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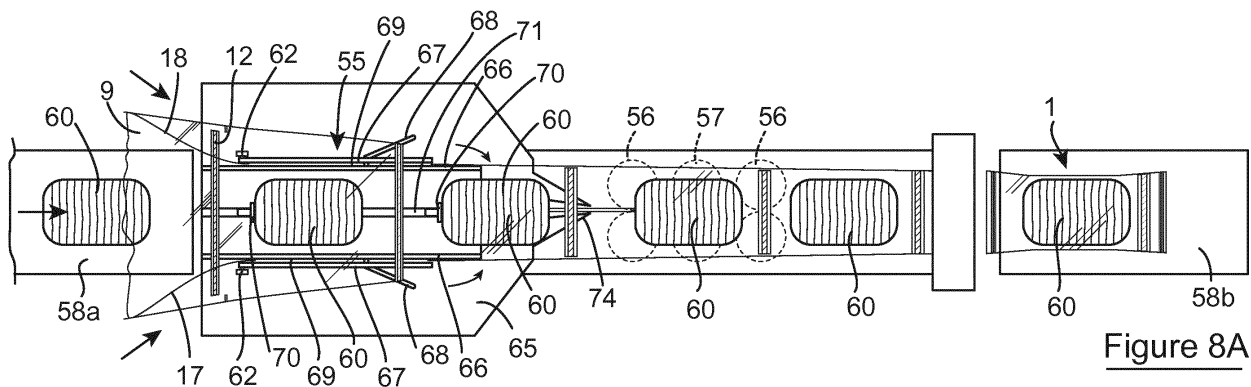
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(54) **METHOD OF PACKAGING**

(57) A method of continuous packaging comprising: providing a continuous sheet (9) of wrapping material (11) the sheet having sides (17, 18); moving the continuous sheet of wrapping material in a continuous manner; folding the continuous sheet of wrapping material so that the sides thereof overlap to form an (elongate) tube shape (20); joining the sides together to form an (elongate) tube; inserting a product (60) to be packaged into the (elongate) tube; cutting and sealing the wrapping ma-

terial forming the (elongate) tube on opposite sides of the product so as to form individual packs (1), wherein the continuous sheet of wrapping material is provided with successive strips (12) of projections with enlarged heads (13); wherein the strips are folded over with folding of the sheet and further wherein opposing parts of successive strips together form recloseable seals for successive individual packs.



Description

Field of the Invention

[0001] The present invention relates to a method of packaging.

Background to the Invention

[0002] It is desirable in many applications, such as in the food industry, to provide packaging which is resealable. Providing resealable packaging is advantageous because after the packaging has initially been opened it can be resealed. Articles that tend to deteriorate in quality (for example foodstuffs that go off) when exposed to the atmosphere, and in particular air, will have a better shelf-life if the packaging in which they are held is resealed after it has been opened.

[0003] Many types of resealable packaging is used. For example, some products are placed into a bag with a resealable mouth. This type of packaging is less cost-efficient because it takes more time and considerably more effort within the context of an automated packaging process to place a product within a bag and then close the bag. One solution, is to provide a resealable mouth at one end of the pack but to insert the contents into the bag from the other (bottom) end and then seal the bottom end of the bag closed. However, while this avoids the necessity to open and reclose the resealable seal, it is still time-consuming and not cost effective.

[0004] Products may be packaged using a flow wrap package solution. Typically the packaging is sealed by jaws that bring sides of the packaging together and seal them closed against each other. They may be sealed closed with adhesive or heat sealed, typically by heating the material sufficiently so the sides stick to each other. This may be achieved by a least partially softening the material so that it sticks to itself.

[0005] Typically in a flow wrap solution, a web of packaging material is utilised. The packaging material is folded back upon itself to form a tubular shape. Typically that tubular shape runs across and to the outside of a forming or folding box which is a hollow former. The product is passed through the inside of folding box. In this way the product is inside the tube of material which will form the packaging. After the product has been inserted the tube of material is sealed on either side of the product and the material is cut so that individual (closed and sealed) packs are formed. One such package is shown in European patent publication EP1 477 425.

[0006] Typically, in a flow wrap package solution, once the product has been sealed within a package, then the package must be ripped, or the seal must be broken, in order to access the contents of the package. Once this is done, it is not possible to reclose the package. The opening of the package is non-reversible. Some closure means which is independent of the packaging must then be employed to hold the packaging closed. Such a pack-

age is considered to be a non-resealable package. Such a seal is considered to be a permanent, non-recloseable, or a non-resealable seal.

[0007] Solutions to this issue have been considered and commercially available solutions include packaging that has both a resealable seal and a non-resealable seal. Typically, in a flow wrap process, a package is provided with both a resealable seal and a non-resealable seal. For example, it is known to provide packaging, for example packaging for bread, that has two non-resealable seals on opposing ends (for example the top and bottom) of the pack. In addition to the two non-resealable seals a resealable seal is provided. Typically it is provided inside relative to, and proximate, one of the non-resealable seals. When it is desired to open the package a non-resealable seal is detached, for example by tear-off (optionally along a pre-formed tear-off perforation) or by cutting. This leaves the package with the non-resealable seal at one end and a resealable seal at the other. It will be appreciated, that the resealable seal can be opened, product can be removed or re-inserted, and the resealable seal can then be re-closed.

[0008] An example of such a package is a flow wrap package which has been formed from a web of material that has been firstly folded into a tube shape, for example by passing across a folding box, and then joined to itself along (its sides in) an overlap region or (elongate) spine to form a (elongate) tube. The product for insertion into the package is passed into the tube thus formed, for example by passing it through the inside of the folding box. It is necessary however to pause the flow wrapping process to allow for insertion of the resealable seal. In a separate step, and using a mechanism (which is additional to that required in a flow wrap process that does not involve a resealable seal,) the resealable seal is inserted into the (elongate) tube of packaging material. Typically it is inserted as a strip which is in the direction across or transverse to the direction of movement of the (elongate) tube. The resealable seal is then joined to the packaging material. As above, the tube of packaging material is closed and sealed to form individual packs with the product therein. Each pack has two non-resealable seals on opposing ends (for example the top and bottom) of the pack. In addition to the two non-resealable seals the resealable seal is provided. This pack may be opened as described above and also resealed/closed as described above.

[0009] In such constructions the resealable seal often takes the form of a seal of a type sold under the brand name Ziploc™. Such a seal has opposing and reversibly interlocking strips of plastics material. Typically one strip forms an elongate female part such as a groove and the other forms an elongate male part such as a ridge. The two strips reversibly mate when pressed together. The mating of the two parts forms a reversible seal. The strips can also be pulled apart to open the seal again. So in a construction of a package, one strip is provided along one side of the mouth of the package and the other strip

is provided on the opposing side. The two strips are aligned for mating. When the two strips are mated along their length, a reversible seal is formed. Pressing the two mating parts together can be done by a continuous sliding motion in the manner of zip. To open they may simply be pulled apart.

[0010] Notwithstanding the current state of the art, it is desirable to provide alternative methods of packaging which are suitable for use in a flow wrap process and which provide a resealable package.

Summary of the Invention

[0011] In one aspect, the present invention provides a method of continuous packaging comprising:

- (i) providing a continuous sheet of wrapping material the sheet having sides;
 - (ii) moving the continuous sheet of wrapping material in a continuous manner;
 - (iii) folding the continuous sheet of wrapping material so that the sides thereof overlap to form an (elongate) tube shape;
 - (iv) joining the sides together to form an (elongate) tube;
 - (v) inserting a product to be packaged into the (elongate) tube;
 - (vi) cutting and sealing the wrapping material forming the (elongate) tube on opposite sides of the product so as to form individual packs,
- wherein the continuous sheet of wrapping material is provided with successive strips of projections with enlarged heads; wherein the strips are folded over with folding of the sheet and further wherein (after folding over) opposing parts of successive strips together form recloseable seals for successive individual packs.

[0012] The method of the invention is an HFFS method - a horizontal-form-fill-seal method. It is a horizontal flow wrapping process. This is distinct from the other commonly used method VFFS (vertical-form-fill-seal).

[0013] With the method of the present invention is no longer necessary to employ the additional step of separately providing, for example (independently) inserting, the resealable seal during the flow wrapping process.

[0014] The strips of enlarged head projections are upstanding with the enlarged heads at the top thereof.

[0015] The term enlarged head projection(s) is used to refer to a projection that has an upstanding leg and the top of the leg is an enlarged head (enlarged relative to the cross-sectional area of the leg). It includes heads that are both round, for example of a pinhead shape, and others that have other shapes enlarged heads including a flat or angular surface on its base for example in a mushroom head. The head may form one or more angular projections, for example one or more barbs. Enlarged head projections that are suitable for use with the present

invention reversibly interengage with (reversibly catch) other enlarged head projections of the same type in order to provide a recloseable seal.

[0016] The enlarged head projections when arranged opposite each other and meshed together releasably interengage thus providing the recloseable mechanism.

[0017] It will be appreciated that the strips of enlarged head projections are each formed by an array of projections. The enlarged head projections are dimensioned and spaced so that one set of enlarged head projections mesh with another set of enlarged head projections when they are pushed together, for example meshing together.

[0018] The meshing together and interengagement provides a mechanism that operates in a manner similar to that of a hook and loop fastener. The projections engage together sufficiently to hold an individual pack closed. The projections can however be pulled part to open the pack when desired. And of course the opening and closing of the pack is repeatable.

[0019] The leg will typically be substantially perpendicular to the sheet of material before it is folded. Once folded, and at and proximate the folds, the legs may have a different orientation.

