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D E C I S I O N
of 21 October 2003

Case Number: T 0962/01 - 3.2.5

Application Number: 94906993.4

Publication Number: 0735943

IPC: B29C 45/16

Language of the proceedings: EN

Title of invention:

Process and apparatus for coinjection molding of articles
having complex shape

Patentee:

Johnson Control S.P.A.

Opponent:

Battenfeld GmbH

Headword:

-

Relevant legal provisions:

EPC Art. 56

EPC R. 67

Keyword:

"Alleged procedural violation (no)"

"Inventive step (no)"

Decisions cited:

T 0330/92

Catchword:

-



Case Number: T 0962/01 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 21 October 2003

Appellant: Johnson Control S.P.A.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 18 June 2001
revoking European patent No. 0735943 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: W. Moser
Members: P. E. Michel
W. Widmeier

Summary of Facts and Submissions

I. The appellant (patentee) lodged an appeal against the decision of the Opposition Division revoking European Patent no. 0 735 943.

The Opposition Division held that the subject-matter of claims 1 and 9 as granted lacked an inventive step, so that neither the main request nor the auxiliary request were allowable.

II. Oral proceedings were held before the Board of Appeal on 21 October 2003.

III. The appellant 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 20 as granted; or
- (ii) 1st auxiliary request: claims 1 to 17 as granted;
or
- (iii) 2nd auxiliary request: claims 1 and 9 filed as 2nd auxiliary request on 22 September 2003, and claims 2 to 8, and 10 to 20 as granted; or
- (iv) 3rd auxiliary request: claims 1 and 9 filed as 2nd auxiliary request on 22 September 2003, and claims 2 to 8, and 10 to 17 as granted; or
- (v) 4th auxiliary request: claims 1 and 9 filed as 4th auxiliary request on 22 September 2003, and claims 2 to 8, and 10 to 20 as granted; or

- (vi) 5th auxiliary request: claims 1 and 9 filed as 4th auxiliary request on 22 September 2003, and claims 2 to 8, and 10 to 17 as granted; or
- (vii) 6th to 11th auxiliary requests: claims according to the main request and first to fifth auxiliary requests, respectively;
- (viii) 12th auxiliary request: claims 1 to 8 submitted during oral proceedings.

The appellant further requested reimbursement of the appeal fee in view of an alleged procedural violation.

The respondent (opponent) requested that the appeal be dismissed.

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

E2: "Abgeschirmte Gehäuse in einem Arbeitsgang mit Hilfe des Mehrkomponenten-Spritzgießverfahrens", H. Eckardt in "Elektrisch leitende Kunststoffe", Mair/Roth, 2nd edition, Carl Hanser Verlag 1989

E3: "Die Zwei-Komponenten-Verfahren", H. Eckardt, in "Spritzgießen von Strukturschaum-Formteilen", VDI publication, 1976

E4: "Mehrkomponentenspritzgießen", H. Eckardt in "Kunststofftechnik 1991", VDI publication 1991

E5/1:EP-A-0 467 274

E6: "Principles of Polymer Processing", Tadmor,
J. Wiley and Sons, 1979, pages 602 and 603

E7: "Computer-Aided Mold and Die Design", Hess et al.,
pages 8 and 9, Kunststoffe German Plastics 78
(1988)

E10: EP-A-0 325 440

V. Claim 9 of the main request and the first, sixth and seventh auxiliary requests of the appellant reads as follows:

"9. An apparatus (4) to perform the coinjection into one cavity of a mold of at least two materials (A, B) at the fluid state coming from one or more equipments (3) for feeding under pressure said materials, characterized in that it comprises canalization means (7-10), independently controlled in temperature, wherein said materials separately flow, said canalization means being in communication with one or more coinjection nozzles (13,26) arranged in correspondence to one or several points of said cavity of the mold (2) to provide different flow paths (103-105) of said injected materials within said cavity, and further characterized in that said cavity of the mold is dimensioned as a function of said flow paths (103-105) to provide paths (103-105) having substantially the same hydraulic resistance."

