

Veröffentlichung im Amtsblatt	Ja/Nein
Publication in the Official Journal	Yes/No
Publication au Journal Officiel	Oui/Non

Aktenzeichen / Case Number / N^o du recours : T 386/87 - 3:3.2

Anmeldenummer / Filing No / N^o de la demande : 80 302 168.2

Veröffentlichungs-Nr. / Publication No / N^o de la publication : 0 023 389

Bezeichnung der Erfindung: Metallized films and method of producing them

Title of invention:

Titre de l'invention :

Klassifikation / Classification / Classement : B32B 15/08

ENTSCHEIDUNG / DECISION

vom / of / du 13 June 1990

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /

Titulaire du brevet :

Imperial Chemical Industries PLC

Einsprechender / Opponent / Opposant :

Hoechst AG

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Art. 56

Schlagwort / Keyword / Mot clé :

"Inventive step (no) - obvious alternative"

Leitsatz / Headnote / Sommaire



Case Number : T 386/87 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal
of 13 June 1990

Appellant : Imperial Chemical Industries PLC
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Representative :

Decision under appeal : Decision of Opposition Division of the European Patent
Office dated 11 September 1987 revoking European patent
No. 0 023 389 pursuant to Article 102(1) EPC.

Composition of the Board :

Chairman : P. Lançon
Members : A. Nuss
C. Holtz

Summary of Facts and Submissions

I. European patent 0 023 389 was granted with ten claims on 14 November 1984 in response to European patent application No. 80 302 168.2, filed on 27 June 1980.

II. The Respondent (Opponent) filed a notice of opposition against the patent on 30 July 1985, requesting revocation on the ground of lack of inventive step. From the ten documents filed in support of the opposition, only the following two need to be considered for the purpose of the present decision:

(1) US-A-3 620 825

(6) GB-A-1 440 317.

III. In a decision dated 11 September 1987, the Opposition Division revoked the patent on the ground that neither the claims as granted, nor the claims of the two amended versions, submitted in the course of opposition proceedings, involved an inventive step.

In its decision, the Opposition Division stated, *inter alia*, that it would have been obvious for a skilled person to replace the adherent layer described in document (1) by that known for example from document (6), in order to get to a multiple-layer, possibly coextruded, metallised film as claimed. Although in (6) the adherent layer was not metallised, this prior document was nevertheless considered to be relevant since conventional metallising in accordance with the patent in suit did not necessarily mean that the entire surface of the adherent layer be covered with a metallic layer, the unmetallised portions enabling packages to be formed by conventional heat-sealing techniques. For the rest, surface treatment before

metal deposition was well known in the art as could be seen from document (1).

- IV. The Appellant (Proprietor of the patent) filed a notice of appeal against this decision on 3 November 1987 together with a debit order for payment of the appeal fee. A Statement of Grounds of Appeal was filed on 8 January 1988.

In this Statement, the Appellant argued that in document (1) one and the same isotactic propylene homopolymer was used for the base film and the coating and that, therefore, this document did not teach the potential utility of a propylene copolymer in the production of a metallised film, whereby at the same time a general undesirability in respect of the use of such copolymers was created in consequence of the stated reduction of the optical qualities of the polypropylene base film. Moreover, in order to promote adhesion of subsequently applied coatings, the intermediate coating should be oriented in only one direction and the degree of orientation should be less than that of the base film. This was achieved by applying the intermediate coating onto a monoaxially stretched base film obtained after the first stretching operation. Since such a disclosure would not lead a skilled man to expect adequate adhesion to be promoted by a composite substrate in which the base and intermediate layers were simultaneously coextruded, and therefore biaxially oriented, there existed no reason to adopt the coextrusion teaching of document (6) in order to get to a film as claimed. The "test report" submitted on 17 June 1987 clearly established the advantages over the closest prior art.

- V. The Respondent agreed with the decision taken by the Opposition Division, essentially for the reason that

Appellant had failed to present any new and valid viewpoint which would allow a different appreciation of the case. In his opinion, document (1) actually taught corona-discharge treatment of composite films, comprising for example a copolymer coating, before applying a metal layer on said coating. Moreover, the comparison made by the Appellant concerned a single layer film which did not represent the closest state of the art.

VI. In a communication dated 11 April 1990, the Board drew the attention of the parties to document JP-A-52-68279 (13), which had come to the Board's notice in connection with another case.

