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(54) Easy-to-open package and seal assembly and sealing method suitable therfore

(57) An easy-to-open package 1 made by a form-fill-seal process where the easy openability is provided by the presence of two longitudinal fin seals, a wide outermost longitudinal fin seal 4a and, separated therefrom, a thin innermost longitudinal fin seal 4c, where the contact pressure in the innermost longitudinal fin seal area is higher than that in the outermost longitudinal fin seal area.

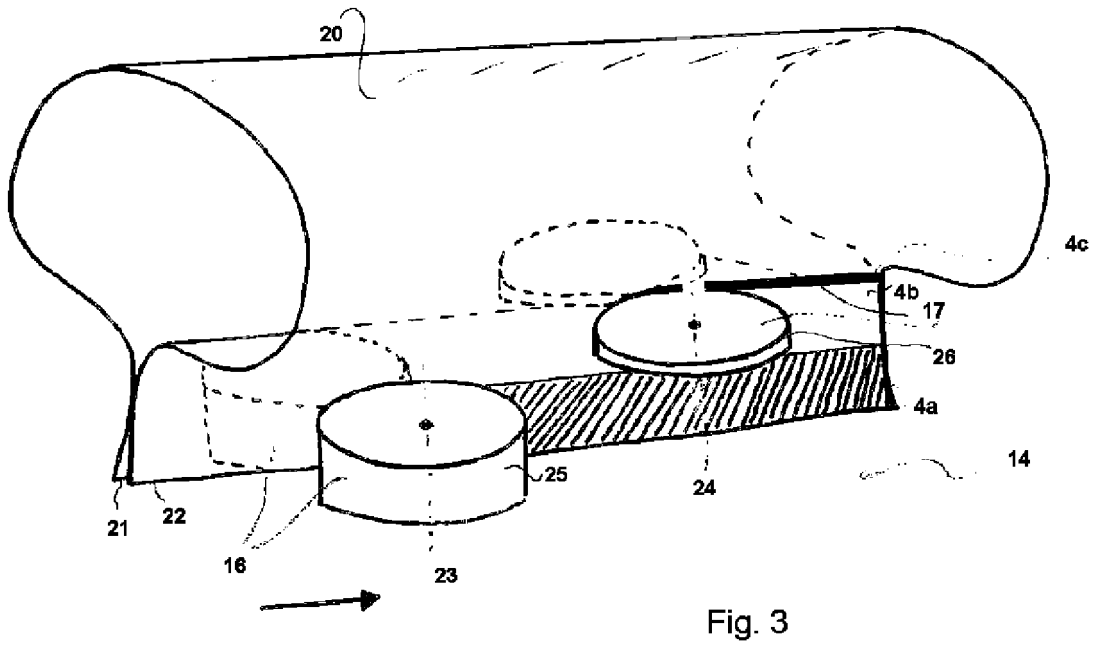

Fig. 3

EP 1 714 903 A1

Description

Technical field

[0001] The present invention relates to an easy-to-open package and to a method and apparatus suitable for forming said package in a form-fill-seal process.

[0002] More particularly the present invention relates to a hermetically sealed package obtained by first forming a thermoplastic film into a tubing by means of a longitudinal fin seal and then transversely sealing and cutting across the tubing once the article has been loaded therein, wherein the package can be easily opened by grabbing the fin excess of the longitudinal seal and pull it outwardly. The invention also relates to the particular seal assembly and sealing method suitably designed to create the easy-to-open longitudinal fin seal.

Background art

[0003] In the field of packaging food products, particularly block-shaped products, such as chunks of cheese, cheese slices or various products that are typically contained in a tray, e.g. chunks of fresh red meat, processed meat, chunks of cheese, or cookies, a convenient method of packaging is generally known as the form-fill-seal process. In such a process a film of thermoplastic material is formed into a tubing by means of a longitudinal seal, a first, front, transverse seal is then made into the tubing to create a sort of open mouth pouch that is ready to receive the product. Once the product is loaded therein, the pouch may be gas flushed, if a modified atmosphere end package is desired, or the air contained therein may just be gently squeezed out and then a second, rear, transverse seal is made to close the package containing the product.

[0004] When the first transverse seal of the end package is made in the tubing, it can be done at the same time as the second transverse seal of the preceding package and may involve also the separation between the finished package and the following package containing said first, front, transverse seal. As an example this can be easily achieved by means of a wide seal band, equivalent to the sum of the width of the two seals, suitably severed transversely.

[0005] Alternatively the packages may be sealed in line but separated off-line. In such a case preferably a transverse weakness line is created between adjacent seals in the form-fill-seal process, which is broken off-line to yield the separated packages.

[0006] Still alternatively it would also be possible to run a form-fill-seal process avoiding the second transverse seal and conveying the semi-finished package, consisting in a pouch with a longitudinal seal and one transverse seal, containing the product to be packaged, into a vacuum sealing chamber where the pouch is evacuated, optionally a preserving gas is introduced therein and finally the second transverse seal is made to give the end package.

[0007] Common to all these alternative processes than can be run with a form-fill-seal machine is the formation of the film into a tubing by means of a longitudinal fin seal.

