AUSTRALIA

PATENTS ACT 1990 675813

PATENT REQUEST : STANDARD PATENT

I/We being the person(s) identified below as the Applicant(s), request the grant of a patent to the person(s) identified below as the Nominated Person(s), for an invention described in the accompanying standard complete specification.

Full application details follow:

[71/70] Applicant(s)/Nominated Person(s):

W. R. Grace & Co.-Conn.

of

1114 Avenue of the Americas, New York, New York, 10036, United States of America

[54] Invention Title:

Packaging material and method of making a packaging material

[72] Name(s) of actual inventor(s):

Walter B. MUELLER

[74] Address for service in Australia:

DAVIES COLLISON CAVE, Patent Attorneys, 1 Little Collins Street, Melbourne, Victoria, Australia. Attorney Code: DM

Basic Convention Application(s) Details:

[31] Application Number	[33] Country	Code	[32] Date of Application
030,750	United States of America	US	12 March 1993

DATED this FIRST day of MARCH 1994

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a member of the firm of DAVIES COLLISON CAVE for and on behalf of the applicant(s)

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NOTICE OF ENTITLEMENT

We, **W. R. Grace & Co.-Conn.**, the applicant/Nominated Person named in the accompanying Patent Request state the following:-

The Nominated Person is entitled to the grant of the patent because the Nominated Person derives title to the invention from the inventor by assignment.

The Nominated Person is entitled to claim priority from the basic application listed on the patent request because the Nominated Person is the assignee of the applicant in respect of the basic application, and because that application was the first application made in a Convention country in respect of the invention.

DATED this FIRST day of MARCH 1994

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(54) Title
PACKAGING MATERIAL AND METHOD OF MAKING A PACKAGING MATERIAL

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(71) Applicant(s)
W.R. GRACE & CO.-CONN.

(72) Inventor(s)
WALTER B. MUELLER

(74) Attorney or Agent
DAVIES COLLISON CAVE , 1 Little Collins Street, MELBOURNE VIC 3000

(56) Prior Art Documents
US 5077123
US 4769262

(57)

The present specification, at page 6, provides that bonding by corona treatment is preferred and states that "bonding techniques in which a separate adhesive is used may be less desirable where certain end uses, such as lettuce packaging, are combined with certain types of machinery for creating a finished package". Heretofore, the direct bonding of a sealant film to polymethylpentene by corona treatment had not been known. Thus, the invention as now claimed represents an advantageous advance in the art of packaging.

CLAIM

1. A laminate comprising a first film containing a layer of polymethylpentene polymer; and a sealant film bonded directly to said polymethylpentene layer of said first film by corona treatment of at least one of said films.

12. A method of producing a packaging film comprising:

providing a film containing polymethylpentene polymer,

providing a polymeric sealant film, and

bonding the films together to form a laminate by corona treating at least one of said films.

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PATENTS ACT 1990

COMPLETE SPECIFICATION

NAME OF APPLICANT(S):

W. R. Grace & Co.-Conn.

ADDRESS FOR SERVICE:

DAVIES COLLISON CAVE
Patent Attorneys
1 Little Collins Street, Melbourne, 3000.

INVENTION TITLE:

Packaging material and method of making a packaging material

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

The present invention is directed to a packaging material and a method of producing the packaging material. The packaging material is a laminate of a polymethylpentene film and a sealant film wherein the films may be bonded by corona treatment.

Background Of The Invention

Many products are marketed in packages formed by wrapping a flexible transparent film around the product. Food products such as cauliflower, broccoli, and lettuce are typical of products benefited by this type of packaging since the flexible transparent film protects the product and provides for visual inspection of the product.

In the packaging of produce such as cauliflower, broccoli and lettuce it is also desirable to provide a packaging material with a high oxygen transmission, yet with low moisture transmission rates to resist a loss of moisture from the food product.

Summary of the Invention

There is now provided a laminate comprising a first film containing a layer of polymethylpentene polymer; and a sealant film bonded directly to said polymethylpentene layer of said first film by corona treatment of at least one of said films.

