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**D E C I S I O N**  
**of 29 June 1999**

**Case Number:** T 0317/98 - 3.2.1  
**Application Number:** 87904425.3  
**Publication Number:** 0272305  
**IPC:** B21D 13/00, B23K 9/00,  
B23B 31/00, B44C 1/22

**Language of the proceedings:** EN

**Title of invention:**

Apparatus and method for forming an integral object from laminations

**Patentee:**

Feygin, Michael

**Opponent:**

Kira Corporation

**Headword:**

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**Relevant legal provisions:**

EPC Art. 54, 56, 114(2)

**Keyword:**

"Late-filed submissions concerning added subject-matter disregarded by Opposition Division; discretion applied correctly"

"Novelty (yes)"

"Inventive step (no)"

**Decisions cited:**

G 0010/91, T 0301/87, T 0986/93

**Catchword:**

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Boards of Appeal

Chambres de recours

Case Number: T 0317/98 - 3.2.1

**D E C I S I O N**  
**of the Technical Board of Appeal 3.2.1**  
**of 29 June 1999**

**Appellant:** Kira Corporation  
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**Decision under appeal:** Interlocutory decision of the Opposition Division  
of the European Patent Office posted 10 February  
1998 concerning maintenance of European patent  
No. 0 272 305 in amended form.

**Composition of the Board:**

**Chairman:** F. Gumbel  
**Members:** S. Crane  
J. Willems

## Summary of Facts and Submissions

- I. European patent No. 0 272 305 was granted on 2 March 1994 on the basis of European patent application No. 87 904 425.3.
- II. The granted patent was opposed by the present appellants, who requested that the granted patent be revoked in its entirety. On the official form used for drafting the notice of opposition the appellants indicated that they were objecting to the patent under Article 100(a) EPC (lack of novelty and inventive step) and Article 100(c) EPC (inadmissible extension of subject-matter). However, only the objections under Article 100(a) EPC were in any way substantiated.

Of the prior art documents relied upon by the appellants in the course of the opposition proceedings in support of their objections to lack of novelty and inventive step only the following have played any significant role on appeal:

(D3) Takeo Nakagawa et al in Proceedings of 25th International Machine Tool Design Research Conference, pages 505 to 510, published in 1985.

(D6) JP-U-59 161896

(D10) JP-A-55 45565

- III. With its decision posted on 10 February 1998 the Opposition Division held that the patent could be maintained in amended form on the basis of claim 1 as granted and independent claim 12 as submitted at the

oral proceedings on 26 September 1996.

Claims 1 and 12 read as follows:

"1. Apparatus for producing an integral three-dimensional object (22) from computer data, the apparatus comprising a storage station (26) for storing and supplying sheet-like material to form said object (22), a computer (36) operable to generate data defining a series of planar shapes corresponding to a succession of parallel sections taken progressively through said object (22) at spaced intervals, a shaper (30) for receiving material from said storage station (26) and responsive to said data from said computer (36) to convert said material into a plurality of laminations (24) each having shapes corresponding to said planar shapes, a stacker (38) for receiving said laminations from said shaper (30) and arranged to stack said laminations (24) successively one on top of the other in an order corresponding to the order of succession of said planar sections, locating means (78) cooperating with the stacker for ensuring the correct attitude of each lamination (24) in said stack and bonding means for bonding said laminations together to form said three-dimensional objects (22) characterised in that said sheet like material is a bimaterial in which one material is the primary material for the lamination and the other material is a bonding material for achieving an integral bond between laminations when subject to heat and/or pressure, and further characterised in that said bonding means includes pressure and/or heating means for effecting an integrated bond between adjacent laminations (26) and control means responsive to the stacker for actuating said pressure and/or heating means to integrally bond each lamination upon being stacked to the immediately

adjacent lamination (26) during an interval before the next successive lamination is stacked thereon."