[0020] Using a folded over strip of enlarged head projections that mesh with each other to releasably interengage means that the same projections can be used on opposing sides of a recloseable seal. This contrasts with a Ziploc™ type arrangement, or a hook and loop fastener arrangement which require two different parts to achieve interengagement. In the case of a Ziploc™ type arrangement a male strip inserts into a female strip so that both male and female strips are required in order to provide a resealable seal. In the case of a hook and loop fastener both hooks and loops must be provided in order to provide a recloseable seal.

[0021] The enlarged head projection arrangement of the present invention therefore obviates the necessity to provide respective mating parts which differ from each other.

[0022] Furthermore, the enlarged head projection arrangement of the present invention is sufficiently flexible to allow folding over of the sheet. In this way, the folding over of each strip occurs with folding over of the sheet. Accordingly, the folding over action is used to create opposing enlarged head projections which can then be meshed together to provide a recloseable seal arrangement.

[0023] This can contribute to the simplicity of providing a recloseable seal. The recloseable seal can be provided on the sheet before it is folded. This contrasts for example with the method described above for providing recloseable seals, which (i) may involve at least temporarily pausing the wrapping process in order to (transversely) insert a recloseable seal; and (ii) only doing so after folding has taken place. With the method of the present invention there is no need to pause the wrapping process or to insert a recloseable seal as a separate step. Furthermore, there is no requirement to insert a seal from a

transverse direction. In addition, the recloseable seal is already in place and is carried by the sheet so there is no necessity to provide it later.

[0024] For example, this means that the sheet carrying the projections with enlarged heads can be folded over a folding box. This means that the method of the invention can be carried out as a continuous flow wrapping process, and in particular within a continuous horizontal flow wrapping process. The folding mechanism for example a folding box is desirably fitted with at least one rotatable member, for example wheels, rollers or bearings, across which a sheet of the invention travels. Rotatable members are desirably located on opposing sides of the folding mechanism for example on opposing sides of the folding box.

[0025] The tubular shape can be formed by folding about a folding box. The product can be passed through the inside of the folding box. (The sheet runs on the outside of the folding box and the product runs on the inside of the folding box. When running on the outside it is desirable that the sheet runs over at least one rotatable member as this may assist with ease of feeding and/or ease of folding of the sheet.) The sheet may be of a bottom sealing type where the sheet is fed from the bottom (relative to the article to be packed) or of the top sealing type where the sheet is fed from the top (again relative to the article to be packed.) In this way the product can be placed inside the tube of material which will form the packaging. After the product has been inserted the tube of material is sealed on either side of the product and the material is cut so that individual (closed and sealed) packs are formed.

[0026] Sealing will be done by catching the material between jaws and closing the jaws to close the material to form a seal. Typically, this will be done by way of heat sealing. Such sealing is a permanent seal, and once a permanent seal is broken, it is not resealable.

[0027] The wrapping for the individual packs will then typically have at least three seals. At one end of the pack it will have a permanent or non-reusable (transverse) seal. At the other end of the pack it will also have a permanent or non-reusable (transverse) seal. Located between the two (transverse) permanent seals there will be provided the recloseable seal of the invention (in a transverse orientation).

[0028] The product that is wrapped will be located between one permanent seal and the recloseable seal. This means that one permanent seal can be broken but the product is still protected by way of the recloseable seal. Typically the recloseable seal will be provided proximate a permanent seal.

[0029] Indications can be provided on the pack to a user to ensure that they break the permanent seal that has the recloseable seal between it and the product. A tear-off portion may be provided for removing the permanent seal that has the recloseable seal between it and the product. For example perforations may be provided that form a tear-off arrangement. Such perforations may

be provided by any suitable method including laser cutting.

[0030] It will be appreciated that a fourth seal which joins the two sides together will also typically be provided.

5 The sheet material is joined to itself along (its sides in) an overlap region or (elongate) spine to form a (elongate) tube. It will be appreciated that the seal which joins the two sides of the sheet together will typically run longitudinally (along the pack and thus in the same direction as the flow movement of the continuous sheet).

10 **[0031]** The method of the invention is suited to being carried out on an HFFS machine.

[0032] The strips of enlarged head projections run transversely (relative to the length of the continuous sheet) across the continuous sheet. They may run from one edge (on one side of the sheet) right across to the other edge (on the other side of the sheet). However it is desirable that the strip does not run up to either side and stops short of either side. In this way respective side margins are provided on respective side of the sheet, each side margin being free of enlarged head projections. Overlap of all or part of the side margins can then be placed in an overlapping arrangement. There are then no enlarged head projections to interfere with the overlapping of the sides. A longitudinal seal can thus be provided (without interference) to form the (elongate) tube.

25 **[0033]** Desirably there is a substantially uniform distribution of enlarged head projections across the sheet.

[0034] The enlarged head projections may be provided in a form in which they are carried on a carrier, for example a strip of plastics material, and the carrier (and thus the enlarged head projections) is fixed to the sheet before the sheet is utilised in the method of the invention.

30 **[0035]** Desirably the strip of plastics material on which the enlarged head projections are carried acts as a reinforcement, to prevent tearing of the packaging, upon opening, across the recloseable seal formed by the enlarged head projections.

35 **[0036]** The strip of plastics material may be attached to the sheet in any desirable manner. It may be heat welded onto the sheet. It may be laser welded onto the sheet.

40 **[0037]** The enlarged head projections may be provided on the sheet of material and the sheet of material may be provided in a roll form. The material is then unrolled from the roll during packaging.

[0038] It will be appreciated that the recloseable seal of the invention does not provide a true hermetic seal. However the (re-)closing of the pack which is achievable with the closable seal of the invention does substantially reduce the exposure of the product to the atmosphere/air.

50 **[0039]** Desirably the enlarged head projections when interengaged in the closed position will desirably be interdigitated. This means that the enlarged head projections form a barrier to the ingress of air.

55 **[0040]** It may be desirable to provide a number of rows of enlarged head projections. The rows can then be offset, for example progressively offset, relative to each other.

er to increase their barrier effect. For example there may be 3 to 10 rows, for example 5 to 8 rows.

[0041] Desirably there are about 20 to 60, such as 25 to 55, for example 35 to 45 for example about 40 to 44 enlarged head projections per cm². (When interengaged there will be approximately double that amount per cm².)

[0042] In order to improve the sealing arrangement achieved with a recloseable seal of the invention, in addition to the enlarged head projections, one or more additional sealing barriers may be provided. For example one or more interdigitating elongate ribs may be provided. Where a carrier is provided for the enlarged head projections the interdigitating elongate ribs may also be provided on the carrier.

[0043] Like the enlarged head projections, the interdigitating elongate ribs may be provided on strips. The elongate ribs run (transversely) across the sheet of wrapping material. (There will be at least one set of elongate ribs arranged on the sheet for the respective parts of the sheet that form individual packs). When the sheet of wrapping material is folded so too are the elongate ribs. They are then arranged so that they are opposite each other. This means that the same ribs on opposite sides can interdigitate.

[0044] Desirably more than one series of interdigitating elongate ribs is provided. In particular, it is desirable to provide interdigitating elongate ribs on opposing sides of the enlarged head projections so that there is an additional seal mechanism either side of the enlarged head projections.

[0045] Desirably there are at least two elongate ribs which when folded over interdigitate with each other. Desirably at least two elongate ribs are provided on opposing sides of the enlarged head projections. Desirably at least four elongate ribs are provided on opposing sides of the enlarged head projections. Desirably at least five elongate ribs are provided on opposing sides of the enlarged head projections. For example six elongate ribs may be provided on opposing sides of the enlarged head projections.

[0046] The method of the invention may be run on a horizontal flow wrap machine that

- (i) feeds the continuous sheet of wrapping material in a continuous manner; optionally by drawing the wrapping material from a roll of wrapping material;
- (ii) folds the continuous sheet of wrapping material, optionally about a box former, so that the sides thereof overlap to form the tube shape;
- (iii) joins, for example heat welds, the sides together to form a tube;
- (iv) moves conveys a product to be packaged into the tube, optionally by conveying the product through a folding box, and
- (v) cuts and seals the wrapping material forming the tube on opposite sides of the product so as to form individual packs with the product inside the wrapping material.

[0047] The invention extends to a method substantially as described herein with reference to and/or as illustrated in the accompanying drawings.

5 **Brief Description of the Drawings**

[0048] It will be noted that the drawings are schematic in nature and are drawn to different scales for the purposes of ease of illustration. Furthermore some drawings show omit the product that is being packed into individual packs for purposes of ease of illustration.

