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**Datasheet for the decision
of 17 January 2012**

Case Number: T 0303/09 - 3.3.03

Application Number: 01981017.5

Publication Number: 1338696

IPC: C08G 18/10, C08G 18/48,
D21F 3/02

Language of the proceedings: EN

Title of invention:
Belt for papermaking

Applicant:
YAMAUCHI CORPORATION

Opponent:
Ichikawa Co., Ltd.

Headword:
-

Relevant legal provisions:
EPC Art. 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Inventive step (yes)- no reformulation of the technical
problem"

Decisions cited:
T 0192/82, T 0910/90, T 0936/96

Catchword:
-



Case Number: T 0303/09 - 3.3.03

DECISION
of the Technical Board of Appeal 3.3.03
of 17 January 2012

Appellant: Ichikawa Co., Ltd.
(Opponent) 14-15 Hongo 2-chome
Bunkyo-ku
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Respondent: YAMAUCHI CORPORATION
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office dated 7 November 2008
and posted 4 December 2008 rejecting the
opposition filed against European patent
No. 1338696 pursuant to Article 101(2) EPC.

Composition of the Board:

Chairman: B. ter Laan
Members: M. C. Gordon
C.-P. Brandt

Summary of Facts and Submissions

- I. The appeal by the opponent lies against the decision of the opposition division announced 7 November 2008 and posted 4 December 2008 rejecting the opposition against European Patent number EP-B1-1 338 696 (application No. 01 981 017.5).

Claim 1 of the patent read as follows:

"A papermaking belt comprising a reinforcing substrate embedded in a thermosetting polyurethane layer and having an outer peripheral surface and an inner peripheral surface formed by said thermosetting polyurethane layer, wherein a polyurethane layer forming said outer peripheral surface is made of a composition containing an urethane prepolymer having isocyanate groups on ends and a hardener containing dimethylthiotoluenediamine."

- II. A notice of opposition against the patent was filed on 20 June 2007 in which revocation of the patent on the ground of Art. 100(a) EPC (lack of inventive step) was requested.

The opposition was *inter alia* supported by the

following documents:

D1: EP-A-877 118;

D2/D2a: "Guide of additives for workability and function improvement - 1 - A New Curing Agent, ETHACURE 300, a MOCA substitute." Albermale Asano (K. K.), published in Polyfile Vol. 36 no. 1 pages 37-38 (1999) and English language translation;

D3: Nalepa, C.J., Eisenbraun A.A., "A New Liquid Aromatic Diamine Curative for Polyurethane

Cast Elastomers" Journal of Elastomers and
Plastics vol. 19, January 1987, pages 6-21;

D4: Beck, R.A., Truss, R.W., "The effect of curative
on the fracture toughness of PTMEG/TDI
polyurethane elastomers", Polymer 36, No. 4 1995
p. 767-774;

D5: Singh, A. *et al* "Recent Developments in High
Performance Castable Elastomers" UTECH Asia 1995,
paper 43, pp. 1-9;

During the course of the opposition proceedings the
opponent further submitted:

D9: A report prepared by Truss, R.W., one of the
authors of D4.

III. The decision under appeal was based on the claims of
the patent as granted (main request).
The only matter at issue was Art. 56 EPC (inventive
step).

According to the decision, the closest prior art was
represented by the teaching of D1 which related to a
papermaking belt (shoe press belt) consisting of a
reinforcing layer and two polyurethane resin layers,
which layers differed in hardness and were cured using
4,4'-methylene-bis-2-chloroaniline (referred to
interchangeably as either "MOCA" or "MBOCA"). The
problem in D1 was to reduce the development of cracks
in the resin layer of shoe press belts and to improve
their wear resistance.

The subject matter of claim 1 of the patent in suit was
distinguished from the disclosure of D1 in that another
curative, namely dimethylthiotoluenediamine (DMTDA,

tradename "Ethacure 300") was employed instead of MOCA.

The technical problem to be solved with respect to D1 was to provide papermaking belts in which the occurrence of cracks and their propagation once present was suppressed, which was consistent with the problem defined in paragraph [0004] of the patent in suit.

