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(54) **Improvements in or relating to the packaging of food products**

(57) A pack containing and closely wrapping a stack of planar food items (113) (e.g. biscuits) comprises a sheet of planar material. The pack is parallelepiped, having a longitudinal seam (108) extending along the top face of the pack parallel to the top face of the stack between two end seams (106/107). The ends of the

pack extend parallel to the end faces of the items in the stack. At least a portion of the longitudinal seam comprises an adhesion zone which is tearably openable by pulling on a part of the top of the pack (112) adjacent to and overlapping the longitudinal seam. The opening provides access to the interior of the pack in a direction transverse to the axis of the stack.

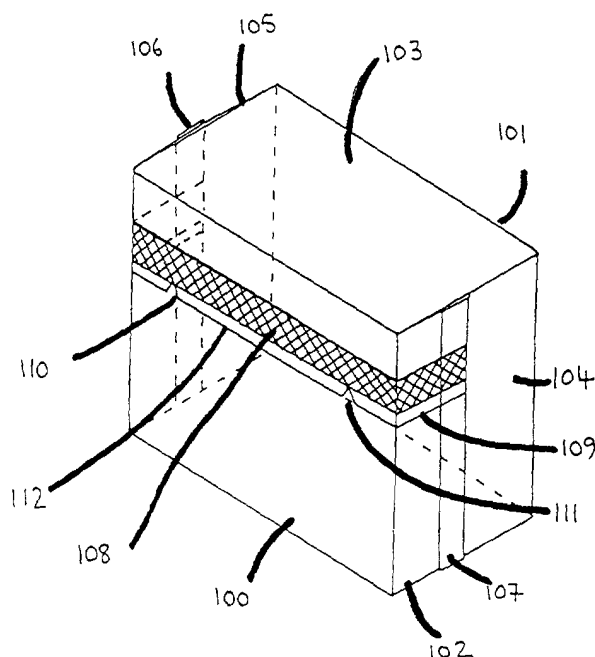


FIG. 4

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Description

[0001] The invention relates to the packaging of food items. In particular, the invention relates to the packaging of two or more stacked food items in packs which are sealed.

[0002] It is known to pack a small number of planar food items, for example, biscuits, in a pack, a plurality of packs then often being incorporated in a larger packet. The packs can be opened individually as and when required, and the freshness of the products is in that way maintained, even after the packet has been opened, until the individual pack is opened.

[0003] Those packs are manufactured by a process (so-called flow wrap process) in which a portion of sheet material is folded around the products and the edges are sealed to form a tube with a longitudinally extending seam. Transverse seals are formed across the tube at each end. Both the transverse seams and the longitudinal seams are formed with the inner surface of a first portion of the sheet being sealed to the inner surface of another portion of the sheet. The longitudinal seal formed in that manner is known as a "fin" seal. The opening of such packs is often unsatisfactory.

[0004] The present invention provides a pack containing a plurality of planar food items in a stack, the pack being of sheet material having an inner surface and an outer surface, and the pack being of substantially parallelepiped configuration, having a top wall extending parallel to the top face of the stack and a bottom wall extending parallel to the bottom face of the stack and, extending between the top wall and the bottom wall, first and second opposed end faces extending parallel to the end faces of the stack and opposed side faces extending parallel to the side faces of the stack, there being first and second end seams on, respectively, said first and second end faces extending parallel to the top and bottom faces of the pack, wherein the pack further has a longitudinal seam extending between the first and second end seams and over the top wall, the longitudinal seam comprising a longitudinally extending zone of adhesion between the outer surface of the sheet material in the region of a first edge thereof and the inner surface of the sheet material in the region of a second edge thereof which overlays the first edge, the second edge extending beyond the zone of adhesion to provide a gripping region by means of which the second edge can be gripped to facilitate opening of at least a portion of the longitudinal seam to tear across at least a portion of the top wall and at least a portion of either the first or second side walls so as to provide access to the stack of food items from a direction substantially transverse to the axis of the stack, and wherein the pack and the stack of food items are so arranged that the pack fits snugly around the stack whereby the stacked items are caused to remain in register and promote retention of the parallelepiped configuration of the pack.

[0005] The pack of the invention can be opened by

lifting the gripping region and detaching the overlying edge of the material from the underlying edge of the material, thereby allowing easy opening of the pack. Further, by tearing the pack open in the manner described, there is obtained a pack which, whilst being self-supporting, enables the user to gain easy access to the food items.

[0006] Advantageously, the longitudinal seam is disposed laterally to one side of a central longitudinal plane through the top face.

