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D E C I S I O N
of 12 July 2000

Case Number: T 0863/97 - 3.4.2

Application Number: 90111670.7

Publication Number: 0404111

IPC: G02B 1/10, B29D 11/00

Language of the proceedings: EN

Title of invention:
Process for producing plastic lens

Patentee:
NIPPON SHEET GLASS CO. LTD.

Opponent:
ESSILOR INTERNATIONAL Compagnie Générale d'Optique S.A.

Headword:
-

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

Keyword:
"Amendments - added subject-matter (no)"
"Inventive step - (no) incentive to try alternative solution"

Decisions cited:
-

Catchword:
-

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Case Number: T 0863/97 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 12 July 2000

Appellant: (Proprietor of the patent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 3 June 1997 revoking European patent No. 0 404 111 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: E. Turrini
Members: S. V. Steinbrener
V. Di Cerbo

Summary of Facts and Submissions

I. The appellant (= proprietor of the patent) lodged an appeal against the decision of the Opposition Division revoking European patent No. 0 404 111.

II. An opposition against the patent as a whole had been filed by the respondent (= opponent) and based on the grounds of lack of novelty and/or inventive step (Article 100(a) EPC).

The opposition *inter alia* referred to the following documents (using the numbering of the opposition proceedings):

E1: JP-A-61-114203 (and English translation thereof furnished by the opponent)

E2: Patent Abstracts of Japan, vol. 13, No. 146 (P-854), 11 April 1989 (and English translation of corresponding JP-A-63-309901 furnished by the opponent)

E4: G. Champetier et al.: "Introduction à la Chimie Macromoléculaire", Masson et C^{ie}, Paris 1969, pages 545 to 547, and

E9: J. Brinker et al.:"Sol-gel Science: The Physics and Chemistry of Sol-Gel Processing", Academic Press 1990, chapter "1.1. Dip Coating".

In addition, document

E8: US-A-4 794 154

already cited before the first instance was referred to by the Board in the present appeal proceedings.

III. In its revocation of the patent in suit, the Opposition Division held that the subject matter of claim 1 in accordance with the main request was obvious from a combination of documents E1 or E2 with document E4. Claim 1 of the auxiliary request was found to lack clarity and, if interpreted as proposed by the patent proprietor, not to be admissible under Article 123(2) EPC.

IV. In a communication pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal, the Board on a provisional basis pointed out that claim 1 offended against Article 123(2) EPC in that a solvent had not been originally disclosed to be an optional component of the primer coating composition.

Furthermore, the Board held the view that the "Application Example" described in document E2 came closest to the subject matter of an admissible claim 1 which appeared to differ from this closest prior art mainly by the primer layer thickness, the primer coating composition, the provision of a curing catalyst, the specification of the proportion of the polyester polyol and the blocked polyisocyanate and the specification of the amount of curing catalyst.

At the scheduled oral proceedings, it should therefore be discussed which technical effects were obtained by the above differences, i.e. which technical problem was solved by the patent in suit with respect to the closest prior art, and whether or not the claimed solution would be obvious from the remaining prior art.

In this context, the Board drew the parties' attention to specific passages of documents E1, E2, E4 and E8 which seemed to be particularly relevant for the assessment of inventive step.

Finally, the parties were reminded of the principle of free evaluation of evidence governing the proceedings before the boards of appeal. The facts on which a decision was to be based must have been established to the satisfaction of the deciding body. This principle also applied to the comprehensiveness of test reports submitted by the parties. With regard to opposition proceedings, the opponent normally bore the burden of proof for its objections.

V. As a reaction to the Board's communication, the appellant filed an amended set of claims with letter dated 9 June 2000.

VI. Oral proceedings requested by the appellant on a subsidiary basis took place on 12 July 2000. At the end of the oral proceedings, the Board's decision was given.

