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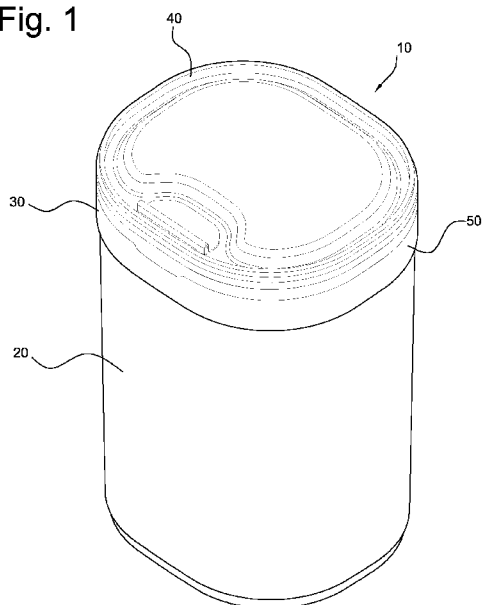
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(54) Title: CARD BASED PACKAGE FOR SENSITIVE MATERIALS

Fig. 1



(57) Abstract: A card-based package for sensitive food products, comprises a container portion defining an interior space with a base and a sidewall extending to an upper peripheral edge for receiving a removable seal for hermetically sealing the container portion prior to use. The package further comprises a lid structure, that can open and close to allow selective access to the interior space after removal of the seal. The container portion and the lid structure are both formed of card-based material and at least the container portion has light, oxygen, and water vapour barrier properties sufficient for storage of the product for a period exceeding 24 months.



CARD BASED PACKAGE FOR SENSITIVE MATERIALS

BACKGROUND OF THE INVENTION

Field of the invention

5 [001] The present invention relates to card-based packages and in particular to ones that are suitable for packaging of sensitive materials such as powdered infant nutrition or milk formula. The invention relates in particular to the structure of such packages.

Description of the related art

10 [002] Packages of all types are well known and have evolved throughout history to maximise the benefits of the latest material technologies. During the last half century, plastic materials have been developed that are exceptionally well suited for packaging, ensuring high barrier protection for sensitive materials. Such materials are also very versatile and allow designs with functional and ergonomic shapes.

15 [003] Nevertheless, plastics and other petroleum-based materials for packaging have a significantly higher environmental impact in comparison to those made of renewable materials, for example, cellulose pulp. For that reason, current trends in packaging consumer goods point towards the use of card-based materials that substitute for petroleum-based materials. Unfortunately, consumers and producers are reluctant to compromise the gains in functionality and recyclable or
20 environmentally friendly packages must still meet with consumer expectations and regulatory requirements if they are to be accepted as alternatives.

[004] Card or paperboard is one preferred material that is highly versatile in the context of packaging. High quality laminates have been produced with good barrier properties that can be used in the construction of rigid or semi-rigid boxes, tubs, tubes, and sleeves. These materials are
25 even suitable for long term packaging of foodstuffs and liquids such as in the now ubiquitous brick packages and beverage cartons. One well known class of card-based containers uses a laminate of polyethylene (PE), aluminium and card to form a primary package that is particularly suitable for storing powdered nutritional products. The PE layer is used as a food facing surface and also serves to heat seal the card to form the container. The aluminium acts as a barrier layer due to its good
30 oxygen and water vapour barrier properties. It also acts as a light barrier. The card is provided at an outside of the container and provides structure and strength to the package. The card itself may be of various qualities depending on the required strength and outwards appearance. It can thus be printed or coated or otherwise decorated. Such a container is described in US5219087 and WO2005/075314 and has been successfully marketed for many years under the name Cekacan™.
35 However, the Cekacan™ material comprises an ALU layer which is disadvantageous in the recyclability of the material.

[005] An important consideration in the terms of developing a packaging solution is its ability to be recycled or disposed of. More complex packages with greater functionality are often more difficult

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to handle during the waste disposal process. In some cases, it is possible to separate packages into their individual components and process each material accordingly. For laminates of different layers that require different processes for recycling, it has proven difficult to separate the layers. Despite their enormous advantages from a packaging perspective these packages have been difficult to recycle effectively.

[006] Boxes made exclusively of card-based material are also known, e.g., of the type used for soaps and washing powder. These may have re-closable lids in the form of a wing or flap of card material. This allows the box to be reclosed after first opening and repeatedly opened and closed for dosing of product at each use. Although these packages may be very economical and environmentally friendly, they generally do not have adequate barrier properties and their closures have not generally been considered adequate for sensitive materials such as foodstuffs, in particular infant nutrition. This is particularly important in countries with high temperatures and humidity or where small insects may attempt to enter the package.

[007] It would thus be desirable to provide an improved package that at least partially overcomes some of the inconveniences of the prior art.

BRIEF SUMMARY OF THE INVENTION

[008] Therefore, according to a first aspect of the invention, there is provided a card-based package for sensitive food products, comprising: a container portion, the container portion defining an interior space for receiving the product and having a base and a sidewall extending to an upper peripheral edge for receiving a removable seal for hermetically sealing the container portion prior to use. The package further comprises a lid structure that can open and close to allow selective access to the interior space after removal of the seal. The container portion and the lid structure are formed of card-based material and at least the container portion has light, oxygen and water vapour barrier properties sufficient for storage of the product for a period exceeding 24 months. The package is particularly intended for powdered infant nutrition but will be equally applicable to similar products with the same requirements such as other high-fat powdered nutritional products.

[009] The values for light, oxygen and water vapour barrier properties are primarily requirements of the sidewall, base and removable seal, which together form the barrier to the interior space. The lid structure may have lower requirements, since it is present as a secondary barrier and only forms a primary barrier after the removable seal has been opened. From this point on, the storage time is thus limited. Nevertheless, it will be understood that the integrity of the lid structure can contribute to the overall barrier properties of the package both during storage and after initial opening.

[0010] The package may be constructed to have a sidewall with an oxygen transmission rate (OTR) of less than 0.5 cc/m²/day, preferably less than 0.3 cc/m²/day and more preferably less than 0.1 cc/m²/day. Oxygen transmission of the sidewall is tested according to ASTM D3985-17en at 1 atm and 23° C, with a relative humidity of 50% at the outside and 0% at the inside. The indicated

values are believed to be adequate to achieve acceptable storage conditions for at least 24 months, in particular when starting from a depleted oxygen content as filled such as less than 2 % oxygen in the head space above the product.

[0011] The package may further be constructed to have a sidewall having a water vapour transmission rate (WVTR) of less than 0.5 g/m²/day, preferably less than 0.3 g/m²/day and more preferably less than 0.1 g/m²/day. Water vapour transmission is tested according to ASTM F1249-20 at 1atm and 23° C with an external relative humidity of 75%. For infant nutrition, it is very important that humidity is kept to a minimum by avoiding water vapour transmission even in humid environments. This is not only important in terms of transmission through the sidewall but also for transmission into the sidewall. During storage in humid environments, it is undesirable that the card-based material of the sidewall should absorb moisture. This can lead to undesirable discoloration or even mould formation. In a preferred embodiment, the WVTR values apply also for transmission into the package material from the environment. The components of the package may thus be provided with a moisture barrier on their external surfaces having the indicated WVTR. This applies equally to the container portion and to the components of the lid structure.

[0012] In an embodiment, the water vapour transmission rate (WVTR) may be less than 1 g/m² day at 38 degrees C 90% RH. Preferably this should remain the case even after processing as may be recreated by 5 cycles of a Gelbo Flex tester according to ASTM F392: Standard Practice for Conditioning Flexible Barrier Materials for Flex Durability.

[0013] It is additionally important for long term storage that the package prevents light transmission to the contents. In an embodiment, the sidewall may have a light transmission in the 300 nm to 700 nm range of less than 0.5 %, preferably less than 0.2 % based on ISO 2471:2008.

[0014] In the present context, 'formed of card-based material' is intended to denote that the respective component is predominantly of card and can be disposed of in the existing recycling streams, in particular the paper and card waste streams. It will be understood that the precise requirement in terms of cellulose or paper content may vary from country to country and will be detailed further below. Furthermore, card-based may be understood to distinguish over components that are predominantly of plastic or metal.

[0015] In an embodiment, the sidewall of the container portion comprises an outer structural layer comprising predominantly cellulose material and an inner hygienic layer of a food quality polymer material. Such polymer materials are those that have been approved by the relevant authorities for entering into contact with food products, for example, a low-density polyethylene polymer, selected from the group consisting of LDPE, LLDPE, VLDPE, ULDPE or mLLDPE and blends of two or more thereof; or a high-density polyethylene polymer, like polypropylene or propylene co- or ter-polymers.

[0016] The hygienic layer can be relatively thin and need only perform the function of maintaining the sterility and/or hygiene of the product with respect to the outer structural layer. It may also assist in achieving the other barrier functions such as preserving freshness, humidity, oxidation level etc in conjunction with other layers to be discussed further below.

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[0017] Although the following paragraphs relate to the inner hygienic layer of the sidewall of the container portion, for use in the context of powdered infant nutrition, all of the inner surfaces of the package that normally enter into contact with the contents preferably have a food compatible surface similar to the inner hygienic layer. That firstly includes the base of the container portion for
5 maintaining the sterility and proper condition of the product during storage. Secondly, during use of the package, other portions of the package will come into contact with the contents. In particular, when scooping out powdered infant nutrition or if the package is accidentally inverted or tipped, some powder will inevitably fall or make contact with portions of the lid structure.

[0018] For above mentioned reasons related to food compatibility, it is important that the package
10 inner surfaces are free from crevices and fibres that can catch and retain powder and are suitable to receive a food quality polymer layer. Thus, in a preferred embodiment, the lid structure is at least partially made of spiral wound cardboard. This offers a stable and durable structure which can be manufactured to high diametric tolerances. It can easily be provided with a smooth food compatible surface by conventional lamination and coating techniques. Furthermore, it has no longitudinal
15 overlap seal, facilitating a smooth fit between engaging card surfaces for better (insect) tightness within the lid structure.

[0019] The thickness of the polymer layer at different portions of the package should preferably be the minimum required to achieve food compatibility without jeopardising the ability to dispose of the package in the paper recycling stream. It will nevertheless be understood that in cases where
20 the inner hygienic layer also functions as a barrier layer, greater thickness may be required. In an embodiment, the inner hygienic layer of the sidewall has a thickness of less than 20 microns, preferably between 2 microns and 20 microns. In existing card-based containers, an inner hygienic layer of polymeric material is often present but with a significantly greater thickness, conventionally around 60 microns. Such polymer layers have been used for the purpose of heat-sealing or welding
25 e.g., between layers. Thicker layers are usually formed by extrusion and applied in a laminating process to the other layers of the paperboard laminate or applied directly by extrusion coating. According to the present disclosure, other procedures may be used to apply the inner hygienic layer. It may thus be separately formed by extrusion but can also be applied to the inner side of the outer structural layer in a coating process, e.g., by extrusion coating or in the form of an aqueous
30 or solvent-based dispersion or solution that may be sprayed, printed or otherwise applied onto the surface. Joining, where necessary can be achieved by other techniques e.g., using a locally applied heat-sealing strip, which can be provided in adequate thickness to achieve its function without significantly contributing to the amount of non-paper-based materials in the container. Should the inner hygienic layer also be required to function as an oxygen or moisture barrier layer, then greater
35 thicknesses may be required of up to 60 microns.