Claim 9 of the second, third, eighth and ninth auxiliary requests of the appellant differs from claim 9 of the main request by the introduction of the

expression "said flow paths having a final meeting point," after the expression "to provide different flow paths (103-105) of said injected materials within said cavity,".

Claim 9 of the fourth, fifth, tenth and eleventh auxiliary requests of the appellant differs from claim 9 of the second auxiliary request by the introduction of the expression "said position of the nozzle(s) resulting in flows having substantially the same speed of penetration in the cavity of the injected materials along the relevant paths and in the balancing of said different flows (103-105) of injected materials within the mold cavity required to obtain said article by having substantially an homogeneous distribution of the injected materials within said mold (2) cavity," after the expression "said flow paths having a final meeting point,".

Claim 1 of the twelfth auxiliary request reads as follows:

"1. A process of preparing a multilayer injection molded article (101) having a sandwich structure with a continuous outer skin, comprising the following steps: analyzing the shape of said article (101) and of the corresponding mold (2) cavity, and determining a position of the injection nozzle(s) resulting in a plurality of different flows having a final meeting point, and the balancing of said different flows (103-105) of injected materials within the mold cavity required to obtain said article by having substantially an homogeneous distribution of the injected materials within said mold (2) cavity;

dimensioning the mold cavity as a function of said different flow paths (103-105), to have a cavity with thickness pattern resulting in hydraulic resistances along the paths of said flows of injected materials that are substantially the same;
selecting the materials (A, B) to be injected;
memorizing a plurality of data describing the behaviour of the selected materials (A, B) at different temperatures, pressures and flow rates;
selecting the injection pressure, flow rates and temperatures for each material to be coinjected according to said memorized data, in order to have a substantially even distribution of the injected materials along said flow paths (103-105) and throughout the mold (2) cavity;
injecting a selected amount of a first material (A) at a first temperature, pressure and flow rate, and immediately after injecting a selected amount of a second material (B) at a second pressure, speed and temperature; and optionally injecting further selected amounts of materials at selected temperatures, flow rates and pressures; the injection of the last injected material being continued until the mould cavity is filled and the different flows (103-105) of injected materials have met and co-penetrated in optimum conditions."

VI. The appellant has argued substantially as follows in the written and oral procedure:

The introduction of document E5/1 at the oral proceedings before the Opposition Division constituted a procedural violation. The case should be remitted to

the Opposition Division to allow consideration of this document at two instances.

The characterising feature of claim 9 of the main request of the appellant, according to which the cavity of the mould is dimensioned as a function of the flow paths to provide paths having substantially the same hydraulic resistance, is not suggested by any of the prior art documents. Thus, document E2 teaches the use of flow paths of equal length, so that when the thickness of the flow path is varied, the hydraulic resistance also varies. A similar teaching is found in document E3 at pages 36 and 37.

Reference is made to the decision T 330/92, in which an inventive step was acknowledged on the basis that experts had been "blind" to common general knowledge available 17 years before the filing date of the patent in suit. Whilst generic sizing of injection moulding cavities had been known at the date of filing of the patent in suit for 17 years, there had been no indication of the idea of providing flow paths having the same hydraulic resistance.

Document E4, at page 90, indicates that it is not possible to use computer programs to design mould cavities for injection moulding items comprising more than one component, and that the same techniques should be used as for single component moulding, that is, to use flow paths of equal length. The term "different flow paths" used in claim 9 of the main request of the appellant indicates that the claim is concerned with products having a complex shape and not having equal flow paths.

As regards claim 9 of the second auxiliary request of the appellant, as shown in Figure 32 of document E4, there is no final meeting point for the core component, the core component being separated by the skin component at the point at which the two flow paths meet.

As regards claim 9 of the fourth auxiliary request of the appellant, the prior art teaches the simultaneous injection of the two materials A and B and that sequential injection should be avoided in order to avoid a pressure drop which adversely affects the surface quality of the moulded article. By virtue of the use of flow paths having the same hydraulic resistance, the pressure drop is equally distributed along the flow paths, thus avoiding the problems arising from a pressure drop.

