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D E C I S I O N
of 9 November 2004

Case Number: T 0230/03 - 3.2.5

Application Number: 88311260.9

Publication Number: 0321117

IPC: B29C 45/17

Language of the proceedings: EN

Title of invention:
Method and system for localized fluid-assisted injection molding and body formed thereby

Patentee:
Melea Limited

Opponent 02:
Cinpres Gas Injection Limited

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 84, 111, 123

Keyword:
"Clarity, main request (yes)"
"Novelty, main request (yes)"
"Inventive step, main request (yes)"

Decisions cited:
T 0322/98

Catchword:
-

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Case Number: T 0230/03 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 9 November 2004

Appellant: (Opponent 02)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 16 December 2002 concerning maintenance of European patent No. 0321117 in amended form.**

Composition of the Board:

Chairman: W. Moser
Members: W. R. Zellhuber
W. Widmeier

Summary of Facts and Submissions

I. The appellant (opponent 02) lodged an appeal against the decision of the Opposition Division maintaining the European patent No. 0 321 117 in amended form.

Oppositions had been filed against the patent as a whole based on Article 100(a) EPC (lack of novelty, Article 54 EPC, and lack of inventive step, Article 56 EPC) and Article 100(c) EPC.

II. Oral proceedings were held before the Board of Appeal on 9 November 2004.

III. The appellant requested that the decision under appeal be set aside and that the European patent No. 0 321 117 be revoked in its entirety.

The respondent (patent proprietor) requested that the decision under appeal be set aside and that the patent be maintained on the basis of the following documents:

(i) main request: claims 1 to 12 filed as main request on 6 October 2004, and pages 2 to 5 of the description , also filed on 6 October 2004; or

(ii) first auxiliary request: claims 1 to 10 filed as first auxiliary request on 23 December 2003; or

(iii) second auxiliary request: claims 1 to 12 filed as second auxiliary request on 6 October 2004; or

(iv) third auxiliary request: claims 1 and 2 of the main request; or

(v) fourth auxiliary request: claims 3 to 12 of the main request.

IV. Independent claims 1 and 3 according to the main request read as follows:

"1. A method for making a hollow-shaped body from a plastic resin in a gas-assisted injection molding system including a mold having an injection aperture and a body forming cavity, the method comprising: injecting an amount of molten resin sufficient for the preparation of the body from an injection nozzle through the injection aperture, along a resin flow path and into the cavity in the mold; injecting gas into the molten resin through at least one aperture to distribute the resin at least partially over interior surfaces defining the cavity, whereby the body is formed within the cavity; cooling the body so formed to a temperature beneath the softening point of the resin; relieving the pressure within the body; and opening the mold to remove the body, characterized by:
causing a portion of the molten resin to flow from the cavity into a resin overflow reservoir in the mold during injection of the resin into the cavity so that the resin at least partially fills the resin overflow reservoir; said method including the step of introducing the pressurized gas into the molten resin through the at least one aperture in the resin overflow reservoir communicating the gas aperture and the mould cavity."

"3. An injection molding apparatus (10) for making a hollow-shaped body (120,124) from a plastic resin, the apparatus (10) including a mold (28;68,70), a source of pressurized gas (24) and an injection molding machine (12) having a nozzle (14) for injecting an amount of molten resin sufficient for the preparation of the body into the mold through a resin injection aperture along a resin flow path (60,62,64) and into a cavity (66;114) in the mold (28;68,70), gas injection means (117) for locally injecting gas into the molten resin through at least one gas aperture (118) to distribute the resin at least partially over the interior surfaces defining the cavity (66; 114) characterized by the mold (28;68,70) having a resin overflow reservoir (112) in the mold (28;68,70) in communication with the cavity (66;114) to receive the plastic resin from the cavity (66;114) which flows from the cavity during the injection of resin into the cavity (66;114), said gas aperture (118), within the resin overflow reservoir (112) being located remote from the injection aperture and wherein the resin overflow reservoir (112) communicates the gas aperture (118) and the mold cavity (66;114)."

