Title: EASY OPENING, RECLOSABLE FLOW-PACK WRAPPER

Abstract: The present invention is related to an easy opening flow-pack wrapper for rigid or semi-rigid products intended to be produced in a vertical or horizontal form, fill and seal process comprising a longitudinal fin seal, at least one cold-seal area and an opening initiation, wherein said longitudinal fin seal is situated on the longitudinal edge of the product, and in said opening initiation is situated in said closing cross cold-seal area, cross-cutting said longitudinal fin seal to guide the tear for a predictable cross-cut of the flow-pack wrapper.
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
Field of the invention
[0001] The present invention relates to packaging and in particular to easy opening flow-pack wrapper intended to be used in a horizontal or vertical form, fill and seal process for rigid or semi-rigid products.

State of the art
[0002] Nowadays, most rigid or semi-rigid articles are packed in a flow-pack wrapper in horizontal or vertical form fill and seal lines reaching extremely high packing speeds.
[0003] The principle of a horizontal flow-pack machine is that a flat film is formed into a tube through a folding box and after the forming of this tube, a set of rotating sealing wheels makes a longitudinal seal also called fin seal. A fin seal is a seal where the packing wrapper is sealed face to face in machine direction (or longitudinal way). This seal is an “inside-inside” seal, in opposition to an overlap seal, which is an “inside-outside” seal.
[0004] The sealing wheels sealing the fin seal are responsible for the transport through the machine together with some guiding wheels. The packed products moves over a horizontal conveyer belt and runs via the folding box into the formed tube.
[0005] Once the product is placed into the tube, the cross-seals are formed through the cross-sealing jaws. In
most applications, the end seal of a pack is formed together with the beginning seal of the following pack. During sealing, the film is cut to split the adjacent pack and the cutting knife is generally built into the sealing jaws.

[0006] Such a process is extensively described in the document GB-A-2349862. This document describes in particular the cold-seal wrapping of food articles under controlled atmosphere.

[0007] A normal flow-pack is opened by tearing, starting at the profiled cross-seal. This tear is generally not guided, which means that the opening is unpredictable and has as a consequence the impossibility of a correct reclosability. Furthermore, all pre-cuts of the prior art wrappers, do not cross-over the longitudinal fin seal of the wrapper and the tearing is generally stopped by this longitudinal fin seal and from that point makes it unpredictable. If the tear power is increased, a piece of the pack brakes off, or the tear continues in a random way.

[0008] In order to obtain an easy and predictable opening of a flow-pack, various solutions have been proposed. One of these solutions is the inclusion of a tear strip in the packaging. This tear strip is sealed at the inside of the pack and allows to guide the tear. If a tear tape is fixed to the wrapper in the cross-direction, the tear also stops at the longitudinal fin seal, while tearing the pack beginning from the tear tape tear initiation. Most of the tear tapes in the market are not heat-sealable but cold-sealable with a pressure sensitive glue already on the tape, taking care of the seal. The disadvantages of this method are the high costs and negative effects on the packing speed. Besides that, a tear tape has a negative influence on machine speed if it is put on the wrapper on
cross direction. In machine direction however, in most cases the speed can be maintained.

[0009] Another solution, well known by those skilled in the art, is the perforation of the flow-pack to achieve easy opening. Such perforation supplies an opening initiation, which generally allows a predictable opening. Nevertheless, this perforation has to be performed within a sealed area in order to keep hermetic packs.

[0010] The documents EP 0 406 613 A1 presents an alternative in form of a package for rigid or semi-rigid food bars with a notch on the flow wrapper substantially parallel to an edge of the bar. This flow wrapper presents no longitudinal fin seal and therefore seems not to be realistic in practice.

[0011] Document DE 10026551 A1 presents a pre-cut in the longitudinal fin seal of a flow-pack wrapper used as a multi-pack wrapper for tablets. The pre-cut does not cross-cut the longitudinal fin seal to preserve the air tightness of the pack.

[0012] Document US 5,934,048 presents a pouch produced in a vertical form, fill and seal process (VFFS) wherein a pre-cut is realised, as opening initiation, in a hot-seal but again does not cross-cut the longitudinal seal.

