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(54) **SEALED FIBROUS CONTAINER**

(57) A tray comprises a tray body, formed from a pul-
pable, fibrous material, and a first polymeric film bonded
directly to the tray body. No less than about 50 % of the
surface area of the first polymeric film is bonded to the

tray body. A sealed container comprises the tray and a cover comprising a second polymeric film bonded to the first polymeric film.

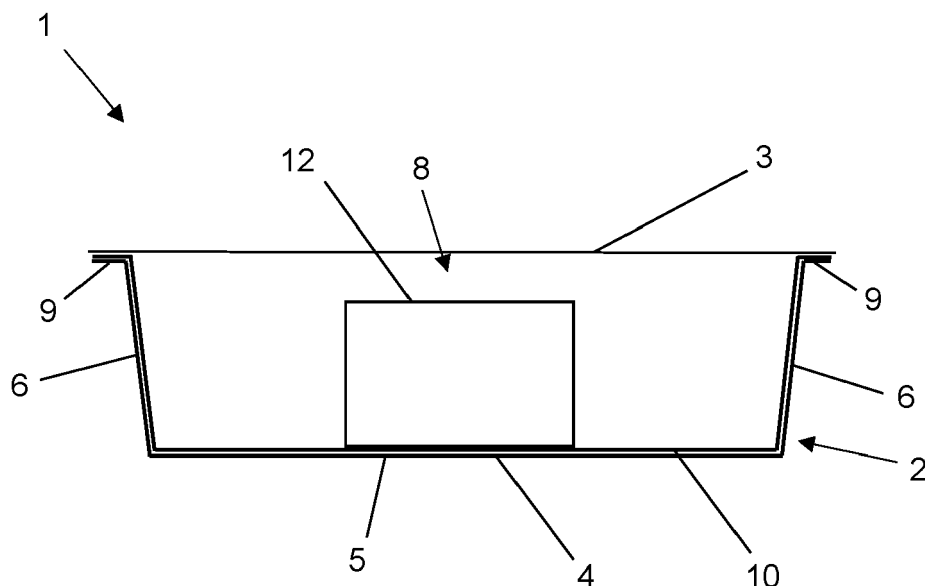


Fig. 2

Description

Field

[0001] The present disclosure concerns a tray, a method of making said tray, a sealed container comprising said tray, a method of making said sealed container, and a method of packaging an article of commerce (e.g. meat or fish) in said sealed container.

Background

[0002] Plastic and polystyrene are the dominant forms of packaging worldwide. They are attractive products owing to flexibility and/or low cost and ease of transport. In the food product market, an important aspect is delivering to the consumer products that are fresh and safe. Plastics and polystyrene are commonly used for packaging food products such as fresh produce (e.g. fruit and vegetables) or meat and fish. However, plastics are less attractive from an environmental perspective because they can be expensive to recycle, and consumers may in any case not bother to recycle and plastics tend to have poor or negligible biodegradability, whereas polystyrene cannot be recycled at all. Thus, there is growing demand for biodegradable and recyclable packaging.

[0003] Plastic packaging is easily sealable using polymeric films, largely owing to the compatibility of the polymeric materials used in the packaging and the film. However, sealing non-plastic forms of packaging is an ongoing challenge.

[0004] Use of non-plastic forms of packaging with wet food products (such as meat or fish) is also an ongoing challenge, as many biodegradable and recyclable materials rapidly lose structural integrity when exposed to moisture.

Summary of invention

[0005] According to a first aspect, there is provided a tray comprising a tray body, formed from a pulpable, fibrous material, and a polymeric film bonded directly to the tray body.

[0006] The tray body, formed of the pulpable, fibrous material, may provide the tray with structural support (e.g. shape and rigidity), while the polymeric film may protect the tray body against exposure to moisture (for example, exuded by a food product stored on the tray, on top of the polymeric film).

[0007] It may be that no less than about 50 %, for example, no less than about 60 %, or no less than about 70 %, or no less than about 80 %, or no less than about 90 %, or no less than about 95 %, or no less than about 99 %, of the surface area of (i.e. one side of) the polymeric film is bonded directly to the tray body. It may be that no more than about 100 %, for example, no more than about 99 %, or no more than about 95 %, of the surface area of (i.e. one side of) the polymeric film is bonded directly

to the tray body. It may be that from about 50 % to about 100 %, for example, from about 60 % to about 100 %, or from about 70 % to about 100 %, or from about 80 % to about 100 %, or from about 90 % to about 100 %, or from about 95 % to about 100 %, or from about 99 % to about 100 %, or from about 50 % to about 99 %, or from about 60 % to about 99 %, or from about 70 % to about 99 %, or from about 80 % to about 99 %, or from about 90 % to about 99 %, or from about 95 % to about 99 %, or from about 50 % to about 95 %, or from about 60 % to about 95 %, or from about 70 % to about 95 %, or from about 80 % to about 95 %, or from about 90 % to about 95 %, of the surface area of (i.e. one side of) the polymeric film is bonded directly to the tray body.

[0008] In some examples, the polymeric film comprises one or more tab portions not bonded directly to the tray body. The tab portion(s) may be sized and configured to enable a user to grip the tab portion(s) and remove, for example, tear or peel back, the polymeric film from the tray body. The tab portion(s), when present, may be integral to the polymeric film.

[0009] It may be that substantially all of the polymeric film (except for the tab portion(s), where present) is bonded directly to the tray body. For example, it may be that the polymeric film is bonded directly to the tray body across substantially the entire polymeric film (except for the tab portion(s), where present). That is to say, there are typically no gaps between the polymeric film and the tray body where the polymeric film is not bonded to the tray body (except at the tab portion(s), where present).

[0010] The polymeric film and the tray body may therefore form a laminate.

[0011] The polymeric film may be bonded directly to a first surface of the tray body. The tray may therefore have a laminated surface, the laminated surface being formed by the polymeric film bonded directly to (e.g. laminated to) the first surface of the tray body.

[0012] The first surface of the tray body may be a first major surface of the tray body. For example, the first surface of the tray body may constitute a substantial proportion (e.g. at least about 25 %, for example, at least about 30 %, or at least about 40 %, for example, about 50%) of the total surface area of the tray body. For example, the tray body may have (e.g. only) two major surfaces which oppose one another (e.g. an interior surface and an exterior surface), and the first surface may be one of said two major surfaces. For example, the first surface may be the interior surface of the tray body. It will be appreciated that a surface (e.g. the first surface) of the tray body is not necessarily flat but may be curved, stepped, ridged, etc., and/or may include two or more connected surface portions inclined (for example, at about 90°) with respect to one another.

[0013] The first surface of the tray body is typically the (i.e. major) surface of the tray body configured to receive an article of commerce in use.

[0014] The tray body may comprise a base and one or more side walls. The one or more side walls may extend

around a perimeter of the base. The one or more side walls may be inclined with respect to the base. For example, an (i.e. interior) angle between the base and each side wall may be at least about 90°, for example, from about 90° to about 120°, or from about 90° to about 110°, or from about 90° to about 100°. The base and the one or more side walls may together define (e.g. partially enclose) an interior of the tray. The interior surface of the tray body may comprise those surface portions of the base and the one or more side walls which face the interior. The first surface of the tray body may be said interior surface. For example, the first surface of the tray body may include an interior surface portion of the base (i.e. the surface portion of the base facing towards the interior) and one or more interior surfaces portions of the one or more side walls (i.e. the one or more surface portions of the one or more side walls facing towards the interior).

[0015] The polymeric film may extend across no less than about 50 %, for example, no less than about 60 %, or no less than about 70 %, or no less than about 80 %, or no less than about 90 %, or no less than about 95 %, for example, of the surface area of the first surface of the tray body. For example, the polymeric film may extend across substantially the entire first surface of the tray body. Accordingly, the polymeric film may extend across substantially the entirety of one side of the tray body, i.e. substantially one entire side of the tray body may be covered by (e.g. laminated with) the polymeric film.

[0016] Accordingly, the polymeric film may be bonded directly to the tray body across no less than about 60 %, for example, no less than about 70 %, or no less than about 80 %, or no less than about 90 %, or no less than about 95 %, of the surface area of the first surface of the tray body. For example, the polymeric film may be bonded directly to the tray body across substantially the entire first surface of the tray body.

[0017] The polymeric film may extend across no less than about 25 %, for example, no less than about 30 %, or no less than about 40 %, or no less than about 50 %, for example about 50%, of the total surface area of the tray body.

[0018] Accordingly, the polymeric film may be bonded directly to the tray body across no less than about 25 %, for example, no less than about 30 %, or no less than about 40 %, or no less than about 50 %, for example about 50%, of the total surface area of the tray body.

[0019] In plan view, the tray body (e.g. the base of the tray body) may take any suitable shape, for example, rectangular, oblong, square, elliptical, circular, oval, or squircular. Corners (e.g., between the base and side walls, or between adjacent side walls or side wall sections), if present, may be angular or curved.

[0020] The polymeric film may be bonded directly to the (e.g. first surface of the) tray body by the application of heat and/or pressure, for example, as the polymeric film is placed on the first surface of the tray body. The polymeric film may be bonded to fibres of the tray body.

[0021] Advantageously, the tray body is moulded, for example, a one-piece moulded tray body which may be biodegradable and/or recyclable.

[0022] The tray body may be formed from a pulvable, fibrous material. The fibrous material may be derived from derived from wood, grasses (e.g., sugarcane, bamboo) or rags (e.g., textile waste, cotton, hemp or flax), preferably from wood. In certain examples, the fibrous material is a cellulosic material. In certain examples, the fibrous material is derived from recycled paper, for example, recycled paper board. In certain examples, the recycled paper board is pre-consumer waste. In certain examples, the recycled paper board is corrugator trim (which is a pre-consumer waste product). As discussed below, the tray body may be formed from a pulp comprising the fibrous material, for example, a pulp comprising recycled paper board, such as a pulp comprising corrugator trim. An advantage in using pre-consumer waste such as corrugator trim is that the waste does not require pre-processing to remove contaminants (e.g., ink, greases) normally associated with a post-consumer waste. However, in certain examples, the pulp may comprise post-consumer waste which will have been treated as necessary to remove any contaminants that would otherwise adversely affect the quality (e.g., food safety) of the food product that is to be packaged in the tray.

[0023] Typically, the tray body comprises at least about 80 wt. % fibrous material, based on the total weight of the tray body, for example, at least about 85 wt. % fibrous material, or at least about 90 % fibrous material, or at least about 91 % fibrous material, or at least about 92 wt. % fibrous material, or at least about 93 wt. % fibrous material, or at least about 94 wt. % fibrous material, or at least about 95 wt. % fibrous material, or at least about 96 wt. % fibrous material, or at least about 97 wt. % fibrous material, or at least about 98 wt. % fibrous material. The tray body may comprise from about 90-99.5 wt. % fibrous material, for example, from about 90-99 wt. % fibrous material, or from about 90-98 wt. %, or 90-97 wt. %, or 90-96 wt. %, or 90-95 wt. %, or 90-94 wt. %, or 90-93 wt. % fibrous material.

