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14

Aktenzeichen / Case Number / N° du recours : T 1/86

Anmeldenummer / Filing No / N° de la demande : 79 302 213.8

Veröffentlichungs-Nr. / Publication No / N° de la publication : 0 010 895

Bezeichnung der Erfindung: Method of making laminates of thermoplastic
Title of invention: polymers by a single-channel coextrusion process
Titre de l'invention : and melt injector block for use therein.

Klassifikation / Classification / Classement : B 29 F 3/12

ENTSCHEIDUNG / DECISION
vom / of / du 15 December 1987

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /
Titulaire du brevet : Imperial Chemical Industries PLC

Einsprechender / Opponent / Opposant : Hoechst Aktiengesellschaft

Stichwort / Headword / Référence :

EPÜ/EPC/CBE Articles 54, 56, 64(2)

Kennwort / Keyword / Mot clé : "Novelty (yes)" - "Inventive step (yes)" -
"Rights conferred by European patent"

Leitsatz / Headnote / Sommaire

Europäisches
Patentamt

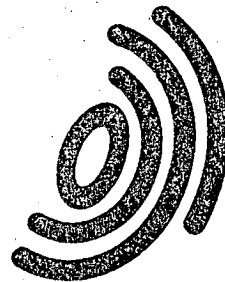
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Chambres de recours



Case Number : T 1/86

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 15 December 1987

Appellant :
(Opponent)

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Representative :

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(Proprietor of the patent)

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Decision under appeal :

Decision of Opposition Division of the European
Patent Office dated 28 October 1985 rejecting
the opposition filed against European patent
No. 0 010 895 pursuant to Article 102(2) EPC.

Composition of the Board :

Chairman : C. Maus

Members : H. Seidenschwarz

P. Ford

Summary of Facts and Submissions

- I. European patent No. 0 010 895 comprising independent Claims 1, 2, 4 and 6 and dependent Claims 3, 5 and 7 was granted to the Respondent on 17 August 1983 in response to European patent application number 79 302 213.8 filed on 15 October 1979 and claiming the priority of a previous application of 23 October 1978.

The independent claims read as follows:

1. A melt injector block for use in a single channel coextrusion process which comprises a primary channel for a primary stream of molten thermoplastic polymer and one or more secondary channels for one or more secondary streams of a different molten thermoplastic polymer characterised in that at a confluence where a secondary channel enters the primary channel the melt injector block contains guides within the primary channel for defining the width of a secondary component of a composite stream.
2. A melt injector block which comprises:
 - (a) one primary channel for a primary laminar-flow stream of molten thermoplastic polymer,
 - (b) one secondary channel for a secondary laminar-flow stream of molten thermoplastic polymer,
 - (c) a unified channel for a composite stream, and
 - (d) a confluence where the secondary channel enters the primary channel,

characterised in that the melt injector block also includes a single pair of guides positioned partly within the primary channel and partly in the unified channel, the secondary channel entering the unified channel between the guides.

4. A melt injector block which comprises:

- (a) one primary channel for a primary laminar-flow stream of molten thermoplastic polymer,
- (b) two secondary channels for secondary laminar-flow streams of molten thermoplastic polymer,
- (c) a unified channel for a composite stream, and
- (d) two confluences each confluence being where a secondary channel enters the primary channel,

characterised in that the melt injector block also includes two pairs of guides, each pair being positioned partly in the primary channel and continuing past one of the confluences into the unified channel, each secondary channel entering the unified channel at a confluence situated between one pair of guides.

6. A method of making a laminate of thermoplastics materials in a single coextrusion process comprising the steps of:

- (a) joining in a tube one primary laminar-flow stream of molten thermoplastic resin and at least one secondary laminar-flow stream of different molten thermoplastic resin to obtain a composite laminar flow stream of molten thermoplastic resin which has a sharply defined principal juncture or sharply defined principal

junctures between the components of the composite stream,

(b) passing said composite stream into the manifold of a sheeting extrusion die, the principal juncture plane(s) being parallel to the principal direction of flow of the resin as it passes from the manifold and takes on the shape of sheeting, and

(c) extruding the composite stream under conditions of laminar-flow whereby a laminate is produced;

characterised in that at the place where the or each secondary stream joins the primary stream the secondary stream(s) are confined between guides within the primary stream which guides define the width of the secondary stream(s).

II. Opposition was filed by the Appellant requesting the revocation of the patent. In support of his request, he referred to four documents.

III. After considering the Grounds for Opposition, the Opposition Division rejected the opposition, and by a decision dated 28 October 1985, maintained the patent unamended.