[0049] Embodiments of the invention will be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a roll of wrapping material provided with successive strips of projections with enlarged heads that can be used in a continuous method of forming packaging according to the invention;

Figure 2 is a perspective view of a piece of wrapping material forming part of the roll of Figure 1 that can be folded to form a (elongate) tube shape;

Figure 3 is an enlarged plan view (from above) of part of the roll of Figure 1 showing in more detail a strip of projections with enlarged heads;

Figure 4 is an enlarged perspective view of part of the roll of Figure 1 showing in more detail a strip of projections with enlarged heads;

Figure 5 is an enlarged plan view (from above) of part of the roll of Figure 1 utilised to form a wrapping for an individual pack;

Figure 6 is a perspective schematic view of part of the roll of Figure 1 folded to form a tube;

Figure 7 is a schematic side view of a horizontal flow wrap process for forming individual packs in accordance with the method of the invention;

Figure 8A is a schematic plan view from above of a horizontal flow wrap process for forming individual packs in accordance with the method of the invention;

Figure 8B is a schematic plan view from above of a sheet being folded on a folding box;

Figure 8C is a series of schematic end views of showing the progressive folding of a sheet such as occurs across a folding box;

Figure 9 is a schematic view (with a sectional view of the wrapping along the direction of travel) being folded and sealed to itself to joins two sides of the wrapping together in an overlap region to form a (elongate) tube within a horizontal flow wrap process for forming individual packs in accordance with the method of the invention;

Figure 10 is a schematic view (with a sectional view of the wrapping in a direction transverse to the direction of travel) of cutting and sealing the wrapping material forming the (elongate) tube on opposite sides (of the product) so as to form individual packs

within a horizontal flow wrap process for forming individual packs in accordance with the method of the invention;

Figure 11 is a schematic view (with a sectional view of the wrapping in a direction transverse to the direction of travel) showing how one permanent seal can be broken (for example cut) and the recloseable seal can be opened to access product within the wrapping;

Figure 12 is a schematic view (with a sectional view of the wrapping in a direction transverse to the direction of travel) showing how the recloseable seal can be used to reclose the pack;

Figure 13 is a schematic plan view from below of a wrapping for a pack according to the invention;

Figure 14 is a schematic enlarged side view (with a sectional view of the wrapping in a direction transverse to the direction of travel) showing how enlarged head projections that are suitable for use with the present invention can (reversibly) interengage with other enlarged head projections of the same type in order to provide a closed seal that can be reopened;

Figure 15 is a schematic perspective view of an individual pack of the invention comprising packaging with a product inside and showing how one permanent seal can be broken (for example cut) to access product within the wrapping;

Figure 16 is a schematic perspective view of an individual pack of the invention comprising packaging with a product being removed from inside and showing how one permanent seal can be broken (for example cut) and the recloseable seal opened to access product within the wrapping; and

Figure 17 is a schematic perspective view of an individual pack of the invention comprising packaging with a product being re-inserted and showing how the recloseable seal can be reclosed to close the pack.

Detailed Description of the Drawings

[0050] **Figure 1** is a perspective view of a roll 10 of a continuous sheet 9 of wrapping material 11 provided with successive strips 12 of projections 13 with enlarged heads 14 (best seen in **Figures 3 and 4**) that can be used in a continuous method of forming packaging according to the invention. The sheet 9 is fed from the top (relative to an article to be packed) and it will be appreciated that the sheet 9 could also be fed from the bottom (relative to an article to be packed). Also provided are indexing marks in the form of print marks 15 which are used to correctly position the wrapping material 11 so that each individual pack 1 formed is correctly formed. It will be noted, for example from **Figure 13** that the indexing marks end up overlapped at either end of the pack 1.

[0051] **Figure 2** is a perspective view of a piece of wrapping material 11 forming part of the roll of wrapping

material 11 of **Figure 1** that can be folded, (as indicated by arrows 21 in **Figure 6**) to form an (elongate) tube shape 20. **Figure 6** is perspective schematic view of part of the roll of **Figure 1** folded to form a tube shape 20. As best indicated in **Figure 2** the part of the sheet 9 that forms the tube shape 20 is still part of the continuous roll 10 and has not been detached therefrom.

[0052] The strips 12 of enlarged head projections 13 run transversely (relative to the length of the continuous sheet 9) across the continuous sheet 9. They may run from one edge (on one 17 side of the sheet) right across to the other edge (on the other side 18 of the sheet). However, as shown it is desirable that a (or each) strip 12 does not run up to either side 17, 18 and stops short of either side 17, 18. As best seen from **Figure 5** and as indicated by respective broken lines 17a and 18a respective side margins 17b and 18b are provided on respective sides 17, 18 of the sheet, each side margin 17b, 18b being free of enlarged head projections 13. All or part of the side margins 17b, 18b can then be placed in an overlapping arrangement when the sheet 9 is folded to form the tube shape 20. There are then no enlarged head projections 13 to interfere with the overlapping of the sides. A longitudinal seal 30 can thus be provided (without interference) to join the overlapping sides margins 17b and 18b as shown in **Figure 6**. For example the overlapping side margins 17b and 18b may be joined by heat welding. Also provided on the sheet 9 are a series of tear-off perforations 16.

[0053] Again as best seen from **Figure 5** a part or portion 6 of the sheet 9 that will be formed into an individual package for a product is defined by a top or leading end 3, a bottom or trailing end 4 and the respective sides 17 and 18.

[0054] As indicated by respective broken lines 3a and 4a, respective end margins 3b and 4b are provided on respective ends 3, 4 of the sheet, each end margin 3b, 4b being free of enlarged head projections 13. All or part of the end margins 3b, 4b can then be placed in an overlapping arrangement to form respective permanent seals 40, 41 as will be described in more detail below.

[0055] It will be noted that the (four) indexing marks in the form of print marks 15 which are used to correctly position the wrapping material so that each individual pack 1 formed is correctly formed are provided one in each intersection of (the four respective intersections of) the side margins 17b, 18b with the end margins 3b, 4b.

[0056] As best seen from **Figures 3 and 4** the strips 12 of enlarged head projections 13 are provided in a form in which they are carried on a carrier in the embodiment a strip 19 of plastics material that has been attached to the sheet 9. In the embodiment the strip 19 (and thus the enlarged head projections 13) is fixed to the sheet 9 before the sheet 9 is utilised in the method of the invention.

[0057] The enlarged head projections are projections that have an upstanding leg 25 (best seen in **Figures 4 and 14**). At the top of the leg 25 is an enlarged head 14. In the form shown the heads 14 are in the form of angular

projections - two opposing barbs 26. It will be appreciated that the shape of the head is not so important provided that they provide sufficient interengagement for reclosing the pack 1. Heads that are both round, for example of a pinhead shape, and others that have other shapes enlarged heads including a flat or angular surface on its base for example in a mushroom head may be used. Enlarged head projections that are suitable for use with the present invention can reversibly interengage with other enlarged head projections of the same type in order to provide a recloseable seal 45 (see for example **Figure 13**).

[0058] Enlarged head projections 13 are arranged opposite each other and can thus be meshed together (as they will be as sheet 9 is folded) releasably interengage thus providing the recloseable mechanism. They face in opposite directions and their enlarged heads catch on each other. This is best seen in **Figure 14** where it can be seen that the barbs 26 on one set of heads 14 interengage with those on the set of heads 14 facing in an opposite direction. This catching /interengaging can be separated by a separating force.

[0059] It will be appreciated that the strips 12 of enlarged head projections 13 are each formed by an array of projections. The enlarged head projections 13 are dimensioned and spaced so that one set of enlarged head projections mesh with another set of enlarged head projections when they are pushed together, for example meshing together.

[0060] As described above the meshing together and interengagement provides a mechanism that operates in a manner similar to that of a hook and loop fastener. The projections 13 engage together sufficiently to hold an individual pack closed. The projections 13 can however be pulled part to open the pack 1 when desired. And of course the opening and closing of the pack 1 can be repeated many times.

[0061] The leg 25 will typically be substantially perpendicular to the sheet 9 of material before the sheet 9 is folded. Once the sheet 9 is folded, and proximate the folds, the legs may have a different orientation.

[0062] Using a folded over strip 9 of enlarged head projections that mesh with each other to releasably interengage means that the same projections can be used on opposing sides of a recloseable seal 45.

[0063] In order to improve the sealing arrangement achieved with a recloseable seal 45 of the invention, in addition to the enlarged head projections, one or more additional sealing barriers 32, 33 may be provided. The additional sealing barriers 32,33 are provided in the form of two separate sets of interdigitating elongate ribs 34,35. The interdigitating elongate ribs 34,35 may also be provided on the same carrier as the enlarged head projections 13 in this case on strip 19. In the drawings the ribs of the sealing barriers 32,33 are not shown in an interengaged position and are not used in the interengaged position. However it is appreciated that the ribs can be provided in a form in which they mate if so desired.

[0064] Like the enlarged head projections 13, the interdigitating elongate ribs may be provided in strips and as formed are part of strips 12. The elongate ribs 34,35 run (transversely) across the sheet 9 of wrapping material 11. When the sheet 9 of wrapping material 11 is folded so too are the elongate ribs 34,35. They are then arranged so that part of ribs 34 are opposite part of ribs 34 as best seen in **Figures 10, 12 and 14**. Similarly part of ribs 35 are opposite part of ribs 35. This means that the same ribs on opposite sides can interdigitate.

[0065] The distinct series of ribs 34 and 35 interdigitating elongate ribs on opposing sides of the enlarged head projections 13 so that there is an additional seal mechanism either side of the enlarged head projections 13. In the embodiment six elongate ribs are provided on opposing sides of the enlarged head projections 13.

[0066] So in the pack of the invention there are a series of barriers or seals. In the embodiment, for example as seen from **Figure 14** (and starting at the top or mouth of the recloseable pack 1) there is a permanent seal 40; an optional ingress barrier 32 (formed by elongate ribs 34); a recloseable seal provided by projections 13, a further optional ingress barrier 33 (formed by elongate ribs 35); and then a further permanent seal 41 (at the bottom of the pack 1).

[0067] The method of the invention is a horizontal flow wrapping process. It could be considered an HFFS method - a horizontal-form-fill-seal method.

[0068] **Figure 7** is a schematic side view of a horizontal flow wrap process/machine 50 for forming individual packs 1 in accordance with the method of the invention;

[0069] **Figure 8A** shows a view similar to that of **Figure 7** but as a schematic plan view from above. Referring now to **Figures 7; Figures 8A to 8C**, the roll 10 (c.f. **Figure 1**) is arranged to supply the sheet 9 in a web form across rollers 10a, 10b and 10c. The strips 12 are schematically indicated.