V. In appeal case T 322/98, it was held that claims 1 to 12 presented during oral proceedings of 8 February 2001 did not contravene Article 123(2) and (3) EPC and it was decided to remit the case to the first instance for further prosecution. These claims are identical to claims 1 to 12 according to the main request.

VI. The following documents are referred to in the present decision:

D1: EP-A 0 283 207

D4: US 3,044,118

VII. In the written procedure and during oral proceedings, the appellant argued essentially as follows:

There was no clear basis in claim 1 according to the main request that the resin overflow reservoir was separate from the cavity in the mould, and claim 1 had to be read as including the possibilities of the resin overflow reservoir being outside of the cavity as well as within the cavity.

Providing a resin overflow reservoir within the cavity had been subject-matter of the application as filed (cf. claim 17, "a resin reservoir is formed within the hollow body"), the patent in suit as granted (cf. column 7, lines 32 and 33 ("... pin retraction may cause a small vent hole to be formed in the part"), wherein by the term "part" the hollow body was meant, and in the description of the patent in suit according to the main request, cf. embodiments according to Figures 7 to 11, which did not disclose gas injection via a resin overflow reservoir located separately from the cavity.

Claim 1 according to the main request was thus not clear contrary to the requirements of Article 84 EPC.

The subject-matter of claim 1 according to the main request was not novel with regard to the embodiments shown in Figures 2 and 3 of document D1. The space 44 depicted in these Figures 2 and 3 was a resin overflow reservoir. By providing that space, a boss or lump was

formed which was not a desired part of the body and which would later be cut away. The space 44 had the function of providing a conduit to enable the gas to flow into the cavity without bursting through, and was thus wholly equivalent to the resin overflow reservoir referred to in the patent in suit.

The subject-matter of claim 3 according to the main request was not novel with regard to the apparatus shown in Figure 1 of document D4. It had to be considered that claim 3 was an apparatus claim and that only the structural features of this claim had therefore to be taken into account.

Actually, the apparatus shown in Figure 1 of document D4 comprised all the structural features of the apparatus according to claim 3 of the main request. Novelty could not be based on different purposes. Moreover, the apparatus disclosed in document D4 could be used for making hollow-shaped bodies without structurally modifying the apparatus, and the apparatus according to claim 3 of the main request could also be used for making solid bodies.

Furthermore, the subject-matter of claim 3 of the main request did not involve an inventive step. At the priority date of the patent in suit, gas-assisted injection moulding was generally known. It was further known that the shrinkage volume of plastic material during cooling could amount to up to 30%. It was obvious that, by appropriately cooling the outer walls of the overflow reservoir and those of the mould cavity of the apparatus of document D4, a hollow interior would be formed due to the reduction in volume of the

resin material during cooling. A person skilled in the art would thus use the apparatus of document D4 for making hollow-shaped bodies instead of making solid bodies, thereby using the gas pressure for maintaining the shape of the body.

Furthermore, the description did not meet the requirements of the EPC. According to column 7, lines 31 to 33, the gas aperture was provided in the mould cavity, whilst, according to claims 1 and 3 of the main request, the gas aperture had to be within the resin overflow reservoir, and not anywhere else. The embodiments according to Figures 7 to 11 of the patent in suit did not disclose a separate resin overflow reservoir. They were not embodiments according to the invention and should be deleted.

The respondent should not be entitled to re-establish the examples according to Figures 7 to 11, which he deleted before the first instance. Re-establishment would put the respondent in a better position which was unfair to third parties.

VIII. In the written procedure and during oral proceedings, the respondent argued essentially as follows:

The objection raised under Article 84 EPC represented a new ground of opposition, and, since consent is not given by the respondent, should not be accepted.

Nevertheless, in decision T 322/98, it was decided that the subject-matter of claims 1 to 12 according to the main request had been disclosed in the application as filed, which implied that the subject-matter of these

claims was clear. Furthermore, the decision held that there was no basis in the application as filed for the concept of providing a spillover reservoir to be used alone without an overflow reservoir, as defined in claims 1 and 2 of the application as filed, cf. point II.(i) of the decision T 322/98.

