

**Internal distribution code:**

- (A) [ ] Publication in OJ  
(B) [ ] To Chairmen and Members  
(C) [X] To Chairmen

**D E C I S I O N**  
**of 2 February 1995**

**Case Number:** T 0415/92 3.3.3

**Application Number:** 83112788.1

**Publication Number:** 0113903

**IPC:** C08J 9/18

**Language of the proceedings:** EN

**Title of invention:**

Process for producing prefoamed polymer particles

**Patentee:**

Japan Styrene Paper Corporation

**Opponent:**

Hüls Aktiengesellschaft

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step (affirmed) - no hint of solution to relevant technical problem"

"No 'one-way street'"

"Option chosen least likely to succeed"

**Decisions cited:**

T 0002/83

**Catchword:**

-



Case Number: T 0415/92 - 3.3.3

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.3  
of 2 February 1995

**Appellant:**  
(Proprietor of the patent) Japan Styrene Paper Corporation  
1-1, 2-chome  
Uchisaiwai-cho  
Chiyoda-ku  
Tokyo (JP)

**Representative:** DIEHL GLÄSER HILTL & PARTNER  
Patentanwälte  
Postfach 19 03 65  
D-80603 München (DE)

**Respondent:**  
(Opponent 02) Hüls Aktiengesellschaft  
Patentabteilung/PB 15  
D-45764 Marl (DE)

**Representative:**

**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office dated 3 December 1991,  
issued in writing on 3 April 1992 revoking  
European patent No. 0 113 903 pursuant to  
Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** C. Gérardin  
**Members:** R. Young  
M. K. S. Aúz Castro

### Summary of Facts and Submissions

- I. The grant of European patent No. 0 113 903, with ten claims, in respect of European patent application No. 83 112 788.1, filed on 19 December 1983 and claiming priorities of 20 December 1982 (JP 221936/82), 7 January 1983 (JP 976/83) and 4 May 1983 (JP 78668/83) was mentioned on 6 September 1989 (cf. Bulletin 89/36). Claim 1 read as follows:

"A process for producing prefoamed polymer particles comprising the steps of impregnating a blowing agent in polymer particles, dispersing the polymer particles into a dispersion medium in a sealed vessel, heating the polymer particles to a temperature higher than the softening point of said polymer particles, as well as opening one end of said vessel, and simultaneously releasing the polymer particles and dispersion medium from inside the vessel to an atmosphere held at a pressure lower than that of the vessel characterized by

- (a) using polymer particles consisting of a cross-linked low density polyethylene, a cross-linked linear low-density polyethylene, or an ethylene-propylene random copolymer,
- (b) using carbon dioxide as the blowing agent, and
- (c) using a dispersant in the dispersion medium."

Dependent Claims 2 to 10 were directed to elaborations of the process of Claim 1, Claim 3 in particular being directed to

"A process according to Claim 1, wherein additionally a volatile blowing agent is used."

II. Two Notices of Opposition were filed on 11 April 1990 (OI) and 26 May 1990 (OII), respectively, on the ground of lack of inventive step. One of the oppositions (OI) additionally raised the ground of insufficiency of disclosure.

The oppositions were supported inter alia by the documents:

D1: EP-A-0 053 333;  
D2: DE-A-2 448 181;  
D3: EP-A-0 041 380;  
D4: GB-A-1 262 889;  
D5: JP-A-55 045714 (considered as English translation);  
and  
D6: DE-A-2 155 775.

III. By a decision which was given at the end of oral proceedings held on 3 December 1991 and issued in writing on 3 April 1992, the Opposition Division revoked the patent.

According to the decision, the sole difference between the claimed subject-matter and the closest state of the art document D1 was in the volatile blowing agent. This was carbon dioxide, rather the known toxic organic agent. A solution to the technical problem of replacing the latter was, however, taught by D2. According to this document, a thermoplastic foam could be produced by the use of carbon dioxide as a safe, non-toxic blowing agent. Consequently, the requirements of Article 56 EPC were not met.