[0013] Document US 6,352,364 B1 presents a tubular stick-pack in an overlap seal process wherein a pre-cut is realised in the transverse sealing joints as well as in the longitudinal overlap sealing joint. Heat seals have numerous disadvantages such as low packing speed due to heat transfer limitations or danger of product damage such as melted chocolate due to heat transfer from the heated seal jaws.

Documents US 5,371,997 and EP 1 136 379 A1 disclose opening initiations cross-cutting partly the
longitudinal seal. These documents do not mention the nature of the seal and do not disclose in particular a cold seal.

**Aims of the invention**

[0014] The present invention aims to provide an easy opening flow-pack wrapper with predictable opening, intended to be used in a horizontal or vertical form fill and seal process not entailing reduction of packing speed on a usual packing equipment, the predictable opening of the packaging allowing the possibility of the introduction of a reclosable cold seal region.

[0015] Therefore, another aim of the present invention is to present an easy opening flow-pack wrapper which is reclosable via a cold-seal area exhibiting a particular pattern design.

**Summary of the invention**

[0016] The present invention discloses an easy opening flow-pack wrapper for rigid or semi-rigid products intended to be produced in a vertical or horizontal form, fill and seal process, comprising a longitudinal fin seal, at least one cold-seal area and an opening initiation, characterised in that said longitudinal fin seal is situated on the longitudinal edge of the product and in that said opening initiation is situated in said closing cross cold-seal area, cross-cutting said longitudinal fin seal.

[0017] In a particular aspect of the present invention, the cold seal area comprises two regions, a first region with a closing cold seal and a second region with a reclosable cold seal separated by a cold-seal free region in the prolongation of said opening initiation to
guide the tear between said first region and said second region.

[0018] According to the present invention, said second reclosable cold-seal region has a lower seal strength than said first closing cold-seal region.

[0019] In a particular embodiment of the present invention, said second reclosable cold-seal region has a specific pattern design allowing a progressive opening and a “push-through” of the semi-rigid or rigid product.

[0020] An additional feature of the present invention is that the specific pattern design of said second reclosable cold-seal region is a banana, a triangle, a multi-triangle or a dot pattern.

**Short description of the drawings**

[0021] Fig. 1 shows a mask of the closing cold-seal area on the unfolded wrapper (first embodiment)

[0022] Fig. 2 shows a mask of the closing cold-seal area and the reclosable cold seal area on the unfolded wrapper (second embodiment)

[0023] Fig. 3 shows the cold-seal area on the unfolded wrapper with an embossed mechanical weakening as opening initiation.

[0024] Fig. 4 shows the pattern of the closing cold-seal area and the reclosable cold seal area on the unfolded wrapper with a perforated mechanical weakening as opening initiation.

[0025] Fig. 5 shows the profile of a folded flow-pack wrapper with longitudinal fin seal situated on the longitudinal edge of the product.

[0026] Fig. 6 shows the profile of a folded longitudinal fin seal on the folded flow-pack wrapper.
Fig. 7 represents a perspective view of a packed product showing the pre-cut crossing the longitudinal fin seal.

Fig. 8 represents a mask of the opening possibility at two sides of the pack with closing cold seal areas and reclosable cold seal areas.

Detailed description of the invention and preferred embodiments

The present invention is based on the technology of a flow-pack used in a horizontal or vertical form fill and seal process. This flow-pack wrapper is easy to open (first embodiment) and preferably, but not necessarily, reclosable (second embodiment). The modifications on the wrapper of the present invention do not entail a significant reduction of the packaging speed and can be achieved on standard packing machinery without significant extra costs.

Definitions

The expression "cold seal" refers to an area of the flexible packaging film covered by a sealing coating able to seal to itself without melting of the polymer film and essentially by the application of pressure. This concept is well known by those skilled in the art.

The expression "opening initiation" refers to all kind of mechanical weakening intended to initiate the tear of the package independently of the generation process of this mechanical weakening (perforations, full pre-cuts, notches, embossing...). As far as it would be endless to describe all the existing mechanical weaknesses, they should be understood in a wide range, independently of their pattern. A pre-cut can for instance start inside a cold-seal area instead of starting at the edge of the pack.
The expression "cross seal" or "transverse seal" should be understood as the sealing in a transverse direction to the flow direction of the wrapper during the pack process. The cross seal is perpendicular to the longitudinal fin seal, said longitudinal fin seal being parallel to the longest edge of the packed product.