"12. A method for producing an integral three-dimensional object namely complex three dimensional parts, dies, molds, prototypes from computer data, the method comprising steps of supplying a sheet-like material to form said object, generating data defining a series of planar spaces corresponding to a succession of parallel sections taken progressively through said object; at spaced intervals, shaping said material in accordance with said data to convert the material into a plurality of individually contoured laminations of the same or gradually varying shape each coated with said bonding component and having shapes corresponding to said shapes, stacking said laminations successively one on top of the other in an order corresponding to the order of successions of said planar sections, locating each lamination as it is stacked and bonding said laminations together to form said three-dimensional object characterised in that said sheet-like material is a bimaterial in which one material is the primary material for the lamination and the other material is a bonding material for achieving an integral bond between laminations when subject to heat and/or pressure and further characterised by the step of applying heat and/or pressure to integrally bond each lamination upon being stacked to the immediately adjacent lamination (26) during an interval before the next successive lamination is stacked thereon."

Dependent claims 2 to 11 and 13 to 27 relate to preferred embodiments of the apparatus according to claim 1 and the method according to claim 12

respectively.

The description of the patent specification was to be maintained in its granted form.

At the oral proceedings the appellants put forward for the first time various objections to the effect that granted claims 1 and 12 contained subject-matter extending beyond the content of the application as originally filed. The Opposition Division exercised its discretion to disregard these late submissions concerning ground of opposition under Article 100(c) EPC.

- IV. An appeal against this decision was filed on 30 March 1998 and the fee for appeal paid at the same time.

The statement of grounds was filed on 8 June 1998. The appellants request that the decision under appeal be set aside and the patent revoked in its entirety.

With a letter received on 20 January 1999 the appellants made further submissions and filed *inter alia* a further prior art document, viz. (D12) US-A-4 285 754.

- V. With a letter dated 31 May 1999 the respondent (proprietor of the patent) conceded that document D12 represented the closest state of the art. He contended however that the contested decision should stand even in the light of the content of this document and the appeal be dismissed. In the alternative he requested the replacement of claim 12 as agreed by the Opposition Division by a modified claim 12 according to an



auxiliary request. The modified method claim 12 had been brought into closer correspondence with apparatus claim 1.

- VI. Oral proceedings before the Board were held on 29 June 1999.
- VII. The arguments put forward by the appellants can be summarised as follows:

The Opposition Division had erred in denying the high *prima facie* relevance of the objections raised under Article 100(c) EPC and in therefore disregarding them. The respondent would have been put under no disadvantage by admitting the objections since all that would have been required was a comparison of the granted independent claims with the original application and it could be assumed that the respondent was well acquainted with the documents he had filed himself. The Board should therefore proceed to examine these objections as to their substance. The most significant ones were that the claims referred to bonding by "heating" whereas the original application only referred in this context to spot brazing, that in the embodiment where spot brazing was used this did not in any case lead to an integral bond between the laminations and that there was no disclosure of bonding by the application of heat **and** pressure. Moreover, in view of the fact that claim 12 had been amended the Board was now obliged to consider the objections raised against it irrespective of its opinion as to how the Opposition Division handled the matter.

The subject-matter of claim 1 was not novel with

respect to the disclosure of document D12. The apparatus described there worked in essentially the same way as that taught by the patent to produce an integral solid object of complex shape by stacking up laminations each having a planar shape corresponding to a respective section through the object. An adhesive was applied to each lamination before it was added to the stack and it was apparent from its name alone that the part of the apparatus designated as the "shear and press station" must include means for applying pressure to that lamination in order to secure its bonding to the rest of the stack. Furthermore, the reference in claim 1 to a "bimaterial" sheet had to be understood in the context of the patent specification from which it was clear, see column 7, lines 26 to 31, that the term extended to a sheet material which had adhesive applied to it during its passage through the apparatus, which was exactly the case in document D12. If any distinctions between the subject-matter of claim 1 and this prior art did exist then they were of a trivial nature, so that at the very least the claimed apparatus lacked inventive step, especially having regard to the common general knowledge of the person skilled in the art as exemplified in documents D3, D6 and D10.

