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Datasheet for the decision of 1 October 2019

Case Number: T 1182/15 - 3.3.09

Application Number: 05736563.7

Publication Number: 1741553

IPC: B32B27/34, B32B1/08, B65D1/09, F16L11/04

Language of the proceedings: EN

Title of invention:
MULTILAYER STRUCTURE

Patent Proprietor:
Ube Industries, Ltd.
Kuraray Co., Ltd.,

Opponent:
EMS-PATENT AG

Headword:

Relevant legal provisions:
RPBA Art. 13
EPC Art. 56

Keyword:
Late-filed requests : admitted
Late-filed evidence : not admitted
Main request : inventive step (no)
First auxiliary request : inventive step (no)
Second auxiliary request : inventive step (no)

Decisions cited:
T 0570/08

Catchword:

Europäisches Patentamt
European Patent Office
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Beschwerdekammern

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Case Number: T 1182/15 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 1 October 2019

Appellant: (Patent Proprietor 1)	Ube Industries, Ltd. 1978-96, O-Aza Kogushi Ube-shi, Yamaguchi-ken 755-8633 (JP)
Appellant: (Patent Proprietor 2)	Kuraray Co., Ltd., 1621, Sakazu, Kurashiki-shi Okayama 710-8622 (JP)
Representative:	Hoeger, Stellrecht & Partner Patentanwälte mbB Uhlandstrasse 14c 70182 Stuttgart (DE)
Respondent: (Opponent)	EMS-PATENT AG Via Innovativa 1 7013 Domats/Ems (CH)
Representative:	Bremi, Tobias Hans Isler & Pedrazzini AG Giesshübelstrasse 45 Postfach 1772 8027 Zürich (CH)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 13 April 2015 revoking European patent No. 1741553 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	W. Sieber
Members:	N. Perakis
	E. Kossonakou

Summary of Facts and Submissions

I. This decision concerns the appeal filed by the patent proprietors against the opposition division's decision to revoke European patent No. 1 741 553.

II. In its notice of opposition, the opponent requested the revocation of the patent in its entirety on the grounds of Article 100(a) EPC (lack of novelty and lack of inventive step).

Claims 1, 7 and 8 as granted read as follows:

"1. A multilayer structure comprising two or more layers including at least a layer (a) comprising (A) an aliphatic polyamide and a layer (b) comprising (B) a semi-aromatic polyamide comprising a diamine unit containing an aliphatic diamine unit having a carbon number of 9 to 13 in an amount of 60 mol% or more based on all diamine units and a dicarboxylic acid unit containing a terephthalic acid and/or naphthalene dicarboxylic acid unit in an amount of 50 mol% or more based on all dicarboxylic acid units, with said layer (b) being disposed as the innermost layer."

"7. The multilayer structure as claimed in any one of claims 1 to 6, wherein the layers are formed by coextrusion."

"8. A multilayer structure selected from the group consisting of a film, a hose, a tube, a bottle and a tank, comprising the multilayer structure claimed in any one of claims 1 to 7."

The documents filed before the opposition division included:

D1 : EP 1 505 099 A2;

D2 : WO 2005/018891 A1;

D4 : FR 2 766 548 A;

D6a: English translation of JP 2000-248175 A;

D7 : "Development of New Heat-Resistant Polyamide Resin, "PA9T", for Electronic and Automobile Parts", Kuraray Co., Ltd., 1998, two pages;

D12: "High-performance polyamide resin PA9T", Kuraray Co., Ltd., 1997, pp 1-20;

D16: EMS-Grivory, "Vorläufiger Prüfungsbericht (Protokollblatt)", Correlation Cresol-H_2SO_4, 23 April 2013, one page;

D23: Amodel®PPA Design Guide, Solvay Specialty Polymers, 2013, pp 1-88;

D24: EP 1 695 817 A1;

D25: EP 1 197 699 A2;

D27: EP 1 710 482 A1.

The opposition division maintained that the subject-matter of the main request (claims as granted) lacked novelty over D24 and that the subject-matter of all four auxiliary requests lacked inventive step starting either from D4 or D25.