[0024] In certain examples, the tray body comprises an additive for varying the moisture and/or water resistance of the tray body. The additive for varying the moisture and/or water resistance of the tray body is present in an amount (i) sufficient to prevent the tray body from absorbing moisture and/or water to the extent that the integrity of the tray body is compromised in use, and (ii) such that the tray body is able to absorb an amount of moisture and/or water to the extent that the flexibility of the container is increased. The additive is not formed as a coating on fibrous material, but instead is dispersed within and throughout the fibrous material. This may be achieved during the manufacturing process in which the additive is mixed with pulp prior to moulding. Generally, the amount of additive for varying the moisture and/or water resistance of the tray body may range from about 0.1 wt. % to about 20 wt. %, based on the total weight of

the tray body, for example, from about 0.1 to about 15 wt. %, or from about 0.1 to about 10 wt. %, or from about 0.5 to about 8.0 wt. %, or from about 0.5 to about 6.0 wt. %, or from about 0.5 to about 5.0 wt. %, or from about 1.0 to about 4.5 wt. %, or from about 1.0 to about 4.0 wt. %, or from about 1.0 wt. % to about 3.5 wt. %, or from about 1.0 to about 3.0 wt. %, or from about 1.0 to about 2.5 wt. %, or from about 1.0 to about 2.0 wt. %, or from about 1.5 wt. % to about 4.5 wt. %, or from about 2.0 wt. % to about 4.0 wt. %, or from about 2.0 to about 3.5 wt. %, or from about 2.5 wt. % to about 3.5 wt. %, or from about 2.0 to about 3.0 wt. %.

[0025] Requirements (i) and (ii) mean that the tray body includes an amount of the additive such that the tray body is able to absorb a certain amount of moisture and/or vapour to increase the flexibility of the tray body (or conversely decrease the rigidity of the tray body), but prevented from absorbing too much moisture and/or water such that the tray body fails in use (e.g., it becomes too bendy or even disintegrates).

[0026] In certain examples, the level of additive should be selected such that the tray body does not fail following packaging, transportation, storage and display over a 5.5 day period, or a 6 day period, or a 6.5 day period, or 7 day period. Generally, the longer the period between packaging and sale, the greater the amount of additive that will be required to prevent the tray body from absorbing too moisture and/or water. A skilled person will be able to determine the appropriate amount of additive by packaging a tray body, for example, with fresh produce, and then storing the packaged tray body at ambient conditions over a 5 day period (or a 5.5 day period, etc) and assessing the integrity of the tray body and the end of the period. Further details of this determination are found in GB-A-2507385, the entire contents of which are hereby incorporated by reference.

[0027] In certain examples, the additive for varying the moisture and/or water resistance of the tray body is wax, for example, natural wax or synthetic wax. In certain examples, the wax is a natural wax selected from group consisting of paraffin wax, beeswax, rice bran wax, caruba wax, candelilla wax, ouricury wax, sugarcane wax, retamo wax, lanolin and jojoba oil, and mixtures thereof. Advantageously, the wax is a paraffin wax. A paraffin wax is understood to refer to mixtures of mainly straight-chain, saturated hydrocarbons produced from petroleum, lignite or shale tar oil. An exemplary paraffin wax is BIM SE 9244, available from BIM (RTM) Kemi Sweden AB.

[0028] Like all of the components of the tray body of the invention, the additive for varying the moisture and/or water resistance of the tray body should comply with any regulatory requirements dealing with food packaging. These may vary depending on the territory in which the tray is to be used and sold. For example, the additive for varying the moisture and/or water resistance of the tray body preferably complies with FDA: 21 CFR 176.170 (2012); FDA: 21 CFR 176.180 (2012); and BfR XXXVI

(2012) "Paper and board for food contact".

[0029] In certain examples, the tray body comprises at least about 80 wt. % fibrous material and from about 0.1 to about 10 wt. % of the additive for varying the moisture and/or water resistance of the tray body, based on the total weight of the tray body, for example, at least about 90 wt. % fibrous material and from about 0.5 to about 5 wt. % of the additive for varying the moisture and/or water resistance of the tray body, or at least about 95 wt. % fibrous material and from 0.5 to about 5 wt. % of the additive for varying the moisture and/or water resistance of the tray body.

[0030] In certain examples, the tray body is coloured. By coloured is meant that the colour of the tray body is different to that of the natural colour of the fibrous material from which the tray body is formed. Thus, in certain embodiments, the tray body comprises a colourant, for example, a dye or pigment, preferably a dye. The colourant, e.g., dye, may be added during preparation of the pulp from which the tray body is to be moulded, as discussed below. The colourant may be selected so to impart a desired colour to the tray body. In certain examples, the colourant is a black colourant, blue colourant or a mixture of black and blue colourant, for example, a black dye, a blue dye or a mixture of black and blue dye. An exemplary black dye is Cartasol Black M-G liquid, available from Clariant (RTM) Products, Switzerland. An exemplary blue dye is Cartasol Blue K5R liquid, available from Clariant (RTM) Products, Switzerland.

[0031] The colourant should comply with any regulatory requirements pertaining to the use of colourants in food packaging. These may vary depending on the territory in which the tray body is to be used and sold. For example, the colourant preferably complies with Regulation (EC) No 1935/2004 of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with food. The tray body may comprise up to about 5 % by weight colourant, based on the total weight of the tray body, for example, from about 0.1 to about 4.5 wt. % colourant, or from about 0.5 to about 4.0 wt. % colourant, or up to about 3.5 wt. % colourant, or up to about 3.0 wt. % colourant, or up to about 2.5 wt. % colourant, or up to about 2.0 wt. % colourant, or up to about 2.0 wt. % colourant, or up to about 1.5 wt. % colourant, or up to about 1.0 wt. % colourant.

[0032] In certain examples, the tray body further comprises a biocide. This may be added to protect food products contained within the tray body, for example, to prevent or inhibit microbial spoilage, e.g., rotting, of food products, and also to protect the manufacturing equipment for making the tray body. The biocide may be a synthetic or natural biocide, preferably a synthetic biocide. An exemplary natural biocide is chitosan. The biocide may be an antimicrobial agent, for example, a germicide, antibacterial agent, antifungal agent, antiprotzoal agent, or an antiparasite agent. Antimicrobial agents also include weak acids, organic acids (e.g., lactic acid, citric acid, acetic acid, and their salts), bacteriocins, en-

zymes, and fungicides, among others.

[0033] In certain examples, the biocide is based on a quaternary ammonium compound. Typically, these compounds comprise one or more polar quaternary amine head groups and a hydrophilic tail (e.g., a long alkyl chain). Although there can be many variations in the minutiae of their structures, the length of the alkyl chain is generally between about 8 and 20 carbon atoms, for example, between about 8 and 16 carbon atoms. An exemplary biocide of this type is Solcide SL 106 (Revision Nr: 0 of 15-08-2011), available from Solstar (RTM). It is based on a twin chain quaternary ammonium compound. This biocide may also comprise glutral.

[0034] In certain examples, the biocide may be based on a glutaraldehyde compound and/or a isothiazolone compound, for example, 5-chloro-2-methyl-2H-isothiazol-3-one and/or 2-methyl-2H-isothiazol-3-one. An exemplary biocide is Solcide P 103 (Revision Nr: 0 of 12-05-2010), available from Solstar (RTM). Another exemplary biocide is Solcide P 112 (Revision Nr: 0 of 22-03-2011), available from Solstar (RTM).

[0035] In certain examples, the biocide may be based on an amide compound, for example, a propionamide, such as, for example, 2,2-di-bromo-3-nitrilo-propionamide. An exemplary biocide is Solcide P 107 (Revision Nr: 0 of 10-04-2010), available from Solstar (RTM).

[0036] The biocide should comply with any regulatory requirements pertaining to the use of biocides in food packaging. These may vary depending on the territory in which the tray is to be used and sold.

[0037] In certain examples, the tray body comprises up to about 3 wt. % biocide, for example, up to about 2 wt. % biocide, or up to about 1 wt. % biocide, or up to about 0.9 wt. % biocide, or up to about 0.8 wt. % biocide, or up to about 0.7 wt. % biocide, or up to about 0.6 wt. % biocide, or up to about 0.5 wt. % biocide, or up to about 0.4 wt. % biocide, or up to about 0.3 wt. % biocide, or up to about 0.2 wt. % biocide. Typically, when present, the tray body will comprise at least about 0.05 wt. % biocide, for example, at least about 0.1 wt. % biocide.

[0038] The biocide may be added during preparation of the pulp from which the tray body is to be moulded, as discussed below.

[0039] In certain examples, the tray consists of fibrous substrate, the additive for varying the moisture and/or water resistance of the tray body, e.g., wax, and the polymeric film. In such examples, the fibrous material may constitute at least about 90 wt.%, or at least about 95 wt. % of the tray, with the balance additive for varying the moisture and/or water resistance of the tray body, e.g., wax, and the polymeric film. Relative to the weight of the tray body, the polymeric film will be understood to have negligible weight.

[0040] In certain examples, the tray body comprises:

- (i) from about 90-98 wt. % fibrous material;
- (ii) from 0.1 to about 5 wt. % additive, e.g., wax;
- (iii) up to about 4.0 wt. % colourant, or from about 0

to 4 wt. % colorant; and

(iv) up to about 2.0 wt. % biocide, or from about 0 to 2.0 wt. biocide, for example, up to about 1.0 wt. % biocide.

[0041] The polymeric film may comprise polymer which softens or melts upon the application of heat and/or pressure, for example, heat and pressure, i.e., as the polymeric film is applied to the tray body. Without wishing to be bound by theory, it is believed that the polymer softens or melts into and around fibres of the tray body, forming a bond between the polymeric film and the tray body. In certain embodiments, at least a portion of the polymeric film, e.g., at least a portion which is in contact with the tray body upon application of the polymeric film to the tray body, is formed of polymer which melts upon the application of heat and/or pressure, e.g., heat and pressure, as the polymeric film is applied to the tray body. Any thermoplastic polymeric material may be used provided it is capable of softening, preferably melting, upon application of heat and/or pressure as the polymeric film is applied to the tray body. In certain embodiments the polymeric material has a melting point of from about 50 °C to about 250 °C, for example, from about 50 °C to about 200 °C, or from about 50 °C to about 150 °C, or from about 75 °C to about 175 °C, or from about 100 °C to about 175 °C, or from about 100 °C to about 150 °C. In certain embodiments, said at least a portion of the polymeric film comprises or is a polyalkylene polymer, for example, a C₂-C₅ polyalkylene polymer, such as polyethylene, or polypropylene, or polybutylene. In certain embodiments, said at least a portion of the polymeric film comprises or is polyethylene. In certain embodiments, the polymeric film comprises or is formed of polyethylene. In certain embodiments, the polymeric film comprises or is formed of HDPE (high density polyethylene having a density of from about 0.93-0.97 g/cm³, and a melting point of between about 100 °C and 140 °C), LDPE (low density polyethylene having a density of from about 0.91-0.93 g/cm³ and a melting point between about 80 °C and 120 °C), or LLDPE (linear low density polyethylene having a density of from about 0.91-0.93 g/cm³ and a melting point between about 120 °C to about 160 °C).

