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D E C I S I O N
of 12 June 2001

Case Number: T 0565/97 - 3.3.1

Application Number: 90916360.2

Publication Number: 0452509

IPC: C10M 105/38

Language of the proceedings: EN

Title of invention:

Use of synthetic lubricating oil based on polyester as
lubricant in refrigerators

Patentee:

Idemitsu Kosan Company Limited

Opponent:

Cognis Deutschland GmbH

Headword:

Polyesters lubricants/IDEMITSU KOSAN

Relevant legal provisions:

EPC Art. 123(2), 56

EPC R. 88

Keyword:

"Correction of the description as originally filed - admitted
(yes) - obvious error"

"Support of the claims in the application as originally filed
(after correction) (yes)"

"Inventive step (yes) - non obvious solution"

Decisions cited:

G 0004/88, G 0003/89, G 0011/91, G 0009/92, T 0002/83,

T 0493/90, T 0686/91

Catchword:

-



Case Number: T 0565/97 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 12 June 2001

Appellant: Idemitsu Kosan Company Limited
(Proprietor of the patent) 1-1, Marunouchi 3-chome
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Tokyo 100-0005 (JP)

Representative: Hrabal, Ulrich, Dr.
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Respondent: Cognis Deutschland GmbH
(Opponent) Cognis IP
Postfach 130164
D-40551 Düsseldorf (DE)

Representative: -

Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office posted 24 March
1997 concerning maintenance of European patent
No. 0 452 509 in amended form.

Composition of the Board:

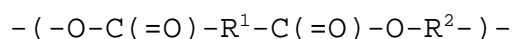
Chairman: P. P. Bracke
Members: P. F. Ranguis
S. C. Perryman

Summary of Facts and Submissions

I. The Appellant (Proprietor of the patent) lodged an appeal against the interlocutory decision of the Opposition Division to maintain the European patent No. 0 452 509 (European patent application No. 90 916 360.2) in amended form pursuant to Article 102(3)(a) EPC.

II. The patent was granted with six claims, independent Claims 1 and 5 reading:

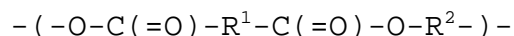
"1. Use of a polyester synthetic lubricating oil which comprises, as an essential component, an aliphatic polyester derivative having a molecular weight in the range of 300 to 2000 and having at least one repeating unit represented by the general formula:



wherein R¹ is an alkylene group having 1 to 10 carbon atoms and R² is an alkylene group having 2 to 10 carbon atoms or an oxaalkylene group having 4 to 20 carbon atoms and wherein the terminal groups are hydroxy groups, carboxyl groups or **esterified carboxy groups** and has a kinematic viscosity at 40°C of 10 to 1000 mm²/s (10 to 1000 cSt), as a lubricant for compression type refrigerators in which hydrofluorocarbon is used as refrigerant." (emphasis added by the Board).

"5. A compression-type refrigerator which comprises at least one compressor, a refrigerant consisting essentially of a hydrogen-containing fluorocarbon and said polyester synthetic lubricating oil which

comprises, as an essential component, an aliphatic polyester derivative having a molecular weight in the range of 300 to 2000 and having at least one repeating unit represented by the general formula:



wherein R¹ is an alkylene group having 1 to 10 carbon atoms and R² is an alkylene group having 2 to 10 carbon atoms or an oxaalkylene group having 4 to 20 carbon atoms and wherein the terminal groups are hydroxy groups, carboxyl groups or **esterified carboxy groups** and has a kinematic viscosity at 40°C of 10 to 1000 cSt, as a lubricant for compression type refrigerators in which hydrofluorocarbon is used as refrigerant." (emphasis added by the Board).

III. The opposition was based on the grounds for opposition under Article 100(a) and (c) EPC, non compliance with Articles 56 and 123(2) EPC respectively.

