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D E C I S I O N
of 31 October 2000

Case Number: T 0719/97 - 3.2.6

Application Number: 92901216.9

Publication Number: 0560878

IPC: D04H 1/70

Language of the proceedings: EN

Title of invention:
Method Of Manufacturing Insulating Boards Composed Of Interconnected Rod-Shaped Mineral Fibre Elements

Patentee:
Rockwool International A/S

Opponent:
Rockwool Aktibolag
Isover Saint Gobain
RHI AG

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
"Novelty (yes)"
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0719/97 - 3.2.6

D E C I S I O N
of the Technical Board of Appeal 3.2.6
of 31 October 2000

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 27 May 1997 rejecting the opposition filed against European patent No. 0 560 878 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: P. Alting van Geusau
Members: T. Kriner
M. Tardo-Dino

Summary of Facts and Submissions

I. Appellant I (opponent I) and Appellant II (opponent III) each lodged an appeal on 22 July 1997 and 18 June 1997 respectively, against the decision of the Opposition Division, dispatched on 27 May 1997, concerning the rejection of the oppositions against European Patent No. 0 560 878. The appeal fees were paid simultaneously with filing of the appeals and the statements setting out the grounds of appeal were filed on 24 July 1994 and 18 June 1997, respectively.

II. The oppositions had been filed against the patent as a whole and were based on Article 100(a) together with Articles 52(1), 54(1), 56 EPC.

In its decision the Opposition Division held that the grounds for opposition did not prejudice the maintenance of the patent unamended and that therefore the oppositions should be rejected.

III. From the documents considered by the Opposition Division, the following documents played a role during the appeal proceedings:

D1a: CA-A-1 209 893 and the corresponding US document

D1b: US-A-4 552 793

D2: US-A-3 493 452

D3: SE-A-8 403 519

D6: DE-A-3 501 897.

IV. Oral proceedings took place on 31 October 2000.

The appellants and opponent II, who was a party to the appeal proceedings as of right, requested that the decision under appeal be set aside and that the patent be revoked in its entirety.

The respondent (patent proprietor) requested that the appeal be dismissed.

V. Claim 1 of the patent in suit reads as follows:
"A method of manufacturing insulating board elements composed of interconnected rod-shaped mineral fibre elements comprising converting a melt of a mineral fibre forming starting material into fibres, supplying a binder to said fibres, collecting the fibres on a conveyor belt so as to form a primary fibre web, characterized in forming a secondary fibre web by doubling of the primary web by laying it in a number of layers transversely to the longitudinal direction of said secondary web, cutting the secondary fibre web in the longitudinal direction to form lamellae, cutting said lamellae into desired lengths, turning the lamellae 90° about their longitudinal axis and bonding them together to form boards, and subjecting the lamellae to a surface compression followed by a longitudinal compression either before or after the fibre web is cut into lamellae".

VI. In support of its request Appellant I relied essentially on the following submissions:

The method defined in claim 1 of the contested patent differed from the method disclosed in D1a only by the step of forming a secondary web by laying it in a

number of layers transversely to the longitudinal direction of the secondary web.

This step was well known and carried out by pendulum machines, as shown for example in D2, D3 and D6. Since at the priority date of the patent in suit, nearly all machines for the production of fibrous sheet products had been pendulum machines, the use of such an engine in a method according to D1a had been obvious for the skilled person, in particular as the contested method and the known machines belonged to the same technical field.

When starting from D2, the method according to claim 1 of the patent in suit would also be obvious.

Consequently, the subject-matter of claim 1 did not involve an inventive step.

VII. Appellant II supported Appellant I's conclusion, but additionally submitted that the subject-matter of claim 1 of the patent in suit lacked novelty with respect to D1a and D2.

According to D1a which was more relevant than D1b because it disclosed additional subject-matter in claims 19 and 20, the mat forming the raw material for the insulating board elements comprised several layers extending in parallel planes to the major surfaces of the mat (see page 1, lines 20 to 25), and was formed in a conventional manner including the step of pleating the mat (see page 1, line 30 to page 2, line 12). Since the conventional methods to form such a mat were well known to the skilled person, they were not described in greater detail in D1a (see page 7, lines 11 to 17).

