(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 September 2005 (22.09.2005)

PCT

(10) International Publication Number
WO 2005/087486 A1

(51) International Patent Classification[7]: B32B 5/24, 27/12, B65D 5/56, 5/62, 75/00

(21) International Application Number: PCT/US2005/008074

(22) International Filing Date: 9 March 2005 (09.03.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/551,591 9 March 2004 (09.03.2004) US

(71) Applicant *(for all designated States except US)*: **E.I. DUPONT DE NEMOURS AND COMPANY** [US/US]; 1007 MARKET STREET, WILMINGTON, Delaware 19898 (US).

(72) Inventors; and

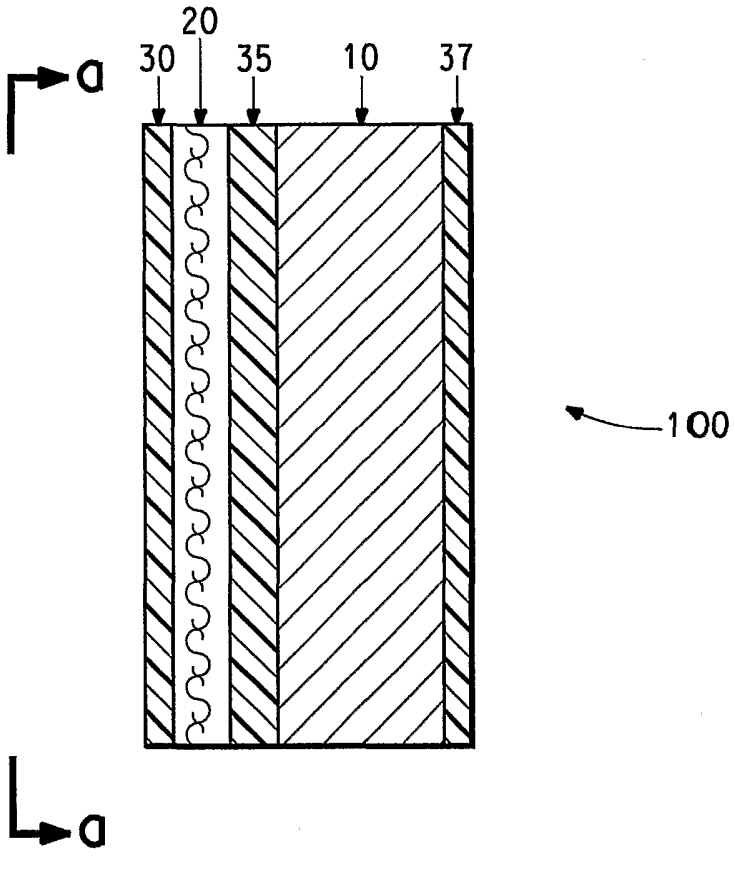
(75) Inventors/Applicants *(for US only)*: **HAUSMANN, Karlheinz** [DE/CH]; Abbesses 21, CH-2012 AUvernier (CH). **SCHENCK, Heiko, E.** [DE/DE]; Altkoenigblick 15, 65817 Eppstein (DE). **TILLMANNS, Claudia** [DE/DE]; Elisabeth-Langgasser-Weg 25, 65460 Riedstadt-Erfelden (DE). **SCHLOEZER, Ruediger** [DE/DE]; Siebenstuecken 41, 48308 Senden (DE). **TROUILHET, Yves, M.** [FR/CH]; 48 Chemin Des Tattes, CH-1222 Vesenaz (CH).

(74) Agent: **EVANS, Craig, H.**; E. I. DU PONT DE NEMOURS AND COMPANY, LEGAL PATENT RECORDS CENTER, 4417 Lancaster Pike, Wilmington, Delaware 19805 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,

[Continued on next page]

(54) Title: PACKAGE ENCLOSURE WITH FABRIC-LIKE OUTER LAYER



(57) Abstract: A package and a packaging material have a fabric-like appearance and/or texture. The packaging material is a layered structure that comprises an underlayer selected from paper, card stock, polymer films, and the like, and an outer layer including one or more of a woven fabric, a non-woven fabric, and fibers. The underlayer and the outer layer are adjacent and adhere to each other. At least one surface internal or external to the packaging material is printed or treated, or is rendered opaque by pigmentation, or has a pattern or other marking that is visible from outside the package.

WO 2005/087486 A1

PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

TITLE

PACKAGE ENCLOSURE WITH FABRIC-LIKE OUTER LAYER

FIELD OF THE INVENTION

This invention relates to packages and packaging materials and, in particular, to packages and packaging materials with an outer surface that provides a fabric-like appearance or texture, or both. These packages and packaging materials are well suited as primary or secondary containers for products such as food, cosmetics and personal care products.

BACKGROUND OF THE INVENTION

Packages that can be found on the market are usually optimized for sealing, barrier properties and cost, whereas technical features relating to the tactile and visual aspects of the package are typically given less consideration. It is, however, the tactile and visual aspects that in many cases determine the appeal to the consumer and strongly influence the decision to purchase the packaged product. In particular, the appearance and texture of fabrics connotes warmth and luxury to many consumers. This invention, therefore, incorporates desirable fabric-like tactile and visual aspects into packages and packaging materials through the use of fibers and/or nonwoven fabrics.

Nonwoven fabrics are well known and have been widely used for many applications such as protective apparel and surgical applications. Various prior art documents describe the use of nonwoven fabrics in packaging applications in which the nonwoven usually fills a precise technical function.

For example, European Patent No. EP-A-0 499 476 and corresponding U.S. Patent No. 5,096,722 describe a package for microwave cooking of food with a grease-absorbing pad that has a porous

spunbonded polyester outer fabric bonded to a needle-punched nonwoven polyester staple-fiber core layer. The pad provides absorption and retention of liquid fat and grease generated during microwave cooking.

Also, German Patent No. DE 4000143 describes a packaging material to protect packed contents from moisture, such as foodstuffs or tobacco products, using a non-woven material with a high water absorption character which is enclosed in a layer of material which is impermeable to steam, and a further non-woven material in contact with the packaging atmosphere to compensate for loss of humidity within the packaging and maintain a preset moisture balance.