IV. The following documents were *inter alia* opposed to the patent in suit:

(1) US-A-2 926 139

(4) US-A-4 155 861

(5) GB-A-2 216 541

V. The Opposition Division held that the feature that the terminal groups are esterified carboxy groups could not be derived from the application as originally filed and, therefore, the patent did not meet the requirements of Article 123(2) EPC.

The Opposition Division held, furthermore, that the auxiliary request wherein Claims 1 and 5 as granted were amended by deletion of the feature "esterified carboxy groups" could be maintained pursuant to Article 102(3) EPC.

- VI. The Respondent (Opponent) was originally Henkel KGaA, Germany. The Board was informed on 13 August 1999 that Henkel KGaA had transferred its entire chemical business to Cognis Deutschland GmbH. A copy of the relevant parts of the agreement between Henkel KGaA and Cognis Deutschland GmbH was filed.
- VII. The Appellant filed in the course of the appeal proceedings, as a request of correction according to Rule 88 EPC, an amended page 8 of the application as filed wherein at line 18, the expression "to a dibasic carboxylic acid each as raw material" was amended to read "to **a diester of** a dibasic carboxylic acid each as a raw material" (emphasis added by the Board). Moreover, he filed with letter of 11 May 2001 sets of claims according to the first to fourth auxiliary request.
- VIII. Oral proceedings took place on 12 June 2001.
- IX. The Appellant's arguments in support of the admissibility of the correction pursuant to Rule 88 EPC on the one hand and the compliance of the claims as granted with Article 123(2) EPC and Article 56 EPC insofar as aliphatic polyester derivatives having esterified carboxy terminal groups are concerned on the other hand may be summarised as follows:

It was obvious that an error had crept into the statement related to the molar ratio of a dihydric alcohol to a dibasic carboxylic acid (cf. page 8, lines 17 to 18) since the said statement clearly referred to the second method for preparing aliphatic polyester derivative, i.e. "ester exchange process". It was indeed obvious for the person skilled in the art that an ester exchange process could not take place by reaction of a dihydric alcohol and a dibasic carboxylic acid.

Furthermore, the correction was obvious as said ester exchange process involved the condensation of a dihydric alcohol and a diester of a dibasic carboxylic acid as set out on page 7, lines 24 to 26. The obviousness of the correction was confirmed by all the examples which were related to the ester exchange process involving a dihydric alcohol and a diester of a dibasic carboxylic acid.

The Claims 1 and 5, insofar as they related to aliphatic polyester derivatives having esterified carboxy terminal groups did not contravene the requirements of Article 123(2) EPC. The application as filed properly corrected disclosed a molar ratio of a dihydric alcohol to a diester of a dibasic carboxylic acid between 0.5 and 2. Therefore, a molar ratio lower than 1, resulting in polyester derivatives having esterified carboxy terminal groups, was directly and unambiguously derivable from that. Furthermore, all the examples related to such an embodiment.

Starting from document (5) as the closest prior art, it would not have been obvious to combine the teaching of this document with that of document (4) since

document (4) did not relate to lubricants to be used with hydrofluorocarbon as refrigerant.

- X. The Respondent's arguments against the admissibility of the correction pursuant to Rule 88 EPC on the one hand and the non compliance of the claims as granted with Article 123(2) EPC and Article 56 EPC insofar as aliphatic polyester derivative having esterified carboxy terminal groups are concerned on the other hand may be summarised as follows:

The statement related to the molar ratio of a dihydric alcohol to a dibasic carboxylic acid (cf. page 8, lines 17 to 20) contained an error. However, the correction was not obvious. The person skilled in the art might have indeed understood that said statement was in direct relationship with the previous one reading "a diester as raw material can be exemplified by a diester prepared by dehydration-condensation of a dibasic carboxylic acid and an arbitrary monohydric alcohol in addition to the above-mentioned dibasic carboxylic acid". It derived therefrom that the correction might have been to replace, at page 8, lines 17 to 20, the term "dihydric alcohol" by "monohydric alcohol". As there was doubt about the correction to be made, the amendment submitted by the Appellant did not fulfill the requirements of Rule 88 EPC. It followed that Claims 1 and 5 as granted extended beyond the content of the application as filed.

