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D E C I S I O N
of 7 July 1998

Case Number: T 0155/97 - 3.2.3

Application Number: 90910083.6

Publication Number: 0445240

IPC: E04C 2/26, E04B 1/78

Language of the proceedings: EN

Title of invention:
Construction board and its manufacturing method

Patentee:
Oy Partek AB

Opponent:
(I) Rockwool International A/S
(II) Isover-Ahlström Oy

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - problem and solution"

Decisions cited:
-

Catchword:
-

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Case Number: T 0155/97 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 7 July 1998

Appellant: (Opponent I)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office dated 22 November 1996, posted on 10 December 1996, rejecting the opposition filed against European patent No. 0 445 240 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: C. T. Wilson
Members: F. Brösamle
J.-P. Seitz

Summary of Facts and Submissions

I. In the oral proceedings of 22 November 1996 the Opposition Division rejected the opposition against European patent No. 0 445 240 pursuant to Article 102(2) EPC, whereby the written decision was posted on 10 December 1996.

In the decision the Opposition Division came to the result that the cited state of the art, including the following documents, did not prejudice the maintenance of the patent in its granted form:

(D1) Rapport No. 132 Institute for Husbygning, "Mineraluldbaserede sandwichelementer hovedrapport", Lyngby 1979 (in Danish) and part English language translation thereof ("Exhibit A"),

(D3) DE-A-2 501 045, and

(D7) SE-A-385 673 (its English translation (D7-EN) was filed in the appeal proceedings).

II. The independent claims of European patent No. 0 455 240 read as follows:

"1. A longitudinal sandwich element comprising a core (1) of longitudinal lamella strips (4) of binder fixed mineral wool and a surface layer, e.g. of metal sheet attached on both sides of the core, the lamella strips (4) extending side by side in the longitudinal direction of the board, the mineral wool fibres being distributed in parallel planes which are mainly perpendicular to the main surface of said board, characterized in that at least some of the lamella strips are composed of two or more lamella pieces (2) which are

longitudinally connected to each other, the end surfaces of the interconnected lamella pieces are longitudinally displaced relative to the end surfaces of the neighbouring lamella pieces, and the end surfaces of the interconnected lamella pieces (2) are matching and pressed together, so that a border layer (3d) is formed comprising intermingling fibres from both end surfaces."

and

"6. A method for manufacturing a sandwich element according to any of claims 1-5, in which lamella pieces are cut from a mineral wool mat, turned 90° around their longitudinal axis and assembled end to end and side by side into a lamella board and surface layers are attached to both main sides of the lamellla board characterized in that the end surfaces of the lamella pieces, which shall be longitudinally connected, are made to match each other; the lamella pieces (2) are turned 90° around their longitudinal axis and assembled into groups of side by side positioned pieces; the individual lamella pieces in such a group are longitudinally displaced in relation to the neighbouring lamella pieces of said group; and the leading end surfaces of the displaced lamella pieces are connected under pressure with the correspondingly displaced tailing end surfaces of a preceding group of lamella pieces; and repeating the preceding steps until an assembly of lamella strips (4) is built up from which board lengths are cut; whereafter a surface layer is attached by means of an adhesive on each side of the board length of the assembly of lamella strips, while said board length is kept under lateral and longitudinal pressure."

III. Against the above decision of the Opposition Division Opponent I (Rockwool International A/S) - Appellant in the following - lodged an appeal on 7 February 1997 paying the appeal fee on the same day. The Statement of Grounds of Appeal was filed on 7 April 1997.

He requests to set aside the impugned decision and to revoke the patent.

IV. Opponent II (Isover-Ahlström Oy) did not appeal and is a party as of right in the following.

V. The Proprietor - Respondent in the following - requests to dismiss the appeal (**main request**) or by way of an **auxiliary request** to set aside the impugned decision and to maintain the patent on the basis of a claim 1 based on a combination of granted claims 1 and 9.

VI. In the oral proceedings of 7 July 1998 which were held following the Board's communication pursuant to Article 11(2) RPBA the party as of right did not appear - his intention not to appear was communicated to the Board by letter dated 9 October 1997 - so that these were continued without him, Rule 71(2) EPC.

