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File Number: T 320/89 - 3.3.2

Application No.: 83 307 398.4

Publication No.: 0 143 130

Title of invention: An oriented multi-layer polypropylene structure and a process of preparing the same

Classification: B32B 27/32

**D E C I S I O N**  
of 19 December 1991

Applicant: MOBIL OIL CORPORATION

Headword: Multi-layer structure/MOBIL OIL

EPC Article 56

Keyword: "Inventive step (no) - obvious solution"

**Headnote**



Case Number : T 320/89 - 3.3.2

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.2  
of 19 December 1991

**Appellant :** MOBIL OIL CORPORATION  
150 East 42nd Street  
New York  
New York 10017 (US)

**Representative :** Colmer, Stephen Gary  
Mobil Court  
3 Clements Inn  
London WC2A 2EB (UK)

**Decision under appeal :** Decision of Examining Division of the European  
Patent Office dated 15.12.1988 refusing European  
patent application No. 83 307 398.4 pursuant to  
Article 97(1) EPC.

**Composition of the Board :**

**Chairman :** P.A.M. Lançon  
**Members :** A.J. Nuss  
R.L.J. Schulte

## Summary of Facts and Submissions

- I. European patent application No. 83 307 398.4 was filed on 6 December 1983 and published under No. 0 143 130.
  
- II. The Examining Division refused this application under Article 97(1) EPC on the ground that the subject-matter of Claim 1 as submitted in the letter dated 26 July 1988, did not involve an inventive step.

In its decision, the Examining Division took the view that as a consequence of fatty acid amide bleeding, as described for example in document (3) FR-A-2 028 212, the claimed film structure showed actually the same fatty acid amide distribution as that of example 5 of document (1) US-A-4 293 608. A difference between the claimed and the known film structure existed thus only insofar as the former also contained finely divided silica in the skin layer. However, the man skilled in the art knew from document (1) that the inclusion of anti-blocking agents such as silica in the skin layer would necessarily decrease the coefficient of friction of such films.

Moreover, the addition of silicone oil in the skin layer had been described in document (1) as being extremely desirable in order to obtain a low coefficient of friction at high temperatures. The statement in this document that the effect of the anti-blocking agents would be greater if incorporated in the base layer, did not constitute an obstacle against the incorporation of such an additive in the outer layer, as could be seen from other parts of that document. Therefore, the solution to the problem of obtaining a multilayer polypropylene packaging film presenting a low coefficient of friction over a wide range of temperature was rendered obvious to the man skilled in

the art by the information contained in the state of the art.

Finally, neither the comparative examples included in the application, nor the comparative tests submitted in the letter dated 22 September 1987 were relevant for assessing inventive step, because none of these experiments concerned the closest state of the art.

III. The Appellant lodged an appeal against this decision.

IV. In their written submissions and at oral proceedings, which took place on 19 December 1991, the Appellant only concurred with the contested decision in so far as he also considered document (1) to be the closest prior art document. He objected, however, that in document (1) the problem to be solved was to provide a seal packaging material having: (i) high transparency and gloss, (ii) excellent antistatic properties, and (iii) excellent heat sealability, and that the solution of this problem consisted actually in using, as stretched surface layer of the film, a blend of specific polyolefins in specific proportions. Films with a high-temperature coefficient of friction between 1.0 and 0.8 were considered to be acceptable. In the present application the problem was, however, to provide a multi-layer packaging film suitable for high speed packaging of cigarettes having a low static coefficient of friction over a wide temperature range, i.e. a coefficient of friction of at least as low as 0.25 maintainable as such at least up to 140°F, which was achieved by selecting a unique combination of surface modifying agents: a specific amide; a silicone oil and finely divided silica. In comparison thereto, document (1) solved a different problem with a different technical solution. Consequently, when trying to solve the problem underlying the present application, there was no incentive

for the man skilled in the art to choose from the great variety of additives mentioned in document (1) the three indicated in present Claim 1. Moreover, the examples included in this prior document showed that it was neither required to include silica anywhere, nor to include fatty acid amide in the base layer. Despite the fact that the coefficient of friction values given in document (1) concerned dynamic measures which were systematically lower than the static ones, the lowest value measured between fibres was only 0.35; the best value of 0.16 was a film to metal measure, thus not between films. However, films with such coefficients of friction were not suitable for high speed packaging machines because they would inevitably lead to machine jamming.