[0020] In the case of a coating, the thickness of the inner hygienic layer may be given as a weight e.g., from 1 to 20 g/m² of dry product or preferably between 3 and 10 g/m² of dry product. Measuring the thickness by weight may be more appropriate since the surface irregularities of the card layer

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to which it may be applied can be of the same order of magnitude as the layer itself. Here too, a greater weight may be required in cases where the layer has additional barrier functions.

[0021] The sidewall may comprise further layers in addition to the outer structural layer and the inner hygienic layer. In particular, while the inner hygienic layer may be the innermost layer, there may be additional layers between this and the outer structural layer in particular, there may be adhesive layers or bonding layers to ensure that each layer is compatible with the adjacent layer or layers. There may also be further layers outside the outer structural layer, such as a removable wrapper.

[0022] In an embodiment, there may be a barrier layer such as an oxygen barrier layer. This may be located between the inner hygienic layer and the outer structural layer. Additionally, or alternatively, a barrier layer may be provided as part of the outer structural layer e.g., an intermediate layer between sub-layers of the outer structural layer.

[0023] In an embodiment the oxygen barrier layer may be a polymeric layer such as those described above as also being suitable as an inner hygienic layer having barrier properties. The skilled person will be familiar with all of the possible barrier layers that may be applied according to the degree of barrier required and also in relation to their compatibility with the adjacent layers.

[0024] It is noted that metal layers such as aluminium may also be used for their barrier properties, including vapour deposited metal layers and layers coated with e.g., Al, SiO_x, AlO_x and the like. In one example, the barrier layer may be formed from a composition comprising a polymer selected from the group consisting of polyvinyl alcohol (PVOH), polyethylene terephthalate (PET), water dispersible ethylene vinyl alcohol (EVOH), ethylene vinyl alcohol vinyl acetate copolymer, polyvinylidene chloride (PVDC), water dispersible polyamide (PA), starch, starch derivatives, and combinations of two or more thereof. Such layers have been shown to not only be food compatible but also have good barrier functions against water vapour, oxygen, and the like. Furthermore, a polymer or compound with functional carboxylic acid groups may be included in the composition to improve the water vapour or barrier properties, such as ethylene acrylic acid copolymer (EAA) and ethylene methacrylic acid copolymers (EMAA) or mixtures thereof. Metalized polymer films (e.g., PVOH or PET with aluminium coating) or metalized paper films may also be used as oxygen barrier layer. These films offer the advantage of having a thin metal layer, less than 1g/m² in combination with a polymer or paper layer between 2-20 g/m². Evidently, metalized paper films offer the advantage of increasing the amount of recyclable material.

[0025] The outer structural layer may have a weight of between 100 g/m² and 500 g/m², preferably from 250 g/m² to 350 g/m². Such weights are generally sufficient for packages in the domestic food sector e.g., for packages in the range of 100 ml to 5 litres in size. The presently disclosed package may have an overall size in the range of (l x b x h) up to 130 x 120 x 200 mm. It may comprise any suitable card or paper construction in a single or multiple layers, including reinforced, corrugated, honeycomb, moulded and foamed constructions. For the purpose of the present specification, card and card-based is intended to denote a product that is primarily formed

from a cellulose-based pulp, not excluding paper. Primarily formed, means that there may be small amounts of other materials including inorganic fillers, inks, binders, and other additives conventionally included in the paper-making process. The card may be formed of virgin or recycled pulp and mixtures thereof. It is well recognised that different definitions and requirements may be applied for the manufacturing and disposal of paper and card and, where reference is made below to percentages of paper, these include all of the paper constituents, including cellulose fibers, mineral filler, bound water, paper additives, size, bulk pigment and latex binders. The percentages of non-paper will apply to all other layers not usually considered to be paper, including print, varnish and non-water-soluble adhesive layers and the barrier layers as mentioned elsewhere.

[0026] Importantly, the outer structural layer forms the bulk of the container, with any non-paper-based materials forming a minor overall percentage thereof. In an embodiment the sidewall and base may comprise greater than 85 wt% paper or at least 90 wt% paper or greater than 95 wt% paper or even greater than 97 wt% paper. By ensuring such a high paper content, the sidewall and the resulting container may be deemed suitable for collection and recycling with paper and card-based products. The precise requirements will depend on local or regional regulations. The same may apply to the lid structure. However, in general, the lid structure can be formed to have a higher degree of paper content as there is less need for barrier layers and the like. Thus, most of the components of the lid structure may have a paper content that is more than 1, 2, 3, 4 or 5 wt% greater than that of the container portion. It will thus be understood that by providing such a card-based lid structure, the overall cellulose content of the package may be increased. A container portion that, alone, might not have reached the requirement for recycling in the paper stream may thus be recycled when offered as an integral part of such a package together with the lid structure. This also obviates a need for a user to separate a lid structure from the container portion prior to disposal.

[0027] The outer structural layer may itself be a laminate comprising a plurality of layers. These may include one, two, three or more layers of paper or card material, combined with intermediate layers of adhesive or barrier materials. The outer structural layer may also be provided with additional layers on its outer surface, in particular for decorative purposes. Such layers may include additional paper layers or labels, hygienic layers, such as the inner hygienic layer, lacquers, varnishes and printable layers or the like. In a preferred embodiment, the outer structural layer is primarily formed by two layers of paper-based material each having a weight between 200 and 450 g/m², adhered or glued to one another by an adhesive layer with a weight between 2 and 25 g/m². The base and sidewall may be joined together by conventional techniques, preferably in a folded seam. Such constructions are described in co-pending application No PCT/EP2022/057364, the contents of which are incorporated herein by reference in their entirety.

[0028] In an embodiment, the lid structure comprises a collar portion connected to the upper peripheral edge of the container and a lid portion, hingedly connected to the collar portion. By providing a collar portion between the upper peripheral edge of the container portion and the lid

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portion, multiple functionalities can be spatially separated and better optimized: For initial sealing of the interior space of the container portion, the removable seal must be capable of forming a hermetic closure with the upper peripheral edge that meets the required level of performance. Once opened, the required degree of closure achieved by the lid portion may be lower but nevertheless sufficiently high that careful tolerances apply. A collar portion of card-based material also allows additional functionalities to be implemented.

[0029] Although it is desirable that the removable seal may also be of recyclable material and may also fall within the above percentage values of cellulose-based material. Nevertheless, since the seal is completely or at least partially removed on initially opening the package, it can be disposed in a separate stream and for this reason it need not be included within the definition of the package for the cellulose content.

[0030] In an embodiment, the collar portion has a height of between 10 mm and 70 mm, preferably between 20 mm and 40 mm. The collar portion has a height that defines an additional inner space at the upper end of the package. This further has the advantage of allowing for the presence of additional elements inside the package. For example, a scoop for extracting and measuring the product.

[0031] The collar portion may also comprise a functional insert allowing additional functionalities to be introduced between the container portion and the lid portion. It will be understood that the functional insert and its associated functionalities will be present in a region of the package that is separated from the interior space prior to opening of the package by removal of the seal. Various functionalities may be contemplated including but not limited to a scoop leveller, a scoop holder, a latch for securing the lid portion, a stiffening flange, an insect barrier, and a sealing surface. The insert is preferably also of card-based material and may comprise a plate having an aperture corresponding to the access opening. The insert may be connected to the collar portion at its internal periphery. In one embodiment, the insert is connected to the collar portion in a folded seam to form an upper peripheral closure rim.

[0032] The lid portion may be of any suitable construction, including moulded or one-piece construction. In a preferred embodiment, the lid portion comprises a lid and a frame that are joined together during manufacture. This may be achieved using a folded seam as frequently used for closing the base of tubular card containers. In the following, reference to a folded seam is intended to denote a connection between two layers of card material that are adhered together and where one or both layers are subsequently folded over the other to produce a fold of at least three layers. In the case of the lid portion, the folded seam may form an upwardly extending peripheral rim that extends upwards above the level of the adjacent portions of the lid. This may be termed a stacking rim, whether or not it actually participates in stacking, as will be discussed further below.

[0033] The lid may be planar e.g., in the form of a flat disk or may be non-planar and may have a profiled shape. In particular, the lid may be bowed upwards in a central region and/or have a cavity at its underside. The lid may be bowed upwards to a height approximating the height of the

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stacking rim. The space created beneath the lid provides additional possibilities for storing objects such as a scoop or the like.

[0034] The frame may have a constant cross-sectional shape over its height. In one embodiment, the frame may extend downwards to form a skirt that, in the closed position of the lid, covers at least part of the upper peripheral closure rim of the collar portion. The skirt may alternatively have a larger cross-section than the remainder of the frame. This can allow it to better fit over and close around the outside of the upper peripheral closure rim of the collar portion. In general, it will be understood that the joint between the upper peripheral closure rim of the collar portion and the lid portion can be arranged at the skirt, elsewhere on the frame, at a lower surface of the lid or at a junction between the frame and the lid. Preferably the upper peripheral closure rim is at least partly covered by the skirt extending downwards from the frame. As noted above, a highly effective joint between these two components is required to ensure that the package can be properly reclosed after initial opening e.g. to prevent powder exit on tipping the container and avoid the entry of unwanted insects and other animals that may otherwise be attracted to the contents. The closure may ensure that no gap greater than 150 microns is present, preferably no greater than 100 microns. It has been found that openings of 70 microns or more can allow ingress of insects and the disclosed closure most preferably ensures an insect-tight closure during the use of the package having no opening greater than 70 microns. The joint should be maintained to the required tolerance e.g. of 70 microns or less, even after repeated opening and closing of the lid during use. Preferably, the joint should be maintained for more than 50 openings or more than 70 openings or even more than 100 openings.

[0035] In a further embodiment, further improved closure may be achieved at the joint between the lid portion and the collar portion by providing an additional resilient element. The lid portion may comprise a gasket that can resiliently bear against part of the collar portion, in particular against the upper peripheral closure rim. The gasket is preferably also made of card-based material. The gasket may be located at an underside of the lid and can have an outwardly extending edge that is resilient. In this context, resilient is intended to include both that the material is resilient or that it is resiliently mounted. The edge of the gasket may be a freely floating edge that can bear against the upper peripheral closure rim. Alternatively, the edge of the gasket may be captured, and a floating annulus may perform the function of a joint. The edge of the gasket may be captured between the lid and the frame, which together may form a folded seam.