[0042] The inventors have found that a polymeric film which softens or melts upon the application of heat and/or pressure (for example, a polymeric film comprising a polyalkylene polymer such as polyethylene) forms a strong bond with the pulpable, fibrous material of the tray body. However, the inventors have also found that such polymeric films can still be separated from the tray body by peeling the polymeric film away from the tray body. Without wishing to be bound by theory, the inventors find that the bond strength between the polymeric film and pulpable, fibrous material is greater than the strength of the fibres of the pulpable, fibrous material itself. Accordingly, when peeling the polymeric film away from the tray body, the fibres of the pulpable, fibrous material tear. The force required to peel the polymeric film away from the

tray body is roughly equivalent to that required to separate a polymeric layer attached by a "peel seal" to a plastic tray. The polymeric film and the tray body can therefore be separated easily from one another for separate disposal (for example, recycling).

[0043] In certain examples, the polymeric film is a layered composite, for example, a polymeric film comprising at least two layers of polymeric material. The layered composite may comprise two layers, or three layers, or four layer, or five or more layers. The layers may be formed of the same polymeric material or different polymeric materials. Suitable polymeric materials may be selected and/or combined to tailor the properties of the polymeric film to a given application. In certain embodiments, the polymeric film comprises a layer of polyalkylene polymer, for example, polyethylene (e.g., HPDE, or LDPE, or LLDPE). In certain embodiments the polymeric film comprises a layer of polyethylene and a layer of another polymeric material, for example, polyester. In such embodiments, the layer of polyethylene faces the tray body during and following application (so that at least a portion of this layer may soften or melt upon application of heat and/or pressure), and the other layer faces outwards.

[0044] In some examples, the polymeric film is water resistant. For example, the polymeric film may be impermeable to water.

[0045] In some examples, the polymeric film is impermeable to gases such as oxygen. For example, the polymeric film may comprise a gas (e.g. air, for example, oxygen) barrier layer, such as a layer of an alkylene vinyl alcohol, e.g. ethylene vinyl alcohol (EVOH). For example, the polymeric film may comprise two layers of a polyalkylene polymer and layer of an alkylene vinyl alcohol therebetween. For example, the polymeric film may comprise two layers of polyethylene and a layer of ethylene vinyl alcohol therebetween. One of the layers of polyalkylene polymer (e.g. polyethylene) may enable the polymeric film to be heat-sealed to the tray body. The other of the layers of polyalkylene polymer (e.g. polyethylene) may enable the polymeric film to be heat-sealed to another polymeric film (for example, a cover for the tray). The layer of alkylene vinyl alcohol (e.g. ethylene vinyl alcohol) may provide a gas barrier function.

[0046] The polymeric film may have a thickness no less than about 5 μm , for example, no less than about 10 μm , or no less than about 20 μm , or no less than about 30 μm , or no less than about 40 μm , or no less than about 50 μm . The polymeric film may have a thickness no greater than about 500 μm , for example, no greater than about 250 μm , no greater than about 200 μm , or no greater than about 150 μm , or no greater than about 100 μm , or no greater than about 75 μm , or no greater than about 60 μm , or no greater than about 50 μm . The polymeric film may have a thickness from about 5 μm to about 250 μm , for example, from about 10 μm to about 250 μm , or from about 20 μm to about 250 μm , or from about 30 μm to about 250 μm ,

or from about 40 μm to about 250 μm , or from about 50 μm to about 250 μm , or from about 5 μm to about 200 μm , or from about 10 μm to about 200 μm , or from about 20 μm to about 200 μm , or from about 30 μm to about 200 μm , or from about 40 μm to about 200 μm , or from about 50 μm to about 200 μm , or from about 5 μm to about 150 μm , or from about 10 μm to about 150 μm , or from about 20 μm to about 150 μm , or from about 30 μm to about 150 μm , or from about 40 μm to about 150 μm , or from about 50 μm to about 150 μm , or from about 5 μm to about 100 μm , or from about 10 μm to about 100 μm , or from about 20 μm to about 100 μm , or from about 30 μm to about 100 μm , or from about 40 μm to about 100 μm , or from about 50 μm to about 100 μm , or from about 5 μm to about 75 μm , or from about 10 μm to about 75 μm , or from about 20 μm to about 75 μm , or from about 30 μm to about 75 μm , or from about 40 μm to about 75 μm , or from about 50 μm to about 75 μm , or from about 5 μm to about 70 μm , or from about 10 μm to about 70 μm , or from about 20 μm to about 70 μm , or from about 30 μm to about 70 μm , or from about 40 μm to about 70 μm , or from about 50 μm to about 70 μm , or from about 5 μm to about 60 μm , or from about 10 μm to about 60 μm , or from about 20 μm to about 60 μm , or from about 30 μm to about 60 μm , or from about 40 μm to about 60 μm , or from about 50 μm to about 60 μm , or from about 5 μm to about 50 μm , or from about 10 μm to about 50 μm , or from about 20 μm to about 50 μm , or from about 30 μm to about 50 μm , or from about 40 μm to about 50 μm . Preferably, the polymeric film has a thickness from about 30 μm to about 150 μm , for example, from about 40 μm to about 60 μm , or about 50 μm .

[0047] The tray body may comprise a base and one of more side walls extending around the perimeter of the base, as described hereinabove, the one or more side walls defining an opening (i.e. to the interior of the tray body). The tray body may have a rim about the opening. The rim about the opening may comprise a flange extending outwards from, and about, the perimeter of the opening. The flange may extend outwards up to about 20 mm from the rim, for example, from about 1 mm to about 15 mm, or from about 2 mm to about 12 mm, or from about 2 mm to about 10 mm, or from about 2 mm to about 8 mm, or from about 2 mm to about 6 mm, from the rim. In certain embodiments, the flange extends outwards up to about 1 mm, or about 2 mm, or about 3 mm, or about 4 mm, or about 5 mm, or about 6 mm, or about 7 mm, or about 8 mm, or about 9 mm, or about 10 mm, from the rim. The flange may be formed about the entirety of the rim at the top of one or more side walls.

[0048] In certain examples, the height of the tray body (i.e. the perpendicular distance between the base of the tray body and the plane containing the rim) is at least about 20 mm, for example from about 20 to about 200 mm, or from about 25 to about 150 mm, or from about 30 to about 120 mm, or from about 30 to about 100 mm, or from about 30 to about 80 mm, or from about 20 to about 60 mm, or from about 20 to about 50 mm, or from

about 25 to about 50 mm, or from about 30 to about 50 mm, or from about 35 to about 50 mm, or from about 25 to about 35 mm, or from about 30 to about 40 mm, or from about 35 to about 45 mm. The length and width of the tray body may vary, independently, between about 50 mm and 500 mm.

[0049] The polymeric film and the tray body may be separable from one another. For example, the polymeric film and the tray body may be separable from one another to enable separate disposal (e.g. recycling) of the polymeric film and the tray body.

[0050] In some examples, the polymeric film extends beyond an edge of the tray body (for example, beyond the flange, where present) by an amount sufficient for a user to grip and tear or peel back the polymeric film in order to separate the polymeric film and tray body. In some examples, the polymeric film comprises one or more tab portions. The tab portion(s) may be sized and configured to enable a user to grip the tab portion and remove, for example, tear or peel back, the polymeric film from the tray body. The tab portion(s), when present, may be integral to the polymeric film.

[0051] Advantageously, the tray may be free of adhesive, i.e., the bond between the first polymeric film and the tray body is achieved without the need for adhesive.

[0052] The tray may be a tray for a food product.

[0053] The food product may be a wet food product (i.e. a food product which is wet on packaging or which typically begins to exude moisture rapidly after packaging) such as meat, poultry, game, fish, seafood or dairy products. Meat includes the flesh of mammalian species such as pigs, cows, sheep, etc. Poultry includes birds such as chicken, turkey, duck, goose, etc. (either whole or the flesh thereof). Game includes animals typically hunted for food, such as venison (deer), rabbit, pigeon, grouse, etc. (either whole or the flesh thereof). Fish includes, for example, salmon, cod, tuna, mackerel, snapper, trout, sole, carp, etc. (either whole or the flesh thereof). Seafood includes crustacea such as crabs, lobsters, crayfish, shrimps, prawns, scallops, clams, oysters, etc. (either whole or the flesh thereof). Dairy products include cheeses.

[0054] In certain examples, the tray is a tray for fresh produce and the like, as described in GB-A-2507385, the entire contents of which are hereby incorporated by reference. In certain examples, the tray is suitable for packaging individual pieces of fresh produce, particularly fresh produce for the premium quality market. Fresh produce includes fruit, vegetables and fungi, e.g., mushrooms. In certain examples, the tray is suitable for packaging a wide range of fruits, such as, for example, apples and pears, grapes, citrus fruit, berries, melons, stone fruits, tomatoes, and exotic fruits. Stone fruits include, apricots, avocados, cherries, dates, greengages, nectarines, peaches and plums, particular the soft skinned stoned fruits which are particularly sensitive to bruising and blemishing during packaging, transport and storage. Citrus fruits include clementines, grapefruit, kumquats,

lemons, limequat, minneolas, oranges, pomelo and satsumas. Berries include strawberries, blueberries, blackberries, cranberries, gooseberries, raspberries, redcurrants, blackcurrants and white currants. Melons include varieties such as cantelope, charantais, galia, honeydew, rock and water. Exotic fruits include custard apple, figs, grenadillo, guava, kiwano (horned melon), kiwi, longuns, lychees, mangoes, mangosteen, passion fruit, paw paw, persimmon, physalis, pineapples (baby), pitahaya red, pitahaya yellow, pomegranates, prickly pear, quinces, rambutans, rhubarb, sharon fruit, star fruit, tamerillo and zespri golden. Mushrooms include varieties such as button, cepes, chanterelles, chestnut brown, cup, enoki, flat, girolle, gold trumpet, mixed wild, morilles, mousseron, oyster, pied de bleu, pied de mouton, pink oyster, Portobello, shitaki, trumpe de la mor and yellow oyster. In certain examples, the tray is suitable for packaging a wide range of vegetables, such as root vegetables, potatoes, onions and shallots, capsicums, broccolis, chillies, beans, mange tout and peas, exotic vegetables and a selection of other general vegetables. Root vegetables include beetroot, carrots, celeriac, parsnips, swedes and turnips. Onions and shallots include varieties such as button, cipolino, English, grelot, red, Spanish, strings, white skinned and banana. Broccolis include sprouting broccoli, button sprouts, red, white and savoy cabbage, cauliflower, curly kale, purple broccoli and brussels sprouts. Other general vegetables include aubergines, chicory, fennel, leeks, marrows, round courgettes and butternut squash.