With regard to two additional problems postulated by the opponent, namely to provide an alternative curing agent to MOCA and to provide a papermaking belt with less hazardous starting compounds the decision held that although the carcinogenic/mutagenic potential of MOCA had been a longstanding issue, in view of the teaching of the closest prior art - D1 - such replacement of MOCA by an alternative having a better toxicological profile was to be regarded at most as an additional benefit. As toxicity issues were not considered in D1 there was no reason for the skilled person to consider alternatives to MOCA to solve the indicated problem.

The examples of the patent in suit showed that the durability of fabric reinforced composites cured with Ethacure 300 was significantly higher than for MOCA cured samples which demonstrated that the problem had been solved.

As there was no indication in any of the documents cited of the effect of DMTDA on suppression of crack development or crack propagation in polyurethane elastomers used in reinforced belts the solution claimed could not be considered as being obvious.

Accordingly the opposition was rejected.

- IV. On 30 January 2009 the opponent lodged an appeal against that decision, the prescribed fee being paid on the same day. The statement of grounds of appeal was received on 31 March 2009.

Together with a written submission dated 27 January 2010 a further document was filed:

D10: JP-A-04-119191 and an English language translation thereof (D10T).

The appellant made further written submissions dated 6 September 2010, 16 February 2011 and 21 July 2011.

- V. The patent proprietor, now the respondent, replied to the appeal with a letter dated 14 August 2009. Three documents, designated "Excerpt 1", "Excerpt 2" and "Excerpt 3" were submitted, pertaining to the toxicity/carcinogenicity of polyisocyanates (Excerpts 1 and 2) and MOCA (Excerpt 3) respectively.

The respondent made further written submissions dated 9 July 2010, 13 January 2011 and 17 June 2011.

- VI. On 20 July 2011 the Board issued a summons to attend oral proceedings, scheduled for 17 January 2012 accompanied by a communication.

- VII. The appellant made further written submissions dated 13 December 2011 and 13 January 2012. Together with the latter submission a further document, herein designated "D11" was submitted:

D11: IARC (International Agency for Research on Cancer) Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol. 57 reporting the meeting of the

IARC working group held 6-13 October 1992,
contents pages and pages 271-279 relating to MOCA.

VIII. The respondent made a further written submission dated
16 December 2011.

IX. Oral proceedings were held before the Board on
17 January 2012.

X. The arguments of the appellant can be summarised as
follows:

(a) The closest prior art was D1.

The subject matter of claim 1 of the patent in
suit was distinguished from this disclosure solely
by the use of a specified hardener, i.e. DMTDA
instead of MOCA. The structure of the belt of D1,
i.e. regions of differing hardness was encompassed
by the wording of claim 1 and was consistent with
the discussion of the structure of the belt in
paragraph [0040] of the patent in suit.

(b) MOCA was highly toxic and carcinogenic, as a
consequence of which efforts had been made to find
alternatives and its use was restricted or even
prohibited. This was supported by the teachings of
D2-D4 and further confirmed by the disclosure of
Regulation D11.

Thus at the priority date of the patent in suit,
this would have been a realistic concern of the
manufacturer of papermaking belts who was the
appropriate skilled person since both the patent
in suit and D1 were concerned with the manufacture

of the belts themselves. DMTDA had been developed expressly as a direct, "drop in" replacement for MOCA, as confirmed by D2-D4.

- (c) In the present case it was appropriate and admissible to depart from the problem mentioned in the patent in suit and the closest prior art, reference being made to the findings of the decisions discussed in section I.D.4.3 of the publication "Case Law of the Boards of Appeal of the European Patent Office" (Sixth edition, 2010, this passage being on page 171 of the English language version thereof), in particular T 910/90 (14 April 1993, not published in the OJ EPO) and T 936/96 (11 June 1999, not published in the OJ EPO) section 2.6 of the reasons. Thus, the realistic technical problem in the present case was linked to the toxicity of MOCA and the solution proposed was obvious. The fact that an additional problem relating to cracking might also have been solved could not change this.