As regards the twelfth auxiliary request of the appellant, the subject-matter of claim 1 is distinguished over the disclosure of document E4 by the features of the flow paths having the same hydraulic resistance and sequential injection of the materials, so that the arguments presented in connection with the fourth auxiliary request apply equally to method claim 1 of the twelfth auxiliary request of the appellant. As stated at page 86 of document E4, a simultaneous phase is essential ("unumgänglich"). The reference in the claim to "different flow paths" excludes the symmetrical flow paths illustrated in documents E2 and E4.

The problem to be solved is to simplify the calculations for the dimensioning of the cavity. The

problem is solved by sequential injection, whilst avoiding the problems which occur as a result of the pressure drop. The method according to the invention also has the advantage of enabling the positioning of the meeting point of the flow paths at a point which will not be seen in the finished article in use. The subject-matter of claim 1 of the twelfth auxiliary request of the appellant thus involves an inventive step.

VII. The respondent has argued substantially as follows in the written and oral procedure:

The introduction of document E5/1 at the oral proceedings before the Opposition Division was not decisive for the decision and thus did not constitute a procedural violation.

The closest prior art is document E4. Documents E6 and E7 demonstrate that computer aided mould design, using the Cadmould and Moldflow programs, can be applied to multicomponent injection moulding of complex articles. When moulding articles having the forms illustrated in Figure 32 of document E4, it is inevitable that the two flow paths have the same hydraulic resistance.

The subject-matter of claim 9 of the main request of the appellant thus does not involve an inventive step.

The features added to claim 9 of the second and fourth auxiliary requests of the appellant do not assist in distinguishing the subject-matter of the claim from the disclosure of document E4. When moulding articles having the forms illustrated in Figure 32 of document

E4, the flow paths have a final meeting point and the material flows have substantially the same speed of penetration along their respective paths.

As regards the twelfth auxiliary request of the appellant, document E4 also discloses sequential injection, albeit with a short simultaneous phase. Firstly, the skin material is injected, and this material is then filled out with the core material. As illustrated in Figure 41 of document E4, this document is also concerned with the injection moulding of complex, non-symmetrical articles. The short simultaneous phase is disclosed as being a preferred feature which allows a smooth transition from the injection of the first material to the injection of the second material. As shown by the deleted passages in the description of the patent in suit, this is also the case in the method of claim 1 of the twelfth auxiliary request of the appellant. In addition, it is not possible to cease injection of the first material immediately as illustrated by Figure 2 of document E2.

Claim 1 of the twelfth auxiliary request of the appellant does not exclude the moulding of symmetrical articles and articles having flow paths of equal length.

The subject-matter of claim 1 of the twelfth auxiliary request of the appellant thus does not involve an inventive step.

Reasons for the Decision

1. Alleged procedural violation
 - 1.1 In the notice of opposition filed by the respondent in the opposition procedure, reference was made to the opposition procedure concerning EP-A-0 579 925, it being requested that the documents on file in this opposition procedure be included in the opposition procedure from which the present appeal procedure lies, but without identifying individual documents. Whilst copies of these documents were filed, these did not apparently include a copy of document E5/1.
 - 1.2 However, the Opposition Division considered that the subject-matter of claim 1 as granted did not involve an inventive step on the basis of a combination of the teachings of documents E1 and E4. Thus, the fact that reference was made in the decision under appeal to document E5/1 in connection with the question of inventive step of claim 9 did not affect the decision to revoke the patent in suit.
 - 1.3 Accordingly, regardless of whether or not a procedural violation occurred, any such procedural violation could not be considered to be substantial as required by Rule 67 EPC, so that the request for reimbursement of the appeal fee is refused. In addition, under these circumstances, in which the admission of document E5/1 was not essential to the decision, it is not necessary to remit the case to the Opposition Division.

Main request

2. *Inventive step of claim 9*

2.1 The closest prior art is represented by document E4. Whilst it was suggested on behalf of the appellant that the apparatus of document E4 does not comprise "different flow paths", this is not accepted. Thus, the two paths shown in Figure 32 at page 87 of document E4, whilst being mirror images of one another constitute, nevertheless, different flow paths. It is thus not considered that the use of the expression "different flow paths" necessarily implies a mould cavity having a complex form. The subject-matter of claim 9 is thus only distinguished over the disclosure of this document by the feature that "said cavity of the mold is dimensioned as a function of said flow paths (103-105) to provide paths (103-105) having substantially the same hydraulic resistance".