[0007] Advantageously, two spaced incisions are provided in the first edge of the sheet material, the spaced incisions defining between them a gripping zone.

[0008] The sheet material may be a polymeric film material. Advantageously, the sheet material is a laminate having at least two layers. Preferably, the laminate has at least three layers and the inner and outer surface layers are of heat-sealable material. The longitudinal seal and/or the end seals may be formed by heat-sealing or by cold-sealing. If desired, the longitudinal seal may be formed by heat-sealing and the transverse seams by cold-sealing or vice versa. Advantageously, the longitudinal seal is peelable. Preferably, the longitudinal seal is peelable and can be resealed. Preferably the material is a unidirectional tear material. The end (transverse) seals are each advantageously folded over upon and affixed to the respective end faces of the pack, for example, by heat-sealing or adhesive.

[0009] Preferably the stacked food items are biscuits, cakes or snack products, especially biscuits, which will advantageously be substantially rectangular planar, for example, square, in configuration. There may be two food items. If desired, however, there may be more than two items, for example, three to eight items. It will be appreciated that the stack of food items may, if desired, include additional inedible items, for example, the stack may comprise one or more planar members as well as the food items, the planar member(s) being located preferably against one or both of the outer food items of the stack and serving to impart shape and/or support to the stack. The planar member is advantageously of a substantially rigid or semi-flexible laminar material, and is preferably rectangular (the term rectangular including "square" herein). The planar members will preferably be of any material suitable for imparting shape to the pack and will then be of a material having greater rigidity than the sheet material. Preferred materials for use as the planar member(s) include, for example, card, paper-board, and substantially rigid or semi-flexible sheeting. The planar member may, if desired, have a peripheral flange extending around a part or all of its periphery and extending inwardly along the stack. Where there are two planar members, one located adjacent each outer food item, the two planar members may, if desired, be joined by an intermediate portion foldably connected to each and extending in the axial direction relative to the stack, the two planar members and the intermediate portion forming a U-shaped body embracing the food items. The

use of one or more planar members may in particular be advantageous where the biscuits are round, as the planar members may then enhance the snug fitting of the pack around the stack.

[0010] The invention further provides a process for packaging a plurality of stackable, substantially planar food items, comprising continuously withdrawing a sheet of material from a roll and advancing the sheet along a working direction, turning inwardly the lateral edge regions of the sheet such that one lateral edge overlies the other to form a tube, positioning a stack comprising a plurality of food items in the tube so formed, advancing the tube and the stack through a sealing zone and sealing the overlying edges to form a longitudinal seal, forming a transverse seal in the longitudinally sealed tube in front of the stack and forming a transverse seal in the longitudinally sealed tube behind the stack.

[0011] In accordance with the invention, food items can be packed in a continuous process in which the pack is formed and filled simultaneously, the pack so formed including a longitudinal seal of the kind known as a "lap seal", in which the outer surface of one edge of the sheet is sealed to the inner surface of another edge of the sheet.

[0012] Advantageously, a first lateral edge region is wider than the second lateral edge region and the seam is positioned laterally of a longitudinally extending vertical plane through the stack of products.

[0013] The material may be a monolayer web. As mentioned above, however, the material is advantageously a laminate having at least two layers. At least one of those layers is advantageously heat-sealable. Preferably, the laminate has at least three layers and the inner and outer surface layers are of a heat-sealable material.

[0014] The film may comprise a pressure adhesive at least in those areas in which seals are to be formed. In some cases, a pressure or heat-sealed-adhesive or cold-seal adhesive is applied to at least the regions of the sheet that are to be sealed.

[0015] Advantageously, the tube is advanced at least in part by lateral belts having surfaces which are able to grip the sheet material, for example, vacuum belts or rubber belts. Preferably, the inward turning of the edge regions of the sheet is so accomplished that the tube fits snugly around the stack of food items. Preferably, the sheet and the tube are advanced in a substantially horizontal direction. Preferably, the food items are introduced into the tube by a horizontal continuously driven pusher device. Advantageously, during or immediately after formation of each transverse seal, the transverse sealing region is severed to separate the sealed trailing end of a leading pack from the sealed leading end of the adjacent trailing pack immediately behind said leading pack. Preferably, the transverse seals are then folded parallel thereto and are affixed to said end faces, for example, by heat-sealing. Preferably, the transverse seals

are folded downwardly. Affixing the transverse (end) seals against the end faces of the pack imparts added rigidity to the pack.

