

RE-CLOSABLE PACK WITH COHESIVE CLOSURE MECHANISM

The present invention relates to a re-closable pack with a cohesive closure mechanism. In particular, the invention relates to a re-closable pack with a cohesive closure mechanism for consumable products, particularly cigarettes.

Many examples of re-closable packs have been known for containing various consumable products. One such example includes a hinged-lid pack comprising a locking tab mechanism. Others include packs comprising pressure-sensitive adhesives, slider zipper assemblies or squeeze-openable mechanisms.

Packs having a re-closable lid have also been known for containing cigarettes. The most commonly used cigarette packs rely on the hinged lid to open and close the pack and have no other means for retaining the pack in a closed configuration. However there have been some examples of cigarette packs with re-closable lids further utilising an adhesive strip, such as those disclosed in EP 1837293 and US 6244435, which covers the opening so as to secure the lid to the pack more effectively.

Even with the added adhesive strip, such packs may suffer unwanted sticking of loose tobacco products to the adhesive strip over the course of its use, and may lose some of its adhesive ability. This can result in the tendency for the lid to at least partially open at times when the user wishes the lid to remain closed. This can result in the contents of the pack escaping from the pack in an undesirable manner as well as leaving an aesthetically displeasing pack.

WO 2007/093758 further discloses a cigarette packaging comprising cohesive members which are used to adhere flaps in the lid. However such cohesive members have not been disclosed for use in closure mechanisms.

Accordingly, there is a clear need for a re-closable pack having an improved closure mechanism for maintaining the pack in a closed configuration.

In order to solve the problems posed by the prior art, the present invention provides a re-closable pack with a closure mechanism characterised in that closure mechanism comprises two opposing cohesive surfaces.

The term surface as used herein may refer to the surface of the re-closable pack itself or a separate member which may be adhered to the pack. In

the latter case, the separate member may be referred to as a cohesive member where appropriate throughout the description.

As used herein, cohesion refers to the action or property of like molecules sticking together, being mutually attractive. This is an intrinsic property of a substance that is caused by the shape and structure of its molecules which makes the distribution of orbiting electrons irregular when molecules get close to one another, creating electrical attraction that can maintain a macroscopic structure. As such, a cohesive surface or member may be any material which has an unevenly distributed electrostatic charge on the surface, thereby allowing it to adhere to itself, or any other material with a complementary charge. A cohesive surface or member may further be any material which is able to form intermolecular forces, such as hydrogen bonds, dipole-dipole interactions or van der Waals interactions, with itself or like-materials.

A cohesive surface or member is therefore distinguished from an adhesive surface or member, in that an adhesive member requires the surface to be sufficiently tacky to enable adhesion to other members. Cohesive members on the other hand have an irregular charge on the surface allowing the members to adhere through complimentary charging.

A cohesive surface or member may further be any material which has sufficient cling. As used herein, the term "cling" refers to the ability of a material to adhere to itself.

The average cling value between two cohesive surfaces or members are assumed to have at least 50 grams force per inch, more preferably between 50 and 500 grams force per inch, more preferably between 60 and 400 grams force per inch, more preferably between 70 and 300 grams force per inch, and even more preferably between 80 and 200 grams force per inch as measured by ASTM D-5458-95. If the cling value is below 50 grams force per inch, the closure mechanism may have insufficient cohesion to provide efficient closure of the pack, whereas a cling value of more than 500 grams force per inch, may provide too much cohesion, preventing the user to open and close the pack easily.

Suitable materials for use as cohesive surfaces or members include, but not limited to, silicon and silicon-based materials, polyolefin blends, polyethylene (PE), low density polyethylene (LDPE), polyvinyl chloride (PVC), polyvinylidene

chloride (PVdC), polyethylene terephthalate (PET) and/or combinations thereof, most preferably polyethylene terephthalate (PET).

For a cohesive surface or member that is composed of a material which does not have sufficient intrinsic cling properties, it may be necessary to incorporate one or more tackifying agents in order to impart increased cling to the cohesive member.