The Appellant and the Respondent upheld their above requests and brought forward the following arguments:

(a) Appellant:

- nearest prior art document is (D1) from which document all features of granted claim 1 are known without the feature that the lamellae are pressed together so that a border layer is formed comprising intermingling fibres from both end surfaces;

- from (D3) it is known to produce endless strings of lamellae which are joined on a plate "15"; the existing axial pressure on the lamellae due to being pushed through the machine leads to a border layer comprising intermingling fibres from both end surfaces;

- a calculation carried out under the (D3) - manufacturing circumstances by Mr Frueland comes to the result that without considering the effects in the guides "12" an axial pressure of more than 500 Pa is exerted on the lamellae to be conveyed;

- the combination of (D1) and (D3) deprives the sandwich element according to granted claim 1 of an inventive step;

- (D7/D7-EN) were only cited to demonstrate what happens when two fibre boards are brought into mutual contact, namely penetration of the fibres of one board into the other and vice versa;

- a calculation carried out by an expert results in an increase of only 3,8% in shear stress when boards with intermingling fibres are compared with jointless boards so that this effect can be disregarded;

- with respect to the intermingling effect of neighboured fibres being pressed together, (D7) discloses that an increase of the pressure enhances the intermingling of fibres; a surprising effect can therefore not be claimed in this respect;

- summarizing, neither the main nor the auxiliary request are allowable so that the patent in suit has to be revoked for reasons of Articles 56 and 100(a) EPC.

(b) Respondent:

- claim 1 as granted relates to a sandwich element in which according to column 3, first paragraph of the patent specification in suit, the resistance of a whole mineral wool without the weakening influence of the joints between the lamella pieces is achieved;

- (D3) aims at the production of a lamella piece without turning the individual lamellae; (D3) is silent about pressures used to create an endless string of lamellae and about a possible weakening effect of the joints of the lamellae; the hint in (D3) that the guides for the lamellae do not offer a substantial resistance of the lamellae to be conveyed teaches away from the application of an axial pressure for combining individual lamellae;

- (D7) is only relevant for the existence of intermingling of fibres but is completely silent about any pressure which is beyond contacting of aligned lamellae; what should be achieved by the teaching of (D7) is to avoid any tendency of the board to split up along the planes of the layers which problem is not considered in the patent in suit;

- while the curve for displacement and applied forces for a sandwich element without using the teaching of granted claim 1 shows a kink, a sandwich element as claimed is free of such a kink in this curve so that these sandwich elements can be used for loads which are harmful for conventional sandwich elements;

- applying the problem - solution - approach when assessing the inventive step of the subject-matter of granted claim 1 it has to be considered that the problems and solutions and technical effects between conventional and claimed sandwich elements are different so that a skilled person not knowing the invention would not combine (D1), (D3) and (D7) to directly achieve the sandwich element according to granted claim 1;

- claim 1 as granted is not restricted to a specific pressure for instance exceeding 100 Pa but teaches the skilled person at least the direction to be followed, namely applying a sufficient axial force to achieve a substantial intermingling of fibres sufficient to compensate for any weakening effects of lamellae-joints;

- summarizing, granted claim 1 defines novel and inventive subject-matter.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Novelty*

From the nearest prior art document (D1) and its English version (D1-EN) it can be seen (see page 16 first paragraph), that two or more lamellae have to be placed end to end and that the joints are local weaknesses. The intermingling of fibres caused by pressing together aligned lamella pieces to form a border layer of intermingling fibres from both end surfaces is not known from (D1) so that the sandwich element of granted claim 1 is novel, Articles 54 and 100(a) EPC. Since novelty was accepted by the parties and the Board, further arguments are superfluous in this respect.

3. *Inventive step*

3.1 As set out in above remark 2 (D1) discloses all features of granted claim 1 but not the feature thereof causing intermingling of fibres from both end surfaces of aligned and pressed together lamella pieces.

3.2 The joints of the sandwich element according to (D1) suffer from a poor shear resistance in the region of the joints between the lamella pieces so that the invention seeks to improve this insufficiency of a conventional sandwich element, see EP-B1-0 445 240, column 3, lines 1 to 5.

3.3 The object of the invention is solved by the features laid down in granted claim 1 in that the end surfaces of matched lamella pieces are pressed together until a border layer is formed comprising intermingling fibres from both end surfaces.

3.4 The result is a sandwich element which shows a border layer "3d" according to granted Figure 4 which no longer has a weakening influence for the sandwich element but can withstand higher shear stresses than a conventional joint of matched lamella pieces. The fact that granted claim 1 prescribes the existence of a border layer "3d" allows an evaluation of the pressures needed for forming such a border layer although granted claim 1 is silent about a specific value for such a pressure. A skilled person aware of the problem to overcome any weakening influence of the joints of a board composed of lamella pieces is therefore pushed into a direction which makes it easy for him to find out specific pressures to be used in this case. Granted claim 1 does therefore offer a complete teaching for a skilled person and is not open to objections insofar.

3.5 The sandwich element of granted claim 1 being novel it has to be assessed whether or not an inventive activity was necessary to achieve it:

3.5.1 (D1) only teaches **to place** lamella pieces **end to end** and accepts the existence of weaknesses of the joints since it is only prescribed that these joints be distributed by arranging the lamellae displaced relative to each other, see (D1-EN), page 16, paragraph 1 and its related figure.

