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D E C I S I O N
of 4 April 2005

Case Number: T 0973/01 - 3.3.9

Application Number: 95907530.0

Publication Number: 0743902

IPC: B32B 27/32

Language of the proceedings: EN

Title of invention:
Multilayer ethylene copolymer film

Patentee:
Liqui-Box Canada Inc.

Opponent:
The Dow Chemical Company
Sealed Air Corporation
ExxonMobil Chemical Patents Inc.

Headword:
-

Relevant legal provisions:
EPC Art. 123(2), (3), 54, 56

Keyword:
"Amendments - added subject-matter (no)"
"Novelty - implicit disclosure (no)"
"Inventive step - exclusion of hindsight"

Decisions cited:
G 0002/98, T 0395/95

Catchword:
-



Case Number: T 0973/01 - 3.3.9

D E C I S I O N
of the Technical Board of Appeal 3.3.9
of 4 April 2005

Appellant: ExxonMobil Chemical Patents Inc.
(Opponent III) 5200 Bayway Drive
Baytown
TX 77522-2149 (US)

Representative: UEXKÜLL & STOLBERG
Patentanwälte
Beselerstrasse 4
D-22607 Hamburg (DE)

(Opponent I) The Dow Chemical Company
2030 Dow Center
Midland
Michigan 48674 (US)

Representative: Marsman, Hermanus Antonius M.
Vereenigde
Postbus 87930
NL-2508 DH Den Haag (NL)

(Opponent II) Sealed Air Corporation
100 Rogers Bridge Road
Building A
Duncan SC 29334-0464 (US)

Representative: UEXKÜLL & STOLBERG
Patentanwälte
Beselerstrasse 4
D-22607 Hamburg (DE)

Respondent: Liqui-Box Canada Inc.
(Proprietor of the patent) 201 South Blair Street
Whitby
Ontario L1N 5S6 (CA)

Representative: Carpmaels & Ransford
43 Bloomsbury Square
London WC1A 2RA (GB)

Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
3 July 2001 concerning maintenance of European
patent No. 0743902 in amended form.

Composition of the Board:

Chairman: P. Kitzmantel
Members: A.-T. Liu
B. Günzel

Summary of Facts and Submissions

- I. European patent No. 0 743 902 was granted from the PCT application CA 95/00064 (EP 95 907 530.0), filed 8 February 1995 and claiming the priority of the British patent application 9402430.4, filed 8 February 1994.
- II. Three notices of opposition were filed against this European patent. Of the 28 prior art documents named in support of the oppositions, reference will be made to the following in the present decision:
- | | |
|-------|----------------|
| D1a: | WO-A-94 09060 |
| D2a: | WO-A-93 02859 |
| D4a: | US-A-4 521 437 |
| D6a: | WO-A-93 03093 |
| D10a: | EP-A-0 353 655 |
- III. At the end of the oral proceedings on 19 June 2001, the Opposition Division held that the patent, with Claims 1 to 16 as amended according to the main request submitted on the same day, met the requirements of the EPC.
- IV. Appeal was lodged by Opponent 03 on 28 August 2001 against the Interlocutory decision of the Opposition Division announcing the maintenance of the patent in amended form. Two additional documents were also filed with the Statement of the grounds of appeal.

V. A Response to the appeal was filed by letter of 25 June 2002, with an annex containing a Declaration by Alan K. Breck, dated 10 May 2002 (hereinafter referred to as document D31a).

VI. At the oral proceedings on 4 April 2005, the Respondent submitted new sets of amended claims as bases for a main request and first to fifth auxiliary requests.

