

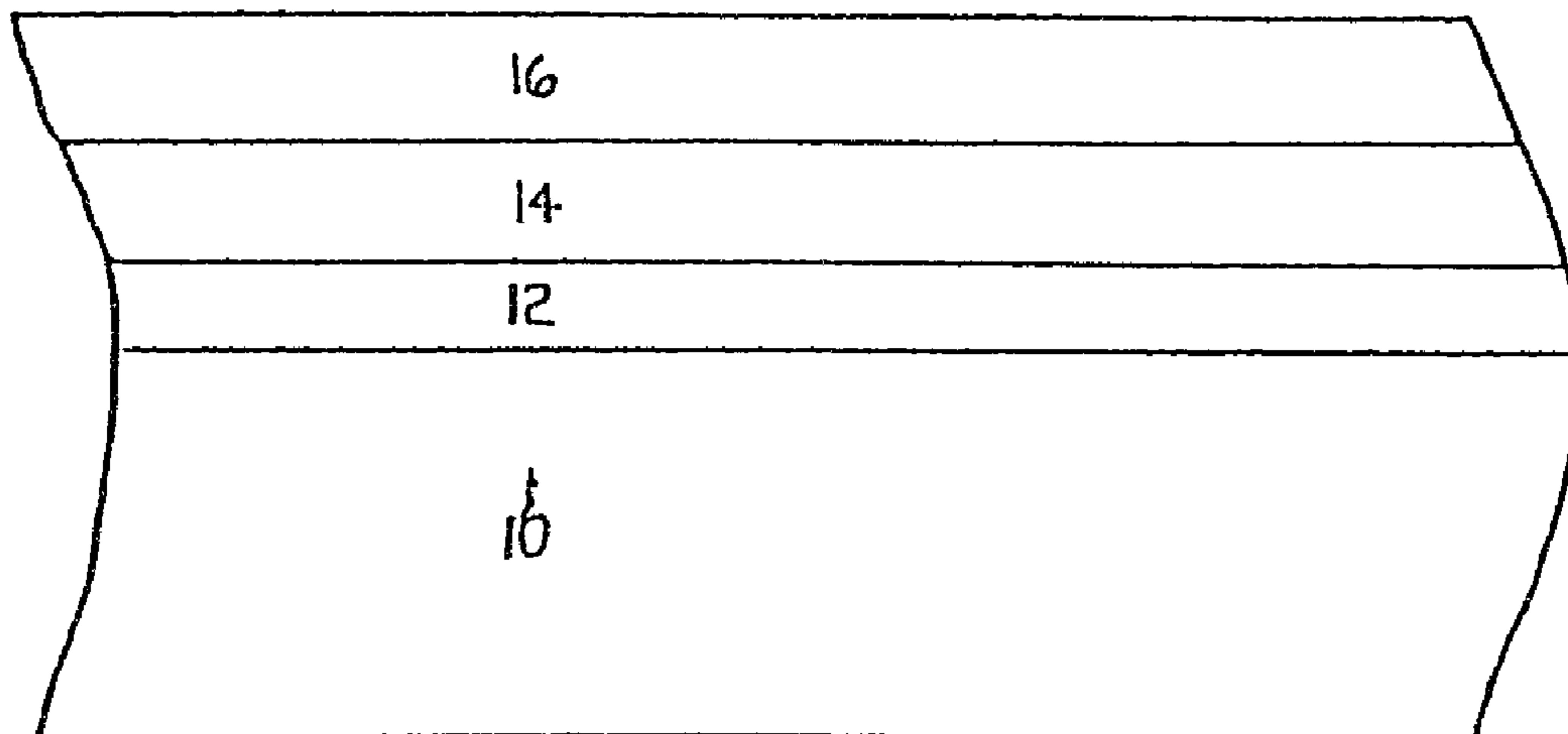


(86) Date de dépôt PCT/PCT Filing Date: 1991/11/12
(87) Date publication PCT/PCT Publication Date: 1992/05/29
(45) Date de délivrance/Issue Date: 2002/07/16
(85) Entrée phase nationale/National Entry: 1993/05/12
(86) N° demande PCT/PCT Application No.: US 1991/008440
(87) N° publication PCT/PCT Publication No.: 1992/008429
(30) Priorité/Priority: 1990/11/13 (07/611,578) US