There is further provided a method a producing a packaging film comprising:

providing a film containing polymethylpentene polymer,

providing a polymeric sealant film, and

bonding the films together to form a laminate by corona treating at least one of said films.

In certain embodiments the present invention provides a packing material suitable for packaging produce such as cauliflower, broccoli, and lettuce.

In certain embodiments the present invention provides a packing material which has high oxygen transmission and heat resistance.

Further, certain embodiments of the present invention provide a method of producing a packaging material which comprises a laminate having a first layer of polymethylpentene film and a second layer of a sealant film, wherein the films are bonded by corona treatment.

Brief Description of the Drawings

The invention can be further understood by reference to the following figures, wherein:

Fig. ' is a schematic cross sectional view of a preferred embodiment of the laminated packaging material of the present invention;

Fig. 2 is a schematic of a preferred embodiment of the process of producing the laminated packaging material of the present invention.

Detailed Description Of The Invention

In carrying out the objectives of the present invention, a packaging film and a method of producing a packaging film are described herein. The packaging film is a laminate which comprises a first layer of polymethylpentene film and a second layer of a sealant film, wherein the polymethylpentene film and the sealant film may be bonded by corona treatment.

In a preferred embodiment, Figure 1 shows a two layer laminate 10 which includes a layer of polymethylpentene film 11 and a layer of a sealant film 12. The polymethylpentene film may be a composition of any of the various conventional homopolymers, copolymers, or blends of polymethylpentene.

The thickness of the polymethylpentene film may be in the range of 0.1-10 mils, with a preferred range of 0.5-2.0 mils.

The sealant film may be composed of any conventional sealant film compatible with the polymethylpentene film. The sealant film may be a single layer or multiple layers. In a preferred embodiment, the sealant film may comprise a material selected from the group consisting of an ethylene vinyl acetate copolymer, an alpha-olefin copolymer, a lower density alpha-olefin copolymer, an antiblocking agent, a tie layer, a copolyester and mixtures or layers of these. Monolayer and multilayer sealant films can be made by extrusion, coextrusion, lamination, and other techniques well known in the art.

EVA is a preferred material for a sealant layer of a multilayer sealant film 12. "Sealant layer" is used in this special context to denote a layer which is to be bonded

to the polymethylpentene film 11, preferably by corona bonding. High vinyl acetate content EVA resins are especially preferred, i.e. VA content of more than 10% by weight of the EVA, more preferably 18% or more.

The term "ethylene vinyl acetate copolymer" as used herein for a type of polyethylene refers to a copolymer formed from ethylene and vinyl acetate monomers wherein the ethylene derived units in the copolymer are present in major amounts and the vinyl acetate derived units in the copolymer are present in relatively minor amounts. Ethylene vinyl acetate copolymer is known for its structural strength and for providing excellent adhesion to an adjacent layer.

The term "tie layer" as used herein refers to an adhesive layer between adjacent layers. Tie layers within the sealant film may be identical or different from each other, and may include a wide range of polymeric adhesives, preferably anhydride-grafted polyolefins including those based on an ethylene vinyl acetate copolymer, a polypropylene, or an alpha-olefin copolymer. Commercial examples of such materials are those marketed under the name Plexar available from QUANTUM/USI, the CXA series from DuPont, and the like.

The term "alpha-olefin copolymer" as defined herein refers to copolymers of ethylene (or propylene or butene) with one or more comonomers selected from C_3 to about C_{10} alpha-olefins but especially comprises ethylene copolymers with C_4 to about C_{10} alpha-olefins such as butene-1, pentene-1, hexene-1, octene-1, and the like in which the polymer molecules comprise long chains with few side chains or branches and sometimes are referred to as linear polymers. These polymers are typically obtained by low pressure polymerization processes. The side branching which is

present will be short as compared to non-linear polyethylenes. The ethylene alpha-olefin polymer has a density in the range from about 0.910 g/cc to about 0.940 g/cc, more preferably in the range of from about 0.912 g/cc to about 0.928 g/cc for film making purposes. The melt flow index of these polyethylenes generally ranges from between about 0.1 to about 10 grams per ten minutes and preferably between from about 0.5 to about 3.0 grams per ten minutes (ASTM D 1238).