[0036] The gasket may extend across the full extent of the lid or may only be present at the periphery. By providing it to be co-extensive, the double layer construction provides additional reinforcement of the lid portion. It can also be used to provide further functionality, e.g. for supporting a latch or a scoop holder.

[0037] The upper peripheral edge of the container may have any suitable termination that allows it to perform its required functions. In principle, these functions include forming a hermetic seal with the removable seal and connection to the collar portion. Reference to the upper peripheral edge is

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intended to denote a region rather than a distinct point i.e., the region at which the sidewall terminates, including both the inner surface and the outer surface. For the avoidance of doubt, the uppermost extremity of the sidewall will be referred to as the uppermost edge.

[0038] The removable seal may be connected at any point of the upper peripheral edge, either
5 to the inner surface or the outer surface or across the uppermost edge. In an embodiment, the upper peripheral edge comprises a circumferential flange. This may be formed by rolling or folding over the sidewall. Preferably, the circumferential flange extends outwards from the container i.e., the sidewall is rolled or folded over outwards. This ensures that the inner surface of the sidewall defining the interior space is available for connection of the seal. The circumferential flange
10 advantageously offers a stable surface to receive the removable seal, providing additional area for the connection. preferably the flange extends outwardly to provide a connecting structure that secures the collar portion to the peripheral edge of the container.

[0039] Connection to the collar portion takes place at the connection segment. This connection is less critical than that of the removable seal, in that the connection is outside the region of the
15 interior space and the connection need not have the same barrier properties. Nevertheless, this connection should be secure enough to prevent separation during use and also to avoid escape of powder or ingress of insects and the like. As discussed above, any gaps must be smaller than 150 microns or smaller than 100 microns or for insect tightness, smaller than 70 microns to avoid such ingress. The connection may also be permanent, e.g. adhesively secured. In an embodiment, an
20 inner circumference of the connection segment engages around an outer circumference of the upper peripheral edge of the container portion. Alternatively, the connection segment can be connected at the uppermost edge of the container portion and can even be attached onto the removable seal, thus sandwiching the seal between the container portion and the collar portion. In this sense, it will be understood that the seal may not be removable in its entirety and may have a
25 removable section.

[0040] In an embodiment, the connection segment may comprise a circumferentially extending groove which can receive part of the upper peripheral edge of the container in an interference fit. This is particularly advantageous when the upper peripheral edge is in the form of an outwardly extending circumferential flange, which can enter the groove. This can allow the portions to be
30 snap-fitted together, which allows for simplified assembly. The groove may be formed by deformation of the material of the connection segment to form a corrugation. Alternatively, or additionally, the connection can be welded, glued, heat-sealed, or as otherwise known in the art including additional connecting elements on the inner or outer surfaces of the container and the collar portion.

[0041] According to a particular embodiment, the package may comprise a locking arrangement
35 between the lid portion and the collar portion. The locking arrangement can prevent accidentally opening of the lid portion. More importantly, it can assist in maintaining the lid portion biased against the upper peripheral closure rim to ensure an adequate joint.

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[0042] The locking arrangement may comprise a first locking element arranged on the collar portion and a second locking element arranged on the lid portion. Advantageously, the locking elements can allow repeated opening and closing of the locking arrangement. Preferably, the locking arrangement is configured to be manipulated with one hand, which provides to the user an easy access to the product. The first locking element may be a detent formed e.g., on a functional insert. The second locking element may be a latch, pivotally mounted in, on, under or through the lid.

[0043] The lid portion may be slid downwardly over the collar portion in a sliding fit and may be completely removed to access the contents. Preferably, a hinge is provided between the lid portion and the collar portion, whereby the lid portion can be pivoted open and closed. A hinge provides a user with an easier and more hygienic selective opening and closing of the access opening by ensuring that the lid stays attached to the package during use.

[0044] In a further embodiment, the package can be provided with a wrapper, removable prior to use, around at least part of the collar portion and the lid portion. This may be present prior to first use and may be completely or partially removed to gain access to the interior of the package. Most preferably, the wrapper is made of paper or card-based material. It will nevertheless be understood that if the wrapper is removed completely, it can be disposed of in a separate waste stream and need not then be made of paper or card.

[0045] The term banderol is often used for wrappers that encircle an item and is used in the following for a narrow wrapper in the form of a strip that spans part of the collar portion and the lid portion. This can guarantee sealing between the collar portion and the lid portion during storage and transportation of the package and can serve to provide tamper evidence. In an embodiment removal of the banderol or part of the banderol may reveal a contrasting colour beneath. The removable portion may be a strip defined by one or more lines of weakness.

[0046] In a particular embodiment, a hinge may be formed between the lid portion and the collar portion by removing a circumferentially extending section of the banderol, leaving a portion of the banderol intact.

[0047] The package may also further comprise a scoop located within the collar portion beneath the lid. The scoop may also be manufactured of a material other than card and may thus be separately recycled. It may also be excluded from the determination of paper percentage. Alternatively, a card-based scoop may be provided.

[0048] The package may also comprise a scoop holder. As noted above, the functional insert may include a location or placement for a scoop. Alternatively, the scoop holder may be located on an underside of the lid, such as on part of the gasket.

[0049] In an embodiment the container portion is a tube of a constant first outer cross-section. This may be referred to as being a cylinder although it will be understood that it need not be circular in cross-section. A preferred cross-section is a rectangle with rounded corners. This provides good visibility for printed surfaces of the package, while ensuring that it can be manufactured using

techniques for forming tubes. In other embodiment, the container portion may be a tube with a slight taper of say 1 degree or less. This may be sometimes required for constructional reasons. The base may comprise a downwardly extending rim in the following referred to as the base rim. The base rim may have the same first outer cross-section as the remainder of the container portion. This is particularly the case when the base is connected to the sidewall in a folded seam that is rolled over inwardly. The lid portion may have a second outer cross-section that is greater than the first outer cross-section, such that the base of a first container can stack on the lid of a second container. In particular, for the construction discussed above with the frame and the lid connected using a folded seam to form an upwardly extending stacking rim, the base rim can stack inside of the stacking rim of another package. In cases where a latch for releasing the lid portion from the collar portion is provided, this may be located on the lid at a position that lies within the base rim.

[0050] The package may also comprise an outer sleeve surrounding the container portion. It is preferable that the sleeve also comprises card-based material. The sleeve offers the advantage of protecting the container portion with respect to environmental conditions and may provide an improved thermal insulation to the container portion. It can thus, improve the light, oxygen and water vapour barriers of the container portion and safeguard the freshness of the infant formula. The sleeve also offers the advantage of providing the package with an additional surface for decoration. Still further, by providing a sleeve of card material having a high paper content, the overall paper content of the whole package may be improved, allowing it to be recycled in the paper/card stream. In an embodiment, the sleeve comprises more than 99 wt% paper.

[0051] As mentioned before, the lid structure may have an outer dimension larger than the outer dimension of the container portion. The sleeve may be formed to taper or adapt the outer dimension of the container portion to the outer dimension of the lid structure. The sleeve may be applied to the sidewall to form a container portion with a constant outer dimension over its length, corresponding approximately to the lid structure. Alternatively, the sleeve may be applied to the sidewall to provide a tapered container portion with a decreasing outer dimension, being similar to the lid structure at the top part and similar to the base of the container at the bottom part. In order to adapt the dimension of the container portion to that of the lid structure, the sleeve may be required to have a significant wall thickness. This may be achieved using corrugated card e.g. formed as a single layer of corrugations at an inner surface of the sleeve. The corrugated card may be partially crushed on assembling the sleeve to the sidewall.

[0052] The outer sleeve may be removable from the container portion. Preferably however it is permanently or semi-permanently connected thereto. The connection between the outer sleeve and the container portion may be welded, glued, heat-sealed, or as otherwise known in the art including connection areas on the inner or outer surfaces of the collar portion and/or the container portion. The outer sleeve may be connected at an upper end to the collar portion and at a lower end to the container portion. In the present context, heat sealing is intended to refer to any suitable manner of

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generating and/or applying heat and pressure to melt appropriate sealing material, including welding, ultrasound, induction heating and the like.

[0053] The invention also contemplates a package constructed of card-based material, the package comprising a longitudinal extending tubular body with at least four transverse elements, sealingly connected to the tubular body at four junctions, comprising in sequence: a first element forming a base; a second element forming a removable seal for enclosing an interior space; a third element being a functional insert; and a fourth element forming a lid. The longitudinal extending tubular body may be constructed in separate segments, between the respective transverse elements, thus a container sidewall may be located between the base and the removable seal, a connection segment may be located between the removable seal and the functional insert, and a frame may be located between the functional insert and the lid. The segments may differ from each other in outer cross-section.

[0054] The transverse elements assist in making a package with adequate strength and functionality. In particular, at each junction, the tubular body may be folded or rolled into a rim or flange. As described above, the base and the sidewall may be joined together in a folded seam to form a downwardly extending rim. The sidewall may be rolled outwardly to form a circumferentially extending flange on which the removable seal can be attached by welding or the like. The functional insert may be joined together with the collar portion in a folded seam to form the upper peripheral closure rim. The lid may be joined together with the frame in a folded seam to form the stacking rim. The package may be provided with an amount of powdered infant nutrition sealed within the interior space. The interior space may further contain an inert gas and less than 2 % oxygen, preferably less than 1.5% oxygen and more preferably, less than 1% oxygen. This may be achieved by application of vacuum and gas flushing with the inert gas during the filling procedure and can ensure an adequate shelf life for the infant nutrition.

25

BRIEF DESCRIPTION OF THE DRAWINGS

[0055] Embodiments will now be described, by way of example only, with reference to the accompanying schematic drawings in which corresponding reference symbols indicate corresponding parts.

[0056] Figure 1 shows a perspective view of a package according to an embodiment of the present invention.

[0057] Figure 2 is a partially exploded view of the package of Figure 1.

[0058] Figure 3 shows a cross-section through a segment of the sidewall of the container portion of Figure 1.

[0059] Figure 4A shows a cross-sectional view through the collar portion of Figure 2 on the sagittal plane X-Z.

[0060] Figure 4B shows a top view of the collar portion of Figure 2.

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[0061] Figure 4C show a top view of the collar portion of Figure 2 with a functional insert according to an alternative configuration.

[0062] Figure 5A shows an exploded view of the lid portion of Figure 2.

[0063] Figure 5B shows a cross-section through the lid portion on the sagittal plane X-Z.

5 [0064] Figure 6A shows a cross-section through the package of Figure 1 on the sagittal plane X-Z.

[0065] Figure 6B shows a closeup of part of the closure between the lid portion and collar portion from Figure 6A.