(51) Cl.Int.⁵/Int.Cl.⁵ B32B 7/06, C09J 7/04
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(54) Titre : **MATERIAU EN FEUILLES DE POLYPROPYLENE PRESENTANT UNE RESISTANCE ACCRUE AU
DECOUPAGE**

(54) Title: **POLYPROPYLENE SHEET MATERIAL WITH IMPROVED CUT RESISTANCE**



CROSS SECTION

(57) Abrégé/Abstract:

A composite material comprising a base liner and a releasable face layer adhered thereto by a pressure sensitive adhesive wherein the base liner has a skin layer on its surface proximate to the pressure sensitive adhesive which is more difficult to cut than the remainder of the base liner materials such that when the composite is subjected to die cutting to allow portions of the face layer to be selectively removed, the die cutter will not penetrate through the base liner to any substantial extent.

PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : A61F 13/02, B32B 27/08, 31/00	A1	(11) International Publication Number: WO 92/08429 (43) International Publication Date: 29 May 1992 (29.05.92) 2096123
(21) International Application Number: PCT/US91/08440 (22) International Filing Date: 12 November 1991 (12.11.91) (30) Priority data: 611,578 13 November 1990 (13.11.90) US (71) Applicant: MOBIL OIL CORPORATION [US/US]; 3225 Gallows Road, Fairfax, VA 22037 (US). (72) Inventors: LU, Pang-Chia ; 86 Stuyvesant Road, Pittsford, NY 14534 (US). SHIELDS, Conway, Francis ; 11 Walnut Run, Fairport, NY 14450 (US). KNOERZER, Anthony, Robert ; 43 Willowick Drive, Fairport, NY 14450 (US). WHYMAN, Donald, George ; 1165 The Grove, Victor, NY 14564 (US).		(74) Agents: 10NG, Tak, K. et al.; Mobil Oil Corporation, 3225 Gallows Road, Fairfax, VA 22037 (US). (81) Designated States: AT (European patent), AU, BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent). Published <i>With international search report.</i>
(54) Title: POLYPROPYLENE SHEET MATERIAL WITH IMPROVED CUT RESISTANCE (57) Abstract A composite material comprising a base liner and a releasable face layer adhered thereto by a pressure sensitive adhesive wherein the base liner has a skin layer on its surface proximate to the pressure sensitive adhesive which is more difficult to cut than the remainder of the base liner materials such that when the composite is subjected to die cutting to allow portions of the face layer to be selectively removed, the die cutter will not penetrate through the base liner to any substantial extent.		

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POLYPROPYLENE SHEET MATERIAL WITH
IMPROVED CUT RESISTANCE

5 This invention relates to substrates for use in connection with release labels. It more particularly refers to an improved polypropylene film or sheeting which is to be used as the substrate for this purpose.

10 There is conventionally widely available self sticking labels, or other indicia, which are commercially sold as temporarily adhered to a film form substrate. In use, the labels are often preprinted, for example with a person's return address. As needed, each label is peeled from the substrate backing and then permanently affixed to a letter or other
15 appropriate place.

20 One commercial embodiment of this article uses a three layer composite structure comprising a face stock, a pressure sensitive adhesive and a base liner. In the return address illustration set forth above, the return address label would be the face stock. This composite structure is assembled and then passed through a die cutter which has its depth of cut closely controlled so that it cuts the face layer but not the base liner layer or at least is such that the die cut
25 only penetrates partially into the base liner. This allows the later peeling of the now cut face layer, with pressure sensitive adhesive adhered thereto, from the base liner. When the cut is all the way through the base liner, or even when it is too deep into the base liner, the adhesive may adhere the two layers
30 together with sufficient force to cause the base liner to tear out with the face layer rather than separate from the face layer as is required.

35 It will be apparent, even from the simple description of this product, that the careful adjustment of the depth of cut will be most difficult to accomplish. Thus, it is not uncommon for the base

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liner to be cut by the die cutting operation, even though efforts are made to carefully control the depth of cut. This can be due to variations in the thickness of the base liner, or of the adhesive layer, or of the face layer, or the die cutting blade. This can also occur as a result of ordinary wear and tear on the machinery which determines the depth of cut.

