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(54) **CARDBOARD MEAL BOX**

(57) Cardboard meal box (1), comprising a container (3) for holding a meal, which is formed by a base and a plurality of walls extending upwardly from the base; and a lid (2) for closing the container, wherein a rear edge of the lid is hingedly connected to a first wall the plurality of walls of the container and the lid comprises a skirt (21) along its free edges, wherein, in a closed position of the lid, the skirt extends downwardly from the free edges of the lid; wherein a second wall (31) of the plurality of walls of the container comprises a flap (310) configured to be folded inwardly with respect to the container about a first fold line, and a tab-shaped cutout (311) extending from the first fold line away from the flap, wherein the flap and the tab-shaped cutout are configured to pivot about the first fold line in one piece, such that the tab-shaped cutout pivots outwards from the second wall, away from the container, upon the flap being folded inwards from the second wall, and wherein the skirt of the lid comprises a locking strip (4), which is partially fixed to an inner surface of the skirt, wherein a free edge of the locking strip, not being fixed to the inner surface of the skirt, forms a ledge (410), and wherein, in a closed position of the lid, the tab-shaped cutout engages the ledge to hold the lid in the closed position.

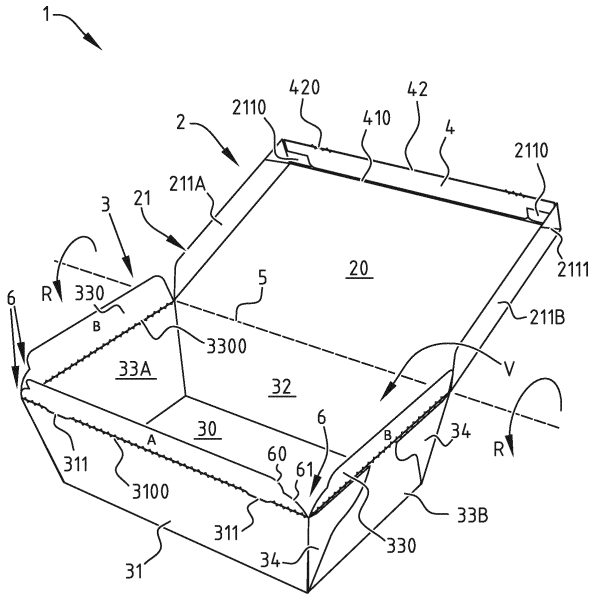

FIG. 2

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Description

[0001] The present disclosure relates to a cardboard meal box.

[0002] Cardboard meal boxes are widely used to transport prepared (hot) meals to customers. For instance, take-out meals may be provided in a cardboard meal box, or a cardboard meal box may be used in-flight on an airline to serve a meal to passengers and crew. Depending on the type of meal served in the cardboard meal box, the cardboard material may be impregnated or coated with a protective layer for mitigating leakage. For instance, a hot meal may contain liquid components, such as oils, sauces, emulsions, which may leak through cardboard material. A protective layer may for instance be a polymer coating. Whilst coating or the like may prevent leakage through the material, leakage may also occur through the structure. For this purpose, cardboard meal boxes may be provided with a lid, or multiple lids. For instance, a widely used design for such meal boxes is a meal container with a base and four upright walls, wherein several walls are provided with flaps to form a top closure of the meal box. In order to prevent spillage, the flaps may be configured to engage with each other, in order to form a type of locking means to lock the top closure of the meal box. However, such locking means are known not to be reliable due to the resilient behavior of the cardboard material. In particular, the cardboard meal box is generally manufactured from a single blank, which is cut from a sheet of cardboard material. Scores, creases and/or perforations may allow for the box to be folded in such a way as to form a three-dimensional meal box from the two-dimensional blank. However, the resilient cardboard material has the tendency to return to its planar, two-dimensional state. Accordingly, the aforementioned flaps serving as a top closure are biased to their opened state. Several other options for top closures are known in the art, such as a lid with a single hinge, a separate lid, et cetera. However, such lids may come undone and/or may introduce gaps or crevices or the like.

[0003] In view of the above, it is an object of the present invention, amongst other objects, to provide a cardboard meal box which mitigates spillage, particularly spillage of liquid or semi-liquid components.

[0004] Accordingly, according to a first aspect of the invention, a cardboard meal box is provided, which comprises a container for holding a meal, which is formed by a base and a plurality of walls extending upwardly from the base, and a lid for closing the container, wherein a rear edge of the lid is hingedly connected to a first wall the plurality of walls of the container and the lid comprises a skirt along its free edges, wherein, in a closed position of the lid, the skirt extends downwardly from the free edges of the lid, wherein a second wall of the plurality of walls of the container comprises a flap configured to be folded inwardly with respect to the container about a first fold line, and a tab-shaped cutout extending from the first fold line away from the flap, wherein the flap and the tab-shaped cutout are configured to pivot about the first fold line in one piece, such that the tab-shaped cutout pivots outwards from the second wall, away from the container, upon the flap being folded inwards from the second wall, and wherein the skirt of the lid comprises a locking strip, which is partially fixed to an inner surface of the skirt, wherein a free edge of the locking strip, not being fixed to the inner surface of the skirt, forms a ledge, and wherein, in a closed position of the lid, the tab-shaped cutout engages the ledge to hold the lid in the closed position.

[0005] The engagement of the tab-shaped cutout (also referred to as the tab) and the ledge, formed by the locking strip, ensure that the lid, which is preferably single-hinged, remains in the closed position. Importantly, the locking strip is partially, and thus not fully, fixed to the inner surface of the skirt. Due to this property, the free edge of the locking strip, which is not fixed to the inner surface, is able to be biased away from the inner surface of the skirt. Accordingly, when the lid is moving to the closed position, the tab comes into contact with the locking strip, preferably at first the part of the locking strip which is fixed to the skirt, and subsequently passes the strip. Since the strip is able to be biased away from the inner surface of the skirt, the strip moves under the tab when the tab passes the strip, such that the tab catches on, or latches onto, the ledge formed by the free edge of the locking strip.