VII. The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of claims 1 to 4 filed with the letter of 9 June 2000.

VIII. The respondent requested that the appeal be dismissed.

IX. The wording of amended claim 1 according to the appellant's request on file at the time of the present decision reads as follows:

"1. A process for producing a plastic lens which comprises the steps of:

providing a primer layer comprising a thermosetting polyurethane on the surface of a plastic lens substrate;

subsequently providing a hard coat layer comprising a silicone resin on the surface of said primer layer; and

then providing a single-layer or multi-layer anti-reflection coating on the surface of said hard coat layer by depositing an inorganic material,

wherein said primer layer has a thickness of from 0.1 to 2 µm and is provided by the steps of coating said plastic lens substrate with a primer coating composition consisting of a polyester polyol, a blocked polyisocyanate, a curing catalyst, a solvent and, if desired, a levelling agent, the proportion of the polyester polyol and the blocked polyisocyanate being such that the molar ratio of the isocyanate groups to hydroxyl groups is from 0.8 to 1.25 and the amount of the curing catalyst being from 0.1 to 5 wt % based on the total amount of the polyester polyol and the blocked polyisocyanate, and then curing the same by heating."

Claims 2 to 4 are dependent on claim 1.

X. The appellant's arguments in support of its request may be summarised as follows:

Amended claim 1, which should be admissible in view of page 4, second paragraph of the A-publication, excludes any further components of the primer coating composition, in particular the presence of promoters. The restriction to polyester polyols has been clearly

disclosed as advantageous in the patent in suit, and the further limitation "consisting of" can be derived from the original disclosure in a straightforward way.

The appellant shares the view that the "Application Example" of document E2 comes closest to the claimed subject matter. Although it is accepted that "Rethan curing agent" is in essence a polyester polyol, the known curing mixture is particular in that it includes a promoter, i.e. a trimethoxy silane hydrolysate, which must be assumed to participate in the polymerisation process, thereby forming a highly involved cross-linked structure. The silane hydrolysate thus has an important function in this system with respect to control of primer layer hardness due to an additional cross-linking mechanism via O-Si bridges and with respect to the adhesion of the abrasion-resistant layer, the latter consisting of the very same compound as the promoter so that siloxane linkages should form between both coatings, i.e. the adhesion is promoted by chemical bonds.

Hence, in addition to the differences mentioned in the summons to oral proceedings, the absence of any promoter in the claimed composition, which is clear from the claim language, means a further important difference in terms of chemistry. Furthermore, it is highly probable that the molar ratio of isocyanate groups to hydroxyl groups (NCO/OH ratio) must be different in E2 because of the high amount of OH groups.

Therefore, the objective problem to be solved may be seen in a simplification of the known process without any deterioration of lens properties with respect to

impact resistance and layer adhesion. In particular, the claimed process is more economical since neither promoters nor surfactants are needed.

From E2, it is not obvious that the claimed system would perform as well as the known one. Since the OH groups of the promoter take part in the polymerisation process and contribute to coating hardness and adherence in a chemically understandable way, it is evident to a skilled person that the promoter cannot be easily omitted from the "Application Example" of E2. If this were nevertheless attempted, then without promoter poor adhesion would be observed as can be seen from the appellant's Experimental Report I, Table B. Although not fully identical, these tests simulate the composition of E2 as closely as possible. The respondent's experimental results in this respect are irrelevant because they do not start from E2, but use different systems. Furthermore, no experimental details and data are given so that the conclusions drawn by the respondent must be considered to be unsubstantiated allegations.

Even if document E2 were not limited to the use of promoters in view of its general disclosure, the "Application Example" is the only really working example described in E2 and there is no other disclosure with respect to control of adhesion properties. Therefore, in accordance with E2 the provision of a promoter would be regarded by a skilled person as imperative for achieving satisfactory adhesion.

Moreover, the use of a blocked polyisocyanate (= PIC) with defined NCO/OH ratio and of a curing catalyst is

not considered in any document for lens applications. In particular, it has never been shown before that blocked PIC achieves similar results without promoter. Since the blocking agent is not very volatile, it remains in the curing system and has an impact on the adhesion properties. Unblocked PCI can only react with polyol or - on a free surface - with H_2O. However, the surface state of the primer layer is a critical parameter with respect to adhesion properties. The surface state will be different for blocked PCI due to the blocking agent which prevents hydrolysis with water. A plausible explanation for the better adhesion performance of blocked PCI could be seen in the fact that blocked PCI may only react partly with polyol so that chemical linkages with OH groups of the hard coat layer could be formed by an unreacted, still blocked PIC proportion. In any case, such an effect would not have been predictable from the prior art so that a skilled person neither had a reason for modifying the prior art composition, nor a reasonable expectation of success when doing so.

