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D E C I S I O N
of 24 January 2001

Case Number: T 1013/97 - 3.3.5

Application Number: 89912973.8

Publication Number: 0406354

IPC: C04B 30/02

Language of the proceedings: EN

Title of invention:

Composite Fiberboard and Process of Manufacture

Patentee:

Armstrong World Industries, Inc.

Opponent:

Odenwald Faserplattenwerk GmbH
AMF-Mineralplatten GmbH Betriebs KG

Headword:

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Relevant legal provisions:

EPC Art. 56, 84, 102(3), 123(2), (3)
EPC R. 61a

Keyword:

"Main and Auxiliary Requests I-IX: Inventive step (no)"
"Auxiliary Request X: Lack of clarity not a result of
amendment"
"Inventive step (yes) - non-obvious alternative"

Decisions cited:

G 0001/91, T 0301/87, T 0367/96

Catchword:

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Case Number: T 1013/97 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 24 January 2001

Appellant:
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Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office posted
21 August 1997 concerning maintenance of European
patent No. 0 406 354 in amended form.

Composition of the Board:

Chairman: R. K. Spangenberg

Members: A.-T. Liu

J. H. Van Moer

Summary of Facts and Submissions

I. European patent No. 0 406 354 was granted with a set of 14 claims. Claim 1 was directed to a product with product claims 2 to 8 dependent thereon; claim 9 related to a process with claims 10 to 13 dependent thereon; and lastly claim 14 was dependent on either claim 1 or claim 9.

II. The independent claims read as follows:

"1. A composite board which comprises up to 87% by weight mineral wool, 5 to 65% by weight perlite, up to 25% by weight clay, 4 to 35% by weight cellulosic newsprint composed primarily of cellulosic fibers, and 2 to 15% by weight of a thermoplastic polymeric binder, obtainable by deposition from an anionic latex, having a glass transition temperature of from 80°C to 115°C, the ratio of the binder to the cellulosic newsprint content being no greater than 1.25 when the cellulosic newsprint content is less than 6% by weight and the ratio being no greater than 0.7 when the cellulosic newsprint content is at least 6% by weight, wherein the cellulose fibers in the board are substantially completely coated with the binder, the board displaying a sag of less than 5.08 mm (200 mils) when a 15.2 mm (0.6 inch) thick sample, 229 mm (9 inches) wide and 610 mm (24 inches) long is supported at both ends and exposed to a temperature of 29.4 °C (85°F) and a relative humidity of 95% for 24 hours.

9. A process for making a composite board comprising 4 to 35% by weight cellulosic newsprint composed

primarily of cellulose fibers, and 2 to 15% by weight of a thermoplastic polymeric binder, the ratio of the binder to the cellulosic newsprint being no greater than 1.25, wherein the components necessary to make the board are mixed with water to form an aqueous slurry, and the slurry is flocculated while being fed to a mold and shaped, the shaped material drained of liquid and pressed into the shape and thickness of the board and heated to solidify the board, characterised in that the polymeric binder is coated on the cellulose fibers of the newsprint substantially completely before the slurry is fed to the mold."

III. Two notices of opposition were filed on the grounds of lack of novelty and/or inventive step. Of the 18 documents cited in the course of the opposition proceedings, reference will be made to the following in the present decision:

D1 EP-A-0 000 922

D3 EP-A-0 266 850

IV. The opposition division held that the process according to claim 9 as granted lacked an inventive step with respect to D3 in combination with D1. The first three auxiliary requests were not admitted because the respective claim 9 was found to lack clarity.

V. The interlocutory decision was based on the patentee's fourth auxiliary request, maintaining the patent with a set of nine claims, essentially corresponding to claims 1 to 8 and 14 as granted. The opposition division held that the subject-matter of claim 1 was distinguished from the closest prior art D3 by the stipulated ratio

of binder to cellulosic fibers. An inventive step was recognised, essentially for the reason that the claimed composite boards were shown to have superior properties.

- VI. The patentee appealed against the decision of the opposition division rejecting the main request with process claims 9 to 13 as granted.

- VII. Opponent Odenwald Faserplattenwerk GmbH appealed against the interlocutory decision allowing the patentee's fourth auxiliary request.