VII. Oral proceedings took place on 13 June 1990, in the course of which the Appellant expressed the view that document (13) was not relevant, essentially for the following reasons:

- no mention of metallised films in this document,
- superior processability concerned adhesion of cellulosic inks to polypropylene films,
- long list of copolymers of ethylene, or propylene, with an α -olefin having at least 4 carbon atoms to be used as (intermediate) layer B, not described as random copolymers,
- transparency of films obtained not satisfactory.

He further submitted that document (1) led away from coextrusion and therefore from the patent in suit. According to Example 8 of this prior art, the same isotactic homopolymer was used for both base and coating. In addition, the latter should be oriented in only one direction and its degree of orientation should be less than that of the base film. Thus, no ethylene rich copolymer coating layer was described and no biaxially

oriented composite film was obtained. Furthermore, document (6) was not concerned with metallising. As for the rest, the comparative tests submitted earlier in the proceedings provided a valid comparison on the basis of the only distinguishing feature which was relevant for the adhesion of the metallic layer, viz. the nature of the adherent layer.

The Respondent contended that it was known from document (13) that the specific ethylene copolymers used as layer B in the multiple-layer films described there exhibited excellent adhesion to metal foil. In addition, surface treatment by corona discharge as well as the use for packaging was also mentioned. In the absence of specific indications said copolymers had to be considered as random in accordance with common practice. This was confirmed by document (6) in which such copolymers were indeed described as random. Moreover, Example 8 of document (1) showed that an amorphous material led to good adhesion, but not a crystalline one. It was therefore obvious to try also those mentioned in (13) known for their outstanding adhesion to metal.

VIII. At the end of the hearing before the Board, the Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the claims received on 8 January 1988, i.e. claim set A (main request), or alternatively, by way of auxiliary requests, that the patent be maintained on the basis of one of the claim sets B and C filed on the same date.

The Respondent requested that the appeal be dismissed.

IX. Independent Claims 1 and 9 of claim set A read as follows:

"1. A multiple-layer metallised film of total thickness from 2.5 to 150 μm comprising a substrate layer of a polymer or copolymer of an alpha-olefin, the molecule of which contains from 2 to 6 carbon atoms, having on at least one surface thereof a coextruded adherent layer of a polymer different from that of the substrate and comprising a random copolymer of ethylene with from 0.25 to 15% by weight of the copolymer of an alpha-mono-olefin containing from 3 to 6 carbon atoms in its molecule, and a metallic layer on the surface of said adherent layer remote from the substrate, said remote surface having been subjected to a surface-modifying treatment prior to the deposition of the metallic layer, and the metallic layer having a thickness of from monoatomic proportions to 50 μm .

9. A method of producing a multiple-layer metallised film according to any one of the preceding claims comprising coextruding said substrate and adherent layer to form a composite structure comprising a substrate layer having an adherent layer on at least one surface thereof, stretching said structure to orient the substrate, subjecting the surface of the adherent layer remote from the substrate to a surface-modifying treatment, and depositing the metallic layer on the modified surface of said adherent layer."

Claim set B introduces the further limitations that:

- (a) the film is defined as a packaging film,
- (b) the coextruded composite polymer structure is biaxially oriented, and
- (c) the thickness of the metallic layer is from 0.005 to 15 μm .

Claim set C introduces the still further limitations that:

- (a) the substrate layer is a polymer or copolymer of propylene,
- (b) the metallic layer is applied by vacuum deposition, and
- (c) the thickness of the metallic layer is from 0.01 to 0.05 μm .

In addition to the foregoing limitations, both claim sets B and C are associated with a preliminary note, preceding the eight claims of each set, which reads as follows:

"The Proprietor makes no claim to a laminated structure comprising a metal structure having thereon a layer of an essentially antioxidant-free normally solid polymer of a 1-olefin having from 2 to 4 carbon atoms per molecule as disclosed in US-A-3 527 667."

Reasons for the Decision

1. The appeal is admissible.
2. There are no objections to claim set A, B or C under Article 123(2) and (3) EPC. The amendments to be considered are all limitations which are adequately supported by the description as originally filed (cf. page 2, lines 1 and 2; page 4, lines 7 to 9 and lines 16 to 22; page 5, lines 22 to 34; page 6, lines 8 to 10 and 14; page 7, lines 5 to 25 of the original description). They do not lead to an extension of the protection conferred (cf. claims as granted).