The "lower density alpha-olefin copolymers" as referred to herein, means ethylene alpha-olefin copolymers have a density from less than about 0.910 g/cc to about 0.860 g/cc, or even lower.

Some ethylene alpha-olefin copolymers are referred to as VLDPE or ULDPE; some lower density ethylene alpha-olefin copolymers are Tafmer(TM) made by Mitsui, and Exact(TM) resins made by Exxon.

In a preferred embodiment, the sealant film structure is a multi-layer composite having the generalized structure of A/B/C/B/D/E/D/F, where A is a sealant layer of about 80% EVA and about 20% antiblock, B is a tie layer, C is a copolyester, D is a lower density alpha-olefin copolymer, E is a layer of EVA, and F is an alpha-olefin copolymer.

In another preferred embodiment the sealant film structure is a multi-layer composite having the generalized structure of A/E/D/F, where A is a sealant layer about 80% EVA and about 20% antiblock, D is a lower density alpha-olefin copolymer, E is a layer of EVA, and F is an alpha-olefin copolymer.

The thickness of the sealant film may be in the range of 0.1-10 mils, with a preferred range of 0.5-2.0 mils.

In a preferred embodiment, the laminate is used as a packaging film. A preferred method of producing the packaging film comprises providing a first layer of polymethylpenetene film, providing a second layer of a sealant film, and bonding the polymethylpentene film to the sealant film by corona treatment.

In a preferred embodiment, a method of producing the laminate is shown in Fig. 2. The bonding surfaces of the polymethylpentene film 11 and the sealant film 12 are each corona treated at 13. The two films are brought together for bonding between rubber roller 14 and heated nip roll 15. Rollers 14 and 15 may provide additional heat and pressure to enhance the bonding of layers 11 and 12. The product is a laminate 10.

Other bonding techniques may be used to bond the layers of the laminate including the use of conventional lamination adhesives. However, bonding techniques in which a separate adhesive is used may be less desirable where certain end uses, such as lettuce packaging, are combined with certain types of machinery for creating a finished package.

The laminate produced by the above process is suitable for many applications, including lid stock applications for packaging produce such as cauliflower, broccoli, and lettuce. In a preferred embodiment, the packaging film of the present invention is especially suitable for use in connection with Kartridg-Pak or other types of vertical form fill seal machinery.

The laminate produced by the above process exhibits high oxygen transfer and heat resistance. The oxygen transmission of the laminate of the present invention may be up to about 18,000 cc/m^2, 24 hours, atm. The high heat resistance of an incorpo-

rated copolyester will help prevent burns through the sealant layer.

The beneficial high oxygen transmission rates associated with laminates of the present invention are demonstrated in Table 3, where several examples and O_2 transmission rates are identified. The commercial resins used in these examples are identified in Table 1; the laminate structures are identified in Table 2. In Table 1, "PMP" refers to polymethylpentene; "EVA 1" is an EVA with 25% by weight vinyl acetate (VA); "EVA 2" is an EVA with about 12% VA; "EVA 3" is an EVA with about 18% VA; "AB" is an antiblock concentrate with 90% low density polyethylene and 10% silica; "ADH" is a modified ethylene methyl acrylate polymeric adhesive; "CP" is a copolyester; "EOC" is an ethylene octene copolymer; and "PP" refers to polypropylene film.

