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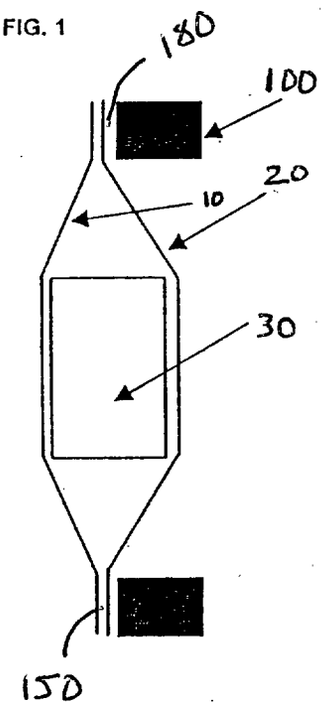
(54) A method of packaging an article and a packaging enclosing an article

(57) A method of forming a packaging in which an article (30) is suspended in a frame (100) by the tension created in a sealable sheet (10) attached to the frame is disclosed. The article is sandwiched between that sheet and a second sheet (20) also attached to the frame. The second sheet may or may not be comprised of a shrinkable material.

FIG. 1



EP 1 291 297 A1

Description

[0001] The present invention relates to a method of packaging an article, in particular, to a method of packaging a food product. The invention also relates to a package with an enclosed article.

[0002] Conventionally articles packaged in shrinkable material can be compressed under vacuum. Particularly in the case of food products this may be presentationally unappealing to customers. When food products are packaged under a preserving atmosphere, the products are often not constrained from moving around within the packaging. This can also result in an unappealing display of the product.

[0003] Some products, notably toys, are held in place within a box with a stiff sheet of PVC or polyurethane esther between 0.05 and 0.5mm thick. Such PVC or polyurethane sheets are not recommended for food applications as not all properties necessary (sealability, gas barrier, food contact) can be satisfied.

[0004] According to the present invention, there is provided a method of packaging an article comprising the steps of:

positioning two sheets on opposite sides of said article, at least one of said two sheets being comprised of a flexible shrinkable material;
sealing between said two sheets around said article by forming at least one seal; and
attaching said two sheets substantially along said at least one seal to a frame member such that said frame member surrounds said article.

[0005] The advantage of this method is that the presentation of the articles in the packaging may be significantly improved over conventional packaging. The thickness of the flexible shrinkable material can be made thinner than that of the prior art (for example, between 12 and 40 μm thick) thereby reducing cost. The article need not be compressed under vacuum and may be kept under a preserving atmosphere if so desired.

[0006] The method may further comprise the step of shrinking said shrinkable material thereby to suspend said article in said frame member under tension forces which are developed in said shrinkable material because of being constrained by said frame member. Thus, the article may be held securely in place thereby improving presentation of the product. Because the article may be constrained within the frame member by tension in the shrinkable material around the product, it is possible to present the article in a more appealing manner than previously. For flat products, the shrinkable film is capable of forming a high suspension/retention tension.

[0007] According to the present invention, there is further provided a packaging and an article said packaging comprising:

two sheets, at least one of which is comprised of a shrinkable material, positioned on opposite sides of said article; and a frame member provided surrounding said article; wherein said two sheets are sealed around said article with at least one seal and are attached to said frame member substantially along said at least one seal.

[0008] Preferably the article is a food product.

[0009] The present invention will now be described by way of example only with reference to the following drawings in which:

Figure 1 is a schematic cross-sectional view through a packaging according to a first embodiment;
Figure 2 is a schematic cross-sectional view through a packaging according to a second embodiment;
Figure 3 is a schematic cross-sectional view through a packaging according to a third embodiment;
Figure 4 is a schematic cross-sectional view through a packaging according to a fourth embodiment; and
Figure 5 is a schematic cross-sectional view through a stack of packagings according to a fifth embodiment.

[0010] Like reference numerals are used to indicate like objects.