VII. The independent Claims 1 and 13 of the main request read as follows:

"1. A pouch filled with a liquid, emulsion or paste and formed from a multi-layer film on a vertical form-fill-seal machine, said pouch having transversely impulse-sealed ends, wherein said film has a stiffness of at least 20,000 psi (138 MPa) and wherein said film comprises at least one layer of a sealant film and at least one stiffening layer of high density polyethylene being of greater stiffness than the layer of a sealant film; said sealant film being made from a composition comprising 10 to 100 parts by weight of a copolymer of ethylene and at least one C₄-C₁₀ alpha-olefin manufactured in a polymerization process using a single-site polymerization catalyst and from 0 to 90 parts by weight of at least one polymer selected from a linear copolymer of ethylene and at least one C₄-C₁₀ alpha-olefin having a density of from 0.900 to 0.930 g/cm³ and a melt index of from 0.3 to 2.0 dg/min other than said single-site catalyst polymer, a high-pressure polyethylene having a density of from 0.916 to 0.930 g/cm³ and a melt index of from 1 to 10 dg/min,

and blends thereof; said stiffening layer of polyethylene being formed from polyethylene having a density of at least 0.93 g/cm^3 and a melt index of less than 1 dg/min; said stiffening layer having a thickness of from 5 to 110 μm and said multi-layer film having a thickness of from 40 to 130 μm ."

"13. A process for making pouches filled with liquid, emulsion or paste, using a vertical form, fill and seal apparatus, in which process each pouch is made from a flat web of film by forming a tubular film therefrom with a longitudinal seal and subsequently flattening the tubular film at a first position and transversely impulse heat sealing said tubular film at the flattened position, filling the tubular film with a predetermined quantity of liquid, emulsion or paste above said first position, flattening the tubular film above the said predetermined quantity at a second position and transversely impulse heat sealing said tubular film at the second position, wherein the pouches are formed from a flat web of film made from a multi-layer film comprising at least one layer of a sealant film and at least one stiffening layer of high density polyethylene being of greater stiffness than the sealant film layer; said sealant film being made from a composition comprising 10 to 100 parts by weight of a copolymer of ethylene and at least one $\text{C}_4\text{-C}_{10}$ alpha-olefin manufactured in a polymerization process using a single-site polymerization catalyst and from 0 to 90 parts by weight of at least one polymer selected from a linear copolymer

of ethylene and at least one C₄-C₁₀ alpha-olefin having a density of from 0.900 to 0.930 g/cm³ and a melt index of from 0.3 to 2.0 dg/min other than said single-site catalyst polymer, a high-pressure polyethylene having a density of from 0.916 to 0.930 g/cm³ and a melt index of from 1 to 10 dg/min, and blends thereof; said stiffening layer of polyethylene being formed from polyethylene having a density of at least 0.93 g/cm³ and a melt index of less than 1 dg/min; said stiffening layer having a thickness of from 5 to 110 µm and said multi-layer film having a thickness of from 40 to 130 µm and a stiffness of at least 20,000 psi (138 MPa)."

VIII. The arguments of the Appellant can be summarised as follows:

- There was no basis in the application documents as originally filed for the combination of the feature of "a pouch filled with a liquid, emulsion or paste" with the feature of "a pouch formed from a multilayer film and having transversely impulse-sealed ends". The amendment to Claim 1 of the main request therefore infringed Article 123(2) EPC.
- Since Claim 1 was not entitled to the claimed priority, document D1a was a prior art document according to Article 54(2) EPC.
- The subject-matter of Claim 1 lacked novelty in view of D1a since impulse sealing was a process step and not a product feature suitable for

distinguishing a product so-defined from one having thermally sealed ends.

- In the case that novelty vis-à-vis D1a should be established, D10a would be considered as comprising the closest prior art.
- The technical problem could only be formulated as the provision of a pouch made of an alternative film to that according to D10a. A technical problem relating to the stiffness of the pouch either did not exist or was not solved over the whole scope of Claim 1.
- The solution proposed in Claim 1 was only distinguished from D10a in that a single-site copolymer was incorporated as sealant film. This proposed solution was rendered obvious by any of the teachings according to D1a, D2a and D6a.

IX. The arguments of the Respondent can be summarised as follows:

- At least a substantial part of the subject-matter of Claim 1 was directly and expressly disclosed in the priority document and therefore entitled to the claimed priority. This view was in conformity with decision T 395/95 of 4 September 1997.
- The opposition division's conclusion on novelty with respect to D1a was correct. In particular, seal beads produced by impulse sealing were clearly distinguishable from seal beads produced by thermal sealing.

