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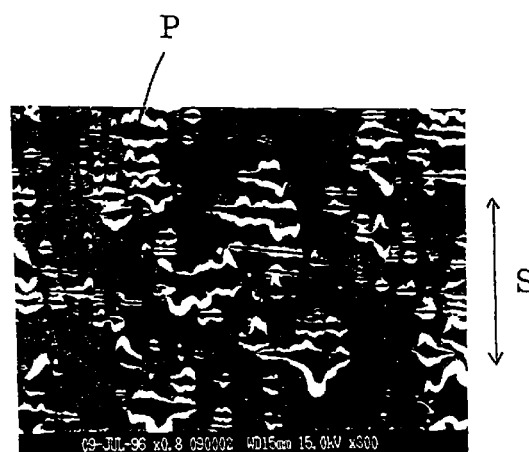
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(54) **PACKAGING MATERIAL HAVING MOLD RELEASE FUNCTION**

(57) In a packaging material having a release function which material permits direct packaging of various pressure-sensitive adhesive goods under the state peelable from the goods, said packaging material has a release function permitting sealing having sufficient adhesive strength even if sealing is carried out on the surface of the releasing agent layer. The releasing agent layer forms cracks when the packaging material is stretched and the area ratio of crack portions per unit surface of said releasing agent layer is 10 to 80% after the packaging material is stretched or the area ratio of crack portions per unit surface area of the releasing agent layer at a portion to be sealed of the packaging material is at least 10%.

FIG. 2



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DescriptionTechnical Field

5 **[0001]** The present invention relates to a packaging material having a release function which material permits direct packaging of various pressure-sensitive adhesive goods under the state peelable from the goods. More specifically, this invention pertains to a packaging material having a release function which material permits sealing processing (adhesion processing) on the surface of the releasing agent layer.

10 Background Art

[0002] As convenient means for providing various goods with adhesive function, pressure-sensitive adhesives have been used frequently.

15 **[0003]** For example, a sanitary napkin (which will hereinafter be called "napkin") has a pressure-sensitive adhesive layer formed on its surface in order to prevent the slip of it at the time of application. In such a napkin, generally, its pressure-sensitive adhesive layer is protected with a release paper and then the whole napkin is hermetically sealed and individually wrapped with a packaging material such as a plastic film. In this case, the opening portion of the packaging material, after the napkin is wrapped, is hermetically sealed by any one of various sealing manners such as heat sealing and press sealing.

20 **[0004]** In recent days, on the other hand, it becomes popular to directly wrap a pressure-sensitive-adhesive-applied napkin with a packaging material having on the surface thereof a release function, without protecting the pressure-sensitive adhesive layer of the napkin with a release paper. As the packaging material having a release function, that comprising a base material such as plastic film and a release agent such as silicone type applied to the base material is usually employed.

25 **[0005]** By the use of such a packaging material having a release function, a release paper for protecting the pressure-sensitive adhesive layer becomes unnecessary, which reduces wastes generated at the using time of napkins and brings about an economical advantage.

30 **[0006]** It was however impossible to seal a packaging material having a releasing agent layer formed on the surface of a base material while imparting it with sufficient seal retention, when the releasing agent was applied to the surface to be sealed (the surface of the releasing agent layer).

35 **[0007]** With a view to sealing with sufficient seal retention, a packaging material in which a releasing agent has been applied not to a portion of a base material to be sealed but only to a portion of the base material in contact with a pressure-sensitive adhesive layer has been proposed. Such a packaging material is however accompanied with the problems that it needs patterned application of the releasing agent, which makes the production process of it more complex and raises the production cost in view of the yield of the product, compared with a packaging material which does not require patterned application of the releasing agent.

40 **[0008]** With the above-described problems in view, the present invention has been completed. An object of the present invention is to provide a packaging material having a releasing agent layer formed on the surface of the base material and therefore having a release function, said packaging material having a release function permitting sealing having sufficient adhesive strength even if sealing is carried out on the surface of the releasing agent layer.

Disclosure of the Invention

45 **[0009]** With a view to overcoming the above-described problems, the present inventors have carried out an extensive investigation. As a result, it has been found that the above-described problems can be solved by producing a packaging material by forming a releasing agent layer on the surface of a stretchable base material, the releasing agent layer being one which forms cracks when the packaging material is stretched; and adjusting, within a predetermined range, the area ratio of crack portions per unit surface area of the releasing agent layer after the packaging material is stretched, leading to the completion of the present invention.

50 **[0010]** Described specifically, the present invention provides a packaging material having a releasing agent layer formed on a stretchable base material, said releasing agent layer forming cracks when the packaging material is stretched and the area ratio of crack portions per unit surface of said releasing agent layer being 10 to 80% after the packaging material is stretched (1st embodiment). In addition, the present invention provides the packaging material wherein the area ratio of crack portions per unit surface area of the releasing agent layer at a portion to be sealed is at least 10% (2nd embodiment). Furthermore, the present invention relates to the use of the packaging material having a release function as described in the first embodiment or second embodiment for individual packaging materials for pressure-sensitive adhesive goods (3rd embodiment).