It is therefore an object of this invention to provide novel means for improving the integrity of this system.

It is another object of this invention to improve the control of the cutting of the face layer in this product in a manner which will substantially prevent the cutting of the base liner.

It is a further object of this invention to produce a composite product, of the type described, which has a lower incidence of base liner perforation than was available in the prior art.

Other additional objects of this invention will become apparent from a consideration of this entire specification including the claims appended hereto.

In accord with and fulfilling these objects, one aspect of this invention is to improve the character of a composite article comprising at least a base liner, a pressure sensitive adhesive and a face layer releasably adhered to the base liner by means of the adhesive, such that fully cutting out of the face layer, or the perforation thereof, will be less likely to injure the integrity of the base liner than was possible in the prior art. In making this composite article, the adhesive may be initially adhered to either the base liner or the face layer and then the two pressed together. It is more common for the adhesive to be first applied to the base liner.

According to this invention, this can be accomplished by changing the character of the base liner so as to provide a layer or skin thereon,

juxtaposed the adhesive layer, which is more resistant to cutting than is the base film form material of which the base liner has been conventionally made. The important feature of this invention is to make the portion of the base liner proximate to the face layer more cut and puncture resistant and therefor to more surely maintain the integrity of the base liner when the die cut face layer is removed therefrom.

The base liner to be used in this invention is suitably a polymeric film form material. The polymeric character of this liner is not essential to the practice of this invention. Thus, the base liner could be paper, metal foil or substantially any other film form material which is suited to the ultimate use to which this product will be put. Typical examples of suitable base liner materials are: polypropylene, polyethylene, polyethylene terephthalate, polystyrene, nylon, polyurethane, other plastic films, paper, metal foils and/or a combination of those materials which have been set forth herein.

The adhesive to be used in the practice of this invention is preferably a pressure sensitive adhesive which adheres more tenaciously to the face layer than it does to the base liner, or to the skin layer on the base liner. Suitable pressure sensitive adhesives for use in the composite article of this invention are well known in this art and can be exemplified by: hot melt adhesives, water based emulsion adhesives, solvent based adhesives, including rubbery adhesives.

The face layer is suitably a polymeric material. However, as with the base liner, this is not a requirement of this composite material. The important feature of the face layer is that it serve the purpose of the composite article and that it adhere more strongly to the adhesive than the adhesive adheres to the base liner/skin. Suitable face layers include: paper, polyethylene, polypropylene, polyethylene

terephthalate, metal foils, laminated composites of these materials, and other similar face stock materials which are per se well known in this trade.

One way of accomplishing this objective is to provide as, or on, the surface of the base liner which will later have the pressure sensitive adhesive layer deposited thereon, a layer of a relatively soft, flexible polymeric film skin. A thickness of about 2 to 25 microns should be sufficient.

The soft polymer can suitably be any one which is not sufficiently brittle to be easily cut by a die cutter or other knife edge. It can be applied by coextrusion, by lamination, or by coating in the usual manner. It can also be provided by treatment of the surface of the base liner so as to make it softer and therefore less likely to be cut by a knife edge. It is also within the scope of this invention to make the surface of the base liner more cut and puncture resistant, more impact resistant and/or more shear resistant.

Where a layer of a soft polymeric material is to be applied onto the surface of the base liner, the means of application are not critical to the practice of this invention. It is important, however, for the soft polymeric skin to be applied in a relatively uniform thickness. While it is not critical to the practice of this invention, it is desirable for the skin on the base liner not to vary in thickness by more than up to about 5 per cent.

Suitable soft polymeric skin materials include linear low density polyethylene, high density polyethylene, polyurethanes, polypropylenes and other polymers having similar properties, as well as mixtures of these with each other and with other polymeric materials, such as ethylene-propylene copolymers, ultra low density polyethylene, high impact polystyrene, wax modified polypropylene, and ethylene copolymers, such

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as ethylene-butene-1 copolymers. The important property of the skin polymer layer of this invention, or of the treated surface of the base liner, is its ability to either resist cutting by a knife edge, particularly a die cutter, or its ability to be uniformly cut so that the cut, if any made therein, has substantially the same cross-sectional shape and size as the blade making the cut in the overlayer. It is postulated that this ability, which is important to the practice of this invention, is due to the resiliency and the impact strength of this material.

