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Datasheet for the decision of 22 April 2008

Case Number: T 0820/06 - 3.3.10

Application Number: 98100645.5

Publication Number: 0856571

IPC: C09K 5/04

Language of the proceedings: EN

Title of invention:
Process for producing mixed refrigerants

Patentee:
SHOWA DENKO KABUSHIKI KAISHA

Opponent:
Ineos Fluor Holdings Ltd.

Headword:
-

Relevant legal provisions (EPC 2000):
EPC Art. 56

Keyword:
"Inventive step (no): improvement (yes) - obvious solution"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0820/06 - 3.3.10

D E C I S I O N
of the Technical Board of Appeal 3.3.10
of 22 April 2008

Appellant: (Opponent)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 3 April 2006 rejecting the opposition filed against European patent No. 0856571 pursuant to Article 102(2) EPC 1973.

Composition of the Board:

Chairman: J. Mercey
Members: P. Gryczka
D. S. Rogers

Summary of Facts and Submissions

I. European patent 0 856 571, in respect of European patent application No. 98100645.5 was granted on the basis of a set of 5 claims. Independent claim 1 read as follows:

"1. A process for producing a mixed refrigerant by which 2 or more different refrigerant components are successively introduced into a vessel at or near its bottom in liquid form to produce a mixed refrigerant, which process comprises selecting the order of introduction of the refrigerant components (groups) so that the liquid density of the refrigerant component (group) to be introduced afterwards is lower at the introduction temperature than the liquid density of the refrigerant component (group) already introduced into the vessel, and introducing the subsequently introduced refrigerant component (group) into the liquid phase of the already introduced refrigerant component (group)."

II. A notice of opposition was filed in which revocation of the patent in its entirety was requested on the ground of lack of inventive step (Article 100(a) EPC).

Inter alia, the following documents were cited during the opposition proceedings:

(1) Proceedings of the International Refrigeration Conference at Purdue University July 23—26, 1996, Edited by J.E. Braun and E.A. Groll: "A refrigerant producer's experience in manufacturing zeotropic blends" H.M. Hughes et al., pages 101 to 106.

(5) Kirk-Othmer, Encyclopedia of Chemical Technology, Fourth Edition, Volume 16, pages 869 to 874, John Wiley and Sons, 1995.

III. The Appellant (Opponent) lodged an appeal against the decision issued in writing on 3 April 2006, by which the Opposition Division rejected the opposition.

The Opposition Division held that the closest prior art for the assessment of inventive step was represented by document (1). The claimed process differed from that disclosed in document (1) only by the fact that the components to be mixed were introduced at or near the bottom of the vessel. The problem underlying the patent in suit was to provide a process allowing a plurality of different refrigerant components to be easily mixed so as to form a uniform composition within a short time. This problem was effectively solved by the claimed process since it was shown by the examples of the opposed patent that the time needed to blend refrigerants was decreased by introducing the components at the bottom of the tank instead of introducing them at the top. Document (1) did not address this problem, nor did it suggest by itself or in combination with document (5) the claimed solution. Therefore, the claimed process involved an inventive step.

IV. According to the Appellant, who objected to the novelty of the claimed process during the oral proceedings in front of the Board, the closest prior art for the assessment of inventive step was represented by document (1) which disclosed that the refrigerants to

be mixed were introduced into a mixing tank in order of decreasing density. Thus, if the claimed process were considered to be novel, it could only differ from the process disclosed in document (1) by the fact that the components to be mixed were introduced into the tank at or near its bottom, this feature not being disclosed explicitly in document (1). The problem underlying the patent in suit was to provide a more efficient process for producing a refrigerant mixture. The claimed solution was characterised by the fact that the components to be mixed were introduced near or at the bottom of the tank. This solution was however obvious for the skilled person, since it was common general knowledge that when introducing components to be mixed at or near the bottom of a tank, the lower density fluid would rise through the higher density fluid creating a turbulence which would improve the mixing of the components. In addition, the introduction of components to be mixed at the bottom of a tank was well known in the art as illustrated, for example, by document (5). For these reasons the process according to claim 1 did not involve an inventive step.

V. The Respondent argued that the claimed process differed from that disclosed in the closest prior art document (1) by the two features requiring that the components were introduced at or near the bottom of the vessel and in order of their decreasing liquid density, document (1) teaching that the components should be added in order of increasing vapour pressure. The objective technical problem underlying the patent in suit was the provision of a more efficient process for producing a refrigerant mixture. As shown by example 1 and comparative example 1, this problem was solved, since a

24-fold improvement in respect of mixing time was achieved with the claimed process. Document (1) did not address the problem underlying the patent in suit and therefore could not provide a solution to it. Furthermore, it was not common general knowledge that mixing efficiency was improved by the introduction of the components to be mixed at or near the bottom of a vessel. Document (5) disclosed all possible positions for introducing the components to be mixed, leaving the skilled person with the teaching that it was irrelevant whether the components were introduced at the bottom or the top of a vessel. In addition, since it related to jet mixers, document (5) was not relevant to the claimed process. Therefore, the claimed subject-matter involved an inventive step.