[0055] In one example, the tray comprises the tray body, formed from the pulpable, fibrous material, and the polymeric film bonded directly to the tray body, the polymeric film having a thickness from about 30 μm to about 150 μm (for example, from about 40 μm to about 60 μm) and comprising at least one layer of a polyalkylene polymer (e.g. polyethylene) and at least one gas (e.g. air, for example, oxygen) barrier layer (e.g. an alkylene vinyl alcohol, for example, ethylene vinyl alcohol). For example, the tray may comprise the tray body, formed from the pulpable, fibrous material, and the polymeric film bonded directly to the tray body, the polymeric film having a thickness from about 30 μm to about 150 μm (for example, from about 40 μm to about 60 μm) and comprising two layers of a polyalkylene polymer (e.g. polyethylene) and layer of an alkylene vinyl alcohol (e.g. ethylene vinyl alcohol) therebetween. For example, the tray may comprise the tray body, formed from the pulpable, fibrous material, and the polymeric film bonded directly to the tray body, the polymeric film having a thickness from about 30 μm to about 150 μm (for example, from about 40 μm to about 60 μm) and comprising two layers of polyethylene and layer of ethylene vinyl alcohol therebetween.

[0056] According to a second aspect, there is provided a sealed container comprising the tray according to the first aspect, wherein the polymeric film of the tray is a first polymeric film and the sealed container further com-

prises a cover comprising (e.g. which is) a second polymeric film bonded to the first polymeric film.

[0057] The tray may have any of the properties described hereinabove in relation to the first aspect. The second polymeric film may have, *mutatis mutandis*, any of the properties of the first polymeric film described hereinabove in relation to the first aspect. The second polymeric film may be the same as (i.e. the same material(s) as) the first polymeric film.

[0058] In examples in which the tray body comprises a base and one of more side walls extending around the perimeter of the base, thereby defining an opening (i.e. to the interior of the tray body), the cover (e.g. the second polymeric film) may seal the opening (i.e. the opening may be sealed by the second polymeric film). That is to say, the cover (e.g. the second polymeric film) may bridge across the opening.

[0059] The second polymeric film may be bonded to the first polymeric film at least around a perimeter of the tray. In some examples, the second polymeric film is bonded to the first polymeric film only around the perimeter of the tray. In other examples, the second polymeric film is bonded to the first polymeric film around the perimeter of the tray and in a region extending inwards from the perimeter of the tray towards a centre of the tray. For example, the second polymeric film may be bonded to the first polymeric film in a region which extends around the tray and includes the perimeter. For example, the region which extends around the tray and includes the perimeter may extend at least about 10 mm, for example, at least about 20 mm, or at least about 30 mm, or at least about 40 mm, or at least about 50 mm, away from the perimeter towards the centre of the tray (i.e. measured along a direction perpendicular to a local tangent to the perimeter). For example, the second polymeric film may be bonded to the first polymeric film in a band which extends around the tray and is at least about 10 mm, for example, at least about 20 mm, or at least about 30 mm, or at least about 40 mm, or at least about 50 mm, wide.

[0060] For the avoidance of doubt, the second polymeric film is not bonded to the first polymeric film across the entire surface area of the first polymeric film (e.g. across the entire tray) or across the entire surface of the second polymeric film. For example, the second polymeric film is not bonded to the first polymeric film in a region where an article of commerce is located, or is to be located, on the tray (i.e. on top of the first polymeric film). It may also be that the second polymeric film is not bonded to the first polymeric film in unoccupied regions of the tray, for example, adjacent to the region where the article of commerce is located or to be located.

[0061] In examples in which the tray has a rim about the opening, the rim about the opening comprising a flange extending outwards from, and about, the perimeter of the opening, the second polymeric film may be bonded to the first polymeric film at the flange (i.e. forming a seal at the flange). The seal formed between the second polymeric film and the first polymeric film at the flange may

be the only point of contact between the second polymeric film and the tray.

[0062] The first and second polymeric films may be heat-sealed to one another. Alternatively, the first and second polymeric films may be bonded to one another by way of an adhesive.

[0063] The first and second polymeric films may be separable from one another, for example, to enable access to the contents of the container.

[0064] In some examples, the second polymeric film extends beyond an edge of the tray by an amount sufficient for a user to grip and tear or peel back the second polymeric film in order to access the contents of the container. In examples in which the tray has a flange, the second polymeric film may extend beyond the flange, for example, by an amount sufficient for a user to grip and tear or peel back the second polymeric film in order to access the contents of the container. In some examples, the second polymeric film comprises one or more tab portions. The tab portion(s) may be sized and configured to enable a user to grip the tab and remove, for example, tear or peel back, the second polymeric film from the container. The tab portion(s), when present, may be integral to the second polymeric film. The tab portion(s) of the second polymeric film may overlap the tab portion(s) of the first polymeric film, where present.

[0065] In some examples, the first polymeric film, and optionally the second polymeric film, extends beyond an edge of the tray (e.g. beyond the flange), for example, by an amount sufficient for a user to grip and tear or peel back the first polymeric film in order to separate the first polymeric film from the tray body. In some examples, the first polymeric film, and optionally the second polymeric film, comprises one or more tab portions. The tab portion(s) may be sized and configured to enable a user to grip the tab and remove, for example, tear or peel back, the first polymeric film from the tray body. The tab portion(s), when present, may be integral to the first polymeric film, and optionally the second polymeric film. The tab portion(s) of the second polymeric film, where present may overlap the tab portion(s) of the second polymeric film.

[0066] The sealed container may comprise an article of commerce (e.g. a food product) contained therein. The article of commerce may have any of the properties discussed hereinabove in relation to the first aspect.

[0067] It may be that the first and second polymeric films together form a sealed pouch. The sealed pouch may be separable from the tray body by peeling apart the first polymeric film and the tray body (i.e. leaving the sealed pouch intact, i.e. sealed), for example by way of the tab portion(s) where present. The sealed pouch may contain the article of commerce (e.g. a food product, for example a wet food product). The sealed pouch may be vacuum sealed around the article of commerce.

[0068] It may be that no greater than about 80 %, for example, no greater than about 70 %, or no greater than about 60 %, or no greater than about 50 %, or no greater

than about 25 %, or no greater than about 20 %, or no greater than about 15 %, or no greater than about 10 %, or no greater than about 5 %, or no greater than about 2.5 %, or no greater than about 1 %, of the surface area of (i.e. one side of) the second polymeric film is in contact with (e.g. bonded to) the first polymeric film. In certain embodiments, at least about 0.1 %, for example, at least about 0.5 %, or at least about 1 %, or at least about 5 %, or at least about 10 %, or at least about 25 %, or at least about 50 %, of the surface area of the (i.e. said one side of) the second polymeric film is in contact with (e.g. bonded to) the first polymeric film. It may be that from about 0.1 % to about 80 %, for example, from about 0.5 % to about 80 %, or from about 1 % to about 80 %, or from about 5 % to about 80 %, or from about 10 % to about 80 %, or from about 25 % to about 80 %, or from about 50 % to about 80 %, or from about 0.1 % to about 70 %, or from about 0.5 % to about 70 %, or from about 1 % to about 70 %, or from about 5 % to about 70 %, or from about 10 % to about 70 %, or from about 25 % to about 70 %, or from about 50 % to about 70 %, or from about 0.1 % to about 60 %, or from about 0.5 % to about 60 %, or from about 1 % to about 60 %, or from about 5 % to about 60 %, or from about 10 % to about 60 %, or from about 25 % to about 60 %, or from about 50 % to about 60 %, or from about 0.1 % to about 50 %, or from about 0.5 % to about 50 %, or from about 1 % to about 50 %, or from about 5 % to about 50 %, or from about 10 % to about 50 %, or from about 25 % to about 50 %, or from about 0.1 % to about 25 %, or from about 0.5 % to about 25 %, or from about 1 % to about 25 %, or from about 5 % to about 25 %, or from about 10 % to about 25 %, or from about 0.1 % to about 20 %, or from about 0.5 % to about 20 %, or from about 1 % to about 20 %, or from about 5 % to about 20 %, or from about 10 % to about 20 %, or from about 0.1 % to about 15 %, or from about 0.5 % to about 15 %, or from about 1 % to about 15 %, or from about 5 % to about 15 %, or from about 0.1 % to about 10 %, or from about 0.5 % to about 10 %, or from about 1 % to about 10 %, or from about 5 % to about 10 %, or from about 0.1 % to about 5 %, or from about 0.5 % to about 5 %, or from about 1 % to about 2.5 %, or from about 0.5 % to about 2.5 %, or from about 1 % to about 2.5 %, or from about 0.1 % to about 1 %, or from about 0.5 % to about 1 %, of the surface area of (i.e. one side of) the second polymeric film is in contact with (e.g. bonded to) the first polymeric film.

[0069] Advantageously, the sealed container may be free of adhesive, i.e., the bonds between the first polymeric film and the tray body, and between the second polymeric film and the first polymeric film, are achieved without the need for adhesive.

[0070] The sealed container may be a skin package (i.e. a skin pack), e.g. a vacuum skin package (i.e. a vacuum skin pack). A skin package (e.g. vacuum skin package) may be formed by draping the cover (e.g. the second polymeric film) over an article of commerce (e.g. food

product) placed on the tray and heat-sealing the cover (e.g. the second polymeric film) to the tray by way of the first polymeric film. Skin packaging (e.g. vacuum skin packaging) may achieve an intimate fit between the cover (e.g. the second polymeric film) and the article of commerce. A vacuum may be used to assist a firm fit.