Although it is admitted that a major difference between blocked and unblocked PCIs concerns pot life, there are further properties of those compounds relevant in the present context, in particular high curing temperatures which could destroy the plastic lens (see e.g. document E4). Therefore, even if the use of blocked PCIs came to the mind of an average practitioner for some other reason, the idea would be immediately discarded for plastic lens applications.

Document E8 is not concerned with lens requirements and relates to a two container system not used in the contested patent. It does not impart any teaching with

respect to the adhesion of a hard coat layer, but rather focuses on better handling properties of the curing composition. Therefore this document can only be taken into account on the basis of *ex post facto* considerations.

XI. The respondent advanced the following counterarguments:

Amended claim 1 offends against Article 123(2) EPC since by the use of "consisting of" it relates to an arbitrary selection of a subgroup of chemical compounds which has not been described to be preferred in the original application documents and the particular effects of which have not been disclosed.

Having regard to inventive step, the combination of claimed features is well known to a skilled person as is the adhesion effect which must be considered to correspond to the normal function of a primer. Document E2 being the most relevant prior art generally underlines the importance of adhesion of the hard coat layer to the primer layer and of the shock resistance of the latter. Although polyurethanes are referred to at page 4 of the English translation of this document, promoters are not mentioned in this context so that a promoter would not be considered by a skilled person to be an essential element.

The use of blocked PCI only involves the blocking of a chemical reaction at room temperature in an entirely classical way as can be seen from textbook E4. This does, however, not affect the functions of the PCI which after having again been rendered reactive behaves like unblocked PCI. Since blocked PCIs are commercially available, the unblocking temperature is indicated by

the supplier and may be selected in accordance with general temperature requirements as can be seen from document E8.

Taking account of the fact that various compounds may be used as blocking agents, their alleged influence on the adherence properties is mere speculation and has not been proven at all. As has been demonstrated by the respondent's test results, under identical conditions no difference exists between layers obtained from blocked or unblocked PCIs. Moreover, the use of blocked PCIs for primers has already been proposed in document E8, which use necessarily implies that further layers are to be added. Therefore, blocked PCIs were at an expert's disposal without the exercise of inventive skill.

The remaining differences are trivial and/or described in the prior art identified. The claimed range of the NCO/OH ratio is simply located around the stoichiometry of the reaction and known from documents E1 or E8. In this prior art, a similar amount of curing catalyst is already provided as well. Said selections would therefore be obvious to an average practitioner. The appellant's experiments with respect to document E2 are not persuasive since the hard coat layer is not identical and may well influence the adherence properties. Moreover, the conditions of the patent in suit have not been reproduced in the appellant's Experimental Report II since the primer composition did not contain a curing catalyst.

Reasons for the Decision

1. *Admissibility of appeal*

The appeal complies with the provisions mentioned in Rule 65 EPC and is therefore admissible.

2. *Admissibility of amendments*

2.1 In the Board's view, the subject matter of claim 1 is based on original claims 1, 2, 4, 5 and 7; page 3, lines 41 to 44 and page 4, lines 2 to 7 of the A-publication (corresponding to claims 1, 2, 4, 5 and 7 as granted and page 3, lines 29 to 32 and lines 47 to 52 of the patent in suit), and thus admissible.

2.2 This finding does not comply with the respondent's opinion who considered claim 1 to be based on an inadmissible selection, in substance due to the fact that the primer composition has been exhaustively restricted ("consisting of") to the constituents set out in the claim, and that the polyol has been specified to be a polyester polyol.