[0011] A first embodiment is illustrated in Figure 1. An article 30 is positioned between a first sheet 10 and a second sheet 20 both sheets being comprised of a shrinkable material. A seal 150 is formed between the two sheets 10, 20 around the article 30. Thus, the article 30 is contained between the two sheets 10, 20 and is protected (i.e. sealed) from the atmosphere. The two sheets 10, 20 are attached to a frame 100. The frame 100, in the embodiment of Figure 1, is a ring and is attached to the two sheets 10, 20 substantially along the seal 150 through a second seal or joint 180.

[0012] Tension is created in the two sheets 10, 20 by shrinking those sheets 10, 20. Because that shrinking is constrained by the frame 100, the sheets 10, 20 are left in tension suspending the article 30 in the frame member 100.

[0013] A method of forming the packaging illustrated in Figure 1 will now be described. First, two sheets 10, 20 of a flexible shrinkable material are placed on opposite sides of the article 30. Examples of flexible shrinkable material are oriented "heat-shrinkable" films which shrink when heated to a critical shrink temperature close to the temperature at which they have been oriented and which then shrink by a certain amount generating shrink tension. Other examples are so-called "shrink" films which shrink upon heating to a critical temperature close to the melting point and which only develop a high shrink

tension upon cooling. The "heat shrinkable" films can be obtained by the so-called trapped bubble technology or by other technology such as flat extrusion or co-extrusion of a cast sheet, followed by quenching, re-heating to the suitably selected orientation temperature and orientation. "Shrink" films are typically obtained by the so-called "hot-blown" method. Both "heat-shrinkable" and "shrink" films are known in the art as well their methods of manufacture.

[0014] Specific examples of heat-shrinkable film are those such as disclosed in EP-A-0,236,099 or WO 97/30844. Those patent applications describe the films with barrier layers comprising ethylene-vinyl alcohol copolymer optionally blended with polyamides. Other films, containing gas barrier materials other than ethylene-vinyl alcohol copolymers, such as PVDC or polyamides, are also suitable.

[0015] Whilst mono-layer barrier films may be used, in the preferred embodiment illustrated in Figure 1, the two sheets 10, 20 also comprise a heat-sealing layer suitable to seal to itself and also to the material used for the frame member 100. A suitable heat sealing layer comprises polyolefins, modified polyolefins, styrene polymers and copolymers. The term "polyolefin" refers to a thermosplastic resin obtained by polymerization of an olefin or by copolymerization of two or more olefins or of one or more olefins with other comonomers, wherein the olefin units are anyway present in larger amounts than any possibly present comonomer. Suitable examples of "polyolefins" are polyethylene, polypropylene, polybutene, ethylene-α-olefin copolymers either heterogeneous or homogeneous, ethylene-vinly acetate copolymers, ethylene-acrylic acid or methacrylic acid copolymers, ethylenepropylene copolymers, ethylene-propylene-butene terpolymers, etc. The term "modified polyolefin" means a polyolefin characterised by the presence of functional groups such as typically anhydride or carboxy group. Examples of said modified polyolefins are graft copolymers of maleic acid or anhydride onto ethylene-α-olefin or ethylene-vinyl acetate copolymers, polymerisation products of these with other polar monomers, blends thereof etc. These polymers may be mixed as known in the art with additives suitable to improve the manufacturing process, such as slip and anti-block agents or to improve the film performance such as UV absorbers, anti-fog agents, anti-microbials, oxygen scavengers, etc. Such multi-layer films have the necessary properties required such as gas (oxygen) barrier properties, punture resistance, modulus, possibly meat adhesion and/or anti-fog properties, etc. for packaging food.

[0016] All seals may be made by glueing although - if possible- they are preferably made by heat-sealing.

[0017] The two sheets 10, 20, if they are comprised of a flexible shrinkable material, need only be 10 to 40 μm in thickness. Such sheets can easily be formulated to reach food contact objectives and the required stable properties and dimensions across a large temperature range. Furthermore, such sheets 10, 20 can provide enough tension when they have been shrunk in order to hold flat products (such as sliced salami).