- VIII. During the oral proceedings held on 24 January 2001, the patentee submitted ten sets of claims to serve as basis for auxiliary requests I to X. The auxiliary requests I to VII comprised claims 1 to 8 as granted and amended process claims. The auxiliary request VIII contained the product claims as allowed by the opposition division. The auxiliary request IX consisted of a process claim 1 and further process claims 2 to 5 dependent thereon. Claim 1 read as follows:

"A process for making a composite board comprising 4 to 35% by weight cellulosic newsprint composed primarily of cellulose fibers, and 2 to 15% by weight of a thermoplastic polymeric binder, added in the form of an anionic latex dispersion, the ratio of the binder to the cellulosic newsprint being no greater than 1.25, wherein the components necessary to make the board are mixed with water to form an aqueous slurry, the slurry is flocculated while being fed to a mold and shaped, the coagulant being added to the mixture of components before the slurry is flocculated, the

shaped material drained of liquid and pressed into the shape and thickness of the board and then heated to solidify the board, the polymeric binder being coated on the cellulose fibers of the newsprint substantially completely before the slurry is fed to the mold."

The auxiliary request X consisted of 6 process claims with independent claim 1 and claims 2 to 6 dependent thereon. Claim 1 reads as follows:

"A process for making a composite board comprising 4 to 35% by weight cellulosic newsprint composed primarily of cellulose fibers, and 2 to 15% by weight of a thermoplastic polymeric binder, the ratio of the binder to the cellulosic newsprint being no greater than 1.25, perlite and mineral wool, wherein the components necessary to make the board are mixed with water to form an aqueous slurry, the cellulosic newsprint and at least a portion of the polymeric binder being mixed and the perlite and mineral wool being added subsequent to that mixing, and the slurry is flocculated while being fed to a mold and shaped, the shaped material drained of liquid and pressed into the shape and thickness of the board and then heated to solidify the board, the polymeric binder being coated on the cellulose fibers of the newsprint substantially completely before the slurry is fed to the mold."

IX. The patentee's submissions in writing and at the oral proceedings could be summarised as follows:

- The problem to be solved with respect to D3 could

be seen in the provision of a composite board having desirable properties at a competitive price.

- The solution proposed in the independent product and process claims was that the cellulose fibers are substantially completely coated with the binder.
- D1 neither taught the need for substantially completely coating the fibers, nor how to achieve it.
- The stipulation that the fibers be substantially completely coated could not be quantified.
- The objection of lack of clarity was made to unamended portions of the respective claims, therefore contrary to the case law.

X. The arguments submitted by the appellant Odenwald Faserplattenwerk GmbH were essentially as follows:

- D1 taught a method for homogeneously and completely coating fibers with a binder to improve the properties of a fiber board.
- The claimed composite boards and their preparation processes therefore lacked an inventive step with regard to D3 in combination with D1, the stipulated ratio of binder to cellulosic fibers being the result of routine experiments which did not require inventive skill.
- The objection of lack of clarity was in line with

the decision G 1/91 of the Enlarged Board of Appeal.

XI. At the end of the oral proceedings, the appellant - patentee Armstrong World Industries Inc. requested that the decision under appeal be set aside and that the patent be maintained as granted or, in the alternative, on the basis of any of the auxiliary requests I to X filed at the oral proceedings.

The appellant - opponent Odenwald Faserplattenwerk GmbH requested that the decision under appeal be set aside and the patent be revoked.

The respondent AMF-Mineralplatten GmbH Betriebs-KG requested that the appeal of the patentee be dismissed.

Reasons for the Decision

Main request

1. *Inventive step*

1.1 Claim 1 is directed to a composite board which comprises mineral wool, perlite, clay, cellulosic newsprint and an anionic latex binder having a glass transition temperature of from 80°C to 115°C.

1.2 D3 relates to polymeric latexes having most preferably a glass transition temperature of from 50°C to 110°C which can be used as a binder to produce strong composite boards that will not sag substantially under conditions of high temperatures and humidity. The polymeric latex serves as a replacement for starch

which is used as binder for composite boards (see abstract and page 2, lines 30 to 44). Their efficiency is illustrated in Examples 1 and 2 in which composite boards are prepared from mixtures comprising mineral wool, perlite, clay, cellulosic newsprint and polymeric latex. Since these are the same ingredients as stipulated in claim 1, the Board concurs with the appellant - patentee in that D3 represents the closest prior art.

