



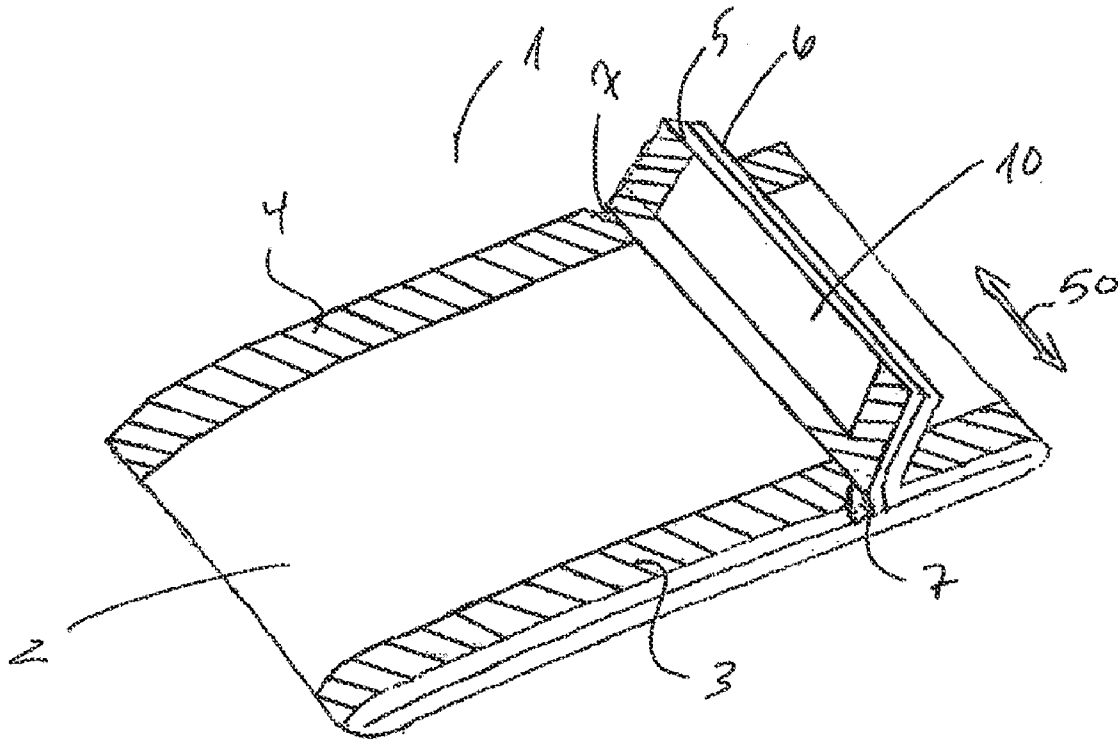
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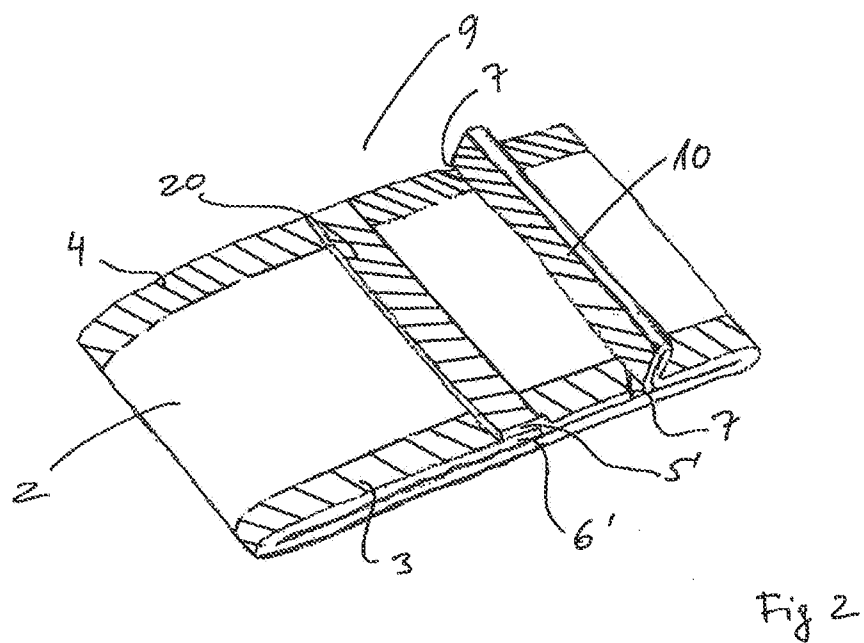
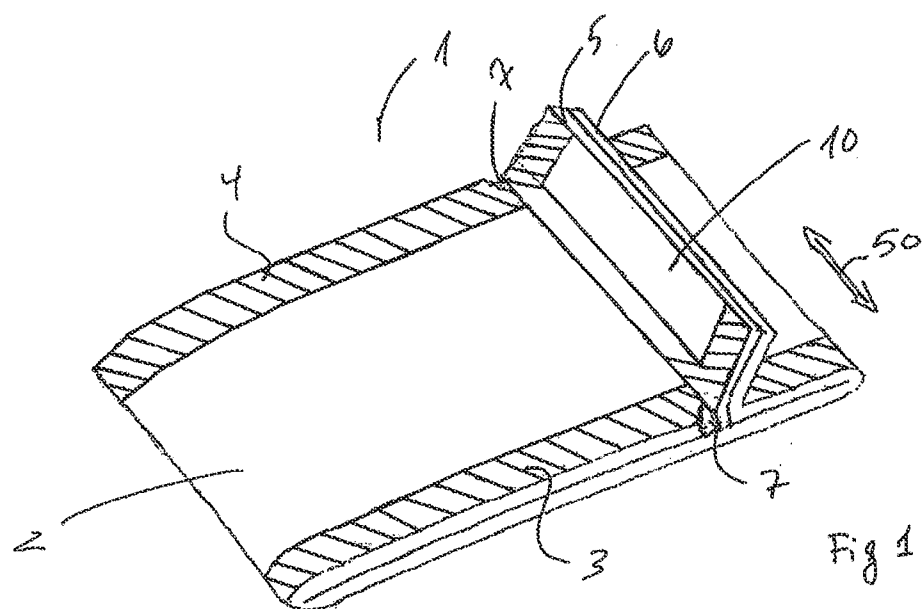
(19) **United States**(12) **Patent Application Publication**
Hofman(10) **Pub. No.: US 2016/0046400 A1**(43) **Pub. Date: Feb. 18, 2016**(54) **EASY TO OPEN PACKAGE**(71) Applicant: **BEANSTALK APS**, Aarhus C (DK)(72) Inventor: **Torkild Hofman**, Beder (DK)(21) Appl. No.: **14/812,953**(22) Filed: **Jul. 29, 2015****Related U.S. Application Data**

