Case Number: T 0710/92 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 11 October 1995

Appellant: KANEGAFUCHI KAGAKU KOGYO KABUSHIKI KAISHA
2-4 Nakanoshima 3-chome
Kita-ku
Osaka-shi
Osaka-fu 530 (JP)

Representative: VOSSIUS & PARTNER
Postfach 86 07 67
D-81634 München (DE)

Decision under appeal: **Decision of the Examining Division of the European Patent Office of 26 February 1992, issued on 9 March 1992 refusing European patent application No. 84 115 031.1 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: F. Antony
Members: B. ter Laan
J. Stephens-Ofner

Summary of Facts and Submissions

I. European patent application No. 84 115 031.1, filed on 10 December 1984, claiming priority of 10 February 1984 from an earlier application in Japan (23716/84), and published on 4 September 1985 under publication No. 0 153 464, was refused by a decision of the Examining Division of the European Patent Office delivered orally on 26 February 1992 and issued in writing on 9 March 1992.

The decision was based on a set of three claims, i.e. Claim 1 filed on 12 February 1990 and Claims 2 and 3 filed on 22 May 1989. Claim 1 read as follows:

"A method of ageing an expansion-molded body of a polyolefin resin prepared by heating pre-expanded polyolefin resin particles filled in a mold, characterized by filling into the mold the pre-expanded polyolefin resin particles having a peak expansion rate at pre-expansion of less than 1.3 times the expansion rate of particles to be filled into the mold, the internal pressure of said particles being substantially equal to atmospheric pressure, cooling the expansion-molded body in the mold, after expansion-molding, removing the expansion-molded body from the mold, placing the expansion-molded body into an atmosphere having a temperature of 25 to 55EC below the melting point of the polyolefin resin while the volume of the expansion-molded body is 70 to 110% relative to the volume of the mold cavity, and equilibrating the temperature of the expansion-molded body with the temperature of the atmosphere."

Claims 2 and 3 were dependent and referred to preferred embodiments of the method of Claim 1.

II. The reason given for refusal was lack of inventive step of the subject-matter as defined in Claims 1 to 3. The Examining Division held that EP-A-0 084 803 (D1), which was considered to be the closest prior art document, described all elements of Claim 1, except the ratio of the peak expansion rate of the beads at pre-expansion to the expansion rate of the beads at packing into the mould. According to D1 this ratio (hereinafter referred to as "expansion ratio") should lie between 1.3 and 3, whereas the application in suit claimed a ratio below 1.3, which characteristic had been introduced by way of disclaimer in order to distinguish the claimed subject-matter from D1. According to the teaching of D1 the ageing process was not directly linked to the use of particles having an expansion ratio of 1.3 to 3, as D1 also envisaged the use of particles with an expansion ratio of less than 1.3, albeit with the use of an additional supply of moulding gas (page 5, lines 6 to 10). In addition, no technical problem seemed to be solved by the use of particles with an expansion ratio of below 1.3. Since the ageing treatment as disclosed in D1 could therefore be expected to have the same results if applied to other pre-expanded beads than those of D1, the claimed subject matter was considered obvious.

III. On 18 May 1992 a Notice of Appeal was lodged against that decision, together with payment of the prescribed fee. In the Statement of Grounds of Appeal, which was filed on 20 July 1992, the Appellant argued in essence that D1 referred to an ageing process for particles having an

expansion ratio of 1.3 to 3 only. It virtually excluded the use of beads having an expansion ratio of less than 1.3, as this would require the supply of additional moulding gas. The present invention made it possible to omit the additional gas supply when moulding the latter beads, which resulted in a much simpler process, which was cheaper and improved in productivity. The invention process was not made obvious by D1 as the latter contained no hint as to the application of the ageing treatment described in its Example 2, Runs 3 and 4, even if falling within the claimed temperature limits, to particles having an expansion ratio of less than 1.3, without the supply of additional moulding gas.

IV. By a communication dated 17 May 1995, which accompanied the summons to oral proceedings to be held on 11 October 1995, the Appellant was informed of the preliminary opinion of the Board. For filing further written submissions, including new citations and/or alternative claims to be considered during oral proceedings, a time limit of up to one month before the oral proceedings was set.