TABLE 1

MATERIAL	TRADENAME	SUPPLIER
PMP 1	TPX X-22	Mitsui
PMP 2	TPX DX 845	Mitsui
EVA 1	Elvax 3190	DuPont
EVA 2	Elvax PE 3508	DuPont
EVA 3	Elvax 3165	DuPont
AB	EPE-8160	Teknor Color
ADH	Plexar 3382	Quantum/USI
CP	Ecdel 9967	Eastman Chemical
EOC 1	DEFD 1138	Union Carbide
EOC 2	Dowlex 2251 A	Dow
EOC 3	DEFD 1137	Union Carbide
EOC 4	Dowlex 2035	Dow
PP	PY 110	W.R. Grace

TABLE 2

EXAMPLE	LAMINATE STRUCTURE
1	PMP 1//80% EVA 1+20% AB/ADH/CP/AD/EOC1/EVA2/EOC1/EOC2

PMP 1 was cast, 1.25 mils thick film
Sealant film was 1.50 mils thick

2. PMP 2//80% EVA1+20% AB/EVA 3/EOC3/EOC4

PMP 2 was cast, 1.00 mils thick film
Sealant film was .75 mils thick

3. like Example 2; PMP was .75 mils thick

4. like Example 2; PMP 2 was .5 mils thick

5. (comparative) like Example 1, but with .60 mils thick PP film instead of PMP 1 film

TABLE 3

EXAMPLE	OXYGEN TRANSMISSION (in cubic centimeters at standard temperature and pressure, in 24 hours, per square meter) (ASTM D3985-81) (average of 3 samples)
1.	6813.9
2.	12844.6
3.	12689.5
4.	16179.1
5. (comparative)	3928.9

Although the present invention has been described by reference to the specific embodiments and examples, those skilled in the art would readily understand that modifications may be made by one skilled in the art after a review of this description without departing from the spirit and scope of the claims which follow.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A laminate comprising a first film containing a layer of polymethylpentene polymer; and a sealant film bonded directly to said polymethylpentene layer of said first film by corona treatment of at least one of said films.

2. A laminate as in claim 1 wherein said sealant film comprises a material selected from the group consisting of a ethylene vinyl acetate copolymer, an alpha-olefin copolymer, a lower density alpha-olefin copolymer, a tie layer, an antiblocking agent, a copolyester and combinations thereof.

3. A laminate according to either claim 1 or claim 2, wherein said sealant film comprises a high temperature resistant copolyester.

4. A laminate according to any one of claims 1 to 3 wherein said sealant film comprises:

a layer of a mixture of a ethylene vinyl acetate copolymer and an antiblocking agent;
an intermediate adhesive layer;
a layer of copolyester;
an intermediate adhesive layer;
a layer of a lower density alpha-olefin copolymer;
a layer of a ethylene vinyl acetate;
a layer of a lower density alpha-olefin copolymer; and
a layer of an alpha-olefin copolymer.

5. A laminate according to any one of claims 1 to 4 wherein said sealant film consists essentially of:

a layer of a mixture of a ethylene vinyl acetate copolymer and an antiblocking agent;
a layer of an ethylene vinyl acetate copolymer;
a layer of a low density alpha-olefin copolymer; and

a layer of an alpha-olefin copolymer.

6. A laminate according to any one of claims 1 to 5 wherein the thickness of the polymethylpentene film is about 0.0025mm to 0.254mm.

7. A laminate according to any one of claims 1 to 6 wherein the thickness of the polymethylpentene film is about 0.0127 to 0.051mm.

8. A laminate according to any one of claims 1 to 7 wherein said sealant film has a thickness of 0.00025mm to 0.254mm.

9. A laminate according to any one of claims 1 to 8 wherein said sealant film has a thickness of about 0.0127mm to 0.051mm.

10. A laminate according to any one of claims 1 to 9 wherein said laminate has an oxygen transmission up to 18,000 cc/m^2, 24 hours, atm.

11. A laminate according to any one of claims 1 to 10 as in claim 1 wherein said polymethylpentene is in a copolymer.

12. A method of producing a packaging film comprising:

providing a film containing polymethylpentene polymer,
providing a polymeric sealant film, and
bonding the films together to form a laminate by corona treating at least one of said films.

13. A method according to claim 12, wherein said sealant film comprises a material selected form the group of ethylene vinyl acetate copolymer, alpha-olefin copolymer, lower density alpha-olefin copolymer, and a mixture thereof.