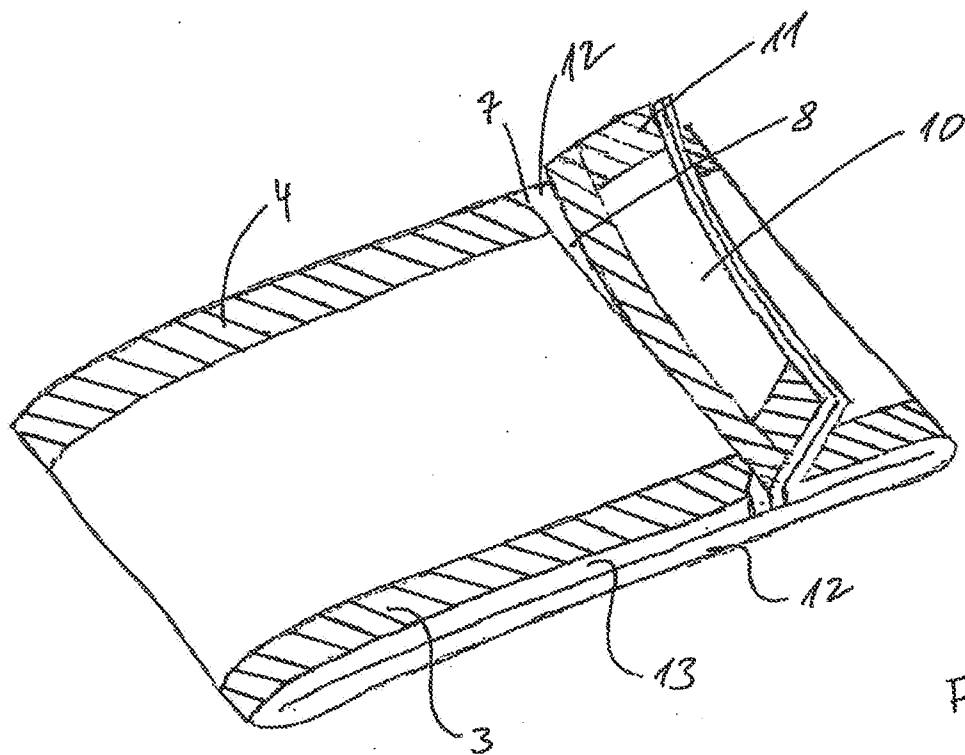
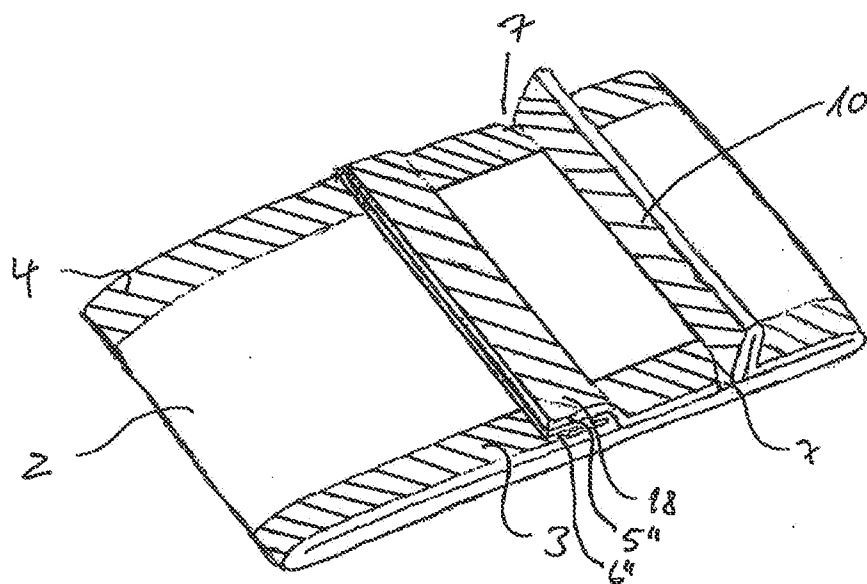
(62) Division of application No. 12/735,850, filed on Oct. 1, 2010, filed as application No. PCT/DK2009/000045 on Feb. 20, 2009.

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Oct. 3, 2008 (DK) PA 2008 01386**Publication Classification**(51) **Int. Cl.**
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B65B 9/20 (2006.01)(52) **U.S. Cl.**CPC **B65B 61/12** (2013.01); **B65B 9/2056**
(2013.01); **B65B 61/02** (2013.01)(57) **ABSTRACT**

Method of manufacturing a package of the type formed from a single-layer or multilayer material sheet, where said package has an easy to open feature, where the sheet is shaped into the finished package having an inner side suitable to be in contact with the matter to be packaged and an outer side, comprising the following method steps: forming the film into a tube, by connecting the two side edges of the sheet longitudinally; where the connection creates a side flap on the outside of the tube or where the tube is passed over a former having a projecting fin, whereby a side flap is formed on the outside of the tube; where cross seals are provided across the tube, thereby delimiting each package between two cross seals; that perforation lines are established in said cross seals, for detaching/separating two adjacent packages; that a perforation of one material layer is established, parallel to and adjacent the side flap, extending from the perforation line towards or into the cross seal.