The claimed invention was obvious in view of documents (4) and (5). Document (5), the closest state of the art, disclosed a working fluid/lubricant combination for use in a mechanical vapour

recompression type heat transfer device wherein working fluid comprised a hydrofluorocarbon, in particular the 1,1,1,2-tetrafluorethane, and the lubricant comprised a monomeric ester having a molecular weight greater than 250. Suitable esters included, in particular, compounds containing from one to three or even more ester groups. Among them, the alkylesters of aliphatic carboxylic acids, for example di(2-ethylhexyl) adipate or the alkoxyalkyl and alkoxyalkoxyalkyl esters of aliphatic carboxylic acid, for example di(methoxyethoxyethyl) adipate were mentioned (cf. Claims 1, 2, description pages 3 and 4). It was true that those polyesters were structurally different from the polyesters derivatives as defined in the patent in suit and that the kinematic viscosity of the exemplified di(2-ethylhexyl) adipate and di(methoxyethoxyethyl) adipate is lower than 10 mm²/s at 40°C. However, the person skilled in the art would have found the relevant information to replace the monomeric esters of document (5) by the polyester derivatives as defined in the patent in suit in considering document (4). Document (4) related to the same technical field (ester lubricant for the lubrication of refrigeration machines as stated column 1, lines 24 to 29) and disclosed the same kind of polyesters as those defined in the patent in suit. In particular the complex esters II, IV and VI exhibited a kinematic viscosity higher than 10 cSt at 37.7°C for a molecular weight comprised between 300 and 2000. It would have been obvious for the person skilled in the art seeking an alternative to the embodiments disclosed in document (5) to replace the disclosed monomeric esters by those having the required viscosity disclosed in document (4). The fact that the polyesters of document (4) were combined with a monomeric diester was of no relevance as the patent in suit did not

exclude the presence of other compounds.

- XI. The Appellant requested that the text of the application as filed on 13 June 1991 on page 8, line 18 reading "to a dibasic carboxylic each as raw material" and the corresponding text on page 4, line 32 of the patent as granted be corrected under Rule 88 EPC to read "to a diester of a dibasic carboxylic each as a raw material", that the decision under appeal be set aside and that the patent be maintained as main request as granted or on the basis of the set of claims filed as first, second, third or fourth auxiliary request on 11 May 2001.

The Respondent requested that the appeal be dismissed.

- XII. At the end of the Oral proceedings the decision was announced orally.

Reasons for the Decision

1. The appeal is admissible.
2. *Identity of the Respondent/Opponent*

In view of the documents submitted by the Respondent (cf. point VI above), the Board is satisfied that the present opposition was validly transferred to Cognis Deutschland GmbH (cf: decision G 4/88, OJ EPO 1989, 480). The Respondent is therefore Cognis Deutschland GmbH. This finding was not contested by the Appellant.

Main request

3. *Scope of the Appeal*

The claims of this request, as far as aliphatic polyester derivatives having hydroxy or carboxy terminal groups are concerned, correspond to the request as maintained by the Opposition Division. According to the principle of prohibiting *reformatio in peius*, the Board is not empowered to decide on this matter (G 9/92, OJ EPO 1994, 875, point 1 of the answer set out in the Order), since no appeal was filed by the only Respondent (Opponent).

The scope of this appeal is, therefore, limited to the claims of this request, as far as aliphatic polyester derivatives having esterified carboxy terminal groups are concerned.

4. *Request for correction under Rule 88 EPC*

4.1 The Opposition Division held that the feature that the terminal groups are esterified carboxy groups could not be derived from the application as originally filed. The Appellant filed in the course of the appeal proceedings, as a request for correction according to Rule 88 EPC, an amended page 8 of the application as originally filed wherein at line 18, the expression "to a dibasic carboxylic acid each as raw material" was amended to read "to a diester of a dibasic carboxylic acid each as a raw material".