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Brief Description of the Drawings**[0011]**

FIG. 1 is a cross-sectional view illustrating a packaging material of the present invention having a release function. FIG. 2 is an electron microphotograph (at x300 magnification) of the surface of the releasing agent layer after the packaging material of the present invention having a release function was stretched, which was observed by scanning electron microscope (SEM).

FIGS. 3a and 3b are electron microphotographs of the surface of the releasing agent layer at the sealed portion after the packaging material of the present invention having a release function was heat sealed, which were observed by SEM at x100 magnification and x300 magnification, respectively.

FIG. 4 is an enlarged schematic cross-sectional view of the packaging material of the present invention having a release function when it is used as an individual packaging material for a pressure-sensitive-adhesive-applied sanitary napkin.

Best Modes for Carrying Out the Invention

[0012] The present invention will hereinafter be described with reference to accompanying drawings.

[0013] FIG. 1 is a cross-sectional view illustrating the state of the packaging material of the present invention having a release function (which will hereinafter be called merely "packaging material") before stretching. The packaging material comprises a base material 1 and a releasing agent layer 2 formed on the entire one side of the base material.

[0014] In the present invention, the releasing agent layer on the surface of the base material forms a continuous film substantially all over the surface of the base material, as illustrated in FIG. 1, right after the releasing agent applied to the surface of the base material is subjected to curing or drying treatment. By the subsequent stretching of the packaging material having the above-described constitution, cracks appear in the releasing agent layer and the continuity of the film is broken.

[0015] The term "cracks which appear in the releasing agent layer by the stretching of the packaging material" as used herein means those minute enough to be recognizable by the observation through a scanning electron microscope (SEM) at x100 to x1000 magnification on the surface of the releasing agent layer of the stretched packaging material, for example, cracks having a diameter of about 10,000 Å to 6,500,000 Å (angstrom) in the direction vertical to the stretching direction.

[0016] On the crack appearing portion (crack portion) of the releasing agent layer, the surface of the base material below the releasing agent layer is exposed or the amount of the releasing agent applied becomes less than that on the other portion of the releasing agent layer. In the packaging material of the present invention, the crack portions appeared in the releasing agent layer make it possible to use the surface of the releasing agent layer as a sealing surface.

[0017] FIG. 2 is an electron microphotograph (at x300 magnification) of the surface of the releasing agent layer after the stretching of the packaging material of the present invention (draw ratio: 100%), which was observed by SEM.

[0018] It has been found that in the case of the packaging material of FIG. 2, an infinite number of crack portions (P) appear in the releasing agent layer in the direction substantially vertical to the stretching direction (S) of the packaging material.

[0019] It is necessary, as described above, that the packaging material of the present invention form cracks in the releasing agent layer when the packaging material is stretched. In addition, from the viewpoints of satisfying both a sealing property and a release function on the surface of the releasing agent layer of the packaging material, it is necessary that the area ratio of the crack portions per unit surface area of the releasing agent layer is 10 to 80%, preferably 30 to 70% after the packaging material is stretched.

[0020] When the area ratio of the crack portions of the releasing agent layer becomes less than 10%, the sealing strength (adhesive strength) upon sealing of the surface of the releasing agent layer of the packaging material becomes insufficient and the packaging material inevitably has lowered seal retention. When the area ratio of the crack portions exceeds 80%, on the other hand, the release function lowers, which makes it impossible to peel the pressure-sensitive adhesive good from the packaging material smoothly.

[0021] In the present invention, the area ratio of crack portions per unit surface area of the releasing agent layer is determined by analyzing the surface of the releasing agent after stretching of the packaging material by an electron probe microanalyzer, obtaining a color mapping image and subjecting it to image analysis processing. When the releasing agent layer is formed of a silicone type releasing agent, fluorine type releasing agent or a long-chain alkyl type releasing agent, Si-K α beam, F-K α beam or O-K α beam strength is measured by an electron beam microanalyzer, respectively and the resulting color mapping image is subjected to image analysis processing.

[0022] The measuring method of the area ratio of the crack portions per unit surface of the releasing agent layer

will next be described more specifically by using a releasing agent layer formed of a silicone type releasing agent as an example.

1) to measure the Si-K α beam strength on the surface of the releasing agent layer of the stretched packaging material by an electron probe microanalyzer ("EPM-810", manufactured by SHIMADZU CORPORATION), thereby obtaining a color mapping image according to the Si-K α beam strength.

The analytical conditions of electron probe microanalyzer are as follows:

- Accelerating voltage: 15 kv, sample current: 10 nA
- Beam scan: 100 μm x 1.40 μm , beam diameter: 1 μm ϕ

2) The unit surface area (100 μm x 100 μm) of the resulting color mapping image according to the Si-K α beam strength is subjected to image analysis processing by an image processing apparatus ("Image Command 5098 Model TMN-1528-01" Nippon Avionics Co., Ltd.) and the area ratio of the crack portions is measured. At this time, the image analysis is effected by regarding the part whose Si-K α beam strength is not greater than 40 cps as a crack portion and the part whose Si-K α beam strength is greater than 40 cps as a releasing agent layer and based on the result, the area ratio of the crack portions is determined.