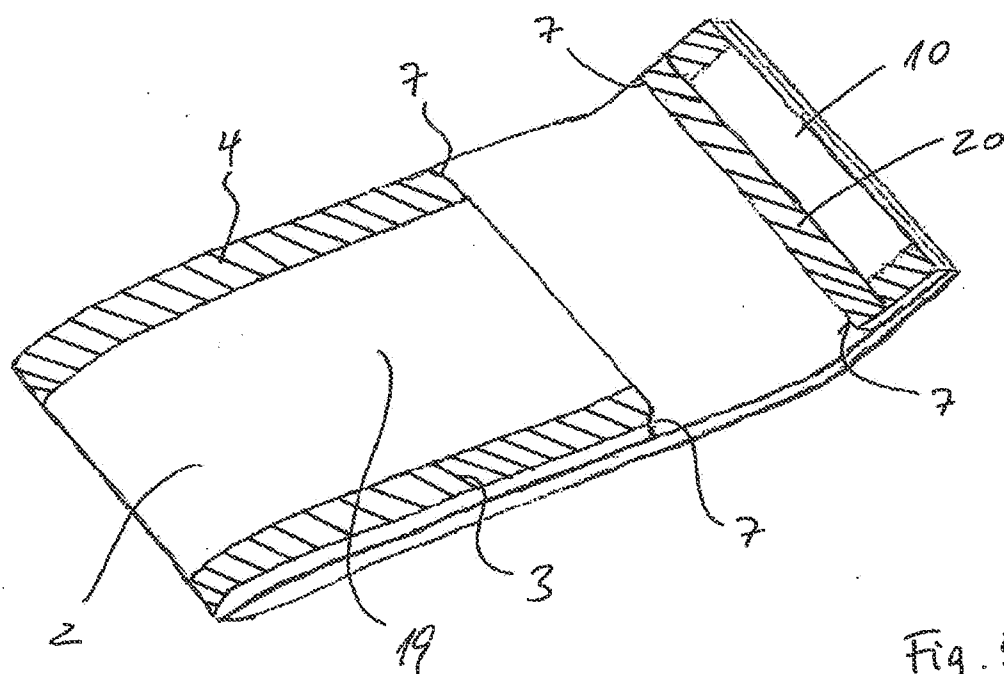


Fig. 5

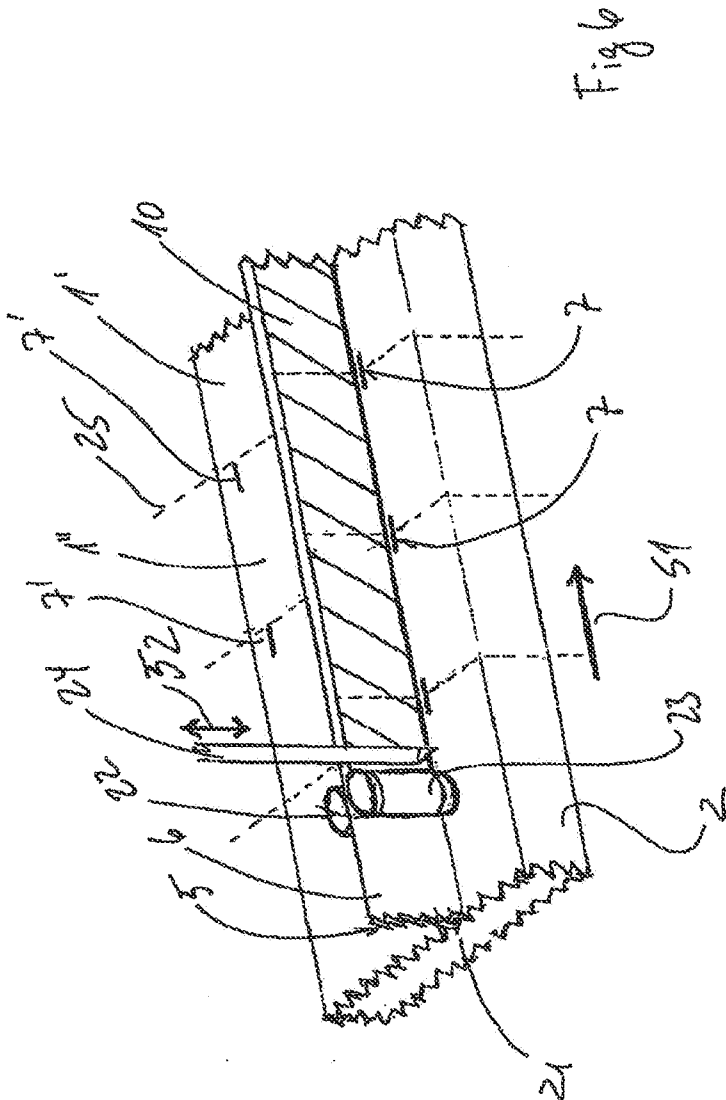
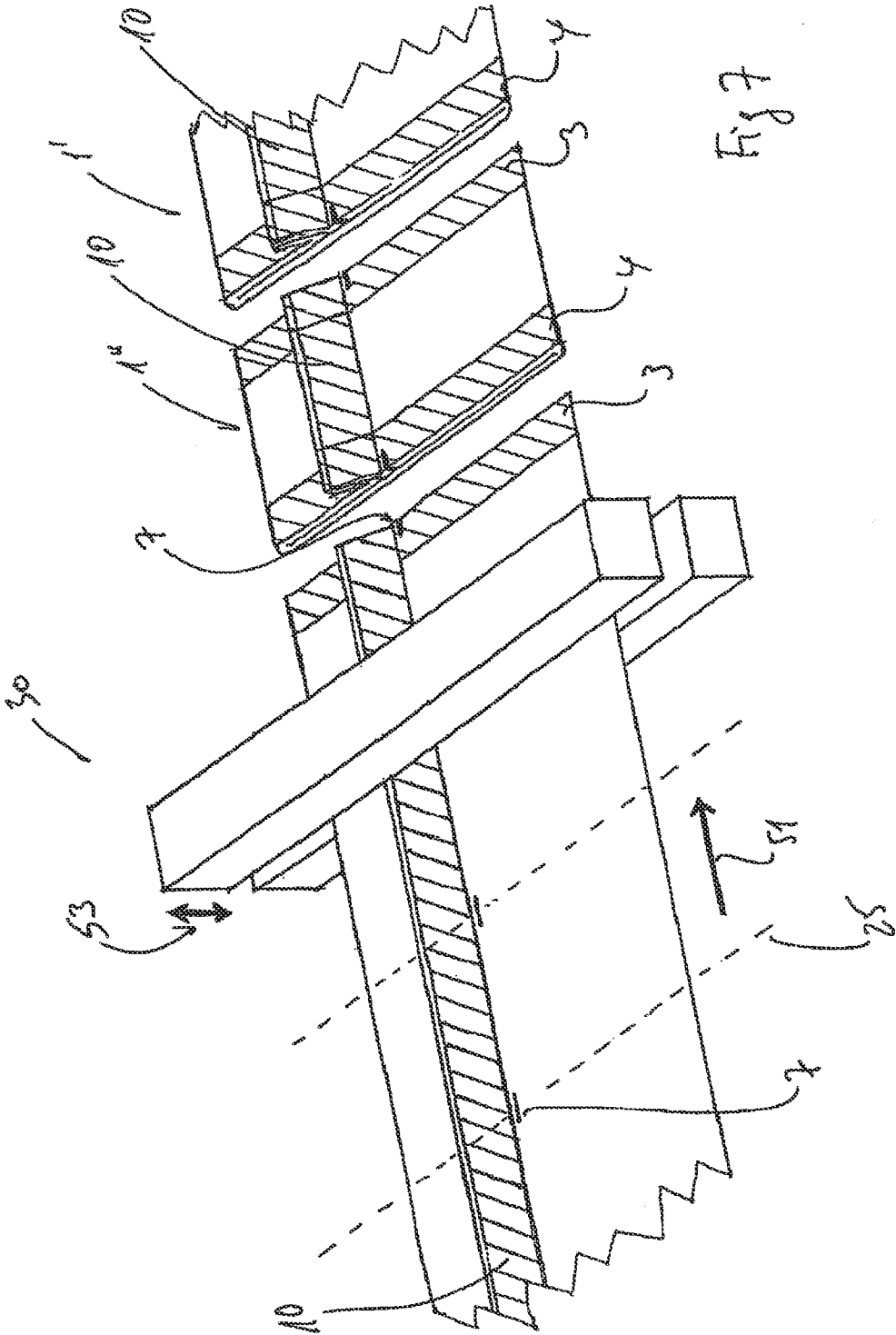