IV. On 30 April 1992 a Notice of Appeal against the above decision was filed, together with payment of the prescribed fee.

In the Statement of Grounds of Appeal filed on 12 August 1992 and a subsequent submission filed on 17 August 1993, the Appellant (Patentee) argued in substance as follows:

(i) The prefoamed particles produced according to the patent in suit were an intermediate product having all the properties (state of the particles; state of the cells) necessary for further processing in a mould, and had advantages over those of the closest state of the art (D1). In the embodiment using carbon dioxide alone, an increased uniformity of expansion ratio was obtained, whereas, in the preferred embodiment with combined use of carbon dioxide and a volatile blowing agent, there was also an enhancement of the expansion ratio and an improved uniformity of cell size as well as an absence of particle shrinkage, deformation and roughness, all of which was demonstrated by the examples. Furthermore, the use of carbon dioxide as a blowing agent provided high security for both personnel and the environment (Statement of Grounds of Appeal, para. 2, 4 and 5; submission of 17 August 1993, pages 5 and 10).

(ii) D2 related to a completely different kind of process, since a polymer mass was foamed, without the use of a dispersion medium, in an extruder, a nucleating agent additionally being necessary. The result was not a prefoamed particle, but a foam for use as an end product. This was not taught as having the required cell quality or uniformity for further moulding

(Statement of Grounds of Appeal, para. 4; submission filed on 17 August 1993, pages 11, 12).

- (iii) The denial of the workability of the process, on the basis that the carbon dioxide would dissolve preferentially in the dispersion medium (Statement of Grounds of Opposition, OI, filed on 11 April 1990) was itself evidence for the non-obviousness of the claimed process. The unsuccessful repetition of Examples 1 to 3 was not reported in sufficient detail. If the examples of the patent in suit had been followed precisely, the result would have been the same (cf. Appellant's submission of 17 August 1993, page 8, para. 6, and page 14, penultimate para., read in the context of the submission of 6 December 1990, page 2, para. 2).
- (iv) As to the report of the comparative experiments filed on 27 November 1991 by the Respondent (OII), it was not understood why the same results had not been obtained (cf. submission filed on 17 August 1993, page 14, last para.).

V. The Respondents (OI, OII), argued essentially as follows:

- (i) It was of no significance whether the products were termed "intermediate products" or "end products", since the products of extrusion were often chopped and then further processed (Counterstatements filed on 18 December 1992, page 2, and on 24 December 1992, passage bridging pages 1 and 2).

(ii) As regards the presence of a nucleating agent, this was not excluded by Claim 1 of the patent in suit. The acceptance of a disadvantage contingent on omission of an advantageous feature could not be inventive (Counterstatement filed on 18 December 1992, page 2).

(iii) The results of the experimental report filed by the Respondent OII on 27 November 1991 showed that there were no advantages in terms of expansion ratio obtainable by the claimed measures; indeed rather the contrary. Consequently, the only problem which could be said not already to have been solved by the closest state of the art was that of providing an environmentally safe process (Counterstatement filed on 18 December 1992, page 1, "Zu 2:" and pages 4 to 6).

(iv) The essential teaching, namely that carbon dioxide could be used just as well as a volatile organic blowing agent, was to be found in D3, D4 and D5. Furthermore, D2 showed that LDPE (low density polyethylene) and PP (polypropylene) in the solid state absorbed gases. In both the extrusion and dispersion processes, the blowing agent was dissolved under pressure in the softened polymer and then released.

Consequently, it was obvious to transfer the knowledge gained from the former process (D2) to the latter (D1) (Counterstatement filed on 18 December 1992, page 2, last para., and page 6, pre-penultimate para.).

- (v) It would furthermore have been obvious to improve the dry impregnation process according to D2 by applying the conditions of D6, in which the dispersion medium, as a rule water, was responsible for the foaming (Counterstatement filed on 18 December 1992, page 5, penultimate para.; page 6, pre-penultimate para.).
  