[0006] Besides forming a secure locking means, the combination of the ledge and the tab also enables a distinct clicking sound or snapping sound when the tab passes the ledge. The force caused by the snapping motion may also be felt by hand. Accordingly, due to these sensations the user is made aware of the point at which the tab catches behind the ledge, which enables the user to consistently and securely close the lid each time. This is of special importance when the user is an employee of a food provider, such as a take-away restaurant, who must close numerous boxes every day. The clicking or snapping sound and feeling thus provide reliable, consistent feedback to the user that the lid is locked in the closed position. The closure force can be adjusted by varying the width of the tab, measured in a direction perpendicular to the first fold line. A larger depth in this case means a higher closure force. A higher closure force generally enables a louder clicking/snapping sound.

[0007] Furter, as mentioned earlier, a cardboard flap, such as the one of the present cardboard meal box, has the tendency to return to its initial position due to the resilient nature of the cardboard material. Accordingly, the flap has the tendency to move upwards to its unfolded state. This further mitigates possible spillage, as the flap moves upward to come near or in contact with the inner surface of the lid. Hence, the flap forms a further barrier between the interior and exterior of the container. Even if the upward resilient force of the flap is relatively high, the lid will remain securely in the closed position, due to the engagement of the tab and the ledge. Moreover, the upward resilient force of the flap(s) ensures that the tab

and the ledge remain in firm engagement, such that the lid is prevented from movement relative to the container. Accordingly, vibration (e.g., flapping or chatter) of the lid is mitigated.

[0008] Hence, the cardboard meal box of the first aspect of the present invention is highly resistant to spillage of meal components. Particularly, the cardboard meal box according to the first aspect effectively mitigates spillage of liquid or semi-liquid components contained therein.

[0009] Preferably, in the cardboard meal box of the first aspect, the skirt and the locking strip are manufactured in one piece and separated by a second fold line, the free edge of the locking strip being opposite to the second fold line, wherein the locking strip is folded inwardly against the inner surface of the skirt before being partially fixed thereto. Accordingly, the correct placement of the locking strip on the inside of the skirt is facilitated. In particular, the fold ensures that, during manufacturing of the cardboard meal box, the location of the ledge formed by the locking strip is consistent between different boxes. It is further preferred that the width of the locking strip is smaller than the width of the skirt, such that the ledge is formed at a distance from the lid. Preferably, the distance is at least the thickness of the cardboard material. Accordingly, the tab-shaped cutout, which has a thickness approximately equal to the thickness of the cardboard material, is able to be received between the ledge and the lid, specifically the main part of the lid, which may also be referred to as the cover part which covers the opening of the container. Optionally, the second fold line may comprise perforations, so as to further ensure a precise fold during manufacturing of the meal box.

[0010] Preferably, in the cardboard meal box of the first aspect, a third wall of the plurality of walls, adjacent to the second wall, comprises a flap configured to be folded inwardly with respect to the container about a third fold line. In other words, the container may be provided with multiple flaps at multiple walls thereof. It is not necessarily required for each wall comprising a flap to also comprise a tab-shaped cutout. A wall may thus have a flap, but not a tab-shaped cutout. Having additional flaps further mitigates possible spillage, as the flaps move upward to come near or in contact with the inner surface of the lid. It is further preferred that adjacent corner portions of the flaps of the second wall and the third wall comprise mutually engaging holding means for holding the flaps in the inwardly folded position. Optionally, each of the mutually engaging holding means is formed by two adjacent circular arcs which form the outer perimeter of each of the adjacent corner portions, wherein, preferably, the two adjacent circular arcs have a different radius of curvature. The mutually engaging holding means formed by two adjacent circular arcs may also be referred to as cloud-shaped corner portions. The cloud-shaped corner portions are able to provide an interlocking mechanism which minimizes the open space between the adjacent corner portions of the flaps of the second wall and the third wall, thus further mitigating spillage or leakage between two adjacent flaps. In further addition, the engagement of two cloud-shaped corner portions is order-independent. For instance, a first cloud-shaped corner portion having circular arcs A_1 and B_1 may engage with a second cloud-shaped corner portion having circular arcs A_2 and B_2. When the first and second cloud-shaped corner portions engage, arc A_1 may overlap arc A_2 whilst arc B_2 overlaps arc B_1, or vice versa. Accordingly, the user of the cardboard meal box need not be concerned with the order in which the flaps must be folded inwards, as the mutually engaging holding means of adjacent corner portions of adjacent flaps are configured to engage one another in an order-independent manner.

[0011] Preferably, in the cardboard meal box of the first aspect, the second wall comprises a plurality of tab-shaped cutouts, and wherein, in a closed position of the lid, each of the plurality of tab-shaped cutouts engages the ledge to hold the lid in the closed position. For instance, the second wall may comprise two tab-shaped cutouts, such that the lid is correctly aligned with the second wall by having two spaced-apart engagement points. The second wall may naturally comprise more than two tab-shaped cutouts, such as three or four or five tab-shaped cutouts.

[0012] Preferably, in the cardboard meal box of the first aspect, each wall of the plurality of walls, preferably except for the first wall, comprises a flap configured to be folded inwardly with respect to the container about a respective fold line. For instance, the cardboard meal box may comprise four walls, i.e., a frontal wall, a rear wall, and two side walls. In this case, the first wall is the rear wall, on which the lid is hingedly attached, and the second wall is the frontal wall, on which the tab-shaped cutouts are provided. The side walls may then both comprise a flap, with or without additionally one or more tab-shaped cutouts. Accordingly, spillage over all of the walls is mitigate by having a barrier in the form of the provided flaps.