[0070] The sheet 9 is conveyed to the exterior of a folding box 55. It comes off the folding box in a tubular shape 20. It is folded upon itself and is joined to itself with a seal 30 as described above by way of seal forming nip rollers 57. It will be appreciated that jaws could be used instead of the rollers. Rollers 56 are conveying rollers that pull the sheet 9 through the machine and keep the sheet 9 taut for sealing movement through sealing rollers 57.

[0071] Meanwhile a product 60, for example bread, is moved along by a conveyor 58a into the folding box 55. In the folding box each product 60 is moved along by a lug 70 of a conveyor. The lugs 70 run in a track 71 defined in a base or support part 65 of the folding box 55. The lugs 70 are in a continuous loop and retract as the product emerges from the folding box and as the product is carried by the folded sheet 9.

[0072] As the sheet 9 is folded around the folding box 55 while the product 60 passes through it, this means that the product 60 emerges from the (inside of) the folding box 55 within the tubular shape 20 as shown. This is

done in a continuous manner so that a series of products 60 are wrapped in this way.

[0073] The sheet 9 is fed over the top of the folding box 55. The folding box 55 has opposing product guides 66 which form side guards to keep the product in the correct orientation. The folding box 55 has opposing film guides 67 which are parallel to and spaced apart from the product guides 66. Together the respective film guides 67 and the respective product guides 66 define two feed channels 69 through which the sheet 9 is fed. In particular as seen in **Figure 8A** the right edge 18 of the sheet 9 is fed into one channel 69 while the left edge 17 of the sheet 9 is fed into another channel 69 on the opposing side. The edges 17, 18 are fed down through the base 65 of the folding box through slots 68 defined therein. The sheet 9 is then fed out through a nose 74 and then progresses through the rollers 56, 57 and 56. The edges 17 and 19 are brought together through the narrowing of the fold box at nose 74 and are aligned so as to form a spine 30.

[0074] The sheet 9 comes off the folding box 55 in a tubular shape 20. It is folded upon itself and is joined to itself with a seal 30 as described above by way of seal forming rollers 57 which heat weld the sheet 8 to itself. This forms a closed tube 22. It will be noted that the sheet 9 is still continuous all the way from roll 10 to the formation of tube 22.

[0075] Then, utilising reciprocating jaws 53,54, the tube 22 so formed is closed by heat sealing to itself between each successive product 60. The jaws 53,54 cut and seal the wrapping material 11 forming the tube 22 on opposite sides of each product 60 so as to form individual packs 1 with the product 60 inside the wrapping material 11. The individual packs 1 are then conveyed away by a conveyor 58b for further handling.

[0076] **Figure 8C** illustrates well as steps (a) to (d) the folding progression of sheet 9. At step (a) the sheet 9 is in a substantially flat configuration. This will be its configuration at/close to the roll 10. As it moves over the folding box 55 it starts to get folded about the box (between the sheet guides 67 and the product guides 66 in the part of the progression shown in step (b). As the sides 17,19 are pulled through slots 68 the sheet begins to take the form shown in step (c). As the sheet emerges from the folding box (through nose 74) it takes the form of a tube 20 with a spine 30. The sides of the sheet forming the spine 30 can be heat sealed together. It will be appreciated that the sheet 9 is continuous so there will be a part of the sheet 9 in the configurations shown in **Figure 8C** at all times (and indeed some part of the sheet 9 will be in transition progressing between these configurations).

[0077] **Figure 9** is a schematic view (with a sectional view of the wrapping along the direction of travel) being folded and sealed to itself to joins two sides of the wrapping together in an overlap region to form a (elongate) tube within a horizontal flow wrap process for forming individual packs in accordance with the method of the

invention;

[0078] The result is a process that produces individual packs in a horizontal flow wrap apparatus, without requiring a separate step to insert a recloseable seal.

[0079] The packaging forming part of the individual packs takes the form shown in **Figure 13**, where it is shown without any product inside.

[0080] **Figures 9 to 12** show schematic views of how the wrapping is done. A product is omitted for ease of illustration.

[0081] **Figure 9** shows a schematic view (with a sectional view of the wrapping material 11 along the direction of travel) being folded and sealed to itself to joins two sides of the wrapping together in an overlap region to form a (elongate) tube 22 within a horizontal flow wrap process for forming individual packs in accordance with the method of the invention. As can be seen, the strips 12, overlay each other when the sheet 8 is folded. **Figure 10** shows the two permanent seals 40 and 41 being formed. This provides the closed and sealed arrangement of a pack 1 as described above.

[0082] **Figure 11** is a schematic view showing how, when one permanent seal 40 is removed, such as being broken, (for example cut such as by utilising a scissors 28,) then the recloseable seal 45 can be opened to access product within the pack. Where tear-off perforations 16 are provided it will be appreciated that the permanent seal can be removed by a user tearing it off along the perforations 16.

[0083] **Figure 12** illustrates how the recloseable seal 45 can be used to reclose the pack 1.

[0084] As already described above **Figure 14** shows the interengagement of the recloseable seal 45.

[0085] **Figures 15 to 17** show how a product 60 may be removed from a pack 1. As shown in **Figure 15** the pack 1 can be opened by removing the (top) permanent seal 40. The recloseable seal 45 is then opened and the product can be removed as indicated in **Figure 16**. **Figure 17** is a schematic perspective view of an individual pack of the invention comprising packaging with a product being re-inserted and showing how the recloseable seal 45 can be reclosed after the product is re-inserted to close the pack 1.

[0086] It will be appreciated that the usable life of the product 60 is increased when it is replaced in a pack which can be reclosed after each use.

[0087] The words "comprises/comprising" and the words "having/including" when used herein with reference to the present invention are used to specify the presence of stated features, integers, steps or components but do not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

[0088] It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention which are, for brevity, described in

the context of a single embodiment, may also be provided separately or in any suitable sub-combination.

Claims

1. A method of continuous packaging comprising:

- (a) providing a continuous sheet of wrapping material the sheet having sides;
- (b) moving the continuous sheet of wrapping material in a continuous manner;
- (c) folding the continuous sheet of wrapping material so that the sides thereof overlap to form an (elongate) tube shape;
- (d) joining the sides together to form an (elongate) tube;
- (e) inserting a product to be packaged into the (elongate) tube;
- (f) cutting and sealing the wrapping material forming the (elongate) tube on opposite sides of the product so as to form individual packs, wherein the continuous sheet of wrapping material is provided with successive strips of projections with enlarged heads; wherein the strips are folded over with folding of the sheet and further wherein opposing parts of successive strips together form recloseable seals for successive individual packs.

2. The method of Claim 1 wherein the enlarged heads have one or more angular projections, for example one or more barbs.

3. The method of any preceding claim wherein the sheet carrying the projections with enlarged heads is folded over a folding box.

4. The method of any preceding claim wherein the individual packs have at least three seals with a permanent seal at a first end of the pack a permanent seal at the other end and located between the two permanent seals a recloseable seal.

5. The method of Claim 4 wherein a fourth seal which joins the two sides together is provided.

6. The method of any preceding claim wherein the strips of enlarged head projections run transversely.

7. The method of any preceding claim wherein respective side margins are provided on respective side of the sheet, each side margin being free of enlarged head projections.

8. The method of any preceding claim wherein the enlarged head projections are provided in a form in which they are carried on a carrier, for example a

strip of plastics material.

9. The method of any preceding claim wherein in addition to the enlarged head projections one or more additional recloseable sealing barriers are provided.

10. The method of Claim 9 wherein said one or more additional recloseable sealing barriers is formed by one or more interdigitating elongate ribs.

11. A method according to any preceding claim wherein the sheet carrying the projections with enlarged heads is folded over a folding box which has fixed dimensions.

12. A method according to any preceding claim wherein during folding of the sheet, the sheet passes across at least one rotatable member.

13. A method according to Claim 12 wherein at least one rotatable member is arranged to assist with folding about the folding box.

14. The method of any preceding claim run on a horizontal flow wrap machine that

- (a) feeds the continuous sheet of wrapping material in a continuous manner; optionally by drawing the wrapping material from a roll of wrapping material;
- (b) folds the continuous sheet of wrapping material, optionally about a box former, so that the sides thereof overlap to form the tube shape;
- (c) joins, for example heat welds, the sides together to form a tube;
- (d) moves conveys a product to be packaged into the tube, optionally by conveying the product through a folding box, and
- (e) cuts and seals the wrapping material forming the tube on opposite sides of the product so as to form individual packs with the product inside the wrapping material.

15. A method of continuous packaging substantially as described herein with reference to and/or as illustrated in the accompanying drawings.