The subject-matter of independent claim 12 was distinguished from the method disclosed in document D12 only insofar as the claimed method required the shaping operation to be performed on bimaterial which was already coated with a bonding component, whereas in document D12 the bonding component was coated onto the sheet material immediately after shaping thereof. This was an insignificant modification of the known method, well within the routine design competence of the person

skilled in the art, which could not justify an inventive step.

VIII. In reply the respondent argued essentially as follows:

The Board should not interfere with the decision of the Opposition Division not to consider the belated submissions of the appellants concerning the new ground of opposition under Article 100(c) EPC. In coming to this decision the Opposition Division had clearly exercised its discretion in a proper way, following the principles developed by the Boards of Appeal in its extensive case law of the subject of the interplay between Article 114(1) and (2) EPC. In any case, the objections of the appellants did not stand up to closer examination since when proper account was taken of the totality of the disclosure in the original application a clear basis for the claims could be found therein.

The appellants had glossed over a number of distinctions between the claimed subject-matter and the disclosure of document D12, the most fundamental of which was that this prior art document was not directly concerned with the production of an integral solid body but merely with the production of planar elements which could be stacked and bonded to form such a body. Thus the bonding step was not part of the teachings of document D12 and the person skilled in the art would therefore proceed to bond the stack of planar elements resulting from the method and apparatus of this document by means of whole stack pressure bonding as was proposed for example in document D3. There was nothing in document D12 or for that matter in any other state of the art document which could suggest to the

person skilled in the art what was the core idea of the present invention, namely bonding each lamination or planar element to the growing stack as it is formed so that with the addition of the last lamination the required integral solid object had been obtained, which required no further processing.

The other distinctions over the prior art according to document D12 were less important, but not insignificant. In particular, the computer disclosed there controlled the sequence of operation of the apparatus but did not itself generate the data needed to form the planar elements. Secondly, document D12 did not propose the shaping of a bimaterial but adopted the more complex arrangement of applying adhesive to the base sheet material after it had been formed.

Taking all of these distinctions into account it was apparent that the subject-matter of the independent claims was both novel and inventive.

### **Reasons for the Decision**

1. The appeal complies with the formal requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC; it is therefore admissible.
  
2. *Objections under 100(c) EPC*

In its review of the decision of the Opposition Division to disregard the belated objections under Article 100(c) EPC against the granted claims 1 and 12 the Board is guided by the principles set out in

decision T 986/93 (OJ EPO 1996, 215), see in particular points 2.1 to 2.5 of the reasons. As set out there a Board of Appeal, having regard to the findings of the Enlarged Board of Appeal in Opinion G 10/91 (OJ EPO 1993, 420), should only interfere with the discretionary decision of an Opposition Division to disregard late-filed submission concerning a new ground of opposition if it is satisfied that there were, *prima facie*, clear reasons for believing that this new ground of opposition was highly relevant and would in whole or in part prejudice maintenance of the patent.

In the present case the objections under Article 100(c) EPC raised at a very late stage in the opposition proceedings are of a complex nature involving difficult questions of fact and law. In particular, they concern *inter alia* the extent to which the person skilled in the art would understand the reference to a specific disclosure as being exemplary for a more broadly defined measure and the extent to which it is permissible to combine the features disclosed in separate embodiments. This situation contrasts clearly with that considered in T 986/93 (*supra*) where an essential feature of the originally filed claim 1 was no longer present in the granted claim allowing high *prima facie* relevance to be established without further ado. Furthermore, the difficulties mentioned above are compounded by the very extensive nature of the original application, totalling 38 pages of description, 16 Figures and 85 claims. For these reasons the Board is satisfied that the Opposition Division did not misuse its discretion when it elected to disregard the related objections under Article 100(c); accordingly the Board will do likewise.