[0008] The form-fill-seal machines traditionally come as either horizontal form-fill-seal (HFFS) machines or vertical form-fill-seal (VFFS) machines. Although the present invention is exemplified in terms of a tube-forming and seal assembly unit for a horizontal form-fill-seal machine, the invention may equally be applied to a vertical form-fill-seal machine or to any other machine where a film is formed into a longitudinally fin sealed tubing.

[0009] In these processes the packaging film maybe an oriented and heat-shrinkable film and in such a case, preferably, the package is submitted to a heat-shrinking step to tighten the packaging film around the packaged product and improve the appearance of the end package.

[0010] To open the packages obtained by the form-fill-seal process, and particularly to open those obtained with a heat-shrinkable film, it is generally necessary to resort to knife or scissors. This might be a problem for the end user first of all because this procedure, even if simple, could expose him/her to the possibility of injury and secondly because not always the end user has available knife or scissors to open the package.

[0011] Among the approaches followed up to now to solve this problem the main one has involved the choice of a suitable packaging material or/and the setting of suitable parameters for the sealing step to give a decrease in the seal strength of either the longitudinal or any of the transverse seals. This however would be unacceptable when a hermetic package is desired, particularly if it is submitted to a heat-shrinking step that would tension the packaging material and strain the weakened seal.

[0012] Alternatively tear notches can be created in the seals to initiate tear. This system however has the disadvantage that not always the end user can immediately perceive where the notch is located and mainly that not all the packaging materials are easily tearable.

[0013] Still alternatively, external fitments, typically rigid and tough plastic pieces, have been studied that could at least in part be heat-sealed or glued to the packaging material and give the opening of the package when pressed against the film surface or torn. The addition of these fitments however does increase the cost of the package. Furthermore it is not uncommon that the package is inadvertently opened or that the fitment is lost in the distribution cycle.

[0014] It would therefore be desirable to obtain a package that is hermetically sealed but can be easily opened when desired without the use of any sharp tool, wherein said package can furthermore be manufactured easily and essentially without added costs.

Disclosure of the invention

[0015] A first object of the present invention is an easy-to-open package obtained by a form-fill-seal process

where an article is enclosed in a pouch of a thermoplastic film having a longitudinal fin seal, a first, front, transverse seal and a second, rear, transverse seal, said package being characterised in that (a) the longitudinal fin seal is made up by an outermost longitudinal fin seal, at least about 5 mm, typically from about 5 mm to about 20 mm wide, and, separated therefrom, an innermost longitudinal fin seal, from about 0.8 mm to about 2 mm wide, and (b) the profile of the innermost longitudinal fin seal is thinner than the profile of the outermost longitudinal fin seal.

[0016] A second object of the present invention is a form-fill-seal machine that can be employed in the process for the manufacture of an easy-to-open package of the first object, said machine comprising a sealing assembly for forming a flat film into a tubing by means of a longitudinal fin seal, wherein said sealing assembly comprises a first couple of heated rollers having a heat-sealing section at least about 5 mm high, that can be pressed together to effect a continuous outermost seal in the facing edges of the film passing therebetween, and a second couple of heated rollers having a heat-sealing section from about 0.8 mm to about 2 mm high, that can be pressed together to effect a continuous innermost seal in the facing edges of the film passing therebetween, the positioning of said second couple of heated rollers being adjusted with respect to that of the first couple in such a way that there is a separation between the outermost and the innermost longitudinal fin seals.

[0017] A third object of the present invention is a form-fill-seal process for the manufacture of an easy-to-open package, involving forming a flat film into a tubing by means of a longitudinal fin seal, creating a first, front, transverse seal, introducing the article to be packaged into the thus formed pouch, or alternatively introducing an article into the tubing and then creating a pouch around said article by making a first, front, transverse seal, optionally removing air and/or introducing a modified atmosphere therein, and closing the package by a second, rear, transverse seal, said process being characterized in that the longitudinal fin seal is made by passing the facing film edges in a first couple of heated rollers, having a heat-sealing section at least about 5 mm high, that can be pressed together to effect a continuous outermost seal in the edges of the film passing therebetween, and then in a second couple of heated rollers, having a heat-sealing section from about 0.8 mm to about 2 mm high, that can be pressed together to effect a continuous innermost seal in the edges of the film passing therebetween, the positioning of said second couple of heated rollers being adjusted with respect to that of the first couple in such a way that there is a separation between the outermost and the innermost longitudinal fin seals, and the sealing pressure of said first and second couples of heated rollers being adjusted in such a way that the specific contact pressure applied to the film edges by the second couple of heated rollers is higher than that applied to the film edges by the first couple of heated rollers, while not being sufficient to trim the film.

Brief description of the drawings

[0018] Figure 1 is a bottom plan view of an easy-to-open package according to the present invention;

[0019] Figure 1a is an enlarged view of the encircled detail of the longitudinal fin seal of the package of Figure 1;

[0020] Figure 1 b is an enlarged view of the profile of the same detail of the longitudinal fin seal of Figure 1a;

[0021] Figure 1c is a view of the same package of Figure 1 opened;

[0022] Figure 2 is a schematic side elevational view of a HFFS machine providing for a longitudinal fin seal;

[0023] Figure 3 is a perspective view of the sealing assembly according to the present invention;

[0024] Figures 4a, 4b, and 4c are alternative suitable profiles of the first couple of heated sealing rollers; and

[0025] Figures 5a, 5b, and 5c are alternative suitable profiles of the second couple of heated sealing rollers.