2.3 The Board, however, does not consider the respondent's objection under Article 123(2) EPC to be justified for the following reasons:

Although polyacrylate polyols are said to be "particularly preferred" in the original application documents, "preferred" examples of the polyols also include polyester polyols (see page 3, lines 41 to 44 of the A-publication corresponding to page 3, lines 29 to 32 of the patent in suit). Therefore, the use of polyester polyols can be directly and unambiguously derived from the original application documents.

Furthermore, in accordance with the original disclosure, the primer coating composition consists of a blocked PCI, a polyol, a curing catalyst, a solvent and - optionally - a levelling agent, an ultraviolet light absorber and an antioxidant (see page 3, line 22 to page 4, line 7 of the A-publication corresponding to page 3, lines 12 to 52 of the patent in suit). The presence of a promoter is not mentioned in the application as filed. Claim 1 has been restricted to only include the four imperative constituents (with the additional specification of the polyol being a polyester polyol) and, if desired, one of the optional constituents, i.e. said levelling agent. Therefore, said restriction is also clearly derivable from the original disclosure.

Moreover, a primer coating composition of the type claimed has been utilised in all of the 28 examples of the A-publication (and the patent in suit) apart from Example 6 making use of a polyacrylate polyol.

3. *Patentability*

3.1 Novelty

The Board is convinced that the prior art identified does not anticipate the claimed subject matter as can also be seen from the assessment of inventive step below. In fact, novelty has not been at issue in the present appeal proceedings.

3.2 Inventive step

3.2.1 There has been consent among the parties that the "Application Example" described in document E2 (see

pages 7 to 9 of the English translation) comes closest to the subject matter of claim 1, and the Board has no reason to question this view.

According to said "Application Example", the process for producing a plastic lens comprises the steps of

- providing a primer layer ("Shock-absorbing layer") comprising a thermosetting polyurethane ("Rethan Clear no. 2026" + "Rethan curing agent") on the surface of a plastic lens substrate;

- subsequently providing a hard coat layer ("Abrasion-resistant coating") comprising a silicone resin ("Silane hydrolysate" + "Methanol-Silicasol"; see also page 4, penultimate paragraph of the English translation of E2) on the surface of said primer layer; and

- then providing a single-layer or multi-layer anti-reflection coating ("Anti-reflection layers") on the surface of said hard coat layer by depositing an inorganic material.

As the known primer coating composition also consists of a polyester polyol ("Rethan curing agent"; as admitted by both parties), a PCI ("Rethan Clear no. 2026") and a solvent, the subject matter of claim 1 differs from the closest prior art in that

(i) the primer layer thickness is 0.1 to 2 µm whereas the shock-absorbing layer of the "Application Example" has a thickness of 2.7 µm;

(ii) the primer coating composition contains a blocked PCI which is of unblocked type in E2 ("Rethan Clear no. 2026"; as admitted by both parties);

(iii) a curing catalyst is provided whereas such catalyst is not mentioned in E2 which on the other hand makes use of a promoter and a surfactant not included in the composition of claim 1;

(iv) the proportion of the polyester polyol and the blocked PCI is specified whereas such proportion is not explicitly disclosed in E2; and

(v) the amount of curing catalyst is specified whereas E2 is silent in this respect.

3.2.2 The Board also shares the parties' view that differences (ii) and (iii) relating to the constituents of the primer coating composition are of primary importance whereas the remaining differences (i), (iv) and (v) basically relate to workshop specifications once the composition has been defined.

Whether the resulting process is simpler or more economical than the known one, as the appellant believes, seems to be debatable in the Board's opinion. Hence, the problem solved may in substance be seen in providing an alternative process for producing a plastic lens having impact resistance and adhesion properties similar to those of the closest prior art.

3.2.3 Document E8 in general terms relates to a two-component urethane coating including blocked PCI and to a method of applying the two-component urethane coating onto a

substrate and articles coated with said coating (see column 1, lines 6 to 10).

The coating compositions may be used as coating agents for primer, intermediate or surface coatings for a variety of different substrates (see E8, column 7, lines 65 to 67). They preferably contain polyester polyols (see E8, column 4, lines 5 to 8) and solvents (see E8, column 7, lines 25 to 35). Furthermore, additives, such as catalysts and levelling aids may be included (see E8, column 7, lines 52 to 54).