[0018] The frame member 100, as mentioned above, is in the shape of a ring. This is not necessarily the case; the frame member 100 may be any shape so long as it defines a central through-hole large enough for the article 30 to pass through. The frame member 100 must be dimensioned and manufactured from a material to withstand the shrink tension generated by the shrinking of the two sheets 10, 20 (i.e. it should not bend or buckle) and should be suitable for sealing to the two sheets 10, 20. Suitable materials include rigid polymers (polypropylene, high density polyethylene, terephthalate, polystyrene and high impact polystyrene) or foamed polymeric materials (such as polystyrene, polyethylene terephthalate and polypropylene), corrugated cardboard or polymer corrugated-like structure obtained by using profile extrusion. The frame member 100 may be produced by injection moulding; sheet extrusion and punch-in press; sheet extrusion and thermo forming to increase mechanical properties and punch-in press; and punch-in press of corrugated cardboard. If cardboard is used, it must be coated with a polymer to ensure sealability to the sheet 20 or sheet 20 must be formulated to seal directly to cardboard (e.g. ethylene-vinyl acetate copolymer, very low density polyethylene, and the like resins). Alternatively it can be attached to film 20 by means of a glue/adhesive.

[0019] In the preferred embodiment, the formation of seal 150 between the two sheets 10, 20 and the formation of the seal 180 between the sheet 20 and the frame member 100, as well as shrinking of the two sheets 10, 20, are performed at the same time. This is arranged for by positioning the article 30 in the middle of the frame member 100 and aligning the two sheets 10, 20 and the frame member 100 as required. In order to form the seals 150, 180 heat and pressure are applied adjacent to the frame member 100 between the frame member 100 and the first (outer) sheet 10. The combined heat and pressure serve to form the seal 150 between the two sheets 10, 20 and the seal 180 between the second (inner as illustrated) sheet 20 and the frame member 100.

[0020] The two sheets 10, 20 are shrunk around the article 30, mainly during the sealing to the frame member 100. If additional heat is required this may be provided by air or water at an elevated temperature in order to increase the amount of shrink tension in the two sheets 10, 20.

[0021] The amount of shrink required in the two sheets 10, 20 is so that enough tension is created where the article 30 and the two sheets 10, 20 contact, that motion of the article 30 during the packaging, transport and handling of the packaging and article is avoided.

[0022] It will be understood that the product may be packaged either under vacuum or with a modified atmosphere as is conventional in the art. It will also be

understood that the sealing of the two sheets 10, 20 to one another, the sealing of the sheet 20 to the frame member 100 and the shrinking of the two sheets 10, 20 may all be performed at once as described above or may be carried out as individual steps or any combination thereof.

[0023] In a variation of the embodiment illustrated in Figure 1, one of the two sheets 10, 20 may be comprised of a non-shrink material if desired. For example, sheet 10 may be comprised of a semi-rigid moulded flexible non-shrinkable material.

[0024] Figure 2 shows a second embodiment in which the two sheets 10, 20 are sealed on opposite sides of the frame member 200. In such a case there is no seal between the two sheets 10, 20 but a first seal 250 between the first 10 of the two sheets and the frame member 200 and a second seal 255 between the second 20 of the two sheets and the frame member 200. Also in this case the two seals can be made separately or in one single step. In such a case, if the article 30 is a food product, it may be necessary that the frame member 200 has the same physical properties with regard to permeability to oxygen, puncture resistance, sealability, meat adhesion etc. as the two sheets 10, 20. In a preferred embodiment however, the frame member is perforated in the surface thereof facing the packaged product in such a way that it may absorb the liquids possibly released by the food product. In a more preferred embodiment it may also comprise an outer gas-barrier shell perforated in the surface facing the product and an inner zone containing an absorbing material in order to absorb and retain the possible drip.