- (d) As D1 did not attach any particular importance to the curing agent and did not teach that MOCA had to be used it would have been obvious to look for a better hardener, e.g. that taught by D2 and D3.

- (e) Replacement of MOCA by DMTDA was merely an "analogous" substitution, which was rendered obvious by D2-D4. This argument was supported by reference to the Guidelines for Examination Part C, Chapter IV-43, paragraph 1.1(iv) and to T 192/82 (OJ EPO 1984, 415).

- (f) Regarding the problem of prevention of cracks, the appellant in its written submissions, and at the initial stage of the oral proceedings held before the Board appeared to accept that this had been solved. However in the course of its oral submissions and, for the first time in the entire opposition and opposition appeal proceedings the appellant disputed that this problem had even been solved. The examples of Table 1 of the patent employed only a single value for the equivalent ratio of H/NCO. Claim 1 however contained no such restriction. Hence there was no evidence that the effect seemingly shown by the examples arose over the whole scope of the claims.

XI. The arguments of the respondent/patent proprietor can be summarised as follows:

- (a) The respondent did not dispute the position of the appellant that the structure of the belt as defined by D1 was encompassed by the operative claims of the patent in suit.
- (b) The appellant had adopted an artificial, technically unrealistic problem, which was based on hindsight and which ignored the problem common to the patent in suit and D1. The problem of toxicity of the curing agent was not mentioned in D1 or the patent in suit. The appellant had neither demonstrated that an inappropriate prior art had been used nor that the problem as set out in the patent in suit had not been solved. Hence it was not permissible to reformulate the problem compared to that defined in the patent in suit.

DMTDA was not known from the prior art as being suitable to provide improved crack resistance in a papermaking belt meaning that considerations relating to analogous substitution did not arise.

- (c) There was no indication in the prior art that modification of the hardener would provide a route to solving the problem set out in the patent in suit. D1 contained no indication that the hardener was critical.

- (d) There was no reason or incentive for the skilled person to combine the teachings of D1 with those of D2 to D4 neither of which related to papermaking belts or machines. Even when starting from the artificial problem formulated by the appellant there were a variety of alternative hardeners and it was not clear why the skilled person would select specifically DMTDA. The application as filed itself contained a list of possible hardeners, any of which was less toxic than MOCA and D5 proposed two less toxic alternatives to MOCA, namely DMTDA and M-CDEA, also called "Lonzacure" and disclosed that these could result in better elastomer properties than MOCA. Hence it was not inevitable to use DMTDA to solve the problem as formulated by the appellant.

- (e) D11 was late filed, and was not *prima facie* highly relevant since the toxicity of MOCA was known from other documents in the proceedings. Hence it should not be admitted to the proceedings.

XIII. The appellant requested that the decision under appeal be set aside and that the European Patent number 1 338 696 be revoked.

The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

Closest prior art

2. The patent in suit relates to a belt for papermaking and process for producing papermaking belt. Papermaking belts are known from D1 which by common consent represents the closest state of the art. The Board sees no reason to take a different view.

2.1 D1 discloses a shoe press belt comprising:
a foundation layer having opposite surfaces and laterally spaced opposite side edges;
a first resin layer formed on one of said surfaces of said foundation layer; and
a second resin layer formed on the other of said surfaces of said foundation layer;
wherein at least one of said resin layers has laterally spaced side edge portions and a middle portion between said side edge portions; and
wherein the hardness of said at least one resin layer decreases from said middle portion to said side edge portions (claim 1).

In the examples, "Cuamine MT" is used as a hardener for thermosetting urethane resins, which the parties agreed is MOCA. A structure as employed in D1, i.e. with differentiated regions of polyurethane across the width of the belt hardness is not excluded by the wording of operative claim 1; on the contrary this is explicitly contemplated according to paragraph [0040] of the patent in suit.

- 2.2 The subject matter of claim 1 of the patent in suit is thus distinguished from the closest prior art D1 by the nature of the hardener employed.