10 [0066] Figure 7 shows a perspective rear view of the package of Figure 1 with the lid portion partially open.

[0067] Figure 8 shows a cross-sectional view of the package of Figure 1 stacked with another package.

[0068] The figures are meant for illustrative purposes only, and do not serve as restriction of the scope or the protection as laid down by the claims.

15

DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

[0069] The following is a description of certain embodiments of the invention, given by way of example only and with reference to the figures.

20 [0070] Figure 1 shows a card-based package 10 for powdered infant nutrition according to the present invention, comprising a container portion 20 and a lid structure composed by a collar portion 30 and a lid portion 40. The package 10 further comprises a banderol 50 surrounding the collar portion 30 and part of the lid portion 40, which is present prior to first use to guarantee sealing during storage and transportation.

25 [0071] Figure 2 is a partially exploded view of the card-based package 10 of Figure 1 illustrating the arrangement of the individual portions. The package 10 has a longitudinal axis X-X, by which may be defined a transverse plane X-Y and a sagittal plane X-Z. In the following, reference to upper, lower, top, bottom etc. is given with respect to the package 10 in its upright condition, with the axis X-X arranged vertically.

30 [0072] The container portion 20 comprises a container 21 with a tubular body, having a base 22 and a sidewall 23 extending upwards to an upper peripheral edge 24 to define an interior space S for receiving the powdered infant nutrition. The upper peripheral edge 24 comprises a circumferential flange 25 extending outwards from the container 21, to receive a removable seal 26. The removable seal 26 hermetically seals the container prior to use and may be removed partially or completely by the user to have access to the interior space S. An outer sleeve 28
35 surrounds the container portion.

[0073] The collar portion 30 comprises, at the bottom, a connection segment 31; and at the top, an upper peripheral closure rim 32 defining an access opening O to the interior space S of the package 10. The collar portion 30 has a height of around 35 mm in the illustrated embodiment but

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it will be understood that this may be adapted according to requirements. The height of the collar portion 30 defines an additional inner space above the container 21 that allows for the presence of additional optional elements inside the package 10, for example, an informational leaflet and/or scoop.

5 [0074] In the package presented in Figure 2, the collar portion 30 includes a functional insert 33. Insert 33 comprises scoop levellers 34 and detent 72. Figures 3A and 3B, described below, show two examples of the insert 33 configured with different functionalities.

[0075] The banderol 50 is a narrow band of paper material having a height of around 35 mm corresponding to that of the collar portion 30. In this view it can be seen to further comprise two
10 circumferential lines of weakness 52 that define a removable strip 51. When the package is to be used for a first time, the strip 51 can be removed to allow the lid portion 40 to be open. The strip 51 may have a contrasting colour, to that of the underlying collar portion 30, that functions as tamper evidence and includes grasping tabs 54, that facilitate its removal.

[0076] The lid portion 40 provides a closure to the package 10 and includes a locking element
15 71. Further details on the construction of the lid portion 40 are described below with reference to Figure 4.

[0077] Figure 3 shows a cross-section through a segment of the sidewall of the container portion of Figure 1. The inner hygienic layer 110 is uppermost. This is a thin polymer layer (e.g., PE) having a thickness of 20 microns. It will be understood that these dimensions are exemplary, and Figure 3
20 is not to scale.

[0078] Beneath the inner hygienic layer 110 is an oxygen barrier layer 120, which comprises a metalized film 122 and a polymer (e.g., EVOH) barrier film 124. At the outer side of the oxygen barrier layer is an outer structural layer 130. In the illustrated embodiment, the outer structural layer 130 is comprised of an outermost card layer 136, an adhesive layer 134 and a thin paper layer 132.

25 [0079] In the illustrated exemplary embodiment of Figure 3, the thin paper layer 132 is delivered from a roll to a deposition station where EVOH is spray coated as an aqueous dispersion and subsequently dried to a thickness of 15 micron. The metalized film 122 is then applied by vapour deposition onto the EVOH layer to a thickness of 5 micron. Finally, the inner hygienic layer 110 is applied by spray coating over the metallized film 122. In a subsequent lamination step, the coated,
30 thin paper layer 132 and the outermost card layer 136 are assembled together with the adhesive layer 134 to form a continuous laminate of sidewall material.

[0080] Figure 4A shows a cross-sectional view through the collar portion 30 of Figure 2 on the sagittal plane X-Z. The insert 33 comprises a die-cut plate of card material, with an aperture O corresponding to the package access opening. It is connected to the collar portion 30 by a folded
35 seam that forms the upper peripheral closure rim 32. As can be seen in this view, the upper peripheral closure rim 32 has a slightly smaller outer cross-section than the rest of the collar portion 30. At a lower part of the collar portion 30, groove 35 is formed between two corrugations of the card material. The groove 35 and corrugations extend circumferentially completely around the

connection segment 31 of the collar portion 30. The detent 72 is formed by a portion of the insert 33 folded upwards out of the plane of the insert 33 into a triangular or prismatic form. The insert 33 is also folded over at the position of the scoop levellers 34 to give additional strength to the edge that is intended for levelling.

5 [0081] Figure 4B and Figure 4C show top views of the collar portion 30 of Figure 2 with two possible configurations of insert 33. In the configuration of Figure 4B, the insert 33 comprises two scoop levellers 34 extending inwards at two corners of the insert 33 at either side of the detent 72. In the case of the configuration shown in Figure 4C, the insert 33 is provided with scoop levellers 34 and a scoop holder 61 to receive a scoop 60.

10 [0082] Figure 5A shows an exploded view of the lid portion 40 according to the package of Figure 2. The lid portion 40 comprises a frame 42 and a lid 41. The lid 41 is formed as a die-cut plate of card, shaped to be bowed upwards in the central region 47. A supplementary plate 45 is provided at an underside of the lid portion 40 and has the same general shape as the lid 41, also being bowed upwards. The supplementary plate 45 has different functions. In this example, the
15 supplementary plate 45 reinforces the lid 41 providing the lid portion 40 with a more durable and solid construction. Furthermore, the supplementary plate 45 is configured to include scoop holder 61 to have easy access to a scoop after opening the lid portion 40. Finally, in the closed position of the lid 41, a resilient edge 48 of the supplementary plate 45 has the function of a gasket to improve the closure of the lid portion 40. Further details of the gasket function are described below with
20 reference to Figures 5B and 6.

[0083] Figure 5B shows a cross-section through the lid portion on the sagittal plane X-Z. The frame 42 is connected to the lid 41 by a folded seam, which forms an upwardly extending stacking rim 44 at the top of the lid portion. The frame 42 also extends downwards to a closure skirt 43 having a larger cross-section than the stacking rim 44. In this view, it can be seen that the upwardly
25 bowed central region 47 forms a cavity C with a height h corresponding to a height of the frame 42. The cavity C created beneath the lid 41 provides additional space for storing elements such as a scoop or the like.

[0084] The central region 47 of the lid 41 is in direct contact with and adhesively connected to the supplementary plate 45. The resilient edge 48 of the supplementary plate 45 is bowed
30 downwards and floating with respect to the edge of the lid 41. This configuration allows the resilient edge 48 to flex. On a region of the lid portion 40, between the stacking rim 44 and the cavity C, a locking element, in this case a latch 71, is pivotally mounted through the lid 41 and supplementary plate 45. An upper part 73 of the latch 71 extends upwardly from the lid 41, while the lower part 74 has a slit 75 and extends downwards under the supplementary plate 45. A cover 76 is adhesively
35 connected to the upper part 73 to retain it to the lid 41.

[0085] Figures 6A and 6B show a partial cross-section through the package of Figure 1 on the sagittal plane X-Z.

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[0086] In Figure 6A is shown the container 21 of the container portion 20. The container 21 is made from a card blank, joined to itself in a longitudinal seam (not shown) to form a tube with constant outer cross-section. At its bottom, the base 22 and the sidewall 23 of the container 21 are joined together by a folded seam which closes the lowest part of the container 21 and forms a base rim 27 extending downwardly and having the same outer cross-section as the container 21. At the top of the container portion 20, the sidewall 23 is rolled over outwardly from the upper peripheral edge 24 of the container 21 to form the circumferential flange 25. The seal 26 is placed on almost the entire surface defined by the circumferential flange 25, which ensures appropriate hermetic sealing of the container 21 prior to use. The collar portion 30 is connected to the container portion 20 by a snap-fit joint formed between the circumferential flange 25 and the circumferentially extending groove 35. Additionally, the joint between the collar portion 30 and the container portion 20 may be glued together to ensure proper permanent sealing.

[0087] An outer sleeve 28 made of card-based material 28 surrounds the container portion 20. The sleeve 28 is made from a card blank, similar to the sidewall 23 of the container 21, joined to itself in a longitudinal seam (not shown) to form a tube. The outer sleeve 28 is connected to the bottom part of the collar portion 30 and to the upper peripheral edge 24 by an inwards double bent of its sidewall and forming a squared edge that covers the bottom inner side of the collar portion 30 and the flange 25 of the container portion 20, as shown in Figure 6A.

[0088] At the top of the container 21, the outer sleeve 28 provides the package with a larger outer dimension at the container portion 20, approximately the same to the outer dimension of the collar portion 30. In the exemplary embodiment of Figure 6A, the outer sleeve extends downwardly with a decreasing outer dimension and towards the bottom of the container portion 20 stopping just before the base rim 27 and approaching to its outer dimension.

[0089] Figure 5A also shows a scoop 60 stored in the space formed above the seal 26 by the collar portion 30 and the lid portion 40 and held by the scoop holder 61 in supplementary plate 45. The banderol 50 extends circumferentially around the outer surface of the collar portion 30 and the closure skirt 43 of the lid portion 40.

[0090] In the closed position of the lid portion 40, as shown in Figure 5B, the closure skirt 43 covers the outer circumferential surface of the upper peripheral closure rim 32, forming a joint between the lid portion 40 and the collar portion 30. The folded seams of the closure skirt 43 and the upper peripheral closure rim 32 ensure that these elements are relatively rigid and can form a tight interference fit. Importantly, high manufacturing tolerances can be achieved ensuring that any gaps are smaller than 70 microns, ensuring adequate insect-tightness. The closure is further improved by the supplementary plate 45. The resilient edge 48 acts as a gasket, flexing into engagement with the upper peripheral closure rim 32. The resilient edge 48 also extends to meet the closure skirt 43, providing additional support for the resilient edge 48 and further enhancing the gasket function.

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[0091] In the locked position of the lid portion 40, as shown in Figure 5B, the detent 72 resides in the slit 75 of the latch 71, effectively retaining the lid portion 40. To unlock the lid portion 40, the upper part 73 of the latch 71 is pushed radially outwards, acting as a lever arm such that the slit 75 releases the detent 72. A pulling movement upwards on the lid portion 40 allows a user to open the package 10.