IV. On 16 December 1985, the Appellant filed an appeal against the decision, paying the appropriate fee simultaneously and requesting that the decision under appeal should be set aside and that the patent should be revoked in its entirety. The Statement of Grounds was received on 28 February 1986.

Referring to the documents DE-A-2 550 553, US-A-3 909 170, 3 448 183 and DE-A-2 425 655, he argued that the subject-matter of the independent claims lacked novelty or at least an inventive step.

- V. The Respondent requested in his letter of 5 February 1987 that the appeal should be dismissed and that the patent should be maintained as granted, alternatively on the basis of four different sets of claims. He submitted that the subject-matter of the patent was novel and inventive having regard to the cited prior art.
- VI. In the oral proceedings of 15 December 1987 the Appellant specified his arguments in a narrower sense, namely that the subject-matter of the independent Claims 1 and 6 was not novel with respect to DE-A-2 425 655 and that the subject-matter of the independent Claims 2 and 4 was obvious in view of the teachings known from DE-A-2 550 553 and 2 425 655. He, therefore, again requested that the decision under appeal be set aside and that the patent be revoked.

The Respondent contested the arguments of the Appellant and was of the opinion that the subject-matter of the patent was novel and involved an inventive step. He requested that the appeal be dismissed and that the patent be maintained as granted, alternatively on the basis of a set of 6 claims (auxiliary request A) or set B (second auxiliary request) or set C (third auxiliary request) or set D (fourth auxiliary request) altogether submitted on 10 February 1987.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rules 1(1) and 64 EPC and is, therefore, admissible.
2. The examination as to whether the subject-matter of Claim 1 and Claim 6 is novel results in the following:
 - 2.1 The pre-characterising portion of Claim 1 and 6 is derived from the prior art as demonstrated in DE-A-2 425 655 which is the DE-application corresponding to US-A-3 833 704 cited in the patent specification. These documents disclose a melt injector block (adapter 13) which is used in a single channel coextrusion process of making a laminate of thermoplastics materials.

The melt injector block (cf. Fig. 2 and 3) is made up of two elements: the mandrel 25 and the housing 26. The mandrel comprises a circular flange 27 having a cylindrical boss 16 projecting from the downstream face 28 of the flange. The boss has an outer cylindrical surface 17 and is provided with an axial bore 31 forming a primary channel for a primary stream of molten thermoplastic polymer furnished by an extruder 11. According to figures 2 and 3, where figure 3 is a sectional view along the lines 3-3 in figure 2, that is to say along the downstream face of the flange, a recess 32 of the housing has a portion defined by an inner cylindrical surface 34 which is spaced from the outer cylindrical surface of the boss thus establishing an arcuate manifold 35. The inner surface 34 on the housing and the outer surface of the manifold 35 on the boss opposite the inner surface are flow surfaces over which a secondary stream of a different molten thermoplastic polymer moves. This manifold forming the secondary channel is interconnected by orifice means 38 with the primary channel and a bore 36 in the housing forming the unified

channel. The orifice means is achieved in part by a relief portion 41 formed in the outer cylindrical surface and in the free end 39 of the boss 16 throughout the arc "a" and in part, by the portion of a frusto-conical surface 40 of the housing opposite the relief portion. The manifold 35, the entrance 42 from the manifold to the orifice means, and the exit 43 from the orifice means to the bore 36 extend through the same arc "a". The entrance 42, however, has a cross-sectional flow area larger than the cross-sectional flow area of exit 43 thus achieving a "nozzle" effect on the pressurized secondary polymer contained in the manifold. The pressure exerted on the heat plastified secondary polymer in the manifold forces the said secondary polymer through the orifice means where it is deposited in a layer on the periphery of the rod made of the heat plastified primary polymer at the interface between the primary channel and the unified channel: cf.

DE-A-2 425 655, page 5, lines 13 to 16, line 33 to page 6, line 11 and lines 22 to 32, page 7, lines 6 to 30, page 8, lines 8 to 17, or US-A-3 833 704, column 3, lines 16 to 19, 35 to 45, 53 to 62, 70 to 73 and column 4, lines 2 to 16, 31 to 35. Further, figure 2 of these documents demonstrates clearly that the exit from the orifice means 38 ends at the interface of the primary channel and the unified channel and does not continue into the unified channel.

DE-A-2 425 655 or US-A-3 833 704, therefore, does not disclose guides within the primary channel, which guides define the width of the secondary polymer in a composite stream comprising at least two different molten thermoplastic polymers.

- 2.2 None of the other documents cited in the patent specification and in the Statement of Grounds discloses the device and method according to the independent Claims 1 and 6 as well as the devices according to the independent

Claims 2 and 4. Since the Appellant neither disputes the novelty of the subject-matter of Claims 1 and 6 with respect to this state of the art nor contests the novelty of the subject-matter of Claims 2 and 4, it is unnecessary to give the reasons in detail.