Advantages over unblocked PCIs are seen in longer pot life, insensitivity to moisture, reduced toxicity and higher flexibility (see E8, column 2, lines 27 to 56). It is reported that the resulting coatings in particular possess excellent adhesion to substrates, are uniform and exhibit excellent mechanical and chemical properties and water and solvent resistance, especially hardness, impact resistance and elasticity (see E8, column 7, line 67 to column 8, line 3).

In the Board's opinion, there would thus be a strong incentive for a skilled person wishing to circumvent the process known from E2 to at least try a primer coating composition of the type proposed in E8 in view of its reported properties having regard to adhesion, impact resistance and elasticity, which are the key properties aimed at by the solution claimed in the contested patent as has been pointed out above (see point 3.2.2).

Hence the use of a primer coating composition consisting of a polyester polyol, a blocked PCI, a curing catalyst, a solvent and optionally a levelling

agent as an alternative to the curing system of E2 is obvious from document E8.

3.2.4 The remaining workshop specifications (i), (iv) and (v) would normally be considered to fall within the competence of a skilled person if not particular circumstances give cause for doubts in this respect which is not the case here.

Moreover, these features can also be straightforwardly derived from the available prior art.

Although in the "Application Example" of E2 a primer layer thickness of 2.7 µm has been chosen, said document discloses a preferred range of 0.1 to 3 µm, which covers the range of feature (i) (see page 4, 5th paragraph of the English translation of document E2).

An NCO/OH ratio of preferably 0.8 to 1.6 and most preferably of about 0.9 to 1.1 is used in document E8 (see column 6, lines 34 to 44), the known ratio thus in substance corresponding to that claimed in feature (iv).

Finally, the amount of curing catalyst ("dibutyltin dilaurate"; see also page 6, lines 10 and 11 of the contested patent in this context) used in Example I of E8 (see column 8, Table 2) appears to be about 0.23 wt% (0.30 g dibutyltin dilaurate as compared to 127.6 g polyol + PCI) which falls within the claimed range of 0.1 to 5 wt% (feature (v)).

These specifications therefore do not involve an inventive step either.

3.2.5 The appellant's counterarguments mainly focus on the presence of a promoter in the coating composition of E2, which promoter should play a reactive role in the polymerisation process and should contribute to the adhesion properties of the primer layer. However, the point at issue in the present context does not relate to the question of whether or not the promoter may be omitted from the composition of E2 in an obvious way but rather to the question of whether or not it would be obvious to replace the composition known from E2 by the alternative curing system of document E8 which does not contain any promoter. The latter question must be answered in the affirmative as has been shown above (see point 3.2.3).

A skilled person would also not be barred from considering blocked PCIs by the fact that high de-blocking temperatures were required, thus leading to the risk of lens damage as the appellant asserts. Document E8 points out that low curing temperatures are both desirable and available (see column 2, lines 11 to 17 and 52 to 56, and claims 6 and 7), which temperatures are clearly compatible with plastic lens requirements (see page 3, line 56 to page 4, line 2 of the contested patent in this context).

Although it is correct that document E8 does not specifically relate to lens applications, the Board is convinced that it would nevertheless be taken into account by a skilled person who necessarily would have to consider the more general field of primer coating compositions in view of the problem posed. Such compositions having *inter alia* very good impact resistance and adhesion properties are explicitly disclosed in document E8 (see in particular column 7,

line 65 to column 8, line 3). Moreover, the curing system of E8, albeit different, is closely related to the system of E2 having regard to the classes of chemical compounds employed so that also from this point of view a skilled person would have a reasonable expectation of success when applying the system of E8. Therefore, the objection of *ex post facto* considerations cannot be accepted.

Finally, claim 1 does not exclude the use of a two container curing system so that the subject matter of the patent in suit is not distinguished from the prior art according to document E8 in this respect.

3.2.6 In consequence, the claimed process cannot be considered to involve the inventive step required by Article 56 EPC, and claim 1 is not allowable for this reason.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana E. Turrini