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Datasheet for the decision of 17 January 2008

Case Number: T 0449/06 - 3.3.09

Application Number: 00917866.6

Publication Number: 1165667

IPC: C08J 3/00

Language of the proceedings: EN

Title of invention:
Masterbatches having high levels of resin, in particular for modifying polymers

Applicant:
Eastman Chemical Resins, Inc.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Inventive step of the claimed process: (yes)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0449/06 - 3.3.09

D E C I S I O N
of the Technical Board of Appeal 3.3.09
of 17 January 2008

Appellant: Eastman Chemical Resins, Inc.
100 North Eastman Road
Kingsport
TN 37660 (US)

Representative: Lederer, Franz
Lederer & Keller
Patentanwälte
Prinzregentenstrasse 16
D-80538 München (DE)

Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 26 October 2005 refusing European application No. 00917866.6 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: W. Ehrenreich
Members: J. Jardón Álvarez
W. Sekretaruk

Summary of Facts and Submissions

I. This appeal lies from the decision of the Examining Division issued in writing on 26 October 2005 refusing the European Patent application No. 00 917 866.6 entitled *"Masterbatches having high levels of resin, in particular for modifying polymers"*.
The application was filed in the name of *Hercules Incorporated - now Eastman Chemical Resins, Inc* - on 21 March 2000 as International application PCT/US00/06421 and was published as WO 00/56806.

II. The decision was based on a set of claims 1 to 22 filed with the letter dated 22 December 2004. Claims 1 and 17 read as follows:

"1. A polyolefin film comprising a masterbatch and a blend polymer;
wherein said masterbatch comprises a least 65% of resin having a R&B softening point as measured in accordance with ASTM 28-67; and carrier polymer having a peak melting temperature, as measured by DSC, up to 20°C greater than the R&B softening point of the resin; and wherein said blend polymer is selected from the group consisting of polypropylene, styrene-butadiene-styrene copolymer, styrene-ethylene-butadiene-styrene copolymer, ethylene copolymers, and styrene-isoprene-styrene copolymer."

"17. A process for producing a polyolefin film comprising mixing a blend polymer with a masterbatch; wherein said masterbatch comprises a least 65% of resin having a R&B softening point as measured in accordance with ASTM 28-67; and carrier polymer having a peak

melting temperature, as measured by DSC, up to 20°C greater than the R&B softening point of the resin; and wherein said blend polymer is selected from the group consisting of polypropylene, styrene-butadiene-styrene copolymer, styrene-ethylene-butadiene-styrene copolymer, ethylene copolymers, and styrene-isoprene-styrene copolymer."

III. It was held in the decision that the subject-matter of the claimed invention lacked an inventive step over the combination of the following documents:

D1 WO-A 98/55537
D2 US-A 5 213 744.

The Examining Division considered D2 representative of the closest prior art and stated that the preparation of polyolefin films comprising compounding a concentrate, consisting of polypropylene or copolymers thereof as carrier polyolefin and a resin or rosin in high load, with polypropylene or a copolymer of polypropylene as blend polymer, was known from this document.
It was argued that the distinguishing feature, namely the missing correlation between the melting point of the carrier polyolefin and the R&B softening point of the modifying resin/rosin was known from D1 and therefore obvious.

IV. On 20 December 2005 the Applicant (hereinafter: the Appellant) lodged an appeal against the decision of the Examining Division. With the Statement of the Grounds of Appeal, which was filed on 3 March 2006, a new set

of claims 1 to 18 as the basis for a new main request was submitted. Independent Claims 1 and 13, which corresponded to Claims 1 and 17 underlying the appealed decision, were amended in that the blend polymer was limited to polypropylene.

V. During the oral proceedings which were held on 17 January 2008 the Appellant filed, after a discussion of the issue of inventive step, an amended set of Claims 1 to 11, solely consisting of process claims, as the basis for a new main request.
Claim 1 corresponds to Claim 13 of the former main request with the amendment that the presence of polyethylene in the carrier polymer is mandatory. The claim reads as follows:

"1. A process for producing a polyolefin film comprising forming a masterbatch comprising:
at least 65 wt% of resin having a R&B softening point as measured in accordance with ASTM 28-67, and
carrier polymer having a peak melting temperature, as measured by DSC, up to 20°C greater than the R&B softening point of the resin;
combining the masterbatch with polypropylene to form a polymer blend; and
forming the polymer blend into the polyolefin film,
wherein the carrier polymer comprises polyethylene."

VI. The Appellant pointed to the examples and comparative examples in the application and alleged that it was possible by the claimed process to compound a masterbatch comprising a high loading of a modifying resin and an ethylene-type carrier polymer, like LLDPE

or HDPE, into polypropylene without negatively affecting the properties of the polypropylene film obtained from the masterbatch/polypropylene blend.

The Appellant argued that the teaching in D1 to provide high resin-loaded masterbatches in which the R&B softening point of the resin and the melting point of the carrier polymer were similar was limited to the preparation of films in which the carrier polymer and the blend polymer were both polyethylene.
However the melting point of the carrier polymer and the softening point of the modifying resin did not match in the case where the polymer was polypropylene, because of its high melting point of about 165°C.

A skilled person could therefore not learn from D1 how to incorporate a high resin-loaded masterbatch into a film based on a polypropylene blend polymer.