Suitable tackifying agents according to the present invention include, but not limited to hydrocarbon resins such as terpene resins, hydrogenated resins and resin esters, isotactic and atactic polypropylenes, polybutenes and/or combinations thereof. In a preferred embodiment, the tackifying agent is polyisobutylene, polyethylene-vinylacetate (EVA) copolymer and/or combinations thereof.

A tackifying agent may be employed in an amount sufficient to provide the desired cling properties. A tackifying agent may be present in an amount of from 0.1 to 15 wt%, preferably 0.5 to 10 wt%, more preferably 0.8 to 8 wt% and even more preferably 1 to 5 wt%, based on the total weight of the cohesive surface or member. If the tackifying agent is present an amount of less than 0.1 wt% based on the total weight of the cohesive surface or member, the resultant surface or member may have insufficient cling properties to provide an effective closure mechanism. On the other hand, if more than 15 wt% of tackifying agent based on the total weight of the cohesive surface or member is used, the resultant surface or member may exhibit too much cling or adhesion properties.

A cohesive surface or member may further have a surface roughness value of between 0.5 and 4 nm, preferably between 0.5 and 3 nm, more preferably between 0.5 and 2 nm, and even more preferably between 0.5 and 1 nm. The surface roughness value can be measured by any method known to those skilled in the art. In a preferred embodiment, the surface roughness value is measured atomic force microscopy (AFM). If the cohesive surface or member has a surface roughness value of less than 0.5 nm, the closure mechanism may be too strong for the user to open and close the pack with ease, and if the surface roughness value is more than 4 nm, the cohesive surface or member may not provide sufficient cohesion to act as an effective closure mechanism.

A cohesive surface or member may further comprise a glossy coating or may itself exhibit gloss. A cohesive member may have a gloss value at 45° of at

least 40%, 50%, 60%, 63%, 65%, 70%, 75%, 80%, 85%, 90%, and 95%, as measured in accordance with ASTM D-2457.

Preferably the surface area interaction between the cohesive surfaces or members is at least 40%, preferably between 40 and 100%, more preferably
5 between 50 and 99%, more preferably between 60 and 98% and even more preferably between 70 and 95%. As used herein, the surface area interaction refers to the percentage of surface area overlap between the at least two opposing cohesive surfaces or members. If the surface area interaction
10 between the surfaces or members is less than 40%, the overlap between the surfaces or members may not be insufficient to provide an effective closure mechanism.

A re-closable pack may be formed of any material known to those skilled in the art. Such materials may display cohesion, and therefore the re-closable pack may itself intrinsically comprise surfaces which act to provide an efficient
15 closure mechanism. In such a case, one of the opposing cohesive surfaces may be treated to provide a surface of complementary charge to the other cohesive surface, to give an effective closure mechanism. In such a case, one of the cohesive members may be treated by any means known to those skilled in the art to provide the necessary charge distribution to give the required
20 complementary charge. In a preferred embodiment, complementary charge is obtained by applying a coating or using plasma etch technology.

The re-closable pack may further comprise a separate cohesive member to provide an effective closure mechanism. The cohesive member may provide the necessary complementary charge required to provide an effective closure
25 mechanism.

In a preferred embodiment, the re-closable pack is made out of cardboard. In such a case, the re-closable pack may require the presence of two or more cohesive members. In a more preferred embodiment, the re-closable pack is a cigarette pack.

30 If the re-closable pack contains two or more cohesive members (vide supra), each cohesive member may be made from the same or different materials. Whether the cohesive member is made from the same or different materials, each cohesive member may display different properties. One cohesive member may exhibit a higher gloss value than the other. One of the

cohesive members may also exhibit a higher cling value than the other. One of the cohesive members may further contain a greater amount of tackifying agents than the other.

Each cohesive member may have a thickness of between 10 microns and 1500 microns, preferably between 10 and 1000 microns, more preferably between 10 and 500 microns and even more preferably between 20 and 250 microns.