Document (3) was also not concerned with the problem raised in the present application. The main object of this document was to provide heat sealable packaging films to be easily opened by a relatively small opening force. The films used there had a coefficient of friction of 0.4-0.8 when measured in accordance with ASTM D-1894-61T, a method for determining the coefficient of dynamic friction. Since this prior art document did not concern high speed packaging of articles, the use in a skin layer of finely divided silica and silicone oil for imparting to a multi-layer film low coefficient of friction over a wide temperature range was not obvious for the man skilled in the art. Therefore, the opinion expressed by the Board at the hearing that document (3) rather than document (1) qualified as closest state of the art would not be shared by the Appellant. Contrary to the present invention, it was not explicitly required there to subject these known films to (biaxial) orientation.

Moreover, the surprising effect of the claimed solution over the prior art solutions was clearly illustrated by

both the examples contained in the application and the additional comparative tests.

V. At the end of the hearing, the Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of Claims 1 to 16 submitted with the Statement of Grounds of Appeal (main request), or alternatively, that a patent be granted on the basis of one of the two sets of claims filed during oral proceedings (first and second auxiliary request).

(i) Claim 1 of the main request reads as follows:

1. A multi-layer film structure comprising (a) a base layer comprising a polypropylene of comparatively high stereoregularity, the precursor resin of which contained an amide of a water-insoluble monocarboxylic acid having from 8 to 24 carbon atoms or a mixture thereof and, on at least one surface of (a), (b) a skin layer comprising a polyolefin of comparatively low stereoregularity and containing finely divided silica and silicone oil, the film structure having been formed by coextrusion and orientation with the migration of at least some of the amide of (a) to the surface of (b).

(ii) Claim 1 of the first auxiliary request differs from that of the main request in that after the feature relating to coextrusion and orientation with the migration of at least some of the amide of (a) to the surface of (b), the phrase "such that the coefficient of friction of the surface of (b) is less than or equal to 0.25 and maintainable to at least 66°C (140°F)" has been added.

(iii) Claim 1 of the second auxiliary request reads as follows:

1. Use, in a multilayer film structure comprising (a) a base layer comprising a polypropylene of comparatively high stereoregularity, the precursor resin of which contained an amide of a water-insoluble monocarboxylic acid having from 8 to 24 carbon atoms or a mixture thereof and, on at least one surface of (a), (b) a skin layer comprising a polyolefin of comparatively low stereoregularity the film structure having been formed by coextrusion and orientation with the migration of at least some of the amide of (a) to the surface of (b), in layer (b) of finely divided silica and silicone oil for imparting to the multi-layer film a low coefficient of friction over a wide temperature range.

#### Reasons for the Decision

1. The appeal is admissible.
2. The claims of all three sets of claims (see point V above) meet the requirements of Article 123(2) EPC because they are adequately supported by the original description; in particular the subject-matter of the "use claims" introduced at the appeal stage is directly and unambiguously derivable from the original disclosure (see original product and process claims; page 2, line 3 ff. and page 5, line 4 ff).
3. The Board has no reason to question the novelty of the subject-matter of the three sets of claims submitted by the Appellant. There is thus no need to further deal with this matter.