A skilled person would conclude from the teaching in D2 that a masterbatch based on a resin and a polypropylene-type polymer had to be used for the preparation of resin-modified polypropylene films.
He could therefore not realize the merit of the invention which is that a high-loaded resin masterbatch comprising a polyethylene carrier polymer can be compounded with a polypropylene blend polymer in order to manufacture a resin-modified polypropylene film without affecting its good properties such as low haze and moisture vapor transmission.

VII. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of Claims 1 to 11, filed on 17 January 2008.

Reasons for the Decision

1. The appeal is admissible.

2. *Novelty*

The claimed process is novel over the cited prior art.

It differs from the process disclosed in D1 in that the resin masterbatch is combined with a polypropylene blend polymer, and from the process according to D2 *inter alia* in that the resin masterbatch is prepared with a carrier polymer comprising polyethylene.

3. *Inventive step*

3.1 The subject-matter of the claimed invention

The invention is concerned with the preparation of resin-modified polypropylene films via a masterbatch route. Accordingly, the process according to Claim 1 comprises the following steps:

(a) the preparation of a resin-masterbatch comprising
  (i) at least 65 wt% of a resin having a R&B softening point measured according to ASTM 28-67 and
  (ii) a carrier polymer comprising polyethylene which has a peak melting temperature (measured by DSC) up to 20°C higher than the R&B softening point of the resin;

(b) the combination of the masterbatch prepared in (a) with polypropylene to form a blend;
(c) the formation of the polymer blend into the polyolefin film.

3.2 The closest prior art

The Board concurs with the Examining Division that D2 is representative of the closest prior art.
The document discloses a process for the preparation of a polypropylene film comprising:

(a) the preparation of a concentrate (ie a masterbatch) comprising
  (i) 60 to 90 wt% of a resin or rosin having a R&B softening point of from 10 to 180°C and
  (ii) 10 to 40 wt% of a carrier polymer which is either polypropylene or (in a less preferred embodiment) a copolymer of propylene with up to 20 wt% ethylene;
(b) the combination of the concentrate (masterbatch) with polypropylene or the above copolymer to form a blend;
(c) the extrusion of the blend to form a film;

(see D2, Claim 14 in conjunction with column 1, line 46 to column 2, line 27).

3.3 The problem to be solved

The claimed process differs therefrom in that

– the carrier polymer comprises polyethylene; and

– no correlation is given between the R&B softening point of the resin/rosin and the peak melting point of the carrier polymer.

The experimental evidence in the application as filed demonstrates that it is possible with the claimed process to prepare masterbatches with a high load of resin and of good quality as regards appearance and shape of the masterbatch pellets and to obtain polypropylene films with good properties as regards clarity, moisture vapor transmission, tensile modulus, tensile strength and elongation, and that these good results are not obtained with a masterbatch with polypropylene as carrier polymer.
This can in particular be derived from the comparison of examples 1, 2, 3, 9 and 10 with comparative examples 1 to 3 (pages 28 to 30, 36/37 and Tables 1 to 6) - concerning the preparation of the masterbatch - and the comparison of examples 16 to 22, 26, 27, 30, 33 with comparative examples 9, 11, 13, 15, 17 (Tables 9 to 14) concerning the preparation of the polypropylene film.

Therefore the problem to be solved is seen in providing a process for the preparation of a resin-modified polypropylene film by processing a high resin-loaded masterbatch into the film without affecting its optical and mechanical properties.

3.4 Obviousness

None of the documents D1 or D2, either alone or in combination, renders the solution to the problem as indicated in Claim 1 obvious.

D2, which is concerned with the preparation of resin-modified polypropylene films, *inter alia* via a masterbatch route, suggests the use of a masterbatch comprising a polypropylene homo- or copolymer as carrier polyolefin. The skilled person learns from this document that the carrier polymer of the masterbatch and the matrix polymer of the film should have the same or at least a similar chemical constitution.
To the same effect is the disclosure in D1 where both the matrix (blend) polymer of the film and the carrier polymer of the resin-masterbatch have to be polyethylene.

Although D1 indicates in the last paragraph on page 11 that with the claimed correlation between the R&B softening point of the resin and the crystalline melting point a high compounding efficiency when making masterbatches with more than 60% resin is achieved, this principle is applied throughout the document for polyethylene-masterbatches which are processed into polyethylene films, ie where the carrier and the blend polymer have the same or a similar chemical structure.

A skilled person starting from D2 and intending to prepare resin modified polypropylene films via a masterbatch route would not therefore be motivated to compound the masterbatch according to D1 into a polypropylene, ie to process a system in which the carrier and the matrix polymer have a different chemical constitution.
Owing to the considerable difference in the crystal melting point of polypropylene (ca 165°C) and

polyethylene (120 to 140°C) the skilled person would rather expect a decrease in the film properties.

In summary, the finding that resin-modified polypropylene films having good mechanical and optical properties can be prepared via the masterbatch technology using a carrier polymer comprising polyethylene is not a teaching that the skilled person being confronted with the above mentioned problem would find in the available prior art.

3.5 Conclusion

The process of Claim 1 according to the main request is therefore inventive over the cited prior art.
The embodiments of dependent Claims 2 to 11 are inventive with the subject-matter of Claim 1.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Examining Division with the order to grant a European patent on the basis of Claims 1 to 11 filed on 17 January 2008, after any necessary adaptation of the description.

The Registrar The Chairman

G. Röhn W. Ehrenreich