[0092] Figure 6 shows a perspective rear view of the package of Figure 1 with the lid portion 40 partially open after the removal of strip 51. Removing the strip 51 from the banderol 50 releases the joint between the lid portion 30 and the lid portion 40 and forms a hinge 53. The hinge 53 secures the lid portion 40 to the collar portion 30 after the seal 26 has been removed from the container portion 20.

[0093] Figure 7 shows a cross-sectional view of the package of Figure 1 stacked with another package. The stacking rim 44 of the first package 10 fits radially outside the base rim 27' of the second package 10', while the base 22' of the second package 10' rests on the top the lid portion 40 of the first package. It can also be seen that there is adequate space for the latch 71 to fit radially inwards of the base rim 27', while the upwardly bowed central region 47 of the lid 41 fits beneath the base 22'. This requires that the base rim 27' also extends downwards a distance greater than h below the base 22'.

[0094] The invention has been described by reference to certain embodiments discussed above. It will be recognized that these embodiments are susceptible to various modifications and alternative forms well known to those of skill in the art. In particular, both the locking arrangement and the scoop holder may be distinct from the schematically illustrated design. Accordingly, although specific embodiments have been described, these are examples only and are not limiting upon the scope of the invention.

Claims

1. A card-based package for sensitive food products, comprising:
a container portion, the container portion defining an interior space for receiving the
5 product and having a base and a sidewall extending to an upper peripheral edge for
receiving a removable seal for hermetically sealing the container portion prior to use;
a lid structure, that can open and close to allow selective access to the interior space
after removal of the seal,
wherein the container portion and the lid structure are formed of card-based material
10 and at least the container portion has light, oxygen, and water vapour barrier properties
sufficient for storage of the product for a period exceeding 24 months.
2. The package according to claim 1, wherein the sidewall has an oxygen transmission rate
(OTR) of less than 0.5 cc/m²/day, preferably less than 0.3 cc/m²/day and more preferably
15 less than 0.1 cc/m²/day (ASTM D3985-17en).
3. The package according to claim 1 or claim 2, wherein the sidewall has a water vapour
transmission rate (WVTR) of less than 0.5 g/m²/day, preferably less than 0.3 g/m²/day and
more preferably less than 0.1 g/m²/day (ASTM F1249-20).
20
4. The package according to any one of the preceding claims, wherein the sidewall has a light
transmission in the 300 nm to 700 nm range of less than 0.5%, preferably less than 0.2%
(ISO 2471:2008).
- 25 5. The package according to any one of the preceding claims, wherein the sidewall comprises
an outer structural layer comprising predominantly cellulose material and an inner hygienic
layer of a food quality polymer material.
6. The package of claim 5, wherein the inner hygienic layer has a thickness of less than 20
30 microns, preferably between 2 microns and 20 microns.
7. The container according to any one of the preceding claims, wherein the sidewall comprises
an oxygen barrier layer, preferably laminated between an outer structural layer and an inner
hygienic layer.
35
8. The package according to any one of the preceding claims, wherein the sidewall comprises
greater than 85% wt% paper, preferably greater than 90 wt% paper.

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9. The package according to any one of the preceding claims, wherein the lid structure comprises greater than 95 wt% paper, preferably greater than 97 wt% paper.
- 5 10. The package according to any one of the preceding claims, wherein the lid structure comprises a collar portion connected to the upper peripheral edge and a lid portion, hingedly connected to the collar portion.
- 10 11. The package according to claim 10, wherein the collar portion comprises a functional insert, including one or more functionalities selected from the group consisting of: scoop leveller, scoop holder, latch, stiffening flange, insect barrier and sealing surface.
12. The package according to claim 10 or claim 11, wherein the lid portion further comprises a gasket located at an underside of the lid and having a resilient edge.
- 15 13. The package of any one of the claims 10 to 12, further comprising a locking arrangement between the lid portion and the collar portion
14. The package of any one of claims 10 to 13, further comprising a paper banderol provided prior to use around at least part of the collar portion and the lid portion.
- 20 15. The package of claim 14, wherein a circumferentially extending section of the banderol is removable to form a hinge between the lid portion and the collar portion.
16. The package of any one of claims 10 to 15, further comprising a scoop holder, preferably located on an underside of the lid portion.
- 25 17. The package of any one of the preceding claims, further comprising a scoop located within the lid structure.
- 30 18. The package of any one of the preceding claims, wherein the base and sidewall are joined together, preferably in a folded seam.
19. The package according to any one of the preceding claims, wherein the upper peripheral edge of the container comprises a circumferential flange extending outwards from the container.
- 35 20. The package of any one of the preceding claims, wherein the container portion is a tube of a constant first outer cross-section.

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21. The package of any one of the preceding claims, further comprising an outer sleeve, surrounding the container portion.
- 5 22. The package of claim 21, wherein the container portion has a first outer dimension, and the lid structure has a second outer dimension that is larger than the first outer dimension and the sleeve tapers from the first to the second outer dimension.
- 10 23. The package of any one of the preceding claims, wherein the lid structure can be repeatedly closed, ensuring no gaps of greater than 150 microns, preferably less than 100 microns and more preferably less than 70 microns.
- 15 24. The package of any one of the preceding claims, further comprising a removable seal hermetically sealing the container prior to use.
- 20 25. The package according to claim 24, further comprising an amount of powdered infant nutrition sealed within the interior space.
26. The package according to claim 25, where the interior space contains an inert gas with less than 2% oxygen, preferably less than 1.5% oxygen and more preferably, less than 1% oxygen.