[0023] In the packaging material according to the present invention, the base material itself is required to be formed of a stretchable material, because, after the formation of the releasing agent layer on the surface of the base material, the packaging material is stretched to form crack portions in the releasing agent layer.

[0024] In the present invention, there is no particular limitation imposed on the components or constitution of the stretchable base material insofar as it has enough stretchability when stretched, as described above, for the formation of crack portions in the releasing agent layer and furthermore, has sufficient mechanical strength as a packaging material even after stretching.

[0025] In the packaging material of the present invention, the base material itself is required to have sealing properties in heat sealing, press sealing or the like because the packaging material is sealed after the formation of crack portions in the releasing agent layer.

[0026] Although there is no particular limitation imposed on the base material to be used for the packaging material of the present invention insofar as it satisfies the above-described properties, the base material comprising a plastic film composed mainly of a polyolefin type thermoplastic film is, for example, preferred.

[0027] As such a polyolefin type thermoplastic resin, polyethylene, polybutene, polyhexene and polyoctene can be used either singly or in combination. Among them, polyethylene is particularly preferred. As the polyethylene, either a single product or blended product of ultra low-density, low-density, linear low-density, medium-density and high-density ones can be used, of which particularly preferred are a blend containing at least 15 wt.% of a linear low-density polyethylene and/or low-density polyethylene or a blend containing 80 wt.% or less of a high-density polyethylene. It is possible to improve the heat resistance by adding a material having a higher melting point than a ultra low-density or low-density polyethylene according to need. Such a material has a melting point of 185°C or less, preferably 110 to 180°C.

[0028] It is also possible to improve flexibility by adding, for example, an elastomer component such as styrene, polyolefin or polyester type preferably in an amount of 40 wt.% or less.

[0029] More specifically, as the polymer which constitutes the thermoplastic film, ultra low-density, low-density, linear low-density, medium-density or high-density polyethylene, polypropylene, ethylene-vinyl acetate copolymer, ethylene-(meth)acrylic acid copolymer, ethylene-methyl (meth)acrylate copolymer, ethylene-ethyl (meth)acrylate copolymer, polyethylene-propylene copolymer, olefin elastomer, styrene elastomer, polyisobutylene and butyl rubber can be used either singly or in combination as a composite resin.

[0030] Examples of the olefin elastomer include ethylene-propylene rubber (EPT), ethylene-propylene-diene rubber (EPDM), ethylene-propylene elastomer and ethylene-butene elastomer, while those of the styrene elastomer include styrene-isoprene-styrene block copolymer (SIS) and styrene-butadiene-styrene block copolymer (SBS), and hydrogenated products thereof.

[0031] In the present invention, the base material may have a single layer structure as described above, but that composed of at least two layers and having, on one side or both sides of one of said layers, a heat sealing layer having a melting point lower by at least 5°C than said layer is preferred because in the latter case, heat sealing can be carried out conveniently and securely.

[0032] Described specifically, the base material composed of a single layer is presumably perforated by strong heat and it is difficult to control the strength of the heat. On the other hand, the base material composed of at least two layers has an advantage that it is easy to find heat sealing conditions, as a heat sealing layer is present exclusively for heat seal.

[0033] Examples of such a base material include multi-layered base materials comprising a heat-sealing layer composed of a low-density polyethylene (melting point: 100°C) and a layer composed of high-density polyethylene (melting point: 120°C). In this case, the releasing agent layer is disposed on the side of the low-density polyethylene layer serving as a heat sealing layer.

[0034] As the base material of the present invention, a laminate of a non-woven cloth or woven-cloth with a thermoplastic film is also preferred.

[0035] In the present invention, the packaging material can be provided with high-class feeling by blending with the above-described polymer, thereby roughening the surface of the base material into a pear-skin surface, embossed surface or the like and removing the gloss on the appearance. In addition, the blending with the polymer can reduce the dynamic coefficient of friction and is therefore effective for improving the running property in the line. The surface is presumed to become pear-skin or embossed, because when the polymers inferior in compatibility are blended, they are mixed in the separated form owing to the difference in surface tension at the melting time so that uniform mixing cannot be attained at the surface and the surface does not become flat but roughened. The surface roughness is usually 0.2 to 30 μm , preferably 2 to 5 μm . The surface roughness is preferably adjusted within the half of the film thickness when the embossed or pear-skin surface is formed by a roll or the like which will be described later. The blending of two polymers different in properties makes it possible to prepare a polymer having only merits of both polymers and therefore is effective for preparing a polymer having a new function, for example, having both functions of flexibility and good nerve.

[0036] In addition, blending with a relatively soft polymer or elastomer lowers the peeling sound upon peeling of the packaging material from the pressure-sensitive adhesive good wrapped therewith, which is effective for preventing others from paying attention to the use of it.

[0037] Instead of the polymer blending method, the pear-skin or embossed surface can also be formed, for example, by using the roll surface which is in contact with a T-die extruder upon formation of a film. In the present invention, the latter method is more preferred in the case of the formation of the embossed surface.

[0038] As the base material of the present invention, it is possible to form at least one side of the multi-layered thermoplastic film to be a pear-skin or embossed surface composed of the above-described polymer blend. Formation of the base material from at least two layers as described above is accompanied with the advantage that properties of the plural polymer films can be combined, leading to the addition of a new function, for example, improvement in the above-described heat sealing property or tear strength and good touch feeling.