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

VII. The Respondent requested in writing that the appeal be dismissed.

VIII. At the end of the oral proceedings, which took place on 22 April 2008 in the absence of the duly summoned Respondent, the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.

2. In the decision under appeal, the Opposition Division decided upon the issue of inventive step only. However, during the oral proceedings in front of the Board the

Appellant objected for the first time in the appeal proceedings and in the absence of the Respondent, to the novelty of the claimed subject—matter. In view of the negative conclusions with respect to inventive step of the claimed subject-matter as set out in point 3 below, a decision of the Board with regard to procedural and substantive issues relating to this novelty objection is not necessary.

3. *Inventive step*

3.1 The patent in suit is directed to a process for producing a mixed refrigerant. A process for producing a mixed refrigerant already belongs to the state of the art, as illustrated by document (1), which was considered in the decision under appeal and by both parties in the appeal proceedings as representing the closest prior art document for the assessment of inventive step. The Board sees no reason to depart from this finding.

Document (1) discloses a process for preparing a mixed refrigerant, namely R—407C, by adding into a vessel, firstly HFC-l34a, followed by HFC-125 and finally HFC-32 (page 102, last paragraph, lines 1 to 3). The densities of HFC-134a, HFC-125 and HFC-32 are respectively 1.206, 1.190 and 0.961 (see table 1, page 5 of the patent specification). Thus, in the process disclosed in document (1), the order of introduction of the refrigerant components is such that the liquid density of the refrigerant component to be introduced afterwards is lower at the introduction temperature than the liquid density of the refrigerant component already introduced into the vessel. There is

no indication in document (1) of the location of the point of introduction of the components into the vessel.

The Respondent argued that document (1) taught that the components to be mixed should be introduced in order of increasing vapour pressure, the liquid density and vapour pressure being properties which were independent from one another. However, for the compounds HFC-134a, HFC-l25 and HFC-32, the order of increasing vapour pressure corresponds to the order of decreasing liquid density, so that document (1) nevertheless unambiguously discloses a process in which the components are added in order of decreasing liquid density as required by the patent in suit.

3.2 Having regard to this prior art, the technical problem underlying the patent in suit was to provide a more efficient process for producing a refrigerant mixture (patent specification, page 2, lines 7 and 8 and 55 to 58).

3.3 As the solution to this problem, the patent in suit proposes the process according to claim 1, which is characterized by the fact that the refrigerant components are introduced at or near the bottom of the vessel into the liquid phase of the component(s) already introduced.

3.4 Having regard to example 1 of the patent specification which reproduces the claimed process, and comparative example 1 in which the components are introduced at the top of the vessel, the Board is satisfied that this technical problem is successfully solved by the claimed

process, since these examples show that when the components are introduced at or near the bottom of the vessel, less time is required to obtain the desired stabilised mixture. This is not contested by the Appellant.

3.5 It remains to be decided whether or not the proposed solution to that objective technical problem, namely the process according to claim 1, is obvious to the skilled person in view of the state of the art.

3.5.1 The skilled person, starting from the closest prior art process disclosed in document (1), and faced with the problem of providing a more efficient process for producing a refrigerant mixture, would turn his attention to the common general knowledge in the field of mixing and blending as illustrated for example by document (5). This document teaches that the components to be mixed may be introduced into a vessel at or near its bottom or, at or near its top (page 870, lines 3 and 4 of the second paragraph, and figure 25). Having the knowledge of these two possibilities, the skilled person would realise immediately that when the more dense component is introduced first, as taught by document (1), the efficiency of the mixing process is increased when the subsequent less dense components are introduced at or near the bottom of the vessel into the liquid phase of the component already introduced into the vessel compared to if they are introduced at the top. This is because it is common general knowledge that the less dense compound will rise through the higher density fluid thereby creating turbulence and thus improving the mixing efficiency of the components.

3.6 The Board concludes from the above that it was obvious for the skilled person from the common general knowledge as illustrated by document (5) to solve the technical problem underlying the patent in suit of providing a more efficient process for producing a refrigerant mixture than that disclosed in document (1), to introduce the refrigerant components at or near the bottom of the vessel into the liquid phase of the component(s) already introduced in the vessel, thereby arriving at the solution proposed by the patent in suit.

For these reasons, the subject-matter of claim 1 of the patent as granted lacks the required inventive step (Article 56 EPC).

3.6.1 The Respondent argued in support of inventive step that although document (5) taught the introduction of the components to be mixed at the bottom of the vessel, it was not relevant for the claimed process since it concerned the introduction of components by way of jet mixers. However, this argument cannot convince the Board since the claimed process is not restricted with regard to the introduction means and thus also encompasses a process using jet mixers.

3.7 To summarize, the process according to claim 1 as granted does not involve an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar The Chairman

D. Magliano J. Mercey