[0025] A further alternative arrangement is illustrated in Figure 3. In this third embodiment, the frame member 300 comprises two elements 310, 320. In the embodiment illustrated, the first element 310 and second element 320 are the same though this is not necessarily the case. The preferred method of forming the packaging is to seal the two sheets 10, 20 and to attach the first 310 and second 320 elements of the frame member 300 in one operation. This is done by positioning the two sheets 10, 20 on opposite sides of the article 30 and positioning the first and second elements 310, 320 of the frame member 300 around the article 30 and opposite one another on either side of the two sheets 10, 20. In this way the first element 310 only contacts the outer side of the first sheet 10 and the second element 320 only contacts the outer side of the second sheet 20. In this embodiment, the seal 350 between the two sheets 10, 20 may be made as an easy peel interface such that the packaging may be easily opened. The easy peel interface is manufactured in a manner conventional in the art by suitably selecting the resins used in the sheets 10 and 20. While in an easy-to-open package the seal between these two sheets should be readily opened by hand the seals between the sheets and the frame members should be unaffected. There are several mechanisms by which the easy openability can be achieved in the package of the invention. In a first one, this is obtained by suitably selecting the innermost sealing layers of sheets 10 and 20 so that upon application of a limited force they separate at their interface ("peel" one from the other). This can be obtained by suitably selecting resins or resin blends for said sealing layers of a sufficiently different chemical nature. In a second mechanism this is achieved by using in at least one of the sheets a thin innermost sealing layer and an adjacent layer of a thermoplastic material suitably selected in such a way that the bond between the sealing layer and said adjacent layer is very low. A typical example is a system where either sheet 10 or 20 or both comprises a very thin layer of polyethylene- as the innermost sealant - adjacent to a polyamide surface. The force exerted to open the package breaks through the thin polyethylene sealing layer and the low bond between polyethylene and polyamide then permits delamination between these two layers to take place leading to opening up of the package. In a third mechanism, the desired easy openability is obtained by using in the innermost seal layer, or in the layer adjacent to a very thin seal layer, of at least one of the sheets 10 and 20, a resin blend that has a low cohesive strength. In such a case the force exerted to open the package will break said layer along a plane parallel to the layer itself, with or without prior breakage of the thin sealing layer, to give the easy opening up of the package.

[0026] A fourth embodiment of packaging is illustrated in Figure 4. In this embodiment the frame member 400 comprises a first element 410 and a second element 420. The first element 410 is formed with a recess 415 in an internal surface. The second element 420 has a jamming portion 425 which fits in the recess 415. The two sheets 10, 20 are positioned around the article 30 and a seal 450 (which may be an easy-peel seal) is formed between the two sheets 10, 20 and the second sheet 20 is attached to the jamming portion 425 in the same step. Next the jamming portion 425 is jammed in the recess 415 and the first element 410 is sealed to the first sheet 10. Alternatively, the article 30 is placed between the two sheets 10, 20 and the edges of the two sheets 10, 20 are positioned in the recess 415 and the jamming portion is used to jam the peripheral edges of the two sheets 10, 20 into the recess 415. Then the two sheets 10, 20 are sealed to one another and the second sheet 20 is sealed to the jamming portion 425 and the first sheet 10 is sealed to the recess 415 in the same step. In both methods of the fourth embodiment, the packaging is subjected to elevated temperature after the two elements 410, 420 and the two sheets 10, 20 are all sealed together such that the flexible shrinkable material, of which one or both of the two sheets 10, 20 are comprised, shrinks. Because the periphery of the sheets 10, 20 is jammed in the recess 415 a shrink tension develops in the sheets 10, 20 comprised of the flexible shrinkable material, thereby suspending the article 30 in the frame member 400. The frame member 400 is

reusable once the packaging has been opened to reseal the article in the packaging by the consumer.

[0027] Figure 5 shows a fifth embodiment which is a variation of the third embodiment. In the fifth embodiment the frame member 500 is also comprised of a first element 510 and a second element 520. However, the first element 510 and the second element 520 are not identical. The first element 510 has, in a first surface substantially parallel to the sheets 10, 20, a protrusion 515. This protrusion is dimensioned to fit in a recess 525 formed in a surface of the second element 520 substantially parallel to the two sheets 10, 20 and opposite the first surface. In this way a plurality of packaged articles may be stacked as is illustrated.