V. In response, by a letter filed on 11 September 1995, the Appellant argued that the state of the art before the priority date of the application in suit, regarding the production of foamed polyolefin articles, required the supply of additional moulding gas. Two further documents were referred to:

D2: EP-A-0 072 499, and

D3: GB-A-1 445 474.

Further arguments were submitted by a letter dated 6 October 1995, received on 10 October 1995, one day before the oral proceedings.

VI. During oral proceedings the Appellant filed four sets of three claims each, to be considered as main request and three auxiliary requests. Claim 1 of the main request, from which the disclaimer as present in Claim 1 as refused was deleted, reads:

"A method of ageing an expansion-molded body of a polyolefin resin prepared by heating pre-expanded polyolefin resin particles filled in a mold, **characterized by** a) filling into the mold the pre-expanded polyolefin resin particles, the internal pressure of said particles being substantially equal to atmospheric pressure; b) expansion-molding; c) cooling the expansion-molded body in the mold; d) removing the expansion-molded body from the mold; e) placing the expansion-molded body into an atmosphere having a temperature of 25 to 55EC below the melting point of the polyolefin resin while the volume of the expansion-molded body is 70 to 110% relative to the volume of the mold cavity; and f) equilibrating the temperature of the expansion-molded body with the temperature of the atmosphere."

Claim 1 of auxiliary request "1" differs from the main request in that step e) should be carried out within 10 minutes after step d). In Claim 1 of auxiliary request "2" the disclaimer regarding the expansion ratio is re-introduced but no requirement as to the starting time of the ageing is present, so that this claim, apart from some

editorial amendments, is substantially the same as Claim 1 as refused. Claim 1 of auxiliary request "3" contains both the time requirement of auxiliary request "1" and the disclaimer of auxiliary request "2".

Claims 2 and 3 of all requests, which are similar to Claims 2 and 3 as refused, are dependent and refer to preferred embodiments of the methods of Claims 1.

The Appellant further argued, along the lines of the letter filed on 10 October 1995, that the ageing process described in D1 was started 12 hours after removal of the expansion-moulded article from the mould cavity, whereas, according to the present invention, ageing should begin much earlier: within 10 minutes after removal from the mould. The early start of ageing was reflected in the requirement that the volume of the expansion-moulded body should be 70 to 110% of the volume of the mould cavity when the expansion-moulded body is placed in to the ageing atmosphere so that the requirement that step e) should start within 10 minutes after step d) was in fact superfluous. This early onset of ageing resulted in an improved appearance as articles having sufficient shrinkage without wrinkles were obtained, and also in a shorter production time as the final form of the moulded product was attained quicker than in D1.

VII. The Appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the main request filed during the oral proceedings on 11 October 1995 or, alternatively, on the basis of one of the auxiliary requests "1" to "3" filed at the same time.

Reasons for the Decision

1. The appeal is admissible.

Procedural matters

2. In the communication of 17 May 1995, accompanying the summons to oral proceedings to be held on 11 October 1995, the Appellant was explicitly informed that any further written submissions, in particular alternative claims to be considered during oral proceedings, should be filed one month before the oral proceedings at the latest.

2.1 On 11 September 1995 the Appellant filed two documents (D2 and D3, see point VI above) which up to then had not been on file. Although it was indicated that these documents demonstrated the necessity of adding moulding gas in expansion-moulding processes, no indication of any relevant passages was given. The Board did not explicitly exclude these late filed documents, but they have not been referred to during oral proceedings. Therefore, these documents are hereby disregarded (Article 114(2) EPC).

2.2 During oral proceedings the Appellant also filed four sets of claims, one of which (auxiliary request "2") corresponded essentially to the claims upon which the decision under appeal had been based. The other three sets of claims (main request and auxiliary requests "1" and "3") are therefore to be considered as alternative claims, filed at a very late stage. According to established EPO jurisprudence (T 153/85, OJ EPO 1988, 1, and T 51/90, T 270/90 and T 241/92, not published in OJ EPO), such late

filed claims may be disregarded by the Board if they are not clearly allowable. Therefore, in order to decide upon the admission of the three requests submitted late in the proceedings, the question of their "clear" allowability needs first to be dealt with.