4. The only point at issue is that of inventive step.
- 4.1 Contrary to the opinion expressed by both the first instance and the Appellant, the Board does not consider document (1) to constitute the closest state of the art but document (3), i.e. a further relevant document used by the first instance when discussing the question of inventive step in its decision. For determining which document is closer to the claimed invention, the Board has taken account not only of the structure of the multi-layer constructs disclosed in the said documents, but also of the chemical composition of the different layers put in combination. This has led to the finding that in example 5 of document (1), i.e. the example discussed in the contested decision, the amide has been incorporated into the outer or skin layer, whereas in document (3) it is imperatively present in the inner or core layer like in the present case (see document (3), page 6, lines 18 to 26). In view of this relevant difference document (3) is regarded as being the closest state of the art.
- 4.2 Document (3) relates in essence to a composite thermoplastic film useful in packaging said composite film being formed by a coextrusion process and comprising at least two different thermoplastic layers conveniently composed of molecularly different materials in order to provide a composite packaging film which when heat sealed about an article forms a package which is easily opened by a relatively small opening force. As mentioned there, it is known from one of the previous attempts for producing easily openable packages, that orienting a polyolefin film, either uniaxially or biaxially, is a means of lowering the tear resistance of such film. In the preferred film constructions described in document (3), polyolefins are employed for the inner and outer layers;

these polyolefins include polyethylene, polypropylene and ethylene-propylene copolymers. In particular, the polypropylene (homopolymer) may be any of the isotactic polypropylenes (i.e. polypropylenes having greater than 50% isotactic components) commercially available, those having an isotactic content above about 90% by weight being preferred. As to the ethylene-propylene polymers, it is desired that the isotactic component thereof be greater than about 50%, preferably below about 90% by weight. Consequently, the combination of layers described in document (3) corresponds to the multi-layer structures claimed in the present application.

With regard to machinability, conventional slip additive is added to the inner layer of the multilaminate packaging film construction to impart the desired outer surface slip. This affects said slip by migration of slip additive into the outer layer from the inner layer. Suitable slip additives are the fatty amides having carbon chains containing from about 15 to 24 carbon atoms, such as for example stearyl amide oleyl amide or the preferred erucyl amide, and mixtures thereof. Antiblocking agents may also be employed in the outer layer of said films to decrease blocking and also to enhance blooming of the slip additive to the surface film. Suitable antiblock agents are diatomaceous earth and finely divided silica. The amount of slip additive and antiblock agent necessary to effect a suitable coefficient of friction (ASTM D-1894-61T) is readily determinable by the skilled worker for any configuration chosen. Depending on the amounts added, it is possible to obtain polypropylene inner layers having a coefficient of friction of 0.4-0.8 (see page 1, lines 1 to 10 and lines 20 to 36; page 2, line 7 to page 3, line 8; page 5, lines 16 to 18; page 6, line 15 to page 8, line 10).

- 4.3 In relation to the above closest prior art, the problem to be solved by the present European application is to provide a multi-layer packaging film with improved coefficient of friction in view of its use in high speed automatic packaging machinery.

The solution to this problem consists in a multi-layer film structure having a skin layer containing a combination of finely divided silica and silicone oil as defined in Claim 1 of both main and first auxiliary requests.

A (static) coefficient of friction of less than 0.25 (maintainable as such up to 140°F or 60°C) having been obtained with the multi-layer structure disclosed in example 2 of the present application, the Board is satisfied that the technical problem stated above is indeed solved by said combination of additives.

- 4.4 The Appellant has not contested that in view of the teaching provided in document (3), the man skilled in the art would have produced (oriented) coextruded multi-layer packaging films composed of the same polymer materials as those described in the present application and in which the base layer contains a fatty amide as slip additive for imparting outer surface slip, whereas the outer layer of said films contains finely divided silica, the function of which is to decrease blocking and also to enhance blooming of the slip additive to the surface film. As stated in that document such films lead to packages which are easily opened by a relatively small opening force. However, as explained in its introductory part, it is known that by orienting a polyolefin film the tear resistance of the film is lowered. Therefore, if for a certain type of product the man skilled in the art had preferred to use a multi-layer film for producing a package to be torn open