[0013] It is generally noted for the cardboard meal box of the first aspect that the tab-shaped cutouts preferably have a relatively small width, the width being measured in a direction perpendicular to the first fold line. More specifically, the width is preferably chosen such that when the tab-shaped cutout is pivoted outwards from the second wall, the hole left behind by the tab-shaped cutout is narrow enough to prevent liquids from spilling through said hole. Particularly, through the surface tension of the cardboard material of the meal box, liquids are prevented from spilling through narrow slits made therein. Hence, the tabs can be provided in the design, i.e., the blank, of the cardboard meal box whilst maintaining its spill-proof characteristics. Preferably, the width of the tab-shaped cutouts lies in the range of about 0.5 mm to 1.5 mm, more preferably in the range of about 0.5 mm to 1.0 mm, and even more preferably the width is about 0.7 mm.

[0014] Preferably, in the cardboard meal box of the first aspect, an area of the locking strip which is fixed to the inner surface of the skirt has a width of less than the total

width of the locking strip, preferably less than 80%, more preferably less than 60%, and most preferably less than 50% of the total width, the total width of the locking strip being the dimension of the locking strip perpendicular to the free edge thereof. Accordingly, the locking strip is able to bend away from the skirt, in an inward direction, to form the ledge.

[0015] Preferably, in the cardboard meal box of the first aspect, the length of the tab-shaped cutout in the direction along the first fold line is between 5 mm and 20 mm, preferably between 10 mm and 14 mm, and most preferably about 12 mm. These dimensions have proven to be effective in providing a secure locking action whilst mitigating spillage through the incision of the tab-shaped cutout.

[0016] Preferably, in the cardboard meal box of the first aspect, the meal box is manufactured from a single blank. This allows the cardboard meal box to effectively be mass-produced.

[0017] Preferably, in the cardboard meal box of the first aspect, the cardboard material is a barrier-type cardboard, which may be defined as a liquid-repellant material. An example of a barrier-type cardboard is a cardboard material comprising a leak-preventing coating, such as a polymer coating. The coating prevents sogging of the cardboard material over time, when the cardboard is in contact with a liquid, or moisture. Preferably, the cardboard comprises a non-polymer barrier, such as a non-polymer barrier coating.

[0018] Preferably, in the cardboard meal box of the first aspect, the locking strip is partially fixed to an inner surface of the skirt by means of gluing or ultrasonic welding. Gluing may be a cost-effective way of producing the cardboard meal box. Ultrasonic welding may allow for precise production of the meal box in an automated fashion. Ultrasonic welding may, for example, entail bringing a piece of polymer-coated cardboard in contact with a piece of non-coated cardboard, and applying ultrasonic waves thereto. The ultrasonic welding may be aided with compression of the pieces of cardboard. Other methods known to the skilled person for achieving ultrasonic welding are envisaged. Ultrasonic welding may also be used with non-polymer barrier coatings.

[0019] According to a second aspect of the invention, a cardboard meal box is provided, comprising a container for holding a meal, which is formed by a base and a plurality of walls extending upwardly from the base, wherein two adjacent walls of the plurality of walls each comprise a flap configured to be folded inwardly with respect to the container about a fold line, wherein adjacent corner portions of the flaps of the two adjacent walls comprise mutually engaging holding means for holding the flaps in the inwardly folded position.

[0020] Preferably, in the cardboard meal box of the second aspect, each of the mutually engaging holding means is formed by two adjacent circular arcs which form the outer perimeter of each of the adjacent corner portions. It is further preferred that the two adjacent circular arcs have a different radius of curvature. The outer perimeter formed by the adjacent circular arcs may be referred to as a cloud shape. The mutually engaging holding means may in this case be referred to as cloud-shaped corner portions. The cloud-shaped corner portions are able to provide an interlocking mechanism which minimizes the open space between the adjacent corner portions of the flaps of the second wall and the third wall, thus further mitigating spillage or leakage between two adjacent flaps. In further addition, the engagement of two cloud-shaped corner portions is order-independent. For instance, a first cloud-shaped corner portion having circular arcs A_1 and B_1 may engage with a second cloud-shaped corner portion having circular arcs A_2 and B_2. When the first and second cloud-shaped corner portions engage, arc A_1 may overlap arc A_2 whilst arc B_2 overlaps arc B_1, or vice versa. Accordingly, the user of the cardboard meal box need not be concerned with the order in which the flaps must be folded inwards, as the mutually engaging holding means of adjacent comer portions of adjacent flaps are configured to engage one another in an order-independent manner.

[0021] According to a third aspect of the invention, a cardboard meal box is provided, comprising a container for holding a meal, which is formed by a base and a plurality of walls extending upwardly from the base, and a lid for closing the container, wherein the lid comprises a skirt along its free edges, wherein, in a closed position of the lid, the skirt extends downwardly from the free edges of the lid, wherein at least one wall of the plurality of walls of the container comprises a flap configured to be folded inwardly with respect to the container about a first fold line, and a tab-shaped cutout extending from the first fold line away from the flap, wherein the flap and the tab-shaped cutout are configured to pivot about the first fold line in one piece, such that the tab-shaped cutout pivots outwards from the second wall, away from the container, upon the flap being folded inwards from the second wall, and wherein the skirt of the lid comprises a locking strip, which is partially fixed to an inner surface of the skirt, wherein a free edge of the locking strip, not being fixed to the inner surface of the skirt, forms a ledge, and wherein, in a closed position of the lid, the tab-shaped cutout engages the ledge to hold the lid in the closed position.

[0022] Preferably, at least two walls of the plurality of walls of the container comprise the flap with the tab-shaped cutout. In this case, the lid preferably comprises at least two locking strips for respective engagement with the at least two walls.

[0023] Preferably, the container comprises four walls, and each of the four walls comprise the flap with the tab-shaped cutout. In this case, the lid preferably comprises four locking strips for respective engagement with the four walls.