III. In their statement setting out the grounds of appeal dated 24 August 2015, the patent proprietors (the appellants) requested that the decision under appeal be set aside and submitted four auxiliary requests and the following document:

D5a: Nylon Plastics Handbook, edited by Melvin I. Kohan, 1995, pp 372-375 and 592-596.

IV. In a letter dated 22 February 2016, the opponent (the respondent) requested that the appeal be dismissed and filed comparative measurements and the following documents:

D28: EP 1 741 549 A1;

D29: SAE international, Surface Vehicle Standard J2260;

D30: Norm Volkswagen AG, Organische Werkstoffe, Kugelfall-Prüfung;

D31: Norm Volkswagen AG, Kraftstoffleitung, Mehrschichtrohr, Werkstoffanforderungen;

D32: Brochure "Vestamid® Polyamide 12", Degussa;

D33: "Technische Thermoplaste Polyamide, Kunststoff Handbuch 3/4", edited by Dr. Ludwig Bottenbruch and Dr. Rudolf Binsack, 1998, pp 724-726.

V. In a letter of 28 December 2016, the appellants withdrew their main request. The previous first auxiliary request became the new main request and the previous second to fourth auxiliary requests became the new first to third auxiliary requests.

VI. In a letter of 16 January 2017, the respondent elaborated on its objections to novelty and inventive step.

VII. In a communication dated 9 August 2019, the board gave a preliminary opinion on the outstanding issues of novelty and inventive step.

VIII. In a letter dated 29 August 2019, the appellants filed the following documents:

D34: Technical Data Sheet of Amodel® AT-1002 HS, Solvay Specialty Polymers, 2018, pp 1-6;

D35: Experimental Report.

They also filed new requests comprising a main request, a first auxiliary request and a second auxiliary request.

Claim 1 of the (new) **main request** reads as follows *[added and deleted features in comparison with claim 1 as granted are either underlined or deleted]*:

"1. A multilayer structure selected from the group consisting of a hose, a tube a bottle and a tank comprising two or more layers including at least a layer (a) comprising (A) an aliphatic polyamide and a layer (b) comprising (B) a semi-aromatic polyamide comprising a diamine unit containing an aliphatic diamine unit having a carbon number of 9 to 13 in an amount of 60 mol% or more based on all diamine units and a dicarboxylic acid unit containing a terephthalic acid ~~and/or naphthalene dicarboxylic acid unit~~ in an amount of 50 mol% or more based on all dicarboxylic acid units, with said layer (b) being disposed as the

innermost layer, wherein the layers are formed by coextrusion."

Compared with claim 1 of the main request, claim 1 of the **first auxiliary request** further specifies that the multilayer structure comprising two or more layers includes a two-layer construction of (a)/(b).

Compared with claim 1 of the first auxiliary request, claim 1 of the **second auxiliary request** further specifies that layer (a) comprises (A) an aliphatic polyamide having a relative viscosity of 2.0 to 4.5 as measured according to JIS K-6920.

IX. In a letter dated 17 September 2019, the respondent requested that neither the appellants' new requests nor D35 be admitted into the proceedings and that, should they be admitted, the oral proceedings be postponed.

The respondent also filed an affidavit signed by Mr Heinz Caviezel and dated 12 September 2019 (D36).

X. On 1 October 2019 oral proceedings were held before the board. After the board's decision to admit the appellants' new requests into the proceedings, the respondent withdrew its request for an adjournment.

XI. The relevant arguments put forward by the appellants in their written submissions and during the oral proceedings may be summarised as follows:

- The requests filed with the letter of 29 August 2019 should be admitted into the proceedings since they were based on the previous requests and thus did not raise any new issue that

the respondent and the board could not deal with during the oral proceedings.

- Also the technical evidence filed with the letter of 29 August 2019 should be admitted into the proceedings because it addressed a very important technical issue relating to the enabling disclosure of D4 which was considered to represent the closest prior art.

- Contrary to the respondent's allegations, the subject-matter of claim 1 of the main request was novel over D1, D2, D24, D25 and D27.