- D2a, and not D10a, should be considered to comprise the closest prior art because it addressed the same technical problem, namely the leaker rate of pouches packed with liquids and sealed in a vertical form, fill and sealing process.
- With respect to D2a, the technical problem to be solved was the provision of a pouch having an improved leaker rate.
- The solution proposed in Claim 1 was characterised by a sealing layer of single-site ethylene/alpha-olefin copolymer and a stiffening layer of polyethylene having a density of at least 0.93 g/cm^3 .
- The test data in the patent in suit and in Breck's Declaration proved that a pouch comprising the above essential technical features had an improved leaker rate over the prior art.
- D2a actually taught away from the incorporation of single-site copolymers into the sealant film.
- There was no incentive for the skilled person to turn to D1a, D6a or D10a in the search for a solution to the technical problem underlying the patent in suit. Moreover, a combination of the characterising features of Claim 1 was not suggested in any of these or other available prior art documents.

- X. The Appellant requested that the decision under appeal be set aside and that the European patent be revoked.

As main request, the Respondent requested that the decision under appeal be set aside and the patent be maintained with the claims of the main request filed during the oral proceedings. As auxiliary requests 1 to 5, the Respondent requested that the patent be maintained on the basis of any of the first to fifth auxiliary requests, taken in their numerical order.

Reasons for the Decision

Main Request

1. *Amendments*

- 1.1 As submitted by the Appellant, Claim 1 is essentially based on Claim 20 according to the international application published under the PCT (hereinafter designated "original application"). In addition, it contains the amendments that (a) the pouch is filled with a liquid, emulsion or paste, (b) it is formed from a multilayer film and (c) it has impulse-sealed ends. It is also undisputed that the incorporation of the latter two features into the claim results in Claim 1 as maintained by the decision under appeal. Its admissibility under Article 123(2) and (3) EPC was expressly recognised by the Appellant at the oral proceedings before the Board, which has no reason to disagree.

- 1.2 With respect to previous Claim 1, the subject of the interlocutory decision, the only difference resides in the replacement of the feature "flowable material" with "a liquid, emulsion or paste".

It is undisputed that the present list of specific materials is supported by the original description which discloses that "the term "flowable material" ... encompasses materials which are flowable under gravity or may be pumped. Such materials include liquids e.g. ...; emulsions e.g. ...; pastes e.g. ...; preserves e.g. ...; ground meat e.g. ...; powders e.g. ...; granular solids e.g. ...; and like materials" (page 1, lines 9 to 17). Thus, the present amendment is a limitation of the intended use to the packaging of some of the materials originally listed. The Appellant, however, has not submitted that any of the materials to be packaged interacts with the pouch materials in a clearly recognisable way. Neither is it apparent to the Board that such functional relationship should exist. Under these circumstances, the combination of the list of materials to be packaged, specifically "a liquid, emulsion or paste", with the other technical features defining the pouch, is allowable under Article 123(2) EPC. It is undisputed that its incorporation into Claim 1 further restricts the scope of the claim (Article 123(3) EPC).

- 1.3 The amendments leading to the present process Claim 13, as compared to original process Claim 22, are essentially the same as those concerning the product Claim 1. The conclusion with respect to the latter therefore applies mutatis mutandis to present Claim 13.

1.4 The dependent Claims 2 to 12 and 14 to 16 are unchanged with respect to the set of claims maintained in the decision under appeal. Since it was not argued that the requirements of Article 123(2) and (3) EPC with respect to these claims were not satisfied, either in the Statement of the grounds of appeal or during the oral proceedings, the Board does not see any reason to query the conclusion of the Opposition Division in this respect.

2. *Priority*

2.1 According to Article 88(3) EPC, the right of priority covers only those elements of the European patent application (and, consequently, of the European patent) which are included in the application whose priority is claimed. In the present case, the British patent application 9402430.4 does not disclose a pouch formed from a multilayer film having a total thickness of 40 to 130 μm and comprising a stiffening layer of a thickness between 5 and 110 μm . Those technical features being essential for the subject-matter of Claim 1, the right of priority cannot be accepted for said claim. It is all the more so since the option in Claim 1 that the sealant film be made from a composition comprising a linear copolymer of ethylene and at least one $\text{C}_4\text{-C}_{10}$ alpha-olefin having a density of from 0.900 to 0.930 g/cm^3 also lacks a counterpart in the priority document.