[0024] The cardboard meals boxes of the second and the third aspect of the invention may be provided with any of the preferred features of the cardboard meal box of the first aspect of the invention.

[0025] The present invention will hereinafter be elucidated by means of illustrative examples with reference to the attached drawings, wherein:

FIG. 1 depicts a schematic plan view of a blank of an exemplary cardboard meal box;
FIG. 2 depicts a perspective view of an exemplary cardboard meal box;
FIG. 3A depicts a perspective view of an exemplary cardboard meal box, with a first engagement configuration of inward folding flaps;
FIG. 3B depicts a detail view of the first engagement configuration of the inward folding flaps of FIG. 3A;
FIG. 4A depicts a perspective view of an exemplary cardboard meal box, with a second engagement configuration of inward folding flaps; and
FIG. 4B depicts a detail view of the second engagement configuration of the inward folding flaps of FIG. 4A.

[0026] In FIG. 1, a schematic plan view of a blank of an exemplary carboard meal box 1 is shown. The entire box 1 can be constructed from the single blank as shown, wherein solid lines indicate the outer boundaries and fold lines, jagged lines indicate fold lines that have intermittent perforations, and the areas with hatching are the areas of the box 1 that are bonded after construction, e.g., by gluing or ultrasonic welding.

[0027] The box 1 comprises a lid portion 2 and a container portion 3. After construction of the box 1 from the blank, the lid portion 2 forms a lid 2 and the container portion 3 forms a container for holding a meal. Preferably, the box 1 is made of cardboard, and more preferably of cardboard that is partially or fully polymer-coated.

[0028] The lid portion 2 has a cover portion 20 which covers the majority of the opening of the container 3 when the lid 2 is in its closed position. The lid portion 2 has a skirt portion 21, which is connected to the free edges of the cover portion 20. The skirt portion 21 is formed by three parts, a front skirt part 210, and a left side skirt part 211A and a right side skirt part 211B. The side skirt parts 211 (211A and 211B) both comprise a fastening flap 2110 used to fasten the side skirt parts 211 to the front skirt part 210. The front skirt part 210 comprises a main part 2100 and a locking strip 4 connected to a free end of the main part 2100. The side skirt parts 211 also have a fold line 2111, which allows for the skirt 21 to be folded inwardly to flatten the lid 2 for transport. For instance, flattening the lid 2 enables the lid 2 to be more compact to improve nesting, and thus storing, of multiple meal boxes before use. In addition, the fold line 2111 provides some flexibility to the skirt 21.

[0029] The locking strip 4 has a fixed area 40 and a non-fixed area 41. The locking strip 4 can be folded along its fold line 42, such that locking strip 4 can be folded on top of the main part 2100 of the front skirt part 210. Particularly, the locking strip 4 can be folded to the inner surface of the main part 2100 of the front skirt part 210, which is the surface that is visible in FIG. 1. The fold line 42 of the locking strip 4 comprises perforated sections 420, which forces the folding of the locking strip 4 about its fold line 42 at that exact location, thus ensuring a more precise fold, especially at the location of the perforated sections 420 which is useful for the locking mechanism, as further elaborated upon below.

[0030] The preferred order of construction of the skirt 21 is that the left skirt part 211A and the right skirt part 211B are folded such that they are approximately perpendicular to the cover portion 20, after which the fastening flaps 2110 of the side skirt parts 211 are folded such that they are approximately perpendicular to the side skirt parts 211 and point towards each other. The front skirt part 210 is then folded such that it is approximately perpendicular to the cover portion 20, and such that the main part 2100 of the front skirt part 210 contacts the fastening flaps 2110 of the side skirt parts 211. The locking strip 4 is then folded inwards such that it partially covers the fastening flaps 2110 of the side skirt parts 211. Accordingly, the fastening flaps 2110 are sandwiched between the fastening flap 4 and the main part 2100 of the front skirt part 210. The aforementioned fixed area 40 (the hatched (or shaded) area of the locking strip 4) is then fixed to the fastening flaps 2110 and the main part 2100 of the front skirt part 210 to simultaneously secure the left side skirt part 211A, the right side skirt part 211B, the front skirt part 210, and the locking strip 4 in their desired locations, thus forming the skirt 21. The skirt 21 as a whole thus extends from the free edges of the cover portion 20, and is approximately perpendicular thereto (pointing out of the paper, in the example of FIG. 1). Due to this construction, the skirt 21 also improves the structural rigidity of the lid 2 (e.g., making it less susceptible to bending).

[0031] It is noted that the non-fixed area 41 of the locking strip 4 is not fixed to the main part 2100 and the fastening flaps 2110. The free end of the non-fixed area 41 forms a ledge 410 which is used for the locking mechanism of the box 1. The tension in the material of the fastening flap 4 due to the bonding of the fixed part 40 to the main part 2100 and the fastening flaps 2110, and/or the thickness of the fastening flaps 2110 bias the non-fixed area 41 and its ledge 410 outwards, and away from the main part 2100 of the front skirt part 210. In other words, there is some distance created between the ledge 410 and the main part 2100 of the front skirt part 210.

[0032] The container part 3 has a base 30, a front wall 31, a rear wall 32, and two sidewalls 33 (left sidewall 33A and right sidewall 33B). The lid part 2 is hingedly connected to the container part 3 by a hinge 5 formed by a fold line between the cover portion 20 and the rear wall 32 of the container 3. The sidewalls 33 each comprise, at their top edge, a side cover flap 330 with a perforated fold line 3300. The front wall 31 comprises, at its top edge, a front cover flap 310. The front cover flap 310 has a perforated fold line 3100, and tab-shaped cutouts 311. The tab-shaped cutouts 311 are shown through a solid

line, which is cut along in practice. As shown in FIG. 1, the tab-shaped cutouts 311, also referred to as tabs 311 or locking tabs 311, are formed away from the front cover flap 310, and thus protrude in the material of the front wall 31. The cuts forming the tab-shaped cutouts 311 are formed such that, when the front cover flap 310 is folded from the top edge of the front wall 31 inwards toward the container 3, the tabs 311 protrude outwards from the container 3 and particularly the front wall 31. The tab-shaped cutouts 311 can also, additionally or alternatively, be provide in the side cover flaps 330.