- The subject-matter of claim 1 of the main request also involved an inventive step. D4 was the closest prior art. The claimed multilayer structure differed from that of D4 in that a specific polyphthalamide was used which improved the properties of the structure, namely the low-temperature impact resistance and the peel strength. This was shown in the appellants' technical evidence of 12 January 2016 which used Grivory®G21 as a suitable representative of the polyphthalamides of D4. The respondent's technical evidence of 22 February 2016 was not conclusive since many parameters had been changed simultaneously (the aliphatic polyamide in the outer layer and the polyphthalamide in the innermost layer). The skilled person would not have found any motivation in the state of the art to combine an aliphatic polyamide with the specific semi-aromatic polyamide in a multilayer structure in order to improve its low-temperature impact resistance and its peel strength.

- The subject-matter of claim 1 of the first auxiliary request involved an inventive step for the same reasons as claim 1 of the main request.

- The subject-matter of claim 1 of the second auxiliary request also involved an inventive step. D4, which was still the closest prior art, did not disclose that the aliphatic polyamide had a relative viscosity of 2.0 to 4.5 as measured according to JIS K-6920. The patent in suit (see paragraph [0048]) disclosed that technical advantages were associated with this distinguishing feature, namely the optimisation of the mechanical properties, the extrusion pressure and the torque, which were not disclosed in the prior art.

XII. The relevant arguments put forward by the respondent in its written submissions and during the oral proceedings may be summarised as follows:

- The appellants' requests filed with the letter of 29 August 2019 should not be admitted into the proceedings since they could have been filed earlier.

- The appellants' evidence filed with the letter of 29 August 2019 should not be admitted into the proceedings. Not only did it contradict the technical evidence filed previously, which had shown that the disclosure of D4 was enabling, but it also raised new technical issues which could not be addressed without postponing the oral proceedings.

- The subject-matter of claim 1 of the main request lacked novelty in view of the disclosure of D1, D2, D24, D25 and D27.

- The subject-matter of claim 1 of the main request did not involve an inventive step. D4 was considered the closest prior art, in particular the multilayer structure with an outer layer comprising PA11 or PA12 and an innermost layer comprising an Amodel polyphthalamide. The claimed multilayer structure differed from that of D4 in the chemical structure of the semi-aromatic polyamide (polyphthalamide). The appellants did not file any relevant technical evidence to show that the claimed structure provided an unexpected technical effect. The evidence filed with the letter of 12 January 2015 had not been carried out according to D4, i.e. with an Amodel polyphthalamide, but with Grivory®G21 polyphthalamide and was therefore irrelevant. Moreover, the results of this evidence were contradicted by the respondent's technical evidence filed with letter of 22 February 2016. Thus, the technical problem was merely the provision of an alternative multilayer structure for the transfer of fluids. The skilled person starting from D4 and looking for alternative multilayer structures would have considered the use of the claimed semi-aromatic polyamides obvious either on the basis of their common general knowledge as illustrated in D5a or on the basis of D6a, D7 and D12.

- The subject-matter of claim 1 of the first auxiliary request did not involve an inventive step. The additional feature of this claim, namely that the multilayer structure included a two-layer

construction of (a)/(b), was also disclosed in D4. Thus, the claimed subject-matter was obvious for the reasons put forward with respect to the subject-matter of claim 1 of the main request.

- The subject-matter of claim 1 of the second auxiliary request did not involve an inventive step. D4 did not disclose the additional feature of this claim, namely that the aliphatic polyamide had a relative viscosity of 2.0 to 4.5 as measured according to JIS K-6920. However, since this feature was not associated with any technical effect, it was arbitrary and did not involve an inventive step. Furthermore, the skilled person based on their common general knowledge as illustrated in D33 and on the correlation between the relative viscosity values obtained in m-cresol and in sulfuric acid shown in D16, would have realised that the relative viscosity of the aliphatic polyamides of D4, namely PA11 and PA12, would necessarily have had values that fell within the claimed range.

XIII. The appellants requested that the decision under appeal be set aside and that the patent be maintained on the basis of the claims of either the main request or one of the first or second auxiliary requests, all requests filed with the letter dated 29 August 2019.