[0039] As another specific embodiment of the base material of the present invention, it is possible, for example, to form at least one side of the thermoplastic film to be a pear-skin or embossed surface having surface roughness (R_a) not greater than about the half of the film thickness and to dispose a releasing agent layer on the other side. Such a structure is effective for imparting the material with soft touch feeling or high class appearance or improving the running property in the line (decrease in the dynamic coefficient of friction).

[0040] As a further embodiment of the base material, it is possible to form at least one side of the thermoplastic film to be a pear-skin or embossed surface having surface roughness (R_a) not greater than about the half of the film thickness and to dispose the releasing agent layer on this side.

[0041] In this case, it is desired that the static coefficient of friction of the pear-skin or embossed surface having the releasing agent layer formed thereon is less than 1.5, preferably 0.2 to 1.0, while its dynamic coefficient of friction is less than 1.2, preferably 0.1 to 1.0. When these coefficients satisfy the above ranges, respectively, the running property in the line can be improved and wrinkles, zigzag, breakage and the like are not generated easily upon contact with a roll.

[0042] Although no particular limitation is imposed on the thickness of the base material, it is usually not greater than 1 mm, of which 10 to 50 μm , particularly 20 to 40 μm , is preferred from the viewpoints of softness and flexibility.

[0043] In the present invention, the base material needs some extent of strength in view of the transport of it on the line. It is usually preferred that the tensile strength (as measured at 23°C) of the base material in the MD direction is 300 gf/10 mm or greater, particularly 300 to 1000 gf/10 mm and that in the TD direction is 200 gf/10 mm or greater, particularly 300 to 1000 gf/10 mm.

[0044] In the present invention, as described above, there is no particular limitation imposed on the material constituting the releasing agent layer insofar as it permits the formation of cracks in the releasing agent layer when the packaging material is stretched, thereby controlling the area ratio of crack portions within a specific range. From the materials satisfying such properties and having a release function, a proper one can be selected and provided for use.

[0045] As the material constituting the releasing agent layer, a proper one which can satisfy the above-described properties is selected for use from known releasing agents such as thermosetting, ultraviolet curable and electron beam curable silicone releasing agents, fluorine releasing agents and long-chain alkyl releasing agents (which generally indicate polymers of a long-chain alkyl acrylate having at least 12 carbon atoms, copolymers of a long-chain alkyl acrylate and another vinyl monomer and reaction products available by the reaction between polyvinyl alcohol with a long-chain alkyl component such as long-chain alkyl isocyanate). Particularly in the case where the base material is composed of a thermoplastic film, use of a ultraviolet curable or electron beam curable silicone releasing agent which does not need

heating for the formation of the releasing agent layer is preferred. Particularly, a cation polymerization type ultraviolet curable silicone releasing agent is preferred.

[0046] Although there is no particular limitation imposed on the thickness of the releasing agent layer to be formed on the surface of the base material, it is usually 0.05 to 4.0 μm , with 0.1 to 4.0 μm being preferred and 0.3 to 1.5 μm being more preferred.

[0047] In the present invention, the releasing agent can be applied to either one side or both sides of the base material. The releasing agent can be applied to either the entire or partial surface of the base material.

[0048] No particular limitation is imposed on the method of applying the releasing agent to the base material. For example, an appropriate applicator such as multi-roll coater or offset gravure coater can be employed.

[0049] In the packaging material of the present invention, crack portions are formed in the releasing agent layer by applying the releasing agent to the surface of the base material, forming the releasing agent layer by drying or subjecting the resulting base material to any one of various curing treatments (for example, ultraviolet ray irradiation or electron beam irradiation) and then stretching the packaging material.

[0050] Although there is no particular limitation imposed on the stretching method, a method selected as needed from known stretching methods ordinarily employed for the stretching of a plastic film such as tenting and rolling can be used.

[0051] Stretching conditions are not limited particularly. They can be determined so that the area ratio of crack portions of the releasing agent layer formed by the stretching treatment will satisfy a particular range defined by the present invention, though depending on the kind of the base material.

[0052] As described above, the packaging material of the present invention can be stretched prior to sealing. Alternatively, after pressure-sensitive adhesive goods are wrapped with the unstretched packaging material, only the portion to be sealed is stretched and crack portions are formed in this portion of the releasing agent layer.

[0053] It is necessary that at this time, the area ratio of the crack portions per unit surface area of the releasing agent layer at the portion to be sealed is at least 10%, preferably 15 to 95%.

[0054] When the area ratio is lower than 10%, the adhesive strength at the portion to be sealed becomes insufficient, leading to poor seal retention as a packaging material.

[0055] It should be noted that the term "area ratio per unit surface area of the releasing agent layer at the portion to be sealed" as used herein means the value obtained by measuring, under the conditions similar to the above, the Si-K α beam strength on the surface of the releasing agent layer at the portion to be sealed and subjecting the resulting color mapping image to image analysis processing under the conditions similar to the above.