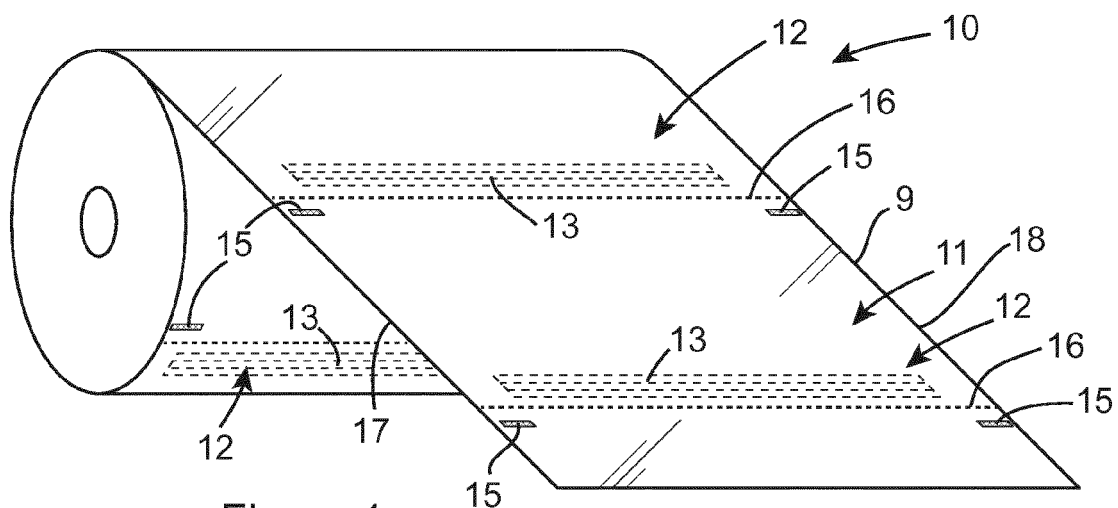


Figure 1

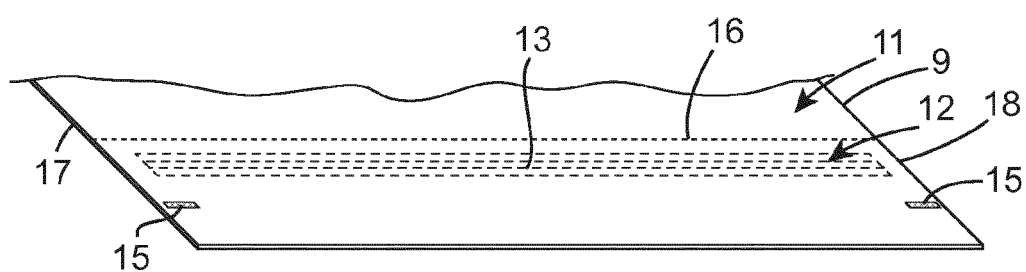


Figure 2

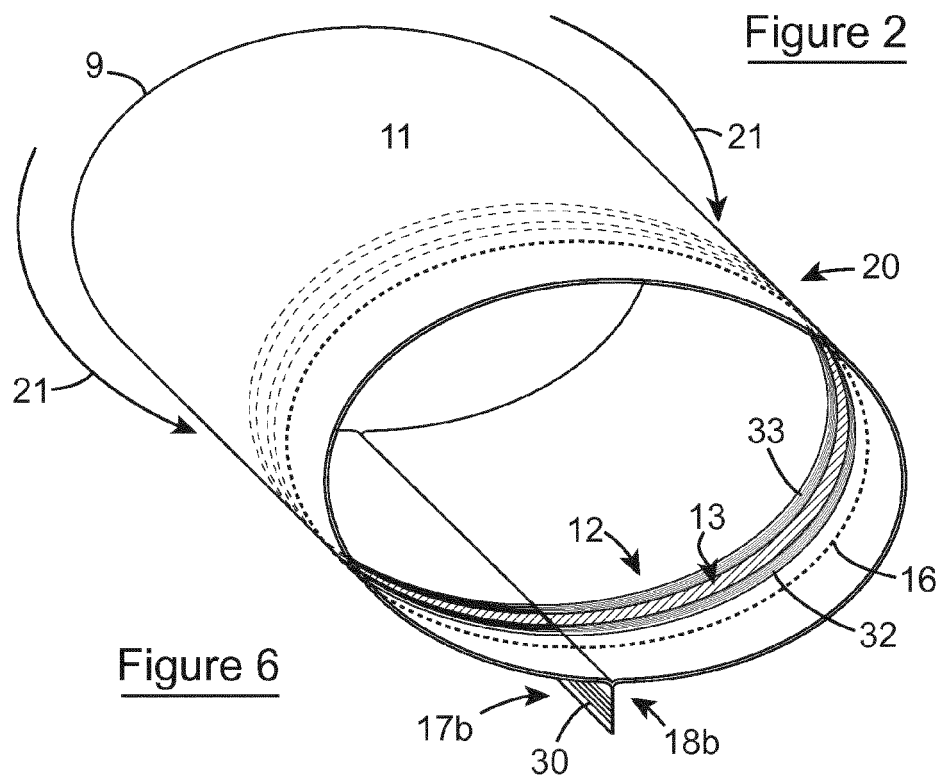


Figure 6

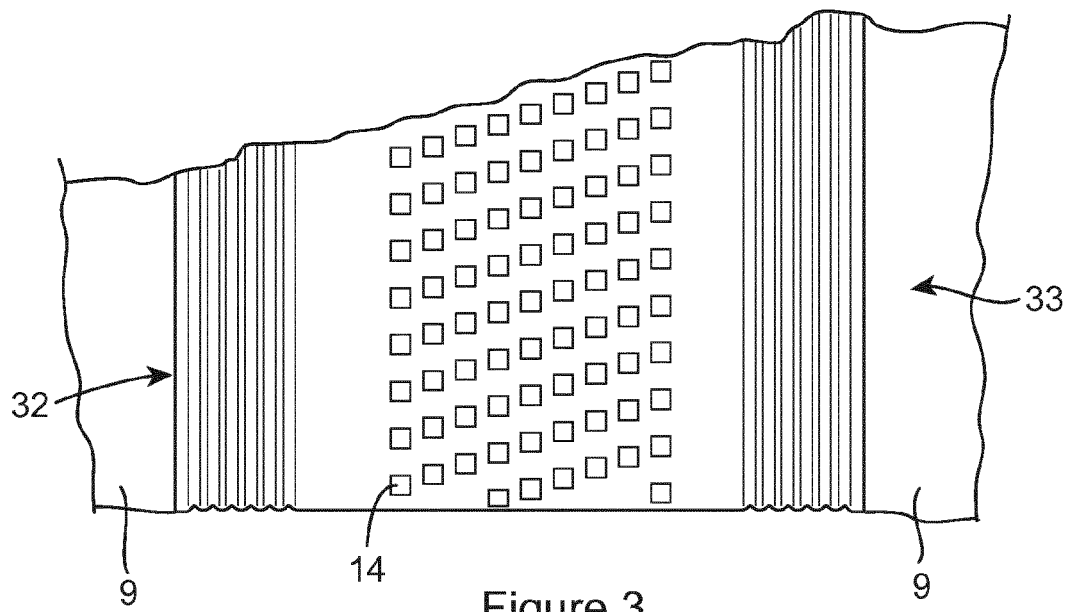


Figure 3

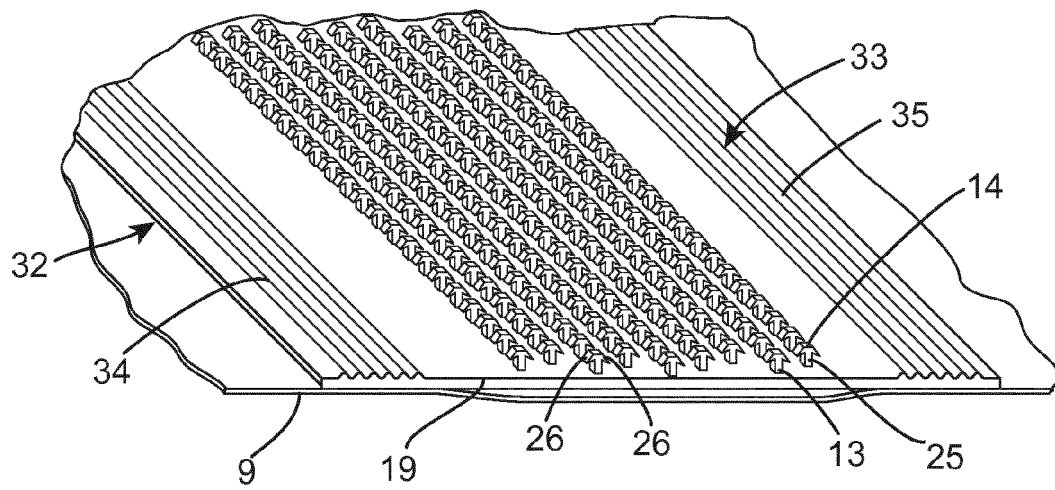


Figure 4

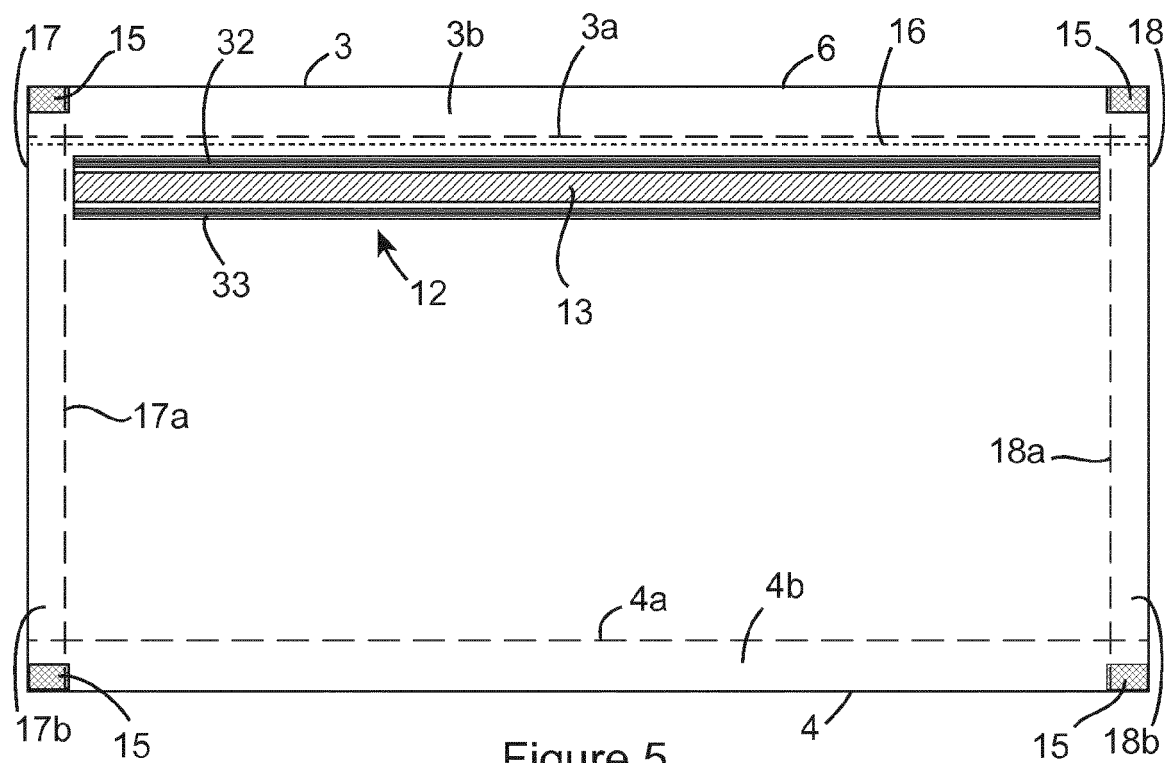


Figure 5