- (vi) Far from there being a prejudice in the mind of the skilled person against the use of carbon dioxide as blowing agent, there was a "one way street" leading to its use. Consequently, even if any additional effects were found to be achieved using carbon dioxide (which was, however, denied), these could not be regarded as conferring inventive activity (cf. Counterstatement filed on 18 December 1992, page 6, last para.).
  
- (vii) The examples in the patent in suit were, in the light of the experimental report filed on 27 November 1991, and of the failure of the Respondent (OI) to obtain the expansion ratios reported in Examples 1 to 3, implausible, either because the data were incorrect, or because of insufficiency of disclosure (Counterstatements filed on 18 December 1992, pages 4, 5 and 24 December 1992, page 3).

VI. With the submission of 17 August 1993, the Appellant filed an amended set of Claims 1 to 9 forming an auxiliary request.

VII. The Respondent (OI) withdrew its opposition with a submission filed on 25 February 1994.



- VIII. Oral proceedings were held before the Board on 2 February 1995. During the proceedings, the Appellant filed a further set of Claims 1 to 7 forming the basis of a second auxiliary request.
- IX. The Appellant requests that the decision under appeal be set aside and, as main request, that the patent be maintained as granted, or, as first auxiliary request, that the patent be maintained on the basis of Claims 1 to 9 filed on 17 August 1993, or, as second auxiliary request, on the basis of Claims 1 to 7 filed during oral proceedings, and in the case of the auxiliary requests, a description yet to be adapted.

The Respondent requests that the appeal be dismissed.

#### Reasons for the Decision

1. The appeal is admissible.
2. *Main request*

The patent in suit relates to a process for preparing prefoamed polymer particles comprising the steps of impregnating a blowing agent in polymer particles, dispersing the polymer particles into a dispersion medium in a sealed vessel, heating the polymer particles to a temperature higher than the softening point of said polymer particles, as well as opening one end of said vessel, and simultaneously releasing the polymer particles and dispersion medium from inside the vessel to an atmosphere held at a pressure lower than that of the vessel. The polymer particles can consist inter alia of an ethylene-propylene random copolymer and a dispersant may be used in the dispersion medium.

Such a process is, however, known from the closest state of the art document D1.

- 2.1 According to D1, a volatile blowing agent is used, which may be a hydrocarbon, e.g. propane, butane, pentane, hexane, heptane, cyclobutane, or cyclopentane; or a halogenated hydrocarbon e.g. trichlorofluoromethane, dichlorodifluoromethane, dichlorotetrafluoroethane, methyl chloride, ethyl chloride or methylene chloride. It may be added in amounts of 10 to 40 wt% of the resin (pages 3, 4).

The contents of the vessel are released while maintaining the pressure of the inside of the vessel higher than the vapour pressure of the blowing agent, the latter not necessarily coinciding with the vapour pressure of the blowing agent which exists alone, but varying depending on the affinity of the blowing agent with the resin particles and the content as well as the types and combinations of the blowing agent; it cannot be generalized (page 4, last para. to page 5, first para.).

In an Example, 100 pbw of ethylene/propylene random copolymer particles, 23 pbw of dichlorodifluoromethane, 2 pbw of basic magnesium carbonate and 250 pbw of water are heated with stirring and maintained for 0.5 h at a temperature of 137°C, and, while maintaining the pressure of the inside of the vessel at about 30 kg/cm<sup>2</sup>.G, one end of the vessel is opened to release the contents into the atmosphere. After the pre-foamed particles have been dried, they are left to stand for 50 h at room temperature and atmospheric pressure, and then for 50 h at 20°C and under an air pressure of 2 kg/cm<sup>2</sup>.G, after which they are filled in a mould and moulded under a steam pressure of 2 kg/cm<sup>2</sup>.G.

2.2 Compared with this state of the art, the relevant technical problem objectively arising is to be seen in the provision of prefoamed polymer particles of narrower distribution of expansion ratio (improved cell uniformity).