[0056] When cracks are formed in the releasing agent layer at the portion to be sealed, stretching for the formation of the cracks can also be carried out at the time of sealing. In other words, in the packaging material of the present invention, the external force applied to the packaging material at the sealing time can be utilized for the formation of the cracks in the releasing agent layer.

[0057] In this case, although there is no particular limitation imposed on the sealing method, stretching and sealing of the packaging material can be carried out simultaneously by passing the portion of the packaging materials to be sealed (the stacked portion of the packaging materials) between two rolls (at least one of these rolls is a heating roll for heat sealing) which are in contact each other while differing in a rotational speed. In this case, by making use of the shear stress between rolls, cracks can be formed in the releasing agent layer of the packaging material.

[0058] Alternatively, the stretching and sealing of the packaging material can be carried out simultaneously by using a heat sealer having a heat sealing bar having a concave portion (protrusion) formed on its surface. In this case, the packaging material is stretched at the concave portion of the heat sealing bar at the time of heat sealing, whereby cracks can be formed in the releasing agent layer of the packaging material.

[0059] If, in the case other than the above ones, it is possible to apply external force to the packaging material to form cracks in its releasing agent layer at the time of sealing, stretching and sealing can be carried out simultaneously. In this case, stretching of the packaging material in advance is not necessary, which makes it possible to improve the productivity of sealing more.

[0060] FIGS. 3a and 3b are electron microphotographs (FIG. 3a: x 100 magnification, FIG. 3b: x 300 magnification) of the surface of the releasing agent layer after the packaging material of the present invention was heat sealed and then the sealed portion was peeled off, which was observed by SEM.

[0061] From the microphotographs, it has been understood that in the packaging material shown in FIGS. 3a and 3b, an infinite number of crack portions are formed only in the releasing agent layer at the sealed portion because at the sealing time, action similar to stretching (packaging material is stretched) is applied to the packaging material.

[0062] The packaging material of the present invention can be provided after stretched in advance, that is, after formation of cracks in the releasing agent layer and ready for sealing. Alternatively, as described above, the packaging material can also be provided without stretching and after pressure-sensitive adhesive goods are wrapped with such packaging material, stretching is carried out upon sealing to form crack portions in the releasing agent layer.

[0063] FIG. 4 is an enlarged schematic cross-sectional view of the packaging material of the present invention used

as an individual packaging material (packaged sheet) of a napkin with a pressure-sensitive adhesive. The napkin B is wrapped with the unstretched packaging material A. Only the portion C to be sealed which is composed of the releasing agent surfaces of the packaging materials is stretched to form crack portions in the releasing agent layers and then sealed. In the drawing, indicated at 1 is a base material, 2 a releasing agent layer and 3 a pressure-sensitive adhesive layer.

[0064] In the present invention, although there is no particular limitation imposed on the sealing method of the stretched packaging material, heat sealing (heat bonding) or press sealing method can be employed for example. In the packaging material of the present invention, the surface of the releasing agent layer having crack portions formed therein is a surface to be sealed.

[0065] In such crack portions, the base material layer below the releasing agent layer has been exposed or an amount of the releasing agent applied has been decreased so that practically sufficient sealing strength (adhesive strength) is available even if the surface of the releasing agent layer is sealed. It should be noted that the surfaces of the packaging material to be sealed may be formed of surfaces of the releasing agent layer of the packaging material or may be formed of the surface of the releasing agent layer and the surface of the base material (for example, a surface opposite to the surface having the releasing agent layer formed thereon).

[0066] In the present invention, it is desired from the viewpoint of the seal retention of the content after sealing, the sealing strength (as measured at 23°C) indicating the adhesive force at the sealed portion is at least 2 g/25 mm but not greater than the breaking strength of the base material, preferably 5 g/25 mm to 1000 g/25 mm. The term "breaking strength of the base material" as used herein means the strength at which the base material does not peel from the sealed portion but is broken upon measurement of the sealing strength. It suggests that the adhesive strength at the sealed portion is markedly strong. When the sealing strength is less than 2 g/25 mm, peeling of the sealed portion occurs easily, indicating the deteriorating tendency of the seal retention.

[0067] The packaging material of the present invention can be used not only as an individual packaging material for a pressure-sensitive-adhesive-applied sanitary napkin, as illustrated in FIG. 4, but also a material for wrapping various pressure-sensitive adhesive goods such as pressure-sensitive-adhesive-applied pocket heater without using a release paper.

[0068] The present invention will hereinafter be described by specific examples. It should however be born in mind that the present invention is not limited by them.

Referential Example 1

[0069] To the entire one side of a low-density polyethylene film having a thickness of 30 µm, a releasing agent prepared from 100 parts by weight of a cation polymerization type ultraviolet curable silicone releasing agent ("TPR6500", produced by Toshiba Silicone Co., Ltd.) and 2 parts by weight of a photo initiator ("UV-9310C", produced by Toshiba Silicone Co., Ltd.) was applied to give a thickness of 0.7 µm. The resulting film was exposed to UV rays to form a releasing agent layer, whereby a packaging material before stretching was prepared.