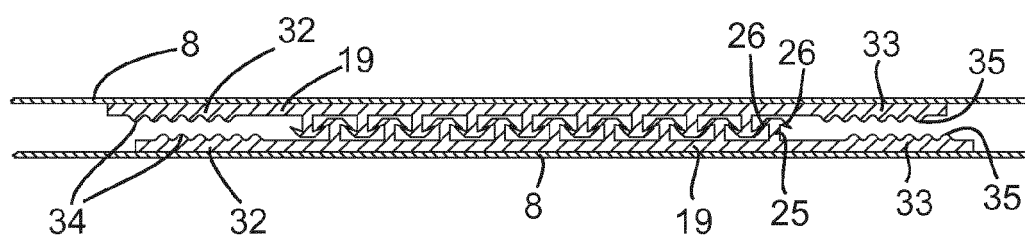


Figure 14

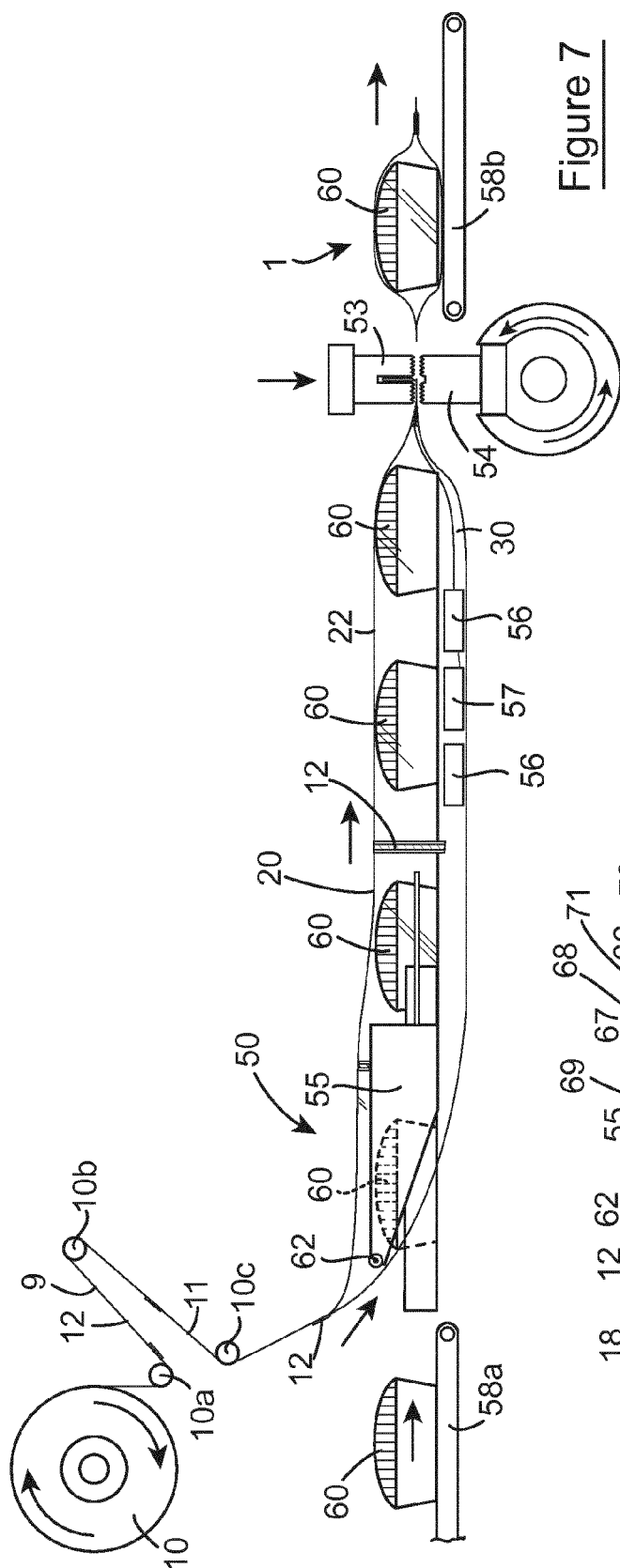


Figure 7

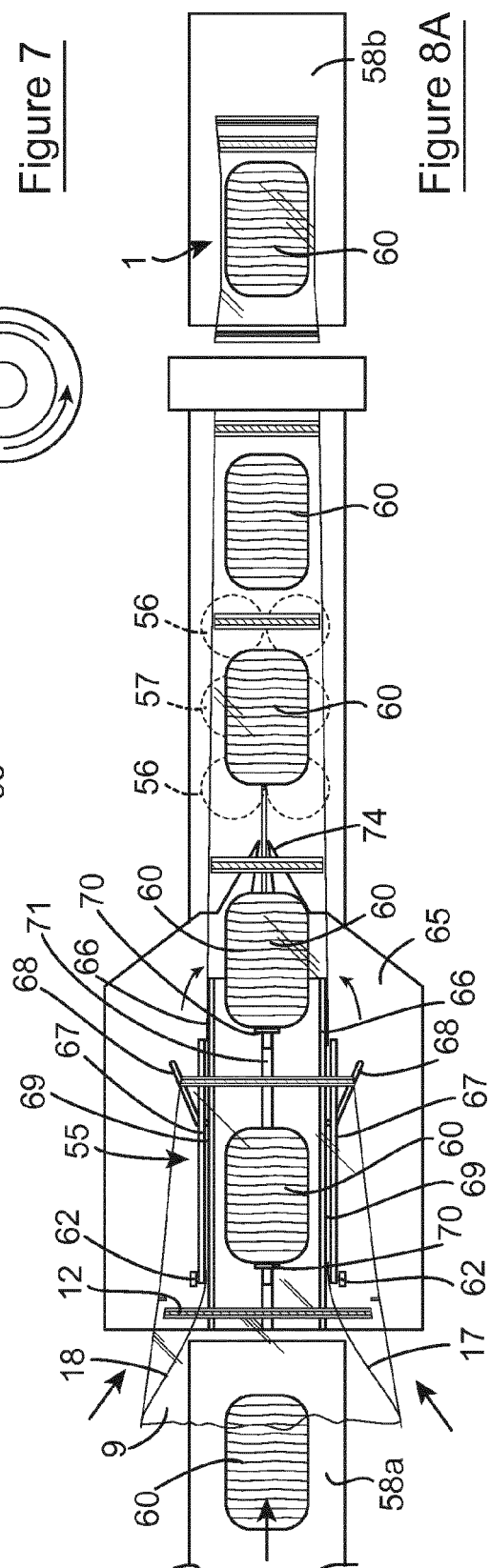
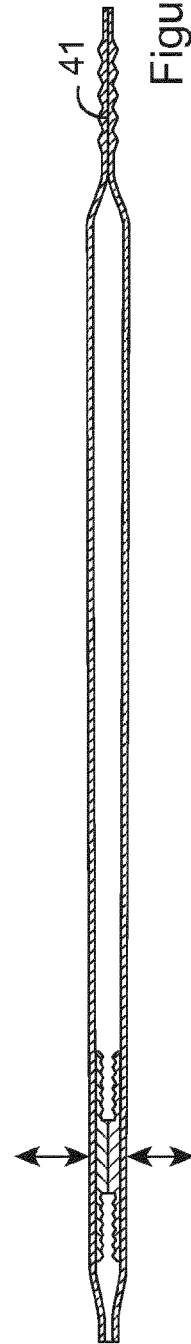
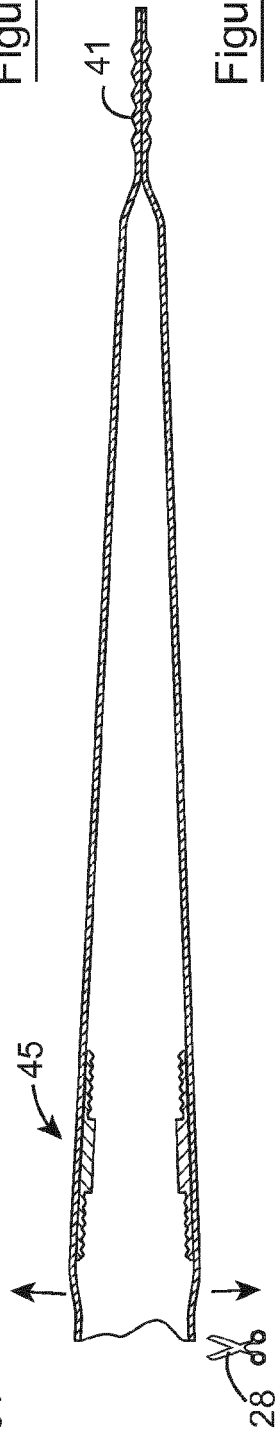
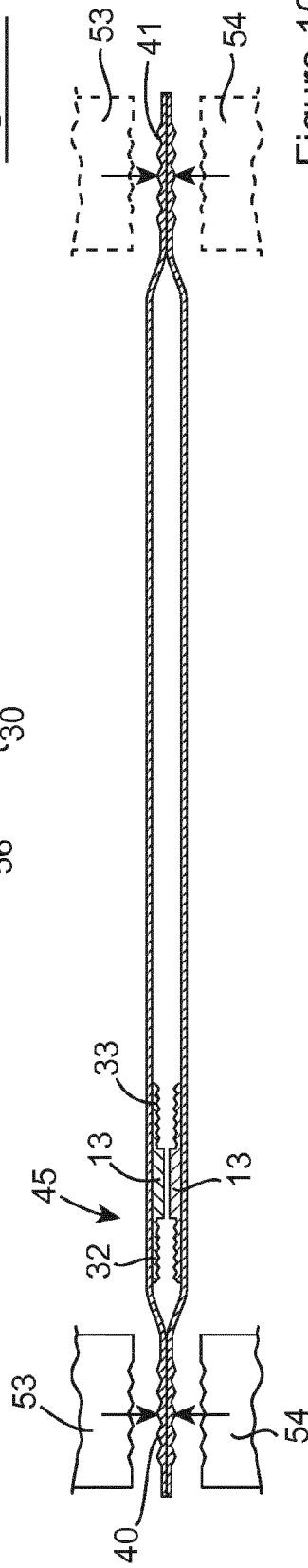
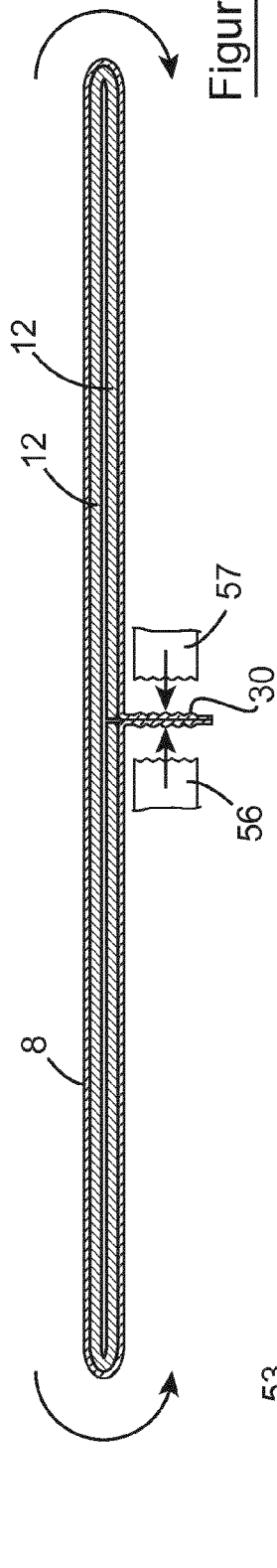