Japanese Patent No. JP 07-040514 describes a nonwoven fabric to which a coating solution based on a polyester resin is applied on a single surface. The coated nonwoven fabric is dried to provide a printing layer.

US Patent No. 6,286,872 describes a label intended to be applied to a package. The label comprises a printed substrate and a film of non-woven material placed on the printed side of the substrate, so that the printing can be seen through the film.

International Publn. No. WO 2004/007590 describes certain liquid crystalline polymers that may be used as barrier layers for containers of multilayer structure, where the barrier layer can be laminated to a substrate such as foil, paper, paperboard or nonwoven fibrous material, and the coated multilayer structure can be formed into a shaped article by folding to provide a rigid container such as a box or carton.

In summary, many consumer decisions are influenced by the sensory appeal of a product's packaging, and in particular by packaging that connotes warmth and luxury. Consequently, it will be appreciated that an

ongoing need exists for packages and packaging materials with the appealing texture and appearance of textiles.

SUMMARY OF THE INVENTION

Accordingly, the present invention provides a packaging material comprising an underlayer. The underlayer may comprise paper, card stock or a polymer film, and it has an upper surface that is internal to the packaging material and a lower surface that is external to the packaging material. Adjacent to the upper surface of the underlayer is an outer layer. The outer layer may comprise a woven fabric, a nonwoven fabric, or fibers, and it has an upper surface that is external to the packaging material and a lower surface that is internal to the packaging material. The underlayer is firmly adhered to the outer layer, and at least one surface internal or external to the packaging material is printed. The printing is visible when the upper surface of the outer layer is viewed from the exterior of the packaging material.

Also provided is a package comprising the packaging material of the invention and a method of manufacturing the packaging material. The method comprises steps of extrusion laminating the outer layer and the intermediate layer(s) to form a laminated sheet and laminating this sheet to the underlayer. An alternative method includes steps of extrusion laminating the outer layer, the intermediate layer and the underlayer together.

These and various other advantages and features that characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and the objects obtained by its use, reference should be made to the drawings which form a further part hereof, and to the accompanying descriptive matter, in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary side view of a first embodiment of the packaging material according to the invention.

FIG. 2 is a fragmentary side view of a second embodiment of the packaging material according to the invention.

FIG. 3 is a fragmentary side view of a third embodiment of the packaging material according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

The definitions herein apply to the terms as used throughout this specification, unless otherwise limited in specific instances.

The term "package", as used herein, is synonymous with "packaging enclosure" and refers to a wrapper, container, or other receptacle for holding a material. Packages may be sealed or unsealed. Portions of packages, such as lids, caps, cups, trays, and bags, are also included in the term "package", provided that they serve a structural function.

The term "packaging material", as used herein, refers to a material that can be fabricated into a package, provided that the packaging material serves a structural function.

The term "label", as used herein, refers to a film that is applied to the surface of a package to impart information or decoration without having a structural function. A label may have one or more layers.

The term "structural function", as used herein, refers to the property of imparting integrity to a package. Examples of structural

functions include, without limitation, providing rigidity, providing containment, providing adhesion between portions of a package, and the like.

The term "to print", as used herein, means "to impress with a mark, design, lettering, or pattern". The mark, design lettering, or pattern may be colored or uncolored; thus, "printing" includes visibly marking and also embossing, treating, rendering opaque by pigmentation, and the like.

The term "about" means that amounts, sizes, formulations, parameters, and other quantities and characteristics are not and need not be exact, but may be approximate and/or larger or smaller, as desired, reflecting tolerances, conversion factors, rounding off, measurement error and the like, and other factors known to those of skill in the art. In general, an amount, size, formulation, parameter or other quantity or characteristic is "about" or "approximate" whether or not expressly stated to be such.

Referring now to the drawings, wherein like reference numerals designate corresponding structure throughout the views, and referring in particular to FIG. 1, provided is a packaging material 100 that comprises an underlayer 10 and an outer layer 20.

The underlayer 10 has an upper surface that is internal to the packaging material and a lower surface that is external to the packaging material. Underlayer 10 may be selected from materials such as paper, card stock, or a polymer film. Suitable polymers for the polymer film include, without limitation, polyethylene; polypropylene; polyester; copolymers of ethylene with one or more α,β-unsaturated carboxylic acids or esters (preferably alkyl esters) of α,β-unsaturated carboxylic acids optionally neutralized to form ionomers; polylactic acid; copolymers of ethylene with other alpha olefins; copolymers of ethylene with vinyl acetate and/or vinyl alcohol; blends of any two or more of these polymers; and like

polymers and blends. The polymer film may be unoriented, oriented, or biaxially oriented.

Examples of suitable materials for polymer films are those available under the Trademarks SURLYN®, ELVALOY®, BYNEL®, APPEEL® and NUCREL® of E.I. du Pont de Nemours and Company of Wilmington, DE ("DuPont").

Still referring to FIG. 1, the outer layer 20 forms the exterior of the packaging materials and packages of the invention, and also provides a fabric-like texture or appearance. The outer layer 20 has an upper surface that is external to the packaging material and a lower surface that is internal to the packaging material. The outer layer 20 may thus be formed of any material that provides the desired tactile and visual characteristics. Notable materials are nonwoven fabrics, woven fabrics, and fibers.

Nonwoven fabrics are manufactured sheets of directionally or randomly oriented fibers, bonded by friction, and/or cohesion, and/or adhesion, possibly with the application of heat and pressure, but excluding paper. Woven fabrics can be woven, knitted or tufted.

The package outer layer 20 is advantageously a non-woven fabric made of at least one of polyesters such as poly(ethylene terephthalate) and poly(trimethylene terephthalate), polypropylene, polyethylene, rayon, acrylic, nylon, wood pulp and cotton fibers or mixtures thereof. Preferably, the outer layer 20 is a spunlaced fabric or a fabric made of a combination of spunbonded and meltblown fibers.