1.3 In agreement with the appellant - patentee, the Board considers that the problem to be solved with respect to D3 can be seen in the provision of a cardboard having comparable properties at a lower cost or with improved properties but obtained at a similar cost (see letter dated 12 May 1998, page 2, paragraph 4).

1.4 It is undisputed that the stated technical problem is indeed solved by the solution as proposed in claim 1, stipulating that:

(i) the ratio of the binder to the cellulosic newsprint content is no greater than 1.25 when the cellulosic newsprint content is less than 6% by weight and the ratio is no greater than 0.7 when the cellulosic newsprint content is at least 6% by weight,

(ii) the cellulose fibers in the board are substantially completely coated with the binder and

(iii) the board displays a sag of less than 5.08 mm when a 15.2 mm thick sample, 229 mm wide and 610 mm long is supported at both ends and

exposed to a temperature of 29.4°C and a relative humidity of 95% for 24 hours.

1.4.1 In essence, the above proposed solution consists in stipulating that the cellulose fibers of the composite board be substantially completely coated with the binder, such that a more efficient use of the binder and consequently a reduction in cost is achieved for a given sag resistance. Concerning the distinguishing feature (ii), the patentee submitted at the oral proceedings that the extent of the coating implied by the stipulation "substantially completely coated" cannot be quantified. For practical purposes, however, the cellulose fibers are considered to be substantially completely coated when the desired effect is achieved, namely when the stipulated sag resistance is obtained with the ratio of binder to cellulosic newsprint content as given in claim 1. This explanation is consistent with the written submission dated 12 May 1998 (page 3, paragraph 3).

1.4.2 Based on the patentee's explanation, the Board holds that, although feature (ii) is an essential part of the solution proposed in claim 1, it is not an independent functional feature imposing further additional restrictions. Rather, it is a feature which is directly connected with the other essential features already stipulated in the claim. More specifically, it is automatically achieved when both stipulations (i) and (iii) are met in combination.

1.5 In determining whether the proposed solution is obvious in view of the available prior art, the Board observes that the purpose of D3 is primarily to disclose a new latex composition which could be used as binder for

composite boards (see claims 1 to 6; page 2, lines 1 to 2; page 3, lines 43 to 48). To this effect, examples are provided with the aim of showing the superiority of the new latex as compared to starch for the same intended use under the same conditions (page 2, lines 7 to 14 and Example 2). There is no indication in this prior art document that an attempt has been made to optimise the use of the latex binder. It is, however, natural for the skilled person, when making composite boards, to try and make the most efficient use of this new proprietary material. Although there is no teaching in this respect in D3, he is expected to use his common general knowledge in the field.

1.5.1 The common general knowledge regarding the deposition of latex on the cellulosic fibers is discussed in the introductory part of D1. It is thus known that, to get good and efficient deposition on these slightly anionic fibers:

- (i) either a low-charge density cationic latex is used without the need for a deposition aid or,
- (ii) an anionic latex is used in combination with a water-soluble cationic deposition aid

(page 1, lines 1 to 13).

D1 further discloses that when a specific kind of cationic latex is used in an amount up to the charge reversal point of the fibers, the latex is uniformly distributed on the fibers and bonded thereto, thereby producing high-strength fibrous materials. The latex concerned comprises a non-ionic polymer core encapsulated by a thin layer of high density of bound

cationic charges, the polymeric core having a glass transition temperature from - 80°C to 100 °C (see page 1, line 23 to page 2, line 19).

1.5.2 The Board therefore considers that, faced with the problem of making the most efficient use of a similar polymeric latex, it obvious for the skilled person to apply the teaching of D1. He would thus be induced into depositing the latex in the same ways as disclosed in D1 with the aim of obtaining a uniform distribution of the latex binder onto the fibers. The Board further holds that it is then a matter of routine experimentation to determine the minimum amount of binder required for achieving a given sag resistance of the composite boards.

1.5.3 The Board concedes that a uniform coating does not necessarily mean a substantially complete coating and that D1 does not explicitly teach that the disclosed deposition method leads to fibers which are substantially completely coated with latex. It is, however, logical that the most extensive coating will be obtained when the binder is deposited uniformly onto the fibers or, in other words, the ratio of binder to fibers required for obtaining the same extent of coating of the fibers is lowest when the binder is deposited uniformly. As a consequence, the skilled person will arrive at the same limit of ratio of binder to fibers whether the aim of his routine experiments be a substantially complete coating or a uniform coating of the fibers.