The closure mechanism may comprise one continuous strip of a cohesive member or may comprise two or more smaller strips of the cohesive member to provide effective closure.

The cohesive member may be supplied on a reel of non-stick paper backing, registered to the passing of the individual re-closable pack and applied. The backing may then be run off and re-wound.

The re-closable pack of the present invention has a novel closure mechanism, which is capable of retaining positive engagement upon closure, for a prolonged period compared to prior closure mechanisms utilising adhesive strips or coatings. Furthermore, cohesive, rather than adhesive materials are used for the closure mechanism, which means that it does not suffer from unwanted sticking of loose tobacco, dirt or finger prints. This in turn provides a more resilient closure mechanism in use.

The present invention also provides a blank for making the above re-closable pack.

Specific embodiments of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a re-closable pack with an open lid, in accordance with the present invention;

Figure 2 is a perspective view of a re-closable pack with a closed lid, in accordance with the present invention; and

Figure 3 shows a two-part blank for forming a re-closable pack according to the present invention.

Figure 4 is a perspective view of a variant embodiment of a re-closable pack with an open lid, in accordance with the present invention

Figure 5 shows a two-part blank for forming a re-closable pack as shown in figure 4.

Figure 1 shows a re-closable pack 1 comprising a body 11 and a lid 12. Body 11 comprises a plurality of side walls 110, 111, 114, a bottom end wall 112 (not visible) and an open top end 113. Lid 12 is provided to close the open top end 113 of the body 11. Lid 12 comprises a lid front wall 121 on the side of the lid substantially opposite a lid hinge 13 connecting the lid to a rear side wall 114 of the body 11. The lid further comprises lid side walls 122. Lid rear wall 123 is not essential and the lid hinge 13 may optionally be formed directly between rear side wall 114 of the pack and top wall 124 of the lid. A number of intermediate side walls 111 may be disposed between the front wall 110 and the rear wall 114 of the pack, in any number, to form a pack of a desired shape. For example, as an alternative to the form illustrated in Figure 1, where a single pair of opposing intermediate side walls 111 is provided to give the pack a regular box-shaped form, a plurality of intermediate side walls 111 may be provided in order to give the pack a substantially oval-shaped form when viewed from its bottom wall 112 or looking into the open top end 113 of the body 11. Other numbers of intermediate side walls 111 may be provided to provide other outer shapes to the box as appropriate. Front side wall 110 is substantially opposite rear side wall 114, but need not necessarily be precisely opposite and parallel to rear side wall 114.

A first cohesive member 14a is adhered to the inner side of the lid front wall 121. A second cohesive member 14b is adhered to the front side wall of an inner frame 11a.

The front side wall of the inner frame 11a is located substantially opposite the rear side wall 114 of the pack. Front side wall of the inner frame 11a is located such that the second cohesive member 14b may engage with the first cohesive member, located on an inner side of the lid front wall 121.

Figure 2 presents a view similar to that shown in Figure 1, but with the lid in a closed configuration. In the arrangement shown in Figures 1 and 2, the second cohesive member 14b is adhered to the front side wall of the inner frame 11a. Inner frame 11a is optional and the second cohesive member 14b may be directly adhered to front side wall 110 if desired. In Figure 2, the features of the inner frame 11a and the first and second cohesive members 14a and 14b (overlapped) are shown in dashed lines, to differentiate them from the features of the front side wall 110 and lid front wall 121, which are shown in solid lines.

Circles 20a indicate attachment of gluing points, where the inner frame 11a may be attached to front side wall 110. Circles 20b indicate the attachments of gluing points, where the first and second cohesive members 14a and 14b may be attached to the inner side of the lid front wall 121 and the front side wall of the inner frame 11a respectively.