Fig. 6



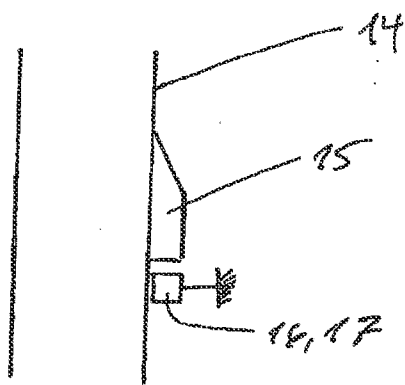


Fig. 8

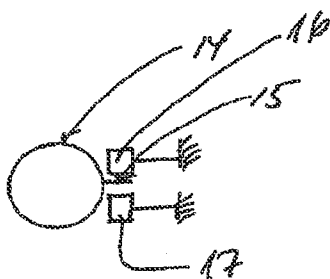


Fig. 9

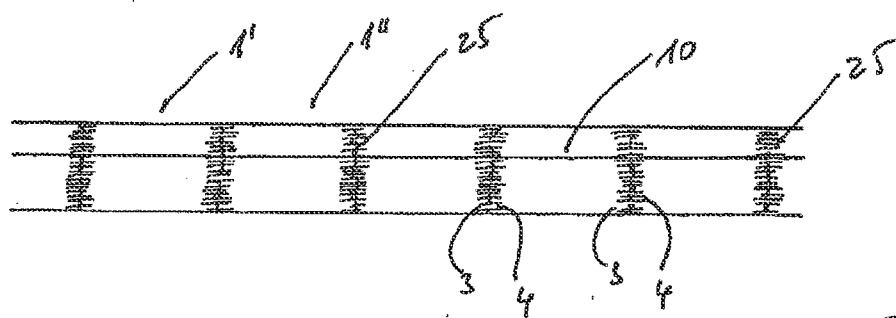
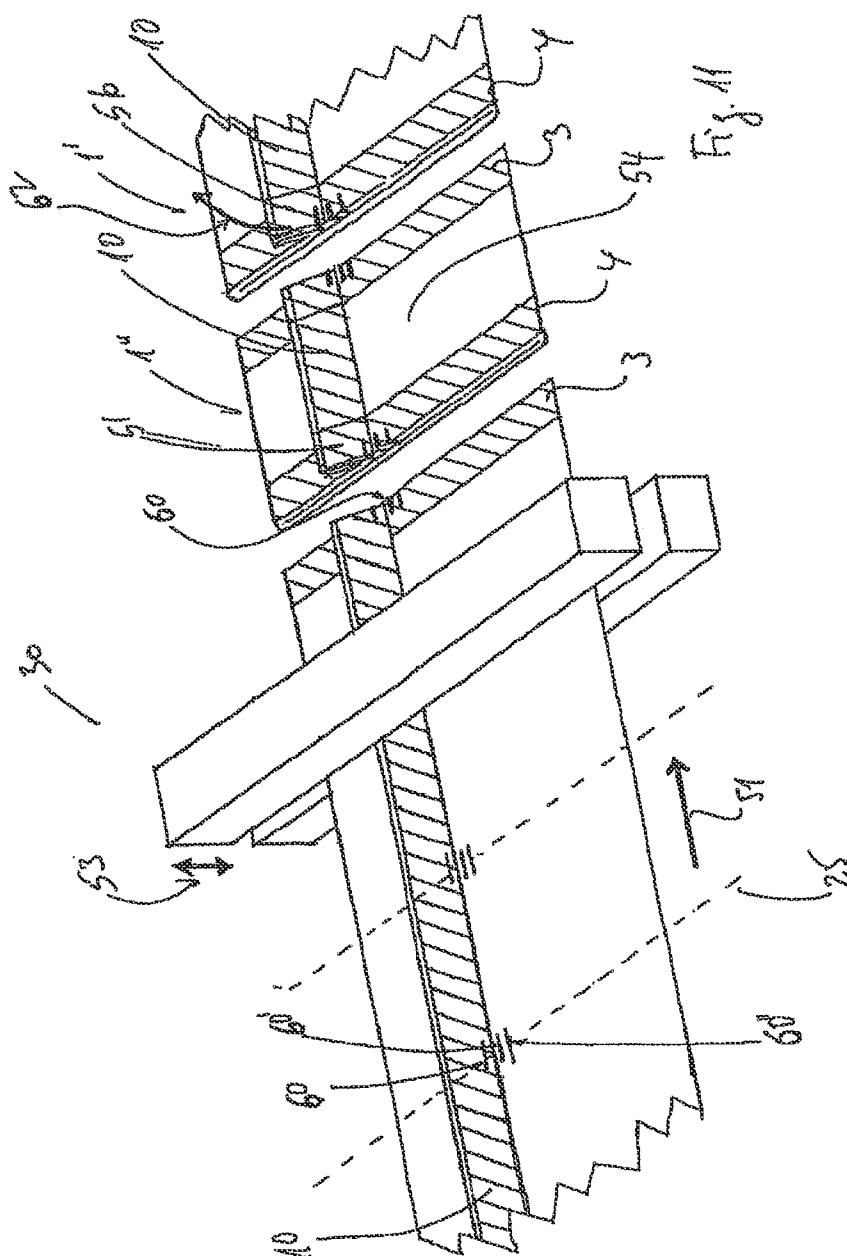


Fig. 10



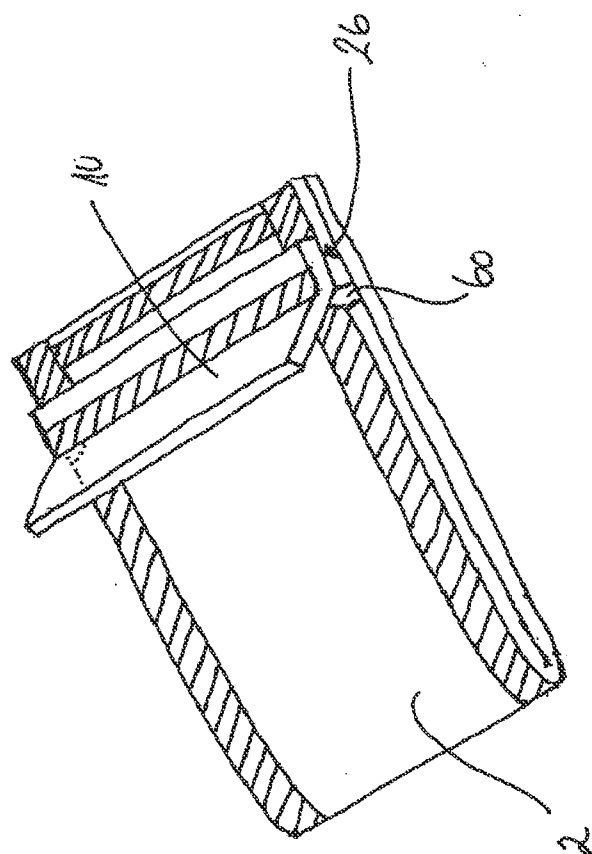


Fig. 12

EASY TO OPEN PACKAGE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application is a divisional of U.S. patent application Ser. No. 12/735,850, filed Oct. 1, 2010, which is a National Stage entry of PCT/DK2009/000045 filed Feb. 20, 2009, which claims priority from Danish Application No. PA 2008 00247 filed Feb. 22, 2008, and Danish Application No. PA 2008 01386 filed Oct. 3, 2008, the entire contents of which are hereby incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to a method of manufacturing a package of the type formed from a single-layer or multi-layer material sheet as well as a form, fill and seal machine (FFS machine) and further a package produced on such an FFS machine according to the present invention.

BACKGROUND OF THE INVENTION

[0003] In the art FFS machines are widely used in connection with packaging of a wide variety of goods, in particular food stuffs, candy and a host of other objects. Basically, an FFS machine operates by being fed a material sheet which by a former in the machine is shaped into a tube by attaching the two side edges of the sheet to each other continuously as the sheet is fed into the machine. Means for creating end seals, within this application referred to as cross seals are provided further downstream in the machine such that the tube is delimited laterally to the tube's longitudinal direction after which the so delimited tube is filled with the object to be packaged and again provided with an end seal laterally to the tube's longitudinal direction. In this manner a very cheap expedient and reliable package is created at a minimum cost. The material sheets are usually polymer-based and may be provided with printing such that information about the object inside the package is conveyed to the user.

[0004] These types of packages are well-known in the art and are used everyday by most consumers. Examples on various embodiments and machines used in the production process are disclosed in WO 03045816, US2007269146, EP176908, EP1746043, EP 1026077, WO 2007/106916, JP10305806, WO 2004002835 and numerous others.