The solution proposed according to Claim 1 of the main request is to combine or replace the volatile blowing agent with carbon dioxide.

2.3 Although the Board considered including the environmental and safety aspects, which are discussed in the introduction of the patent specification and played a major role in the Appellant's submissions, in the statement of technical problem (cf. section IV (i), last sentence, above), it has not done so for two reasons.

2.3.1 Firstly, the patent in suit aims not only at a narrow distribution of apparent expansion ratio, which is shown to be achieved, in Examples 1 to 3, by the use of carbon dioxide alone (cf. page 5, Table 1), but also at a further enhancement of that expansion ratio based on a synergistic effect resulting from the combined use of carbon dioxide and a conventional blowing agent (cf. patent in suit, Table 3). There was no evidence, however, that this preferred embodiment involved a significantly reduced release of fluorocarbon blowing agent into the atmosphere. On the contrary, as can be seen from the description of the patent in suit, the amount of the volatile blowing agent can be up to 800% of the carbon dioxide used (page 3, lines 45 to 50).

Consequently, even if following the Appellant's approach, the environmental aspect had been made part of the technical problem underlying the patent in suit, it

could not have been regarded as plausibly solved and, therefore, could not have been considered for the assessment of inventive step.

- 2.3.2 Secondly, as regards the safety aspect, this was concerned primarily with the fire hazard arising from the use, as blowing agent, of a hydrocarbon such as butane. The disclosure of D1 is not, however, limited to such flammable blowing agents, but on the contrary exemplifies dichlorodifluoromethane, which is not flammable.

Consequently, the fire hazard aspect has already been solved according to the disclosure of D1, and thus cannot form part of the technical problem arising from it.

- 2.4 The evidence provided by the Respondent (cf. experimental report filed on 27 November 1991), according to which the enhanced expansion ratio, cell uniformity and shape advantages were not obtained when repeating the procedure exemplified in the patent in suit (cf. submission filed on 18 December 1992, page 4, third para.) is not persuasive to the Board for the following reasons:

- 2.4.1 Although the conditions of the experiment are stated to correspond exactly to those of Example 1 of the patent in suit, a comparison of the two procedures shows the following:

(Example 1 of patent vs. Experiment of Respondent):

- (i) capacity of the autoclave: 2 100 cc vs. 5 000 cc;
- (ii) polymer: ethylene-propylene random copolymer (ethylene content: 3 wt%) vs. the same;
- (iii) amount of polymer particles: 300 g vs. 500 g;

- (iv) amount of water: 1350 cc vs. 2 500 cc;
- (v) dispersant: 1 g alumina vs. 5 g tricalcium phosphate and 1 g sodium alkylbenzenesulphonate;
- (vi) amount of blowing agent: 30g=10% vs. 42.5g=8.5%;
- (vii) impregnation time: 60 min. vs. 30 min.;
- (viii) residual volume in autoclave: 20% vs. 40%;
- (ix) impregnation temperature: 145° vs. 144°C.

Thus, of the conditions applied, only the polymer particles themselves and the impregnation temperature are the same in both cases.

2.4.2 In this connection, the fact that an autoclave having a capacity of 2 100 cc was not available, as argued by the Respondent during oral proceedings, was not an obstacle to an accurate reproduction of Examples 1 to 3 of the patent in suit. In particular, it would not justify major changes, such as (a) other proportions of the ingredients, (b) use of another dispersant and (c) limitation of the impregnation time. Whilst it may be that the Respondent was more used to work with one dispersant than another, which might account for discrepancy (b), there is no apparent reason for discrepancies (a) and (c), which are not related to the products or the costs of the comparative test, but to experimental conditions chosen by the Respondent.

2.4.3 Furthermore, although the effects of the divergencies of the Respondent's experiment cannot be quantified, it is evident that they involve the impregnation of a more dilute dispersion of polymer particles with a larger free space above it for a shorter time with less carbon dioxide blowing agent.