Referential Example 2

[0070] To the entire one side of a low-density polyethylene film of 30 µm thick, a releasing agent prepared from 100 parts by weight of an addition reaction type thermosetting silicone releasing agent and 2 parts by weight of a platinum curing catalyst was applied to give a thickness of 0.3 µm. A releasing agent layer was formed in a hot-air drier, whereby a packaging material before stretching was formed.

Example 1

[0071] The packaging material before stretching (25 mm wide x 100 mm length), which had been prepared in Referential Example 1, was stretched at a draw ratio of 100% in the direction of the flow of the base material (MD direction). At that time, stretching was carried out at a tensile rate of 50 mm/min by using a tensile tester.

[0072] After stretching, the surface of the releasing agent layer was observed by SEM (x 300 magnification). As a result, generation of cracks in the releasing agent layer was observed. It was also found that the area ratio of crack portions per unit surface area of the releasing agent layer was 15% after stretching.

Example 2

[0073] In a similar manner to Example 1, the packaging material before stretching (25 mm wide x 100 mm length), which had been prepared in Referential Example 1, was stretched at a draw ratio of 150% in the direction of the flow of the base material (MD direction).

[0074] After stretching, the surface of the releasing agent layer was observed by SEM (x 300 magnification). As a result, generation of cracks in the releasing agent layer was observed. It was also found that the area ratio of crack portions per unit surface area of the releasing agent layer was 50% after stretching.

5 Example 3

[0075] In a similar manner to Example 1, the packaging material before stretching (25 mm wide x 100 mm length), which had been prepared in Referential Example 1, was stretched at a draw ratio of 200% in the direction of the flow of the base material (MD direction).

10 **[0076]** After stretching, the surface of the releasing agent layer was observed by SEM (x 300 magnification). As a result, generation of cracks in the releasing agent layer was observed. It was also found that the area ratio of crack portions per unit surface area of the releasing agent layer was 75% after stretching.

Example 4

15 **[0077]** The unstretched packaging materials obtained in Referential Example 1 were stacked such that their surfaces of the releasing agent layers faced each other and then heat sealed by a heat sealer equipped with a heat sealing bar having on the surface thereof convex portions formed. In this example, at the time of heat sealing, each of the packaging materials was stretched at the convex portions of the heat sealing bar and cracks were formed in the releasing agent layer corresponding to the convex portions, whereby heating sealing providing sufficient sealing strength for practical use was carried out.

20 **[0078]** After heat sealing, the sealed portion of one of the packaging materials was peeled and the area ratio of the crack portions per unit surface area of the releasing agent layer at the sealed portion was measured, resulting in 53%.

25 Comparative Example 1

[0079] The unstretched packaging material obtained in Referential Example 1 was used as was without stretching. At that time, the area ratio of crack portions per surface unit area of the releasing agent layer was 0%.

30 Comparative Example 2

[0080] In a similar manner to Example 1, the unstretched packaging material (25 mm wide x 100 mm length) prepared in Referential Example 1 was stretched at a draw ratio of 50% in the direction of the flow of the base material (MD direction).

35 **[0081]** After stretching, the surface of the releasing agent layer was observed by SEM (x 300 magnification). As a result, generation of cracks in the releasing agent layer was observed. It was also found that the area ratio of crack portions per unit surface area of the releasing agent layer was 5% after stretching.

Comparative Example 3

40 **[0082]** In a similar manner to Example 1, the unstretched packaging material (25 mm wide x 100 mm length) prepared in Referential Example 1 was stretched at a draw ratio of 300% in the direction of the flow of the base material (MD direction).

45 **[0083]** After stretching, the surface of the releasing agent layer was observed by SEM (x 300 magnification). As a result, generation of cracks in the releasing agent layer was observed. It was also found that the area ratio of crack portions per unit surface area of the releasing agent layer was 85% after stretching.

Comparative Example 4

50 **[0084]** In a similar manner to Example 1, the unstretched packaging material (25 mm wide x 100 mm length) prepared in Referential Example 1 was stretched at a draw ratio of 100% in the direction of the flow of the base material (MD direction).

[0085] After stretching, the surface of the releasing agent layer was observed by SEM (x 300 magnification). As a result, generation of cracks was not observed in any portions of the releasing agent layer.

55 Comparative Example 5

[0086] The unstretched packaging materials obtained in Referential Example 2 were stacked such that their sur-

faces of the releasing agent layers faced each other. They were heat sealed in a similar manner to Example 4, resulting in failure.

[0087] The samples obtained in Examples 1 to 3 and Comparative Examples 1 to 4 were evaluated as follows:

5 Heat Sealing Strength

[0088] The packaging materials of each sample were stacked such that their surfaces of the releasing agent layers faced each other and then heat sealed by a heat sealer ("TP-701S HEAT SEAL TESTER, TESTER SANGYO CO. LTD) under the below-described conditions. After heat sealing, heat sealing strength was measured at a tensile rate of 300 mm/min (T type peeling test) by making use of a tensile tester.

[0089] Incidentally, the heat sealing bar of the heat sealer employed in the above evaluation had a flat shape.

