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D E C I S I O N
of 19 November 2002

Case Number: T 0595/99 - 3.2.5

Application Number: 92200406.4

Publication Number: 0504954

IPC: B29C 55/00

Language of the proceedings: EN

Title of invention:

Microporous film of polyethylene and process for the production thereof

Patentee:

DSM N.V.

Opponent:

Minnesota Mining & Manufacturing Company of 3M Centre

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56

Keyword:

"Novelty (yes)"

"Inventive step (main and first auxiliary request, no; second auxiliary request, yes)"

"Fresh ground for opposition (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 0595/99 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 19 November 2002

Appellant: DSM N.V.
(Proprietor of the patent) Het Overloon 1
NL-6411 TE Heerlen (NL)

Representative: -

Respondent: Minnesota Mining & Manufacturing Company of
(Opponent) 3M Centre
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Representative: Wilhelm, Stefan (DE)
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 1 April 1999
revoking European patent No. 0 504 954 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: W. R. Zellhuber
Members: P. E. Michel
M. K. S. Aúz Castro

Summary of Facts and Submissions

- I. The appellant (patentee) lodged an appeal against the decision of the Opposition Division revoking patent No. 0 504 954.

Opposition had been filed against the patent as a whole based on Article 100(a) EPC (lack of novelty and inventive step).

The Opposition Division held that the subject-matter of claim 1 of a main request of the appellant was not novel, that the subject-matter of claim 1 of a first auxiliary request did not involve an inventive step and that the description of a second auxiliary request did not satisfy the requirements of Rule 27(1)(b) EPC.

- II. The appellant requested that the decision under appeal be set aside and that the patent be maintained as granted, and by way of auxiliary requests that the patent be maintained either on the basis of claims 1 to 11 filed as first auxiliary request during oral proceedings, or on the basis of claims 1 to 7 filed as second auxiliary request together with description pages 1 to 9 also filed during oral proceedings.

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

Oral proceedings before the Board of Appeal were held on 19 November 2002.

- III. The main request of the appellant includes the following independent claims:

- "1. Microporous film of polyethylene, characterized in that the film has a permeability to air of less than 10 s/50 ml and a moisture vapour transmission rate of at least 7500 g/24h.m²."
- "6. Process for the production of a microporous film from a polyolefine by forming a solution thereof in an evaporable first solvent into a film, passing the film through a cooling bath containing a cooling agent and removing the solvent from the film at a temperature below the dissolution temperature and stretching the film in one or more directions in the plane of the film, characterized in that the surfaces of both sides of the film are brought into close contact with a second solvent before the film is contacted with the cooling agent."

The first auxiliary request differs from the main request in that it is additionally specified in claim 1 that "the film has a weight average molecular weight of the polyethylene of at least 10⁶ g/mole".

The second auxiliary request differs from the main request in that claims 1 to 5 are omitted and claims 6 to 11 are renumbered as claims 1 to 7, and that the words "for the polyolefine" are inserted after "with a second solvent" in the characterising portion of claim 1 (former claim 6).

The following documents have been referred to in the written and oral proceedings:

D0: EP-A-0 378 279

D1: US-A-4 539 256

D2: US-A-4 726 989

- D3: EP-A-0 355 214
- D4: US-A-4 744 906
- D5: MVTR v. Gurley
- D6: MVTR v. Gurley based on Examples of patent
in suit
- D7: Experimental Procedure
- D8: Affidavit by Johnston
- D9: Prediction Bands
- D10: Affidavit by Mrozinski
- D11: US-A-4 194 041
- D12: US-A-4 999 222
- D13: MVTR v. Gurley
- D14: Blue film designed experiment
- D15: Comparison of MVTR upright and inverted cup
measurements
- D16: ASTM E 96-80
- D17: ASTM E 96-66
- D18: Comparison of MVTR/Gurley, including
Figure 2.

IV. In the written and oral proceedings, the appellant argued essentially as follows:

The subject-matter of claim 1 of the main request is distinguished over Example 21 of document D1 since the microporous film disclosed in this example does not have a moisture vapour transmission rate (MVTR) of at least 7500 g/24h.m². Since there is no general relationship between permeability to air and MVTR, it is not possible to assume that the film of Example 21 possesses this feature from the fact that the films of Example 23 have an MVTR of 15,000 g/24h.m². In particular, as compared with Example 23, Example 21 uses a material having a different melt flow index and a different mineral oil, at a different temperature and a different degree of stretching.