Furthermore, the Board can see nothing attractive in the proposition of the appellants that it was in any case obliged to consider in detail the same objections of added subject-matter against claim 12 according to the main and auxiliary requests since that claim had been amended and was therefore subject to full review. In this respect it is noted that the amendments made to claim 12 have no bearing whatsoever on the aspects of the claim which the appellants find offensive, cf. T 301/87 (OJ EPO 1990, 335).

3. *Novelty and inventive step*

The central topic of discussion at the oral proceedings before the Board was the way in which the person skilled in the art would understand document D12. In the view of the appellants this document, when account was taken of what was implicit to its teachings, took away the novelty of the subject-matter of claim 1. The respondent on the other hand saw several differences (up to six if more generally stated features in the preamble and more specifically stated features in the characterising clause are counted separately) between the claimed apparatus and that disclosed in document D12. In the opinion of the Board a fair reading of document D12 leads to a result which lies somewhere between the two extremes advanced by the parties.

On the first important issue - whether the apparatus of document D12 itself leads to a product which is an integral three-dimensional object - the Board finds that the weight of the arguments lies in favour of the appellants. However on the second important issue -

whether the document explicitly or implicitly teaches the person skilled in the art to apply pressure to each lamination to bond it to the stack being formed - the scales tip back towards the respondent.

There is no dispute between the parties that the basic idea underlying document D12, namely the production of a three-dimensional object by building this up from laminations corresponding to a succession of sections taken through the object at spaced intervals, is the same as that utilised in the claimed invention.

In the introductory description of document D12 it is made clear that this underlying idea is not new in itself and the stated purpose of the invention presented in the document is to provide an efficient and economical arrangement for producing the laminations ("planar elements") for the construction of the three-dimensional objects. To this end a laser cutter cuts the required contour of a lamination into a strip of material, leaving some connecting tabs between the lamination and the body of the strip. Thereafter the strip is forwarded to a second cutting station and a blank is cut from the strip which includes the lamination and surrounding parts of the strip. These surrounding parts of the strip have been provided before the first cutting station with registration holes to facilitate accurate stacking of the blanks (and hence laminations) once they have been separated from the strip. The various cutting operations and movement of the strip through the apparatus is controlled by a computer. Although document D12 is principally concerned with the formation of the individual laminations, its disclosure clearly goes

beyond that. In particular, it is explained in column 2, line 67 to column 3, line 16 how adhesive is applied to selected areas of the lamination and surrounding strip material between the two cutting stations and in column 4, lines 51 to 62, it is explained how the blanks cut from the strip are stacked in proper alignment with each other by virtue of rods passing through the registration holes in them. In this second passage it is stated that after removal of the surrounding strip material of the blank the contoured laminations are all attached to neighbouring laminations by adhesive, so that a solid rigid structure is obtained. This structure is shown in Figure 6.

Nevertheless, the respondent seeks to draw a distinction between the subject-matter of his independent claims and the disclosure of document D12 which hinges on the meaning to be given to the terms "integral" or "integrally bonding" in those claims. The respondent argues that his invention gives a product which is already "integral" at the end of the stacking of the laminations and does not therefore require any further bonding operation, for example the in-stack pressure bonding taught by document D3. He adopts this line of argument despite the fact that the patent specification contains embodiments where a subsequent in-stack bonding operation is taught as being necessary to give the final product. Nevertheless at the oral proceedings before the Board the respondent offered to bring the description of the patent specification into alignment with the interpretation of the claims he was seeking, if the Board were to find in his favour on the basis of that interpretation. Since this approach



seemed expedient it was the one which was adopted. The question is therefore whether the product of the method and apparatus disclosed in document D12 can be considered as an integral three-dimensional object with integrally bonded laminations in the sense argued by the respondent. In the opinion of the Board that question must be answered in the affirmative. Document D12 states unambiguously in column 4, lines 60 to 62, that in the stack of laminations as shown in Figure 6 the laminations are attached to each other by adhesive to give a "solid, rigid structure". The only plausible understanding of that passage is that the structure created by the stacking of the laminations does not require any further bonding operation to be applied to it and that it is already "integral" in the argued sense. There is nothing in document D12 which could suggest to the person skilled in the art that some such further bonding operation might be necessary nor is there any objective reason for him to believe this to be the case.