Furthermore, claim 1 of D1a defined a product in which the major portions of the fibres extended across the thickness of the product between the opposite major surfaces thereof. Since it was not possible to obtain such an orientation of the fibres by the method steps according to the description of D1, it was obvious for the skilled person to use such a conventional method for the production of the mat which, when prosecuted in the manner disclosed in D1a led to the arrangement of the fibres according to claim 1 of the patent in suit.

A suitable method was described in D6 which referred to a conventional production of a mat comprising the step of forming a secondary web by laying a primary web in a number of layers transversely to the longitudinal direction of the secondary web. Since a mat produced in accordance with this conventional method comprised several layers as a result of a pleating step, and since the use of this method in the process described in D1a resulted in a product as defined in claim 1 of this document, it was implicitly disclosed in D1a.

With respect to the steps of cutting the fibre web in a crosswise direction and bonding the cut elements together, claims 19 and 20 of D1a gave the teaching that the sequence of these steps could be selected at will.

Therefore, D1a disclosed all features of claim 1 of the patent in suit.

Furthermore, D2 referred to another method of manufacturing fibrous products comprising all steps of claim 1 of the patent in suit. Since the fibrous products included insulating board elements, D2 was

also novelty destroying.

VIII. The respondent disputed the views of Appellant I and Appellant II. His arguments can be summarized as follows:

D1a did not refer to a method of manufacturing insulating board elements wherein a primary fibre web was converted to a secondary fibre web by doubling of the primary web as defined in claim 1 of the patent in suit.

D1a merely described the formation of a primary fibre mat which consisted of several laminations extending in planes substantially parallel to the major surfaces of the mat. The indication that the mat had to be formed in a conventional manner which was well known in the art related exclusively to the formation of the primary mat and not to its transformation to a secondary mat by laying the primary web in a number of layers transversely to the longitudinal direction of the secondary mat.

Pleating was referred to in D1a only in connection with a longitudinal compression of the primary mat and did not provide for a transformation to a secondary mat by doubling of the primary web.

During the longitudinal compression of the primary mat, the laminations were rearranged from a first orientation in which they extended generally parallel to opposite major surfaces of the mat to a second orientation in which at least a major portion of the laminations extended across the thickness of the mat. Since the laminations in their second orientation had

the form of planes extending perpendicularly to the longitudinal direction of the mat, their orientation did not change during the following steps of cutting the mat in strips and turning the strips 90° about their longitudinal axis. Hence, the method described in D1a resulted exactly in the final product defined in claim 1 of this document, according to which the laminations of both, the transformed fibre mat and the final product extended across the thickness of the mat and of the product.

In an insulating board manufactured according to the patent in suit the laminations and the majority of the fibres in the laminations extended across the thickness of the board. Therefore, it had an improved stiffness and strength over the board disclosed in D1a, in which only the laminations were oriented in this way, while the fibres were randomly arranged within the laminations.

Although the orientation of the fibres was not defined in claim 1 of the contested patent, it was clear for the skilled person that the production of the thin primary web and its transformation to a secondary web by doubling of the primary web required a rapid propulsion of the primary web which inevitably resulted in an orientation of the fibres in the longitudinal direction of the primary web. As a result of the following steps, the fibres in the final product extended in a direction perpendicular to the major surfaces of this product.

Since the step of forming a secondary fibre web by doubling of the primary web by laying it in a number of

layers transversely to the direction of the secondary web, to solve the underlying problem of the patent in suit was not known or suggested by any of the documents cited by the appellants, the subject-matter of claim 1 of the contested patent was not only new, but also involved an inventive step.