rather than one to be easily opened, he would certainly not have hesitated to subject the film to conventional orientation. In view of this, the Appellant's objection concerning the absence of orientation in the known multi-layer packaging films is only relevant for establishing the novelty of the claimed films, which is not contested, but not for refuting the obviousness of such measure. Apart from being obvious, the orientation or stretching of the film is manifestly of little importance for deciding whether the claimed solution is inventive or not because it has been maintained during the whole proceedings that the essential character of the alleged invention lies in the combined presence of silica and silicone oil in the skin layer (see in particular letter dated 26 July 1988, page 2, third paragraph) and the present application, page 2, lines 3 to 6 (cf. T 37/82, OJ EPO 1984, 71).

The Appellant's persistency in considering document (1) to be closer to the alleged invention than document (3) is thus not only at variance with the facts but also with his further submission that, in comparison to the present application, document (1) solves a different problem with a different technical solution.

- 4.5 When trying to lower the coefficient of friction of packaging films such as those mentioned above so that they can be used in high speed automatic packaging machines, the man skilled in the art would have noticed that document (1) relates to olefinic packaging laminates of the said type comprising a base layer formed of (isotactic) polypropylene and at least one surface layer composed of a blend of two different propylene polymers which can be used in conventional automatic packaging machines with ease. These films are stated to have a number of excellent properties such as lubricity in sliding and separability from a hot plate, which makes

them useful for repackaging a single article or a mass of articles previously packed in a case or a mass of articles previously packed in a case, or the like, in their sealed state. The importance of this is immediately apparent from the background information provided in this document: automatic packaging machines have been operating at a higher speed with a higher efficiency for use on such automatic packaging machines, the packaging materials are therefore required to have a number of properties such as lubricity between packaging material and the metal guide portion of the automatic packaging machine, separability and slideability between the packaging material and the hot plate, flow preventing properties on sliding between the packaging material and the packaging machine.

In order to reduce the coefficient of friction at the heated state it is therefore suggested in document (1) to include silicone oil in the surface layer of the composite film. Apart from improving said coefficient silicone oil also reduces the slide resistance caused during hot plate seal by an automatic packaging machine and thus prevents generation of wrinkles. Moreover, the combined use of silicone oil and a lubricant like a fatty acid amide prevents stick-slip at a temperature of room temperature to 100°C which is apt to occur by the sole use of the silicone oil and improves the lubricity between the film and various metal guide plates of the automatic packaging machine to prevent bad packages (see in particular column 1, line 1 to 42; column 2, line 32 to 39; column 7, line 9 to 64).

- 4.6 There can thus be no doubt that the man skilled in the art would have realised that by incorporating silicone oil into the surface layer of a packaging film of the type known from document (3) (see point 4.4 above), he would be able to immediately solve the technical problem as defined

in point 4.3. It should be clear from the preceding paragraphs that the packaging films produced in this way would necessarily correspond to those of Claim 1 of the Appellant's main request.

Consequently, the experimental results to be found in example 2 of the present application as well as those of the additional comparative tests submitted in the letter dated 22 September 1987 (see in particular last two paragraphs) only confirm what the man skilled in the art could reasonably expect. Therefore, the additional recording in Claim 1 of Appellant's first auxiliary request of such a result, viz. that of example 2 of the present application, can only lead to repeat what has already been said above.

It also follows from the preceding paragraphs that the use as claimed in accordance with Appellant's second auxiliary request is rendered obvious to the man skilled in the art.

5. In view of the foregoing, the Board has come to the conclusion that the main claim of all three sets of claims submitted by the Appellant does not involve an inventive step in the sense of Article 56 EPC. Under these circumstances, the Appellant's three requests have to fail.

**Order**

**For these reasons, it is decided that:**

The appeal is dismissed.

The Registrar:

P. Martorana

The Chairman:

P.A.M. Lançon