The term "spunlaced fabric" as used herein refers to a nonwoven fabric that is produced by entangling fibers in the web to provide a strong fabric that is free of binders. For example, a spunlaced fabric can be prepared by supporting a nonwoven web of fibers on a

porous support such as a mesh screen and passing the supported web underneath water jets, such as in a hydraulic needling process. The fibers can be entangled in a repeating pattern. Spunlaced fabrics, sometimes referred to as "hydroentangled", are described for example in US Patents 3,485,706, 4,635,628, 5,093,190, 5,240,764 and 5,320,898.

Spunbonded nonwovens (sometimes called "spunlaid") are produced by extruding a molten polymer through spinnerets. Spunbonded nonwovens are relatively strong.

Meltblown nonwovens are produced by extruding low viscosity polymers into a high velocity airstream.

Some suitable nonwoven fabrics and fibers are commercially available from DuPont under the trademarks Sontara® and Sorona®.

The outer layer of non-woven (or less preferably woven) fabric that provides the fabric-like tactility and appearance usually has a thickness corresponding to 5-150g/m^2, preferably from 10-30g/m^2 where a see-through effect is wanted.

The underlayer and the intermediate layer(s) of the layered structure are preferably co-extensive with the entire package enclosure and the outer layer of woven or non-woven fabric is also preferably co-extensive with the entire package enclosure, but alternatively it only partly covers the package enclosure.

When underlayer 10 and upper layer 20 are adjacent to each other, they may adhere to each other directly, or alternatively through one or more intermediate layers 40, as is the case in packaging material 200, depicted in FIG. 2. When underlayer 10 and upper layer 20 adjoin each other, and thus are adhered directly to each other, the adhesion may result

from any physical mechanism that provides sufficient stability to the packaging material 100, depicted in FIG. 1.

One suitable physical mechanism for adhering underlayer 10 and upper layer 20 is mechanical entanglement. One favorable condition for mechanical entanglement is selecting an underlayer 10 whose melt flow index (MFI) is of sufficient value, e.g., equal to or greater than 5g/10 min at 190°C under a 2.16kg weight. Another favorable condition for mechanical entanglement is the result of pairing materials of like polarity. Specifically, when underlayer 10 comprises a polar material, such as a copolymer of ethylene and a polar monomer, mechanical entanglement is favored when upper layer 20 comprises a polar fabric or fibers, such as a polyester, for example. Conversely, when upper layer 20 comprises a nonpolar fabric or fibers, such as polypropylene, mechanical entanglement is favored by the choice of an underlayer 10 comprising a nonpolar material, such as polyethylene, e.g.

Still referring to FIG. 1, the packaging material of the invention also includes printing that is visible when the upper surface of the outer layer 20 is viewed from the exterior of the packaging material 100. Stated alternatively, the printing is visible when the packaging material 100 is viewed along line a—a. Thus, if underlayer 10 is transparent, printing may be included at one or more of positions 30, 35, and 37. Likewise, when underlayer 10 is opaque such that printing at position 37 cannot be viewed along line a—a, then printing is included at one or both of positions 30 and 35.

In more complicated embodiments of the invention, such as packaging materials 200 and 300, depicted in FIGS. 2 and 3, respectively, there are more possible positions for printing. For clarity, only positions 30 and 35 are shown. Those of skill in the art, however, are capable of determining optimal positions for printing based on the materials to be used

in the packaging material and on the desired visual effects. For example, in general, when the printing is at position 30, it will appear to be clearer and sharper than when it is viewed through one or more layers, as it is at position 35 or 37. Also, printing may interfere with the performance of intermediate layer 40. In this case, printing at position 35 is inadvisable.

Those of skill in the art also understand how to order the formation of the various layers and the conversion steps necessary to achieve printing at any suitable position within the packaging material. For example, referring again to FIG. 1, a film comprising underlayer 10 and upper layer 20 may be printed on one or both of its exterior surfaces, that is, at positions 30 and/or 37. If printing at position 35 is desired, however, then the upper surface of underlayer 10 or the lower surface of upper layer 20 may be printed before the underlayer 10 and the upper layer 20 are adhered.

The printing may be accomplished by any suitable means known in the art, including embossing, flexography, rotogravure, and lithographic printing. The choice of ink and printing technique may be made by one of skill in the art according to established criteria such as economic factors, compatibility of ink with substrate, level of detail of the design to be printed, and the like.

Referring now to FIG. 2, which depicts packaging material 200, one or more other layers may optionally be included in the packaging material. For example, in certain embodiments, it may be desirable to include an intermediate layer 40. The intermediate layer 40 has an upper surface and a lower surface. The upper surface of intermediate layer 40 is adjacent to the outer layer 20 and the lower surface is adjacent to the underlayer 10. Preferably, the upper surface of intermediate layer 40 adjoins the outer layer 20 and the lower surface adjoins the underlayer 10,

but for any printing that may intervene, such as printing at position 35, for example.

In some preferred embodiments, the intermediate layer 40 is an adhesive layer. Suitable polymers forming the adhesive layer are typically thermoplastic polymers or thermosetting polymers. Suitable thermoplastic polymers include copolymers of ethylene and at least one comonomer selected from alpha olefins containing between 3 and 8 carbon atoms, alkyl acrylates (e.g., methyl acrylate, ethyl acrylate or butyl acrylate), saturated or unsaturated ethylene carboxylic acid copolymers, optionally neutralized to form ionomers, or ethylene vinyl acetate copolymers. Suitable thermosetting polymers include, for example, those based on polyurethane chemistry.

When the underlayer 10 is paper or card with a printed surface, the intermediate layer 40 is preferably a single synthetic film adhering by its opposite faces to the underlayer and to the outer layer.

Referring now to FIG. 3, which depicts packaging material 300, the intermediate layer may be a multilayered structure. For example, when the package enclosure protects the contents notably against the ingress of gases such as air, packaging material 300 advantageously comprises a layer 50 between first and second synthetic films 40 and 45.

Layer 50 may, for example, be a flexible transparent barrier layer. The flexible transparent barrier layer 50 may include materials such as polyethylene vinyl alcohol (EVOH), liquid crystalline polymers (LCP), or polyamides (PA), and the like. Examples of suitable liquid crystalline polymers (LCP) are given in the above-mentioned publication WO 2004/007590.