3. The patent in suit relates to metallised films and a method for producing them.

3.1 Document (1) is regarded as the closest state of the art, fixing the point of departure for judging the alleged invention as defined in the present claims. This document is concerned with films of isotactic polypropylene which have been oriented in at least one direction. Such films are suitable for many fields of application, because of their mechanical strength, their optical clarity and surface gloss, and their low vapour permeability. The citation relates especially to a biaxially oriented film of isotactic polypropylene which is provided on at least one surface thereof with a coating which may be an isotactic polypropylene or a copolymer of propylene and up to 15% by weight of ethylene; the coating being substantially unoriented in the first stretching direction and less oriented than the base film in the second stretching direction. The biaxially stretched supporting or base film of such composite film may have any desired thickness, whereas that of the coating is in the range of about 0.2 to 4 μm . A heat-sealable film thus produced displays improved adhesion characteristics when compared to uncoated, but oriented, films of isotactic polypropylene, which have the significant drawback that, due to the nonpolar character of the material and its high degree of molecular orientation, their adhesion e.g. to heat-sealing layers, metal layers and the like is poor (see Claim 1; col. 1, lines 9 to 19; col. 2, lines 4 to 18 and lines 33 to 38; col. 3, lines 1 to 4).

As described in Example 8, a composite film comprising both a longitudinally and transversely stretched isotactic polypropylene film coated on both sides with only transversely oriented layers of the same polypropylene,

was provided with an aluminium layer in the normal manner, by vacuum deposition. The bonding strength of the metal layer to that film was 400 g/cm, whereas a composite film prepared in the same manner, but without an intermediate polypropylene layer, had a bonding strength of only 240 g/cm. The non-metallised coated film had been prepared as described in Example 1, so that the substrate film had a thickness of 25 μm and each of the adjacent layers a thickness of 0.8 μm .

- 3.2 The technical problem in respect of document (1) could only be seen in providing an alternative for the known multiple-layer metallised film.
- 3.3 The solution to this problem is a composite film as defined in one of the alternative sets of claims A, B and C (see point IX above).

Examples 1, 3 and 4 to 16 of the patent in suit show that the problem is indeed solved by all three proposals.

- 4. In the absence of any document which discloses the multiple-layer metallised film as defined in either claim set A, B or C, the subject-matter of all these claims is new. This was not disputed by the Respondent.
- 5. It remains, therefore, to be examined whether the requirement for inventive step is met by one of the claimed solutions to the technical problem as indicated under 3.2 above.
 - 5.1 It is known from document (1) that the poor adhesion of heat-sealing or metal layers to biaxially oriented polypropylene (co)polymer films is due to the nonpolar character of the latter and its high degree of molecular orientation, but that an additional, intermediate layer of

the same material, which is however substantially unoriented in the first stretching direction and less oriented than the base film in the second stretching direction, is quite sufficient to provide heat-sealable films with improved adhesion characteristics, in particular considerably improved bonding strength in respect of a metal layer (aluminium) obtained in the normal manner, by vacuum deposition (see point 3.1 above).

In view of this teaching, the man skilled in the art, confronted with the problem of finding an alternative thereto, would certainly have tried to find out if there existed other intermediate layers suitable to provide adequate adhesion between the polypropylene substrate and the metallic layer, especially since this would allow to continue to use the known base layer or substrate which has quite a number of outstanding properties, making it suitable for many applications as pointed out in (1). He would, therefore, not have ignored document (13) which is also concerned with polypropylene composite films, in particular such expected to have a number of properties like high printing ink adhesion, metal foil adhesion, heat-sealing characteristics and transparency (see item 3, first paragraph). The explicit pointer to metal foil adhesion and heat-sealing characteristics is too apparent to be ignored by the man skilled in the art in that situation.

The polypropylene composite films described in document (13) comprise a base layer (layer A) coated with at least a further layer (layer B). Although layer A may be polypropylene or a copolymer of propylene and ethylene, like in document (1), layer B is composed of a different polymer, viz. a copolymer of ethylene and/or propylene with 1-50%, preferably 2-8% of an α -olefin having 4 or

more carbon atoms, such as butene-1, hexene-1, or 4-methylpentene-1; especially a layer B of ethylene - α -olefin copolymer exhibits excellent adhesion to printing inks containing cellulose derivatives or to metal foil. Such films may be prepared by various methods, such as coextrusion and melt-extruding lamination and both layers are at least uniaxially stretched. In the case of simultaneous biaxial stretching orientation, any tentering and inflation method may be adopted.

