AU9514999

(12) PATENT ABRIDGMENT (11) Document No. AU-B-14999/95
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 679323

(54) Title
IMPROVEMENTS IN OR RELATING TO LAMINATES AND PACKAGING MATERIALS

International Patent Classification(s)
(51)[6] **B32B 015/08** **B23B 027/10** **B32B 027/08** **B65D 065/40**

(21) Application No. : **14999/95** (22) Application Date : **22.03.95**

(30) Priority Data

(31) Number	(32) Date	(33) Country
9016440	**26.07.90**	**GB UNITED KINGDOM**

(43) Publication Date : **15.06.95**

(44) Publication Date of Accepted Application : **26.06.97**

(62) Related to Division(s) : **82928/91**

(71) Applicant(s)
ELOPAK SYSTEMS AG

(72) Inventor(s)
ATLE FLOM

(74) Attorney or Agent
SPRUSON & FERGUSON , GPO Box 3898, SYDNEY NSW 2001

(56) Prior Art Documents
US 4753832
US 4692327
FR 2618726

(57)

Owing to these aspects of the invention, the surface coating is less liable to damage by heat-sealing.

The final laminate has a greater resistance to heat damage of the aluminium of the metallized EVOH film compared with a corresponding laminate with that aluminium on the inside of the film.

Claim

1. A packaging laminate comprising a first layer comprised of paperboard, stiff plastics, plastics sheet, foamed plastics, kraft paper, grease-proof paper, coated film, metal or plastics foil, or metallized plastics foil, a second layer comprised of surface-coated material selected from coated film and metallized plastics foil, an adhesive, third layer intermediate the first and second layers and by way of which the first and second layers are tied together, and a heat sealing layer, each of the first and second layers being stiffer than the third layer, the surface coating of said second layer being at that surface of said material facing towards said first layer.

2. A laminate according to claim 1, wherein said surface-coated material comprises metallized polymer.

3. A laminate according to claim 1, wherein said surface-coated material comprises M-PET, G-PET, M-OPP, G-OPP or M-EVOH.

IMPROVEMENTS IN OR RELATING TO LAMINATES AND PACKAGING MATERIALS

This invention relates to laminates and packaging materials.

A wide variety of packaging materials is known. Many are in the form of laminates in order that the material may have a desired combination of properties not available from a single layer of a single composition.

For packaging cartons, known laminates generally comprise one stiffening layer, often paperboard, which also reliably retains scores and folds therein.

A conventional packaging laminate comprises, progressing inwards, an external layer of LDPE (low density polyethylene), a paperboard layer, and an internal layer of LDPE. The LDPE layers are relatively good barriers to moisture migration and provide relatively good liquid-tight seals when heat-sealed during forming of the carton.

Another conventional laminate comprises an external layer of LDPE, a paperboard layer, a further layer of LDPE, a layer of aluminium foil, and an internal layer of LDPE. The further layer of LDPE provides a relatively good bond between the foil and the paperboard. The foil provides a good barrier to O_2 and light, so that this laminate is used particularly when the contents of the carton would otherwise be deleteriously affected by migration of substances, for example O_2, either inwards or outwards or by light. However, such foil has a number of disadvantages, for example it is relatively brittle and thus relatively liable to break during feeding, scoring and folding. Moreover, owing to its relatively smooth surface, it is relatively difficult to bond to LDPE or other polymers. Moreover, the further layer of LDPE allows significant O_2 penetration at the sealed seams and through defects, such as pinholes or cracks, in the foil.

Various alternatives have therefore been proposed.

One such alternative is disclosed in EP-A-0124772, in which the foil is replaced by a foil consisting of an oriented plastics film, eg. of polyester, PP (polypropylene), or PA (polyamide), with aluminium vapour-deposited upon that surface of the film facing towards the inside. The latter foil has the advantage of providing a relatively good barrier to O_2 and of being strong without being brittle. However, an LDPE layer is again used to bond the plastics film to the paperboard, so that O_2 penetration again occurs. A disadvantage of having the metallized surface of the foil facing towards the inside of the carton is that it is liable to become damaged by the heat of the seam-sealing, so reducing the O_2 barrier effect of that foil.

EP-A-0341937 discloses a range of laminates which basically comprise an external layer of LDPE, a paperboard substrate, a barrier layer preferably of aluminium foil, and at least one caulking layer of e.g. "SURLYN" adjacent to the foil, usually with an abuse-resistant layer. This range of laminates appears to be an attempt to counteract the brittleness of the foil by caulking any fractures which occur. However,

not only does "SURLYN" have a relatively low resistance to O_2 penetration, but also the minimum number of layers shown is eight and the maximum twelve, so that the laminate would be relatively expensive and difficult to produce.

EP-A-0318771 discloses a liquid-packaging laminate which comprises an external thermoplastics layer, a stiffening board layer, an EVOH layer, an aluminium foil layer, and an internal thermoplastics layer. A moisture-permeable layer, for example of "NYLON", may be included between the board layer and the EVOH layer.