[0026] With reference to Figures 1, 1 a, and 1 b, the easy-to-open package 1 of the present invention comprises an article 2 wrapped up into a pouch 3 of thermoplastic material that has a longitudinal fin seal 4, made of an outermost longitudinal fin seal 4a, at least about 5 mm, typically from about 5 mm to about 20 mm, wide, and, separated therefrom, an innermost longitudinal fin seal 4c, from about 0.8 mm to about 2 mm wide, and two transverse seals 5a and 5b. In Figure 1a, 4b indicates the separation between the outermost and the innermost longitudinal fin seals 4a and 4c. In Figure 1 b the profile 6c of the innermost longitudinal seal 4c is shown to be thinner than that 6a of the outermost longitudinal seal 4a. Figure 1 c shows the same package of Figure 1, that has been opened by grabbing the longitudinal fin seal area 4, with the fingers of the user closely pointing to the innermost longitudinal fin seal 4c and pulling outwardly as indicated by the arrow 7. The packaging film will break along the innermost longitudinal seal 4c and it will then be possible to easily open the package and remove the article therefrom.

[0027] The outermost longitudinal fin seal 4a in the end package 1 is at least about 5 mm wide, typically from about to about 20 mm wide, and preferably it is from about 8 to about 15 mm wide; the separation 4b between the outermost seal and the innermost seal is preferably at least 1 mm, but it could also be larger, e.g. up to 4-5 mm, while the thickness of the innermost seal is preferably comprised between about 0.9 and about 1.8 mm and even more preferably between about 1 and about 1.6 mm. The longitudinal fin seal area 4 (or fin excess) that is made up by these three components should be wide enough to be grasped by the fingers of the end user for the opening of the package, i.e. it should be at least about 7 mm wide, preferably at least about 10 mm and even more preferably at least 12 mm wide.

[0028] The outermost margins of the film in the longitudinal fin seal area 4 are sealed together. This is particularly important if a heat-shrinkable film is employed for

the manufacture of the easy-to-open package because the heat treatment required for the shrinking step might otherwise give sticking of the film in the longitudinal fin seal area 4 to the bottom of the pouch, thus preventing grasping thereof by the end user and affecting the pouch openability.

[0029] The thermoplastic film 2 used for the manufacture of the easy-to-open pouch may be a single layer or, preferably, a multi-layer structure, either symmetrical or asymmetrical. Polymeric materials that can suitably be employed for the manufacture of the thermoplastic film 2 typically include polyolefins, modified polyolefins, polyesters and copolyesters, gas-barrier materials such as polyamides, copolyamides, PVDC, ethylene-vinyl alcohol copolymers, and the like materials. Suitable polyolefins are the polymers or co-polymers resulting from the polymerisation or co-polymerisation of unsaturated aliphatic, linear or cyclic, straight or branched, hydrocarbon monomers that may be substituted or unsubstituted. Specific examples include polyethylene homo-polymer, polypropylene homo-polymer, polybutene homo-polymer, ethylene-α-olefin co-polymer, propylene-α-olefin co-polymer, butene-α-olefin co-polymer, ethylene-unsaturated ester co-polymer, ethylene-unsaturated acid co-polymer, (e.g., ethylene-(C_1-C_4)alkyl acrylate or methacrylate copolymers, such as for instance ethylene-ethyl acrylate co-polymer, ethylene-butyl acrylate co-polymer, ethylene-methyl acrylate co-polymer, ethylene-methyl methacrylate co-polymer, ethylene-acrylic acid co-polymer, and ethylene-methacrylic acid co-polymer), ionomer resin, polymethylpentene, etc.

[0030] Modified polyolefins include those polymers prepared by co-polymerizing the homo-polymer of the olefin or co-polymer thereof with an unsaturated carboxylic acid, e.g., maleic acid, fumaric acid or the like, or a derivative thereof such as the anhydride, ester or metal salt or the like, as well as the modified polymers obtained by incorporating into the olefin homo-polymer or co-polymer, by blending or preferably by grafting, an unsaturated carboxylic acid, e.g., maleic acid, fumaric acid or the like, or a derivative thereof such as the anhydride, ester or metal salt or the like.

[0031] Preferred resins for the film layer that will heat-seal to itself are however ethylene homo-polymers and ethylene co-polymers and propylene co-polymers, and more preferred are heterogeneous and homogeneous ethylene-α-olefin copolymers, particularly those with a density of from about 0.890 to about 0.935 g/cm^3, and more preferably of from about 0.895 and about 0.925 g/cm^3, ethylene-vinyl acetate copolymers, particularly those with a vinyl acetate content of from about 4 to about 14 % by weight, ionomers, propylene-ethylene copolymers, propylene-butene copolymers, propylene-ethylene-butene terpolymers, propylene-butene-ethylene terpolymers, and their blends.