14. A method of packaging comprising providing a laminate according to any one of claims 1 to 11 and wrapping produce in said laminate.

15. A laminate substantially as hereinbefore described with reference to the drawings and/or Examples.

16. A method of producing a package substantially as hereinbefore described with reference to the drawings and/or Examples.

DATED this 22nd day of AUGUST, 1996

W.R. Grace & Co.-Conn.

by DAVIES COLLISON CAVE
Patent Attorneys for the applicant(s)

Abstract

A packaging laminate which includes a layer of polymethylpentene film and a sealant film. The films may be bonded by corona treatment. The laminate displays high oxygen transmission and heat resistance and may be used as a packaging material for produce such as cauliflower, broccoli and lettuce.

56644/9K

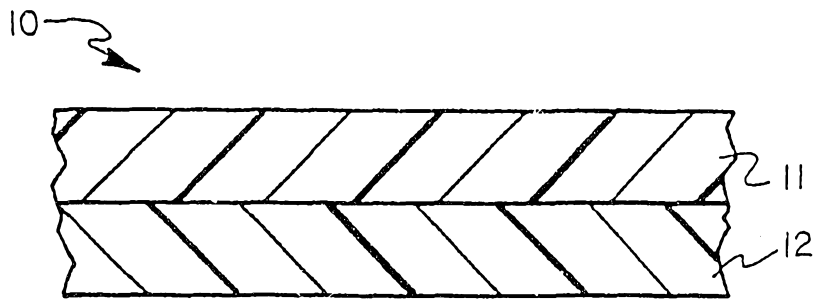

FIG. 1

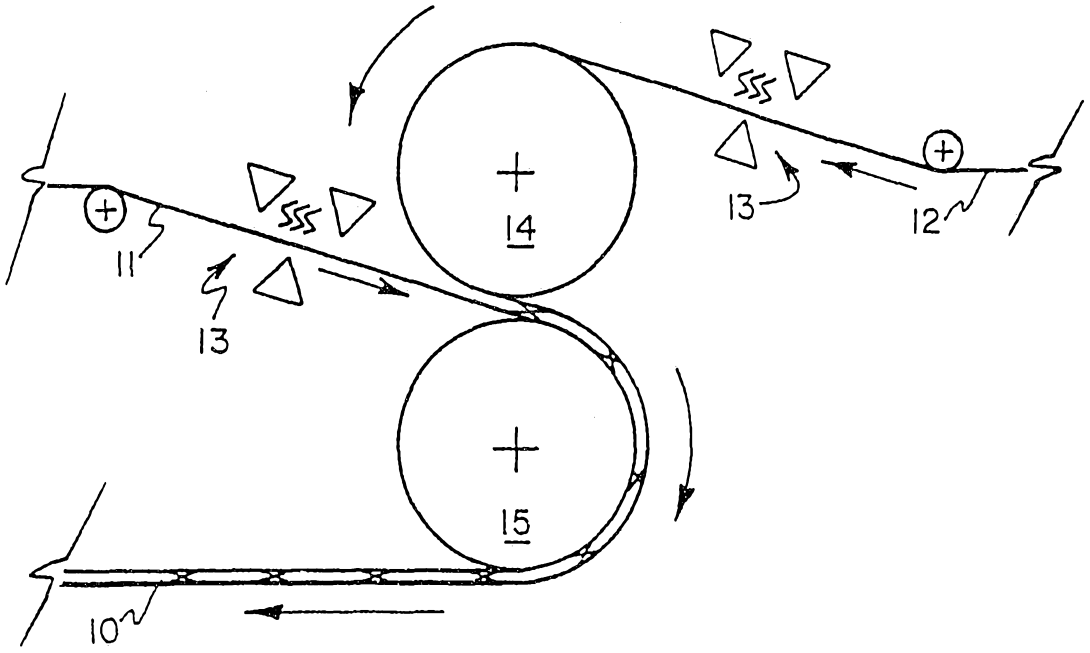

FIG. 2