Claim 1 clearly defined that the resin overflow reservoir was separate from the cavity. The interpretation of claim 1 by the appellant that it included the possibility of the resin overflow reservoir being provided within the cavity did not make sense. The embodiments as depicted in Figures 7 to 11 did not show a resin overflow reservoir. However, it was clear that these embodiments were only part of the invention as defined in the claims in combination with gas injection via an overflow reservoir.

Document D1 represented prior art according to Article 54(3) EPC to the extent that it could benefit from the claimed priority of 16 March 1987. Figures 2 and 3 of document D1 show the space indicated with the reference number 44 as being a part of the body-forming cavity. Document D1 was completely silent about the function of space 44 shown in Figures 2 and 3, and there was no indication that the boss formed by that space was unwanted. The subject-matter of claim 1 of the main request was thus novel.

In the apparatus according to Figure 1 of document D4, the gas was applied to the upper surface of the resin for making a solid body, whilst, in the apparatus according to claim 3 of the main request, the gas was injected into the resin for making hollow bodies. The

known apparatus was not suitable for making hollow bodies, and, in order to produce such bodies, would have to be modified completely. Document D4 thus did not disclose an apparatus for making hollow-shaped bodies as defined in claim 3 of the main request.

Furthermore, whilst the apparatus shown in Figure 1 of document D4 was for making solid bodies of simple shape, the patent in suit provided a solution for making hollow bodies of complex shape. There was no motivation to use the apparatus of document D4 for making hollow bodies, a use for which it was not even suitable.

The subject-matter of claim 3 according to the main request thus also involved an inventive step.

Reasons for the Decision

1. *Binding effect (Article 111 EPC)*

Decision T 322/98 held that claims 1 to 12 according to the present main request did not contravene Article 123(2) and (3) EPC. Furthermore, under point II.(i) of decision T 322/98, it was "... concluded that there was no clear and unambiguous basis in the originally filed application documents for a so-called second concept of the invention differing from the invention defined in the originally filed claims 1 and 2 in that a spillover reservoir is used alone without an overflow reservoir as defined in the originally filed claims 1 and 2."

The Board is bound by these findings (ratio decidendi) under Article 111 EPC.

2. *Clarity (Article 84 EPC), Extension (Article 123(2) EPC)*

2.1 According to claim 1 of the main request, the mould comprises **a body-forming cavity**, and **the body is formed within the cavity**. Furthermore, according to the characterizing portion of claim 1 of the main request, a portion of the molten resin is caused to flow **from the cavity into a resin overflow reservoir** in the mould, and the pressurized gas is introduced into the molten resin **through at least one aperture in the resin overflow reservoir communicating the gas aperture and the mould cavity**.

Consequently, claim 1 of the main request has to be interpreted in such a way that the resin overflow reservoir is separate from the body-forming cavity. This applies *mutatis mutandis* to claim 3 of the main request as well.

2.2 The embodiments according to Figures 7 to 11 of the patent in suit according to the main request illustrate the formation of an endless hollow body **portion**, cf. column 3, lines 45 to 47 and 52 to 54, and column 4, lines 1 and 2. Figures 7 and 9 show such endless hollow body portions. Figures 8 and 10 show a gas injection device for forming such endless hollow body portions, wherein a gas injection pin, contrary to the gas injection according to claims 1 and 3 of the main request, extends into the body-forming mould cavity. Figure 11 shows an endless hollow body portion with a spillover reservoir located opposite to a gas injection

aperture. The gas injection device is not shown in detail in Figure 11. It is related to the device shown in Figure 8 only in that the same reference sign 73 is used. Admittedly, in the drawings (Figures 7 to 11), a resin overflow reservoir separate from the body-forming cavity and including a gas injection aperture is not shown.