Alternatively, layer 50 may be a structural polymer layer that provides stiffness to packaging material 300 or to a package comprising packaging material 300. Appropriate levels of stiffness can be achieved by selecting stiff polymers such as certain polyethylenes, polypropylenes, polystyrenes, and polyamides. The stiffness of packaging material 300 may also be varied systematically by varying the thickness of layer 50.

In either case, first and second synthetic films 40 and 45, which may be the same or different, are tie layers that provide adhesion between the flexible transparent barrier layer 50 and the outer layer 20 and underlayer 10, respectively.

It is apparent that layer 50 may itself be a multilayered structure, for example, when the particular packaging application requires a combination of several functions. In this case, layer 50 and synthetic films 40 and 45, taken together, include two or more layers selected independently from the group consisting of one or more tie layers, one or more adhesive layers, one or more barrier layers, one or more structural polymer layers, and the like. Those of skill in the art know how to formulate and fabricate such multilayered laminated structures 50, and how to select appropriate tie layers 40 and 45 to ensure the physical integrity of the packaging material 300.

The invention also provides a method of manufacturing the packaging material, which comprises steps of extrusion laminating the outer layer and the intermediate layer(s) to form a laminated sheet and laminating this sheet to the underlayer. An alternative method includes steps of laminating the outer layer, the intermediate layer and the underlayer together by coextrusion.

The layers of the layered structure are preferably bonded by heat lamination. The barrier layer and the sealant/adhesive layer can be

coextruded through blown and cast film or extrusion coating techniques. An extra adhesive/bonding agent can be used if needed.

The packaging material may be converted into packages by any suitable method that is known in the art, for example, one or more of die cutting, folding, sealing, and the like.

The package may be a flexible pouch or bag. The pouch or bag may be sealed, unsealed, or partially sealed. Alternatively, the package enclosure may be a generally polygonal, prismatic, cylindrical, or rectangular overpack, open or closed at its ends, for example with a printed card or paper underlayer. Such overpacks are generally formed by cutting and, optionally, scoring a portion of the packaging material. The portion is then folded or bent into the desired shape. Other examples are folded boxes, cans, bottles and tubes, and lids.

Moreover, the packages according to the invention may be primary or secondary packages. The term "primary package" as used herein refers to a package that is in direct contact with its contents. For example, a jar containing a cosmetic is a primary package. The term "secondary package" as used herein refers to a package that contains one or more other packages. For example, a box that encloses the jar containing the cosmetic is a secondary package, as is a film that wraps the box.

The package according to the invention is suitable for numerous packaging applications where a good "textile feel" and appearance is important combined with excellent strength where required, good visibility of printing or decoration allowing multiple possibilities of decorating or displaying printed matter on the package, a wide choice of the materials that can be used for different applications, possibilities for including functional layers for instance to increase sealing or strength, the possibility to form the

layered structure into many different types of packages of different shapes, and ease of manufacture. The mentioned "textile feel" and appearance and the printing/marking can if desired be provided for the entire package surface and are already produced during the package manufacture, without the need to separately manufacture labels and apply the labels to the packaging.

Two preferred embodiments of the invention will now be described in detail, the first type having a card or paper underlayer, and the second type having a polymer sealant underlayer.

First Embodiment:

Nonwoven/Adhesive Layer/Card or Paper

A first example of the inventive package enclosure has a layered structure made of a card or paper underlayer, which is usually printed, an intermediate layer made of a single usual transparent synthetic film forming an adhesive layer, and a nonwoven outer layer which is usually translucent (to allow visibility of printing on the paper/card) or can have a printed surface.

Nonwoven fabrics on rigid or semi-rigid container packages of paper/card are predominantly intended for cosmetic applications, but are also useful in food applications where separate means are used for sealing of the food content.

The nonwoven outerlayer can be spunlaced nonwoven based on PP, PE, PET, PA, Polyaramid, LCP, Nomex®, or Rayon in pure form, in blends of two or more polymers, or in blends of one or more polymers with wood pulp or cotton. An advantage of incorporating wood pulp or cotton is sustainability/use of renewable resources.

Spunlaced nonwoven fabric is preferred as this gives a three-dimensional touch and excellent tactile feeling. Preferred spunlaced fabrics are available from DuPont under the trademark SONTARA®. These spunlaced fabrics provide good through-visibility (transparency) for viewing printing on the underlayer, and are also printable.

Alternatively, spunbonded or spun flashed or blown fiber-based nonwovens can be used. Suitable spunbonded nonwovens are available from DuPont under the trademarks TYVEK® and TYPAR®.

Monocomponent fibers can be used for the nonwoven fabric, but in order to produce special effects bicomponent fibers can be used produced according to Advanced Composite Technology (ACT) employing nonwoven fabrics combining spunbonded and meltblown fibers to combine strength with fine structure, for instance as described in US 5,240,764, US 5,885,909, US 6,548,431, WO 0109425, WO 0229145, and US 2002/0025748.

Thicknesses of 5-100 or 150 g/m^2 of nonwovens can be used, preferably in the range of 10-30 g/m^2. Ideally, in order to facilitate reading through the nonwoven to better identify printing underneath the nonwoven, the nonwoven can be specifically hydroentangled in order to make it appear more open in structure.

The adhesive layer can be a monolayer film based on a polyethylene or ethylene copolymer, but it can also be made up of more than one layer, and can be made of ethylene homopolymers and copolymers of ethylene with at least one comonomer, selected from the group of alpha olefins containing between 3-8 C atoms, vinylacetate, alkylacrylate ester (methylacrylate, ethylacrylate or butylacrylate), saturated or unsaturated carboxylic acids (acrylic acid or methacrylic acid), optionally neutralized between 0.05 – 95% with metal ions (Zn, Na, Li, Mg, K or

others). Alternatively, thermosetting adhesive layers common for adhesive laminations can be used, for example based on polyurethane chemistry.