In this embodiment one or both of the members 14a, 14b can advantageously be made of a piece of Gecko®-Nanoplast® material, manufactured and sold by Gottlieb Binder GmbH & Co. KG, Holzgerlingen, Germany. This material is a silicon-based material with a microstructure of thousands of gripping elements per cm² and exhibiting high adhesion properties using "Van-der-Waals" forces of attraction on any kind of substantially flat surface,

Such cohesive member of Gecko®-Nanoplast® material has the particular advantage to provide good adhesion of the lid to the inner frame of the pack without any tackifying agent directly to the inner frame or lid surface depending on where the cohesive member 14 is attached.

Alternatively, as represented in Figure 4, the re-closable pack 1 may comprise only one cohesive members 14b. In this embodiment the only one cohesive member 14b can advantageously be made of a piece of Gecko®-Nanoplast® material, manufactured and sold by Gottlieb Binder GmbH & Co. KG, Holzgerlingen, Germany.

Preferably, the cohesive member 14b is attached to the inner frame 11a front surface and is further fitted with a peelable label (not shown in the drawings) before use/opening of the pack. Such peelable label prevents the lid of the pack from strongly adhering to the cohesive member 14b until the pack is first opened by a user. Then it also leaves the user the choice to use or not the re-sealability function offered by the cohesive member 14b. The user can thus peel the protective label off to be able to activate the cohesive member and confer a re-sealable closure to the pack or leave the peelable label on the cohesive member 14b to keep a pack with a regular lid closure if preferred.

Preferably, the cohesive member 14b made of Gecko®-Nanoplast® material is attached, for example with glue, on the inner frame 11a before the latter is itself attached to the inner surface of the front wall of the pack during the manufacturing process. Advantageously, the inner frame can be provided from a

reel and individually cut or provided in stacks and then "labelled" with a cohesive member 14b at a determined position before the inner frame 11a is associated to a blank used for forming the pack as explained hereinafter.

Figures 3 and 5 illustrate a two part blank which may be used to form the re-closable pack of the present invention as shown in figures 1 and 4 respectively. The blank comprises a first portion 71 for forming the body of the pack, a second portion 72 for forming the lid of the pack, and in this example comprises a further blank 73 for forming an inner frame for the pack. As described earlier, the inner frame is optional and if an inner frame is not desired, the second cohesive member may be adhered directly on the front side wall 110 of the pack 1 by its reproduction on the upper edge 710a of front wall panel 710. The pack blank comprises a front side wall panel 710, having intermediate side wall panels 711 on each side, connected by fold lines to the front side wall panel. At its bottom edge, the front side wall panel 710 is connected by a fold line to a bottom wall panel 712. Bottom wall panel 712 is in turn connected to a rear wall panel 714 by a fold line. Rear wall panel 714 is connected on each side by fold lines to side wall tabs 713, which are connected to bottom wall tabs 712a by fold lines. To form the main body of the pack, the front side wall panel 710 and rear side wall panel 714 are folded about their respective fold lines connecting them with the bottom panel 712. Bottom wall tabs 712a are folded at their connecting fold lines through 90°. Side wall tabs 713 are folded through 90° about their connecting fold lines with rear side wall panel 714 such that bottom wall tabs 712a rest on bottom wall panel 712 on the inside of the pack. Front wall panel 710 is then folded to form the front side wall of the pack and its connected side wall panels 711 are folded about their connecting fold lines through 90° on to the outside of side wall tabs 713. Side wall panel 711 can then be fixed to side wall tabs 713 to maintain the form of the pack body.

A second portion 72 of the blank forms the lid 12 of the pack 1. The lid section comprises a lid front wall panel 721, a pair of adjoining lid side wall panels 722, a lid rear wall panel 723 and a lid top wall panel 724. Lid rear wall panel 723 is connected by fold lines to lid side wall tabs 722a, which are in turn connected to lid top wall tabs 724a. To form the lid the lid top wall tabs are folded through 90° about their connecting fold line with lid side wall tabs 722a. In turn, lid side wall tabs 722a are folded through 90° about their connecting fold

lines with lid rear wall panel 723. Lid top wall panel 724 can then be folded about its connecting fold line with lid rear wall panel 723 to form the top wall 124 of the pack 1. The lid front wall panel 721 can then be folded about its connecting fold line with lid top wall panel 724 to form the front wall of the lid.