- 2.3 The subject-matter of the independent claims is therefore novel in relation to the revealed state of the art.
3. On the question of whether or not the state of the art could suggest the melt injector block and method according to the independent claims the following should be observed:
 - 3.1 The invention relates to the preparation of laminates of thermoplastic polymers by a flat film process and to the preparation of such laminates by a single channel coextrusion process.

In many film-making processes the edges of the film are of low quality. For example, the edges of the film are damaged when sideways forces are applied by means of clips. The damaged edges are cut off giving rise to a waste material conveniently known as "edge trim".

Since edge trim is valuable polymer it has to be recovered e.g. by cutting it into small pieces which are returned to the extruder. However, where the edge trim contains two different polymers, recovery is difficult because in any other composition one polymer will be an impurity. In order to overcome this disadvantage US-A-3 448 183 proposes that a multi-channel coextrusion process should be carried out in such a manner that the edge trim consists of one polymer only. When applied to a single channel coextrusion process as known from DE-A-2 425 655 and US-A-3 833 704 respectively this requires good control so as to produce sufficiently defined boundaries for the edge trim.

It is, therefore, the object of the invention to facilitate the production of such boundaries (see EP-B-0 010 895, column 1, lines 42 to 44).

- 3.2 According to the teaching of the independent claims, this problem is solved by joining the respective streams of polymers in a melt injector block in such manner that the width of the stream of the secondary polymer in the stream of the primary polymer is defined.
- 3.3 DE-A-2 550 553 discloses a method of making a laminate of thermoplastic materials in a twin channel coextrusion process and an extrusion die for use in this process. The extrusion die comprises two separate extrusion channels with a confluence at the flat mouthpiece of the die.

According to figure 3 the mouthpiece of the extrusion die has edge zones with steps constituting side walls of a narrower channel. The distance between the side walls and the depth of said side walls determine the width and the thickness of the narrower layer. These side walls do not intrude into the wider channel.

In the embodiment of the extrusion die according to figure 4 the steps are removed whereby the edge zones of the wider channel are progressively increased in depth from the entrance of both channels into the mouthpiece of the extrusion die towards the flat orifice resulting in a wider layer whose edge regions overlap the narrower layer.

The teaching of this document is to join two channels of different widths in a flat mouthpiece of an extrusion die in such a manner that the two independent streams do not merge until they enter the flat mouthpiece of the extrusion die producing as a final product a laminate having defined boundaries for the edge trim.

Since DE-A-2 550 553 does not mention any guides at the confluence of the two channels to confine the streams of molten thermoplastic polymer in the mouthpiece of the die, the skilled person, therefore, does not get any hint to control in the single channel coextrusion process known from DE-A-2 425 655 the width of the respective molten polymer streams to obtain a composite laminar flow stream which has a sharply defined principal juncture between the components of the composite stream thereby yielding a finished laminate having homogeneous edges comprising the polymer of the primary layer which extends across the full width of the laminate.

- 3.4 US-A-3 448 183 already mentioned in the patent specification also discloses a twin channel coextrusion process and a sheet producing apparatus in which the two channels discharge into two separate orifices being arranged one within the other. This document as well as the documents cited as references, to which the Appellant did not refer during the oral proceedings, likewise give no suggestion of the subject-matter of the independent claims. Their teaching could, therefore, neither per se nor in combination with the teachings of the documents discussed in the foregoing paragraph lead the skilled person to a melt injector block and a method of making a laminate according to the independent claims.

- 3.5 Consequently, the subject-matter of the independent Claims 1, 2, 4 and 6 involves an inventive step within the meaning of Article 56 EPC.

4. The following comments are made with respect to the Appellant's objections to Claim 6 having regard to Article 64(2) EPC:

The product directly obtained at the orifice of the extrusion die by the method according to Claim 6 is a laminate whose edge rims consist only of the polymer of the primary stream of molten thermoplastic resin of a composite laminar flow stream of molten thermoplastic resin. The treatment of the laminate by removing the edge regions following the extrusion is not claimed in Claim 6 and does not depend on the claimed method.

A laminate having no homogeneous edges comprising the polymer of the primary stream is not a direct product of the method specified in Claim 6, within the meaning of Article 64(2) EPC.

Therefore, the objections on the basis of Article 64(2) EPC raised by the Appellant cannot support his submission that the subject-matter of Claim 6 is not novel or not inventive.

5. Hence, the patent can be maintained with the claims in the wording as granted.
6. Under these circumstances, there is no need to consider the auxiliary requests.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

F. Klein

C. Maus