[0005] An example of a method to manufacture such packages is known from U.S. Pat. No. 5,337,539. According to the disclosed method, a material web is shaped into a V-shape or trough shape. At this stage three different embodiments are disclosed. In a first embodiment, cross seals are made, i.e. the sides of the web are united in order to form pockets, which are then filled with the material or goods is placed in the package. In the second embodiment, the material or goods is placed in the bottom of the V or trough on the web, after which the free side edges of the web are joined/sealed to form a tube. A folding of the free ends extending from the seal forming the tube, is performed. Finally cross seals, delimiting each package from the next are formed. In the third embodiment the tube is shaped about a VFF filler tube, such that the tube forming seal uniting the webs side edges is formed together with a cross seal, at such a rate that the tube relative to the filler tube will be open upwards, but limited by a cross seal downwards. This document does not provide any means for easing the opening of the package.

[0006] One problem arising with this type of well-known packaging is the situation where the consumer or user has to open the package. Usually, the longitudinal connection between the two side edges of the material seal are welded together whereby a side flap is created, and where the side flap coincides with the end seals it becomes a natural point where a consumer will attempt to open the package in order to gain access to the interior. The seals are usually created by welding the polymer materials together such that a relatively strong connection is created both in the end seal and the side flap which when attempting to open the package requires a substantial force such that during opening the user may tear the package apart and spill the contents.

[0007] In this connection attempts has been made to design the welds such that a desired opening force is required. This in turn requires that the surfaces to be welded together have certain characteristics, allowing welding/fusion. For example foils for use in wrapping/package items such as candy usually have a plurality of layers. Typically a layer on which pictures, text and the like is printed, will be covered by a thin protective layer. Layer thicknesses are typically in the range of 5-60 μ , such that the overall foil is the sum of the different layer thicknesses. Other layers such as layers exhibiting uni-direction tearing and/or barrier layers etc may be added. These layers all exhibits different characteristics and together provides the foil with the desired characteristics, also when it comes to welding/fusion. When these types of multilayered foils are used in FFS machines (both horizontal and vertical) it is often the outer side which has to be united with the inner side. In U.S. Pat. No. 5,826,985 these aspects are disclosed. Therefore in addition to have the desired qualities (barrier, print etc) the foils shall also be mutually weldable/fusionable.

[0008] In order to avoid this, different solutions have been proposed. One such solution is to provide a small cut, through all material layers, said cut being arranged in the end seal in the longitudinal direction but limited to a few millimetres into the end seal such that a tear initiator is created whereby e.g. a corner of the package may relatively easily be torn off. See various examples in JP 10250764, JP 2003191965, WO 9216431 and JP2004182267. In some of these examples the tearing action is helped along by further providing a tear line in the shape of a cut going partly through a foil layer along where the opening is intended to be, or providing a tape, see for example JP 10250764 such that as the tape is pulled it will tear the foil. This in turn creates, in most cases a relatively limited opening, but also in some cases depending on the manner in which the corner is torn off and the material from which the package is manufactured a situation which may ruin the package in the same manner as already described above, see for example U.S. Pat. No. 5,826,985.

[0009] Common for these two types of openings is the fact that once the package has been torn apart it is impossible to reseal the package if the entire content is not to be used.

[0010] For these purposes a number of solutions have been proposed, e. g. by incorporating resealable zippers into the material adjacent the end seal. This, however, is a relatively costly process and also requires that the size of the package remains relatively constant even after part of the content has been removed.

OBJECT OF THE INVENTION

[0011] It is an object of the present invention to provide a method and apparatus and a package alleviating the problems mentioned above and providing further advantages particu-

larly relating to a cheap, reliable manner of providing an opening in a package of the type mentioned above where the package may be opened without having to use so much force that the user risks destroying the entire package in the process.

DESCRIPTION OF THE INVENTION

[0012] The invention addresses this by providing a method of manufacturing a package of the type formed from a single-layer or multi-layer material sheet, where said package has an easy to open feature, where the sheet is shaped into the finished package having an inner side suitable to be in contact with the matter to be packaged and an outer side, comprising the following method steps:

[0013] forming the sheet into a tube, by connecting the two side edges of the sheet longitudinally;

[0014] where the connection creates a side flap on the outside of the tube or where the tube is passed over a former having a projecting fin, whereby a side flap is formed on the outside of the tube;

[0015] where cross seals are provided across the tube, thereby delimiting each package between two cross seals;

[0016] that perforation lines are established in or in between said cross seals, for detaching/separating two adjacent packages;

[0017] that a perforation of one sheet or one or more layers making up the sheet, is established adjacent side flap or fin, extending from the perforation line and parallel to, or at an angle up to 60° relative to the side flap or fin, and extending towards or into the cross seal.

[0018] Initially, it should be noted that the filling stage of the package has been left out as it is well-known in the art depending on the make of the machine to introduce products into this type of packages during the process of forming the package. The present invention is independent of the type of device used to fill the packages and is only concerned with providing novel features for opening of the finished package.

[0019] This is achieved by particularly the last method step, namely the perforation of one material layer adjacent the side flap. The perforation will extend from the edge of the perforation line and a small distance towards or into the cross seal, parallel to the side flap such that as a user holds the package in one hand and pulls the side flap at the edge with the other hand, the perforation will provide a weak spot which will initiate the tearing of the material such that it is very easy to tear open the material and thereby gain access to the interior of the package without destroying said package. Repeated tests have clearly shown that a very easy opening is provided, and that the opening is well defined, and limited to the desired section of the package.

[0020] The perforation of one material layer only is distinctly different from the solution proposed above where a cut through all material layers in the cross seal in that had the perforation gone through the material layers, the package material on both sides of the package would have been torn at the same time thereby risking destroying the package altogether. By limiting the perforation to only penetrate one material layer the tearing action by a user on the side flap will create a relatively clean tear opening in the package without destroying the package altogether.

[0021] In the art distinction is made between the manner in which this type of packages are manufactured. If the contents are inserted in the package as it is being shaped in a vertical

position, it is known as a vertical form, fill and seal machine. Consequently when the contents are introduced horizontally it is known as a horizontal form, fill and seal machine. For the purposes of the present invention, both types of machines may be used, and has so with equal success.

[0022] Furthermore, the manner in which the seals are made which are created during the formation of the sheet material into a package, distinction is made between two main types: lap seals and fin seals. Lap seals are created by simply overlaying one sheet over the other and welding, gluing or otherwise connect the two sheets. In this manner two different sides of the sheet will be connected—what is to be the inner side of the package with what will be the outer side of the package. When using fin seals, the sides of the sheets are connected, inner side to inner side whereby a flap or fin is created. Within the scope of the present invention the manner of sealing has no effect on the invention, as long as a fin or flap is provided. For these reasons it is foreseen that means are provided in situations where laps seals are used, or where the fin seal creates a fin/flap in a position where it is not desirable to open the package. The flap may be created by a former tool, or may be provided as a separate piece of sheet material adhesively or welded onto the outside of the tube.