2.3 Starting with the new claims according to the main request, Claim 1, which would be allowable as regards Article 123(2) EPC, basically corresponds to a claim that had been considered during the examination proceedings and which the Examining Division had found to be not novel over D1. The Board concurs with this view (see point 4 below). Also, even if novelty could be established, the Board has considerable doubts as regards the presence of an inventive step (see point 6 below). It follows that these claims are not clearly allowable.

2.4 Compared with Claim 1 of the main request, Claim 1 of auxiliary request "1" contains the additional requirement that ageing should begin within 10 minutes after removal of the expansion-moulded body from the mould. The Board considers this claim allowable as regards Article 123(2) EPC (see page 6, lines 5 to 8 of the description as originally filed) and also as regards Article 54 EPC. However, the Board has considerable doubts as regards the presence of an inventive step. In particular, concerning the problem to be solved by the measures defined in Claim 1 of auxiliary request "1", in the absence of appropriate evidence, the Board is not convinced that the appearance of the expansion-moulded products is indeed improved; moreover, the Board is equally unconvinced that a shorter time than in D1 is needed for the expansion-moulded body to

attain its final form. In addition, even if a shorter production time would have been convincingly demonstrated, the inventiveness of shortening the time between removal from the mould and starting the ageing treatment is not immediately clear. Even if the problem were to be reformulated on a less ambitious basis as the definition of an alternative method for expansion-moulding, the Board cannot **prima facie** see any inventive step in a delay of up to 10 minutes between removal from the mould and starting the ageing treatment. Therefore, the claims of auxiliary request "1" are again not clearly allowable.

2.5 Claim 1 of auxiliary request "3" is the same as that of auxiliary request "1", with the additional requirement, by way of disclaimer, that the pre-expanded beads should have an expansion ratio below 1.3. As stated under point 2.4 above, the subject matter of Claim 1 of auxiliary request "1" is novel so that an additional disclaimer would not serve to establish the novelty of the claim. Hence the disclaimer is not allowable under Article 123(2) EPC (T 4/80, OJ EPO 1982, 149 and T 433/86 dated 11 December 1987, not published in OJ EPO). Moreover, for the same reasons as given for auxiliary request "1" (point 2.4 above), the Board has considerable doubts that the claimed subject matter is inventive.

2.6 In view of the above, the Board concludes that none of the claims of the main request and of auxiliary requests "1" and "3" is clearly allowable and therefore refuses to admit these claims into the proceedings. As a consequence, the claims of auxiliary request "2", which correspond essentially to the claims upon which the decision under

appeal is based, is the only set of claims to be considered.

Article 123(2) EPC

3. Claim 1 has been restricted as regards the expansion ratio of the particles to be used in the claimed process, so that these are now required to have a peak expansion rate of less than 1.3 times the expansion rate at packing into the mould. This amendment did not give rise to any objections from the Examining Division and the Board sees no reason to decide otherwise (T 4/80, OJ EPO 1982, 149 and T 433/86 dated 11 December 1987, not published in OJ EPO). See also point 4.2 below.

Novelty

4. D1 describes a process for preparing a polyolefin foam by heat-moulding pre-expanded beads of an expandable polyolefin resin containing a foaming agent in a mould, which beads have a peak expansion rate at pre-expansion of 1.3 to 3 times the expansion rate of particles to be filled into the mould, adjusting the beads to a desired pre-expansion rate, and packing and moulding the pre-expanded beads without further addition to the expandability thereof (Claim 1). According to the examples, after moulding, the expansion-moulded body is cooled in the mould and then removed from the mould, so that all the presently claimed process features as defined in steps a), b), c) and d) are clearly disclosed.

4.1 As regards process step f), the Board assumed and indicated its assumption to the Appellant, that 4 hours of ageing, as disclosed in the invention examples and also in D1, Example 2, is sufficient to reach the temperature equilibrium now required. Since this assumption was not challenged by the Appellant, it is concluded that the features of present process step f) are also known from D1.