- 2.4.4 It is, however, known that the success of dispersion processes for producing pre-foamed particles is significantly dependent upon the vapour pressure levels in the autoclave, in particular that of the blowing agent (cf. D1, Claim 4, and para. bridging pages 4, 5).
- 2.4.5 Furthermore, it is a requirement of experiments which aim at establishing that the promised result cannot be obtained that they be done expertly.
- 2.4.6 The presence of such a series of gratuitous divergencies - which the Representative of the Respondent himself admitted at the oral proceedings was less than desirable and which in any case tended in the direction of "starving" the polymer particles of carbon dioxide blowing agent - cannot be regarded as fulfilling the obligation of expert operation.

Consequently, the results cannot be regarded as credible evidence that the technical problem is not solved.

- 2.5 The reference in the Statement of Grounds of Opposition (OI) that a repetition of the teaching of Example 1 of the patent in suit had been unsuccessful contains no information at all about the manner in which the "repetition" was carried out.

It therefore amounts to an unsupported assertion and is even less suited to call into question the effectiveness of the proposed solution of the technical problem.

- 2.6 The examples of the patent in suit on the other hand convincingly show, in a comparison in which only the blowing agent is varied, an increased expansion ratio and an increased uniformity (narrower distribution) of that expansion ratio using carbon dioxide instead of a conventional volatile blowing agent such as butane or

dichlorodifluoromethane (cf. Examples 1 to 3, and page 5, Table 1). A further increase in expansion ratio of the particles as well as freedom from shrinkage and deformation and uniform cell size is observed in the embodiment in which carbon dioxide is combined with a conventional volatile organic blowing agent, as can be seen from Examples 9 to 16, and pages 9/10, Table 3.

2.7 In view of the above experimental results and since the experimental evidence provided by the Respondents is, for the reasons given above, unconvincing, it is plausible to the Board that the claimed measures provide an effective solution of the technical problem.

2.8 Since, furthermore, the allegation of insufficiency of disclosure is based on an alleged failure to achieve the promised results, the attack under Article 100(b) EPC must fail.

3. *Novelty*

There is no allegation of lack of novelty. Nor is the Board aware of any such lack of novelty.

Consequently, the claimed subject-matter is considered to be novel.

4. *Inventive step*

It is necessary to ask whether the skilled person, starting from D1, would have expected an enhancement of the uniformity of the expansion ratio of the prefoamed particles to be achieved by combining or replacing the volatile organic blowing agent with carbon dioxide.

- 4.1 There is no hint in this direction in D1 itself, since this refers only to the conventional volatile organic hydrocarbons and halogenated hydrocarbons as blowing agents.
- 4.2 A reference to the use of carbon dioxide as a foaming agent is, however, to be found in certain of the other documents cited.
- 4.3 According to D2, a synthetic material, such as PP, LDPE, or ethylene-vinyl acetate copolymer, containing a nucleating agent for foam formation is subjected, in solid form, to a pressurised gas at a higher pressure, and then at a lower, but still superatmospheric pressure, and extruded at this lower pressure to form a foam. The higher pressure is maintained until the polymer has taken up a quantity of gas corresponding to the equilibrium amount of the gas at the lower pressure (Claims 1, 4).

The gas is chosen with a view to maximising the quantity absorbed and the safety of the process. It may be carbon dioxide, a "Freon" gas such as  $\text{CCl}_2\text{F}_2$  or  $\text{CHCl}_2\text{F}$ , or nitrogen, though the latter is absorbed in lower quantities (pages 11, 12 and Fig. 1).

A foam promoting nucleating agent is added to produce small, homogeneous cells. It may be thermally decomposable in the extruder, e.g. azodicarbonamide, or thermally non-decomposable, e.g. talcum or powdered chalk (page 10).

According to Examples 1 and 2, the process may be used continuously to extrude a mantle insulation of constant capacity on a copper transmission cable.



4.3.1 There is no disclosure of pre-foamed particles capable of being further processed by moulding. Whilst it is true that the general aim of D2 is to obtain uniformity of foam expansion, there is no indication that the level achieved corresponds to that required in pre-foamed particles.