[0033] When the lid 2 is closed on top of the container 3 by hinging the lid about the hinge 5, the tabs 311 can latch behind the ledge 410 of the locking strip 4. As noted above, the ledge 410 is biased away from the main part 2100 of the front skirt part 210. In other words, in the closed position of the lid 2, the ledge 410 is biased inwards towards the container 3. Accordingly, when the lid 2 is being closed, the tabs 311 come into contact with the ledge 410, which is in that case biased against the tabs 311 until the tabs 311 move past the ledge 410. When the tabs 311 move past the ledge 410 the ledge 410, due to its bias, is pressed against the outer surface of the front wall 31 of the container 3. This action may provide an audible click sound, as the ledge 410 slides from the tabs 311 and snaps against the front wall 31. The ledge 410 then effectively locks the lid 2, as the tabs 311 rest on top of the ledge 410 and hinder an upward movement of the ledge 410 and thus the lid 2. The tab-shaped cutouts 311 have smooth, S-shaped corners with a relatively large radius of curvature, which prevents tearing of the tabs 311 when force is applied to the tabs 311, which ensures that the lid 2 is suitable for multiple use (i.e., multiple opening and closing actions). For instance, if the corners of the tabs 311 are 90-degree corners, pulling on the tab 311 could easily lead to the tab 311 tearing inwards in the front cover flap 310. Accordingly, the S-shaped corners improve the longevity of the box 1, making its locking mechanism suitable for multiple use. This may be useful, e.g., in the airline industry, where a meal is served in-flight on an aircraft, and the food is served with the lid 2 closed for safety reasons (protection against spilling during handling/transport), and the customer intermittently opens and closes the lid 2 when said customer wishes to have a portion of the food in the container 3. In this case, it also becomes possible for the customer in the aircraft to take his/her meal, which is served onboard, out of the airplane to consume it at a later time, thus reducing waste. Further examples of relevant industries may include event catering, fast-food and take out restaurants, leftover servings ("doggy bag"), et cetera.

[0034] As shown in FIG. 1 by two dashed lines, the each of the tab-shaped cutouts 311 is aligned with a respective one of the perforated sections 420 of the fold line 42 of the locking strip 4. Namely, at the location where the ledge 410 and the tabs 311 engage, the fold of the locking strip 4 needs to be precise and reliable. The reason is that the width of the locking strip 4 (measured in y-direction) is slightly smaller than the width of the main part 2100 of the front skirt part 210, such that enough room is provided between the ledge 410 and the cover portion 20, such that the tabs 311 can fit between the ledge 410 and the cover portion 20. If the fold at the location where the tabs 311 engage the ledge 410 would not be consistent and precise, the situation may rise where the ledge is in contact with the cover portion 20. This is to be mitigated, as when the ledge 410 contacts the cover portion 20 the ledge 410 may be jammed (not biased away from the skirt 21) and/or there may not be enough room for the tabs 311 to latch behind (i.e., on top of) the ledge 410.

[0035] The front wall 31 and the rear wall 32 are connected to the sidewalls 33 through a wall fixing portion 34 (hatched area 34) and a support portion 35. The preferred order of construction of the container 3 is that the visible surface (i.e., the surface visible in FIG. 1) of the wall fixing portions 34 connected to the rear wall 32 are brought into contact with the outer surfaces (the surfaces facing outwards from the container 3 in its assembled state) of the sidewalls 33, after which the visible surface of the wall fixing portions 34 connected to the front wall 31 are brought into contact with the outer surfaces of the sidewalls 33. Each of the aforementioned fixing portions 34 (the hatched (or shaded) area of the fixing portions 34) is then fixed to the outer surface of the respective sidewall 33A, 33B and the support portions 35, which are also folded on the outer surface of the container 3. The support portions 35 prevent tearing of the blank of the box 1, and provide additional rigidity and leakage prevention, amongst other functions.

[0036] Further, the front cover flap 310 and the side cover flaps 330 (also referred to as inward folding flaps) comprise mutually engaging holding means 6 formed in both free corner portions of the front cover flap 310 and a free corner portion of each of the side cover flaps 330 that is adjacent to the front cover flap 310. As further elaborated upon below, the mutually engaging holding means 6 of the front cover flap 310 and side cover flaps 330 are configured to engage with each other to hold the flaps 310, 330 in a closed position, wherein the closed position is the position wherein the flaps 310, 330 are folded inwards towards the interior of the container 3. The mutually engaging holding means 6 are further elaborated upon below.

[0037] FIG. 2 shows an exemplary cardboard meal box 1 in an assembled state. The box 1 may be assembled, for instance, from the blank of FIG. 1, as described above. The base 30, front wall 31, rear wall 32, and sidewalls 33 of the container 3 define an interior volume V for holding a food product. The box 1 is preferably at least partially or fully coated and/or impregnated with a water/moisture resisting coating, such as a polymer coating. Hence, the interior volume V of the box is suitable, for instance, for a hot meal which contains liquid components, such as oils, sauces, emulsions, which are prevented from leaking through or sogging the material of the box 1.

[0038] In particular, FIG. 2 shows a ready state of the box 1. In the ready state, the box 1 is ready to receive a food product in its interior volume V. This means that the front cover flap 310 and the side cover flaps 330 are in the upright position, and the lid 2 is in its opened position. After the food is introduced in the container 3, the cover flaps 310, 330 may be folded inwardly towards the volume V, and the lid 2 may be closed by rotating it about the rotation axis R formed by the hinge 5.