XIV. The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. Admission of the appellants' late-filed requests

1.1 With their letter dated 29 August 2019, i.e. just one month in advance of the oral proceedings before the board, the appellants filed a new main request and new first and second auxiliary requests.

1.2 The appellants' new requests are based on requests underlying the decision under appeal and/or requests filed with the statement setting out the grounds of appeal.

1.2.1 Claim 1 of the main request is derived from claim 1 of the second auxiliary request filed with the statement setting out the grounds of appeal (corresponding to the second auxiliary request of the decision under appeal), and is further limited in that the multilayer structure is selected from the group consisting of a hose, a tube a bottle and a tank.

1.2.2 Compared to claim 1 of the main request, claim 1 of the first auxiliary request contains the further limitation that the multilayer structure comprising two or more layers includes a two-layer construction of (a)/(b).

1.2.3 Claim 1 of the second auxiliary request is further limited in that the relative viscosity for the aliphatic polyamide (A) has been introduced.

1.3 The appellants' late-filed requests did not raise any new issue, which the board or the respondent could not reasonably be expected to deal with without an adjournment of the oral proceedings. Contrary to the argument of the respondent, no additional search

appeared to be necessary since at least the closest prior art document D4 (see below the section related to inventive step) discloses a multilayer tube made by coextrusion, i.e. it discloses the features relating to coextrusion and the shape of the multilayer structure which had been inserted into claim 1 of all new requests.

1.4 Therefore, the board did not see any reason not to admit the appellants' late-filed requests into the appeal proceedings under Article 13(1) and (3) RPBA.

2. Admission of the appellants' late-filed experimental report D35

2.1 With their letter of 29 August 2019, the appellants also filed a new experimental report to support their argument that the skilled person would not be able to produce a coextruded tube of polyamide 12 and AMODEL polyphthalamide following the teaching of D4.

2.2 This new argument, casting doubt on whether the disclosure of D4 was enabling or not and appearing to contradict the respondent's technical evidence filed on 10 March 2015 and 22 February 2016, could and should have been filed earlier. D4 was filed with the notice of opposition and the respondent's technical evidence was filed at least three years before D35 was filed. The respondent's evidence filed in opposition showed that it was possible to manufacture a multilayer tube with PA12 as the outermost layer and Amodel AT 1002 HS as the innermost layer (see comparative example 5). Until the appellants filed D35, this had never been questioned. In reaction to the filing of D35, the respondent filed D36, an affidavit that confirmed the

correctness of the respondent's experiments filed in opposition.

2.3 On this basis, it was concluded that the appellants' late-filed technical evidence amounted to a change of case at a very late stage of the appeal proceedings. Furthermore, the admission of D35 into the proceedings would have required a postponement of the oral proceedings to allow the respondent to deal with the argument and D35 properly. However, this would have been contrary to the requirements of Article 13(3) RPBA. Therefore, the board decided not to admit this late-filed technical evidence into the appeal proceedings.

3. Main request - novelty

The respondent contested the novelty of the subject-matter of claim 1 of the main request on the basis of D1, D2, D24, D25 and D27. The board does not consider that any of these documents anticipates the claimed subject-matter. However, since the main request failed due to lack of inventive step, any elaboration on novelty is unnecessary.

4. Main request - inventive step

4.1 Closest prior art

The parties agreed that D4 could be considered to represent the closest prior art. The board has no reason to disagree with them.

D4 discloses a tube having a multilayer structure for fluid transportation, in particular fuel for an automobile vehicle, which has improved mechanical and

thermal properties as well as improved fuel impermeability (title; abstract; page 1, lines 3-5; page 4, lines 9-14). The tube can be manufactured by coextrusion (page 4, lines 29-30) and comprises an external layer made of thermoplastic material as well as an internal layer based on a polyphthalamide, i.e. a semi-aromatic polyamide (claim 1). Examples of thermoplastic materials to be used in the external layer include the aliphatic polyamides PA11 and PA12 (page 2, lines 4-5). The sole example of a polyphthalamide to be used in the internal layer is commercialised under the brand name of Amodel by Amoco Oil Company (page 2, line 33 to page 3, line 3). This polyphthalamide can be processed by coextrusion.