Figure 8A



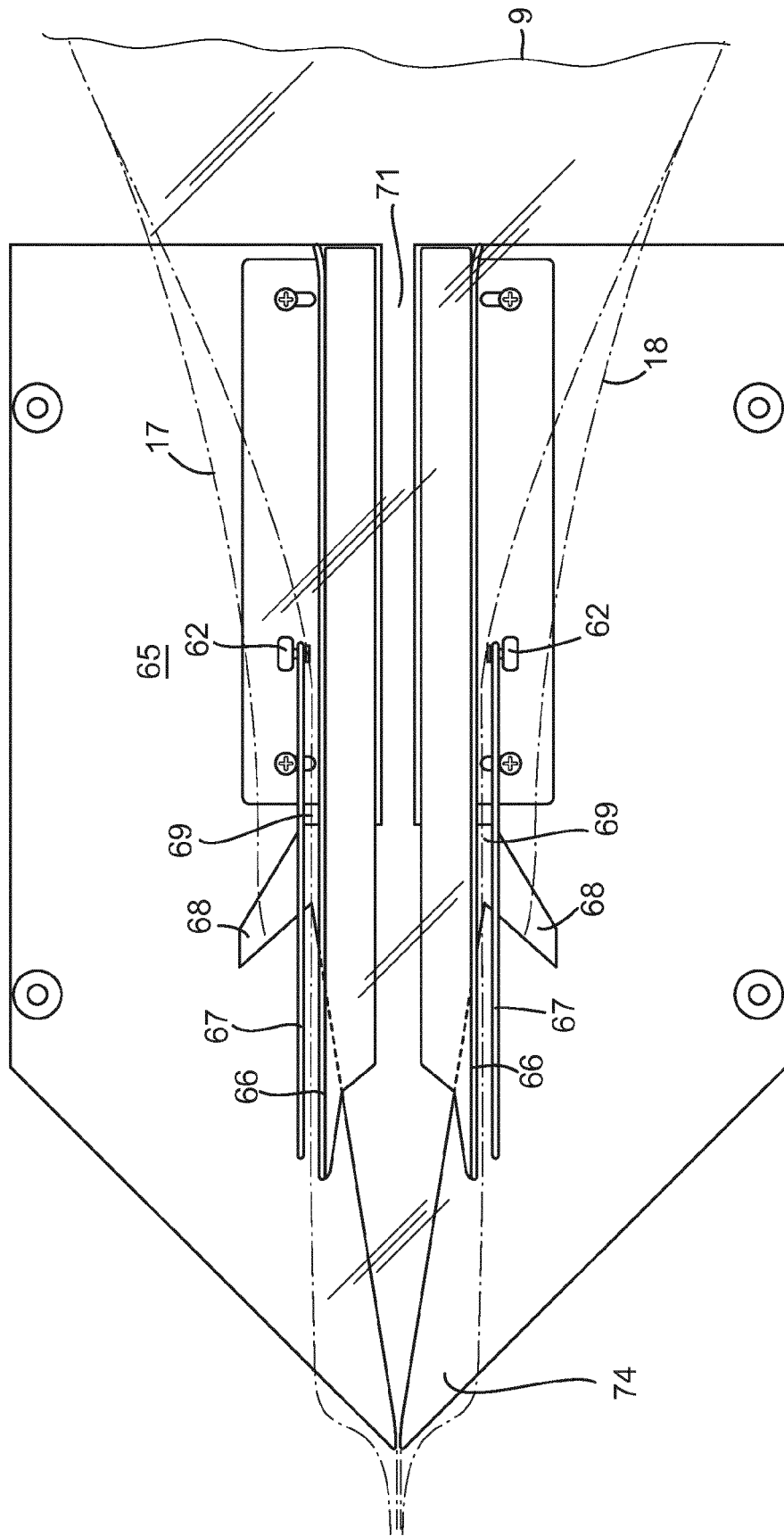


Figure 8B

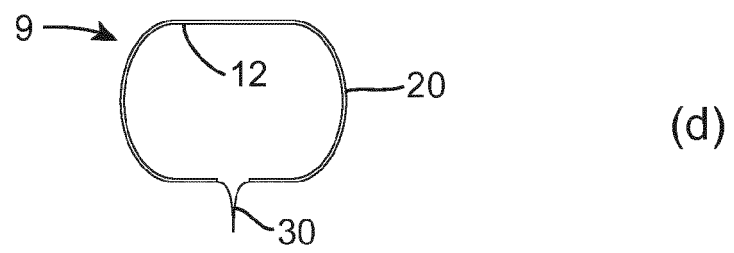
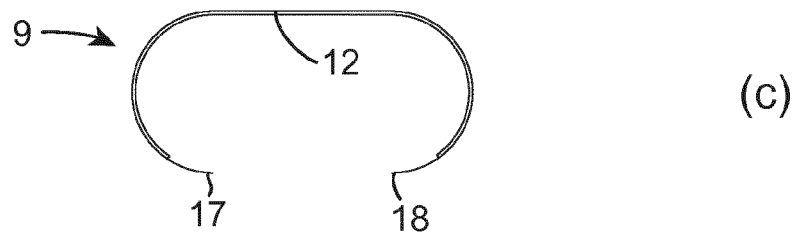
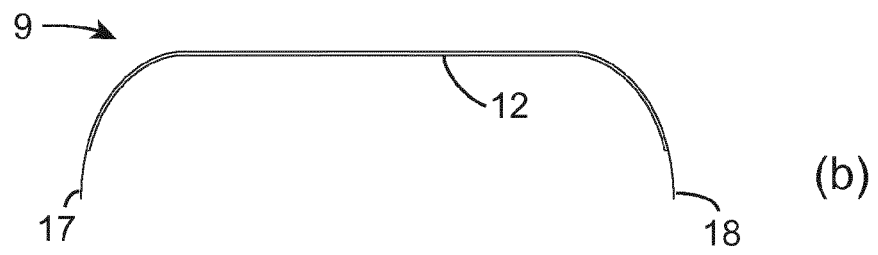
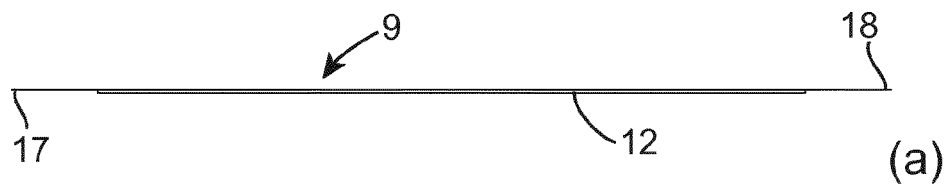