4.2 The parts of a European patent application or of a European patent relating to the disclosure (the description, claims and drawings) may be corrected under Rule 88, second sentence, EPC only within the limits of what a skilled person would derive directly

and unambiguously, using common general knowledge, and seen objectively and relative to the date of filing, from the whole of these documents as filed. Such a correction is of a strictly declaratory nature and thus does not infringe the prohibition of extension under Article 123(2) EPC (see Orders of G 3/89 and G 11/91, OJ EPO 1993, 117 and 125).

4.3 The Appellant and the Respondent had divergent views on the matter whether or not that amendment represented the correction of an **obvious** error within the meaning of Rule 88 EPC.

4.4 In order for a correction under Rule 88, second sentence, EPC to be allowable, it must be established (a) that an error is in fact present in the document filed at the EPO, and (b) that the correction of the error is obvious in the sense that it is immediately evident that nothing else would have been intended than what is offered as the correction (see T 493/90 of 10 December 1991, point 2 of the reasons).

4.5 With respect to the above requirement (a), the description as originally filed contains two methods of preparation of the aliphatic polyester derivatives, namely (i) direct esterification process and (ii) ester exchange process (see page 6, lines 23-24 of the application as originally filed). The paragraph for which a correction is requested (see page 8, lines 17 to 20 of the application as originally filed) belongs clearly to the ester exchange process. This method is generally defined as a process wherein a dihydric alcohol and a diester of a dibasic carboxylic acid is subjected to condensation in the absence or presence of a catalyst (see page 7, lines 24 to 27 of the

application as originally filed). In the Board's judgment, it is clear that an error crept into the paragraph of page 8, lines 17 to 20 because an ester exchange cannot be performed by the condensation of a dihydric alcohol with a dibasic carboxylic acid. This finding was not contested by the Respondent.

4.6 With respect of the above requirement (b), the question to decide is whether or not the amendment is obvious in view of the description as a whole. The Respondent argued that there was doubt about the correction to be made since the incorrect statement might refer to the previous one relating to the synthesis of diester by condensation of dicarboxylic acid with monohydric alcohol.

4.7 However, the Board cannot share this opinion since it is in contradiction with the end of the contested sentence which indicates that a molar ratio alcohol/dibasic carboxylic acid is usually in the range of 0.5 to 2.0. Actually a molar ratio of monohydric alcohol to dibasic carboxylic acid lower than 2 cannot lead to diester and it is, therefore, clear that the incorrect statement on page 8, lines 18 to 20 does not refer to the synthesis of diester by condensation of dicarboxylic acid with monohydric alcohol.

In other respects, the Board observes that the ester exchange process is defined as a process wherein a dihydric alcohol and a diester of a dibasic carboxylic acid is subjected to condensation in the absence or presence of a catalyst (see page 7, lines 24 to 27 of the application as originally filed).

Moreover, all the examples (Examples Nos. 1 to 16) are related to the condensation of a dihydric alcohol and a diester of a dibasic carboxylic acid (see page 13, line 8 to page 16, line 15).

4.8 From the application as originally filed as a whole, it is, therefore, the conclusion of the Board that the only possibility to correct the error is to replace the expression "the proportions in terms of molar ratio of a dihydric alcohol to a dibasic carboxylic acid ..." by the expression "the proportions in terms of molar ratio of a dihydric alcohol to **a diester of** a dibasic carboxylic acid ...". The insertion of the term "a" before the expression "raw material" is a linguistic error the correction of which is obvious. This last finding was not contested by the Respondent.

4.9 The Board concludes that the amendments made on page 8 of the application as originally filed may be allowed as an admissible correction under Rule 88 EPC.

5. *Amendments of the Claims 1 and 5 - Article 123 (2)*

5.1 In view of the application as originally filed (after correction), the question to decide is now whether or not the feature related to the use of an aliphatic polyester derivative having esterified carboxy terminal groups and including the other parameters mentioned in Claims 1 and 5 extends beyond the application as originally filed.