[0028] Because of the flexible nature of the packaging, a plurality of packages may be wound on a reel or folded in strips if so desired. Of course all of the embodiments illustrated may comprise features of the other embodiments. For example, all of the embodiments may have one of the two sheets 10, 20 formed of a semi-rigid material and may have the various steps of forming a seal, attaching the sheets to the frame member and shrinking performed at the same time or in separate operations. The article 30 may, in all cases, be packaged in a modified (preserving) atmosphere usually an inert gas of, for example, carbon dioxide. This may be accomplished by gas flushing (with, for example, nitrogen) between the sheets to expel any oxygen before injecting the modified atmosphere. Gas flushing may also be carried out with the modified atmosphere or at least a partial vacuum may be formed between the sheets prior to injecting the modified atmosphere instead of gas flushing.

Claims

1. A method of packaging an article (30) comprising the steps of:

   positioning two sheets (10, 20) on opposite sides of said article (30), at least one of said two sheets (10, 20) being comprised of a flexible shrinkable material;
   sealing between said two sheets around said article (30) by forming at least one seal (150; 250, 255; 350; 450); and
   attaching said two sheets (10, 20) substantially along said at least one seal (150; 250, 255; 350; 450) to a frame member (100; 200; 300; 400; 500) such that said frame member (100; 200; 300; 400; 500) surrounds said article (30).

2. A method according to claim 1, further comprising the step of shrinking said shrinkable material thereby to suspend said article in said frame member (100; 200; 300; 400; 500) under tension forces which are developed in said shrinkable material because of being constrained by said frame member (100; 200; 300; 400; 500).

3. A method of claim 2, wherein said step of shrinking occurs simultaneously with said step of sealing.

4. A method according to claim 2 or 3, wherein said step of shrinking includes subjecting said shrinkable material to an elevated temperature.

5. A method according to claim 4, wherein said step of shrinking also includes cooling said shrinkable material from said elevated temperature.

6. A method according to any one of the preceding claims, wherein both of said two sheets are comprised of a shrinkable material.

7. A method according to any one of the preceding claims, wherein said step of sealing and said step of attaching are performed simultaneously.

8. A method according to any one of the preceding claims, wherein said step of attaching comprises attaching said frame member (100) on one side of one of said two sheets (10, 20) only.

9. A method according to any one of claims 1 to 7, wherein said steps of attaching and sealing comprise inserting said frame member (200) between said two sheets (10, 20) and attaching said two sheets (10, 20) on opposite sides of said frame member (200).

10. A method according to any one of claims 1 to 7, wherein said frame member (300) comprises two elements (310, 320) and said step of attaching comprises attaching each of said two elements (310, 320) facing one another on one side of different ones of said two sheets (10, 20).

11. A method according to any one of claims 1 to 8, wherein said frame member (400) comprises two elements (410, 420), and said step of attaching comprises inserting peripheral edges of said sheets (10, 20) into a recess (415) in a first (410) of said two elements and inserting at least a part (425) of a second (420) of said two elements into said recess (415) thereby to jam said peripheral edges into said recess (415).

12. A method according to any one the preceding claims, wherein said frame member (500) has a first surface, substantially in the same plane as said two sheets (10, 20), having a recess (525) and said frame member (500) has a second surface, substantially in the same plane as said sheets (10, 20) and opposite said first surface, having a protrusion (515) wherein two of said frame members (500)

may be positioned one on top of another with said respective protrusion (515) engaging said recess (525).

13. A method according to any one of the preceding claims, wherein said shrinkable material comprises a heat sealing layer suitable for sealing to itself and said frame member (100, 200, 300, 400, 500).

14. A method according to any one of the preceding claims, wherein said step of sealing comprises forming at least partly around said article (30) an easy peal seal (350, 450).

15. A method according to any one of the preceding claims, further comprising the step of injecting a modified atmosphere between said sheets (10, 20).

16. A method according to claim 15, further comprising the step of forming at least a partial vacuum between said two sheets (10, 20) prior to injecting the modified atmosphere.