However, in the Board's judgement, the fact of not showing, or making mention of, a separate resin overflow reservoir in connection with the formation of a particular body **portion** (endless hollow body portion) cannot be construed as meaning that the method for making the hollow body generally excludes the use of an overflow reservoir including a gas injection aperture or requires the overflow reservoir to be within the cavity.

2.3 The embodiments according to Figures 7 to 11 of the patent in suit according to the main request thus concern the formation of endless hollow body portions and measures (i.e. providing a spillover reservoir and gas injection pins) which are particularly suitable for the formation of a hollow body comprising an endless hollow body portion. These measures may be used in combination with a gas injection via a resin overflow reservoir as claimed in claims 2 and 4 of the main request.

The fact that Figures 8 and 10 show gas injection pins which extend into a part of a body-forming cavity is not in contradiction to the subject-matter of the claims according to the main request, because providing further gas injection pins for forming specific body

portions is not excluded by the wording of the claims, and, in particular, dependent claim 7 makes mention that more than one gas aperture may be provided. By the same token, the statement in column 7, lines 31 to 33 ("... pin retraction may cause a small vent hole to be formed in the part") of the patent in suit according to the main request also is not in contradiction to the subject-matter of the claims of the main request.

2.4 It should be remembered that, according to decision T 322/98, claims 2 and 4 of the main request do not contain subject-matter which extends beyond the content of the application as filed. Since claims 2 and 4 are dependent on claims 1 and 3, respectively, they explicitly concern the formation of a hollow-shaped body comprising a substantially endless hollow body portion with a spillover reservoir, as illustrated in Figure 11, in combination with a resin overflow reservoir, the latter being separate from the body-forming cavity and including a gas aperture.

It should further be remembered, that decision T 332/98 reached the conclusion that there was no clear and unambiguous basis in the application documents as filed for a spillover reservoir being used alone without an overflow reservoir as defined in claims 1 and 2 of the application as filed.

Taking into account these findings and the fact that the embodiments according to Figures 7 to 11 were already part of the application as filed, the Board concludes that the presence of these embodiments in the description of the patent in suit according to the main request does not give rise to the patent in suit as

amended according to the main request extending beyond the subject-matter of the application as filed.

2.5 To sum up, in the Board's judgement, the subject-matter of claims 1 to 12 according to the main request is clear and supported by the description, thus meeting the requirements of Article 84 EPC. In particular, the part of the description concerning the embodiments according to Figures 7 to 11 is neither in contradiction to the subject-matter of the claims of the main request, nor does it contain subject-matter which goes beyond the application as filed.

2.6 Furthermore, in the Board's judgement, by reintroducing the embodiments according to Figures 7 to 11 into the description after their deletion before the first instance, the respondent has not been put into a better position. The claims remained unamended, and, as shown above, the embodiments do not give rise to any deviating meaning of the claims. Thus, the scope of protection of the patent in suit remained unchanged.

3. *Novelty (Article 54 EPC)*

None of the documents cited in the appeal procedure discloses a method or an apparatus as claimed in claims 1 and 3 of the main request, respectively.

In particular, to the extent that it benefits from the priority of 16 March 1987 (priority document GB 87 06 204), document D1 represents prior art under the terms of Article 54(3) EPC. Figures 2 and 3 of document D1, which are also disclosed in the priority document, show a mould cavity including a recessed opening or space 44 formed therein. There is no disclosure in document D1

that said space in the mould cavity is not part of the body-forming cavity, or that, after moulding, the part of the moulded body formed by that space, inevitably, had to be cut away. Document D1 thus does not disclose a method or an apparatus wherein a gas injection aperture is provided in a resin overflow reservoir which is separate from the body-forming cavity as claimed in claims 1 and 3 of the main request.