5.2 The Board observes that the application as originally filed (after correction) mentions on page 8, lines 17 to 20 that "the proportions in terms of molar ratio of a dihydric alcohol to a diester of a dibasic carboxylic

acid each as a raw material is usually in the range of 0.5 to 2.0, preferably 0.8 to 1.5 and particularly preferably 0.9 to 1.2".

- 5.3 Those embodiments include, when the molar ratio of a dihydric alcohol to a diester of a dibasic carboxylic acid is < 1 , aliphatic polyester derivatives having esterified carboxy terminal groups. Moreover all the examples (Examples Nos. 1 to 16) relate to this embodiment (the molar ratio of a dihydric alcohol to a dibasic carboxylic acid is always < 1).
- 5.4 Therefore, Claims 1 and 5 of this request, as far as aliphatic polyester derivatives having esterified carboxy terminal groups are concerned, directly and unambiguously derive from the application as originally filed (after correction) and therefore, meet the requirements of Article 123(2). This was not contested by the Respondent

6. *Inventive step - Article 56 EPC*

- 6.1 Although the set of claims at issue comprises two independent claims, i.e. Claims 1 and 5, those claims relate actually to the same claimed subject matter. It is, therefore, proper to examine the compliance of said claims with Article 56 EPC together. The arguments of both Appellant and Respondent address, in fact, that issue without differentiating one claim from the other.
- 6.2 In accordance with the "problem-solution approach" consistently applied by the Boards of Appeal to assess inventive step on an objective basis, it is necessary to establish the closest state of the art being the

starting point, to determine in the light thereof the technical problem which the invention addresses and solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art. In this context, the Boards of Appeal have developed certain criteria that should be adhered to in order to identify the closest state of the art being the starting point. One such criterion is that the "closest prior art" is normally a prior art document disclosing subject-matter aiming at the same objective as the claimed invention and having the most relevant technical features in common.

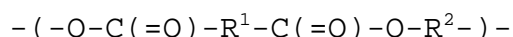
6.3 The patent in suit relates to the use of a polyester synthetic lubricating oil suitable for a refrigerating machine in which hydrofluorocarbon is used as refrigerant. The objectives to be achieved, as indicated in the patent in suit, consist in offering a lubricating oil having excellent lubricating performances as well as favourable miscibility over the entire working temperature range with hydrofluorocarbon compounds (cf. patent specification page 2, lines 3 to 11 and 55 to 58). In relation to these objectives and to the relevant technical features in common, a selection among the documents cited in the proceedings must be made as to which is to be considered as the "closest prior art".

6.4 Document (5) relates to a working fluid/lubricant combination for use in a mechanical vapour recompression type heat transfer device wherein the working fluid comprises a hydrofluorocarbon or hydrochlorofluorocarbon or chlorofluorocarbon and the lubricant comprises an ester having a molecular weight greater than 250 (cf. page 2, lines 26 to 32).

6.5 It is not disputed by the parties that this document is the sole one aiming at the same objective as the claimed invention. The documents (1) to (4) do not relate to lubricants for a refrigerating machine in which hydrofluorocarbon is used as refrigerant.

6.6 In view of the closest state of the art, i.e. document (5), the technical problem underlying the patent in suit consists in the provision of a lubricating oil having excellent lubricating performances as well as favourable miscibility over the entire working temperature range with hydrofluorocarbon compounds (cf. patent specification page 2, line 55 to page 3, line 2) for use in compression type refrigerators in which hydrofluorocarbon is used as refrigerant.

6.7 The claims as far as this appeal is concerned propose as the solution to this problem, to use an aliphatic polyester derivative having a molecular weight in the range of 300 to 2000 and having at least one repeating unit represented by the general formula:



wherein R¹ is an alkylene group having 1 to 10 carbon atoms and R² is an alkylene group having 2 to 10 carbon atoms or an oxaalkylene group having 4 to 20 carbon atoms and wherein the terminal groups are esterified carboxy groups and having a kinematic viscosity at 40°C of 10 to 1000 mm²/s (10 to 1000 cSt).