[0039] After closing of the box 1, cover flaps 310, 330, the container 3, and the lid 2 work together to prevent spillage when the box 1 is transported or handled. As the cover flaps 310, 330 are initially manufactured from a blank (see, e.g., FIG. 1 for example), and the cardboard material is generally resilient, the cover flaps 310, 330 are biased towards their upright position as shown in FIG. 2. Accordingly, when the lid 2 is closed, the cover flaps 310, 330 are biased against the cover portion 20 of the lid 2, thus forming an additional barrier against spillage of the food contained in the volume V. In other words, the cover flaps 310, 330 and the cover portion 20 of the lid 2 prevent the food, particularly the liquid components thereof, from leaking out of the box 1. Furthermore, in the closed position of the lid 2, the tab-shaped cutouts 311 engage with the ledge 410 of the skirt 21 of the lid 2, to hold the lid 2 in the closed position. This prevents the lid 2 from opening during transport or handling. The tab-shaped cutouts 311 are relatively thin (as measured in y-direction in FIG. 1), such that when the tabs 311 are protruding outwards (i.e., when the front cover flap 310 is folded inwardly) the tabs 311 only produce a very thin opening in the front wall 31, which is thin enough to prevent liquid components of the food from spilling out of the interior volume V.

[0040] The cover flaps 310, 330 comprise mutually engaging holding means 6, such that the front cover flap 310 and the side cover flaps 330 can engage with each other, to hold them substantially in their inwardly folded position. The mutually engaging holding means 6 may be referred to as cloud-shaped corner portions 6. The cloud-shaped corner portions 6 are formed of two adjacent circular arcs 60, 61, forming an outer perimeter of the corner portions 6 which resembles a cloud-shape. Preferably the first circular arc 60 has a smaller radius of curvature than the radius of curvature of the second circular arc 61. When two cloud-shaped corner portions 6 engage with each other, the first circular arc 60 of one cover flap covers the first circular arc 60 of the other cover flap, and the second circular arc 61 of the other cover flap covers the second circular arc 61 of the one cover flap, as illustrated below by means of FIGS. 3 and 4.

[0041] A benefit of the cloud-shaped corner portions 6 of the cover flaps 310, 330, as shown in FIG. 2, is that they are engageable in an order-independent manner. This means that the engagement of the corner portions 6 of the front cover flap 310 and a side cover flap 330 can successfully be achieved regardless of whether the front cover flap 310 is folded inwardly before the side cover flap 330 is folded inwardly, or vice versa. This is illustrated by means of FIGS. 3A, 3B, 4A and 4B.

[0042] An additional benefit of the cloud-shaped corner portions 6 is that upon engagement of two of such corner portions 6 the gap between them is minimized due to its shape (see, e.g., FIGS. 3B and 4B for a closed-up view). This mitigates liquid components from leaking through between the cover flaps 310, 330. Moreover, the leak-preventing shape of the corner portions 6 works together with the effect of the flaps 310, 330, which have resilient nature and thereby contact the cover portion 20 of the lid 2, which in turn leads to an additional barrier between the container 3 and the lid 2 which further mitigates spillage, and further pushes the lid 2 slightly upwards to ensure a direct engagement between the tabs 311 and the ledge 410 thus mitigating vibration (e.g., flapping or chatter) of the lid 2 relative to the container 3.

[0043] FIGS. 3A and 3B show the same box 1 as FIGS. 4A and 4B. In FIGS. 3A and 4A, the cover flaps 310, 330 are folded inwardly as described above, to form a barrier against spillage of liquid components out of the volume V of the box 1. However, the order in which the cloud-shaped corner portions 6 of the front cover flap 310 and the side cover flaps 330 differ between FIGS. 3A and 4A.

[0044] FIG. 3B shows an enlargement (detail view) of the engagement of the corner portions 6 of the front cover flap 310 and a side cover flap 330 of FIG. 3A, and FIG. 4B shows an enlargement (detail view) of the engagement of the corner portions 6 of the front cover flap 310 and a side cover flap 330 of FIG. 4A.

[0045] The cloud-shaped corner portion 6 of the front cover flap 310 will be referred to as corner portion 6A, and the cloud-shaped corner portion 6 of the side cover flap 310 will be referred to as corner portion 6B. In FIG. 3B it is seen that the first circular arc 60A of corner portion 6A overlaps the first circular arc 60B (not visible) of corner portion 6B, and that the second circular arc 61B of corner portion 6B overlaps the second circular arc 61A (not visible) of corner portion 6A. The opposite is true in FIG. 4B, where it is seen that the first circular arc 60B of corner portion 6B overlaps the first circular arc 60A (not visible) of corner portion 6A, and that the second circular arc 61A of corner portion 6A overlaps the second circular arc 61B (not visible) of corner portion 6B. Both the situations as shown in FIGS. 3B and 4B provide a secure engagement of the front cover flap 310 with the side cover flaps 330. Accordingly, a person handling the box 1 need not concern himself/herself with the order in which the cover flaps 310, 330 are folded inwardly, thus mitigating faulty handling of the box 1. In addition, the inward folding of the front cover flap 310 automatically deploys the tabs 311, such that the person handling the box 1 can immediately close the lid 2 after folding the cover flaps 310, 330 inwards, which will then be securely locked by the locking mechanism of the box 1 which is essentially formed by the tabs 311 and the ledge 410 as described above. In addition, the inwardly folded flaps 310, 330 also improve the structural rigidity of the container 3 (e.g., making it

less susceptible to bending).

[0046] Accordingly, the exemplary cardboard meal boxes 1 as described with reference to the figures provides a spill-proof and easy to handle meal box system, suitable for mass-production and mass-handling in demanding, high-pressure, time-sensitive situations, such as serving meals in the airline industry, such as on an airplane, or in the fast-food and delivery industries, and the like. Other industries may likewise benefit from the above technical features of the meal box 1 described herein.