No arguments had been raised in the opposition proceedings or in the appeal procedure before the oral proceedings concerning the question of inventive step of claim 1. It is therefore not permissible to examine this issue at the oral proceedings, since this would constitute the introduction of a fresh ground of opposition. In the absence of the consent of the appellant, such a fresh ground cannot be introduced. If the Board was of a mind to allow the introduction of the issue, the case should be remitted to the first instance, since the appellant had not had the opportunity of considering any arguments.

The subject-matter of claim 1 of the main request involves an inventive step. If Example 23 of document D1 is regarded as being the closest prior art, then Example 21, whilst disclosing a film having a lower Gurley value, does not provide any indication of what measures should be taken in order to achieve this. This is also true if Example 21 is regarded as being the closest prior art. Similarly, Table 3, appearing at

columns 15 and 16 of document D2, does not provide a teaching to increase the stretching ratios in order to increase Gurley. One could equally use a lower density or a nucleating agent. The teaching of document D10 was ignored in the opposition procedure owing to its inconsistency and should also be ignored in the appeal procedure.

The subject-matter of claim 1 of the first auxiliary request involves an inventive step. The closest prior art is document D3, not document D1, since this document relates to ultra high molecular weight polyethylene (UHMWPE), which has completely different properties as compared with high molecular weight polyethylene. Methods for producing microporous films from high molecular weight polyethylene cannot be applied to UHMWPE, since UHMWPE does not melt and does not undergo phase separation.

The object of the invention is to modify the film known from document D3 so as to reduce the Gurley value and increase the MVTR. D1 does not offer a solution to this problem. The process of document D1 is the phase separation process acknowledged in document D3 at page 2, line 11. The presence of separate phases means that the material is completely different from a gel in which there is no phase separation. The process of document D1 requires the polymer to undergo melt processing. This is not possible for UHMWPE, since it can only attain a molten state without undergoing degradation under extreme conditions.

According to the decision of the opposition division, the subject-matter of claim 1 of the second auxiliary request involves an inventive step. The issue of inventive step of this claim cannot therefore be raised in the present proceedings, in which the respondent (opponent) did not file an appeal.

The subject-matter of claim 1 of the second auxiliary request involves an inventive step. The process disclosed in document D4 does not involve bringing the surfaces of both sides of the film into close contact with a second solvent before the film is contacted with the cooling agent. The cooling agent required by claim 1 of the patent in suit cannot be the second solvent.

V. In the written and oral proceedings, the respondent argued essentially as follows:

The subject-matter of claim 1 of the main request lacks novelty in view of Example 21 of document D1. In view of the fact that the films of Example 23 have an MVTR of 15,000 g/24h.m², it is inevitable that the microporous film of Example 21 will have a moisture vapour transmission rate (MVTR) of at least 7500 g/24h.m². Both examples are concerned with films of high density polyethylene (HDPE), using a mineral oil at a similar blend ratio and a similar method using water quenching and mineral oil extraction followed by stretching.

The films of Example 23 have an MVTR of 15,000 g/24h.m² and Gurley values between 12.3 and 17.4, that is, a little over 10. Therefore, the film of Example 21, which has a Gurley value of 4.8, is more porous than the films of Example 23 and will also have a similarly high MVTR.

In Figure 2 of document D18, the Reeks 3 data, representing the materials of document D12, and the Reeks 4 data, representing the materials of Table 1 of document D18, do not relate to microporous materials, that is, materials having pores of the order of 1µm, and must therefore be neglected. Without these values

and without the values of Reeks 6, accepted by the appellant as being incorrect, the figure shows that there is a clear relationship between MVTR and Gurley values.

The ground of lack of inventive step had been introduced and substantiated in the notice of opposition, so that there was no question of the introduction of a fresh ground.