4.2 As regards step e), the Appellant argued that the requirement that the volume of the expansion-moulded body should be 70 to 110% of the volume of the mould cavity when the expansion-moulded body is placed into the ageing atmosphere, reflected an early start of the ageing treatment, which was not disclosed in D1. However, this argument cannot be accepted as Figure 10 of the application in suit shows that, after an initial shrinkage of below 70% of the volume of the mould cavity, the volume may re-expand to more than 70% of the mould cavity. In particular, Samples 1 and 3 fulfil the volume requirement in about 20 hours after removal from the mould. Therefore, the volume requirement cannot serve to define an early start of the ageing treatment. Moreover, Figure 1 of D1 discloses that at the start of the ageing treatment the expansion-moulded body has a volume of 82% of that of the mould cavity, so that the volume requirement does not constitute novelty.

Other features present in process step e) are the expansion ratio of the beads to be used in the process and the ageing step. In D1 comparative Example 1, particles with an expansion ratio of below 1.3 are used (1.10 and 1.25), but ageing takes place at room temperature, which is more than the now claimed upper limit of 55EC below the melting point

of the polyolefin. In D1, Example 2, Runs 3 and 4, the expansion-moulded body, after removal from the mould, is placed into an atmosphere having a temperature of 25 and 45EC, respectively, below the melting point of the polyolefin, during 4 to 10 hours. However, present Claim 1 and the disclosure of D1, Example 2, Runs 3 and 4, differ in the expansion ratio of the particles to be used for expansion-moulding. As this is the only difference present, it shows that the disclaimer is necessary in order to establish novelty.

4.3 In view of the above it is concluded that the subject-matter of Claim 1 is novel.

Inventive step

5. The subject-matter now being claimed has been restricted in the sense that the expansion ratio of the particles to be used for expansion-moulding has to be below 1.3. This restriction finds no basis in any disclosure of the invention as described in the original application, but is, instead, solely designed to delimit the disclosure of D1, in which particles having an expansion ratio of 1.3 to 3 are claimed. It is therefore in effect a disclaimer. Thus the above disclaimer was introduced to overcome anticipation by D1, and for this reason is allowable (see T 4/80, OJ EPO 1982, 149 and T 433/86 of 11 December 1987, not published in OJ EPO). See also point 4.2 above.

According to decisions T 170/87, OJ EPO 1989, 441 and T 597/92 of 1 March 1995 (not published in OJ EPO), a disclaimer cannot be allowed if it only serves to establish

an inventive step and, moreover, it cannot make an obvious teaching inventive (T 170/87 supra, point 8.4.4). The latter is also valid in case the disclaimer is introduced for novelty reasons, since the excision, in the form of a disclaimer, of part of a claim cannot change the content of the original teaching. Therefore, it has to be decided whether the subject-matter of Claim 1 to the extent it is supported by the original disclosure of the application in suit (not including the disclaimer) is obvious, and to that end it has first to be determined what is taught by the application as originally filed and whether that teaching is inventive.

6. The description and claims originally filed concern a method of curing or ageing expansion-moulded bodies of polyolefin. Such subject-matter is disclosed in D1 which the Board, like the Examining Division, regards as the closest state of the art.

6.1 According to the original description and claims, the aim of the invention is to define a treatment for expansion-moulded bodies in order to obtain in a short period of time an expansion-moulded body of polyolefin which is satisfactory in surface smoothness and adhesion of particles, and is less susceptible to sink shrinkage and shaped in close conformity to the shape of the mould (page 1, lines 5 to 12; page 3, line 23 to page 4, line 4).