3.5.2 From (D1) a skilled person could therefore not get useful hints of how to overcome the weakening influence of joints of lamella pieces. Even if a skilled person turned to further prior art documents the situation would not improve since the prior art teaches to glue matching lamella pieces together or to overlap them to strengthen the joint but not **to press them together** so that a border layer as defined in the last feature of granted claim 1 is obtained.

3.5.3 Pressing lamella pieces together to deliberately obtain the above border layer for a skilled person not knowning the invention cannot be derived from (D3) since a skilled person is lead away from applying axial pressures in (D3), see page 4, lines 11/12 which teaches **to avoid as for as possible any resistance** when conveying lamella pieces. The avoidance of any resistance when pushing the pieces is the same as the **exclusion** of axial pressures to form an above border layer. A skilled person would therefore **not turn** to (D3) and any contrary findings are the result of inadmissible hindsight. It is tempting to derive from Figure 1 of (D3) a deliberate wish to create an axial pressure and to calculate a minimum pressure under simplified circumstances, but (D3) **taken as a whole** is based on a construction in which axial resistances should clearly be avoided (see uninterrupted guides "12").

3.5.4 In (D7-EN), see page 1, last paragraph, a description is given of what happens when two boards with irregular border surfaces are brought into mutual contact, namely a **certain penetration** of fibres from one board to the other. (D7) does, however, not simply rely on the penetration of fibres, rather on the existence of an

(uncured) **binder** which after setting fixes the fibres of different boards together. In this context (D7-EN), see page 3, lines 21 to 26, prescribes that an **appropriate force** should be applied to improve the contact between the boards and the penetration of the fibres.

3.5.5 The skilled person is, however, not led by (D7) to the problem of how lamella pieces with fibres in the **same direction** and **without** the existence of a binder can be joined simply by applying a **sufficient axial pressure** to form a border layer which does no longer cause a weakening effect in the board. In (D7) more pressure would not achieve the result claimed in granted claim 1 since the fibres of the boards to be joined have the **wrong orientation**, namely **perpendicular** to one another. The intermingling of fibres in (D7) depends on the **irregularity of the boarder surfaces** of the two boards, see (D7-EN), page 1, last paragraph, whereas granted claim 1 is based on lamellae which have "open ends" i.e. are suitable to be deformed until a border layer "3d" (see granted Figure 4) is achieved. This border layer avoids any kink in the curve representing the deformation in dependency of the applied load to the sandwich element.

3.5.6 Contrary to Respondent's findings, that the sandwich element according to granted claim 1 leads to an essential increase in shear strength and to an omission of a kink in the curve reflecting deformation and applied loads, the appellant based his argument on theoretical considerations with the result that the improvement would only be in the range of 3,8%. The Board was therefore in a position of having to compare the theoretical findings with the test results of a sandwich element as claimed when assessing the contribution of the claimed subject-matter to the art.

The Board's decision is based on the test results of the Respondent, which are considered to be more convincing and to be more "real life". It has to be acknowledged as **a surprising effect** that the creation of a border layer "3d" of intermingling fibres is sufficient on its own to cope with the weakening influence of the joints between lamella pieces of a sandwich element..

3.5.7 Summarizing the above considerations the Board comes to the conclusion that a skilled person starting from (D1) would not get useful hints from the prior art to be considered for solving the problem of how any detrimental effects of joints between lamella pieces can be overcome since the prior art (D1), (D3) and (D7) addresses problems and solutions and technical effects which are different from EP-B1-0 445 240.

3.5.8 The sandwich element according to granted claim 1 is therefore novel **and** inventive and granted claim 1 is valid. This is also true for granted claims 2 to 5 which depend on granted claim 1.

3.6 Granted claim 6 is based on a method for manufacturing the sandwich element defined in any of granted claims 1 to 5 and contains the crucial feature that the lamella pieces are matched and joined under axial pressure. Since granted claim 6 can be seen as clear - namely interpreting the step "turning 90°" of the characterising clause of granted claim 6 as a **repetition** of the corresponding feature in the preamble thereof - and unambiguous the Board has to take granted claim 6 as it is without any "tidying up", since the main request is to dismiss the appeal i.e. maintain EP-B1-0 445 240 unamended.

For the above reasons granted claim 6 is not open to objections under Articles 54, 56 and 100(a) EPC and is also valid.

Dependent claims 7 to 10 are related to valid claim 6 and are likewise valid.

3.7 Under these circumstances the appeal has to be dismissed.

Auxiliary request

4. The **main request** being allowable the **auxiliary request** has not to be dealt with.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

N. Maslin

The Chairman:

C. T. Wilson

J.P.S