[0047] The illustrative embodiments or examples described above are not to be construed as limiting the scope of protection, which is determined by the appended claims.

Claims

1. Cardboard meal box, comprising:

   a container for holding a meal, which is formed by a base and a plurality of walls extending upwardly from the base; and
   a lid for closing the container, wherein a rear edge of the lid is hingedly connected to a first wall the plurality of walls of the container and the lid comprises a skirt along its free edges, wherein, in a closed position of the lid, the skirt extends downwardly from the free edges of the lid;
   wherein a second wall of the plurality of walls of the container comprises a flap configured to be folded inwardly with respect to the container about a first fold line, and a tab-shaped cutout extending from the first fold line away from the flap, wherein the flap and the tab-shaped cutout are configured to pivot about the first fold line in one piece, such that the tab-shaped cutout pivots outwards from the second wall, away from the container, upon the flap being folded inwards from the second wall, and
   wherein the skirt of the lid comprises a locking strip, which is partially fixed to an inner surface of the skirt, wherein a free edge of the locking strip, not being fixed to the inner surface of the skirt, forms a ledge, and wherein, in a closed position of the lid, the tab-shaped cutout engages the ledge to hold the lid in the closed position.

2. Cardboard meal box of claim 1, wherein the skirt and the locking strip are manufactured in one piece and separated by a second fold line, the free edge of the locking strip being opposite to the second fold line, wherein the locking strip is folded inwardly against the inner surface of the skirt before being partially fixed thereto.

3. Cardboard meal box of claim 2, wherein the width of the locking strip is smaller than the width of the skirt, such that the ledge is formed at a distance from the lid.

4. Cardboard meal box of any of the preceding claims, wherein a third wall of the plurality of walls, adjacent to the second wall, comprises a flap configured to be folded inwardly with respect to the container about a third fold line.

5. Cardboard meal box of claim 4, wherein adjacent corner portions of the flaps of the second wall and the third wall comprise mutually engaging holding means for holding the flaps in the inwardly folded position.

6. Cardboard meal box of claim 5, wherein each of the mutually engaging holding means is formed by two adjacent circular arcs which form the outer perimeter of each of the adjacent corner portions.

7. Cardboard meal box of claim 6, wherein the two adjacent circular arcs have a different radius of curvature.

8. Cardboard meal box of any of the preceding claims, wherein the second wall comprises a plurality of tab-shaped cutouts, and wherein, in a closed position of the lid, each of the plurality of tab-shaped cutouts engages the ledge to hold the lid in the closed position.

9. Cardboard meal box of any of the preceding claims, wherein each wall of the plurality of walls, except for the first wall, comprises a flap configured to be folded inwardly with respect to the container about a respective fold line.

10. Cardboard meal box of any of the preceding claims, wherein an area of the locking strip which is fixed to the inner surface of the skirt has a width of less than the total width of the locking strip, preferably less than 80%, more preferably less than 60%, and most preferably less than 50% of the total width, the total width of the locking strip being the dimension of the locking strip perpendicular to the free edge thereof.

11. Cardboard meal box of any of the preceding claims, wherein the length of the tab-shaped cutout in the direction along the first fold line is between 5 mm and 20 mm, preferably between 10 mm and 14 mm, and most preferably about 12 mm.

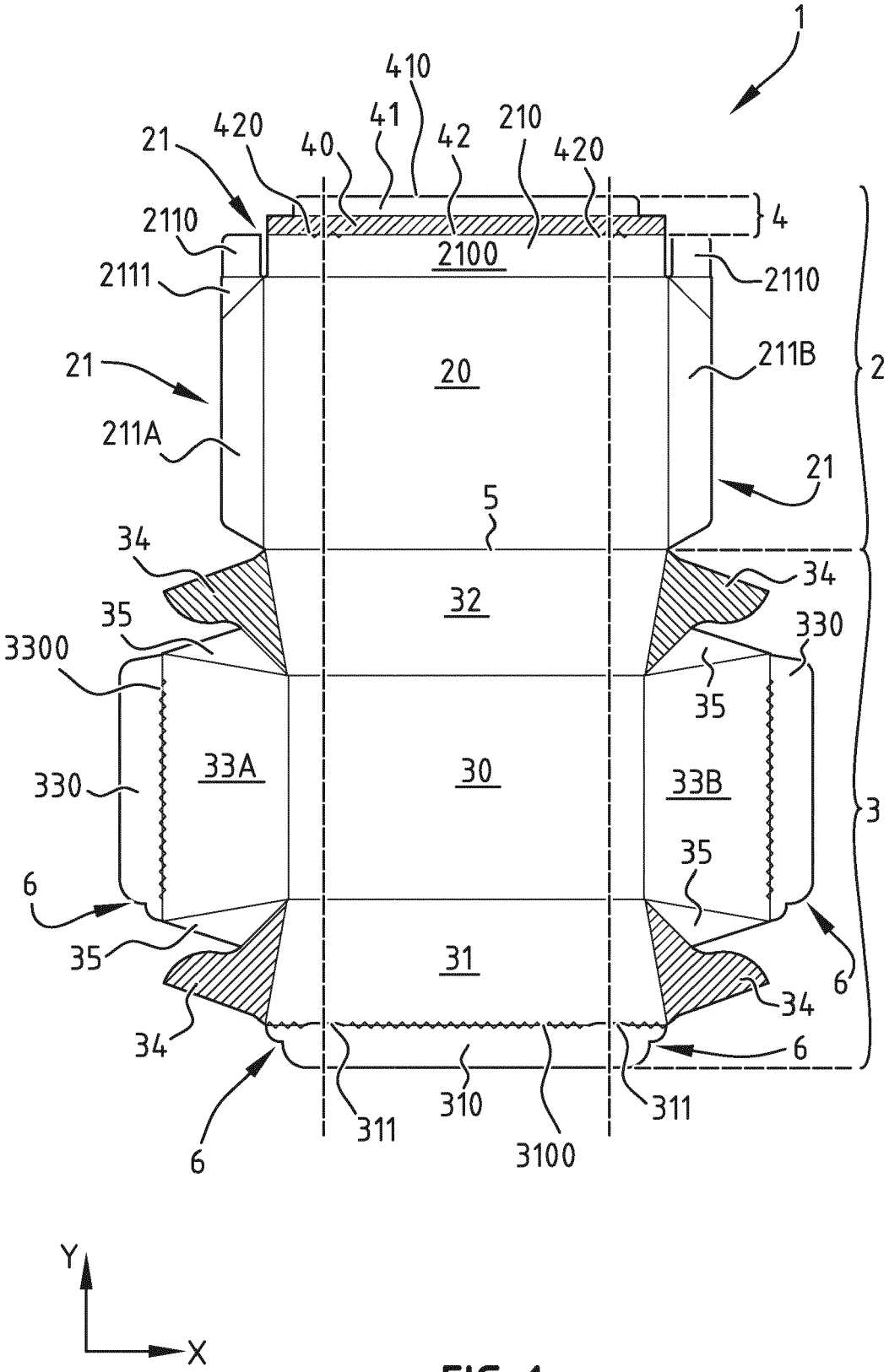
12. Cardboard meal box of any of the preceding claims, wherein the width of the tab-shaped cutout in the direction perpendicular to the first fold line is between 0.5 mm and 1.5 mm, preferably between 0.5 mm and