2.2 In support of its claim for priority, the Respondent made reference in his letter dated 25 June 2005 (page 2, item 2.2) to the unpublished decision T 395/95. However, the passage of the cited decision concerns the right to

multiple priorities, as laid down in Article 88(2) EPC. Since the question of multiple priorities does not arise here, the cited decision is not relevant for the present discussion. On the other hand, it is established case law that the priority of a previous application in respect of a claim is to be accepted only if the skilled person can derive the subject-matter of the claim directly and unambiguously, using common general knowledge, from the previous application **as a whole** (emphasis added), which is not the case here (see decision of the Enlarged Board of Appeal G 2/98 (OJ EPO 2001, 413), Headnote).

2.3 As a consequence and in accordance with Article 54(2) EPC, document D1a is state of the art for the subject-matter of Claim 1.

3. *Novelty*

3.1 The subject-matter of Claim 1 is essentially a pouch formed from a multilayer film on a vertical form, fill and seal (VFFS) machine, and having transversely impulse sealed ends. As is commonly known, the so-called impulse sealer is a device which has a wire as sealing element mounted in sealing jaws. In operation, the sealing jaws are closed and an electric current is caused to flow through the wire which heats to a pre-established temperature that will melt and fuse the materials (see patent in suit, page 7, lines 1 to 15).

3.2 D1a is essentially directed to films and methods for making these films for use in packaging and wrapping food, beverages and non-food articles (Abstract, Examples and Comparative Examples 1 to 33; Claims 1 to

24). For packaging these goods, a number of methods are proposed, which may be shrink, skin, stretch, form-fill-seal, bag-n-box and vacuum wrap methods (page 1, lines 15 to 18). Where the form-fill-seal process is to be applied, the "filled structure is sealed, typically by heat or ultrasound"; there is no mention of impulse-sealing (page 2, lines 10 to 13). D1a therefore does not directly and unambiguously disclose a "pouch having transversely impulse-sealed ends".

- 3.3 According to the Respondent, conventional heat sealing is by far the most common method used in the form-fill-seal process, in which the sealing jaws that fuse the film are heated and a knife is used to cut the film at the welding seam. For impulse-sealing, in contrast, the sealing jaws are water-cooled while electricity is passed through the wire, which melts and at the same time cuts the film. This results in a narrow sealing bead that has a melted, not a cut edge (see Response to the Appeal, sent by letter of 25 June 2002, paragraph bridging pages 2 and 3). To the Board, it is plausible that these different sealing methods are indeed reflected in the final sealed products. In particular, a seal produced with a heated wire (in impulse-sealing) will be narrower than one produced with heated sealing jaws (in thermal sealing) and will exhibit a differently shaped seam.

With reference to D1a, which mentions at page 2, line 16 "rapid sealing" in connection with VFFS process, the Appellant has alleged that impulse-sealing is the same as thermal sealing (see also Statement of the grounds of appeal, page 10, last two paragraphs). In the cited passage of the description, D1a points out

that "Film structures that provide rapid hot tack performance, hot tack films, are utilized to package food and non-food articles by the form-fill-seal process. ... Achieving rapid sealing or hot tack performance is critical to enabling line speeds to increase..." (page 2, lines 8 to 19). To the Board, this part of the description addresses the properties to be fulfilled by the film to be sealed and does not convey any information as to the method for sealing the film. The Appellant's assertion is therefore not justified by the disclosure of D1a.

Since the Appellant has not advanced any convincing argument, let alone any proof to the contrary, the Board holds that the subject-matter of Claim 1 is at least distinguished from that disclosed in D1a by the technical feature of the "pouch having transversely impulse-sealed ends".

3.4 It is common ground that none of the other available documents disclose a pouch having the combination of technical features stipulated in Claim 1. The subject-matter as claimed therefore satisfies the requirements of Article 54 EPC.