Optionally a barrier layer can be incorporated in the adhesive layers as well as any required tie layers to adhere this barrier layer to the adhesive layer and to adhere to both carton or paper and nonwovens. The barrier layer, like the adhesive layer(s), can be transparent when needed, or can be pigmented/opaque in the case where an outer spunlaced nonwoven fabric is printed.

The adhesive layer can be extrusion coated on the nonwoven or on the paper/board substrate and subsequently laminated to either the paper/board or the nonwoven substrate. Alternatively the Nonwoven/Adhesive/Paper-Board structure can be extrusion laminated in one step.

For paper or board substrates, conventional materials of any suitable thicknesses can be used, and these materials may be coated with a surface treatment or a printing layer depending on the final application.

The full structure can then be folded to form a rigid or semi-rigid package. This could be a folded one-part or two-part box, or an open-ended folded card package.

Second Embodiment:

Spunlaced Nonwoven/Adhesive/Barrier/Adhesive/Sealant Layer

A second example of the inventive package enclosure has a layered structure made of a polymer sealant underlayer, which is possibly printed, a first adhesive film, a barrier layer, a second adhesive film, and a spunlaced, nonwoven outer layer which is usually translucent (to allow visibility of printing on the sealant layer through the adhesive layers and barrier layer, which in this case are all transparent) or can have a printed

surface. This type of layered structure is intended principally for food or nonfood packaging applications where the packaging has to seal the content. In this case the nonwoven will be preferably be spunlaced or ACT technology, as defined above.

The adhesive and the sealant layer can be as defined as for the first embodiment, but can also be polypropylene (PP). The flexible, transparent barrier material should be either EVOH, (polyethylenevinylalcohol) or LCP (Liquid Crystal Polymer) or polyamide. Examples of suitable liquid crystalline polymers (LCP) are given in the above-mentioned publication WO 2004/007590. In addition, the intermediate layer of the package optionally further includes a structural layer (e.g. PP or PE) to enhance the strength of the package. The structural layer will usually be sandwiched between two adhesive layers.

This second type of packaging enclosure can typically be embodied in a sealed flexible pouch or bag, or could be a semi-rigid package. Such packages can be closed by heat sealing edges together.

In another preferred embodiment, the underlayer comprises a synthetic polymer sealant layer which for example comprises or consists essentially of a copolymer of ethylene and at least one comonomer selected from alpha olefins containing between 3 and 8 carbon atoms, alkyl acrylates (methylacrylate, ethylacrylate or butylacrylate), saturated or unsaturated ethylene carboxylic acid copolymers, optionally neutralized to form ionomers, or ethylene vinyl acetate copolymers, and in this case the outer layer is preferably a spunlaced fabric or a fabric made of a combination of spunbonded and meltblown fibers.

Also of note are the following embodiments of the invention:

Embodiment 1. A package enclosure for containing products in particular food and cosmetics, said package enclosure being a layered structure that is shaped or shapeable to fit over and to surround a product or products, the layered structure comprising:

(a) an underlayer, selected from paper, card and synthetic polymer sealant layer(s);

(b) an outer layer made of a woven or non-woven fabric that provides the outer surface of the package enclosure with a fabric-like tactile feel and visual appearance; and

(c) at least one intermediate layer that provides adherence between the underlayer and the outer layer, and that

- is a single synthetic film adhering by its opposite faces to the underlayer and to the outer layer, or
- includes a first synthetic film adhering by an inner face to the underlayer and a second synthetic film adhering by an outer face to the outer layer, the first and second synthetic films adhering together or being separated by one or more further intermediate layers, in particular a barrier layer,

wherein the underlayer and/or at least one intermediate layer has at least one printed or treated surface, or is rendered opaque by pigmentation or has a pattern, that is visible from outside the package enclosure through the woven or non-woven fabric of the outer layer, and/or the outer layer has a visible printed surface.

Embodiment 2. The package enclosure of embodiment 1, wherein the underlayer and the intermediate layer(s) of the layered structure are co-extensive with the entire package enclosure and the outer layer of woven or non-woven fabric is co-extensive with the entire package enclosure or partly covers the package enclosure.

Embodiment 3. The package enclosure of embodiment 1 or 2 wherein the outer layer is a non-woven fabric made of at least one of polyester,

polypropylene, polyethylene, rayon, acrylic, nylon, woodpulp and cotton fibers, which is a spunlaced fabric or a fabric made of a combination of spunbonded and meltblown fibers.

Embodiment 4. The package enclosure of embodiment 1, 2 or 3, wherein the underlayer is paper or card with a printed surface, and the intermediate layer is preferably a single synthetic film adhering by its opposite faces to the underlayer and to the outer layer.

Embodiment 5. The package enclosure of any preceding embodiment, wherein the underlayer comprises a synthetic polymer sealant layer which is a copolymer of ethylene and at least one comonomer selected from alpha olefins containing between 3 and 8 C atoms, vinyl acetate, alkyl acrylates (methyl-, ethyl- or butyl- acrylate), saturated or unsaturated carboxylic acid (in particular methacrylic or acrylic acid), which can optionally be neutralized between 0.05 and 95% with metal ions selected from Na, Zn, Mg, K, or Li to form an ionomer, and the outer layer is preferably a spunlaced fabric or a fabric made of a combination of spunbonded and meltblown fibers.

Embodiment 6. The package enclosure of any preceding embodiment, wherein the intermediate layer comprises a flexible transparent barrier layer between first and second synthetic films.

Embodiment 7. The package enclosure of embodiment 6, wherein the barrier layer is selected from polyethylenevinylalcohol (EVOH), liquid crystalline polymers (LCP) and polyamides (PA).

Embodiment 8. The package enclosure of any preceding embodiment, wherein the synthetic film(s) forming, the adhesive layer are typically thermoplastic polymers or thermosetting polymers.

Embodiment 9. The package enclosure of embodiment 8, wherein said thermoplastic, polymers are copolymers of ethylene and at least one comonomer selected from alpha olefins containing between 3 and 8 C atoms, vinyl acetate, alkyl acrylates (methyl-, ethyl- or butyl- acrylate), saturated or unsaturated carboxylic acid (in particular methacrylic or acrylic acid), which can optionally be neutralized between 0.05 and 95% with metal ions selected from Na, Zn, Mg, K, or Li to form an ionomer, and the outer layer is preferably a spunlaced fabric or a fabric made of a combination of spunbonded and meltblown fibers.