4.3.2 The argument of the Respondent, that such extrusion products were often comminuted and moulded was unsupported by any evidence. Indeed, the remoteness of the field of application (covering transmission cables) makes it rather unlikely that such an unrelated additional requirement would be fulfilled.

Consequently, there was, on the face of it, no reason for the skilled person to suppose that the information contained in D2 would be of assistance in obtaining an improved pre-foamed particle.

4.3.3 Notwithstanding the above, the process of D2 differs in a number of respects from the process of the closest state of the art (D1). The former involves the direct pressurization of a gas into a solid mass of polymer instead of impregnation of a dispersion of polymer particles in a liquid medium; the former passes the solid mass to an extruder for foaming whereas the latter maintains the polymer (which is not the same in each case) in the softened state; and the former depends on the presence of a nucleating agent in the polymer whereas the latter does not.

4.3.4 Thus, whereas the uptake of gas in the process of D2 is related to the pressure by a simple curve (cf. D2, Figs. 1 to 3), the vapour pressure of the blowing agent in the autoclave of D1 depends on various parameters and cannot be generalised (cf. D1, para. bridging pages 4 and 5).

Hence, any analogy between the processes of D2 and D1 cannot be pursued to the level of the manner of interaction of the blowing agent with the polymer, i.e. the level of the solution of the technical problem.

Consequently, even if the attention of the skilled person were to have fallen upon D2, there would have been no reason for supposing that the information it contained could be transferred usefully to the context of D1.

- 4.3.5 There is in any case no suggestion in D2 that the uniformity of expansion ratio of the foam depends particularly on the choice of gas used for foaming. On the contrary, the achievement of uniformity of foaming is taught as being dependent on having a sufficient quantity of nucleating agent present (cf. page 10, last sentence). Indeed, "Freon" and carbon dioxide are presented as being, on the whole, equally valuable for this purpose, "Freon", if anything, having the higher expansion ratio (cf. page 11, last para.; page 14, first para.).

Hence, the skilled person could not have derived any hint as to a special suitability of carbon dioxide for solving the technical problem.

- 4.4 The documents D3, D4 and D5 are similar in their thrust. They all disclose the use of an extruder for producing foams of polymers, using a nucleating agent and in the absence of a dispersion medium.

- 4.4.1 None, however, discloses the formation of pre-foamed particles nor a level of uniformity of expansion ratio commensurate with that achieved for this purpose according to the patent in suit. Indeed, the only document disclosing a direct measure of cell uniformity

is D3 (see Table 1) in which variations in cell diameter of a factor of two (100-200  $\mu\text{m}$ ) are considered good. This contrasts with the very much lower variation of expansion ratio disclosed in the examples of the patent in suit (cf. for example, Table 1).

Consequently, there is no evidence of suitability of the products of D3, D4 and D5 for the purposes of solving the technical problem.

- 4.4.2 The above documents furthermore do not associate uniformity of expansion ratio with the choice of a carbon dioxide blowing agent. On the contrary, carbon dioxide, nitrogen, oxygen, air, neon and argon are all presented as gases suitable for use as blowing agents (cf. D3, page 4; D5, page 4, first para.).

Consequently, the disclosures of D3, D4 and D5 do not, any more than that of D2, assist the skilled person to reach a solution of the stated problem.

- 4.5 The remaining document D6, although disclosing a dispersion process for producing pre-foamed particles, does not teach specifically impregnation with a blowing agent other than the dispersion medium (usually water) itself. The teaching requires, furthermore, that the process be carried out at a temperature below the polymer melting or softening point (D6, Claim 1 and page 8, last para.) so that crystallisation proceeds. This is in contrast to D1 and the patent in suit, which require a temperature above the softening point.

Thus, even if carbon dioxide were used as a blowing agent in the process of D6, the result would not fall under any claim of the patent in suit.

Consequently, none of the documents cited, whether taken alone or in combination, would lead the skilled person to the solution of the stated problem.