Fig. 1

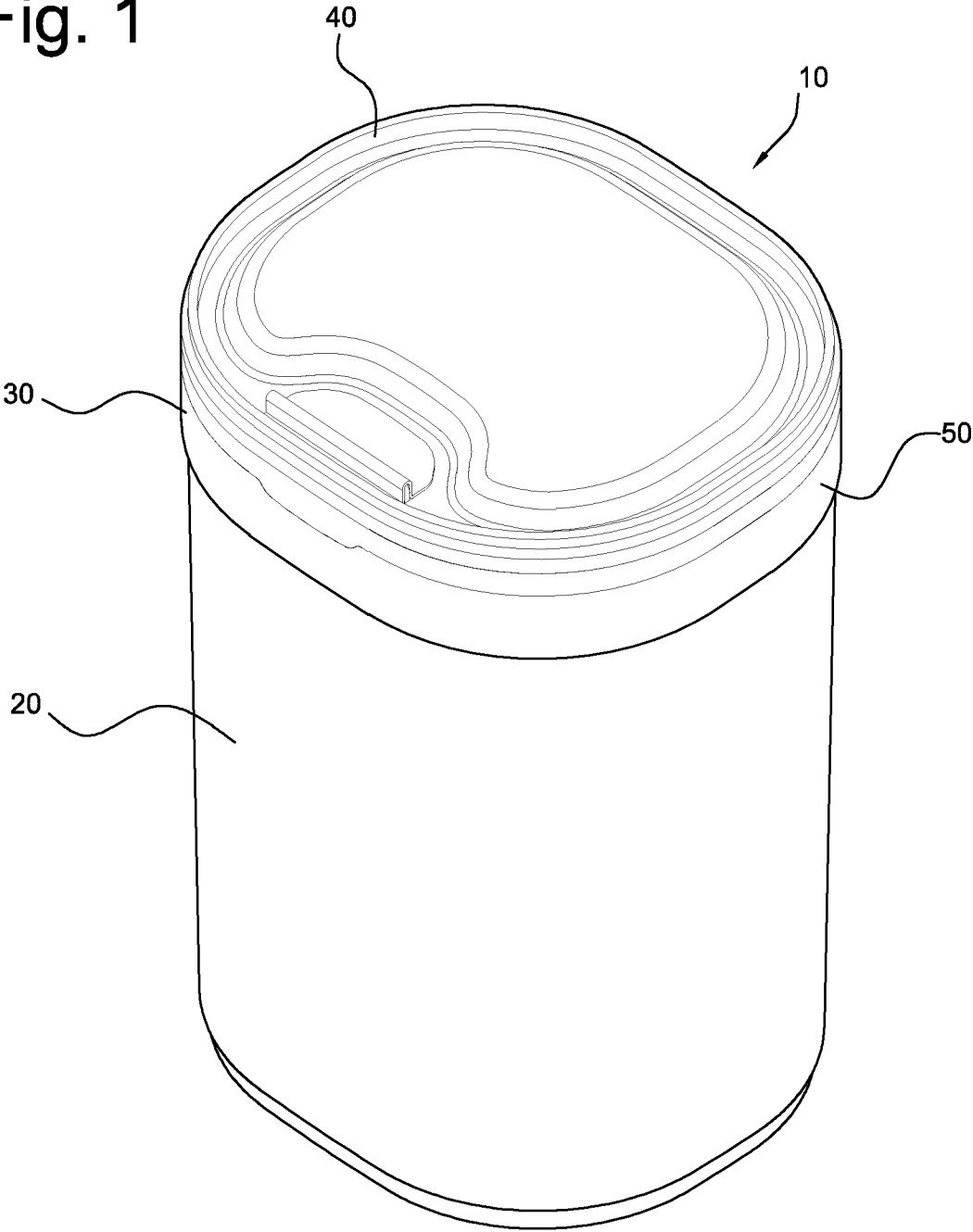


Fig. 3

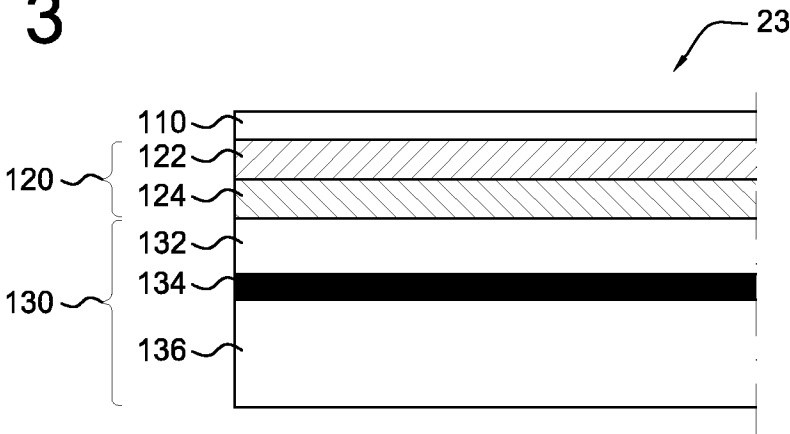


Fig. 2

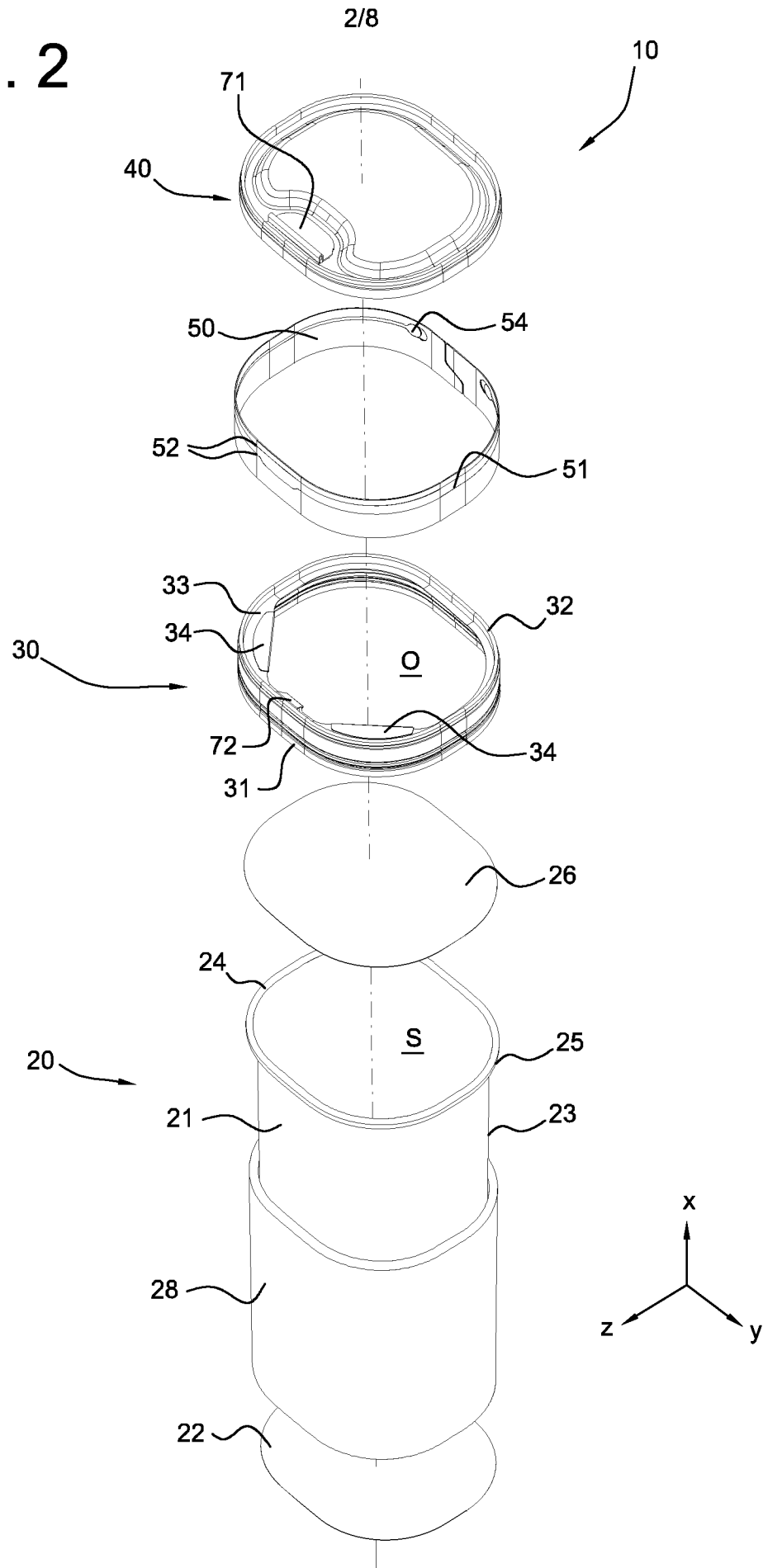


Fig. 4A

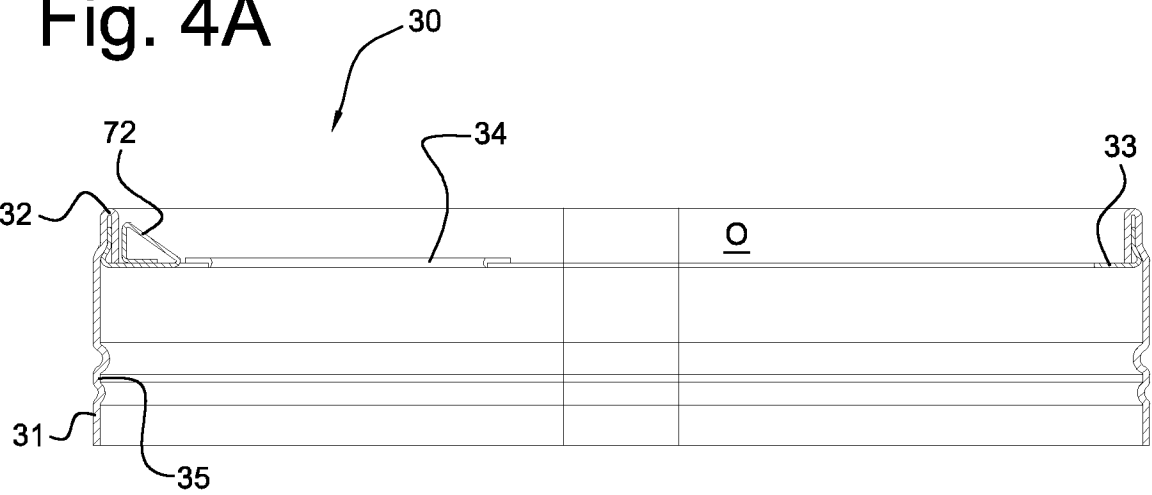


Fig. 4B

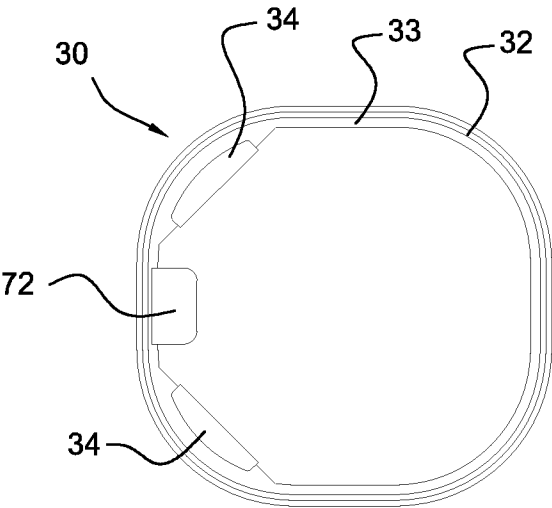


Fig. 4C

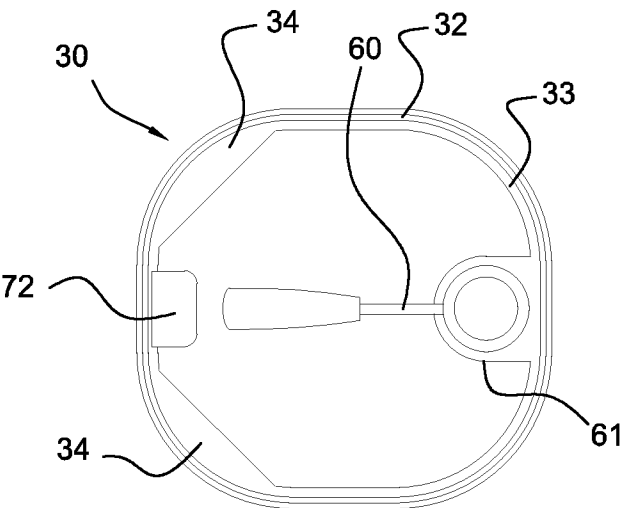


Fig. 5A

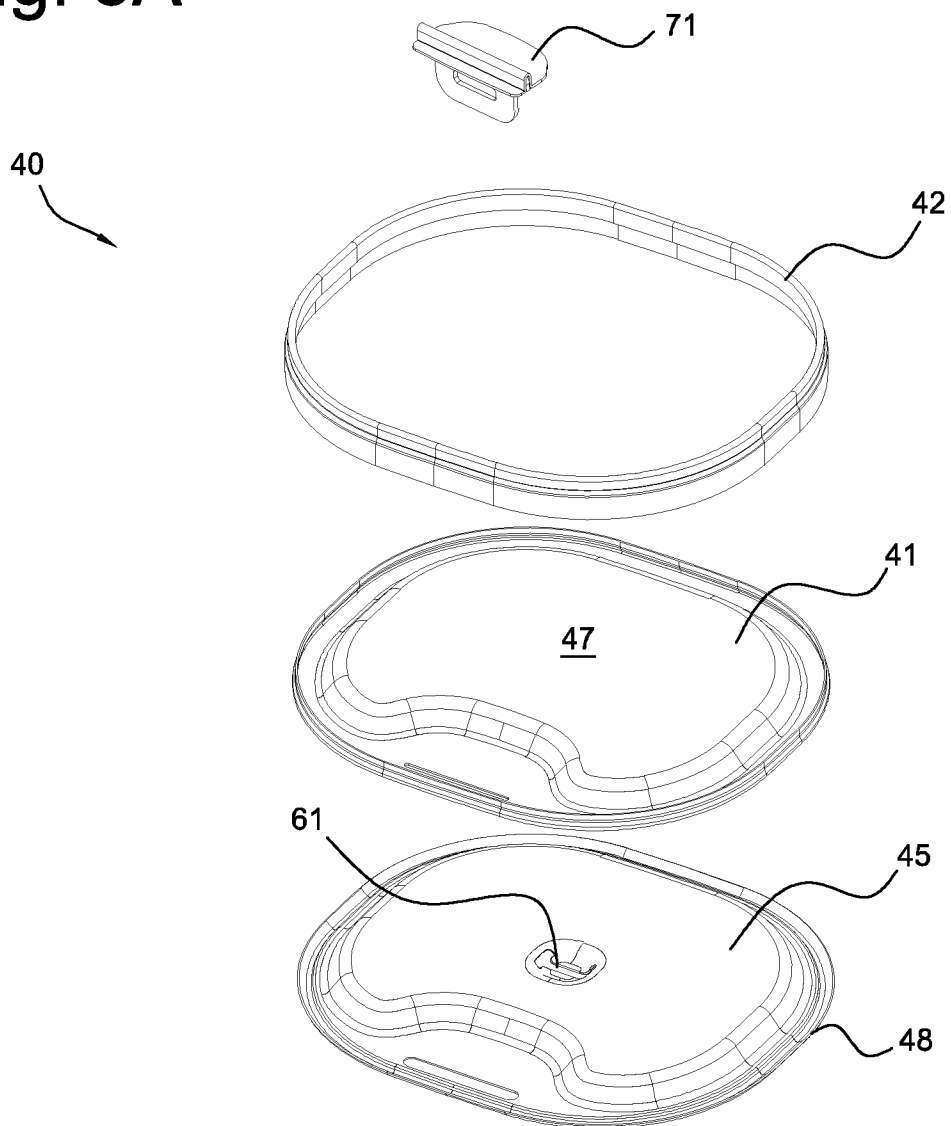


Fig. 5B

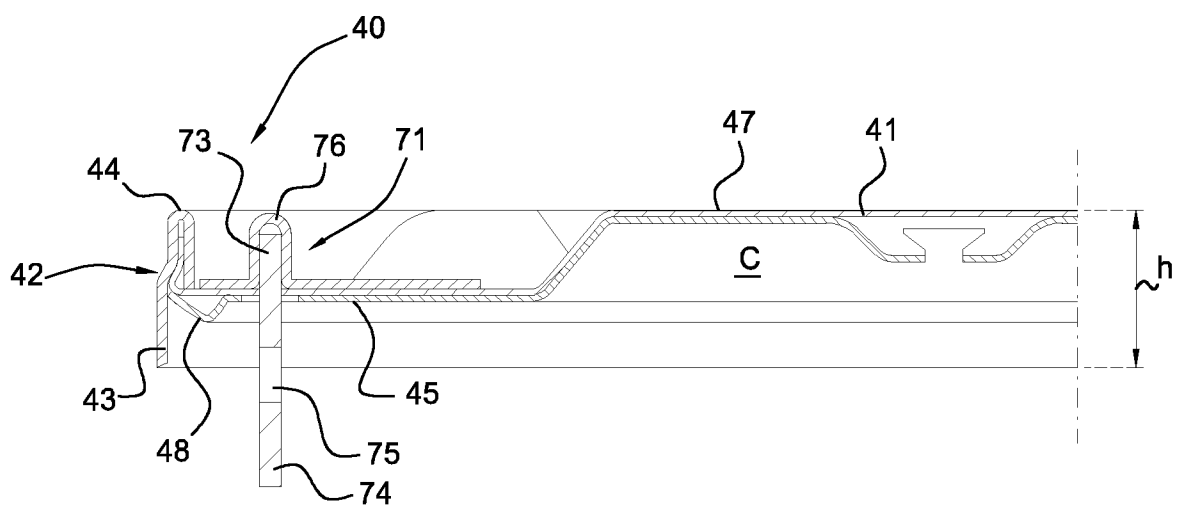


Fig. 6A

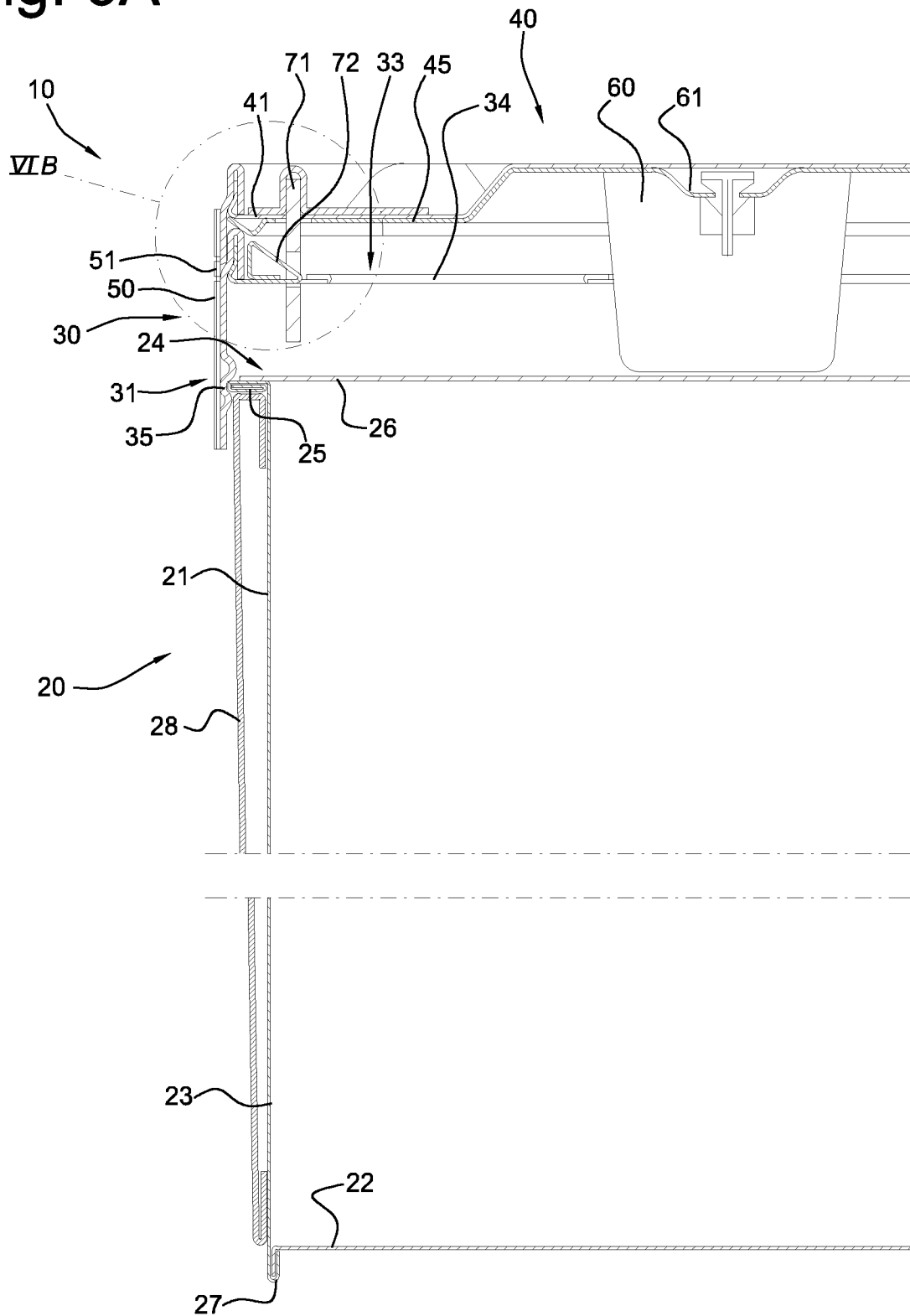


Fig. 6B

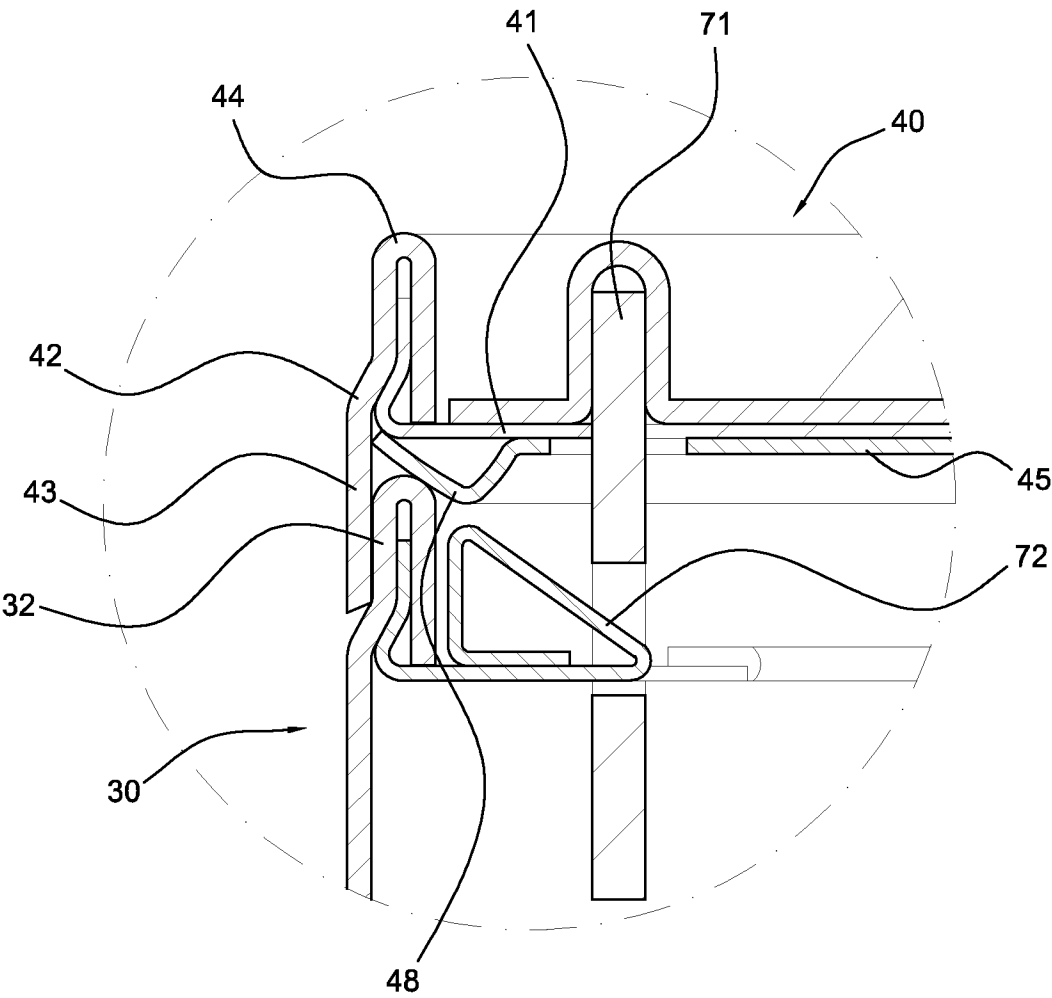


Fig. 7

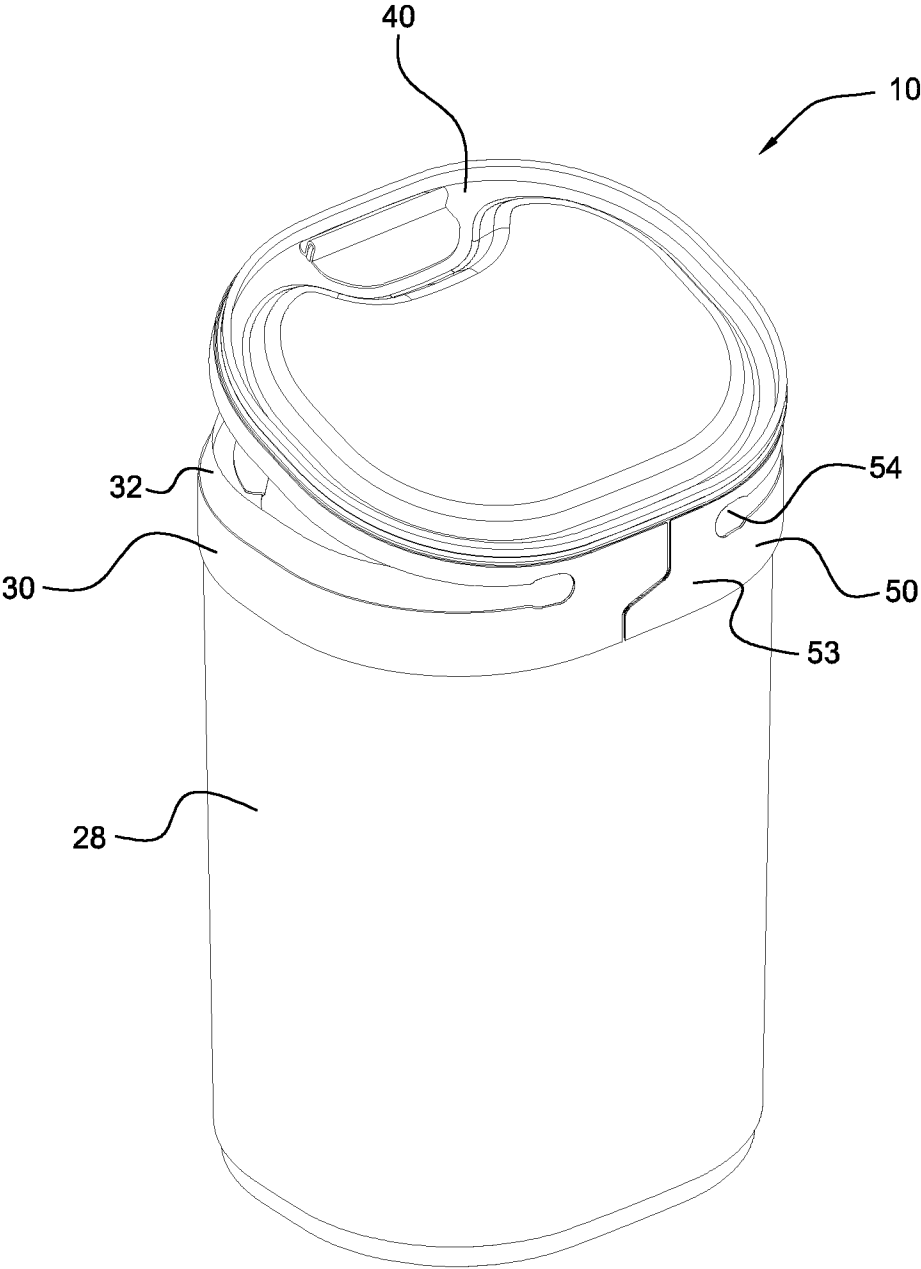
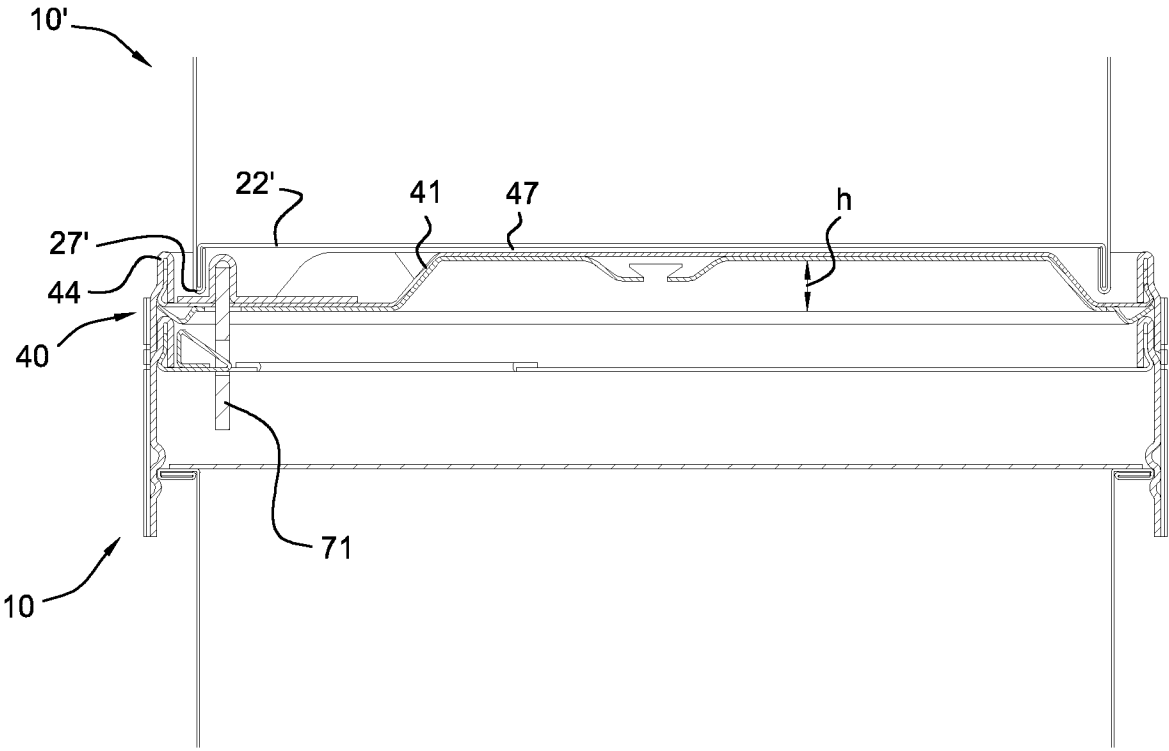


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2022/078845

A. CLASSIFICATION OF SUBJECT MATTER INV. B65D3/22 B65D43/16 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) B65D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 669 549 A (ROBERTSON RONALD D [US]) 23 September 1997 (1997-09-23) column 5, line 46 - column 6, line 4; figures 1-8 -----	1,2
X	EP 3 473 560 A1 (BILLERUDKORSNAES AB [SE]) 24 April 2019 (2019-04-24) paragraph [0002]; claim 1; figure 6 -----	1,2
X	GB 2 052 455 A (DRG LTD) 28 January 1981 (1981-01-28) page 1, line 72 - line 125; figure 2 -----	1,2
X	US 5 669 550 A (KLEMME KIRK [US] ET AL) 23 September 1997 (1997-09-23) column 6, line 19 - line 26; figure 4 ----- -/--	1,2
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance;; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 12 May 2023		Date of mailing of the international search report 17/07/2023
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Wimmer, Martin

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2022/078845

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012/298733 A1 (XU QIHUA [US] ET AL) 29 November 2012 (2012-11-29) paragraph [0131]; figures 2-5 -----	1, 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2022/078845

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims;; it is covered by claims Nos.:
1, 2

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 2

A card-based package suitable for sensitive food products, comprising a container portion, the container portion defining an interior space for receiving the product and having a base and a sidewall extending to an upper peripheral edge for receiving a removable seal for hermetically sealing the container portion prior to use; a lid structure, that can open and close to allow selective access to the interior space after removal of the seal, wherein the container portion and the lid structure are formed of card-based material and at least the container portion has light, oxygen, and water vapour barrier properties sufficient for storage of the product for a period exceeding 24 months (according to claim 1). The potential special technical feature is that there is a protective layer with special oxygen transmission rate. The problem solved by this features is that the product can be protected against unwanted oxidation.

2. claim: 3