The single figure is a perspective view of a composite sheet according to this invention with a portion of the layers of the sheet broken away.

Referring now to this drawing, the composite article of this invention comprises a base liner 10, a skin layer 12 on at least one surface of the base liner, a pressure sensitive adhesive layer 14 disposed on the skin layer on at least one side of the base liner, and a face layer 16 adhered to the adhesive layer, and thereby removably adhered to the base liner.

EXAMPLES 1-5

A base liner was produced or oriented polypropylene sheets 2 mils thick provided with various skin materials, or no skin material in the case of Example 1, as shown in the following table. The skin was about 12% of the thickness of the entire base liner thickness, and was substantially uniform in thickness across the length and the width of the polypropylene sheet.

Without any adhesive or face stock laminated to them, these samples were evaluated on an Allied Gear Flexomaster model 1B label maker set to cut a square shaped label with depth of on (1) mil whereby the intent was to compare the relative cut resistance of these samples.

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The results of these comparative tests are set forth in the following table. In each case the depth of cut was measured at three (3) locations around the cut line: the lead, the trail and the side edges under an optical microscope. The cutting depth is reported as the percentage of the total sheet thickness. The larger the number, the deeper the cut.

Sample #	Skin Material	Lead	Trail	Side
1	none	22%	60%	51%
2	50% PP + 50% Kraton-1102	14%	26%	34%
3	LLDPE	19%	27%	42%
4	HDPE	11%	32%	53%
5	polyurethane	20%	29%	58%

It is clearly shown that the cut resistance of 2 mil OPP sheet is improved with a soft skin such as PP/Kraton blend, LLDPE, HDPE or polyurethane.

EXAMPLES 6-11

A base liner was produced of oriented polypropylene sheets 2 mils thick provided with various skin materials, or no skin material in the case of Example 6, as shown in the following table. The skin was about 12 percent of the thickness of the entire base liner thickness, and was substantially uniform in thickness across the length and the width of the propylene sheet.

A layer of Findley L3566 water based pressure sensitive adhesive, 20 microns (0.8 mil) thick was deposited on the skin side of the base liner by a smooth roll on a Faustel coater, and a layer of Mobil 155R3 polypropylene film, 1.55 mils thick, was laminated over the pressure sensitive adhesive.

5 These samples were evaluated on the same Allied Gear Flexomaster model 1B label maker as described in Examples 1-5 to cut a depth of 2.75 mils. By this set up, the cutting knife will cut into the base liner of 0.4 mil depth. The cutting depth comparisons listed below are reported as percentages of the base liner thickness.

<u>Sample #</u>	<u>Skin Material</u>	<u>Lead</u>	<u>Trail</u>	<u>Side</u>
6	none	31%	54%	21%
7	50% PP + 50% Kraton-1102	19%	32%	14%
8	LLDPE	14%	51%	19%
9	HDPE	23%	25%	9%
10	ULDPE (ultra low density PE) (Dow Atene-4001)	28%	36%	21%
11	EP copolymer	25%	32%	11%

10 It is shown that the cut resistance of 2 mil OPP sheet is improved with a soft skin such as PP/Kraton blend, LLDPE, LDPE, ULDPE or EP copolymer.

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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A composite material comprising a base liner film form material, a pressure sensitive adhesive layer disposed on at least one surface of said liner and a releasable face layer film form material disposed on said pressure sensitive adhesive such that the adhesive layer adheres more strongly to one of said face layer film form material or said base liner film form material than it does to the other, said face layer film form material being releasably adhered to said base liner film form material by means of said adhesive, characterized in that in a die cutting operation said face layer film form material is die cut but said base liner film form material is not cut through, and in that said base liner film form material comprises a base liner material and skin layer thereon and being adjacent said adhesive layer said skin layer being of a polymeric material which is more cut resistant than said base liner material to an extent sufficient to maintain the integrity of said base liner material after die cutting of the face layer film form material.

2. A composite material as claimed in claim 1 wherein said base liner material is at least one material selected from the group consisting of polypropylene, polyethylene, polyethylene terephthalate, polystyrene, nylon, polyurethane, paper and metal foil.