The expression "wrapper" should be understood in a large sense as a mono or multilayer packaging film which is optionally printed and generally coiled, and cutted into strips to be used in form, fill and seal processes. After the production process of such coils, well known by those skilled in the art, the semi-finish wrapper is used to wrap a serie of products, transforming them into wrapped products using the wrapper of the present invention.

Problem intended to be resolved by the invention

A particular problem occurring in the opening of cross seals with pre-cuts or other opening initiations is the fact that these various opening initiations are stopped by the longitudinal fin seal which is generally situated in the middle of the confectionery bar. Once the tear reaches this longitudinal fin seal, said tear stops or becomes unpredictable. An unpredictable tear makes the reclosability impossible because the reclosable cold-seal region cannot be defined.

Solution proposed by the present invention

In a first embodiment of the present invention, the longitudinal fin seal 9 is situated on the longitudinal edge of the product and cross-cut by the opening initiation (3, 7, 8, 12). This allows the continuation of a predictable tear.
[0036] In a second embodiment of the present invention, the longitudinal fin seal 9 is also situated on the longitudinal edge of the product and cross-cut by the opening initiation, but additionally, a reclosable cold seal region 6 adjacent to the closing cold seal region 2 in the cross direction is added to the packaging. In this configuration, a cold seal free region 15 subsist in between said closing cold seal region 2 and said adjacent reclosable cold seal region 6 which guides the tear automatically in between both zones. The reason for this guidance is that the tear chooses the way of the lowest resistance. In other words, the non adhered multilayer film/film is less tear resistant than the multilayer complex film/cold seal/cold seal/film. The adhesion of the cold seal layer to itself increasing even this tear resistance.

[0037] The converting process is based on the production of a normal cold-seal wrapper, preferably, but not necessarily, with a special cold seal pattern design. The closing cold-seal region 2 contains a cold-sealing coating in a quantity of about 3 to 5 grams per square meter. The reclosable cold-seal region 6 has a lower seal strength than the closing cold seal area. This lower seal strength can be reached by different means. No limitative examples of such means are, a lower quantity of cold-sealing coating (only 2 to 3 grams per square meter), the use of a very dry cold-seal and/or the use of specific pattern design.

[0038] In the particular case of food packaging, food-approved cold-seals for confectionery products are well known by those skilled in the art. No limitative examples are based on natural rubber latex and styrene acrylics. The rubber latex performs the cohesion of the
coating to itself, while the acrylic polymers perform the adhesion onto the substrate.

[0039] All kind of substrates used in the standard flow-wrap technology can be used in the present invention. No limitative examples are mono and/or multilayer polymer films in general, and in particular aluminum coated and bioriented polypropylene mono and/or multilayer films.

[0040] The packing of the product is performed on a standard horizontal or vertical form, fill and seal machine with slightly adapted sealing jaws. The knife in the sealing jaws should preferably be straight. The sealing jaw area at one side has a specific design adapted to the desired pattern. In order to obtain an opening initiation one, non limitative, option is the inclusion of a cutting knife in the sealing jaw to make a pre-cut in the cross-seal. This pre-cut has to be made in the closing cold-seal region 2 to guarantee hermetic or semi-hermetic packs.

[0041] Other opening initiations such as perforations, tear initiations by mechanical or laser weakening or embossing are also possible and should also be situated in the closing cold-seal region 2 to ensure said hermetic or semi-hermetic packaging.

[0042] The easy opening of the wrapper of the present invention, is possible by the fact that there are no profiled ends to have a "fool-prove" packaging. If the consumer cannot tear from the end, he is obliged to use the "side possibility". The easy opening is possible through opening initiation in the closing cold seal region 2 in the prolongation of the tear guide cold-seal free area 5. The tear is guided through the cold-seal free region 5 to the other end of the wrap and the consumer takes away the major part of the closing cold-seal 2 and the remaining reclosable cold-seal 6 can be "pushed through" by the packed product. This particular reclosable cold-seal region
6 with lower seal strength can be improved in terms of easy opening by the use of particular banana-shaped cold-seal patterns, triangle or dots, so that the product only touches this particular reclosable sealing area at one point and makes the "push-through" easier (see Fig 3). The reclosability is possible by pushing the reclosable cold seal area 6 at the open end of the flow-wrap against each other. Due to pressure and human temperature, this is easily resealed.