[0023] In this connection it is also important to realise what is meant with the formulation “a single-layer or multi-layer material sheet”. In the art, see for example U.S. Pat. No. 5,826,985 it is common to use sheets made up of a number of different layers, each layer having unique characteristics, such that the finished sheet, has been created in order to possess specific features for the designated purpose. As examples of layers can be mentioned layers which may only be ripped in one direction, layers with a special coating, for example metal in order to render the layer vapour tight, UV protective layers, barriers etc. etc. With respect to the present invention the composition of the sheet is not important, but in some embodiments of the invention it may be sufficient in order to achieve the desired effect, that the perforation extends through some of the material layers making up the sheet material.

[0024] Particularly when lasers are used in combination with PE, CPP or PP containing material layers, it is important to realise that it is only necessary to perforate some layers. This is due to the fact that in order to laser cut these materials relatively high energy lasers are required, whereas other sheet material requires substantially less laser energy. As the same rip-effect is achieved, as described above, it is advantageous only to perforate layers not requiring high intensity lasers, both for energy consumption reasons, cost of lasers, and also production speed which is lower when sufficient energy has to be conveyed to PE, CPP and PP materials in order to perforate these.

[0025] The orientation of the perforation, i.e. between parallel to the flap up to and including an angle of 60°, will, depending on the sheet construction, facilitate the desired effect. This is due to the fact that the perforation when exposed to tearing by pulling the flap, will guide the crack forming towards the flap, which will be welded and thereby constitute a stronger construction than the sheet material. When the crack encounters the flap, even from an angle of 60°, the crack will follow the flap, and thereby provide the desired inventive effect.

[0026] In a further advantageous embodiment of the novel and inventive method the perforation of the one sheet material layer is made either in:

[0027] an un-sealed part of one sheet material projecting between the cross seal and the perforation line separating two adjacent packages;

[0028] or in the unsealed part and part of the cross seal;

[0029] or where the cross seal is immediately adjacent the perforation line between two adjacent packages, only in the cross seal.

[0030] By limiting the perforation to be situated in a cross seal, the free sheet ends or a combination, the volume in which the goods inside the package are contained is still sealed off and thereby not exposed to the ambient.

[0031] In a further advantageous embodiment the material sheet is a polymer material sheet where seals and connections are created by heat fusing or welding. This is the most common type of materials used for the vast majority of packages manufactured from sheet materials. The heat fusing or welding provides reliable and strong seals such that a good, firm package is provided naturally depending on the choice of sheet material, but usually the welded portions will be stronger than the sheet material as such.

[0032] Alternative sheet materials are addressed in the further advantageous embodiment wherein the material is a non-weldable or non heat-fusionable material, where seals and connections are created by applying adhesives between material surfaces to be joined in order to create the seals, where the material is selected from one or more of the following: coated or uncoated cellulose based materials, polymeric films, aluminium based sheets. In this connection it is known to use e. g. paper sheet material which on one side, namely the side intended to be in contact with the products to be packaged, is provided with a polymer coating such that in theory a seal could be created by welding, but due to the nature of the over-all sheet material, namely paper, it is necessary to use an adhesive in order to create the seals.

[0033] When this process is used in e. g. so-called vertical FPS-machines the sheet material is formed into a tube around a pipe or former, which pipe at the same time is used for filling the material to be packaged into the package. Here the edge sections of the material sheet are overlaid and depending on the type of sheet material, welded or glued together where the filling pipe may be used as a land, i. e. as a back support for the welding wheel. In these instances no side flap is created and therefore the invention in a further advantageous embodiment is provided with two rollers such that, as the side flap, created by having passed the fin in the alternative embodiment mentioned above the side flap is exposed to heat or heat and/or pressure exerted by two rollers arranged on either side of the side flap and biased towards said side flap. In this manner a side flap is created although the traditional manufacturing of packages of this type does not require a side fin, but due to the advantageous opening procedure incorporating the perforation according to the present invention a side flap is desirable, and therefore the fin on the filling pipe is provided in cooperation with the side rollers.

[0034] In order to create the perforation a perforation tool is provided where the perforation tool may be selected between one or more of the following:

[0035] a cutter or a rotating cutter head, controlled in relation to the production speed, where the cutter head has a plurality of spaced cutting edges, cooperating with a land, where the land is placed such that the material passes between the cutter and the land, whereby activa-

tion of the cutter establishes the perforation in the material, which material during cutting is in contact with said land;

[0036] a laser device;

[0037] where the positioning of the perforation is located relative to markers provided on the sheet material, corresponding to the desired package size, where means are provided for detecting said markers and using this information as input for activating the perforation tool.

[0038] In this connection it is vital that only one material layer is cut as already explained above such that the easy and reliable tear open of the package may be achieved without ruining the package and therefore the land is provided in cooperation with the cutter such that the land is placed behind the material and the cutter on the opposite side such that when the cutter is operated. The land will hinder it from going further into the materials.

[0039] Using a laser device for either cutting or engraving the perforations is a well-known technology. It is known in the art to operate lasers such that they only penetrate a certain, very small distance into a material. This may further be enhanced by providing a coating on the inside of the materials, such that the laser device will detect different material characteristics and thereby delimit the depth of the penetration of the laser to that particular material layer, whereby it becomes possible to very efficiently perforate only one layer of the package material at the cross seals.

[0040] In order to locate the perforations in the cross seals at relatively high production speeds the package material is usually provided with indications intended to be present on each package such as e. g. bar codes, printing, print markers or the like. These markers may be used as detection points for e. g. a photo cell such that the recognition of the marker passing the photo cell will be used as input for the perforation tool which may be arranged downstream from the photo cell and activated in response to the detection of a marker. In this manner very well-proven technology which in some cases are already present in the machine may be further utilized in order to be used as input for the perforation tool thereby providing the perforation in the exact, correct positions relative to the separating lines.

[0041] In order to be able to perform the inventive method according to the present invention the invention also discloses a form, fill and seal machine for forming packages, where said machine comprises means to convey a continuous sheet material through the machine. and where said machine comprises means for creating at least one side flap on the package and where said machine further comprises means for establishing sealed cross zones extending substantially laterally to the side flap and means for establishing separating lines, where said separating lines are established in said cross zones wherein the sealed cross zones have at least a two material layer thickness, characterised in that the machine comprises a perforation tool which perforation tool perforates one of the two material layers adjacent and parallel to said side flap, and where the perforation extends inside said sealed cross zone, and that the perforation at least extends to the separating lines.

[0042] Although the invention will be described for a so-called in-line production method, the invention is also suitable for batch wise productions.

[0043] In-line implies that the packaging material is feed into a packaging machine in one end and that a finished package containing the goods to be packaged is being ejected in the other end. This is of course a rational and possible use

of the invention. The invention is however also suitable for being used such that the packaging material is shaped more or less into a finished package, for example leaving an end open. At a later stage or even at another location the package is thereafter filled with the goods to be packaged and sealed.

[0044] The inventive features for being able to carry out the inventive method as discussed above are set out in the dependent embodiments

DESCRIPTION OF THE DRAWING

[0045] FIG. 1- 5 illustrates various embodiments of a package according to the invention;

[0046] FIG. 6 illustrates the perforator tool adjacent a side flap former;

[0047] FIG. 7 illustrates the last step in the production process;

[0048] FIGS. 8 and 9 illustrate the fin and rollers creating the side flap;

[0049] FIG. 10 illustrates a string of finished packages according to the invention.

[0050] FIG. 11 is substantially identical to FIG. 7, illustrating a further embodiment.