Figure 8C

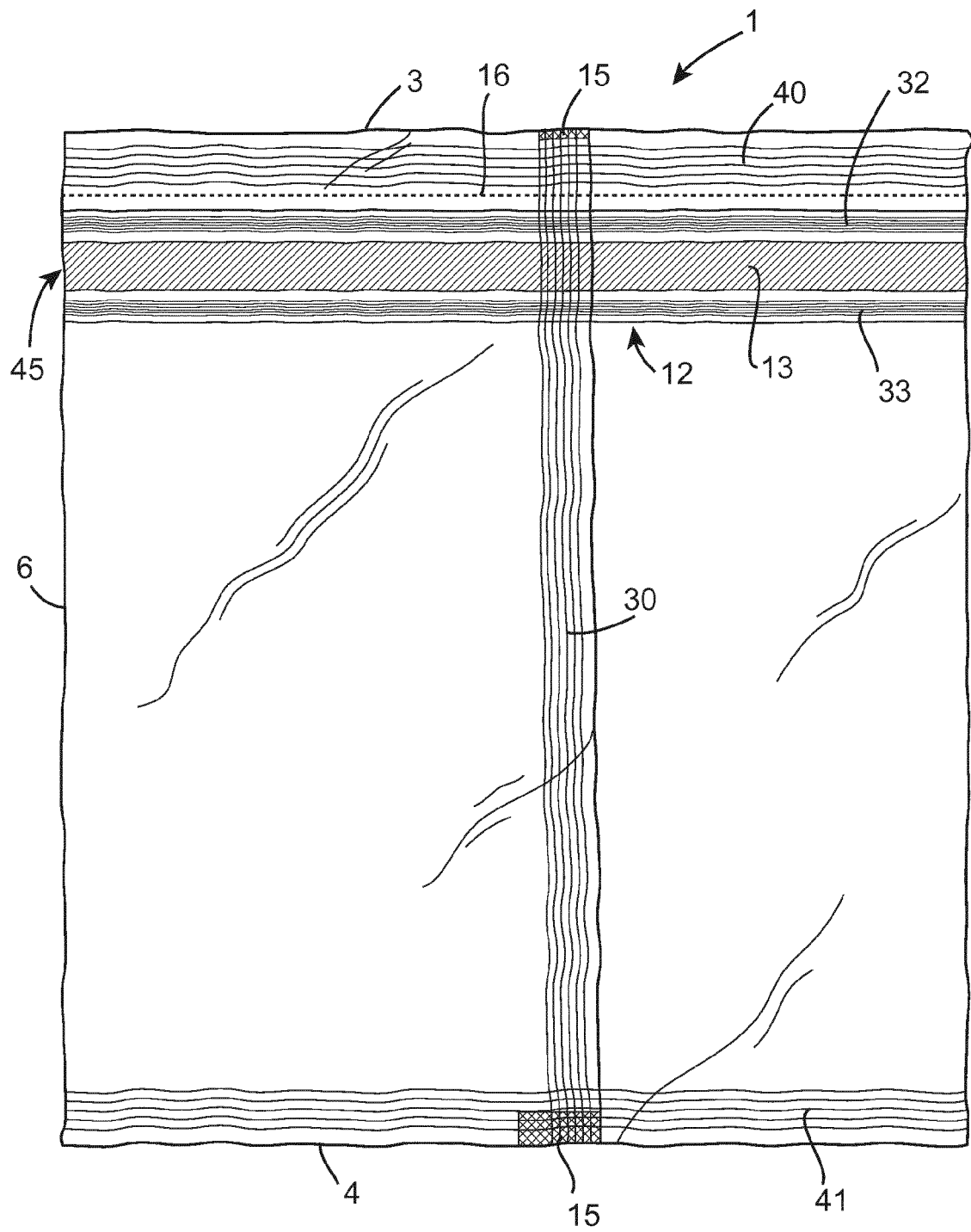


Figure 13

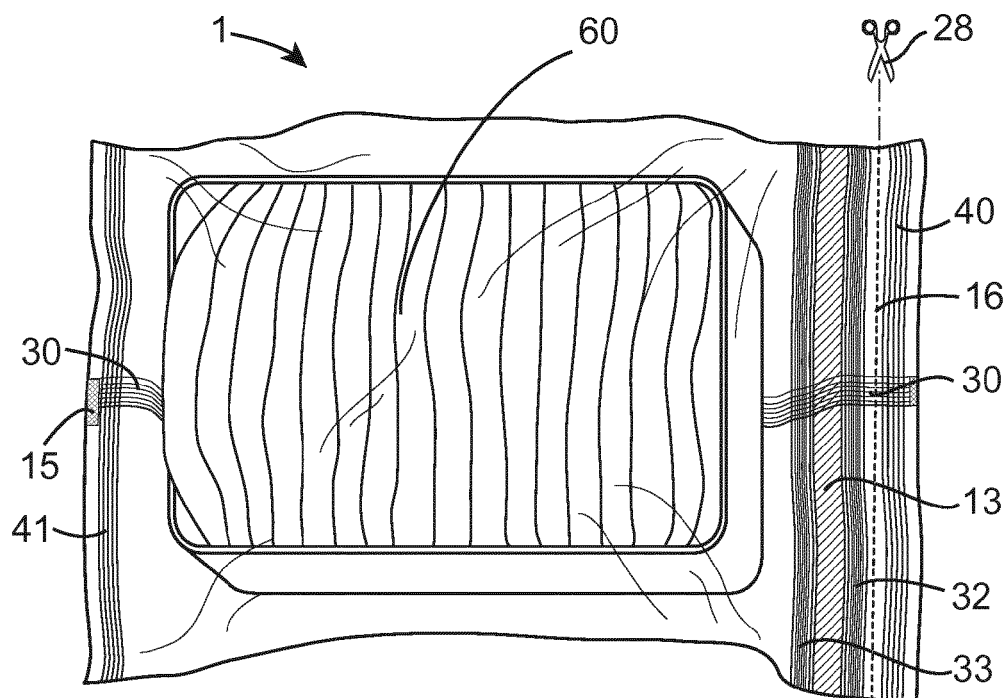


Figure 15

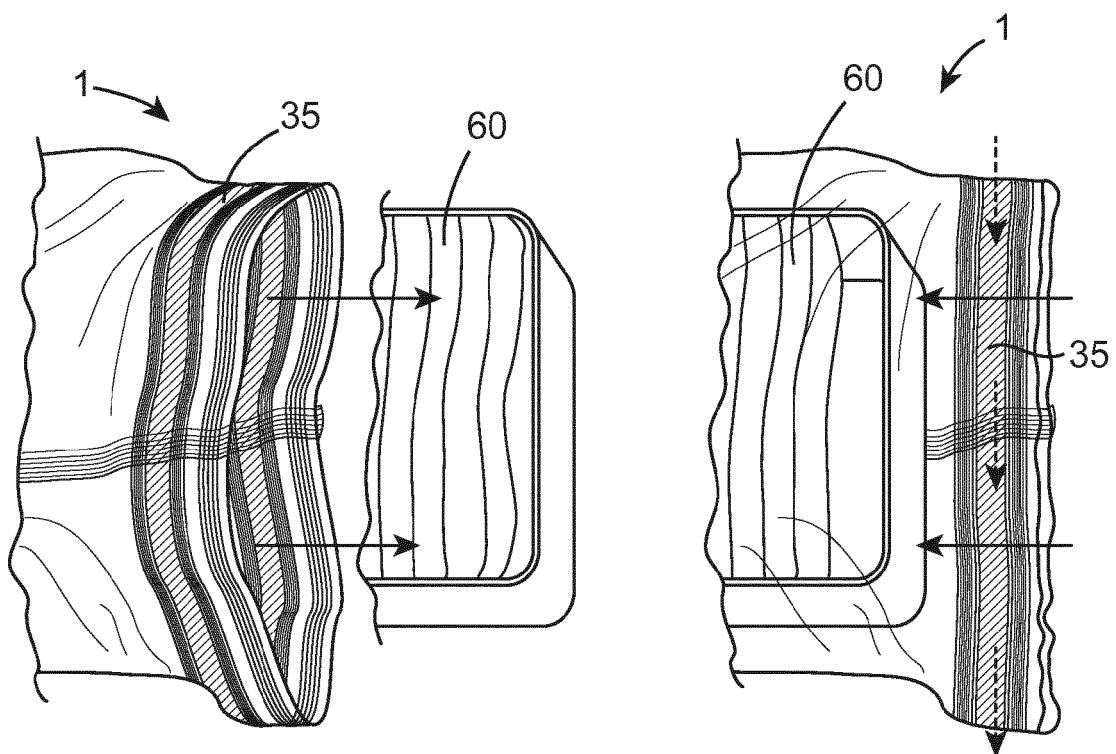


Figure 16

Figure 17



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Place of search Munich		Date of completion of the search 5 August 2015	Examiner Schmitt, Michel
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