[0016] Suitable film materials for use in the pack and process of the invention include in particular films having characteristics which are such that they tend to tear predominantly along one direction. Such films may have a base layer of, for example, polyethylene (for example, HT103 - trade mark), polypropylene, or polylactic acid film. The base layer is preferably sandwiched between outer layers of a heat-sealable material, for example, an acrylic polymer, polyvinylidene dichloride, or a copolymer of ethylene with propylene or butylene. The films may be clear, voided-opaque, translucent, metallised or coloured, for example, white. In some circumstances, it will be preferable for at least the outer surface of the film to be printable. Suitable printable polymer layers include those layers which are printable per se and those which may be treated, for example, using corona discharge treatment, to render them printable. Monolayer films may be used, and it will then be necessary to apply to the film before or during production process a suitable adhesive.

[0017] Preferably the sheet material is unidirectional, that is, it will tend to tear in a particular, predetermined direction. This has the advantage that when the user tears the film to make the opening, the tears will extend approximately parallel rather than running together or completely apart. With such a film, by arranging weakened areas (if any) advantageously, the size and shape of the opening can be controlled to be convenient for the user.

[0018] The unidirectional material is preferably a unidirectional flexible film such as Hicor HT103. The flexible unidirectional film is advantageously laminated with another film material which may impart additional desirable properties, for example, rigidity, stiffness, printability, heat-sealability. For example, the unidirectional material may be laminated with a white polypropylene film, for example, Hicor film, which is suitable for printing and also imparts stiffness.

[0019] The terms "transverse" and "longitudinal" as used herein refer in general terms to the orientation relative to the direction of travel during pack formation and do not imply any particular relative sizes. For example, the transverse seals may be, but are not necessarily, shorter than the longitudinal seam and vice versa.

[0020] Certain illustrative embodiments of the invention will now be described in detail with reference to the accompanying drawings, in which:

Fig. 1 is a plan view of an apparatus according to the invention;

Fig. 2 is a side view of the apparatus;

Fig. 3 is a perspective view of a pack according to the invention; and

Figs. 5 to 7 are perspective views of the pack during opening.

[0021] With reference to Figs. 1 and 2, a packaging apparatus 1 has a film delivery region 2, an upstream forming region 3, a downstream forming region 4 and an end sealing region 5.

[0022] The film delivery region 2 has a rotatably mounted roll 6 of film 7, from which film is delivered upwardly towards a roller 8 over which the film is turned such that, on departure from roller 8, the film is travelling horizontally. The film has first and second lateral edges 7a, 7b. outer surface A and inner surface B. Downstream of the roller 8, above the film 7, is a continuously driven pusher device 9 which is arranged to push a plurality of stacked planar objects 10 from a rearward position to a forward position along the direction of travel of the film. In Fig. 1, the pusher device 9 is shown between the rearward and forward positions. The pusher device 9 is conveyed forwards by means of a conveying device located above the pusher device and connected thereto. A number of pusher devices are driven by the conveying device in known manner. The stacked planar objects 10 are delivered by delivery means (not shown) to the pusher device 9 which is then propelled forwards by the conveying device to move the biscuits forwards with the adjacent film. It will be appreciated that the form of the delivery means will be selected to be appropriate having regard to the nature of the items to be packed. The speed of travel of the pusher device on its forward journey is chosen to be similar to the speed of advance of the film 7, which may be up to 100m/min. The relative speeds of the pusher device and the film are controlled so as to ensure that the stack of objects are deposited in the correct position on the film, for example, relative to a pre-printed design on the film and/or relative to portions of the film to which adhesive has been applied for the subsequent formation of seals. For that purpose monitoring means (not shown) may be provided for recognition of registration marks on the film and for determining the position of the stack, the pusher device being controlled in dependence upon information gathered by the monitoring means. When the pusher device 9 reaches its forwardmost position, the stack of objects is snugly held between the sides of the sheet 7 and advances with the advancing sheet 7 upon which it rests. The pusher device is then retracted by the conveyor device by means of moving it forwardly and upwardly behind the stack of objects (which is being carried forwards by the advancing sheet). The next consecutive pusher device on the conveyor device subsequently introduces in like manner a further stack of objects. The operation of the conveyor device and associated pusher devices is such that consecutive stacks are introduced at predetermined intervals so as to be evenly spaced from one another along the advancing sheet 7 and in register therewith. An appropriate spacing will be selected according to the height of the stack of objects to be packed, and

will typically be from 25mm to 150mm.