A card-based package suitable for sensitive food products, comprising a container portion, the container portion defining an interior space for receiving the product and having a base and a sidewall extending to an upper peripheral edge for receiving a removable seal for hermetically sealing the container portion prior to use; a lid structure, that can open and close to allow selective access to the interior space after removal of the seal, wherein the container portion and the lid structure are formed of card-based material and at least the container portion has light, oxygen, and water vapour barrier properties sufficient for storage of the product for a period exceeding 24 months (according to claim 1). The potential special technical feature is that there is a protective layer with a special vapour transmission rate. The problem solved by this features is that the product can be protected against unwanted humidity.

3. claim: 4

A card-based package suitable for sensitive food products, comprising a container portion, the container portion defining an interior space for receiving the product and having a base and a sidewall extending to an upper peripheral edge for receiving a removable seal for hermetically sealing the container portion prior to use; a lid structure, that can open and close to allow selective access to the interior space after removal of the

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

seal, wherein the container portion and the lid structure are formed of card-based material and at least the container portion has light, oxygen, and water vapour barrier properties sufficient for storage of the product for a period exceeding 24 months (according to claim 1). The potential special technical feature is that there is a protective layer with special light transmission rate. The problem solved by this features is that the product can be protected against unwanted illumination.

4. claims: 5-8

A card-based package suitable for sensitive food products, comprising a container portion, the container portion defining an interior space for receiving the product and having a base and a sidewall extending to an upper peripheral edge for receiving a removable seal for hermetically sealing the container portion prior to use; a lid structure, that can open and close to allow selective access to the interior space after removal of the seal, wherein the container portion and the lid structure are formed of card-based material and at least the container portion has light, oxygen, and water vapour barrier properties sufficient for storage of the product for a period exceeding 24 months (according to claim 1). The potential special technical feature is that the side walls are made of a cellulose layered laminate. The problem solved by this features is that the container should be stable, suitable for food products and easy to recycle.

5. claims: 9-17, 23