Document D4 relates to an apparatus for making solid bodies, wherein resin is injected from the bottom in a mould cavity comprising an overflow reservoir on top of the body-forming cavity. Gas pressure is applied "to the surface of the melt in the reservoir whereby the melt flows into the mold cavity from the reservoir in sufficient quantity to compensate for the volume change attending the solidification and cooling of the thermoplastic material in the mold cavity", cf. column 1, lines 55 to 60 of document D4. There is no indication, and in the Board's judgement also no way, that the apparatus having a structure as shown in Figure 1 of document D4, namely a resin injection aperture provided in the bottom part of the mould cavity, a resin overflow reservoir on top the mould cavity, and a gas inlet on top of the reservoir, is suitable or might be used for injecting gas into the molten resin for making a hollow-shaped body.

There is no evidence that, by heating and/or cooling the outer walls of the mould cavity and the overflow reservoir in a specific manner during solidification of the resin, a hollow-shaped article might be produced. Anyway, such a process would require specific heating

and cooling means which are disclosed neither explicitly nor implicitly.

Consequently, document D4 does not disclose an apparatus suitable for making a hollow-shaped body in a gas-assisted injection moulding process as claimed in claim 3 of the main request.

The subject-matter of claims 1 and 3 is therefore novel within the meaning of Article 54 EPC.

4. *Inventive step*

4.1 None of the documents cited in the appeal procedure suggests a method for making a hollow-shaped body, wherein pressurized gas is injected into the molten resin via a gas injection aperture provided in a resin overflow reservoir which is separate from the body-forming mould cavity. Accordingly, the subject-matter of claim 1 of the main request is not rendered obvious by the cited prior art.

4.2 Furthermore, the apparatus according to claim 3 of the main request is not rendered obvious by the cited prior art either.

The patent in suit as amended according to the main request relates among others to an apparatus for gas-assisted injection moulding. "One problem associated with gas-assisted injection molding is that some parts are of such a size and shape so as to reduce the benefits normally obtained from the use of gas-assisted injection molding. For example, for some items it is near impossible for the gas introduced at the injection

aperture to move to the farthest reaches of the mold cavity. Very complex channel configurations throughout the part would be required to put the gas in a local area where it is needed and to the farthest reaches of the mold", cf. column 1, lines 31 to 41 of the description of the patent in suit according to the main request.

That problem is solved by an apparatus for making a hollow-shaped body according to claim 3 of the main request, i.e. an apparatus comprising gas-injection means suitable for injecting gas into the molten resin via a gas injection aperture provided in a resin overflow reservoir which is separate from the body-forming mould cavity.

That feature is suggested in neither of the cited documents. In particular, document D4 relates to an apparatus for making solid bodies, wherein resin is injected from the bottom in a mould cavity comprising an overflow reservoir on top of the body-forming cavity, and wherein gas pressure is applied to the surface of the melt in the overflow reservoir, cf. Figure 1 and column 2, lines 13 to 42. The overflow reservoir is used in document D4 for the purpose of compensating for the volume change due to solidification and cooling of the resin material, cf. column 1, lines 47 to 60.

There is no motivation for a person skilled in the art, intending to solve a problem related to the making of hollow-shaped bodies by gas-assisted injection moulding, to consider the use of an apparatus for making solid and simply structured bodies. Furthermore, there is no indication in document D4 that the shrinkage volume of

the resin might be used for the purpose of making hollow-shaped bodies, or that due to shrinkage gas injection could occur. Finally, although methods and devices suitable for making hollow-shaped bodies were generally known, there are no suggestions in the cited prior art which hint at modifying the apparatus shown in Figure 1 of document D4 in such a way that it might be used for making hollow-shaped bodies, thereby neglecting the issue of whether or not such a modification would actually be possible.

4.3 Therefore, the subject-matter of claims 1 and 3 according to the main request involves an inventive step within the meaning of Article 56 EPC. The subject-matter of claims 2 and 4 to 12, which are appendant to claims 1 and 3, respectively, similarly involves an inventive step.

5. Consequently, the auxiliary requests of the respondent need not be considered.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of the following documents filed on 6 October 2004:

   (a) claims 1 to 12 as main request; and

   (b) description, pages 2 to 5; and

   (c) drawings, Figures 1 to 13.

The Registrar: The Chairman:

M. Dainese W. Moser