[0023] In the upstream forming region 3 are provided a driven conveyor 11 and guide elements 12, 13, above, and laterally of conveyor 11, which cause the lateral edges 7a, 7b of the film 7 to be turned upwards and towards each other until they meet and edge 7a overlies edge 7b at meeting point 14, at which the downstream forming region 4 commences. The driver conveyor 11 assists forward transportation of sheet 7 and thereby maintains the stack. Thus, at meeting point 14, the film has been formed into a tube ready for subsequent sealing.

[0024] The guide elements 12, 13 are asymmetrically arranged about the centre line C1 of the roller and the film immediately after delivery therefrom, and are so arranged that the width of the lateral film portion turned over by element 12 is greater than that turned over by element 13. In that manner the region in which the edge 7a overlies edge 7b is displaced laterally of the line C1 as will further be described below.

[0025] A stationary horizontal forming plate 15 is suspended from two vertical rails 16, 17 in the upstream forming region 3, the horizontal plate 15 extending in the downstream direction, substantially parallel to the central region of the film 7. The plate 15 is spaced vertically from the conveyor 11 by a distance selected to be just sufficient to permit passage therebetween of the items 10 to be packed. An opening is provided in the upstream portion of the plate 15 to permit the upward retraction of the pusher device 9.

[0026] The downstream forming region 4 has a pair of opposed conveyor devices, 18, 19, positioned on opposite sides of the path along which the film travels. Each conveyor has a pair of rollers 18a, 18b; 19a, 19b, the axes of which extend vertically, and an endless belt 20, 21 which is suitable for gripping the adjacent film 7 as it passes, thereby maintaining stack-to-film register in the downstream forming region 4. The belts 20, 21 may be vacuum belts, or they may be of a material suitable for gripping the film by means of friction, for example, they may be tubular rubber belts. Between the conveyor devices 18, 19 is a roller 22 which is arranged to form a longitudinal seal between heat-sealable layers on the inner surface of the film immediately adjacent to edge 7a and the outer surface of the film immediately adjacent to the edge 7b. It will be appreciated that, instead of the roller 22, there may be employed any suitable heat-sealing device, for example a heated bar. The tube may be supported underneath during passage through the forming region 4 and sealing region 5 by suitable support means, for example, a plate or conveyor (not shown).

[0027] By virtue of the lateral displacement of the guide elements 12, 13, from the film centre line C1 mentioned above, the overlapping edges 7a and 7b are located laterally of the centre line C2 of the tube formed at the meeting point 14 (which centre line C2 coincides with a longitudinally extending vertical plane through the

stack of objects 10), between that centre line C2 and the conveyor device 18. The roller 22 may be a heated roller, which may form a longitudinal seal between the two overlapping edges of a film of which the contracting surfaces at least in the regions of edges 7a, 7b are heat-sealable to one another. Alternatively, the roller 22 may be a pressing roller, which applies pressure that is sufficient to seal together overlapping edges of a film of which the two outer surfaces at least in the regions of 7a, 7b are pressure-sealable to one another. In general, the film will comprise a laminate of which the inner and outer layers are heat-sealable to one another or pressure-sealable to one another, as the case may be. As already mentioned, the film is advantageously a unidirectional film. A particularly suitable film for use in the process described is Hicor HT103. If desired, however, longitudinal deposit of a heat-sensitive adhesive or a pressure sensitive adhesive may be incorporated into the film before use on the outer (A) surface immediately adjacent to edge 7a and on the inner (B) surface immediately adjacent to edge 7b, or may be applied by suitable applicator devices located in the film delivery region.

[0028] On exit from between the conveyor devices 18, 19, the tube is sealed by a longitudinal seal 23.

[0029] End sealing region 5 has reciprocating transverse sealing jaws 24 with which is associated monitoring means (not shown) for monitoring the advancing tube containing longitudinally spaced stacks of items. The monitoring means is arranged to initiate operation of the jaws 24 in response to recognition of an appropriate registration mark on the film 7. The jaws 24 are arranged to close upon the tube between a leading and adjacent trailing stack of items and to advance with the continuously advancing tube whilst sealing is effected. The temperature of the transverse sealing jaws may be within the range of from 10°C to 200°C, but typically is within the range of from 90°C to 160°C. Lower temperatures may be appropriate where the inner surface of the tube is pressure-sealable. Preferably, however, the inner surface is heat-sealable to itself. The sealing jaws 24 are provided with a knife 25 which severs the tube, leaving a transversely extending seal 26 on the trailing end of the leading stack of items and a transversely extending seal 27 on the leading end of the trailing stack of items. After the sealing and cutting step, the jaws 24 are opened and reciprocated to their starting position. The pack so obtained is then turned 90° about a vertical axis and sealing plates are applied to the end faces of the pack such that the fin seals are folded against the end face of the pack and sealed thereto. Whilst in the embodiment described, heat-sealable film is used, it will be appreciated that the sealing of the fin seals against the end face of the pack can be accomplished by any suitable means, for example, using a suitable heat-sealable lacquer or cold-seal adhesive.