The specification of the patent in suit demonstrates in Tables 1 and 2 on pages 8 and 9 that the problem is indeed solved within the entire scope of the claims.

This finding was not contested by the Respondent.

6.8 It remains to be decided whether the claimed solution is obvious in view of the prior art. In particular, the question to decide is whether the person skilled in the art would have used a polyester as defined in point 6.7 above to get a favourable miscibility with hydrofluorocarbon compounds over the entire working temperature range for use in compression type refrigerators in which hydrofluorocarbon is used as refrigerant.

6.9 Document (5) describes a working fluid/lubricant combination for use in a mechanical vapour recompression type heat transfer device wherein the working fluid comprises a hydrofluorocarbon or hydrochlorofluorocarbon or chlorofluorocarbon and the lubricant comprises an ester having a molecular weight greater than 250 (cf. page 2, lines 8 to 13 and lines 26 to 32). Suitable esters include compounds containing from one to three or even more ester groups. Among them, the alkoxyalkyl and alkoxyalkoxyalkyl esters of aliphatic carboxylic acid, for example di(methoxyethoxyethyl) adipate are mentioned. The solubility of di(methoxyethoxyethyl) adipate in 1,1,1,2-tetrafluoroethane is shown in the Table at three temperatures, respectively room temperature, 0°C and 55°C for different proportions of lubricant with respect of the hydrofluorocarbon compound.

6.10 The Respondent argued that the person skilled in the art would have been directed to replace the aliphatic esters of document (5) by the polyesters of document (4), arriving, therefore at the claimed solution.

However, the Board does not share this opinion for the following reasons:

- 6.11 Document (4) relates to ester lubricants suitable for some important applications of lubrication technology, in particular, for the lubrication of refrigeration machines and transmissions (cf. column 1, lines 37 to 40 and 28 to 29). Moreover, document (4) discloses the same kind of polyesters as those defined in the patent in suit. In particular, the polyesters II, IV and VI have terminal esterified carboxy groups and exhibit a kinematic viscosity higher than 10 cSt at 37.7°C for a molecular weight comprised between 300 and 2000. This finding was not contested by the Appellant. The Board observes, however, that this document does not mention the use of those polyesters with a hydrofluorocarbon as refrigerant.
- 6.12 It is true that the person skilled in the art **could** fairly expect that the partial problem of providing an appropriate lubricant for refrigeration machines **could** in principle be solved by using such polyesters. However, it is necessary in order to demonstrate obviousness to show that the person skilled in the art **would** have applied such polyesters with the view to solving the properly defined technical problem (cf. T 2/83, OJ EPO 1984, 265, point 7 of the reasons and T 686/91, point 4, page 13, second paragraph, of the reasons). Since the technical problem to be considered here, i.e. that of a favourable miscibility of the lubricants with hydrofluorocarbons over the entire working temperature range is not addressed in document (4), the person skilled in the art would not have derived any suggestion from that document which could assist him in the attempt to solve this technical

problem.

6.13 Nor can document (1) provide any suggestion. The Respondent, during oral proceedings, rightly abandoned his previous argument based on this document, as the disclosed refrigerant is of a different kind and the lubricant too.

6.14 It follows from the above that the subject-matter of Claim 1 is not rendered obvious by the prior art cited taken as a whole. The same applies to the dependent Claims 2 to 4 relating to specific embodiments of said Claim 1. Independent Claim 5 relating to a compression-type refrigerator comprising a refrigerant consisting essentially of a hydrofluorocarbon and a polyester derivative as defined in Claim 1 is based on the same inventive concept and derives its patentability on the same basis as does Claim 1. This also applies to dependent Claim 6.

The requirements of Article 56 EPC are met.

Auxiliary requests

7. The Board is satisfied that the claims of the main request, as far as the appeal is concerned, meet the requirements of the EPC. No need arises to consider the auxiliary requests.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The request for correction under Rule 88 EPC is allowed.
3. Subject to the correction the patent is maintained as granted.

The Registrar:

The Chairman:

N. Maslin

P. P. Bracke