Amodel corresponds to polyphthalamide resins commercialised in 1991, all of which are semi-crystalline (D23: page 1, left column, first paragraph) and based on PA6T (D5a: page 592, last paragraph), which is the condensation product of hexamethylene diamine and terephthalic acid (D23: page 1, right column, second full paragraph).

The multilayer structure of claim 1 differs from the multilayer tube of D4 in that the innermost layer comprises a specific polyphthalamide, i.e. a polyphthalamide comprising a diamine unit containing an aliphatic diamine unit having a carbon number of 9 to 13 in an amount of 60 mol% or more based on all diamine units and a dicarboxylic acid unit containing a terephthalic acid in an amount of 50 mol% or more based on all dicarboxylic acid units.

4.2 The technical problem and its solution

4.2.1 The patent in suit discloses that the claimed multilayer structure has excellent heat resistance, chemical resistance, liquid and/or gas chemical permeation-preventing properties, monomer-oligomer elution resistance, interlayer adhesion and durability (paragraph [0013]). The multilayer structure of D4 is disclosed to have similar properties (page 4, lines 9-11). Since there is no technical evidence showing that the claimed multilayer structure has improved properties over the multilayer tube of D4, the technical problem in view of D4 consists in the provision of an alternative multilayer structure suitable for the transfer of fluids.

4.2.2 The appellants' technical evidence filed with the letter dated 12 January 2015

This evidence allegedly shows that the claimed multilayer structure (see example 1) has improved low-temperature impact resistance and peel strength when compared with a multilayer structure comprising the amorphous polyphthalamide Grivory®G21 in its innermost layer (see the reference example). However, this comparison is not the most relevant. Although Grivory®G21 is a polyphthalamide within the broad definition of the polyphthalamides of D4, it is not mentioned therein. The only polyphthalamide explicitly disclosed in D4 is Amodel, which in contrast to Grivory®G21 is semi-crystalline. Apparently, the appellants carried out their experimentation ignoring the clear indication of D4, that Amodel is the most promising polyphthalamide for use in a multilayer structure.

4.2.3 The respondent's technical evidence filed with the letter of 22 February 2016

In this evidence multilayer structures with Amodel PA6T in the innermost layer (according to D4) are compared with multilayer structures with Amodel PA9T in the innermost layer (according to claim 1). The aim of this evidence was to show that the properties of the claimed multilayer structure are not better than those of the multilayer structure of D4.

4.2.4 Although the respondent's evidence is not entirely conclusive, it questions the results of the appellants' evidence. It shows that the multilayer structures of comparative examples 1 and 2 with Grivory®G21 polyphthalamide in the innermost layer (i.e. according to D4) compared with the multilayer structures of comparative examples 8 and 9 with polyphthalamide PA9T in the innermost layer (i.e. according to claim 1) have the same low-temperature impact resistance (SAE J2260) but a much higher peel strength.

In the present circumstances, it is not the respondent who bears the burden of proof since the evidence it provided casts doubts on the effect allegedly achieved by the claimed invention and the appellants could not convincingly eliminate these doubts (T 570/08, point 1.1.4).

Consequently, the appellants' technical evidence is not considered sufficient to show a technical effect of the claimed invention over the disclosure of D4. The alleged technical effect cannot be taken into account when formulating the objective technical problem, which therefore remains the provision of an alternative

multilayer structure suitable for the transfer of fluids.

4.3 Obviousness

The skilled person starting from the multilayer tube of D4 with a PA11 or PA12 linear polyamide in the external layer and an Amodel polyphthalamide (a PA6T polyphthalamide) in the innermost layer and looking for an alternative multilayer tube suitable for the transfer of fluids would find in D6a, D7 and D12 the motivation to use the heat-resistant and chemical-resistant polyphthalamide PA9T instead of a PA6T polyphthalamide.