[0032] Films suitable for use in the manufacture of the easy-to-open package of the present invention may have an overall thickness typically up to 100 μm, preferably up to 80 μm, more preferably up to 60 μm, and even more preferably up to 50 μm, e.g. typically from about 12 to about 40 μm, and preferably from about 14 to about 35 μm.

[0033] The film may be obtained by co-extrusion, extrusion coating, or lamination techniques. Preferably however the film is coextruded. It can be cross-linked, either chemically or, preferably, irradiatively. It may be non oriented or, preferably, mono- or bi-axially oriented and in the latter case it can be either heat-shrinkable or heat-set.

[0034] When a vacuum or modified atmosphere package is desired, the thermoplastic film 2 preferably has an Oxygen Transmission Rate (evaluated by following the method described in ASTM D-3985 and using an OX-TRAN instrument by Mocon) at 23°C and 0% of relative humidity that is lower than 200, preferably lower than 150 and even more preferably lower than 100 cc^3/m^2.d.atm. To get such a low OTR the film 2 will comprise a gas-barrier polymeric material, such as PVDC, polyamides, copolyamides, ethylene-vinyl alcohol copolymers and blends thereof.

[0035] In a first preferred embodiment the film used in the manufacture of the easy-to-open package of the present invention is a multi-layer heat-shrinkable film with a thickness of from 14 to 50 μm, comprising an inner layer comprising ethylene-vinyl alcohol copolymer and at least one outer layer, the heat-sealing layer, of polyolefins. In said preferred embodiment the film may be symmetrical and both outer layers have the same resin composition or it may be asymmetrical and in this case the resin or resin blend used for the other outer layer has most preferably a melting point which is higher than that of the heat-sealing outer layer.

[0036] For the sake of clarity and ease of representation, Figures 1 to 1 c refer to an easy-to-open package of the present invention in a non shrunk version, while, as indicated above, in a preferred embodiment of the present invention the wrapping film is an oriented heat-shrinkable film and the package is submitted to a heat-treatment step to shrink the film and improve the package appearance.

[0037] With reference to the schematic view of an HFFS machine of Figure 2, the heat-sealable film 10 is dispensed from a roll not shown and tensioned by a dancing roller 11, passed over and around a forming box 12 where the edges of the film 10 are brought downwardly and inwardly into contact with one another into a slit 13. A couple of guide rollers (not shown in Figure 2) positioned below the slit 13, advance the film to the sealing assembly 14 eventually to form a tube 20 into which products 2 can be fed in the direction of travel of the film. The cross-section of such a tubing is not necessarily circular. It will be understood that in practice the film will adopt a cross-section that will possibly be defined by the shape of the forming box and should fit to the shape of the products to be packaged.

[0038] Upon leaving the sealing assembly 14, that will

be described below in details with reference to Figure 3, the film is in the form of a tubing 20 containing one or more suitably spaced products 2.

[0039] A first, front, transverse seal 5a will then be made into the package. This will preferably be obtained while the film is moving by using a cyclically movable jaw sealing assembly (a translating sealing bar or moving box) arranged on opposite sides of the tubing and which is schematically indicated in Figure 3 with numeral 15. This system will create the rear seal 5b in one package and the front seal 5a in the following one, with an area between these two seals that can then be cut to severe the individual packages. If the machine is used for modified atmosphere packaging a gas nozzle (not shown in the Figure) connected with a gas flushing system will flush the desired preserving gas or gas mixture into the tube 20 while flushing out the air. Just before the rear transverse seal 5b is made to complete the package, a presser gently squeezes the excess gas back into the tubing.

[0040] With reference to Figure 3, the sealing assembly 14 is made by two couples of heated rollers, indicated in said Figure 3 as 16 and 17, which are positioned at a short distance one after the other, with their axes 23, 24 perpendicular to the direction of travel of the film tubing 20. The distance between the outer edges of these two couples of sealing rollers may be as short as few mm and typically is from 5 mm to 15-20 cm. The first couple, 16, has a heated sealing section 25 at least about 5 mm high, typically from about 5 mm to about 25 mm, and preferably from about 10 to about 20 mm high. Possible profiles for this first couple of heat sealing rollers are illustrated in Figures 4a, 4b, and 4c. In Figure 4a the two rollers have flat profiles 30,31, with slightly rounded corners at the two edges 32,33 and 34,35, as known in the art to avoid that the friction of the film running therebetween against any sharp corner could scratch it. Figure 4b reports a "criss-cross" type of profile where there is a series of recesses and protuberances, 36,37, in the profile of one of the rollers that are complementary to the protuberances and recesses, 38,39, in the profile of the other roller. Figure 4c illustrates a further possible alternative where there is a series of matching flat sealing sections, 40,41, separated by thin non matching sections 42,43.The second couple of heated rollers 17 may have a heated sealing section 26 from about 0.8 mm to about 2 mm high, preferably from about 0.9 to about 1.8 mm and more preferably from about 1 to about 1.6 mm high. This may be obtained as described in Figure 5a by profiles of the rollers with a thin flat surface 44,45 with slightly rounded corners at the two edges. The presence of the supporting rollers 46,47, in which the heated sealing ones are incorporated and from which they protrude is preferred in this embodiment but it is not necessary. Alternatively, as described in Figure 5b, the heated rollers of the second couple can have curved (convex) profiles 48,49 where the radius of curvature is large enough to provide for a sealing area of from about 0.8 mm to about 2 mm high. Figure 5c finally illustrates the alternative where the profile of one of the two rollers 17 has a convex profile 50 and the other one has a flat profile 51. In all these alternative embodiments for the second couple of sealing rollers 17, the profiles can be defined as sharing a flat or almost flat sealing section, as there are no sharp corners as in the devices for trim sealing.