The subject-matter of claim 1 of the main request does not involve an inventive step. There are a number of approaches to the question of inventive step, depending upon which document is selected as being the closest prior art. One approach is to take Example 23 of document D1 as the closest prior art. The subject-matter of claim 1 only differs from this example in that the film has a higher porosity to air. The object of the invention is thus to provide a material having not only a high moisture vapour permeability, but also a high permeability to air. The prior art, as represented by Tables I and III of document D1 and Table III of document D2 teaches that, by increasing the amount of stretching of the extruded film, the porosity of the film is increased.

The subject-matter of claim 1 of the first auxiliary request also does not involve an inventive step. Either Example 21 or Example 23 of document D1 can be taken as the closest prior art. Document D3 teaches that ultra high molecular weight polyethylene can be used to obtain a microporous film having high strength. It does not involve an inventive step to use an ultra high molecular weight polyethylene in the method of Example 21 or Example 23 of document D1 in order to obtain this advantage and thereby obtain a film as claimed in claim 1.

The processes of documents D1 and D3 are similar. Both involve dissolving the polyethylene in a solvent followed by extrusion and cooling. The sole difference is the removal of a proportion of the solvent before stretching in the process of document D3.

There is thus nothing which would deter the person skilled in the art from combining the teachings of documents D1 and D3 and thus arriving at the subject-matter of claim 1.

The subject-matter of claim 1 of the second auxiliary request also does not involve an inventive step. The closest prior art is document D4, which discloses a process in which the mixture of polymer with an inert liquid is extruded into a bath containing at least some of the inert liquid at a temperature below the separation temperature. An upper layer of the liquid in the bath can be considered as fulfilling the role of the second solvent contacting the surfaces of the film before the film is contacted with the cooling agent. In the alternative arrangement disclosed in document D4, where two or more separate baths at different temperatures are used, the first bath fulfils the role of the second solvent.

The sole feature which distinguishes the subject-matter of claim 1 of the second auxiliary request from document D4 is the step of stretching the film. It is, however, known in the art, as illustrated by document D1, column 7, line 45, that stretching renders the film microporous. The inclusion of this step thus does not involve an inventive step.

Reasons for the Decision

1. *Main request of the appellant*

1.1 Novelty

Example 21 of document D1 relates to a method for making a microporous film of polyethylene having a permeability to air of 4.8 seconds, that is, less than the value of 10 s/50 ml as specified in claim 1. The moisture vapour transmission rate of the film is not, however, specified. The sole point at issue between the parties was whether or not the film produced by following the instructions of Example 21 would inevitably possess a moisture vapour transmission rate of at least 7500 g/24h.m².

The respondent placed particular weight on the fact that the films of Example 23 all have a moisture vapour transmission rate of 15,000 g/24h.m² whilst having values for air permeability of between 12.3 and 17.4 s/50ml. Evidence was produced to the effect that, as would be expected, microporous films having a lower Gurley generally have a higher MVTR; that is, increasing permeability to air is generally accompanied by increasing permeability to liquid vapour. Document D9 shows prediction bands for a plot of MVTR against ln Gurley. These show that, for a particular Gurley value, the MVTR lies within the prediction bands in 95% of cases.

Thus, whilst it is highly probable that the film produced in accordance with Example 21 will have a moisture vapour transmission rate of at least 7500 g/24h.m², it is not inevitable. Such a finding is not sufficient to conclude that the subject-matter of claim 1 lacks novelty.

1.2 Fresh ground for opposition

The appellant objected to the consideration of the issue of lack of inventive step of claim 1 on the basis that this would constitute a fresh ground for opposition.

As stated in the opinion of the Enlarged Board G 10/91 (OJ, EPO 1993, 420), the term "a fresh ground for opposition" at the appeal stage refers to a new legal basis for objecting to the maintenance of the patent which was neither raised and substantiated in the notice of opposition, nor introduced into the proceedings by the opposition division under Article 114(1) EPC. In the present case, the ground of lack of inventive step was raised in the notice of opposition as noted at page 2 of the standard form and substantiated in the facts and arguments accompanying the form in paragraph II, 6 at page 3 and in paragraph III, 1 at page 4.