EP-A-0174198 discloses a liquid-packaging laminate comprised of an external layer of paper, or plastics such as polyamide, polyethylene, polypropylene or polyester, a polyolefin layer of for example polyethylene, polypropylene or EVA, an aluminium foil layer, and an internal polyester layer.

EP-A-0215630 discloses a liquid-packaging laminate comprising an external PETG layer, a paperboard layer, an adhesive layer, a layer of PET, aluminium foil, PVDC, EVOH, or NYLON, and an internal PETG layer.

EP-A-0096581 discloses a wide variety of examples of laminates, but each of several layers and including an external polypropylene or polyamide film layer, with an aluminium layer vacuum-deposited either directly on the inner surface of the film or on a gold coating on that inner surface.

Other alternatives are disclosed in US-A-4701360; EP-A-0237235 and WO-89/12406.

According to a first aspect of the present invention, there is provided a packaging laminate comprising a first layer comprised of paperboard, stiff plastics, plastics sheet, foamed plastics, kraft paper, grease-proof paper, coated film, metal or plastics foil, or metallized plastics foil, a second layer comprised of surface-coated material selected from coated film and metallized plastics foil, an adhesive, third layer intermediate the first and second layers and by way of which the first and second layers are tied together, and a heat sealing layer, each of the first and second layers being stiffer than the third layer, the surface coating of said second layer being at that surface of said material facing towards said first layer.

According to a second aspect of the present invention, there is provided a packaging container comprised of a laminate comprising an outer, first layer comprised of paperboard, stiff plastics, plastics sheet, foamed plastics, kraft paper, grease-proof paper, coated film, metal or plastics foil, or metallized plastics foil, an inner, second layer comprised of surface-coated material selected from coated film and metallized plastics foil,

an adhesive intermediate layer intermediate the first and second layers and by way of which the first and second layers are tied together, and a heat-sealing layer whereby said container is sealed, each of the first and second layers being stiffer than the intermediate layer, the surface coating of said second layer being at that surface of said material facing towards said first layer.

Owing to these aspects of the invention, the surface coating is less liable to damage by heat-sealing.

One or both of the first and second layers may comprise paperboard, stiff plastics, plastics sheet, foamed plastics, kraft paper, grease-proof paper, coated films, metal or plastics foil, or metallized plastics foil, for example.

Any one or more of the layers may constitute a barrier to light or to migration of moisture, water vapour, gases such as CO_2, O_2, N_2, essential oils, flavour or aroma compounds, perfumes, or volatile compounds and/or may contain scavenging material, particularly O_2 - scavenging material. The barrier material may incorporate additives to obtain particular properties, such as pigments to obtain protection against light, and/or be any suitable PO, such as PE, barrier films such as EVOH, metallized plastics, PA, metal foil, greaseproof paper, or coated films.

Externally of the first and/or second layer(s) may be one or more further layers having barrier, scavenging, protective and/or sealing properties. The barrier property can be provided by any of the barrier materials listed in the preceding paragraph. The protective property can be provided by PE (against abrasion). The sealing property can be provided by PE and/or other sealing polymers.

The laminate is particularly suitable for packaging purposes, especially the packaging of food and other products sensitive to migration through package walls and/or intended to be of a long-life character. Among the packages for which it is especially useful are gable-topped and flat-topped cartons.

In one preferred version of the laminate, a polymer which constitutes a relatively good barrier to O_2 migration, eg. EVOH or a PA (such as MXD6), forms the third layer and the first layer is formed by a paperboard, stiffening layer onto which to EVOH or PA is extruded directly or indirectly. Thereafter, a material having both stiffening and O_2 barrier properties, such as M-PET, G-PET, M-OPP, G-OPP, or M-EVOH, as the second layer, is laid onto the third layer, thereby itself to provide a further barrier to O_2 migration and also to protect the third layer against heat utilized during subsequent heat-sealing of carton blanks, for example. The second layer, which is a material with a coating at one of

its surfaces, for example M-PET, G-PET, M-OPP, G-OPP, or M-EVOH, has the coated surface directed towards the third layer, thereby to protect the surface coating itself against such heat. Upon the outside of the second layer is extruded directly or indirectly a moisture barrier layer such as PE, which protects against moisture the second and third layers. The third layer, in the case of EVOH or PA, is much less liable to crack on scoring or folding than is the metal or glass coating of the second layer in the case of M-PET, G-PET, M-OPP, G-OPP, or M-EVOH, and thus is much better able to maintain the O_2 barrier property of the laminate during subsequent conversion of the laminate into a carton.

The O_2 barrier effect of EVOH or PA combined with M-PET, G-PET, M-OPP, G-OPP, or M-EVOH, appears to be overall greater than the simple sum of their individual O_2 barrier effects.

On the outside of the paperboard layer is a layer of a material, such as PE, constituting a moisture-barrier and heat-sealing material.

The EVOH or PA can be applied as a monolayer or as a co-extrusion with other plastics material; it is preferably attached to at least the second layer by means of a tie layer. It is advantageous if the EVOH or PA is applied to the M-PET, G-PET, M-OPP, or G-OPP in a molten state, since it thereby fills the pores in the coated surface and thus increases the combined O_2 barrier effect of those two layers.