[0041] The height of the second couple of heated rollers 17 is suitably adjusted, raised, with respect to that of the first couple 16, to allow a separation between the two seals produced thereby. Said separation is preferably of at least 1 mm. It could also be slightly larger, e.g., 2 or 3 mm and up to 4-5 mm.

[0042] While this is the preferred configuration, it will however also be possible to invert the positioning of the two couples of heated rollers so that the innermost seal 4c is made before the outermost one 4a.

[0043] The two couples of rollers 16 and 17 are heated to a suitably selected temperature that will mainly depend on the type of film employed and particularly on the type of resins used for the heat-sealing surface layer. Preferred temperatures, for films comprising a polyolefin, and particularly ethylene-based polyolefin, heat-sealing layer, will be comprised in the range 110-160 °C. Each one of these two couples of heated rollers is typically made of e.g., silicone rubber or Teflon® tape covered stainless steel, as known in the art.

[0044] The two rollers in each couple are moved toward each other or, preferably, one of the rollers in each couple is in a fixed position and the other one is moved to reach the sealing configuration. The contact pressure in each couple of rollers is generated by means of one or two pressure springs (depending on whether only one or both rollers in each couple are movable) that can be easily adjusted to provide the desired compression value that will give heat-sealing at the given sealing temperature.

[0045] Once the pressure of the first couple of rollers (those providing for the outermost seal 4a) has been set, the pressure for the second couple can be set at the same value or suitably adjusted in such a way that in view of the difference in the sealing sections, 25 and 26, between the two couples of rollers, the specific contact pressure (in psi) for the second couple of rollers 17, i.e., that applied to the film edges at the innermost seal 4c, is at least twice, preferably at least three times and more preferably at least four times the specific contact pressure for the first couple of rollers 16, i.e., that applied to the film edges at the outermost seal 4a. However the specific contact pressure applied to the film edges at the innermost seal 4c should not be too high in order to avoid cutting through the film. The optimum specific contact pressure values can be easily set by the person skilled in the art, by suitably adjusting the compression springs, by trial and error.

[0046] Just because of this difference in the specific contact pressure values between the first couple of sealing rollers 16 and the second couple of sealing rollers 17, the temperature range for the first couple of heated

rollers 16, is generally higher, typically in the range of from about 130 °C to about 160 °C, while the temperature range used for the second couple of heated rollers 17, is lower, typically in the range of from about 110 °C to about 140 °C.

[0047] As indicated before, the outermost margins 21, 22 of the film in the longitudinal fin seal area 4 are sealed together. This can be obtained by having these outermost margins pressed together between the heated rollers 16, that in such a case might also have a sealing section higher than the height of the outermost longitudinal fin seal, or by trimming off the excess of these outermost margins not clamped by the heated rollers 16. To this purpose a trimming unit, including e.g. a roller equipped with a rotary cutter and an anvil roller, and a system to remove the trimmed portion can be foreseen to severe and remove the excess unsealed margins.

[0048] At the end of the form-fill-seal process, once the individual packages have been severed, if a heat-shrinkable film is employed as the wrapping film, the packages are conveyed to a shrink tunnel, where heating can be generated by hot-air, hot steam, IR, microwave, or the like systems, and the film is shrunk to give the packages the desired tight appearance.

[0049] The whole packaging process is preferably controlled electronically by means of photocells detecting the presence and/or positioning of an article in the film tubing or/and the presence of registered print markings on the wrapping film, as known in the art.

Claims

1. An easy-to-open package 1 obtained by a form-fill-seal process where an article 2 is enclosed in a pouch 3 of a thermoplastic film having a longitudinal fin seal 4, a first, front, transverse seal 5a and a second, rear, transverse seal 5b, said package being **characterised in that** (a) the longitudinal fin seal 4 is made up by an outermost longitudinal fin seal 4a, at least about 5 mm wide, and, separated therefrom, an innermost longitudinal fin seal 4c, from about 0.8 mm to about 2 mm wide, and (b) the profile 6c of the innermost longitudinal fin seal is thinner than the profile 6a of the outermost longitudinal fin seal.

2. The easy-to-open package of claim 1 where the separation 4b between the outermost longitudinal fin seal 4a and the innermost longitudinal fin seal 4c is at least about 1 mm.

3. The easy-to-open pouch of claims 1 or 2 wherein the outermost longitudinal fin seal 4a is from about 5 mm to about 20 mm wide, and preferably from about 8 to about 15 mm, and the innermost longitudinal fin seal 4c is from about 0.9 mm to about 1.8 mm wide and preferably from about 1 mm to about 1.6 mm.

4. The easy-to-open package of any of the preceding claims wherein the thermoplastic film is an oriented heat-shrinkable film.