- heat sealing temperature: 130°C
- contact bonding time: 2 sec
- 15 • contact bonding conditions: 4 kg/cm²
- contact bonded area: 10 mm x 30 mm

Peeling Strength

20 **[0090]** A pressure-sensitive adhesive tape (trade name: "F-140BK", produced by NITTO DENKO CORPORATION) was adhered onto the surface of the releasing agent layer of each sample (10 mm wide) by the reciprocation of a 2 kg roller and it was allowed to stand for 30 minutes at room temperature. The peel force at the time when the pressure-sensitive adhesive tape was peeled from the sample (packaging material) at a tensile rate of 300 mm/min (180° peeling) was measured using a tensile tester.

25 **[0091]** The results are shown in Table 1.

Table 1

30		Area ratio (%) of crack portions	Heat sealing strength [g/25 mm]	Peel force [g/10 mm]
	Ex. 1	15	310	44
	Ex. 2	50	400	85
35	Ex. 3	75	530	98
	Comp. Ex. 1	0	0	4
	Comp. Ex. 2	5	<1	8
	Comp. Ex. 3	85	560	210
40	Comp. Ex. 4	0	0	10

[0092] As is apparent from Table 1, it has been understood that because in each of the packaging materials of Examples 1 to 3, the area ratio of crack portions per unit surface area of the releasing agent layer formed by stretching is adjusted within a particular range defined by the present invention, they have sufficient heat sealing strength even if the surfaces of the releasing agent layers are sealed and in addition, the releasing agent layer has peeling property from the pressure-sensitive adhesive tape.

[0093] In the packaging material of Comparative Example 3, on the other hand, the area ratio of crack portions exceeds 80%, that is, higher than the value defined in this invention, so that the releasing agent layer has lowered peeling property from the pressure-sensitive adhesive tape.

[0094] It has been also found that in the packaging materials of Comparative Examples 1, 2 and 4, crack portions are not formed in the releasing agent layer or even if the crack portions are formed, the area ratio of them is lower than 10%, that is, lower than the value defined in this invention so that heat sealing cannot be carried out or sealing strength becomes markedly low.

55 Industrial Application Possibility

[0095] The above-described structure of the packaging material of the present invention having a release function

makes it possible to carry out sealing with sufficient adhesive strength even if the surfaces of the releasing agent layers are sealed each other, and at the same time to maintain sufficient peeling property from various pressure-sensitive adhesive goods.

[0096] By using a packaging material according to the present invention, it becomes possible to produce a packaging material having a release function without a conventionally-employed complex production step of applying a releasing agent to the portions other than the portion to be sealed.

[0097] In the present invention, when external force similar to the stretching force can be applied to the packaging material at the time of sealing, the step for forming crack portions in the releasing agent layer can be carried out simultaneously with sealing so that it is not necessary to stretch the packaging material in advance and working efficiency of sealing can be improved further.

Claims

1. A packaging material having a release function, which comprises a stretchable base material and a releasing agent layer formed on the surface thereof, said releasing agent layer forming cracks when the packaging material is stretched and the area ratio of crack portions per unit surface area of said releasing agent layer being 10 to 80% after the packaging material is stretched.
2. A packaging material having a release function, which comprises a stretchable base material and a releasing agent layer formed on the surface thereof, the area ratio of crack portions per unit surface of said releasing agent layer at a portion to be sealed being at least 10%.
3. A packaging material having a releasing function according to claim 1 or 2, which is used as an individual packaging material for pressure-sensitive adhesive goods.
4. A packaging material having a releasing function according to claim 1 or 2, which is used as an individual packaging material for a sanitary napkin.
5. A packaging material having a releasing function, which has been obtained by stretching a material having a releasing agent layer formed on the surface of a stretchable base material and wherein the area ratio of crack portions per unit surface area of the releasing agent layer is 10 to 80%.
6. A packaging material having a releasing function according to claim 5, wherein said base material comprises a plastic film having a thickness of 10 to 50 μm and being composed mainly of a polyolefin thermoplastic resin.
7. A packaging material having a releasing function according to claim 5, wherein said releasing agent layer is formed of a ultraviolet curable silicone releasing agent.
8. A packaging material having a releasing function according to claim 5, wherein said releasing agent layer has a thickness of 0.05 to 4.0 μm .
9. A packaging material having a releasing function according to claim 5, wherein said releasing agent layer has a thickness of 0.1 to 4.0 μm .