Problem solved

3. According to D1, column 2, line 13ff, the problems of avoiding development of cracks and improving the abrasion resistance of the belts have been contradictory. It was an object of the invention of D1 to provide a belt capable of satisfying both these requirements. This problem is solved according to D1 by a structure whereby on one surface the hardness decreases laterally outwards from the middle portion to the side portion.

D1 contains two examples. The first demonstrates a belt wherein one surface has regions of differentiating hardness, the comparative example employs a belt where both surfaces have a uniform hardness across the width thereof. These examples show that the belt of the example according to the claims of D1 did not develop cracks after 600 hours on a "testing machine", whereas the belt of the comparative example developed cracks after 250 hours. D1 contains no discussion of the

considerations leading to the selection of the hardener or any consideration of possible alternatives.

3.1 According to paragraph [0005] the object of the patent in suit is to provide a papermaking belt, formed by integrating a reinforcing substrate and a thermosetting polyurethane layer with each other, capable of preventing cracking. A further aim is to provide a belt as above, capable of suppressing growth of a crack even if one forms. A still further aim is to provide a belt resistant to delamination.

3.2 Table 1 of the patent in suit compares belts having differing compositions of polyurethane forming the outer surface whereby the constitution of the prepolymer varies. Further two sets of belts are provided, one employing the hardener required by the claims, i.e. DMTDA, the other set employing MOCA, i.e. the hardener employed in D1. In the cases of both hardeners the same equivalent ratio of hardener hydrogen to isocyanate (H/NCO) of 1.04 is employed. Table 1 shows that for a given polyurethane prepolymer composition the belt prepared using DMTDA as hardener exhibits greater endurance. Thus the compositions according to the claims have endurance limits of between 250 and 2250 x 10⁴ reciprocations whereas the respective compositions employing MOCA achieve levels of only 10 to 90 x 10⁴.

3.3 Table 2 reports examples based on the same three polyurethane compositions as in Table 1 but in which only DMTDA curative is employed. In the examples of Table 2 the equivalent ratio of hardener, expressed as H/NCO, is varied over the range 0.92-1.15. The results

show that over the majority of this range, i.e. 0.92-1.14 no cracking is observed after 10^6 reciprocations, which is superior to the best result obtained with the MOCA cured compositions reported in Table 1.

Therefore, the examples of the patent in suit show that the distinguishing feature compared to D1, i.e. the use of DMTDA instead of MOCA, makes it possible to obtain a belt that is resistant to cracking even without a differentiated hardness profile across the width (i.e. the "comparative" belt structure of D1) and that this effect is, contrary to submissions of the appellant obtained over a broad range of hardener equivalent ratios.

3.4 In the light of this evidence the technical problem to be solved with respect to D1 can be formulated as being to provide a further papermaking belt which is resistant to cracking and which does not require the differentiated hardness structure of D1, which problem has been effectively solved by using DTMDA instead of MOCA.

4. The appellant argued that that the problem as set out in the patent in suit was not in fact the correct one and that a different problem should be adopted, namely that of avoiding the use of MOCA hardener or to provide a papermaking belt employing less toxic materials.

4.1 According to the problem solution approach, the problem as set out in the patent in suit is normally taken as the starting point for the analysis of inventive step. Under certain circumstances it is permissible - or even necessary - to modify this and adopt a different

problem. For example, if it had been shown that the problem as set out in the patent had not been solved, or if inappropriate prior art had been employed to define the problem (see summary of the appropriate case law presented in "Case Law", *infra* section I.D.4.3.2). In view of the analysis set out in sections 2 and 3 above, it is apparent that such circumstances do not exist in the present case since both D1 and the patent in suit address the same problem, namely cracking of the paper-making belt, and the evidence of the patent in suit shows that this problem has been solved by the distinguishing feature with respect to closest prior art D1.

- 4.2 The appellant invoked two decisions to support its position that in the present case it was appropriate to depart from the problem as set out in the patent in suit.