6.2 According to the original description and claims, this problem is to be solved by placing the expansion-moulded body into an atmosphere having a temperature of 25 to 55EC

below the melting point of the polyolefin resin while the volume of the expansion-moulded body is 70 to 110 % relative to the volume of the mould cavity, and equilibrating the temperature of the expansion-moulded body with the temperature of the atmosphere. No indication that the expansion ratio would play any role at all, let alone a key role, is given. Also in view of description page 1, lines 5 to 20; page 3, line 23 to page 4, line 20; page 7, line 9 to page 8, line 12 and page 9, line 8 to page 10, line 11, the original teaching of the application in suit clearly considers only the effects of the ageing treatment and does not refer to the expansion ratio of the beads to be used for the production of the expansion-moulded body.

Unquestionably, the limitation by way of disclaimer that the particles used for expansion-moulding should have an expansion ratio of below 1.3, does not contribute anything to the original teaching of the application as a whole, including its claims, as the original teaching of the application in suit does not contain any information regarding the expansion ratio or any hint at a possible technical importance of the expansion ratio limit in the claimed process.

6.3 As regards the presence of an inventive step in the application in suit as originally filed, the examples in the application (Tables 1 to 10 on pages 16 to 19, 22 to 25 and 29 and 30) show that the various aspects of the above-defined problem (point 6.1) are **not** effectively solved by the measures taken according to the original claims of the application in suit. In particular, after 4 hours curing time, which the Board assumes to be sufficient for

"equilibrating the temperature of the expansion-moulded body with the temperature of the atmosphere", and which assumption has not been refuted by the Appellant, none of the exemplified expansion-moulded bodies has an acceptable sink shrinkage according to the definition given on page 15, line 20 to page 16, line 1 of the description, and in some cases even 24 hours curing time is not enough to give a satisfactory result (Table 1, Sample 6; Table 3, Sample 6; Table 6, Samples 4 and 7; Table 9, Sample 6; Table 10, Samples 4 and 7), in spite of the fact that all the requirements of the original claims are fulfilled. On the other hand, some of the comparative examples give excellent results (Table 2, Sample 8; Table 8, Sample 8), although not all the required features are present. From the examples it must therefore be concluded that the measures described and claimed in the application in suit as originally filed are not adequate to result in an acceptable, let alone an improved, sink shrinkage of expansion-moulded bodies or, in other words, to provide an expansion-moulded body with an acceptable appearance. That those measures would provide a quicker and simpler expansion-moulding process has also not been convincingly demonstrated because, as already indicated above (point 4) the required volume is not sufficient to indicate a short delay between removal from the mould and starting the ageing treatment.

6.4 In view of the above considerations the Board concludes that the expansion-moulding process of the application in suit as originally filed does not solve the problem as defined in the original description. Even if the technical problem underlying the original application would be

reformulated on a less ambitious basis as the definition of an alternative expansion-moulding process, the result would not be more favourable.

6.5 D1, in particular Example 2, Runs 3 and 4, and Figure 1, teaches that applying to expansion-moulded polyolefin bodies an ageing treatment at temperatures of 45 and 25EC below the melting point of the polyolefin resin, greatly improves the sink shrinkage of the product so treated. The explicit teaching of D1 refers to expansion-moulded bodies made of beads having an expansion ratio of 1.3 to 3, but, as demonstrated above (point 6.2), these are included by the original teaching of the application in suit and hence cannot constitute any (inventive) distinguishing feature between the teachings of D1 and the application in suit. Moreover, the possibility of using beads having lower expansion ratios is also mentioned in D1, in comparative Example 1, Runs 1 and 2.

In view of the teaching of D1, it would therefore be obvious for the skilled person to apply the ageing treatment as defined in the original application to expansion-moulded bodies made from beads having **any** expansion ratio and hence the teaching of the application as originally filed is not inventive.

7. It follows from the above that the subject-matter of present Claim 1 as far as this is supported by the original application (i.e. without taking the disclaimer into account) is equally non-inventive. If the disclaimer would be taken into account in deciding inventive step, the purpose of this would, in effect, admit of the possibility

of its conferring an inventive step - contrary to the jurisprudence of the Boards of Appeal (see point 5 above). Claim 1 accordingly cannot be allowed.

8. The dependent claims, constituting part of the same request, must share the fate of Claim 1. Also, the Board cannot recognise any inventive subject-matter in them.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:The Chairman:

E. Görgmaier F. Antony