[0071] In embodiments in which the sealed container is a skin package (i.e. a skin pack), e.g. a vacuum skin package (i.e. a vacuum skin pack), it may be that the first and second polymeric films are in contact (e.g. bonded to one another) across a relatively large area. For example, it may be that from about 10 % to about 80 %, for example, from about 25 % to about 80 %, or from about 50 % to about 80 %, or from about 10 % to about 70 %, or from about 25 % to about 70 %, or from about 50 % to about 70 %, or from about 10 % to about 60 %, or from about 25 % to about 60 %, or from about 50 % to about 60 %, or from about 10 % to about 50 %, or from about 25 % to about 50 %, or from about 50 % to about 50 %, of the surface area of (i.e. one side of) the second polymeric film is in contact with (e.g. bonded to) the first polymeric film.

[0072] Alternatively, the tray may be shaped, and the second polymeric film may be bonded to the tray, such that the sealed container encloses an interior space substantially larger (e.g. at least 25 %, for example, at least 50 %, or at least 75 %, or at least 100 %, larger, in terms of the volume of the interior space relative to the volume of the article of commerce) than the article of commerce, i.e. such that the cover (e.g. the second polymeric film) is typically not fitted against the article of commerce but is instead spaced apart from it in normal use. For example, the sealed container may be a modified atmosphere package. A modified atmosphere package may be formed by modifying the atmosphere trapped between the cover (e.g. the second polymeric film) and the tray, for example, by displacing oxygen with an inert gas, such as nitrogen, helium, argon or xenon, and/or with carbon dioxide.

[0073] In embodiments in which the sealed container encloses an interior space substantially larger than the article of commerce, or in which the cover (e.g. the second polymeric film) is spaced apart from (i.e. not fitted intimately against) the article of commerce (e.g. wherein the sealed container is a modified atmosphere package), it may be that the first and second polymeric films are in contact (e.g. bonded to one another) across a relatively small area. For example, it may be that from about 0.1 % to about 20 %, for example, from about 0.5 % to about 20 %, or from about 1 % to about 20 %, or from about 5 % to about 20 %, or from about 0.1 % to about 15 %, or from about 0.5 % to about 15 %, or from about 1 % to about 15 %, or from about 0.1 % to about 10 %, or from about 0.5 % to about 10 %, or from about 1 % to about 10 %, or from about 5 % to about 10 %, or from about 0.1 % to about 5 %, or from about 0.5 % to about 5 %, or from about 1 % to about 5 %, or from about 0.1 % to about 2.5 %, or from about 0.5 % to about 2.5 %, or from about 1 % to about

2.5 %, or from about 0.1 % to about 1 %, or from about 0.5 % to about 1 %, of the surface area of (i.e. one side of) the second polymeric film is in contact with (e.g. bonded to) the first polymeric film.

[0074] In one example, the sealed container comprises: (a) the tray body formed from the pulpable, fibrous material; (b) the first polymeric film bonded directly to the tray body, for example wherein no less than about 50 % of the surface area of the first polymeric film is bonded directly to the tray body, the first polymeric film having a thickness from about 30 μm to about 150 μm (for example, from about 40 μm to about 60 μm) and comprising at least one layer of a polyalkylene polymer (e.g. polyethylene) and at least one gas (e.g. air, for example, oxygen) barrier layer (e.g. an alkylene vinyl alcohol, for example, ethylene vinyl alcohol); and (c) the cover comprising the second polymeric film bonded to the first polymeric film (e.g. at least around the perimeter of the tray), the second polymeric film having a thickness from about 30 μm to about 150 μm (for example, from about 40 μm to about 60 μm) and comprising at least one layer of a polyalkylene polymer (e.g. polyethylene).

[0075] In one example, the sealed container comprises: (a) the tray body formed from the pulpable, fibrous material; (b) the first polymeric film bonded directly to the tray body, for example wherein no less than about 50 % of the surface area of the first polymeric film is bonded directly to the tray body, the first polymeric film having a thickness from about 30 μm to about 150 μm (for example, from about 40 μm to about 60 μm) and comprising at least one layer of a polyalkylene polymer (e.g. polyethylene) and at least one gas (e.g. air, for example, oxygen) barrier layer (e.g. an alkylene vinyl alcohol, for example, ethylene vinyl alcohol); and (c) the cover comprising the second polymeric film bonded to the first polymeric film (e.g. at least around the perimeter of the tray), the second polymeric film also having a thickness from about 30 μm to about 150 μm (for example, from about 40 μm to about 60 μm) and comprising at least one layer of a polyalkylene polymer (e.g. polyethylene) and at least one gas (e.g. air, for example, oxygen) barrier layer (e.g. an alkylene vinyl alcohol, for example, ethylene vinyl alcohol).

[0076] For example, the sealed container may comprise: (a) the tray body formed from the pulpable, fibrous material; (b) the first polymeric film bonded directly to the tray body, for example wherein no less than about 50 % of the surface area of the first polymeric film is bonded directly to the tray body, the first polymeric film having a thickness from about 30 μm to about 150 μm (for example, from about 40 μm to about 60 μm) and comprising two layers of a polyalkylene polymer (e.g. polyethylene) and layer of an alkylene vinyl alcohol (e.g. ethylene vinyl alcohol) therebetween; and (c) the cover (e.g. the second polymeric film) bonded to the first polymeric film (e.g. at least around the perimeter of the tray), the second polymeric film also having a thickness from about 30 μm to about 150 μm (for example, from about 40 μm to about

60 μm) and comprising two layers of a polyalkylene polymer (e.g. polyethylene) and layer of an alkylene vinyl alcohol (e.g. ethylene vinyl alcohol) therebetween.

[0077] For example, the sealed container may comprise: (a) the tray body formed from the pulpable, fibrous material; (b) the first polymeric film bonded directly to the tray body, for example wherein no less than about 50 % of the surface area of the first polymeric film is bonded directly to the tray body, the first polymeric film having a thickness from about 30 μm to about 150 μm (for example, from about 40 μm to about 60 μm) and comprising two layers of polyethylene and layer of ethylene vinyl alcohol therebetween; and (c) the cover (e.g. the second polymeric film) bonded to the first polymeric film (e.g. at least around the perimeter of the tray), the second polymeric film also having a thickness from about 30 μm to about 150 μm (for example, from about 40 μm to about 60 μm) and comprising two layers of polyethylene and layer of ethylene vinyl alcohol therebetween.

[0078] According to a third aspect, there is provided a method of making a tray, the method comprising: placing a polymeric film over a tray body which is formed from a pulpable, fibrous material; and bonding the polymeric film to the tray body by the application of heat and/or pressure to the polymeric film and/or the tray body.

[0079] The method may be a method of making the tray according to the first aspect. The tray body and the polymeric film may have any properties as described hereinabove in relation to the first aspect.

[0080] It may be that at least a portion of the polymeric film softens or melts upon application of said heat and/or pressure, thereby bonding the polymeric film to fibres of the tray body.

[0081] The method may comprise bonding no less than about 50 %, for example, no less than about 60 %, or no less than about 70 %, or no less than about 80 %, or no less than about 90 %, or no less than about 95 %, or no less than about 99 %, of the surface area of (i.e. one side of) the polymeric film to the tray body. The method may comprise bonding no more than about 100 %, for example, no more than about 99 %, or no more than about 95 %, of the surface area of (i.e. one side of) the polymeric film to the tray body. The method may comprise bonding from about 50 % to about 100 %, for example, from about 60 % to about 100 %, or from about 70 % to about 100 %, or from about 80 % to about 100 %, or from about 90 % to about 100 %, or from about 95 % to about 100 %, or from about 99 % to about 100 %, or from about 50 % to about 99 %, or from about 60 % to about 99 %, or from about 70 % to about 99 %, or from about 80 % to about 99 %, or from about 90 % to about 99 %, or from about 95 % to about 99 %, or from about 50 % to about 95 %, or from about 60 % to about 95 %, or from about 70 % to about 95 %, or from about 80 % to about 95 %, or from about 90 % to about 95 %, of the surface area of (i.e. one side of) the polymeric film to the tray body.

[0082] Bonding the polymeric film to the tray body by the application of heat and/or pressure to the polymeric

film and/or the tray body may comprise pressing the polymeric film and the tray body together, for example, using suitably shaped (e.g. heated) plates, moulds or dies, depending on the three-dimensional shape of the tray body. Additionally or alternatively, the method may comprise pressing the polymeric film against the tray body using a vacuum or gas (e.g. air) pressure.

[0083] The method may be a method of laminating the first surface of the tray body with the polymeric film by placing the polymeric film over the first surface of the tray body and bonding the polymeric film to the first surface of the tray body by the application of heat and/or pressure to the polymeric film and/or the tray body.

[0084] According to a fourth aspect, there is provided a method of making a sealed container comprising: providing a tray according to the first aspect or manufactured by the method according to the third aspect, the polymeric film being a first polymeric film; placing a cover comprising (e.g. which is) a second polymeric film over the first polymeric film; and bonding the second polymeric film to the first polymeric film.

[0085] The tray and the first polymeric film may have any properties described hereinabove in relation to the first aspect or the third aspect. The method may be a method of making the sealed container according to the second aspect. The cover and the second polymeric film may have any properties described hereinabove in the relation to the second aspect.

[0086] The method may comprise bonding the second polymeric film to the first polymeric film by the application of heat and/or pressure. Alternatively, the method may comprise bonding the second polymeric film to the first polymeric film by way of an adhesive.

[0087] In certain embodiments, for example, embodiments in which the tray comprises a flange, a seal is formed between the first polymeric film on the flange and the second polymeric film by pressing them together between parallel, optionally heated plates, which are brought together about (e.g., from above and/or below) the flange and second polymeric film. In certain embodiments, the flange rests upon a bottom plate (which may or not be heated, preferably not heated) and an upper plate is brought against the upper side of the flange. In certain embodiments, the upper plate is heated. The upper or lower plate may additionally comprise means for cutting the second polymeric film if it is provided as a continuous film.

[0088] In certain embodiments, heating is at a temperature of from about 50 °C to about 250 °C, for example, of from about 50 °C and 200 °C, or from about 50 °C to about 175 °C, or from about 75 °C to about 175 °C, or from about 100 °C to about 150 °C. As discussed above, the heating is advantageously at a temperature at which at least a portion of the second polymeric film (e.g., polyethylene) (and optionally a corresponding portion of the first polymeric film) melts, forming a bond between the first polymeric film and the second polymeric film.

[0089] In certain embodiments, the pressure applied

(e.g., by an upper plate brought down against the upper side of the flange which is supported by a lower plate) is up to about 10 bar, for example, from about 2 bar to about 10 bar, or from about 3 bar to about 8 bar, or from about 4 bar to about 8 bar, or from about 5 bar to about 7 bar.

[0090] In certain embodiments, heat and pressure are applied from about 0.1 to about 5 seconds, for example, from about 0.2 to about 3.0 seconds, or from about 0.2 to about 2.0 seconds, or from about 0.2 to about 1.5 seconds, or from about 0.3 to about 1.2 seconds, or from about 0.4 to about 1.1 seconds. The duration of application may be referred to as the residence or dwell time of the container in a container-sealing apparatus.