It is noted that these paragraphs refer to claims 5 and 6 as granted respectively and that the appellant objects to the application of this argument to claim 1. However, all objections of lack of inventive step, regardless of which claim they are directed against, fall within the same ground for opposition and are hence admissible. Since, in the present case, the patent is opposed in its entirety, the decision of the Enlarged Board G 9/91 (OJ, EPO 1993, 408) is not relevant to the present case, since this decision concerns the case in which a patent is not opposed in its entirety, but only in respect of certain claims in accordance with Rule 55(c) EPC (see also decision T 327/92).

The issue of lack of inventive step of claim 1 thus does not constitute a fresh ground for opposition and may be considered in the present proceedings. It is also not considered appropriate to remit the case to the first instance in view of the fact that the documents relied upon were not introduced late.

1.3 Inventive step

The closest prior art is represented by Example 23 of document D1. The subject-matter of claim 1 is distinguished over the films produced in accordance with this example in that, whilst the known films have a permeability to air of 12.3 s/50 ml or more, claim 1 specifies that the film has a permeability to air of less than 10 s/50 ml.

For some applications of microporous membranes, such as filtration, it is desirable for the film to have both a high permeability to air and a high moisture vapour permeability. This combination of properties thus represents a known desideratum which the person skilled in the art would attempt to achieve as a matter of routine.

An object of the invention is accordingly to modify the known film so as to have both a high permeability to air and a high moisture vapour transmission rate.

This is not a case in which the two properties have been regarded as being in conflict with one another or being irreconcilable. Rather, increasing porosity tends in general to increase both permeability to air and moisture vapour transmission rate.

Further, the prior art provides an indication as to how both a high permeability to air and a high moisture vapour transmission rate can be achieved. Thus,

Tables I and III of document D1 as well as Table III of document D2 show that, by increasing the amount of stretching of the extruded film, the porosity of the film is increased. In particular, films C to H of Table III of document D2 shows that by increasing the degree of stretching, the Gurley value can be reduced to 6 s/50 ml. It may be noted that the decrease of density which accompanies the increase in stretching is an indication of the increase in void volume which accompanies the increase in porosity.

It thus does not involve an inventive step to specify a maximum value for the permeability to air of 10 s/50 ml. The subject-matter of claim 1 of the main request of the appellant therefore does not involve an inventive step and the main request is accordingly not allowable.

2. *First auxiliary request of the appellant*

2.1 Novelty

The prior art does not disclose a film having a weight average molecular weight of the polyethylene of at least 10^6 g/mole in combination with the parameters specified in claim 1 of the main request. It may also be noted that novelty of the subject-matter of claim 1 was not in dispute.

2.2 Inventive step

The closest prior art can be regarded as being document D3. This document discloses a microporous film of polyethylene having a weight average molecular weight of the polyethylene of at least 10^6 g/mole (page 3, line 19). The films produced according to the examples, however, possess Gurley values of 60 or more (page 7, Table 1).

As stated above, it is often desirable for the film to have both a high permeability to air and a high moisture vapour permeability, so that the object of the invention is to increase the permeability of the known film to air and moisture vapour whilst retaining the known advantages of UHMWPE, that is, a good chemical and abrasive resistance.

The solution to this object is known from document D1 which suggests to the person skilled in the art that these parameters can be increased by increasing the amount of oil in the extruded blend and increasing the degree of stretching of the film.

It was suggested on behalf of the appellant that the processes of documents D1 and D3 are incompatible, and that the methods taught by document D1 could not be applied to UHMWPE. This is not accepted. Both documents teach a process in which polyethylene is dissolved in a non-volatile solvent and extruded to form a sheet which is then cooled and subsequently subjected to stretching. No significant difference is seen in the conditions to which the polyolefine is subjected in order to obtain an extrudable solution. Document D3 suggests that the UHMWPE should be heated to a temperature of between 140 and 250°C whilst stirring with the solvent. Similar temperatures are reached in the extruder taught by document D1. Document D3 further teaches that the UHMWPE can be extruded relatively easily (see page 3, line 51) and also suggests the use of an antioxidant to protect the polyolefine from degradation by oxidation (page 3, line 42). There is thus no reason for the person skilled in the art to be deterred from submitting an UHMWPE to the process conditions taught by document D1.