[0030] A pack manufactured using the above-described method is shown in Fig. 3. The pack has a top

face 100, a bottom face 101, opposed side faces 102, 103, and opposed end faces 104, 105. The pack has two end seals 106, 107 which extend in a direction parallel to the planes of the top and bottom faces. A longitudinal seal 108 extends between the end seals 106, 107, across the top face 100. An edge 109 of the sheet material 7 extends beyond longitudinal seal 108. Two spaced incisions 110, 111 are provided in the edge 109 defining between them a tab 112. The pack contains a number of stacked rectangular biscuits 113.

[0031] Referring to Figs. 4 to 6, in order to gain access to the biscuits 113, the pack is opened by grasping the tab 112 and peeling the tab backwards. Because the pack is formed of a unidirectional tear material, tearing of the tab tends to continue in the direction of the incisions 110, 111.

[0032] As the tab 112 is pulled, the film tears in two lines originating at the incisions as shown in Figs. 6 and 7 to form an opening 114 of approximately rectangular shape. If desired, the pack may be such that the piece of film 115 that is pulled away may be torn off by the user as shown in Fig. 6 to leave the opening 114 clear and to afford easy access to the biscuits.

[0033] The pack shown in Fig. 3 has a generally rectangular cross-section. As described above with reference to Figs. 1 and 2, the tube of film extends in the direction shown by arrow 'A'. In use, however, the pack is turned through 90° to lie in the direction of arrow 'B'. In the orientation shown in Figs. 4, 5 and 6 the pack is ready for use. It will be appreciated that references herein to a "top face" are to a face which coincides with the top of the stack of items, for example, biscuits. In the orientation shown in Figs. 4 to 6, in which in use the pack is normally opened, the top face forms a lateral face of the pack.

[0034] The tab 112 is preferably between 1 and 10 cm wide, advantageously between 2 and 6 cm wide.

[0035] In the embodiment described, the biscuits are rectangular. In the case of round biscuits, the biscuits may be stacked with one or more rectangular planar members which are of dimensions so chosen that the overall shape of the stack is determined at least in part by the planar members. In that manner, the stack of round biscuits and planar members fit snugly into the pack and promote retention of the pack's shape.

Claims

1. A pack containing a plurality of planar food items in a stack, the pack being of sheet material having an inner surface and an outer surface, and the pack being of substantially parallel piped configuration, having a top wall extending parallel to the top face of the stack and a bottom wall extending parallel to the bottom face of the stack and, extending between the top wall and the bottom wall, first and second opposed end faces extending parallel to the