It is preferable that the film comprises 3 or more layers rather than two layers. For general purposes, the thickness of layer B (surface layer) is 0.1 to 10 micron, preferably 0.4 to 5 micron, after completion of the stretching process. Such films may be used not only as a packaging material, but also for metal-adhering tapes.

Although no metallised film is explicitly disclosed there, it is clear from the above that excellent adhesion to metal is to be expected from such films, due to the particular coating applied to the substrate. The man skilled in the art would therefore not hesitate to consider both the films and the coatings described in (13) as suitable substitutes for those known from (1).

5.2 It is true, as suggested by the Appellant, that not each and every detail of the claimed solution is disclosed in document (13). This is however not required when dealing with inventive step, because if this were the case, the document would be relevant for the question of novelty. What matters, is the teaching drawn from a document, which in the present case provides a strong incentive to the man skilled in the art to produce for the field of packaging coextruded, biaxially oriented composite films metallised by normal vacuum deposition, whereby the substrate and the coating layers correspond largely to those now claimed, in

particular those described as preferred or exemplified in the patent in suit. The same applies to the thickness of the substrate (25 μm) and coating (0.1 to 10 μm).

For the rest, metallisation by vacuum is a conventional technique as acknowledged in the patent in suit (see col. 4, lines 33 to 47). Therefore, in precisising the thickness of the metal layer (0.01 to 0.05 μm), the present claims merely express the result to be expected by the skilled man when applying this known technique. There is nothing in the whole file which would suggest that the thickness of the metal layer is unusual or critical.

Moreover, the Appellant made it quite clear at the hearing before the Board that actually the nature of the adherent layer is the only distinguishing feature relevant for the adhesion of the metallic layer.

- 5.3 The Appellant insisted on the fact that it is nowhere stated in document (13) that the copolymers used for the adhesive layer B are random. In the opinion of the Board, this omission is however common practice when speaking about polymers having just the normal statistical distribution. Be that as it may, the Board considers that there is another reason why this must have been obvious to the man skilled in the art, viz. that it is known from document (6) that such heat-sealable copolymers are necessarily random in view of their method of preparation (see page 1, lines 25 to 80; page 2, lines 11 to 16 and lines 32 to 42). If however layer B cannot be distinguished from the coating used in the patent in suit, the Board has no reason to believe that it will lead to composite films with transparency properties substantially inferior to those of the claimed ones.

The same applies to the surface-modifying treatment mentioned in the claims, which covers chemical and physical treatments preceding metallisation (see col. 4, lines 6 to 18 of the patent in suit). Such treatment is described in document (1) as making the surface of biaxially stretched isotactic polypropylene films more suitable for a subsequent coating or a metallisation process (see col. 1, lines 30 to 36), and in document (13) it is said that corona discharge treatment leads to films which exhibit excellent adhesion to an ink that contains cellulosic derivatives. This shows however that there is nothing unusual in carrying out such treatment on polypropylene wrapping films, whether coated with a heat-sealable layer or not, before applying the final coating of ink or metal. Moreover, experiments A and B of Appellant's "Test Report" show that with or without corona discharge treatment, the adhesion of the metal to the claimed film is the same. Apart from being obvious, this treatment is thus not even an essential feature of the claimed solution and therefore of no relevance for the question of inventive step (see decision T 37/82, "Low-tension switch/SIEMENS", OJ EPO 1984, 71).

6. Finally, the comparative tests submitted by the Appellant (cf. "Test Report") cannot be considered to be relevant for demonstrating an unexpected or surprising improved effect vis-à-vis the closest state of the art because, unlike the situation described in decision T 197/86 (see OJ EPO 1989, 371, in particular point 6.1.3 of the Reasons), the elements of the comparison were modified by the Appellant in a way that they no longer differ by the only distinguishing feature, i.e. the nature of the adherent layer. The film used in Experiments C and D corresponds manifestly neither to the base film nor to the coating layer used in Example 8 of document (1); the single film is uncoated and has a thickness of 25 μm ,

which is typical for the substrate, but is uniaxially oriented, which is typical for the coating layers. Obviously, such a variant cannot be considered to come closer to the claimed films than the composite film described in document (1).

7. It follows from the preceding paragraphs that the claimed solution, i.e. a metallised film in accordance with the claims of claim set A, B or C, is obvious to a person skilled in the art and, therefore, does not involve an inventive step in the sense of Article 56 EPC. The result is that Appellant's three requests have to fail.

Order

For these reasons, it is decided that:

The appeal is rejected.

The Registrar:

The Chairman:

M. Beer

P. Lançon