1.5.4 The above reasoning is corroborated by a comparison of the methods for depositing the binder according to the patent in suit and D1. Thus, according to the patent in

suit, the deposition of the latex onto the fibers may be accomplished according to any one of the three processes:

- (i) a coagulant is introduced prior to or along with the latex to the board components,
- (ii) the latex is deposited with a coagulant on a filler, then the filler/latex is coated onto the fibers,
- (iii) a cationic latex is deposited onto the fibers or clay filler. The fibers and filler, being anionic, will retain the latex on its surface. This method eliminates the need for the coagulant.

(column 4, lines 23 to 56)

The coagulants used in the patent in suit are polymers carrying a positive charge. Their function is to absorb onto the latex to reverse the charge and eliminate aggregation of the latex particles, thereby enhancing the deposition of the latex onto the (negative) cellulose fibers (column 7, line 41 to column 8, line 23).

Thus, in order to achieve a substantially complete coating of the fibers with the stipulated ratio of binder to fibers, such that the composite boards show the stipulated sag resistance, the patent in suit resorts to the strategic use of a coagulant when an anionic latex is applied as binder for the fibers or the use of a cationic latex without the need for a coagulant. These same measures are disclosed in D1 as

necessary for obtaining a uniform deposition of the binder onto the fibers (compare patent in suit, column 8, lines 36 to 46 and point 1.5.1 above).

1.5.5 The Board does not accept the patentee's argument that, in seeking to improve the composite boards disclosed in D3, the skilled does not have an incentive for turning to D1 which relates to paper making. As is already indicated above, D1 is not restricted to the technical field of paper making but addresses the common general knowledge in the field of latex deposition onto fibers (see point 1.5.1).

1.5.6 The Board does not see any relevance as to the patentee's argument that D1 requires the cationic binder latex be used in an amount up to the charge reversal point of the fibers (see D1, page 1, line 22 to page 2, line 3). The patentee has not argued and the Board has no reason to presume that the ratio of binder to fibers as stipulated in claim 1 would reverse the charge of the fibers. Thus, the stipulated ratio is a priori not different from the requirement of D1 in this respect.

1.6 As a corollary of the above, the main request cannot be allowed since the subject-matter of claim 1 lacks an inventive step in view of D3 in combination with D1 and routine experimentation.

Auxiliary requests I - VIII

2. Claim 1 of the auxiliary requests I to VIII is the same as claim 1 of the main request (see point VIII). The above findings therefore apply likewise to these auxiliary requests.

Auxiliary request IX

3. Claim 1 of this auxiliary request relates to the process for making a composite board using as binder an anionic latex dispersion.
- 3.1 With regard to the closest prior art process according to D3, the technical problem is again to improve the prior art from an economic aspect.
- 3.2. The solution proposed in claim 1 is to ensure that the cellulose fibers of the newsprint are substantially completely coated with the binder. The Board observes at this point that the ranges of content of cellulosic newsprint and thermoplastic polymeric binder as well as the ratio of the binder to the cellulosic newsprint as stipulated in claim 1 cover the proportions of the components used in example 2 of D3. With respect to D3, the distinguishing measure is thus the addition of a coagulant to the mixture of components before the slurry is flocculated.
- 3.3 The technical problem is thus the same and the proposed solution involves elements already discussed in the context of the product claim 1 of the main request. In particular, the use of a cationic deposition aid in combination with the anionic latex is known from D1 to improve the deposition of the binder onto the negatively charged fibers (see point 1.5.1 above). The reasoning and the conclusion reached for the main request apply mutatis mutandis to the process as claimed.

The auxiliary request IX cannot thus be allowed because the process according to claim 1 lacks an inventive

step with regard to D3 in combination with D1.

Auxiliary request X

4. *Amendments*

Claim 1 of this request differs from claim 9 as granted through the additional stipulation of "the cellulosic newsprint and at least a portion of the polymeric binder being mixed and the perlite and mineral wool being added subsequent to that mixing".