3. A composite material as claimed in claim 1 wherein said face layer material is at least one material selected from the group consisting of polyethylene, polypropylene, polyethylene terephthalate, and metal foil.

4. A composite material as claimed in claim 1 wherein said skin layer is at least one material selected from

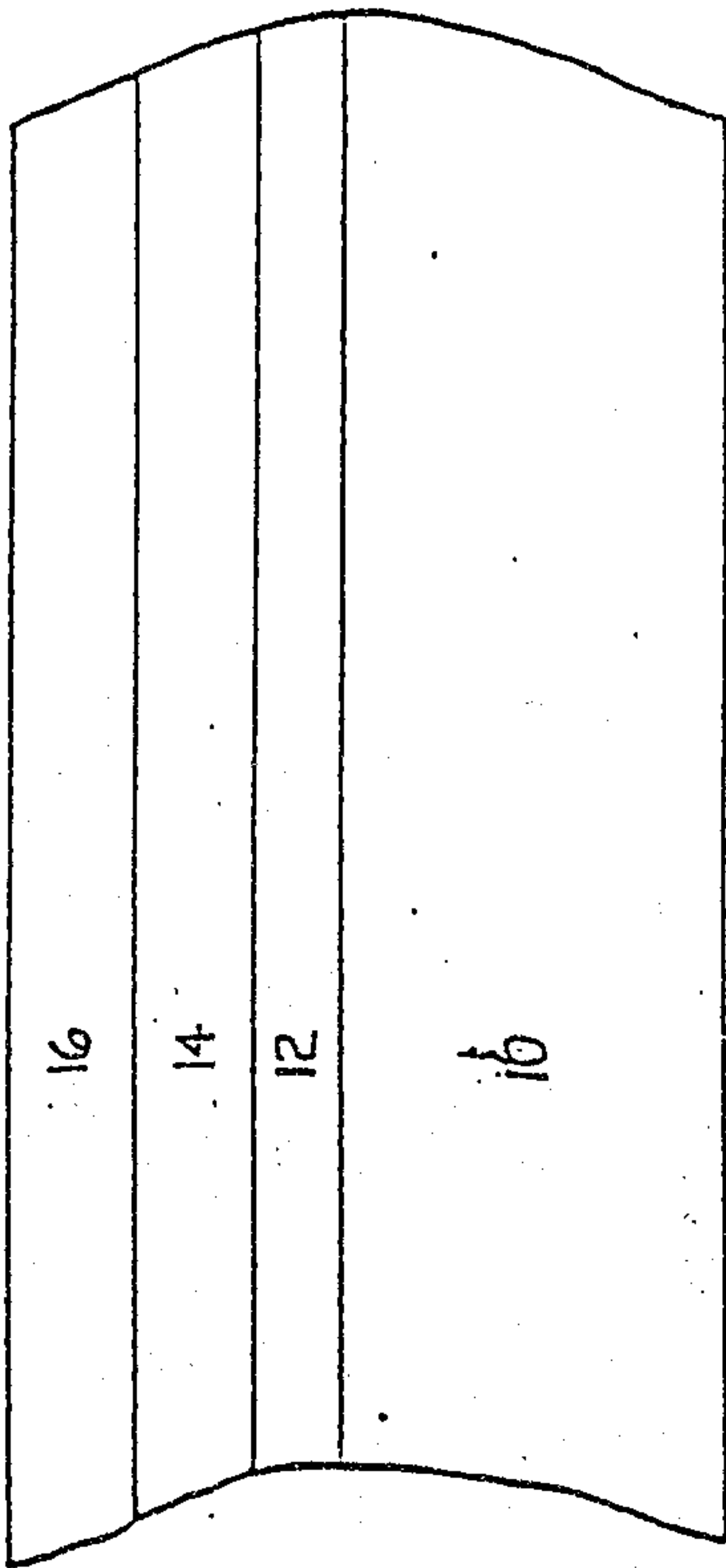
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the group consisting of ethylene-propylene copolymer, ultra low density polyethylene, high impact polystyrene, wax modified polypropylene, and ethylene-butene-1 copolymer.

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5. A composite material as claimed in claim 1 wherein said skin layer is up to about 5% of the thickness of the base liner film form material thickness.

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