FIG. 1

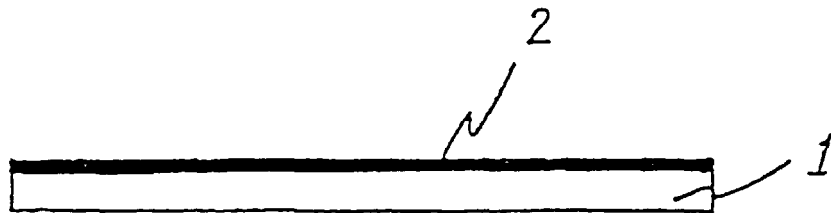


FIG. 2

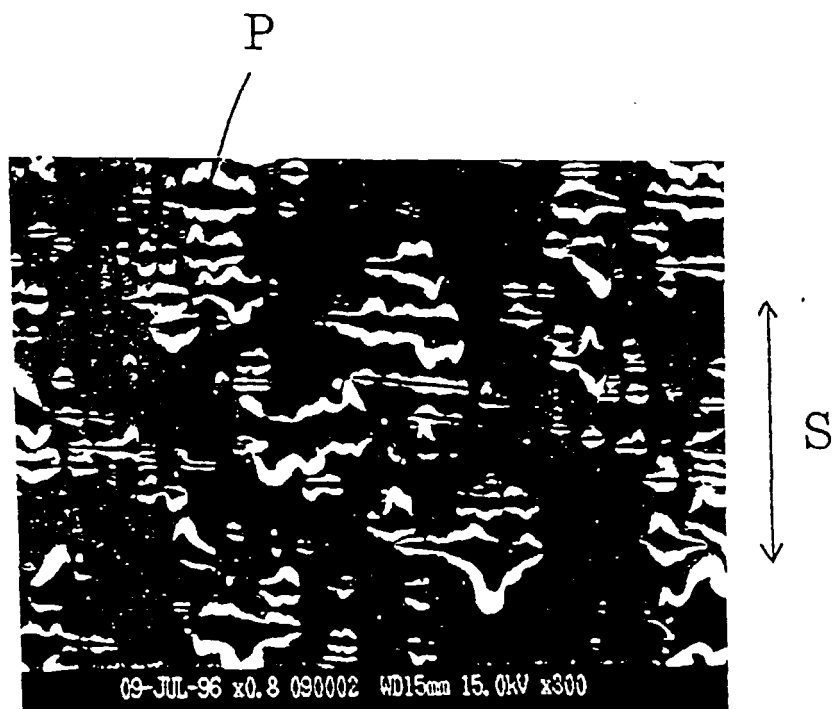


FIG. 3a

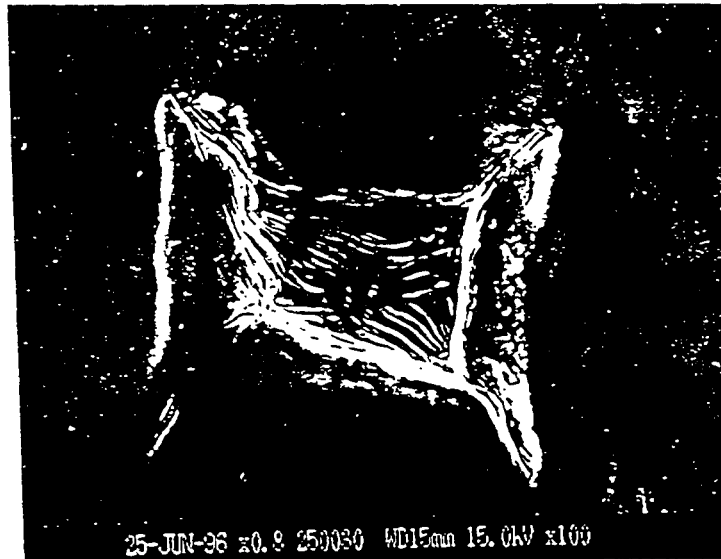
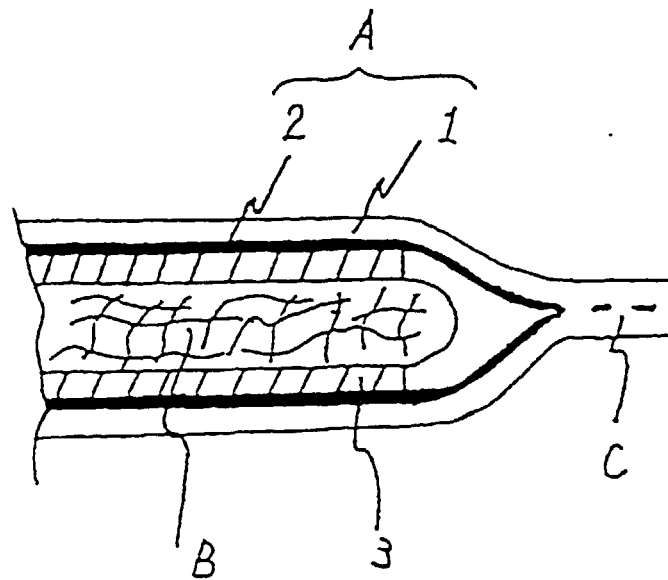


FIG. 3b



FIG. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP98/00604

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl. ⁶ B65D65/42		
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) Int.Cl. ⁶ B65D65/42, B32B27/00, 101		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1926-1996 Toroku Jitsuyo Shinan Koho 1994-1998 Kokai Jitsuyo Shinan Koho 1971-1998 Jitsuyo Shinan Toroku Koho 1996-1998		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP, 3-24949, A (Dainippon Printing Co., Ltd.), February 1, 1991 (01. 02. 91), Page 2, upper right column, lines 13 to 18 (Family: none)	1-9
A	JP, 4-284237, A (Dainippon Printing Co., Ltd.), October 8, 1992 (08. 10. 92), Page 3, left column, lines 2 to 7 (Family: none)	1-9
☐ Further documents are listed in the continuation of Box C. ☐ See patent family 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 April 24, 1998 (24. 04. 98)		Date of mailing of the international search report May 12, 1998 (12. 05. 98)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)