According to T 910/90, when assessing the objective technical problem, it was not important whether the problem had already been mentioned in the closest prior art, but what mattered was what the skilled person objectively recognised as the problem when comparing the closest prior art with the invention (T 910/90, reasons 5.1, final passage on page 9 thereof).

In the present case, one aspect of the technical problem mentioned in the prior art is the same as in the patent, namely prevention of cracking and it is this common problem which is the focus of the examples of D1 and of the patent. As this problem is explicitly mentioned in both the patent in suit and in D1, and is solved according to the examples of both, the skilled

person would objectively recognise this as the technical problem to be solved. Accordingly the situation underlying the findings of T 910/90 does not apply to the present case and consequently the reasoning thereof does not support the position of the appellant concerning the definition of the technical problem.

- 4.2.1 Decision T 936/96 states in section 2.6 of the reasons, and in the Catchword that if an analysis following the framework of the problem-solution approach leads to the conclusion that the subject matter claimed is not inventive, this assessment cannot be changed or overcome if a different problem was also solved, the solution to which was not obvious.

The essence of this decision is thus that the correct approach is that of the problem solution approach, and that conclusions arrived at by application of a divergent analysis, not following the problem solution approach cannot overcome or prevail over the conclusion so reached. In the present case however, following the problem-solution approach, the conclusion is that the claimed subject-matter is inventive. Accordingly, decision T 936/96 does not provide support for the position of the appellant that it is appropriate in the present case to depart from the definition of the problem that results from application of the problem solution approach.

- 4.2.2 In conclusion, the problem proposed by the appellant is neither mentioned in nor derivable from either the patent in suit or D1 since neither document contains - even implicitly - any discussion of matters such as

toxicity. Accordingly there are no grounds for departing from the problem as set out in the patent in suit in any manner and in particular no grounds for adopting the formulation of the problem as petitioned by the appellant.

Obviousness

5. Closest prior art D1 teaches that in order to obtain a belt with the necessary properties it is required to adopt a particular structure of differentiated hardness bands. There is no suggestion or hint in D1 of any alternative to this differentiated hardness structure, or of any means to avoid employing this. There is also no recognition in D1 that the selection of the hardener might play any role in the overall properties of the belt. On the contrary, D1 is silent as to the selection and role of the hardener and consequently gives no hint that modifications of the hardener could provide a route to solve the above-formulated technical problem nor any incentive to modify the hardener for any other reason. Consequently the claimed solution to the above technical problem is not rendered obvious by closest prior art D1 on its own.

Nor does any other document cited by the opponent provide any hint that modification of the hardener would provide a route to solve the above-formulated technical problem. Hence, for the skilled person seeking on the basis of D1 to provide further crack resistant belts permitting a less complicated belt structure, there is no teaching to solve this problem by modifying the hardener used to any degree, let alone by employing specifically DMTDA in place of MOCA.

5.1 Even if, for the sake of argument, the formulation of the technical problem as petitioned by the appellant were to be adopted, namely that the technical problem was in fact to provide a replacement for MOCA in view of the toxicity thereof, this would not lead to a different conclusion.

From D2 and D3 it can be deduced that DMTDA is not identical to MOCA and that it cannot serve as a direct MOCA substitute.

From D5 it appears that apart from DMTDA also other alternatives for MOCA were available and known in the art, so that there was not a "one way street" leading inevitably to DMTDA when desiring to replace MOCA.

Consequently, even if the problem as proposed by the appellant regarding the replacement of MOCA were to be adopted, the proposed solution is not rendered obvious by the prior art invoked by the appellant.

5.2 Likewise, the arguments advanced concerning analogous substitution cannot lead to any other conclusion. None of the disclosures cited by the appellant relating to DMTDA considered the application thereof to papermaking belts in general, let alone specifically in the context of solving the aforementioned objective technical problem. Consequently, the issue of analogous substitution does not even arise, so that decision T 192/82 does not apply.

6. In view of the above, the subject matter of claim 1 is not obvious and meets the requirements of Art. 56 EPC.

As claims 2-6 are dependent on claim 1 this conclusion applies also to these.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

E. Görgmaier

B. ter Laan