5. The easy-to-open packages of claim 4 wherein the outermost margins 21, 22 of the film in the longitudinal fin seal area 4 are sealed together.

6. The easy-to-open package of any of the preceding claim wherein the longitudinal fin seal 4 is located along the bottom of the packaged article 2.

7. A form-fill-seal machine that can be employed in the process for the manufacture of an easy-to-open package 1 of claim 1, said machine comprising a sealing assembly 14 for forming a flat film into a tubing by means of a longitudinal fin seal 4, wherein said sealing assembly 14 comprises a first couple of heated rollers 16, with a heat-sealing section 25 at least about 5 mm high, that can be pressed together to effect a continuous outermost seal 4a in the edges of the film passing therebetween, and a second couple of heated rollers 17 with a heat-sealing section 26 from about 0.8 mm to about 2 mm high, that can be pressed together to effect a continuous innermost seal 4c in the edges of the film passing therebetween, the positioning of said second couple of heated rollers 17 being adjusted with respect to that of the first couple 16 in such a way that there is a separation 4b between the outermost longitudinal fin seal 4a and the innermost longitudinal fin seal 4c.

8. The form-fill-seal machine of claim 7 wherein the heat-sealing section 25 of the first couple of heated rollers 16 is from about 5 to about 25 mm, preferably from about 8 to about 15 mm, high.

9. The form-fill-seal machine of claims 7 or 8 wherein the heat-sealing section 26 of the second couple of heated rollers 17 is preferably from about 0.9 to about 1.8 mm, and more preferably from about 1 to about 1.6 mm, high.

10. A form-fill-seal process for the manufacture of an easy-to-open package 1, involving forming a flat film into a tubing by means of a longitudinal fin seal 4, creating a first, front, transverse seal 5a, introducing the article 2 to be packaged into the thus formed pouch, or alternatively introducing an article 2 into the tubing and then creating a pouch around said article by making a first, front, transverse seal 5a, optionally removing air and/or introducing a modified atmosphere therein, and closing the package by a second, rear, transverse seal 5b, said process being **characterized in that** the longitudinal fin seal 4 is made by passing the paired film edges in a first couple of heated rollers 16 with a heat-sealing section 25 at least about 5 mm high, that can be pressed

together to effect a continuous outermost seal 4a in the edges of the film passing therebetween, and in a second couple of heated rollers 17, with a heat-sealing section 26 from about 0.8 mm to about 2 mm high, that can be pressed together to effect a continuous innermost seal 4c in the edges of the film passing therebetween, the positioning of said second couple of heated rollers 17 being adjusted with respect to that of the first couple 16 in such a way that there is a separation 4b between the outermost 4a and the innermost 4c longitudinal fin seals and the sealing pressure of said first and second couples of heated rollers being adjusted in such a way that the specific contact pressure applied to the film edges by the second couple of heated rollers 17 is higher than that applied to the film edges by the first couple of heated rollers 16, while not being sufficient to trim the film.