A card-based package suitable for sensitive food products, comprising a container portion, the container portion defining an interior space for receiving the product and having a base and a sidewall extending to an upper peripheral edge for receiving a removable seal for hermetically sealing the container portion prior to use; a lid structure, that can open and close to allow selective access to the interior space after removal of the seal, wherein the container portion and the lid structure are formed of card-based material and at least the container portion has light, oxygen, and water vapour barrier properties sufficient for storage of the product for a period exceeding 24 months (according to claim 1). The potential special technical feature is that the lid and collar have special properties. The problem solved by this features is to provide a container that can be opened and closed and has a taper evident sealing.

6. claims: 18-22

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

A card-based package suitable for sensitive food products, comprising a container portion, the container portion defining an interior space for receiving the product and having a base and a sidewall extending to an upper peripheral edge for receiving a removable seal for hermetically sealing the container portion prior to use; a lid structure, that can open and close to allow selective access to the interior space after removal of the seal, wherein the container portion and the lid structure are formed of card-based material and at least the container portion has light, oxygen, and water vapour barrier properties sufficient for storage of the product for a period exceeding 24 months (according to claim 1). The potential special technical feature is that the container tube has special properties. The problem solved by this features is to provide a container that is simple in manufacturing.

7. claims: 24-26

A card-based package suitable for sensitive food products, comprising a container portion, the container portion defining an interior space for receiving the product and having a base and a sidewall extending to an upper peripheral edge for receiving a removable seal for hermetically sealing the container portion prior to use; a lid structure, that can open and close to allow selective access to the interior space after removal of the seal, wherein the container portion and the lid structure are formed of card-based material and at least the container portion has light, oxygen, and water vapour barrier properties sufficient for storage of the product for a period exceeding 24 months (according to claim 1). The potential special technical feature is that there is packed a special product with an appropriate sealing/gas filling. The problem solved by this features is to provide a container that can hold an infant nutrition for longer time.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2022/078845

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