[0051] FIG. 12 illustrates an embodiment where the flap is a separate member.

DETAILED DESCRIPTION OF THE INVENTION

[0052] In FIGS. 1-5 is illustrated various examples of a package provided with the perforation and thereby the easy opening feature according to the present invention.

[0053] In FIG. 1 the package generally indicated by number 1 is in its most basic configuration. The material sheet 2 has been formed into a package which package 1 is delimited by cross seals 3, 4 in either end of the package 1. With reference to FIGS. 7 and 10 the definition of cross seals and the overall direction of the package are determined according to the manner in which the package is produced.

[0054] As is evident from FIGS. 7 and 10 the packages are formed from an in theory endless material sheet 1 which by means of a former not illustrated shapes the sheet into a tube. The tube is created for example by welding together sheet material adjacent the two edges 5, 6 of the sheet material thereby creating a tube and at the same time creating a side flap 10, see FIG. 1.

[0055] After the side flap 10 has been created the tube will be sealed with the cross seals 3, 4 in order to create a space limited by the formed tube and the cross seals 3, 4.

[0056] In order to be able to easily open the package, perforations or cut-outs 7 are provided. In the embodiment illustrated with reference to FIG. 1 perforations 7 are provided at both ends of the side flap 10, but the same advantages are achievable with only one perforation 7 provided at either end of the side flap.

[0057] The perforations 7 are provided parallel to and adjacent the side flap 10 and has an extent in the longitudinal direction of the package indicated by the arrow 50 such that the entire perforation is maintained within the limits of the cross seal 3 such that no opening is provided from the interior of the package 1 to the ambient.

[0058] In FIG. 4 is indicated a situation where the corner 11 of the side flap 10 has been lifted relative to the package whereby a tear 8 initiated by the perforation 7 makes it possible to create an easy and substantially straight opening of the package.

[0059] As indicated by reference number 12 the lower material layer remains intact and only the top surface material sheet 13 is ruptured.

[0060] In the embodiment illustrated with reference to FIG. 1 these types of packages are typically manufactured on a so-called horizontal form, fill and seal machine (FFS) whereas the package 9 illustrated with reference to FIG. 2 typically will be manufactured on a vertical FFS machine where the edges 5', 6' will be mutually overlapping and creating a connection seal 20, such that the formation of the tube from the material sheet 2 does not provide a side flap 10. In this case the side flap may be provided by installing a side flap former as illustrated with reference to FIGS. 8 and 9.

[0061] Turning to FIG. 8 a former/filling pipe 14 is illustrated. The material sheet (not illustrated) will at this point be surrounding the former pipe and has been provided with the connection seal 20 (see FIG. 2) such that the material sheet at this stage will be in the shape of a tube. The tube is arranged outside the former/filling pipe 14 and as the tube advances downwards in FIG. 8 the tube will engage the fin 15 such that a fold will be created in the sheet material. As the material advances further the fold will be squeezed between the two rollers 16, 17 which are biased towards each other. Depending on the type of material used to form the package, the fold may be sealed either by providing an adhesive nozzle just downstream of the fin 15 before the rollers 16, 17 such that the rollers squeeze together the fold and thereby the adhesive coated inner portions of the material sheet (here shaped into a tube) thereby creating the side flap 10. Alternatively, where the sheet material is suitable to be welded the rollers 16, 17 may be welding rollers such that by heating the rollers the fold will be fused together in a welding process thereby creating the side flap 10.

[0062] Consequently, returning to FIG. 2 a side flap 10 as well as perforations 7 are provided exactly corresponding to the embodiment described with reference to FIG. 1.

[0063] In FIG. 3 is an embodiment of the combination of different techniques illustrated. The cross seals 3, 4 are manufactured in the same manner as the embodiments described above which will be further described with reference to FIG. 6 and a longitudinal seal 18 is furthermore provided in order to connect the edges 5", 6" such that a sealed package 2 is created. In this manner the embodiment illustrated in FIG. 3 so far corresponds completely to the embodiment illustrated with reference to FIG. 1.

[0064] In some instances, however, it is desirable to be able to position the longitudinal seal 18 independently of the position where it is desirable to open the package, and therefore a side flap 10 manufactured as described with reference to FIG. 2 is provided at a different location, where the side flap 10 is provided adjacent the perforations 7 thereby providing the novel and inventive easy tear open feature of this type of packages. For practical purposes the seal 18 may further be fastened to the surface of the package material and fastened to the cross seals 3, 4 such that a user may not mistakenly try to open the package by pulling on the edge seal 18.

[0065] A further embodiment is illustrated with reference to FIG. 5 where a package has been opened by tearing at the side flap 10 thereby providing access to the interior of the package. The perforation 7 has been divided such that half the perforation is present on the side flap 10 and half the perforation 7 is present of the package itself. This package has furthermore been provided with a resealing strip 20 arranged at what is now the bottom part of the side flap and parallel to

the longitudinal direction **50** (see FIG. 1). By overlapping the side flap **10** with the front of the package **19** it is possible by pressing the resealable seal **20** against the surface **19** to reseal the package and thereby maintain the remainder of the content of the package inside the package.

[0066] The type of material used for the resealable seal **20** may be chosen according to the circumstances depending on the sheet material and the quality of the resealing properties which it is desired to achieve. The seal **20** may be selected from the so-called peelable materials or may simply be a double-sided, adhesive tape or the like as long as it fulfills the requirement of being able to hold down the side flap **10** in relation to the surface **19** of the package.

[0067] In these embodiments it is possible to create stronger and more robust packages with the present technology, than what is otherwise achievable with conventional peel technology. By providing the peel strips to the material sheet, where the peel material has less peel ability, the perforation (easy open facility) will make it easier to open the package. In this manner the weak peel connection may be made stronger as the perforation will aid in opening the package, whereby stronger and more robust packages may be produced, without sacrificing the peelability.

[0068] Turning to FIG. 6 a schematic illustration of how the perforation **7** is manufactured is illustrated. The package material **2** has, prior to the method step illustrated with reference to FIG. 6 been arranged around the former such that a tube is created. The tube has an interior space **21** delimited by the package material **2**. Furthermore the two edges of the package material **5**, **6** is arranged to be introduced between two rollers **22**, **23**. The rollers may be heated such that they will weld the package material **2** together forming the side flap **10** as already described above. Alternatively, a nozzle providing adhesive material to the inside of the edges **5**, **6** may be provided just upstream of the rollers **22**, **23** such that the rollers **22**, **23** which are biased towards each other, will press the two edge portions together thereby creating the side flap **10**. The package material moves in the direction **51** indicated by the arrow, and the directions "up-stream", "downstream" are defined relatively to this direction of movement of the package material **2**.

[0069] Markers (not illustrated) may be provided on the surface of the package material **2** such that as a detection unit detects/registers a marker this registration will be used as input for the perforation tool of which only the cutting blade **24** actually carrying out the cutting of the perforation is illustrated. These markers are usually present on printed sheets materials, in order to locate the print correctly to the cutting zone, separating two packages. The input from the marker registration means is used in order to activate the perforation tool such that the cutting blade **24** may be moved up and down repeatedly as indicated by the arrow **52** whereby the cutting blade cuts a perforation **7** at predetermined positions. These predetermined positions are decided relative to the marker such that the perforation as indicated on the lower side of the side flap **10**, crosses the separating line **25**. The separating lines are provided as shear lines where the different packages may be separated into individual packages such that as two packages **1'**, **1''** are separated, the perforation **7** will be present parallel to the side flap **10** and extending from the edge of the package, which edge is created by the separating line **25** and into the cross seal (not illustrated). In FIG. 6 it has been chosen not to illustrate the cross seals in order to clarify the position of the perforations in relation to the separating lines.