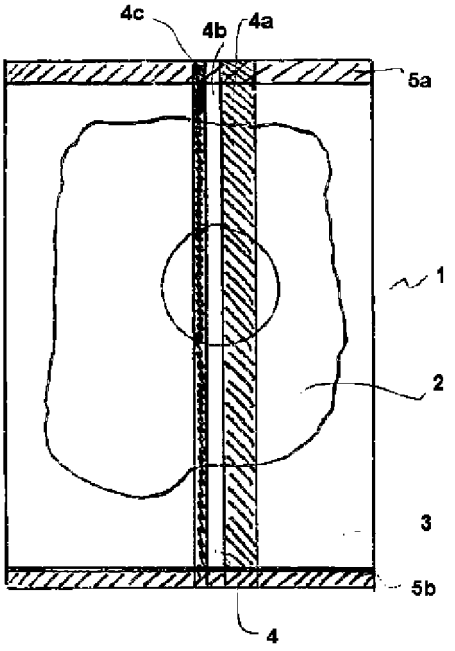

Fig.1

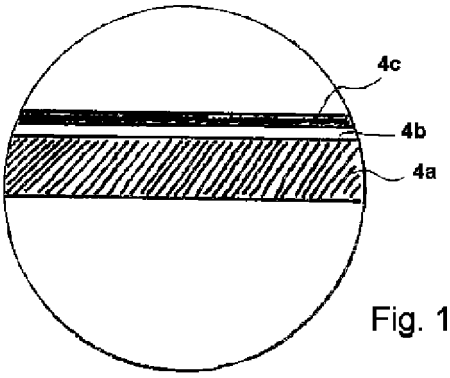

Fig. 1a

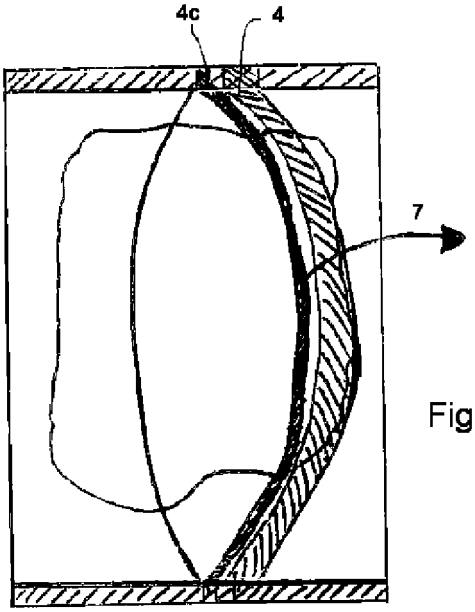

Fig. 1c

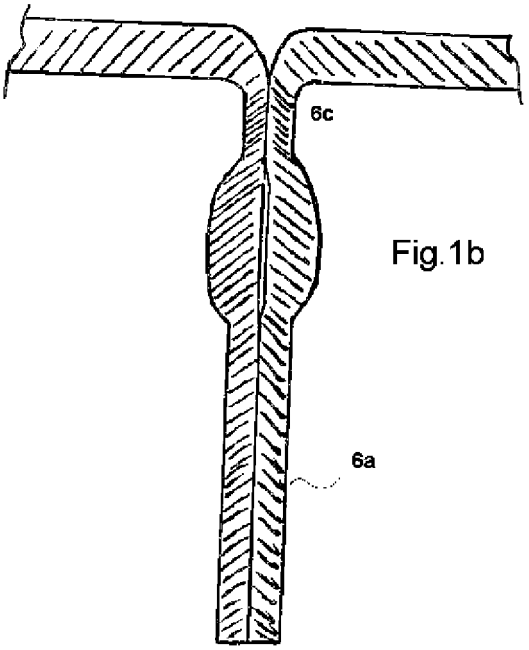

Fig. 1b

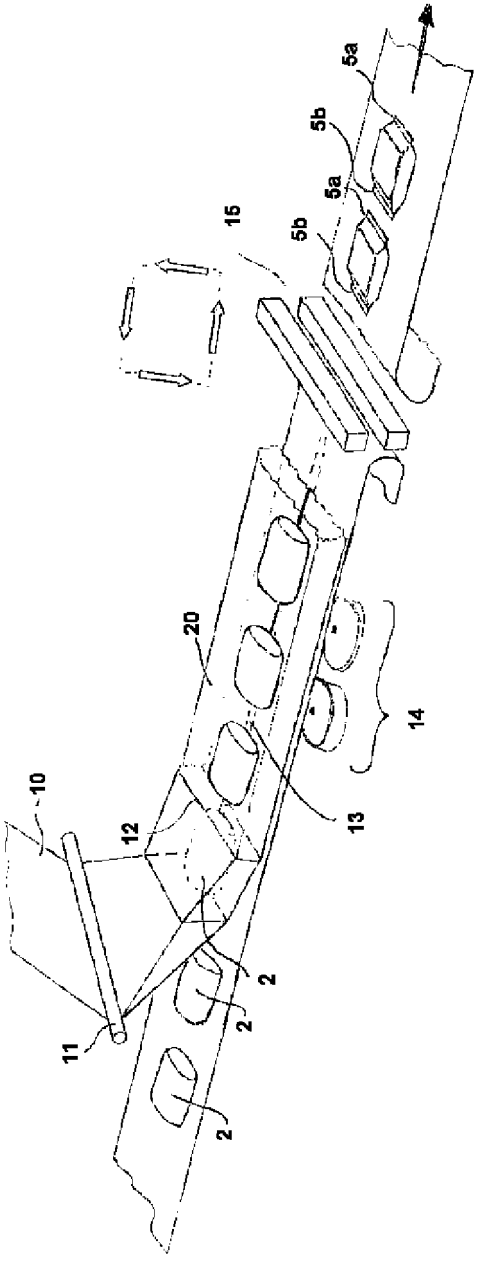

Fig. 2

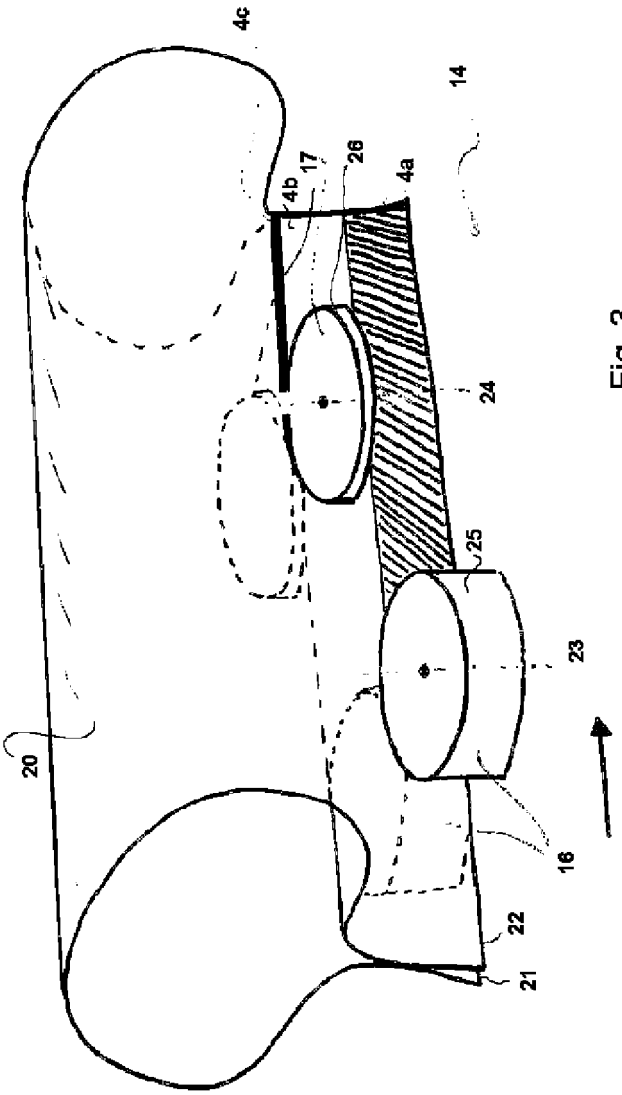

Fig. 3

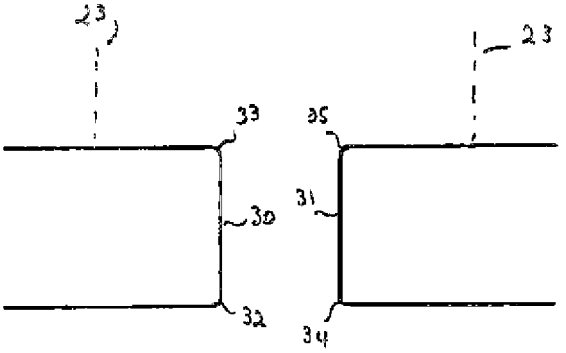

Fig. 4a

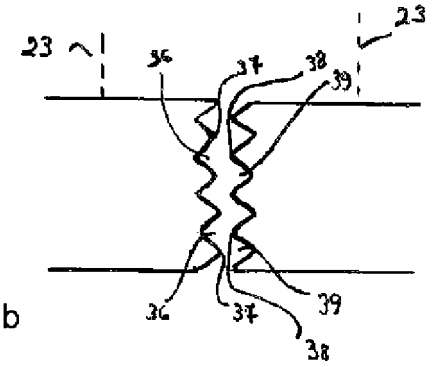