[0043] The present invention can be used in different configurations. No limitative examples are easy openings on each side of the pack such as represented in figure 8. Multi-packs (not represented) are also part of the present invention. Such multi-packs can be separated by a closing cold seal region 2 and equipped with opening initiations according to the present invention on each side top and/or bottom.

[0044] In a vertical form, fill and seal process, a heat seal coating of 3 to 5 grams per square meter can be used according to the same concept. In this case, the opening initiation is again placed within the sealed area and cross-cuts the longitudinal fin seal placed on the longitudinal edge of the packed product.

[0045] Typical heat seal coatings for this application are:
- Primaseal H 59-123-Sovereign-EVA based low temperature heat seal coating.
- Diofan A 716 or Diofan 193 D- Solvay- PVDC based heat seal coating.

[0046] To create the possibility of a reclosable package by a cold seal, it is necessary to develop a flow wrapper with a predictable tear. The predictable tear has been obtained by placing the longitudinal fin seal 9 on the
longitudinal edge of the packed product (see Fig.5 and 6) making it possible to place a cross-cutting opening initiation over said longitudinal fin seal 9. The discovering of this possibility by the inventors not only improves the opening of non-reclosable packs (first embodiment) but also offers the possibility of the use of a reclosability concept by the presence of a reclosable cold seal 6 (second embodiment).

[0047] Legend

1. Flow wrapper
2. Closing cold seal region
3. Interrupted notches as opening initiation
4. Cut zone
5. Cold seal free zone
6. Reclosable cold seal region (in different pattern designs)
7. Embossing as opening initiation
8. Perforation as opening initiation
9. Longitudinal fin seal on the longitudinal edge of the packed product
10. Closed cross seal of the finished pack
11. Cutted end of the packed product
12. Full pre-cut as opening initiation crosscutting the longitudinal fin seal
CLAIMS

1. Easy opening flow-pack wrapper for rigid or semi-rigid products intended to be produced in a vertical or horizontal form, fill and seal process, comprising
   - a longitudinal fin seal (9),
   - at least one cold-seal area, and
   - an opening initiation (3, 7, 8, 12),
characterised in that said longitudinal fin seal (9) is situated on the longitudinal edge of the product and in that said opening initiation (3, 7, 8, 12) is situated in said closing cross cold-seal area (2), cross-cutting said longitudinal fin seal (9) to guide the tear for a predictable cross-cut of the flow-pack wrapper.

2. Easy opening flow-pack wrapper according to Claim 1, characterised in that the cold seal area comprises two regions, a first region with a closing cold seal (2) and a second region with a reclosable cold seal (6) separated by a cold-seal free region (15) in the prolongation of said opening initiation (3, 7, 8, 12) to guide the tear between said first region (2) and said second region (6).

3. Easy opening flow-pack wrapper according to Claim 1, characterised in that said second reclosable cold-seal region (6) has a lower seal strength than said first closing cold-seal region (2).

4. Easy opening flow-pack wrapper according to Claim 2, characterised in that said second reclosable cold-seal region (6) has a specific pattern design allowing a progressive opening and a “push-through” of preferably semi-rigid or rigid product.

5. Easy opening flow-pack wrapper according to Claim 4, characterised in that the specific pattern
design of said second reclosable cold-seal region (6) is a banana, a triangle, a multi-triangle or a dot pattern.

6. Easy opening flow-pack wrapper according to Claim 1, characterised in that said opening initiation is a mechanical weakening such as pre-cut and/or a perforation and/or an embossing.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B65D75/58

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65D

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

Electronic database consulted during the International search (name of database and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of box C. Patent family members are listed in annex.

* Special categories of cited documents:

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Date of actual completion of the International search: 28 July 2004

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Authorized officer: Fitterer, J
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