On this first major aspect of the comparison between the claimed subject-matter and the disclosure of document D12 the Board therefore concludes that the view of the appellants prevails. It is however different with the second major aspect. Although the document indeed refers in Figure 1 to the second cutting station at which the blank is removed from the strip as a "shear and press station", the use of the term "press" cannot unequivocally be interpreted as meaning that the station is responsible for pressing the blanks including the contoured laminations against the top of the stack as this is built up. The term "press" has a broad ambit, as indicated by the passage

at column 3, lines 23 and 24, of document D12 which refers to the blank having been "punched or pressed" out of the strip material, thus giving a different reference point as to why the designation of the relevant processing station includes the term "press". Furthermore, no other indication is to be found in document D12 that this processing station includes means for applying pressure to each lamination as it is added to the stack and before the next lamination arrives.

Thus without any need at this stage to refer to the other features which the respondent sees as distinguishing his invention from the prior art the Board is satisfied on the basis of the above consideration that the subject-matter of claims 1 and 12 is novel. It is now therefore necessary to address the feature of sequential bonding of the laminations by the application of pressure from the point of view of inventive step. Here the Board cannot agree with the respondent that the provision of means for applying pressure to each lamination to ensure that it is properly bonding to the underlying lamination in the stack is something which goes beyond the routine considerations of the person skilled in the art on the basis of his common general knowledge as witnessed by for example documents D6 and D10, both of which relate to a method of forming solid bodies by sequentially adhesively bonding together a set of laminations of varying contour.

Since in the opinion of the Board the main distinguishing features relied upon by the respondent are either non-existent or do not involve an inventive

step, it is necessary to consider the status of the other features which the respondent sees as separating his invention from the state of the art.

The first of these is the requirement of claim 1 that the computer is "operable to generate data defining a series of planar shapes" whereas according to document D12 the computer, in the opinion of the respondent, merely supplies signals to the laser cutter to move this around the required cutting contour. The respondent therefore argues that the computer only stores data defining a series of planar shapes but does not "generate" it. At best the Board can see here little more than a purely semantic distinction. In any case it is not in dispute that at the relevant priority date of the contested patent software for computer assisted designing (CAD) was commercially available which could equip a general purpose computer to generate the required data from information concerning the solid object to be produced, see for example document D3. Thus nothing of inventive significance can be seen in providing the computer of document D12 with such software.

The second further feature relied upon by the respondent is the fact that according to document D12 the adhesive is only applied to the sheet-like material after this has passed the cutting station where the contoured laminations have been formed whereas, they argue, the claims require this cutting or forming operation to be performed on a "bimaterial". It is however clear from column 7, lines 26 to 31 that the term "bimaterial" is intended to extend to a sheet-like material which is only provided with a thin layer of

adhesive once it has left the storage station. To this extent therefore it is apparent that the claims do not exclude the possibility of the "bimaterial" being formed during the course of the sheet-like material through the apparatus or as the method proceeds. Nevertheless the Board can agree with the respondent that a fair reading of claims 1 and 12 in the light of the patent specification indicates that the bimaterial is in existence before the contoured laminations are formed. However, the Board cannot see how an inventive step can be justified on the basis of this distinguishing feature since the modification in question is a design option freely available to the person skilled in the art which has no bearing on the fundamental principles of operation of the claimed apparatus and method, nor for that matter any clearly discernible advantages.

Having regard to the above the Board therefore comes to the conclusion that the subject-matter of claims 1 and 12 as upheld by the Opposition Division lacks inventive step. Claim 1 of the auxiliary request of the respondent corresponds to that previously mentioned claim 1, so for this reason alone the auxiliary request must fail. In any case, the subject-matter of claim 12 of the auxiliary request, which claim has been amended by reference to the apparatus features of claim 1, also lacks inventive step for the reasons explained above.

## **Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

S. Fabiani

F. Gumbel