Reasons for the Decision

1. The appeal is admissible

2. *Novelty*

2.1 D1a undisputedly discloses

a method of manufacturing insulating board elements composed of interconnected rod-shaped mineral fibre elements (see Figure 5) comprising

- converting a melt of a mineral fibre forming starting material into fibres (see fig.1, forming section 10),

- supplying a binder to said fibres (see D1a, page 7, line 14),

- collecting the fibres (16) on a conveyor belt (14) so as to form a primary fibre web (12),

- cutting the fibre web (by cutter blades 42) in the longitudinal direction to form lamellae (30),

- turning the lamellae 90° about their longitudinal axis (within guide members 33, see Figure 3) and

- bonding them together (at reassemble point 34), and

- subjecting the lamellae to a surface compression before the fibre web is cut into lamellae (at the mat processing station 18).

However, D1a does not disclose the steps of

A: forming the secondary fibre web by doubling of the primary web by laying it in a number of layers transversely to the longitudinal direction of said secondary web, and

B: forming the boards by cutting said lamellae into desired lengths and bonding them together.

2.2 The line of argument developed by Appellant II according to which step A was implicitly disclosed in D1a is not convincing.

D1a refers to fibrous insulating board elements in which the "laminations" extend across the thickness of the elements (see claim 1 of D1a). In order to achieve such an orientation of the laminations, D1a describes a manufacturing process comprising the steps of forming a mat in which the laminations extend in planes parallel to the major surfaces of the mat (see page 7, lines 13 to 17), pleating or crimping the mat to rearrange the laminations so that they extend across the thickness of the web (see page 15, lines 2 to 22), and after having cut the web in strips, turning the strips 90° about their longitudinal axis and bonding them together so that the laminations continue to extend across the thickness of the resulting elements (see Figure 2,

reference sign 24). It is to be noted that D1a speaks about the orientation of the laminations rather than about the orientation of the fibres. When considering the orientation of the fibres in the laminations, D1a clearly indicates (see page 1, lines 20 to 25) that the fibres are randomly arranged in the planes of the laminations.

Since the process described in D1a directly results in the product defined in claim 1 of this document, there is no reason for the skilled person to assume that the formation of the mat according to D1a requires the additional step of forming a secondary web by doubling of a primary web by laying it in a number of layers transversely to the longitudinal direction of the secondary web.

Furthermore, there is also no support for the assumption that step A is implicitly disclosed in D1a for the other reasons submitted by Appellant II.

The statement that the mat is formed in a conventional manner, which is well known to those skilled in the art, refers exclusively to a forming section, where the glass fibres, together with a binder, fall on a conveyor to form the mat (see page 6, lines 13 to 17). Pleating is mentioned only in connection with the step of rearranging the laminations so that they extend across the thickness of the mat. Therefore, the fact that the mat according to D1a comprises several layers cannot be interpreted in such a way that the mat is formed by pleating a primary web to form a secondary web according to step A.

2.3 With respect to step B, D1a shows that the final

products or boards are formed by bonding the strips together to form a strip assembly and by cutting this assembly into elements of desired length.

This sequence of steps is confirmed by claims 19 and 20 of D1. According to claim 19, the strips are secured together to form a board, and according to claim 20 this board is cut transversely, and not the separated strips. Therefore, contrary to the opinion of Appellant II, D1a does not teach to cut the strips at will.

Hence, the subject-matter of claim 1 is new over D1a.

2.4 D2 discloses a further method of manufacturing fibrous materials, including amongst others insulating material (see column 7, lines 38 to 42).
However, since the manufacturing of insulating material is only mentioned in connection with flexible low-cost pile fabrics such as carpets, blankets and the like, D2 does not refer to a method of manufacturing insulating board elements as defined in claim 1 of the patent in suit.

Therefore, the subject-matter of claim 1 is also new over D2.

2.5 Since the other documents in the proceedings are less relevant than D1a (or D1b) and D2, novelty of the subject-matter of claim 1 can be concluded.