Embodiment 10. The package enclosure of any preceding embodiment, wherein the layers of the layered structure are bonded by heat lamination.

Embodiment 11. The package enclosure of any preceding embodiment, wherein the outer layer of woven or non-woven fabric has a thickness corresponding to a fabric weight of 5-100g/m^2, preferably from 10-30g/m^2.

Embodiment 12. The package enclosure of any preceding embodiment which is a sealed enclosure.

Embodiment 13. The package enclosure of embodiment 12 which is a closed flexible pouch or bag.

Embodiment 14. The package enclosure of any of embodiments 1 to11 which is a generally polygonal, prismatic or rectangular folded overpack, open at its ends.

Embodiment 15. The package enclosure of any of embodiments 1 to11 which is a folded box.

Embodiment 16. The package enclosure of any of embodiments 1 to11 which is a can, bottle or tube.

Embodiment 17. A method of manufacturing a package enclosure according to any preceding embodiment, which comprises extrusion laminating the outer layer and the intermediate layer(s) to form a laminated sheet and laminating this sheet to the underlayer.

Embodiment 18. A method of manufacturing a package enclosure according to any one of embodiments 1 to 16, which comprises extrusion laminating the outer layer, the intermediate layer and the underlayer together.

Embodiment 19. A layered structure of a package enclosure according to any one of embodiments 1 to 11, the layered structure being a laminated sheet that is shapeable to form a package enclosure that fits over and surrounds a product or products.

The following examples are provided to describe the invention in further detail. These examples, which set forth a preferred mode presently contemplated for carrying out the invention, are intended to illustrate and not to limit the invention.

EXAMPLES

Using a commercial extrusion coating line with a 3 layer (45mm) extruder set up, available from Egan Davis-Standard Extrusion Coating Systems of Somerville, New Jersey, a three layer polymer film was extruded onto a substrate of Sontara® 8010.

The film consists of HDPE and Elvaloy® 1224 AC, which is a copolymer of ethylene methacrylate with a melt flow index (MFI) of 2 at 190C/2.16 kg measured according to ASTM 1268. The HDPE was BOREALIS™ FL 5580 (1.2MI, 958 Kg/m^3), available from Borealis A/S of Copenhagen, Denmark. The film had the following structure:

Sontara® 8010/Elvaloy® AC 1224/HDPE/ Elvaloy® AC 1224

The thicknesses of the polymer layers were:

60microns/50microns/60 microns.

The melt temperature settings of the 3 extruders were the same, and are given below:

Zone	1	2	3	4	5	Flange	Adaptor	Pipe	Die
Temperature, C°	180	210	240	270	300	300	300	300	300

These settings resulted in an actual melt temperature of 290°C.

This film three-layered polymer film was labeled as No. 1, and it was coated onto the Sontara® 8010 using a line speed of 20m/min.

In making Film No. 1, the inner surface of the Sontara® may be printed before it is coated with the polymeric film. Likewise, the outer surface of the Sontara® may be printed before or after coating with the polymeric film. In addition, the outer surface of the outer layer of Elvaloy® may be printed before or after the polymeric film is coated onto the Sontara®. Moreover, the inner surface of the inner Elvaloy® layer may be printed before or after the polymeric film is coated onto the Sontara®.

In a second trial the same three-layer polymer film was made using the same temperature settings; however, the polymer film portion was extruded onto the chill roll and hauled off without extruding it onto a fabric or other substrate. This film was labeled as No 2.

In a third trial, the following film was made using the same temperature settings:

HDPE/Elvaloy® 1224AC
110micron/50micron

This film was also extruded directly onto the chill roll of the extrusion coating equipment and hauled off without extruding or laminating it onto a fabric or other permanent substrate. This film was labeled as No. 3.

Samples of each of these three films were fabricated into pouches of dimensions 10cm x 10 cm. The pouches were prepared and sealed with a commercial laboratory sealing equipment made by Sentinel (150°C, 0.5 MPa pressure, 1 sec dwell time). The pouch seal was formed by cutting two samples (10cmx10cm) from each film, and sealing the Elvaloy® 1224AC sides to each other. The label numbers of the pouches are the same as those of the corresponding films.

In a second series of experiments, Kraft paper board (250 g/m^2) was used as a substrate. The paper board was flame-treated to improve adhesion on the side to which the polymer was applied.

The following temperature settings were applied to extrude the Elvaloy® AC and the HDPE at a line speed of 100 m/min. Different temperature settings are required because the processing temperature of the HDPE should not exceed 300°C.

Extruder zones	1	2	3	4	5
Temperature, °C, for Elvaloy® AC	200	230	260	290	320
Temperature, °C, for HDPE	200	230	260	280	300

The structure of the laminate was:

BOARD / Elvaloy® AC 1224/HDPE/Elvaloy® AC 1224.

The thickness of each layer was: 250/20/20/20 microns.

In a fourth trial the substrate of Film No. 1 (Sontara®) was replaced by the Kraft paper board described above, leaving all the other components the same. The structure of this film, which was labeled as No. 4, was:

BOARD/Elvaloy® AC1224/HDPE/ Elvaloy® AC1224.

In a fifth trial the same structure as in the fourth trial was produced; however, Sontara® film was laminated onto the outer Elvaloy® AC1224 layer to yield the following structure, which was labeled as No. 5:

BOARD/ELVALOY1224AC/HDPE/Elvaloy® 1224AC/Sontara.

In a sixth trial, the film of trial 3 was extrusion coated onto the board again under the same conditions so that eventually the following structure was obtained and labeled as No. 6:

BOARD /Elvaloy® 1224AC/HDPE.

Samples of Film Nos. 4, 5, and 6 were converted by cutting and folding into carton boxes of the dimensions 10cmx10cmx10cm. The board side of the film was inside of the box. The boxes were labeled with the same numbers as the corresponding films.