17. A method according to claim 15, further comprising the step of gas flushing between said sheets (10, 20) prior to injecting the modified atmosphere.

18. A method according to any one of the preceding claims, wherein said frame member (100; 200; 300; 400; 500) has a rigidity sufficient to withstand distortion forces generated during shrinking of said shrinkable material.

19. A packaging and an article (30), said packaging comprising:

two sheets (10, 20), at least one of which is comprised of a shrinkable material, positioned on opposite sides of said article (30); and a frame member (100; 200; 300; 400; 500) provided surrounding said article (30); wherein said two sheets are sealed around said article with at least one seal (150; 250, 255; 350; 450) and are attached to said frame member (100; 200; 300; 400; 500) substantially along said at least one seal (150; 250, 255; 350; 450).

20. A packaging and an article according to claim 19, wherein said heat shrinkable material has been shrunk thereby suspending said article (30) in said frame member (100; 200; 300; 400; 500) under tension forces developed in said shrinkable material because of being constrained by said frame member (100; 200; 300; 400; 500).

21. An apparatus according to claim 19 or 20, wherein said frame member (100) is attached to one side of one of said two sheets (10, 20).

22. An apparatus according to claim 19 or 20, wherein said frame member (200) is attached between said two sheets (10, 20), said two sheets being sealed on opposite sides of said frame member (200).

23. An apparatus according to claim 19 or 20, wherein said frame member (300) comprises two elements (310, 320) opposite one another on one side of a different one of said two sheets (10, 20).

24. An apparatus according to claim 19 or 20, wherein said frame member (400) comprises two elements (410, 420), and peripheral edges of said sheets (10,20) are inserted in a recess (415) in a first (410) of said two elements, and at least a part (425) of said second (420) of said two elements is inserted in said recess (415) thereby jamming said peripheral edges in said recess (415).

25. An apparatus according to any one of claims 19 to 24, wherein said frame member (500) has a first surface substantially in the same plane as said sheets (10,20), having a recess (525) and said frame member (500) has a second surface, substantially in the same plane as said sheets (10,20) and opposite said first side, having a protrusion (515), wherein two of said frame members (500) may be positioned one on top of another with said respective protrusion (515) engaging said recess (525).

26. A method according to any one of claims 1 to 18 or a packaging and an article (30) according to any one of claims 19 to 25, wherein said article (30) is a food product.

