples differing only in that n-butane in Example 1 was replaced by isobutane in (comparative) Example 2. In view of said data, the Board is satisfied that the problem underlying the patent in suit has been successfully solved.

5.5.1 Appellant II challenged the success of the claimed solution, arguing that the data in the aforementioned Table were obtained from studies described in paragraph [0016] of the specification of the patent in suit which modelled initial leakage only and did not represent what might happen at a later stage of leaking. However, as indicated in point 5.3 above, the problem to be solved by the patent in suit was the provision of a refrigerant composition with reduced flammability upon initial leakage, the data showing that this problem had indeed been solved, such that Appellant II's argument is devoid of merit.

5.5.2 Appellant II also argued that the test conditions in the studies leading to the results in said Table did not reflect the regulatory tests required in order to give a composition the official label "non flammable". However, so long as the improvement required by the problem to be solved according to the invention has been shown to have been achieved under fair conditions, there is no need that the composition fulfil any particular regulatory requirements. The test conditions employed in the patent in suit are indeed fair and reflect the desired property that a composition should be non-flammable from the outset; a composition which were flammable from the outset would clearly not be suitable for further flammability tests and would thus, by virtue of this initial screening test, be disqualified as a candidate for further testing. The Board thus holds that these submissions of Appellant II do not throw doubt on the success of the claimed solution to the problem underlying the patent in suit.

5.6 Finally, it remains to decide whether or not the proposed solution to the objective problem underlying the patent in suit is obvious in view of the state of the art.

5.6.1 Document (2) taken alone, although listing n-butane and isobutane as possible refrigerant blend components in Table 1, gives no hint to replace isobutane with n-butane in order to reduce flammability, but rather presents these two compounds as equivalents (see Table 1). The third sentence on page 2 of document (2), cited by Appellant II, merely addresses the fact that hydrocarbons in general are flammable and teaches that

their inclusion in minor quantities into refrigerant blends does not compromise the non-flammability of the blend. Indeed, document (2) does not teach how to reduce flammability at all, let alone to use n-butane instead of isobutane in order to achieve this aim.

5.6.2 Appellant I also argued that the teaching of document (3), which related to refrigerant compositions containing 1,1,1,2-tetrafluoroethane, pentafluoroethane and n-butane and/or isobutane, and addressed their flammability, in combination with the teaching of document (2), rendered the composition of claim 1 obvious.

5.6.3 More particularly, document (3) addressed the proposed solution of the patent in suit, namely the replacement of isobutane by n-butane, mixtures containing n-butane being described as preferred to those containing isobutane, Appellant II citing page 3, lines 44 to 45 in this respect. However, said preference is taught in order to achieve azeotropic or near-azeotropic behaviour of the compositions and not to reduce flammability upon initial leakage (see page 3, lines 45 to 46). Said cited portion of text in document (3) concludes a paragraph (starting at line 41) which relates to ternary compositions containing 1,1,1,2-tetrafluoroethane, pentafluoroethane and n-butane and/or isobutane, said paragraph indicating that all said mixtures are non-flammable, as long as the amount of hydrocarbon does not exceed 4 wt.%, thereby placing emphasis on this threshold and not on the structure of the hydrocarbon. Thus, with regard to flammability, no distinction is made between n-butane and isobutane, contrary to the teaching of the invention. Therefore,

this paragraph does not give any incentive to the skilled person to improve the flammability properties of the composition by using n-butane instead of isobutane.

5.6.4 At page 3, lines 57 to 59, cited by Appellant II, document (3) taught that near-azeotropic mixtures were less likely to fractionate into flammable liquids or vapours. However, this passage also indicates that this azeotropic behaviour depends "on the content of the hydrocarbons", which feature does not characterise the solution proposed by the patent in suit, which instead resides in modifying the butane isomer used.

5.6.5 Appellant II also referred to page 4, lines 52 to 54 of document (3), wherein it was reported that the non-flammability of the binary mixtures 1,1,1,2-tetrafluoroethane/n-butane and 1,1,1,2-tetrafluoroethane/isobutane was improved by the incorporation of pentafluoroethane into said mixtures. However, on the one hand, ternary compositions including pentafluoroethane are already described in document (2), with the consequence that this passage does not take due account of the closest prior art, and, on the other hand, this passage presents mixtures containing n-butane or isobutane as equivalents with regard to flammability properties, which may also be regarded as being in line with the teaching of document (2) (see point 5.6.1 above) and with that of document (14) addresses by Appellant II, wherein the flammability limits (see "Explosionsgrenzen") given for n-butane (1.5 to 8.5 Vol.%) and isobutane (1.3 to 8.4 Vol. %) are virtually identical.

5.6.6 Finally, Appellant II cited the passage at page 2, lines 30 to 32 of document (3), which taught that if a refrigeration composition contained a more volatile, inflammable component, the vapour phase enriched in such component until the inflammability point was reached and if the inflammable component was less volatile, it concentrated in the liquid phase, giving rise to an inflammable liquid. However, this passage does not form part of the invention of document (3), but is rather a representation of the then prior art as seen by the applicant of document (3) at that time. There are thus doubts that it is a teaching considered by the skilled person to have general validity in the art. In any case, this passage neither makes reference to refrigerant mixtures containing 1,1,1,2-tetrafluoroethane/pentafluoroethane, nor does it address hydrocarbons at all, let alone either n- or isobutane, such that the Board holds that the skilled person, faced with the problem underlying the patent in suit of reducing flammability upon initial leakage, would not have been directed by this passage to the claimed solution, such that the argument of Appellant II in this respect may be dismissed as being based on hindsight. Furthermore, as submitted by Appellant I, there is no teaching that the boiling point of an individual compound in a multicomponent mixture, irrespective of the other components in said mixture, exclusively determines its amount in the vapour phase above said mixture, let alone the flammability of said mixture.

5.7 Accordingly, there is no suggestion in document (2), either taken alone or in combination with the teaching of document (3), to support Appellant II's objection

that it was obvious to replace the isobutane in the composition of document (2) with n-butane in order to provide a refrigerant composition with reduced flammability upon initial leakage.

5.8 For these reasons the Board concludes that the subject-matter of claim 1, and by the same token, that of independent claim 2, relating to a refrigeration apparatus containing the composition as claimed in claim 1, involves an inventive step within the meaning of Articles 52(1) and 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of auxiliary request 1, submitted during the oral proceedings before the Board, and a description yet to be adapted.

The Registrar: The Chairman:

C. Rodríguez Rodríguez R. Freimuth