2.2 The problem to be solved is thus to provide an apparatus for coinjection moulding in which the injected materials have a substantially homogeneous distribution.

2.3 The solution to this problem is known from document E2, in particular at pages 179 and 180 and in Figures 10 and 11, according to which the form and the length of the flow paths are adapted by an appropriate selection of the wall thickness and the location of the point of injection. The teaching of document E2 is not limited to the moulding of articles in which the flow paths are of equal length. Thus, at page 180, first paragraph, it

is stated that the wall thicknesses should be adapted to the lengths of the flow paths.

- 2.4 It was suggested on behalf of the appellant that document E2 does not provide any general teaching to the person skilled in the art. This cannot be accepted. Whilst the discussion is in the context of the moulding of a particular casing, the person skilled in the art reading this document will appreciate that the teaching to modify the thickness of the walls of the flow paths is generally applicable to the moulding of asymmetric articles, and will note the teaching to use the Cadmould program for the individual materials.
- 2.5 As regards argumentation based on decision T 330/92, there is no evidence to suggest that experts had been "blind" to the teaching of document E2 in the period between publication of this document and the filing date of the patent in suit.
- 2.6 The subject-matter of claim 9 of the main request thus does not involve an inventive step and the main request is not allowable.

First auxiliary request

3. *Inventive step of claim 9*
- 3.1 Claim 9 of the first auxiliary request is identical with claim 9 of the main request.
- 3.2 The subject-matter of claim 9 of the first auxiliary request thus does not involve an inventive step for the reasons given above in respect of the main request, and

the first auxiliary request is accordingly not allowable.

Second auxiliary request

4. *Inventive step of claim 9*

4.1 The additional feature of claim 9, according to which the flow paths have a final meeting point, is known from document E4, as shown in Figure 32 at page 87. It was argued on behalf of the appellant that, in the mould cavities shown in this figure, the two flow paths of core material do not meet, being separated by a layer of the skin material. Even if this were the case, this is not what is specified in claim 9, which requires that the flow paths, each of which includes both the skin and the core materials, have a final meeting point.

4.2 The subject-matter of claim 9 of the second auxiliary request thus does not involve an inventive step, and the second auxiliary request is not allowable.

Third auxiliary request

5. *Inventive step of claim 9*

5.1 Claim 9 of the third auxiliary request is identical with claim 9 of the second auxiliary request.

5.2 The subject-matter of claim 9 of the third auxiliary request thus does not involve an inventive step for the reasons given above in respect of the second auxiliary

request, and the third auxiliary request is therefore not allowable.

Fourth auxiliary request

6. *Inventive step of claim 9*

6.1 The additional feature of claim 9, according to which the flows have substantially the same speed of penetration in the cavity and are balanced is also known from document E4, as shown in Figure 32 at page 87. Since the two flow paths are substantially mirror images of one another, the flows will have substantially the same speed of penetration in each flow path and the flows will be balanced.

6.2 The subject-matter of claim 9 of the fourth auxiliary request thus does not involve an inventive step and the fourth auxiliary request is not allowable.

Fifth auxiliary request

7. *Inventive step of claim 9*

7.1 Claim 9 of the fifth auxiliary request is identical with claim 9 of the fourth auxiliary request.

7.2 The subject-matter of claim 9 of the fifth auxiliary request thus does not involve an inventive step for the reasons given above in respect of the fourth auxiliary request, and the fifth auxiliary request is therefore not allowable.

Sixth to eleventh auxiliary requests

8. *Inventive step of claim 9*

8.1 Claims 9 of the sixth to eleventh auxiliary requests are identical with claim 9 of each of the main and first to fifth auxiliary requests respectively. The sole difference between the sixth to eleventh auxiliary requests and the main and first to fifth auxiliary requests is that the description has been amended by the deletion of passages referring to simultaneous delivery of the first and second materials. This amendment is not, however, such as to render it necessary to construe claim 9 of each of the main and first to fifth auxiliary requests differently, since none of the features of these claims, which are directed to an apparatus per se, is dependent upon the question of whether the commencement of injection of the core material occurs before, simultaneously with, or after the conclusion of injection of the skin material.