The subject-matter of claim 1 therefore does not involve an inventive step and the first auxiliary request of the appellant is accordingly not allowable.

3. *Second auxiliary request of the appellant*

3.1 Amendments

Claims 1 to 7 essentially correspond to claims 6 to 12 as granted. The description is amended to reflect the fact that a microporous film *per se* is no longer claimed and to acknowledge document D1. The amendments thus do not introduce subject-matter which extends beyond the content of the application as filed. In addition, the amendments do not extend the scope of protection conferred and are made in order to overcome a ground of opposition.

The amendments thus comply with the requirements of Article 123(2) and (3) as well as Rule 57(a) EPC. This was not disputed by the respondent.

3.2 Novelty

The prior art does not disclose a process including the step of bringing the surfaces of both sides of the film into close contact with a second solvent before the film is contacted with the cooling agent. The reasoning for the finding of the board that this feature is not disclosed in document D4 is set out below under point 3.4.

3.3 *Reformatio in peius*

It was suggested on behalf of the appellant that the doctrine of *reformatio in peius* prevents any discussion of the issue of inventive step of claim 1 of this request, since, according to the decision of the

opposition division, the subject-matter of this claim involves an inventive step. This cannot be accepted. The position after the conclusion of the proceedings before the opposition division was that the patent had been revoked. It is therefore impossible for the present proceedings to arrive at a result which would be to the disadvantage of the appellant. The principle of *reformatio in peius* can only be applied to the requests of the parties and not to individual aspects of the decision of the opposition division. It will be noted that, if the argument of the appellant were to be followed, this would lead to the absurd result that, since the proceedings before the opposition division resulted in the revocation of the patent, the respondent was not in a position to file an appeal, and would therefore be prevented from contesting any of the points in the decision of the opposition division which were not decided in his favour.

3.4 Inventive step

The closest prior art is represented by document D0, which discloses a process having all the features of the preamble of the claim.

It was suggested on behalf of the respondent that the closest prior art is document D4, the claim only being distinguished over the disclosure of this document by the inclusion of the step of stretching the film in one or more directions in the plane of the film. This is not accepted. In the process of document D4, the mixture of a meltable polymer and a liquid inert to the polymer is extruded at a temperature above the separation or segregation temperature into a bath containing at least some of the inert liquid at a temperature below the separation temperature. In one

preferred embodiment, the temperature in the bath is continuously reduced in the direction in which the film passes and in another preferred embodiment, two or more baths are used.

In any case, the surfaces of both sides of the film are not brought into close contact with a second solvent before the film is contacted with the cooling agent. There is no suggestion in document D4 of the surfaces of the film coming into contact with any liquid before contact with the cooling agent.

Thus, document D0 discloses a process not only having all the features known from document D4 but, in addition, the step of stretching the film in one or more directions in the plane of the film. Document D0 does not, however, suggest bringing the surfaces of both sides of the film into close contact with a second solvent before the film is contacted with the cooling agent.

Examples I to V of the patent in suit, when compared with Comparative Examples A and B, indicate that a process including the step of bringing the surfaces of both sides of the film into close contact with a second solvent before the film is contacted with the cooling agent, as compared with processes in which this step is either omitted or only one side of the film is brought into close contact with a second solvent before the film is contacted with the cooling agent, results in a film having a significantly higher permeability to air.

The object of the invention is thus to provide a process for producing a film having increased permeability to air and moisture vapour transmission rate as compared with the materials known from document D0.

The prior art does not suggest that this object could be achieved by bringing the surfaces of both sides of the film into close contact with a second solvent before the film is contacted with the cooling agent. As stated above, it is not accepted that this step is disclosed in document D4. It is also not suggested by the remaining cited prior art.

The subject-matter of claim 1 of the second auxiliary request of the appellant therefore involves an inventive step. Claims 2 to 7 are directly or indirectly appendant to claim 1 and relate to preferred features of the process of claim 1. The subject-matter of these claims thus also involves an inventive step. The second auxiliary request is accordingly allowable.

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 in amended form on the basis of claims 1 to 7 filed as second auxiliary request during the oral proceedings and the description pages 1 to 9, also filed during the oral proceedings.

The Registrar:

The Chairman:

M. Dainese

W. Zellhuber