[0091] Suitable apparatus for sealing the tray with the second polymeric film to form the sealed container include those conventionally used for sealing plastic containers and include, without limitation, apparatus manufactured by Proseal (RTM) and Mondini (RMT).

[0092] The method may be a continuous process in which a plurality of trays are sealed sequentially, or it may be a batch process. The apparatus may be configured to enable automated manufacture of a plurality of sealed containers. Alternatively, the apparatus may be portable enabling individual containers to be sealed manually.

[0093] The method may comprise evacuating the space between the cover (e.g. the second polymeric film) and the tray. The method may comprise displacing oxygen from the space between the cover (e.g. the second polymeric film) and the tray, for example, with an inert gas, such as nitrogen, helium, argon or xenon, and/or with carbon dioxide.

[0094] According to a fifth aspect, there is provided a method of packaging an article of commerce in a sealed container, the method comprising: providing a tray according to the first aspect or manufactured by the method according to the third aspect, the polymeric film being a first polymeric film; placing the article of commerce on the tray in contact with the first polymeric film; placing a cover comprising (e.g. which is) a second polymeric film over the article of commerce and the first polymeric film; and bonding the second polymeric film to the first polymeric film, for example, by the application of heat and/or pressure.

[0095] The method may be a method of making the sealed container according to the second aspect. The tray or the first polymeric film may have any properties described hereinabove in relation to the first or third aspects. The cover or the second polymeric film may have any properties described hereinabove in the relation to the second aspect. The article of commerce may have any of the properties described hereinabove in relation to the first or second aspects. The second polymeric film may be bonded to the first polymeric film by any of the methods described in relation to the fourth aspect.

[0096] The method may comprise evacuating the space between the cover (e.g. the second polymeric film) and the tray. The method may comprise displacing oxy-

gen from the space between the cover (e.g. the second polymeric film) and the tray, for example, with an inert gas, such as nitrogen, helium, argon or xenon, and/or with carbon dioxide. For example, the method may be a method of making a modified atmosphere package.

[0097] Alternatively, the method may be a method of making a skin package (i.e. a skin pack), e.g. a vacuum skin package (i.e. a vacuum skin pack). The method may comprise draping the cover (e.g. the second polymeric film) over the article of commerce on the tray and heat-sealing the second polymeric film to the tray by way of the first polymeric film. A vacuum may be used to achieve firm fit between the cover (e.g. the second polymeric film) and the article of manufacture.

[0098] The skilled person will appreciate that, except where mutually exclusive, a feature described in relation to any one of the above aspects may be applied *mutatis mutandis* to any other aspect. Furthermore, except where mutually exclusive, any feature described herein may be applied to any aspect and/or combined with any other feature described herein.

[0099] For the avoidance of doubt, the application extends to the subject-matter set out in the following numbered paragraphs:

1. A tray comprising a tray body, formed from a pul-
pable, fibrous material, and a polymeric film bonded
directly to the tray body, wherein no less than about
50 % of the surface area of the polymeric film is bond-
ed directly to the tray body.

2. The tray according to paragraph 1, wherein the
polymeric film is bonded directly to the tray body by
the application of heat and/or pressure as the poly-
meric film is placed on the tray body.

3. The tray according to paragraph 1 or paragraph
2, wherein the polymeric film is bonded to fibres of
the tray body.

4. The tray according to any preceding paragraph,
wherein the tray body is moulded.

5. The tray according to any preceding paragraph,
wherein the tray body is formed from a composition
comprising a fibrous pulp and wax, for example, par-
affin wax.

6. The tray according to paragraph 5, wherein the
fibrous pulp is derived from recycled paper.

7. The tray according to any preceding paragraph,
wherein the tray body comprises at least 90 wt. %
fibrous material and from 0.1 to 10 w. % wax.

8. The tray according to any preceding paragraph,
wherein the polymeric film is recyclable and/or bio-
degradable.

9. The tray according to any preceding paragraph,
wherein the polymeric film comprises two or more
layers of different polymeric materials.

10. The tray according to paragraph 9, wherein the
polymeric film comprises two layers of a polyalkylene
polymer and a layer of an alkylene vinyl alcohol ther-
ebetween, for example, wherein the polyalkylene
polymer is polyethylene and the alkylene vinyl alco-
hol is ethylene vinyl alcohol.

11. The tray according to any preceding paragraph,
wherein the polymeric film has a thickness from
about 30 μm to about 150 μm , for example, from
about 40 μm to about 60 μm .

12. The tray according to any preceding paragraph,
wherein the polymeric film comprises a tab portion
sized and configured to enable a user to remove, for
example, tear or peel, the polymeric film from the
tray body.

13. The tray according to any preceding paragraph,
wherein the tray body comprises a base and one of
more side walls extending around the perimeter of
the base, thereby defining an opening, the tray hav-
ing a rim about the opening, the rim about the open-
ing comprising a flange extending outwards from,
and about, the perimeter of the opening.

14. A sealed container comprising the tray according
to any preceding paragraph, wherein the polymeric
film is a first polymeric film and the sealed container
further comprises a cover comprising a second poly-
meric film bonded to the first polymeric film.

15. The sealed container according to paragraph 14,
where dependent on paragraph 13, wherein the sec-
ond polymeric film seals the opening and is bonded
to the first polymeric film at the flange.

16. The sealed container according to paragraph 14
or paragraph 15, wherein the first and second poly-
meric films together form a sealed pouch which is
separable from the tray body by peeling apart the
first polymeric film and the tray body.

17. The sealed container according to any of para-
graphs 14 to 16, wherein the sealed container is a
skin package.

18. The sealed container according to any of para-
graphs 14 to 16, wherein the sealed container is a
modified atmosphere package.

19. The sealed container according to any of para-
graphs 14 to 18, further comprising an article of com-
merce contained therein, optionally wherein the ar-

article of commerce is a food product, for example, one or more pieces of meat, fish or the like.

20. A method of making a tray, the method comprising: placing a polymeric film over a tray body which is formed from a pulpable, fibrous material; and bonding no less than about 50 % of the surface area of the polymeric film to the tray body by the application of heat and/or pressure to the polymeric film and/or the tray body.

21. The method according to paragraph 20, wherein at least a portion of the polymeric film softens or melts upon application of said heat and/or pressure, thereby bonding the polymeric film to fibres of the tray body.

22. A method of making a sealed container, the method comprising: providing a tray according to any of paragraphs 1 to 13 or manufactured by the method according to paragraph 20 or paragraph 21, the polymeric film being a first polymeric film; placing a cover comprising a second polymeric film over the first polymeric film; and bonding the second polymeric film to the first polymeric film.

23. The method according to paragraph 22, comprising bonding the second polymeric film to the first polymeric film by the application of heat and/or pressure.

24. A method of packaging an article of commerce in a sealed container, the method comprising: providing a tray according to any of paragraphs 1 to 13 or manufactured by the method according to paragraph 20 or paragraph 21, the polymeric film being a first polymeric film; placing the article of commerce on the tray in contact with the first polymeric film; placing a cover comprising a second polymeric film over the article of commerce and the first polymeric film; and bonding the second polymeric film to the first polymeric film, for example, by the application of heat and/or pressure.

25. The method according to paragraph 24, wherein the article of commerce is a food product, for example, one or more pieces of meat, fish or the like.

Figures

[0100] Embodiments will now be described by way of example only, with reference to the Figures, in which:

Figure 1 shows a plan view of an exemplary sealed container;

Figure 2 shows a sectional view of the sealed container of Figure 1 through A-A;

Figure 3 shows the container of Figures 1 and 2 after a cover has been removed;

Figure 4 illustrates schematically how a tray base and polymeric film of a tray of the container of Figures 1 to 3 may be separated from one another;

Figure 5 shows a sectional view of a second exemplary sealed container;

Figure 6 shows the container of Figure 5 after a cover has been removed; and

Figure 7 shows the container of Figure 5 after a sealed pouch has been separated from a tray base.

Detailed description

[0101] With reference to Figures 1 and 2, a container 1 includes a tray 2 and a cover 3. The shape of the tray 2 is defined by a tray body 4 which has a generally rectangular base 5 and side walls 6 defining an opening 8 to the tray 2. A flange 9 extends outwards around the perimeter of the opening 8 at the top of the side walls 6. The tray body 4 is made of a pulpable, fibrous material such as bagasse. The tray 2 also includes a first polymeric film 10 which is heat sealed to the interior of the tray body 4. In the example shown in Figures 1 and 2, the first polymeric film covers the entire interior surface of the tray body 4, including the top surface of the flange 9. The cover 3 is a second polymeric film 3 which extends across the opening 8 and is heat sealed to the first polymeric film 10 at the flange 9. The first and second polymeric films 10 and 3 include overlapping tab portions 11 which extend away from the flange 9 at a corner of the container 1.

[0102] The container is suitable for storing an article of commerce 12, which may be a food product such as a piece of meat or fish. The first polymeric film 10 comprises a heat-sealable (e.g. thermoplastic) polymeric material. The composition and thickness of the first polymeric film 10 is typically selected so as to provide the tray 2 with water resistance, thereby protecting the tray body 4 (made of the pulpable, fibrous material) from any moisture within the container 1 (for example, exuded by the article of commerce 10). The polymeric film 10 may also function as a gas (e.g. air) barrier. The second polymeric film 3 may also be selected from any suitable polymeric material capable of being heat sealed to the first polymeric film 10. In some examples, the second polymeric film 3 has the same composition and thickness as the first polymeric film 10.

[0103] As shown in Figures 1 and 2, the container 1 may be used to store and transport an article of commerce 12. In order to access the article of commerce 12, a consumer may remove the cover 3 from the container,

for example by peeling back the second polymeric film 3 using the tab portion 11. The article of commerce 12 may then be removed for consumption, as shown in Figure 3.

[0104] Following removal of the article of commerce 12, the first polymeric film 10 and the tray body 4 may be separated from one another, as shown in Figure 4, for example by peeling back the first polymeric film 10 using the tab portion 11. The first polymeric film 10 and the tray body 4 may then be disposed of separately as appropriate, for example by recycling.

[0105] In some examples, the container 1 is a modified atmosphere package. Accordingly, the atmosphere inside the container 1, between the tray 2 and cover 3, may contain reduced oxygen levels (i.e. relative to the exterior conditions). Oxygen can be replaced with, for example, an inert gas, such as nitrogen, and/or carbon dioxide.