8.2 The subject-matter of claim 9 of each of the sixth to eleventh auxiliary requests thus does not involve an inventive step for the reasons given above in respect of the main and first to fifth auxiliary requests, and the sixth to eleventh auxiliary requests are therefore not allowable.

Twelfth auxiliary request

9. *Inventive step of claim 1*

9.1 The closest prior art is represented by document E4.

- 9.2 As regards the references in the claim to "different flows", this feature is regarded as being disclosed in document E4 for the reasons given under point 2.1 above.
- 9.3 As regards the reference in the claim to injection of the second material "immediately after" injection of the first material, the wording of claim 1 is not regarded as excluding the process disclosed in document E4, according to which, whilst injection of the two materials is carried out sequentially, there is, nevertheless a simultaneous phase during which both materials are injected. Thus, injection of the core material is commenced before injection of the skin material is completed. This is done in order to avoid pressure fluctuations which lead to surface markings (document E4, page 86, lines 2 to 8).
- 9.4 Thus, referring to the description of the patent in suit as granted at column 4, lines 20 to 23, "... in a preferred embodiment of the invention, there is provided a reduced time during which the first and the second material are fed together from the nozzle". In addition, in connection with the injector shown in Figure 2, at column 6, lines 24 to 28, it is stated that "It is moreover possible to obtain a combination of movements allowing a simultaneous delivery of both materials, when injection of first material is nearly ended, in order to avoid any pressure drop in the nozzle and mold". Similarly, in connection with the injector shown in Figure 4, the possibility of "the simultaneous delivery of both materials" is discussed (cf. column 7, lines 17 to 19).

9.5 Document E4 (page 86, lines 2 to 8) teaches that a method in which, whilst the injection of the core material occurs after the injection of the skin material, it is desirable to have a phase in which the injection of the two materials overlaps in order to avoid a pressure drop which would occur if there was to be a pause between the injection of the core and skin materials.

9.6 Whilst the appellant has proposed deleting the passages referred to at point 9.4 above from the description of the patent in suit as granted, the mere absence of a reference in the description to a period during which both materials are delivered simultaneously is not sufficient to conclude that claim 1 excludes a period during which both materials are delivered simultaneously. Thus, the amended page 7 of the description of the patent in suit as submitted during the oral proceedings states at lines 12 to 15 that "it is important to limit as far as possible any stopping time between injection of first and second material". Since injection cannot be immediately stopped or immediately started, owing to inertia and elasticity of the materials, to wait until injection of the first material had completely stopped before starting injection of the second material would inevitably result in a period involving a substantial pressure drop during which a reduced amount of material is injected. If the appellant had wanted to exclude such a possibility, it would have been open to him to amend the claims accordingly.

- 9.7 The subject-matter of claim 1 is thus distinguished over the disclosure of document E4 by the feature of "dimensioning the mold cavity as a function of said different flow paths (103-105), to have a cavity with thickness pattern resulting in hydraulic resistances along the paths of said flows of injected materials that are substantially the same".
- 9.8 The problem to be solved is thus to provide an apparatus for coinjection moulding in which the injected materials have a substantially homogeneous distribution. The problem to be solved cannot be considered to be to simplify the calculations for the dimensioning of the cavity, since this problem is not solved by the characterising feature of the claim.
- 9.9 As discussed above in connection with the main request at point 2.3 above, the solution to this problem is known from document E2, in particular at pages 179 and 180 and Figures 10 and 11. According to the teaching of this document, the Cadmould computer program should be used together with practical experimentation in order to achieve a homogeneous distribution of the injected materials by balancing the flows of the materials. This is achieved by adapting the dimensions of the flow paths by an appropriate selection of the wall thicknesses and adjusting the lengths of the flow paths by choosing a suitable location for the point of injection.
- 9.10 The subject-matter of claim 1 of the twelfth auxiliary request thus does not involve an inventive step.

10. In view of the above, none of the requests of the appellant are allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

R. Schumacher

W. Moser