4.3.1 D6 discloses a blow-moulded product composed of a resin composition including a modified olefin resin and/or modified styrene resin contained in a specific polyamide, that is composed of a dicarboxylic acid unit containing 60 to 100% by mole of a terephthalic acid und and a diamine unit containing 60 to 100 % by mole of a 1,9-nonanediamine and/or a 2-methyl-1,8-octanediamine unit. This product is reported to have excellent heat resistance, low water-absorption, hot-water resistance, chemical resistance, toughness and mechanical characteristics. Thus, it can be used appropriately in pipes, containers and radiator tanks in a wide range of conditions (claim 1; paragraphs [0005], [0006] and [0042]).

4.3.2 D7 discloses that PA9T shows resistance to gasoline, engine oil, alcohol, acid and alkali hot water (page 2, point (2)(b)).

4.3.3 D12 discloses that PA9T is characterised by excellent heat-stability, low water-absorption and high chemical

resistance in contrast to other polyamines including PA6T and that it can be typically used in automobile parts as fuel filter and oil filter brackets (page 1, first paragraph; page 2, points (1) to (4); page 3, table 1, "water absorption"; page 12, point 4-1; page 13; page 20, point (1)).

4.3.4 Therefore, the skilled person faced with the objective technical problem of providing an alternative multilayer structure suitable for the transfer of fluids would obviously replace PA6T with PA9T. Particularly since, according to their common general knowledge, PA6T has a melting point above its decomposition temperature of 360°C and is technically not usable in particular for extrusion (D5a: page 372, last paragraph; page 593, lines 4-5). In fact, D5a suggests replacing the hexamethylenediamine by longer chained diamines to create processable homopolymers with a low melting point (page 373, lines 1-3). This means that the use of an aliphatic diamine having a carbon number of 9 is obvious to the skilled person.

4.4 In view of the above, the subject-matter of claim 1 of the main request does not involve an inventive step with the consequence that the main request is not allowable.

5. First auxiliary request - inventive step

5.1 The subject-matter of claim 1 of the first auxiliary request compared with that of the main request contains the additional feature that the multilayer structure comprising two or more layers includes a two-layer construction of (a)/(b).

5.2 This additional feature is also disclosed in D4 (claim 5 and figure 1). Thus, the subject-matter of this claim lacks an inventive step for the reasons provided above in the context of claim 1 of the main request.

5.3 Consequently, the first auxiliary request is not allowable.

6. Second auxiliary request - inventive step

6.1 The subject-matter of claim 1 of the second auxiliary request compared with that of the first auxiliary request contains the additional feature that the aliphatic polyamide (A) has a relative viscosity of 2.0 to 4.5 as measured according to JIS K-6920.

6.2 D4 does not disclose that the aliphatic polyamides PA11 and PA12, which correspond to the aliphatic polyamide (A) of the multilayer structure of claim 1, have the claimed relative viscosity (page 2, lines 4-6).

6.3 However, there is no evidence on file to show that a technical effect is obtained when using an aliphatic polyamide with the claimed relative viscosity. In the present circumstances, the statement of the patent in suit (paragraph [0048]) remains a mere allegation:

"If the relative viscosity of the (A) aliphatic polyamide is less than the above-described [i.e. the claimed] value, the obtained multilayer structure may have insufficient mechanical properties, whereas if it exceeds the above-described value, the extrusion pressure or torque becomes excessively high and this sometimes makes it difficult to produce a multilayer structure".

Thus the claimed relative viscosity is considered to be an arbitrary selection.

6.4 Furthermore, D33 discloses that if polyamides PA11 and PA12 are to be extruded, they must have a high relative viscosity (page 726, point 4.10.4 line 1), namely higher than 2.1 measured in 0.5% m-cresol (page 725, table 4.3.1, last line). D16 shows that, if the relative viscosity were to be measured in sulfuric acid instead of m-cresol, and thus according to the method used in the patent in suit, namely JIS K-6920 (patent in suit: paragraph [0098]), its value would be increased by approximatively 0.3. Thus, the relative viscosity of the polyamides PA11 and PA12 of D33 would in any case be higher than 2.1 and necessarily fall within the claimed range.

6.5 Consequently the second auxiliary request is not allowable.

7. As none of the appellants' requests is allowable, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

D. Magliano W. Sieber

Decision electronically authenticated