- 5 Lid side wall panels 722 are then folded through 90° and may be fixed to lid side wall tabs 722a to form the lid structure. A tab 726 is provided, connected via a fold line to lid front wall panel 721 and is provided with a first cohesive member 14a in a form appropriate for engagement with a second cohesive member. Tab 726 can be folded through substantially 180° about its connecting fold line with
10 the lid front wall panel 721 in order to provide a first cohesive member on the inside of the lid front wall 121 of the pack 1.

- Secondary blank 73 may be provided where an inner frame is required. The blank comprises an inner frame front wall panel 731 connected by fold lines to inner frame side wall panels 732. The inner frame side wall panel 732 may
15 comprise fold lines 733. These fold lines allow a portion of the inner frame to be angled slightly towards the interior of the pack, which can help to grip the products within the pack. In particular, if the products are cigarettes, this can help to fold the cigarettes in a tight bundle within the pack. The second cohesive member 14b is provided on the inner frame, where the inner frame is required.
20 As described above, if the inner frame is not necessary, the second cohesive member may be adhered to the front side wall panel 710.

- Dashed line 734 indicates the line on the inner frame which should correspond to the top edge 710a of the blank 71 once the pack is assembled. A degree of inaccuracy generally exists in packaging manufacturing processes,
25 concerning exactly where the inner frame may be attached to main body blank 71. Accordingly, having a first cohesive member which can engage with a second cohesive member regardless of the precise location of the inner frame on the outer pack blank is therefore advantageous. The tolerances of the relative placement of the inner frame to the outer pack can be in the region of +
30 or – 0.5mm.

CLAIMS

1. A re-closable pack (1) with a closure mechanism characterised in that the closure mechanism comprises two opposing cohesive surfaces (14a, 14b).
- 5 2. A re-closable pack according to claim 1, wherein at least one of the opposing cohesive surfaces is a cohesive member.
3. A re-closable pack according to claim 1 or claim 2, wherein said cohesive surface or member is selected from the group consisting of silicon, silicon-based
10 materials, polyolefin blends, polyethylene (PE), low density polyethylene (LDPE), polyvinyl chloride (PVC), polyvinylidene chloride (PVdC), polyethylene terephthalate (PET) and/or combinations thereof.
4. A re-closable pack according to any preceding claim, wherein said
15 cohesive surface or member further comprises one or more tackifying agents.
5. A re-closable pack according to claim 4, wherein said tackifying agent is selected from the group consisting of hydrocarbon resins such as terpene resins, hydrogenated resins and resin esters, isotactic and atactic polypropylenes,
20 polybutenes and/or combinations thereof.
6. A re-closable pack according to claim 4 or claim 5, wherein said tackifying agent may be present in an amount of from 0.1 to 15 wt% based on the total weight of the cohesive surface or member.
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7. A re-closable pack according to any of claims 2 to 6, wherein said cohesive member has a thickness of between 10 microns and 1500 microns.
8. A re-closable pack according to any preceding claim, wherein said
30 cohesive surface or member has a surface roughness value of between 0.5 and 4 nm.

9. A re-closable pack according to any preceding claim, wherein the surface area interaction between the opposing cohesive surfaces or members is at least 40%.

5 10. A re-closable pack according to any preceding claim, wherein said pack is made out of cardboard.

11. A re-closable pack according to claim 10, wherein said pack is a cigarette pack.

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12. A re-closable pack according to any preceding claim, wherein said pack further comprises a hinged lid (12) with one of the cohesive members (14a) on the inner side of the lid.

15 13. A re-closable pack according to claim 12, wherein said cohesive members display different cling and/or gloss values.

14. A blank or set of blanks for forming the pack of any one of claims 1 to 13.

20 15. A method of forming the pack of any one of claims 1 to 13 by folding the blank or blanks of claim 14.