4. *Inventive step*

4.1 The patent in suit is directed to packaging particular fluids using a VFFS apparatus with impulse sealing ("VFFS-IS"). This technical field is expressly reflected in the wording of Claim 1 ("a pouch filled with a liquid, emulsion or paste, formed from a multi-layer film on a vertical form-fill-seal machine, said pouch having transversely impulse-sealed ends"). As

submitted by the Respondent and not refuted by the Appellant, there is a real possibility that, in such processes, the fluid to be packaged may splotch the area to be sealed (see letter dated 25 June 2002, page 3, item 3.2). Even under these circumstances, the seals formed must be strong enough to survive a drop test in which the pouches are dropped from a height onto concrete floor (page 6, line 57 to page 7, line 2; page 7, lines 16 to 24 and page 9, lines 21 to 23). As a consequence, the Board accepts that the technical problems concerned are specific to this art of packaging and involve forming strong seals at high running speeds.

- 4.2 The Board does not agree with the Appellant that D10a should be considered to comprise the closest prior art (see also point 4.6.4 below). This document is essentially directed to a resin laminate suitable for packing liquid, powdery or granular matters such as foods, beverages and chemicals (page 2, lines 8 to 10). The only example of liquid packaging is a bag for individual servings of soy sauce. These bags are made using a filling packer; there is no mention of the use of a VFFS machine (page 7, lines 1 to 5). Furthermore, with dimensions of 60 mm x 70 mm and a low mass of content, the problem of leakage is unlikely to arise when these small sachets are dropped.

Instead, the Board holds that D2a represents the closest prior art document since it also relates to problems associated with the sealing of pouches for liquid packaging using a VFFS machine and the resulting leaker resistance (page 1, lines 3 to 4; page 2, lines 4 to 8; page 7, line 30 to page 8, line 6 and

page 8, lines 16 to 21). In D2a, the pouches are formed from multilayer films comprising a sealant film of ultra low density linear polyethylene (ULDPE) and a core layer of a linear low density polyethylene (LLDPE) having a density greater than 0,916 g/cm³, preferably from 0,916 to 0,935 g/cm³ (page 5, lines 34 to 36; Claims 1 and 2).

4.3 The Board accepts the Respondent's submission that the technical problem to be solved with respect to D2a is the provision of pouches with an improved drop leaker rate (see item 4.1 above).

4.4 To solve the technical problem posed, Claim 1 essentially proposes a pouch formed from a multi-layer film characterised by :

- (a) a sealant film comprising 10 to 100 parts by weight of a copolymer of ethylene and at least one C₄-C₁₀ alpha-olefin, made using a single-site catalyst ("single-site copolymer"), and
- (b) a stiffening layer formed of polyethylene having a density of at least 0.93 g/cm³ and a melt index of less than 1 dg/min ("HDPE core layer").

4.5 According to Breck's Declaration D31a, a commercially available coextruded version of a film according to D2a ("Falla film"; ULDPE sealing layer/LLDPE core layer) was used for producing a pouch. Its drop test performance was compared with that of a pouch made from a film ("Storms film" SM3) according to D4a and constituting a single layer made from a linear copolymer of ethylene and octene-1. As can be assessed

from the test data, the pouches made from films according to D2a and D4a are practically equal in performance (D31a, page 3, paragraph 3; page 4, first paragraph and page 5, last paragraph). On the other hand, the patent in suit shows test data obtained with a pouch made according to Claim 1 (Film 3) and a "Control", which is also according to D4a. These tests show that the pouch made with Film 3 clearly outperforms the "Control" (Table, page 8 and Figure 1). It follows that a pouch according to Claim 1 will also outperform those according to D2a. In addition, the patent in suit shows test data performed on a pouch formed from Film 1, which comprises a single site copolymer in the sealant film but not a HDPE in the core layer. The test results clearly show that such a pouch, with a leaker rate comparable to that of the "Control", does not exhibit the desired reduction of the leaker rate in the drop test (see Figure 1).

The Appellant has neither queried the validity of the test data nor challenged the conclusion drawn in D31a (page 5: "Advantages of the Invention"). The Board therefore finds that the combination of the characterising features (a) and (b) indicated above (point 4.4) is essential and effectively contributes to solving the technical problem posed.