- end faces of the stack and opposed side faces extending parallel to the side faces of the stack, there being first and second end seams on, respectively, said first and second end faces extending parallel to the top and bottom faces of the pack, wherein the pack further has a longitudinal seam extending between the first and second end seams and over the top wall, the longitudinal seam comprising a longitudinally extending zone of adhesion between the outer surface of the sheet material in the region of a first edge thereof and the inner surface of the sheet material in the region of a second edge thereof which overlays the first edge, the second edge extending beyond the zone of adhesion to provide a gripping region by means of which the second edge can be gripped to facilitate opening of at least a portion of the longitudinal seam to tear across at least a portion of the top wall and at least a portion of either the first or second side walls so as to provide access to the stack of food items from a direction substantially transverse to the axis of the stack, and wherein the pack and the stack of food items are so arranged that the pack fits snugly around the stack whereby the stacked items are caused to remain in register and promote retention of the parallel-opiped configuration of the pack.
2. A pack according to claim 1, in which the longitudinal seam is disposed laterally to one side of a central longitudinal plane through the top face.
 3. A pack according to claim 1 or claim 2, in which two spaced incisions are provided in the first edge of the sheet material, the spaced incisions defining between them a gripping zone.
 4. A pack according to any one of claims 1 to 3, in which the sheet material is a polymeric film material.
 5. A pack according to claim 4, in which the sheet material is a laminate having at least two layers.
 6. A pack according to claim 5 in which the laminate has at least three layers and the inner and outer surface layers are of a heat-sealable material.
 7. A pack according to claim 5, in which the material is a unidirectional tear material.
 8. A pack according to any one of claims 1 to 7, in which the longitudinal seam is peelable.
 9. A pack according to any one of claims 1 to 8, in which the end seams are folded against and affixed to the end faces of the pack.
 10. A pack according to any one of claims 1 to 9, in which the food items are biscuits, cakes or snacks.
 11. A pack according to any one of claims 1 to 10, in which there are two food items.
 12. A pack according to any one of claims 1 to 11 in which there are three or more food items.
 13. A pack according to any one of claims 1 to 12, in which the food items are rectangular.
 14. A pack according to any one of claims 1 to 12, in which the food items are round and the stack further comprises one or more planar members.
 15. A pack according to any one of claims 1 to 14, in which the stack comprises a plurality of food items and at least two opposed planar members, the food items being arranged in register between the opposed planar members.
 16. A pack according to claim 15, in which the opposed planar members are linked via an intermediate portion foldably connected to each planar member.
 17. A process for packaging a plurality of stackable, substantially planar food items, comprising continuously withdrawing a sheet of material from a roll and advancing the sheet along a working direction, turning inwardly the lateral edge regions of the sheet such that one lateral edge overlies the other to form a tube, and positioning a plurality of stacked food items into the tube, advancing the tube through a sealing zone and sealing the overlying edges to form a longitudinal seal, forming a transverse seal in the tube in front of the stacked items and forming a transverse seal in the tube behind the stacked food items.
 18. A process according to claim 17, in which a first lateral edge region is wider than the second lateral edge region and the seam is positioned laterally of a longitudinal plane through the stack of products.
 19. A process according to claim 17 or claim 18, in which the tube is formed around a plate and sealing is effected by applying sealing means to the overlying material edges when supported by the plate.
 20. A process according to any one of claims 17 to 19, in which the sheet of material is a polymer film.
 21. A process according to claim 20, in which the film is a laminate having at least two layers.
 22. A process according to claim 21, in which the laminate has at least three layers and the inner and outer surface layers are of a heat-sealable material.
 23. A process according to claim 20, in which the film

comprises a pressure adhesive at least in those areas in which seals are to be formed.

24. A process according to claim 20, in which a pressure or heat-seal-adhesive or cold-seal adhesive is applied to at least the regions of the sheet that are to be sealed. 5
25. A process according to any one of claims 17 to 24, in which the tube is advanced at least in part by lateral belts having surfaces which are able to grip the sheet material. 10
26. A process according to any one of claims 17 to 25, in which the inward turning of the edge regions of the sheet is so accomplished that the tube fits snugly around the stack of food items. 15
27. A process according to any one of claims 17 to 26, in which the sheet and the tube are advanced in a substantially horizontal direction. 20
28. A process according to claim 27, in which the food items are introduced into the tube by a horizontal continuously driven pusher device. 25
29. A process according to any one of claim 17 to 28, in which during or immediately after formation of each transverse end seal, the transverse sealing region is severed to separate the sealed trailing end of a leading pack from the sealed leading end of the adjacent trailing pack immediately behind said leading pack. 30
30. A process according to any one of claims 17 to 29, in which the end seals are folded against the end faces of the pack so as to extend parallel thereto and are affixed to said end faces. 35
31. A process according to claim 30, in which the end seals are both folded downwardly. 40
32. A process according to claim 30 or claim 31 in which the end seals are affixed to the end faces by heat-sealing. 45
33. A process according to anyone of claims 17 to 32, in which the food items are rectangular.
34. A process according to any one of claims 17 to 33, in which the food items are biscuits, cakes or snacks. 50
35. A process according to any one of claims 17 to 34, in which one or more planar members are combined with the stacked food items and positioned therewith into the tube. 55

Fig.1.