The packages created by the method described with reference to FIG. 6 will have a general appearance as illustrated with reference to FIGS. 1-5 and as described above.

[0070] The perforation may also be one-sided, i.e. such that a perforation **7'** as illustrated above the side-flap **10** is only present on one side of the separation line and thereby only in one place on the finished package.

[0071] As the package material proceeds from the method step illustrated with reference to FIG. 6 the package material **2** has been turned into a tube on which tube's surface a side-flap **10** is provided and perforations **7** are established parallel to the longitudinal direction of the side-flap adjacent or crossing the separating lines **25** where it is intended to separate the packages **1'**, **1''**.

[0072] As the tube proceeds it will be subjected to method steps described with reference to FIG. 7. The material sheet formed into a tube by the method step in FIG. 6 proceeds towards a sealing apparatus **30**. The sealing apparatus will only be described very broadly, but any type of apparatus which is able to create the cross seals **3**, **4** may be used with the present application. Furthermore, in the embodiment illustrated in FIG. 7 the means for sealing **30** furthermore comprises means for separating the packages such that separate packages **1'**, **1''** provided with cross seals **3**, **4**, a side-flap **10** and perforations **7** result from the action of the novel and inventive method and apparatus according to the present invention. The operation of the means for sealing **30** is carried out in response to the presence of the separating lines **25** such that the means for sealing **30** is activated in the direction indicated by the arrow **53** such that the cross seals **3**, **4** and the separation of the packages **1'**, **1''** is established in the correct positions in relation to the perforation **7** and the overall package size.

[0073] The sealing means **30** may also be provided without means for separating the packages whereby a string of packages as illustrated with a reference to FIG. 10 is the result such that a continuous array of packages **1'**, **1''** separated by cross seals will be the result. The separating lines **25** indicated between the cross seals **3**, **4** may for example be perforations such that it is easy for a user to detach one package from an adjacent package or maybe partly cut such that it is easy to detach one package from the next.

[0074] In FIG. 11 is illustrated a further embodiment, where a plurality of perforations **60**, **60'**, **60''** are indicated. In the illustrated embodiment three substantially parallel perforations are illustrated, but any number depending on the size of the package, the materials etc may be used. The perforations are identical to the perforations discussed above. The perforations are illustrated as arranged substantially parallel to the longitudinal flap **10**, but may also be arranged at an angle to the longitudinal direction of the flap. Angles up to approx. 60° have proven to achieve the inventive effect. When the package, for example as indicated by **1'** or **1''** is to be opened, the flap **10** shall be pulled away from the plane of the package, for example by gripping the flap in the area indicated by **56**, and pulling in the direction indicated by the arrow **62**. The material from which the package **1'**, **1''** is made will then easily tear initiating the tear at one of the perforations **60**, **60'**, or **60''**. The tear will propagate towards the weld in the flap **10**, where after the tear will follow the intersection between the flap **10** and the face **54** of the package.

[0075] In FIG. 12 is illustrated an embodiment where the flap **10** is welded onto the sheet material **2**, by the weld **26**. The flap **10** is placed adjacent the perforation **60**. Alterna-

tively the flap could have been attached by means of an adhesive. The connection between the flap **10** and the sheet **2** shall be such that by pulling in the flap **10** the perforation **60** will initiate a tear, without the flap **10** being pulled off.

[0076] Above the invention has been described in embodiments where the seals are created either by heating thereby welding or fusing the material layers together, or applying adhesives in order to create the seals. Particularly the latter, i.e. the adhesive solution is used for a number of purposes, but of particular interest are applications where the objects or material to be package are not suitable to be heated, or that there may be a risk that an adhesive spray may have a detrimental effect on the characteristics of the object/material.

[0077] One such example is chocolates. For these applications a cold seal technique has been developed, where an adhesive is applied to the edges to be joined prior to arranging the sheet material in the packaging machine. The surface of the adhesive is dry and non-stick. However when the areas coated with the cold seal adhesive are placed facing each other and subjected to pressure, for example by being placed between two rollers biased towards each other, an adhesive seal is formed. In addition to pressure heat may be applied, but much less than in a welding process.

[0078] This sealing technology may also be used within the present invention in order to establish the seals.

[0079] Although the invention is described with reference to particular embodiments, the scope of protection is only to be limited by the appended claims.

1-15. (canceled)

16. Method of manufacturing a package of the type formed from a single-layer or multi-layer material sheet, where said package has an easy to open feature, where the material sheet is shaped into the finished package having an inner side suitable to be in contact with the matter to be packaged and an outer side, where said method comprises the following method steps:

- forming the material sheet into a tube, by connecting the two side edges of the sheet longitudinally;
- where the connection creates a side flap on the outside of the tube or where the tube is passed over a former having a projecting fin, whereby a side flap is formed on the outside of the tube, or where a fin is attached longitudinally to the outside of the tube;
- where cross seals are provided across the tube, thereby delimiting each package between two cross seals;
- that perforation lines are established in said cross seals, for detaching/separating two adjacent packages;
- that a perforation of only one material sheet layer or only one or more layers making up the sheet, is established adjacent the side flap or fin, extending from the perfora-

tion line and parallel to, or at an angle up to 60° relative to the side flap or fin, and extending towards or into the cross seal.

17. Method according to claim **16**, wherein the perforation of the one sheet material layer is made either in:

- an un-sealed part of one sheet material projecting between the cross seal and the perforation line separating two adjacent packages;

- or in the unsealed part and part of the cross seal;

- or where the cross seal is immediately adjacent the perforation line between two adjacent packages, only in the cross seal.

18. Method according to claim **16**, wherein the perforation of the one sheet material layer is established by a perforation tool selected from one or more of the following:

- a cutter or a rotating cutter head, controlled in relation to the production speed, where the cutter head has a plurality of spaced cutting edges, cooperating with a land, where the land is placed such that the material passes between the cutter and the land, whereby activation of the cutter establishes the perforation in the material, which material during cutting is in contact with said land;

- a laser device, where the positioning of the perforation is located relative to markers provided on the sheet material, corresponding to the desired package size, where means are provided for detecting said markers and using this information as input for activating the perforation tool.

19. Method according to claim **16**, wherein two separate material sheets are formed into a tube, by superposing the sheets and connecting the edges of the superposed sheets, such that a tube is formed having side seals along the longitudinal edges.

20. Method according to claim **16**, wherein a plurality of substantially parallel perforations of one sheet material layer or one or more material layers making up the sheet material, is established in the cross seal adjacent the perforation line and parallel to or at an angle up to 60° relative to the side flap.

21. Method according to claim **16**, wherein cross seals are only provided in one end of each package, such that as the packages are separated into separate packages along the perforation lines, each package will be open in one end.

22. Method according to claim **16**, where the flap is a separate piece of sheet material attached to the outside of the tube, where the flap is fastened by means such that the connection between the flap and the tube is stronger than the tearing strength needed when initiating a tear with the perforation.

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