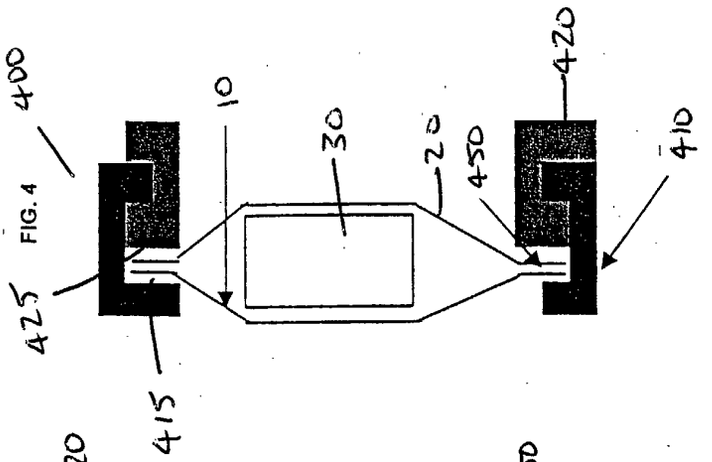


FIG. 4

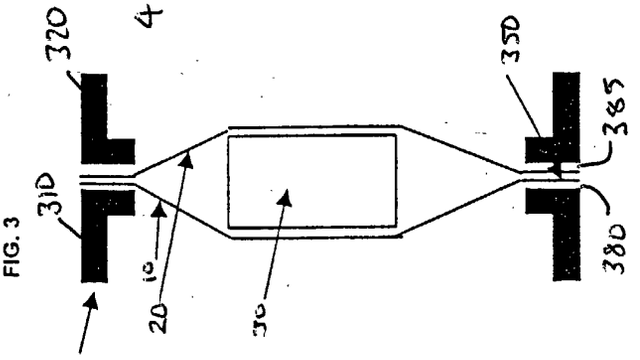


FIG. 3

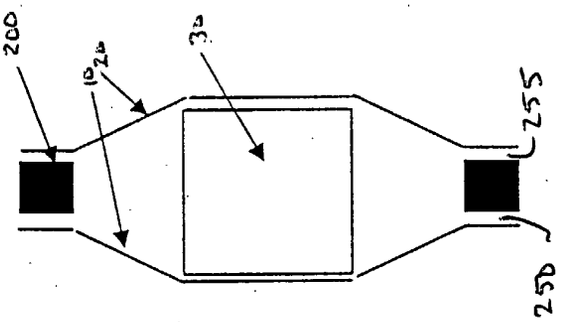


FIG. 2

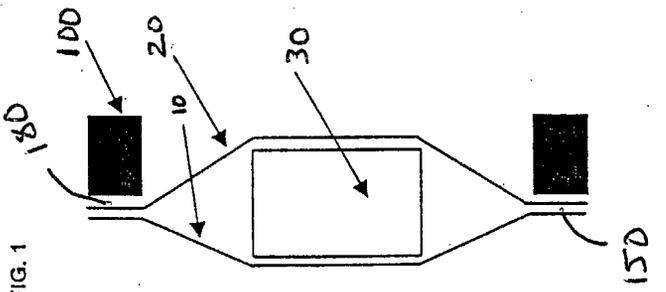
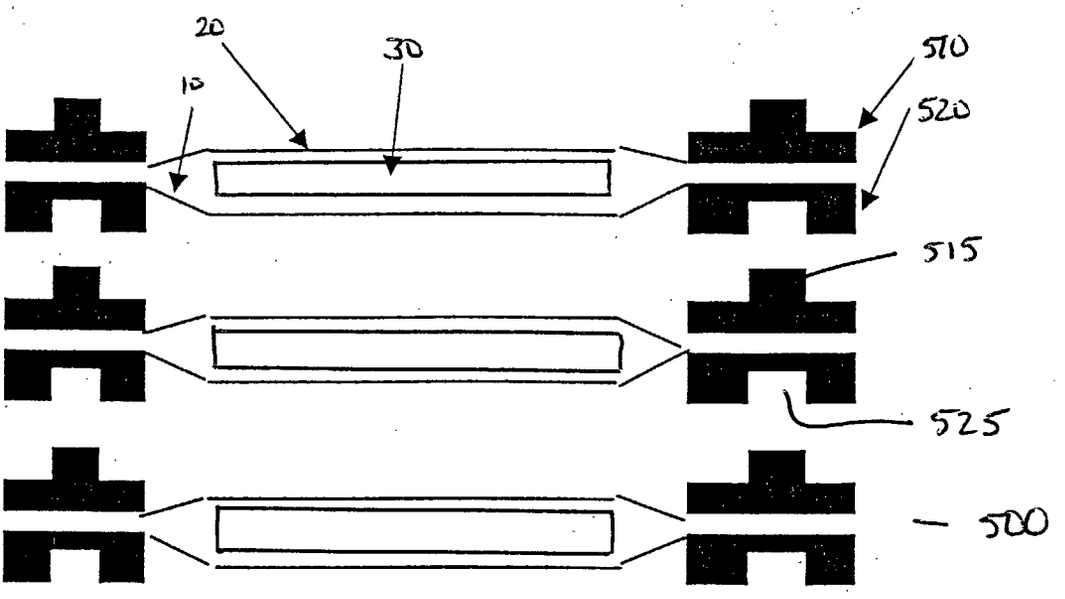


FIG. 1

FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 01 30 7548

DOCUMENTS CONSIDERED TO BE RELEVANT

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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	1 November 2001	Papatheofrastou, M

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 01 30 7548

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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