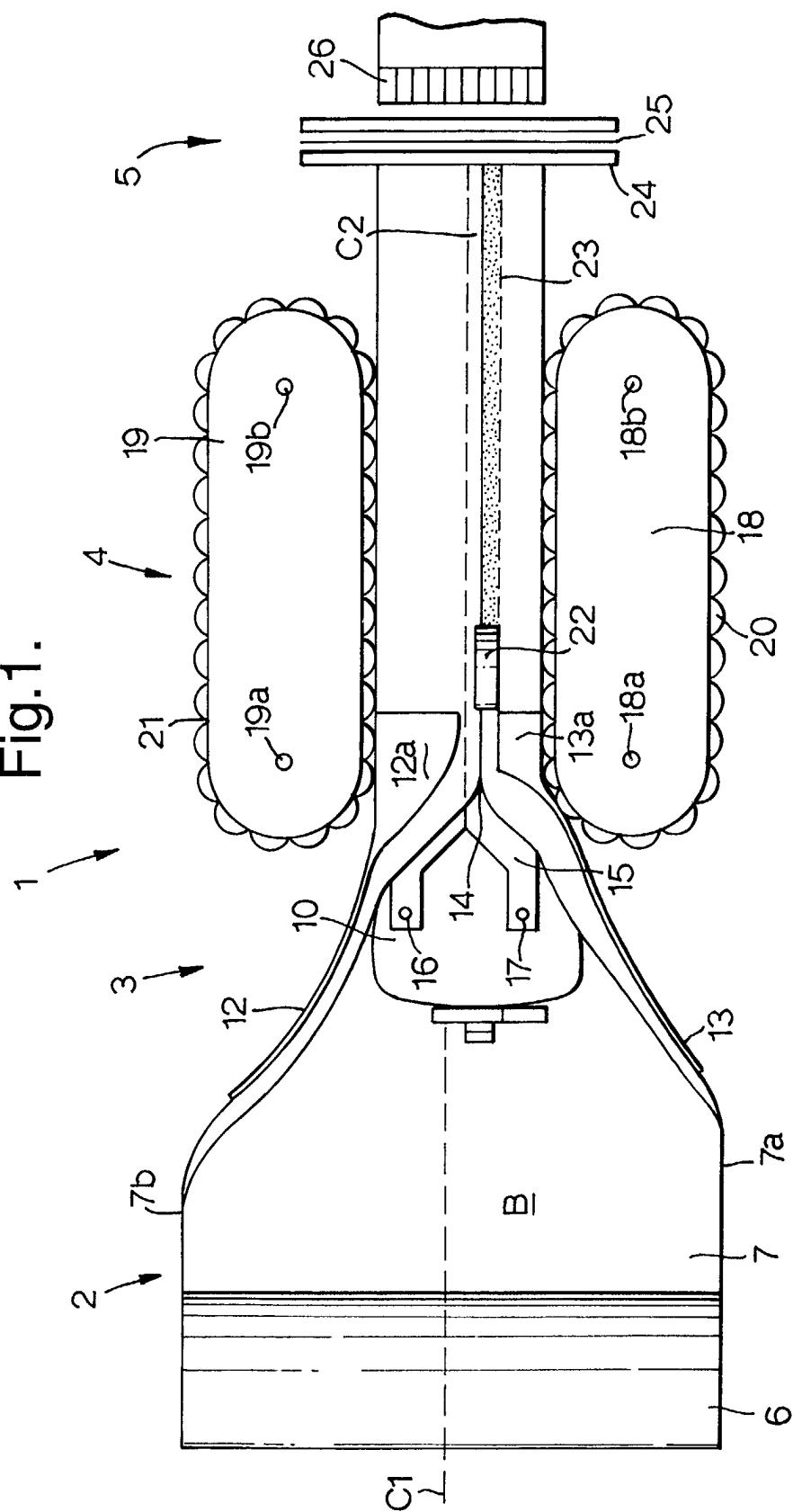
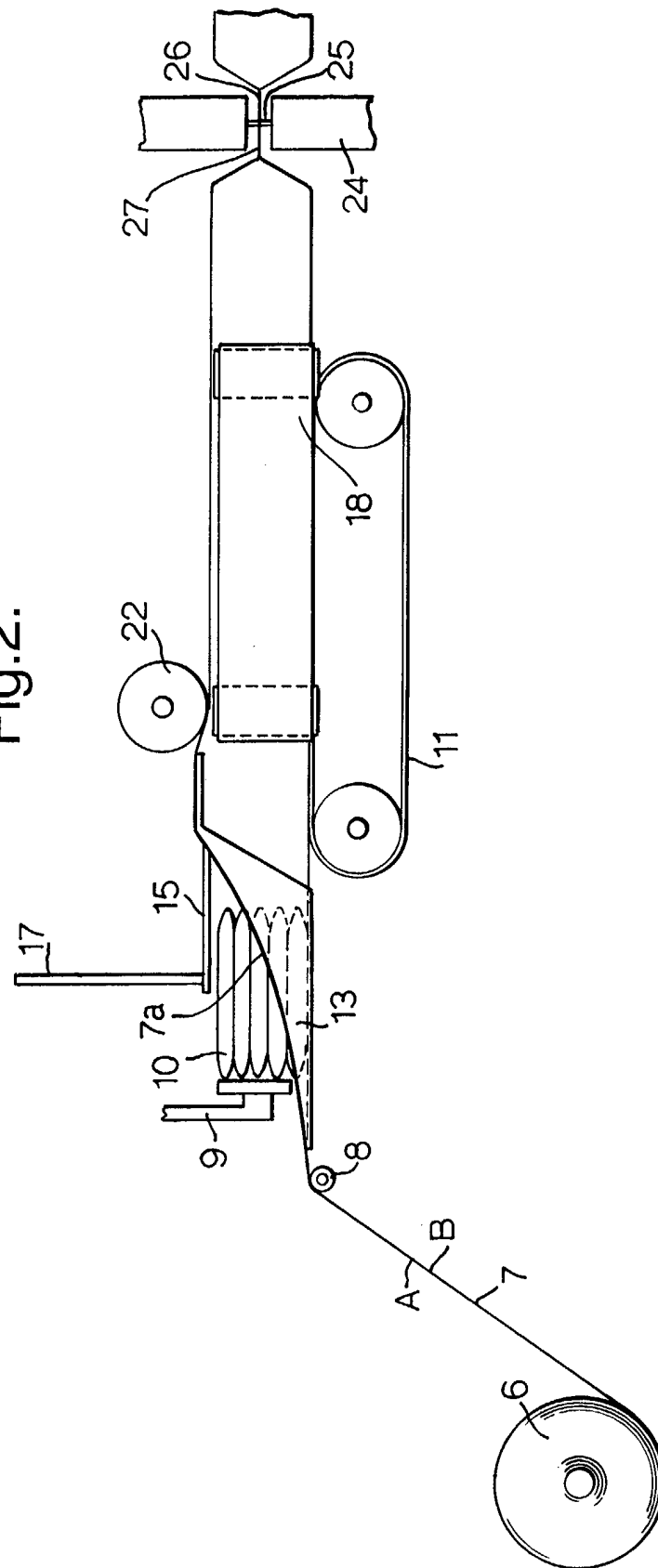