In a container made from the laminate, the layers are preferably arranged as shown in the single Figure of the accompanying drawing, which is a fragmentary cross-section through a packaging laminate. The layer arrangement is as follows, progressing inwards:-

(a) a moisture-barrier and heat-sealing layer 1 (10 to 30 g/m^2 LDPE)

(b) a paperboard stiffening layer 2 (150 to 400g/m^2 board)

(c) O_2 barrier polymer 3, such as EVOH or polyamide (3 microns to 15 microns, preferably 3 microns to 7 microns); for example in the form "thin tie layer (4)/EVOH or PA(5)/thin tie layer (6)"

(d) M-PET, G-PET, M-OPP, or G-OPP 7 (6 microns to 25 microns, preferably 9 microns to 14 microns) with its coated surface 8 directed outwards

(e) a moisture-barrier and heat-sealing layer 9 (10 to 70 g/m^2 LDPE).

The surfaces of the various layers may be treated, for example flame- or corona-discharge-treated, to enhance adhesion or sealability.

In another preferred version of the laminate, the first layer is formed by paperboard and the second layer is formed by metallized or glass-coated barrier plastics, eg. aluminium metallized EVOH film, with the third layer being PE or a suitable tie tying the aluminium-coated surface of the film to the paperboard. Again, the innermost and outermost layers of the laminate are of a moisture-barrier and heat-sealing material, such as PE.

In a container made from the laminate, the layers are preferably arranged as follows, progressing inwards:-

(a) a moisture-barrier and heat-sealing layer (10 to 30 g/m^2 LDPE)

(b) a paperboard stiffening layer (150 to 400 g/m2 Duplex)

(c) polyethylene or tie (10 to 50 g/m^2 LDPE)

(d) aluminium-metallized material, such as aluminium-metallized greaseproof paper, or polymer film, for example Cellophane film or EVOH film (7 microns to 20 microns)

(e) a moisture-barrier and heat-sealing layer (10 to 70 g/m^2 LDPE).

A particular example of this preferred version is now given:-

Example II

230g/m^2 of Duplex board is flame-treated on both sides and extrusion-coated on its outside with a layer of 14g/m^2 LDPE. The resulting laminate is flipped over, then the inside of the Duplex board is brought face-to-face with the metallized surface of the metallized EVOH film (12 microns) in a laminating station of an extrusion coating line and between them there is co-extruded a two-layer structure consisting of an outer layer of LDPE (25g/m^2) and an inner tie layer ("SURLYN", 5g/m^2). The resulting laminate is then co-extrusion coated with an outer tie layer ("BYNEL", 5g/m^2) and an inner layer of LDPE (30g/m^2).

The final laminate has a greater resistance to heat damage of the aluminium of the metallized EVOH film compared with a corresponding laminate with that aluminium on the inside of the film.

The claims defining the invention are as follows:

1. A packaging laminate comprising a first layer comprised of paperboard, stiff plastics, plastics sheet, foamed plastics, kraft paper, grease-proof paper, coated film, metal or plastics foil, or metallized plastics foil, a second layer comprised of surface-coated material selected from coated film and metallized plastics foil, an adhesive, third layer intermediate the first and second layers and by way of which the first and second layers are tied together, and a heat sealing layer, each of the first and second layers being stiffer than the third layer, the surface coating of said second layer being at that surface of said material facing towards said first layer.

2. A laminate according to claim 1, wherein said surface-coated material comprises metallized polymer.

3. A laminate according to claim 1, wherein said surface-coated material comprises M-PET, G-PET, M-OPP, G-OPP or M-EVOH.

4. A packaging container comprised of a laminate comprising an outer, first layer comprised of paperboard, stiff plastics, plastics sheet, foamed plastics, kraft paper, grease-proof paper, coated film, metal or plastics foil, or metallized plastics foil, an inner, second layer comprised of surface-coated material selected from coated film and metallized plastics foil, an adhesive intermediate layer intermediate the first and second layers and by way of which the first and second layers are tied together, and a heat-sealing layer whereby said container is sealed, each of the first and second layers being stiffer than the intermediate layer, the surface coating of said second layer being at that surface of said material facing towards said first layer.

5. A container according to claim 4, wherein said surface-coated material comprises metallized polymer.

6. A container according to claim 4, wherein said surface-coated material comprises M-PET, G-PET, M-OPP, G-OPP, or M-EVOH.

7. A container according to claim 6, and in the form of a gable-topped or flat-topped carton.

DATED this Ninth Day of April 1997

Elopak Systems AG

Patent Attorneys for the Applicant

SPRUSON & FERGUSON

ABSTRACT

IMPROVEMENTS IN OR RELATING TO LAMINATES AND PACKAGING MATERIALS

A laminate comprising first and second layers which serve to stiffen the laminate, and a third layer intermediate the first and second layers and by way of which the first and second layers are tied together, said second layer comprising surface-coated material, characterized in that the surface coating is at that surface of said material facing towards said first layer.