[0106] In other examples, the container is formed as a skin package. For example, Figure 5 shows a container 21 which is a skin package including a tray 22 and a skin cover 23. The shape of the tray 22 is defined by a tray body 24 which has a generally rectangular base 25 and side walls 26 defining an opening 28 to the tray 22. A flange 29 extends outwards around the perimeter of the opening 28 at the top of the side walls 26. The tray body 24 is made of a pulpable, fibrous material such as bagasse. The tray 22 also includes a first polymeric film 30 which is heat sealed to the interior of the tray body 24. In the example shown in Figure 5, the first polymeric film covers the entire interior surface of the tray body 24, including the top surface of the flange 29. The tray 22 retains an article of commerce 32. The skin cover 23 is a second polymeric film 23 which covers the article of commerce 32 and is heat sealed to the first polymeric film 30 across those portions of the tray 22 not covered by the article of commerce 32. The first and second polymeric films 30 and 23 again include overlapping tab portions (not shown) which extend away from the flange 29 at a corner of the container 21.

[0107] The first polymeric film 30 again comprises a heat-sealable (e.g. thermoplastic) polymeric material. The composition and thickness of the first polymeric film 30 is also again typically selected so as to provide the tray 22 with water resistance, thereby protecting the tray body 24 (made of the pulpable, fibrous material) from any moisture within the container 21 (for example, exuded by the article of commerce 32). The first polymeric film 30 may also function as a gas (e.g. air) barrier. The second polymeric film 23 may also be selected from any suitable polymeric material capable of being heat sealed to the first polymeric film. In some examples, the second polymeric film 23 has the same composition and thickness as the first polymeric film 30.

[0108] As shown in Figure 5, the container 21 may be used to store and transport the article of commerce 32. In order to access the article of commerce 32, a consumer may remove the cover 23 from the container, for example by peeling back the second polymeric film 23 using the tab portion, dependent on the strength of the heat seal

between the first polymeric film 30 and the second polymeric film 23. The article of commerce 32 may then be removed for consumption, as shown in Figure 6. Following removal of the article of commerce 32, the first polymeric film 30 and the tray body 24 may again be separated from one another for separate disposal.

[0109] Alternatively, in some embodiments, the first and second polymeric films 30 and 23, when heat-sealed to one another, form a sealed pouch 33 which surrounds the article of commerce 32. This sealed pouch 33 may be separated from the tray body 24 by peeling the tray body 24 and the first polymeric film 30 apart, for example using the tab portion, as illustrated in Figure 7. Because the tray body 24 is typically relatively rigid, while the first and second polymeric films 30 and 23 are typically relatively flexible, separating the sealed pouch 33 containing the article of commerce 32 from the tray body 24 may provide a consumer with greater flexibility when storing the sealed article of commerce 32, for example in a refrigerator or freezer, for example enabling the consumer to store larger numbers of sealed articles of commerce in a smaller volume of space. The article of commerce 32 may then be removed from the sealed pouch 33 by peeling apart the first and second polymeric films 30 and 23 (dependent on the strength of the heat seal between them) or by cutting through the first and/or second polymeric film 30 and 23 using a blade (e.g. a knife or pair of scissors).

[0110] It will be understood that the invention is not limited to the embodiments described above and various modifications and improvements can be made without departing from the concepts described herein. Except where mutually exclusive, any of the features may be employed separately or in combination with any other features and the disclosure extends to and includes all combinations and sub-combinations of one or more features described herein.

Claims

1. A tray comprising a tray body, formed from a pulpable, fibrous material, and a polymeric film bonded directly to the tray body, wherein no less than about 50 % of the surface area of the polymeric film is bonded directly to the tray body.
2. The tray according to claim 1, wherein the polymeric film is bonded directly to the tray body by the application of heat and/or pressure as the polymeric film is placed on the tray body, optionally wherein the polymeric film is bonded to fibres of the tray body.
3. The tray according to any preceding claim, wherein the tray body:
 - (a) is moulded;
 - (b) is formed from a composition comprising a

- fibrous pulp and wax, for example, paraffin wax, optionally wherein the fibrous pulp is derived from recycled paper; and/or
(c) comprises at least 90 wt. % fibrous material and from 0.1 to 10 w. % wax.
4. The tray according to any preceding claim, wherein the polymeric film:
 - (a) is recyclable and/or biodegradable;
 - (b) film comprises two or more layers of different polymeric materials, optionally wherein the polymeric film comprises two layers of a polyalkylene polymer and a layer of an alkylene vinyl alcohol therebetween, for example, wherein the polyalkylene polymer is polyethylene and the alkylene vinyl alcohol is ethylene vinyl alcohol;
 - (c) has a thickness from about 30 μm to about 150 μm , for example, from about 40 μm to about 60 μm ; and/or
 - (d) comprises a tab portion sized and configured to enable a user to remove, for example, tear or peel, the polymeric film from the tray body.
 5. The tray according to any preceding claim, wherein the tray body comprises a base and one of more side walls extending around the perimeter of the base, thereby defining an opening, the tray having a rim about the opening, the rim about the opening comprising a flange extending outwards from, and about, the perimeter of the opening.
 6. A sealed container comprising the tray according to any preceding claim, wherein the polymeric film is a first polymeric film and the sealed container further comprises a cover comprising a second polymeric film bonded to the first polymeric film.
 7. The sealed container according to claim 6, where dependent on claim 5, wherein the second polymeric film seals the opening and is bonded to the first polymeric film at the flange.
 8. The sealed container according to claim 6 or claim 7, wherein the first and second polymeric films together form a sealed pouch which is separable from the tray body by peeling apart the first polymeric film and the tray body.
 9. The sealed container according to any of claims 6 to 8, wherein the sealed container is a skin package.
 10. The sealed container according to any of claims 6 to 8, wherein the sealed container is a modified atmosphere package.
 11. The sealed container according to any of claims 6 to 10, further comprising an article of commerce contained therein, optionally wherein the article of commerce is a food product, for example, one or more pieces of meat, fish or the like.
 12. A method of making a tray, the method comprising: placing a polymeric film over a tray body which is formed from a pulpable, fibrous material; and bonding no less than about 50 % of the surface area of the polymeric film to the tray body by the application of heat and/or pressure to the polymeric film and/or the tray body, optionally wherein at least a portion of the polymeric film softens or melts upon application of said heat and/or pressure, thereby bonding the polymeric film to fibres of the tray body.
 13. A method of making a sealed container, the method comprising: providing a tray according to any of claims 1 to 5 or manufactured by the method according to claim 12, the polymeric film being a first polymeric film; placing a cover comprising a second polymeric film over the first polymeric film; and bonding the second polymeric film to the first polymeric film, for example, by the application of heat and/or pressure.
 14. A method of packaging an article of commerce in a sealed container, the method comprising: providing a tray according to any of claims 1 to 5 or manufactured by the method according to claim 12, the polymeric film being a first polymeric film; placing the article of commerce on the tray in contact with the first polymeric film; placing a cover comprising a second polymeric film over the article of commerce and the first polymeric film; and bonding the second polymeric film to the first polymeric film, for example, by the application of heat and/or pressure.
 15. The method according to claim 14, wherein the article of commerce is a food product, for example, one or more pieces of meat, fish or the like.