4.6 The question is whether the proposed solution can be deduced from the available prior art in an obvious way.

4.6.1 D2a specifically teaches that the advantages of the films described therein are due to the broad heat sealing temperature range of the sealant polymer (page 2, lines 20 to 30; page 4, lines 17 to 22). In

view of this teaching, the skilled person does not have any incentive to replace the prior art copolymer in the sealant film with a single-site copolymer which is known in the art for its narrow ranges of molecular weight and composition distribution, leading to a narrow heat sealing temperature range.

- 4.6.2 Although D1a is directed to various packaging and wrapping methods requiring diverse performance, it does not mention impulse sealing in connection with the VFFS method (see also point 3.2 above). Furthermore, D1a points out that the single-site copolymers disclosed therein have a narrow melting and heat sealing temperature range compared to prior art ethylene alpha-olefin copolymers which are not made with single-site catalysts (page 18, last paragraph). For the same reason as indicated in the preceding paragraph, the skilled person does not have any incentive for replacing the sealant polymer of D2a having a broad heat sealing temperature range with a single-site copolymer disclosed in this document, with the aim of solving the technical problem related to VFFS-IS.

The Appellant has asserted that D1a would teach the use of tougher film materials, thus indirectly the use of single-site copolymers for reduced leaker rates. However, the statement relied upon, that "... tougher film materials are desired in shrink, skin and vacuum packaging for reduced bag punctures ...", does not relate to the strength of a seal but to the mechanical resistance of "down-gauged films" (page 6, lines 19 to 25). Similarly, the Appellant's reference to the description at page 9, lines 7 to 10, according to which "Films made from polymers produced by Exxon (i.e.

single-site copolymers, remark added by the Board) are also said to have advantages in sealing characteristics as measured by hot-tack and heat-seal curves, but these publications do not discuss shrink characteristics", has no apparent relevance as to the VFFS-IS method as such or to the film properties specifically required for use in VFFS-IS.

- 4.6.3 Although D6a describes a wide range of heat sealed articles, it only makes particular reference to sealing films used as closures for containers, as illustrated in Figure 13, but does not mention impulse-sealed pouch packaging of fluids (page 1, line 26 to page 2, line 2). The heat sealable films used in this prior art comprise ethylene copolymers with a narrow composition distribution (Abstract). Again, in view of the teaching in D2a, the skilled person would not turn to this document in the expectation of a useful solution for addressing the present packaging problem. Furthermore, this document neither discloses nor suggests a multilayer film with a stiffening layer of HDPE.
- 4.6.4 Finally, D10a is not related to impulse-sealed pouches for packaging liquids. Furthermore, it recommends that, for use in packaging, the films should have a wide range of sealing temperatures (page 2, lines 21 to 25). This recommendation clearly precludes the use of single-site copolymers which is an essential feature of the subject-matter of Claim 1. According to D10a, the heat-sealable layer comprises a random copolymer from ethylene and alpha-olefin having a melt index ranging from 5 to 50 g/10 min (page 3, lines 18 to 25). As is pointed out by the Respondent and not refuted by the Appellant, this range of melt index, which is

significantly higher than the melt index of the usual film-grade polyethylenes, is not desirable for use with VFFS-IS. As a consequence, the skilled person has even less incentive to turn to D10a for a solution to the technical problem posed.

4.7 The Appellant has not provided any other prior art document directed to a pouch formed by VFFS-IS wherein the sealant film comprises a single-site copolymer, let alone one suggesting a multilayer film comprising a combination of single-site copolymer film and a HDPE film. The Board therefore concludes that the Appellant has failed to demonstrate that the subject-matter of Claim 1 is an obvious combination of prior art teachings.

4.8 It is undisputed that the process of Claim 13 contains all the essential features for producing a pouch according to Claim 1. The dependent Claims 2 to 12 and 14 to 16 relate to preferred embodiments of the pouch according to Claim 1 and to preferred embodiments of the process according to Claim 13, respectively. The subject-matter of Claims 2 to 16 is therefore also new and involves an inventive step.

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 with the claims of the main request filed during the oral proceedings and the description as maintained by the Opposition Division.

The Registrar:

The Chairman:

G. Röhn

P. Kitzmantel