The tactile properties of the flexible pouches and rigid boxes were rated according to the following system:

A = feels soft, pleasant, warm

B = feels soft, sticky

C = feels hard, plastic-like

The results were as follows:

Pouch/Box No.	1	2	3	4	5	6
Touch Rating	A	B	C	B	A	C

These results demonstrate that packages and packaging materials having an outer layer of Sontara® possess the desirable tactile characteristics of fabrics.

While numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

CLAIMS

1. A packaging material comprising:

(a) an underlayer comprising paper, card stock or a polymer film, wherein the underlayer has an upper surface that is internal to the packaging material and a lower surface that is external to the packaging material; and, adjacent to the upper surface of the underlayer,

(b) an outer layer comprising a woven fabric, a nonwoven fabric, or fibers, wherein the outer layer has an upper surface that is external to the packaging material and a lower surface that is internal to the packaging material;

wherein the underlayer is firmly adhered to the outer layer, and wherein at least one surface internal or external to the packaging material is printed such that the printing is visible when the upper surface of the outer layer is viewed from the exterior of the packaging material.

2. The packaging material of claim 1, wherein the lower surface of the outer layer adjoins the upper surface of the underlayer.

3. The packaging material of claim 1, further comprising an intermediate layer, wherein the intermediate layer has at least an upper surface and a lower surface, and wherein the upper surface of the intermediate layer is adjacent to the outer layer and the lower surface of the intermediate layer is adjacent to the underlayer.

4. The packaging material of claim 3, wherein the intermediate layer is an adhesive layer.

5. The packaging material of claim 4, wherein the underlayer is paper or card stock, wherein a surface of the paper or card stock is printed surface, and wherein the intermediate layer is a single synthetic film

adhering by its opposite faces to the underlayer and to the outer layer.

6. The packaging material of claim 3, wherein the intermediate layer is a multilayered structure comprising two or more layers selected independently from the group consisting of one or more tie layers, one or more adhesive layers, one or more barrier layers, and one or more structural polymer layers.

7. The packaging material of claim 6, wherein the one or more adhesive layers are selected from the group consisting of polyurethanes and copolymers of ethylene and at least one comonomer selected from the group consisting of vinyl acetate, alpha olefins containing between 3 and 8 carbon atoms, alkyl acrylates, and carboxylic acids that may optionally be neutralized to form ionomers; the one or more barrier layers are selected from the group consisting of polyethylene vinyl alcohol, liquid crystalline polymers, and polyamides; and the one or more structural polymer layers are selected from the group consisting of polyethylenes, polypropylenes, polystyrenes, and polyamides.

8. The packaging material of any of claims 1 to 7, wherein the outer layer comprises a nonwoven fabric.

9. The packaging material of claim 8, wherein a surface of the outer layer is printed.

10. The packaging material of claim 9, wherein the exterior surface of the outer layer is printed.

11. The packaging material of any of claims 1 to 10, wherein the underlayer comprises a polymer film, and wherein the polymer film

comprises a copolymer of ethylene and at least one comonomer selected from the group consisting of vinyl acetate, alpha olefins containing between 3 and 8 carbon atoms, alkyl acrylates, and carboxylic acids that may optionally be neutralized to form ionomers

12. The packaging material of claim 11 wherein the outer layer comprises a spunlaced fabric or a fabric made of a combination of spunbonded and meltblown fibers.

13. A package comprising the packaging material of any of claims 1 to 12.

14. The package of claim 13 being a box.

15. The package of claim 13 being a pouch or bag.

16. The package of claim 13 being a polygonal, prismatic, cylindrical, or rectangular overpack.

17. The package of any of claims 13 to 16 being a primary package.

18. The package of any of claims 13 to 16 being a secondary package.

19. A method of fabricating the packaging material of any of claims 3 to 12, comprising extrusion laminating the outer layer to an adhesive layer and bonding the adhesive layer to the underlayer.

20. The method of claim 19 wherein the underlayer is paper or card stock.

21. The method of claim 19 wherein the adhesive layer is bonded to the underlayer by heat lamination.

22. A method of fabricating the packaging material of any of claims 3 to 12, comprising laminating the outer layer, the intermediate layer and the underlayer together by co-extrusion.