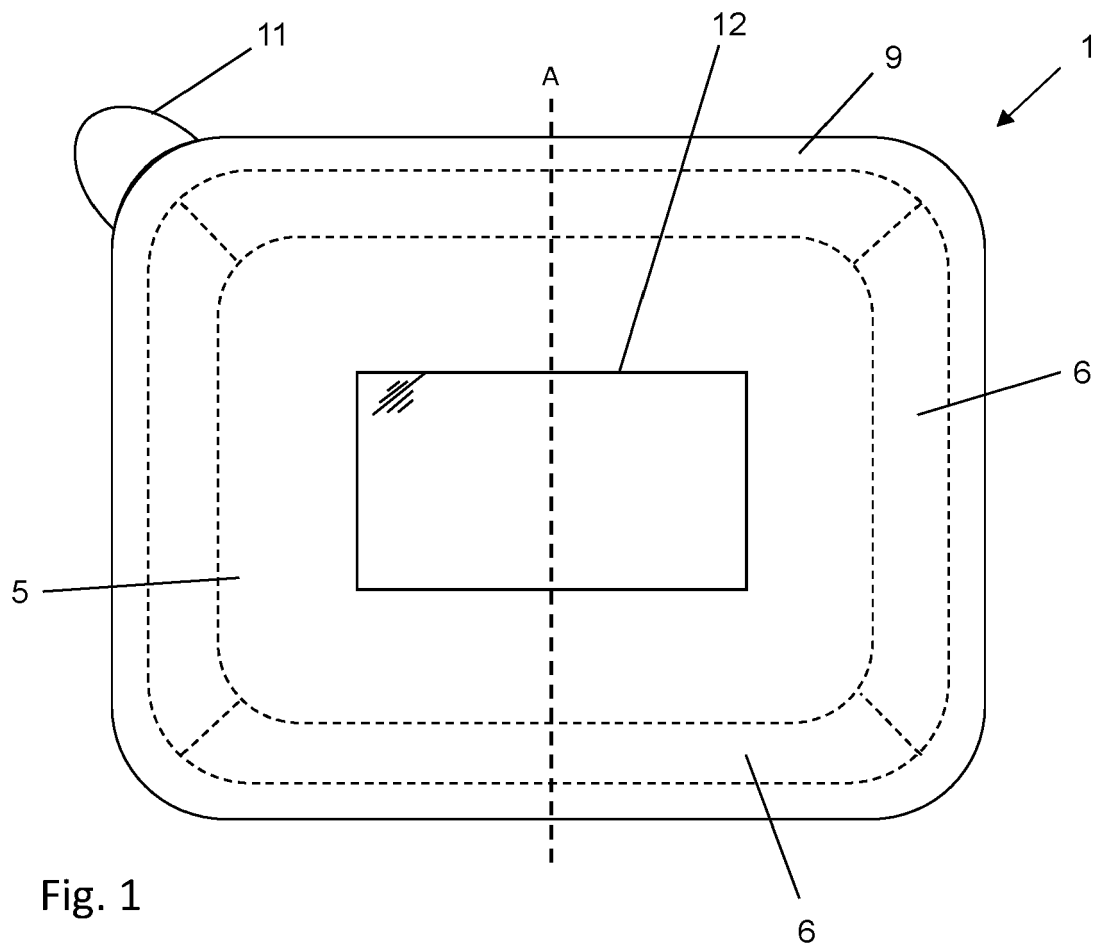


Fig. 1

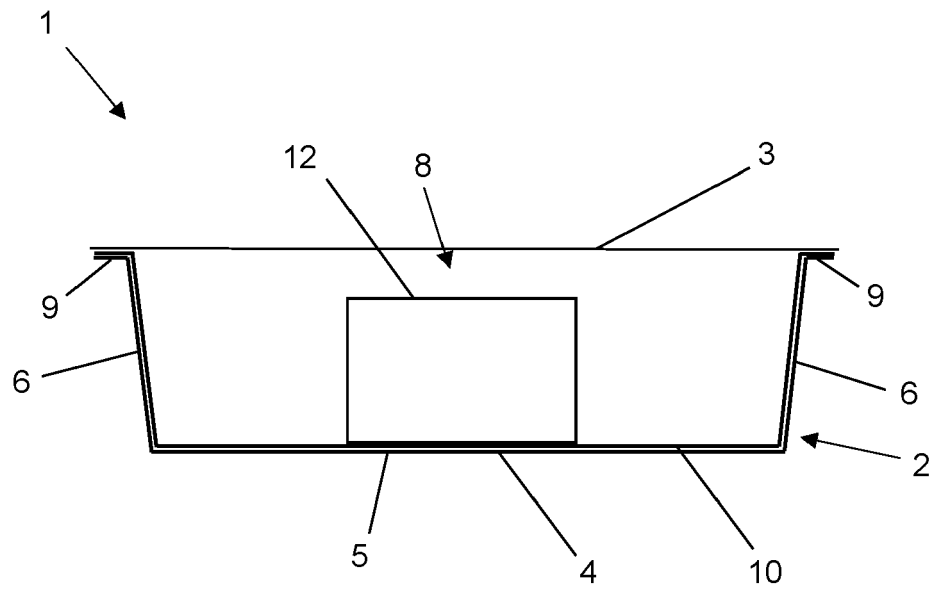


Fig. 2

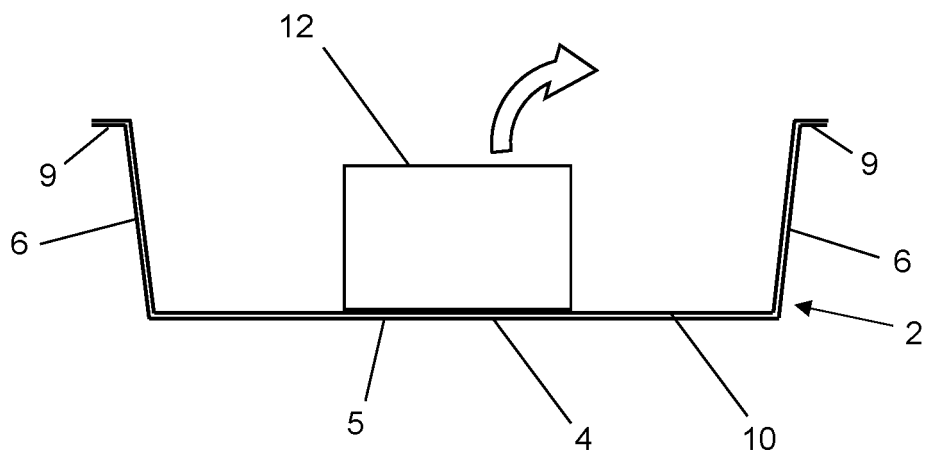


Fig. 3

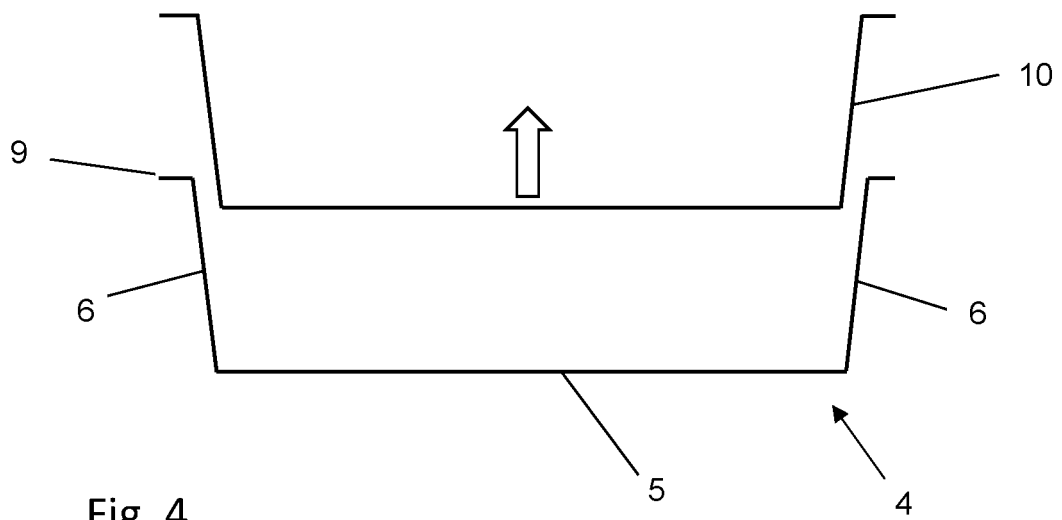


Fig. 4

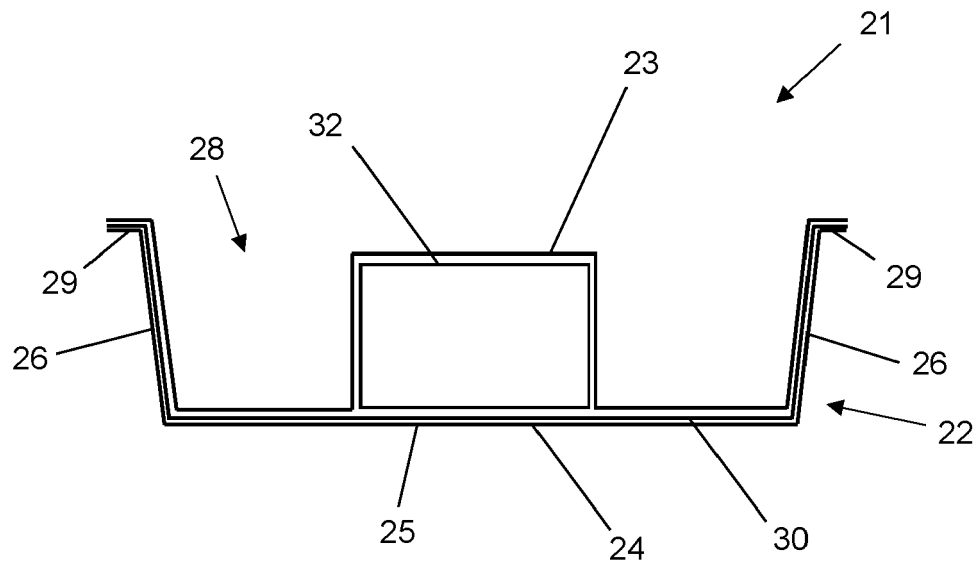


Fig. 5

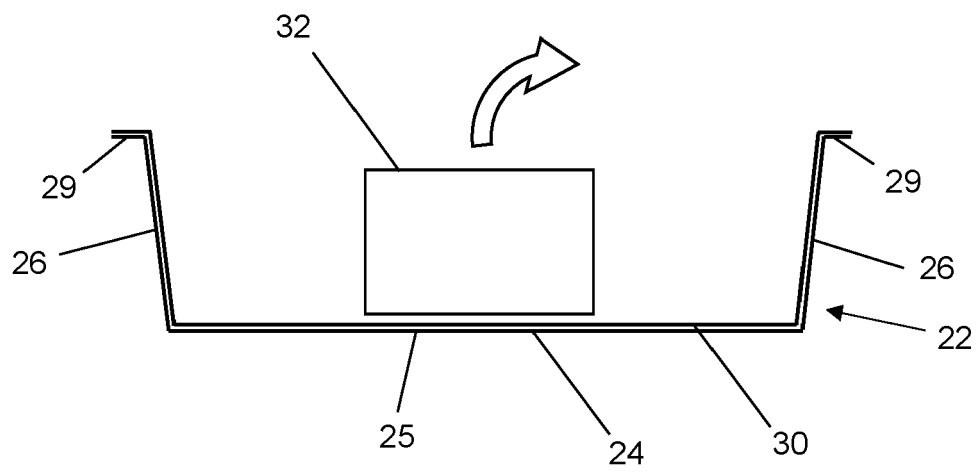


Fig. 6

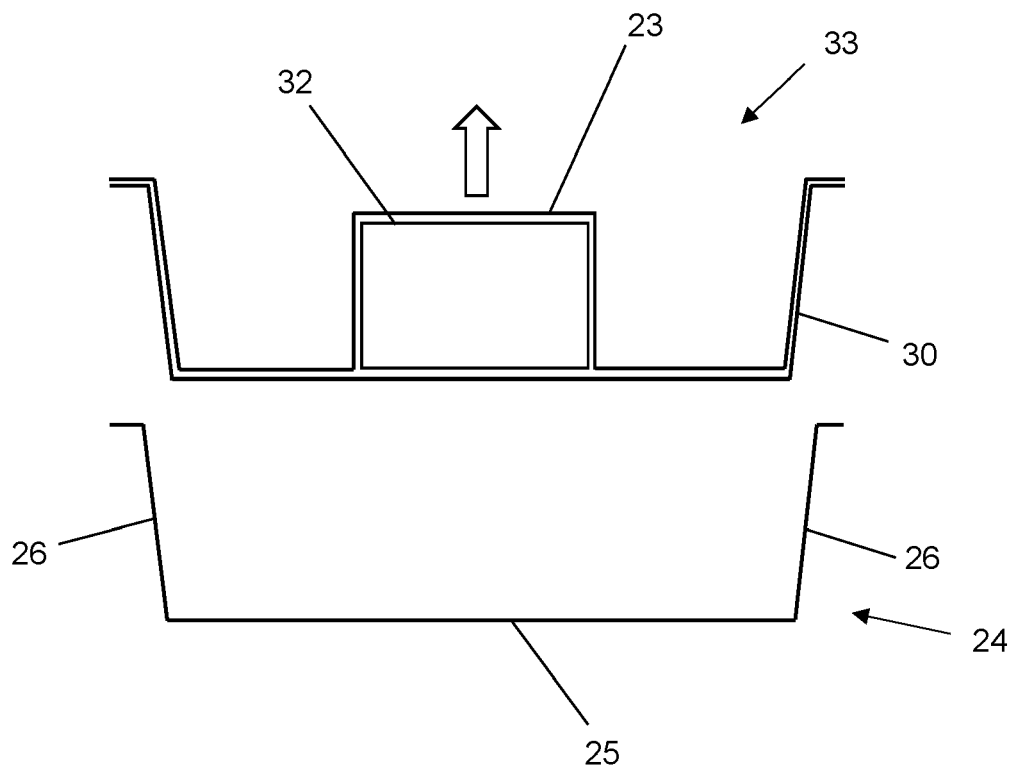


Fig. 7



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