3. *Inventive step*

3.1 The most relevant state of the art is undisputedly disclosed in D1a.

On the basis of the method for manufacturing insulating board elements described in this document, the object of the subject-matter of the patent in suit may be regarded as to improve the stiffness and strength of the elements to be manufactured (see column 1, lines 33 to 58 of the patent in suit).

3.2 This object is achieved by the step of forming a secondary fibre web by doubling of the primary web by laying it in a number of layers transversely to the longitudinal direction of said secondary web (step A, described in point 2.1 above).

As was convincingly explained by the respondent, the provision of this step enables an orientation of the fibres in the laminations of the finished insulating board elements in such a way that not only the laminations themselves, but also a substantial number of the fibres in the laminations extend across the thickness of the elements. Such an arrangement results in insulating board elements having a superior stiffness and strength compared to insulating board elements according to D1a (see column 2, lines 23 to 32 of the patent in suit) where the laminations extend perpendicularly to the major surfaces of the insulating board elements, but the fibres are randomly oriented within the laminations (see D1a, page 7, lines 13 to 15 in conjunction with page 1, lines 7 to 13).

3.3 It is undisputed that the step of forming a secondary fibre web by doubling of a primary web by laying it in a number of layers transversely to the longitudinal direction of the secondary web is well known and disclosed in each of the documents D2, D3 and D6.

However, as was also noted by the Opposition Division in the decision under appeal, none of these documents suggests to provide this step in order to influence the mechanical properties, in particular the stiffness and strength, of the product to be manufactured, in a manner which would suggest improvement of these properties of the board elements manufactured in accordance with the process disclosed in D1a.

D2 relates to a process for manufacturing fibrous sheet products having a generally fibre-on-end orientation (see column 1, lines 37 to 39), and which states that this process is especially suitable for manufacturing self-supporting low density products including amongst others insulation products (see column 7, lines 31 to 45). However, as was also noted by the Opposition Division (see page 7, first paragraph), D2 does not relate to a method of manufacturing insulating board elements, but to bonded fibrous sheets which are flexible (see column 2, lines 52 to 54) and can be wound up (see column 4, lines 55 to 60). Since such products do not require a high stiffness and strength, the skilled person would not consider D2 when looking for a solution for the object underlying the patent in suit.

D6 refers to a method for manufacturing fibrous products having a high degree of uniformity (see page 4, lines 19 to 22), and D3 refers to a method for manufacturing fibrous products which method is suitable to control the density of these products (see abstract). Hence, there is also no reason for the skilled person to consider the step of forming a secondary web as described in any of D3 or D6 for an improvement of the stiffness and strength of insulating

board elements.

3.4 The argumentation of Appellant I that the combination of D1a with step A was obvious, because the pendulum machines described in D2, D3 or D6 had been used in nearly all methods for manufacturing fibrous products, cannot be accepted by the Board, in particular, because no reason was given as to why the skilled person would abandon the mat forming process in the apparently satisfactory method according to D1a.

D1a refers to insulating board elements which have a desired stiffness and strength as a result of the orientation of the laminations within the elements. To arrive at this orientation D1a relies on a manufacturing method which does not require the step of forming a secondary layer according to step A. Consequently the skilled person would not consider the provision of this additional step only for the reason that it is well known, in particular since this step requires additional machines and thus a complication of the known method.

3.5 The argumentation of Appellant I according to which the method of claim 1 of the patent in suit would also be obvious when starting from D2, has not been further substantiated. In the absence of both, a verifiable line of argument in this respect or an apparent reason for combining the teachings of D2 and D1a, the Board does not see a necessity to give further comments concerning this objection.

3.6 In view of these assessments, the Board comes to the conclusion that the subject-matter of claim 1 of the patent in suit cannot be derived in an obvious manner

from the available prior art and accordingly involves an inventive step. Claim 1 together with dependent claims 2 to 5 according to the patent specification, and the description and drawings of the patent specification, therefore can be maintained unamended.

Order

For these reasons it is decided that:

The appeals are dismissed.

The Registrar: The Chairman:

M. Patin P. Alting van Geusau