- 4.6 As regards the argument that the skilled person was in a "one way street" situation compelling the selection of carbon dioxide on the grounds of its non-toxic, non-explosive, non-corrosive, low cost nature and the fact that it did not attack the ozone layer (cf. submission of the Respondent OII, filed on 18 December 1992, page 6), this presupposes a statement of technical problem in which only environmental terms are present and which the Board was not prepared to accept (cf. section 2.3 etc., above).

Even considering the process purely in environmental terms, however, it would clearly be perfectly possible for the skilled person to experiment with mixtures of known volatile organic blowing agents which would be reduced both in level of flammability and in tendency to attack the ozone layer, without departing from the disclosure of D1. Furthermore, there are a number other blowing agents disclosed in D1, such as methylene chloride, which are neither flammable nor contain fluorine associated with hazards to the ozone layer. Finally, the documents D2-D5, which mention carbon dioxide, also mention other gases as blowing agents, such as nitrogen and air itself, which are at least equally non-toxic, non-explosive and cheap and also do not attack the ozone layer.

Thus there was no "one way street" compelling the choice of carbon dioxide in any case.

- 4.7 It only remains to ask whether, in spite of the above considerations, it was nevertheless in some other way "obvious to try" carbon dioxide as a possible blowing agent.

The relevant question in a situation where, as here, there is no inevitable "one way street" situation, but the skilled person is faced with a number of choices, is not whether the skilled person could have used carbon dioxide in combination with or replacement of the known volatile organic agents, but whether he would have done so in expectation of some improvement or advantage (T 0002/83, OJ EPO 1984, 265).

- 4.7.1 The principal difference between carbon dioxide and the other substances mentioned in the art as blowing agents lies in its relatively higher affinity for water. Indeed, according to the Statement of Grounds of Opposition (OI), filed on 11 April 1990, the affinity of carbon dioxide for water is substantially higher than for polymers, which would theoretically result in only a fraction of the applied carbon dioxide being effectively available as a blowing agent. This was offered as a hypothesis for non-workability of the claimed process.
- 4.7.2 The counterargument of the Respondent OII, based on a water/carbon dioxide solubility diagram (cf. submission filed on 28 February 1991, pages 2, 3) is irrelevant, since it does not relate to the more complex situation determining vapour pressures in the autoclave system which, as stated above, cannot be generalised (cf. D1, para. bridging pages 4, 5).

Thus the fact remains that one of the parties (who must be assumed to be in possession of the knowledge of the skilled person) was of the opinion that the process was unworkable as a result of the affinity of carbon dioxide for water.

- 4.7.3 This opinion was furthermore expressed after the fact, i.e. in the full knowledge of the disclosure of the patent in suit.

Consequently, it is not credible to the Board that the hypothetical skilled person, who by definition does not have the benefit of such foreknowledge, would have been more optimistic.

On the contrary, considering that all the other blowing agents listed have less affinity for water, it would have been reasonable to regard carbon dioxide as the option least likely to succeed as a blowing agent in the dispersion process.

- 4.8 In summary, therefore, it was not obvious to use carbon dioxide as a blowing agent in such a process.

5. Hence, the subject-matter of Claim 1 involves an inventive step. This conclusion applies a fortiori to the subject-matter forming the embodiment of Claim 3. Consequently, the remaining, dependent Claims 2 and 4 to 10 are equally directed to subject-matter involving an inventive step.

6. *Auxiliary request*

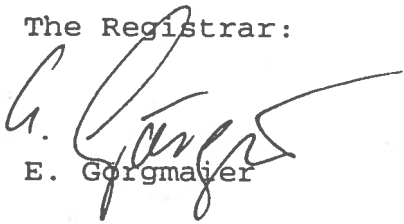
In view of the conclusions reached in respect of the claims of the main request, it is not necessary for the Board to consider the auxiliary requests further.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is maintained as granted.

The Registrar:

  
E. Gorgmaier

The Chairman:

  
C. Gérardin

10/11  
10.