4.1 Compliance with Article 123(2) and (3) EPC

The new stipulation of the two-step addition of the latex binder represents a restriction of the scope of the claim with respect to the granted claim 9. Furthermore, it is based on the original description at page 5, lines 8 to 9 and Figure 1 with the accompanying description at page 6, lines 7 to 33. Thus, the amendment satisfies the requirements of Articles 123(2) and (3) EPC.

4.2 Issue of clarity

4.2.1 The opponent - appellant Odenwald Faserplattenwerk GmbH has raised the objection that the stipulation of "the polymeric binder *being* (emphasis added) coated on the cellulose fibers of the newsprint substantially completely before the slurry is fed to the mold" in claim 1 is not clear. He has therefore asserted that, pursuant to Rule 61a EPC, the amended claim 1 is not admissible since it does not satisfy the requirement of clarity as set out in Article 84 EPC. In support of his argument, he has cited the decision of the Enlarged

Board of Appeal G 1/91.

4.2.2 The patentee - appellant, on the other hand, has submitted that the requirements of Article 84 EPC are not relevant in the present case since the alleged lack of clarity does not arise out of amendments made after grant of the patent in suit. This view would be in agreement with the case law, for instance according to the decisions T 301/87 and T 367/96. Furthermore, it is not in conflict with the cited decision of the Enlarged Board of Appeal G 1/91.

4.2.3 The Board notes that, with the exception of the word "*being*" instead of "*is*", the wording of the feature in question is indeed unchanged from that in claim 9 as granted. Furthermore, the amendment concerned does not have any substantive implication but is merely dictated by grammatical requirements following a rewording of the entire claim. It is thus undisputed that, if there is a lack of clarity in the sense of Article 84 EPC in present claim 1, said lack of clarity was already there in claim 9 as granted and has not been introduced with the present amendment. On the other hand, following the decisions T 301/87, OJ EPO 1990, 335 (cf. points 3.7 and 3.8 of the reasons) and the unpublished decision T 367/96 dated 3 December 1997 (cf. points 4 and 6.2 of the reasons), the Board holds that Article 102(3) EPC does not allow for objections to be based upon Article 84 EPC unless they arise out of the amendments made after the grant of the patent. This not being the case here, the objection cannot be upheld by the Board.

4.2.4 The opponent - appellant has not indicated in which way the above finding would contradict the decision G 1/91 of the Enlarged Board of Appeal. This decision only

addresses the question whether the requirements of Article 82 EPC have to be met when a patent is maintained in amended form under Article 102(3) EPC. In the introductory part of the decision, it is remarked that, in resolving the point of law raised, it is Article 102(3) EPC which is of prime importance and not Rule 61a EPC (see point 2.1 of the decision). Furthermore, the decision expressly refrains from discussing the meaning of Article 84 in this context (see point 5.2 of the decision).

The Board therefore fails to see any contradiction between the decision G 01/91 and the EPO practice as set out in the cited decisions T 301/87 and T 367/96 (see point 4.2.3 above).

5. *Inventive step*

5.1 Claim 1 relates to a process for making a composite board.

5.2 The Board can see the problem to be solved with regard to the closest prior art process of D3 in the provision of an alternative process for making composite boards.

5.3 The solution proposed in claim 1 is essentially a process involving a two step addition of the thermoplastic binder such that:

(i) the cellulosic newsprint and at least a portion of the polymeric binder is mixed first, and

(ii) the perlite and mineral wool is added subsequent to that mixing.

5.4 It is undisputed that the stipulated process solves the technical problem as stated in point 5.2 above. It is also uncontested that the proposed two-step addition of the thermoplastic binder is neither suggested in D1, D3 nor in any other of the 18 available prior art documents so that it was not obvious for a skilled person to contemplate modifying the process of D3 in the manner as stipulated. In consequence, the Board concludes that the process of claim 1 involves an inventive step.

5.5 Claims 2 to 6 are dependent claims relating to specific embodiments of the subject-matter of claim 1. The patent can therefore be maintained with these claims, after the necessary adaptation of the description.

Order

For these reasons it is decided that:

The decision under appeal is set aside.

The case is remitted to the first instance with the order to maintain the patent with the following documents:

1. claims 1 to 6 (auxiliary request X),
2. a description, including the drawings, to be adapted.

The Registrar:

The Chairman:

G. Rauh

R. Spangenberg