Fig.2.



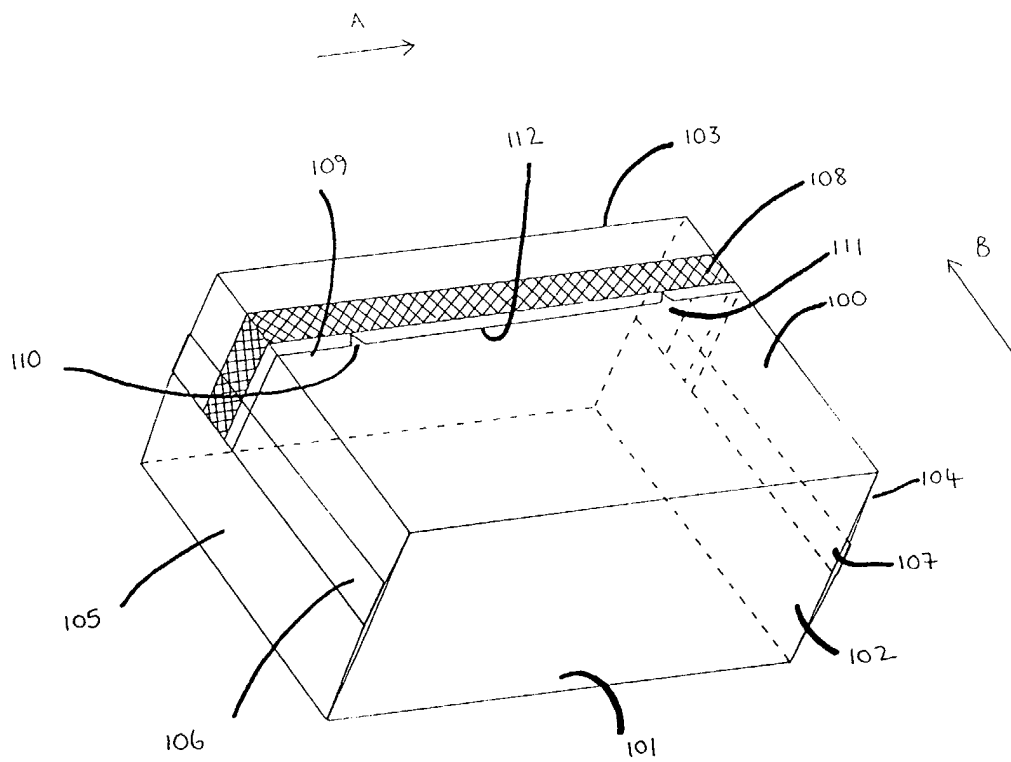


FIG 3