23. The method of claim 10 wherein the outer layer comprises a nonwoven fabric.

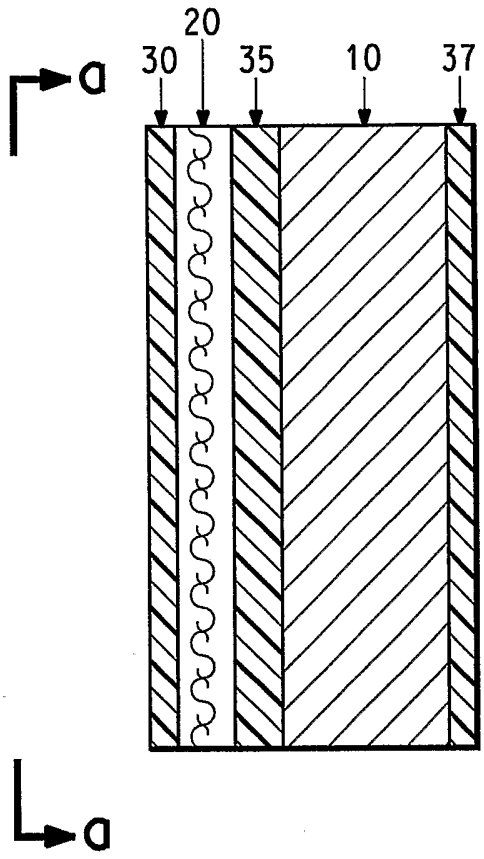


FIG. 1

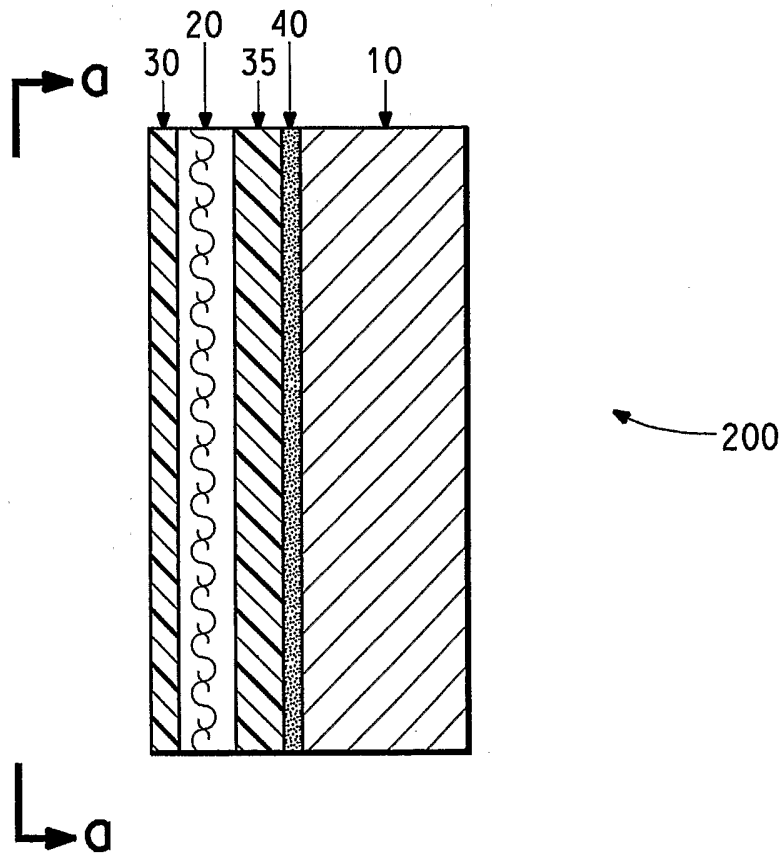
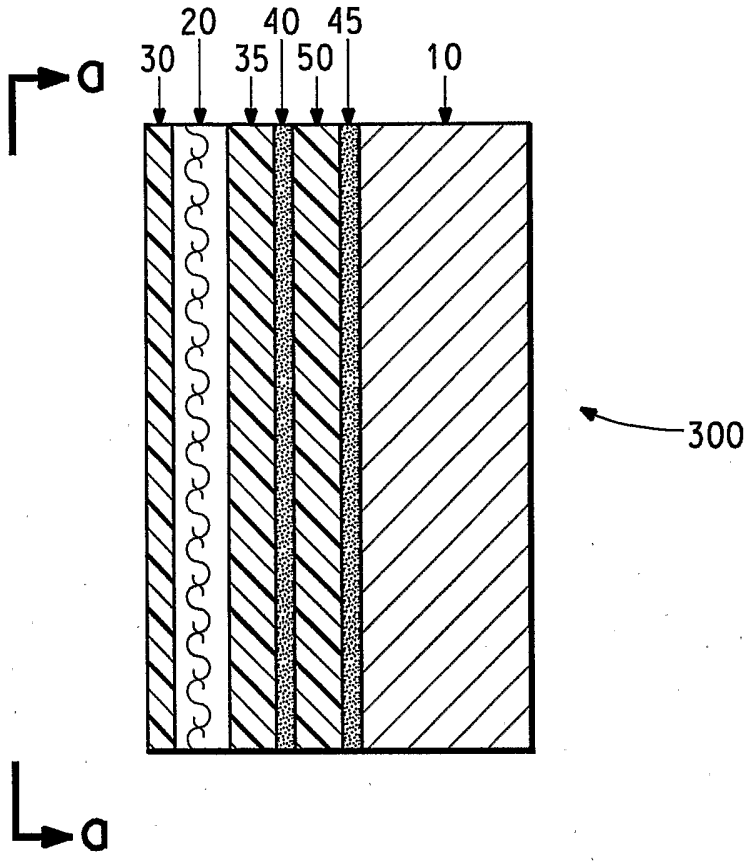


FIG. 2

FIG. 3



INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2005/008074

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B32B5/24 B32B27/12 B65D5/56 B65D5/62 B65D75/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B32B B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/113116 A1 (VAYRETTE SOPHIE HELENE) 22 August 2002 (2002-08-22)	1-5,8, 13,14, 16,17
A	paragraphs '0008!, '0009!, '0040! - '0044!; claims 1-3,6-8,11,12,23,26,27,29; figures	6,7, 9-12,15, 18-23
X	DU PONT DE NEMOURS & CO E I ET AL: "Sontara laminates as plush wallcoverings (EI du Pont de Nemours)" RESEARCH DISCLOSURE, KENNETH MASON PUBLICATIONS, WESTBOURNE, GB, vol. 192, no. 7, April 1980 (1980-04), XP007107173 ISSN: 0374-4353 the whole document	1,3,6, 8-10

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents:

'A' document defining the general state of the art which is not considered to be of particular relevance

'E' earlier document but published on or after the international filing date

'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

'O' document referring to an oral disclosure, use, exhibition or other means

'P' document published prior to the international filing date but later than the priority date claimed

'T' later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

'X' document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

'Y' document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

'&' document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 June 2005	08/07/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Kanetakis, I

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2005/008074

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 207 242 B1 (HOFFMAN ROGER P) 27 March 2001 (2001-03-27) column 2, line 23 - column 4, line 8; claims 1-4,7-9; figures column 4, line 53 - line 67	1-4,13, 14,16-18
A	US 5 015 520 A (VACCARI ET AL) 14 May 1991 (1991-05-14) the whole document	1,13

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US2005/008074

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002113116 A1	22-08-2002	FR 2817239 A1	31-05-2002
		CA 2363215 A1	30-05-2002
		EP 1211182 A1	05-06-2002
		JP 2002205731 A	23-07-2002
US 6207242 B1	27-03-2001	US 5882746 A	16-03-1999
		AU 5328499 A	21-02-2000
		WO 0006462 A1	10-02-2000
		ZA 9904914 A	22-09-2000
		US 6099674 A	08-08-2000
		US 2001010845 A1	02-08-2001
US 5015520 A	14-05-1991	IT 217844 Z2	11-02-1992
		DE 8909516 U1	13-06-1990
		FR 2642700 A1	10-08-1990