Fig. 4b

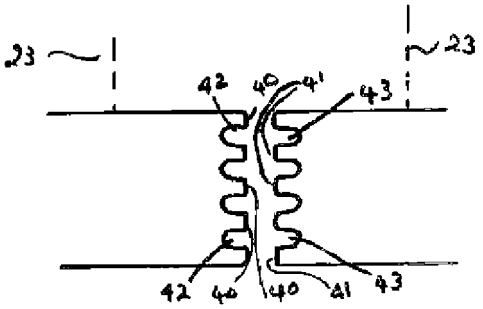

Fig. 4c

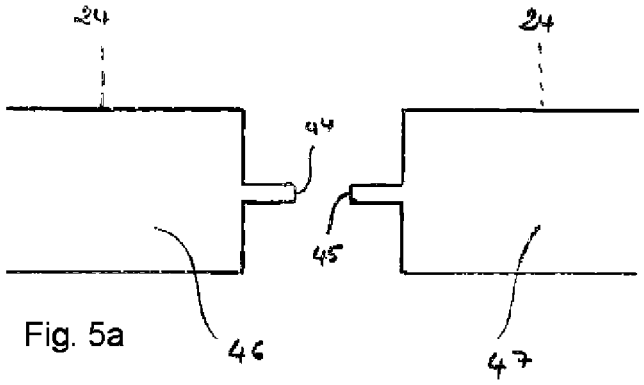

Fig. 5a

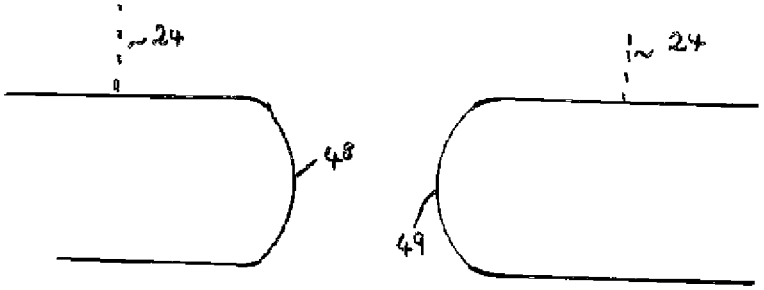

Fig. 5b

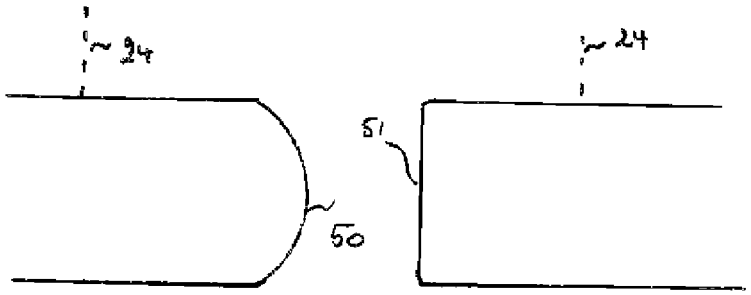

Fig. 5c

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 September 2005	SERRANO GALARRAGA, J

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