1.0 mm, and even more preferably the width is about 0.7 mm.

13. Cardboard meal box of any of the preceding claims, wherein the meal box is manufactured from a single blank.

14. Cardboard meal box of any of the preceding claims, wherein the cardboard material comprises a leak-preventing coating, such as a polymer coating.

15. Cardboard meal box of any of the preceding claims, wherein the locking strip is partially fixed to an inner surface of the skirt by means of gluing or ultrasonic welding.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33A
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Y
X

FIG. 1

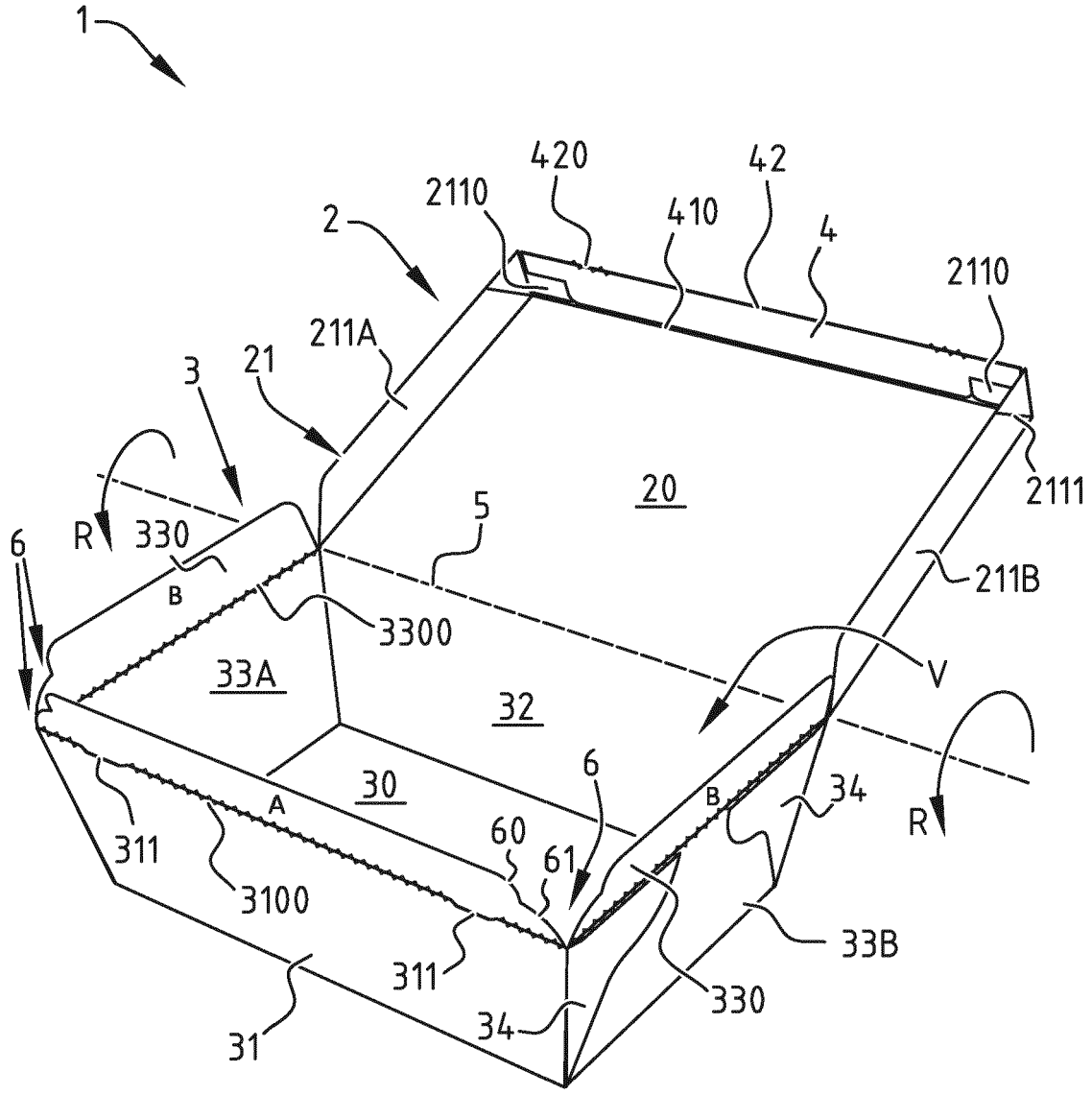
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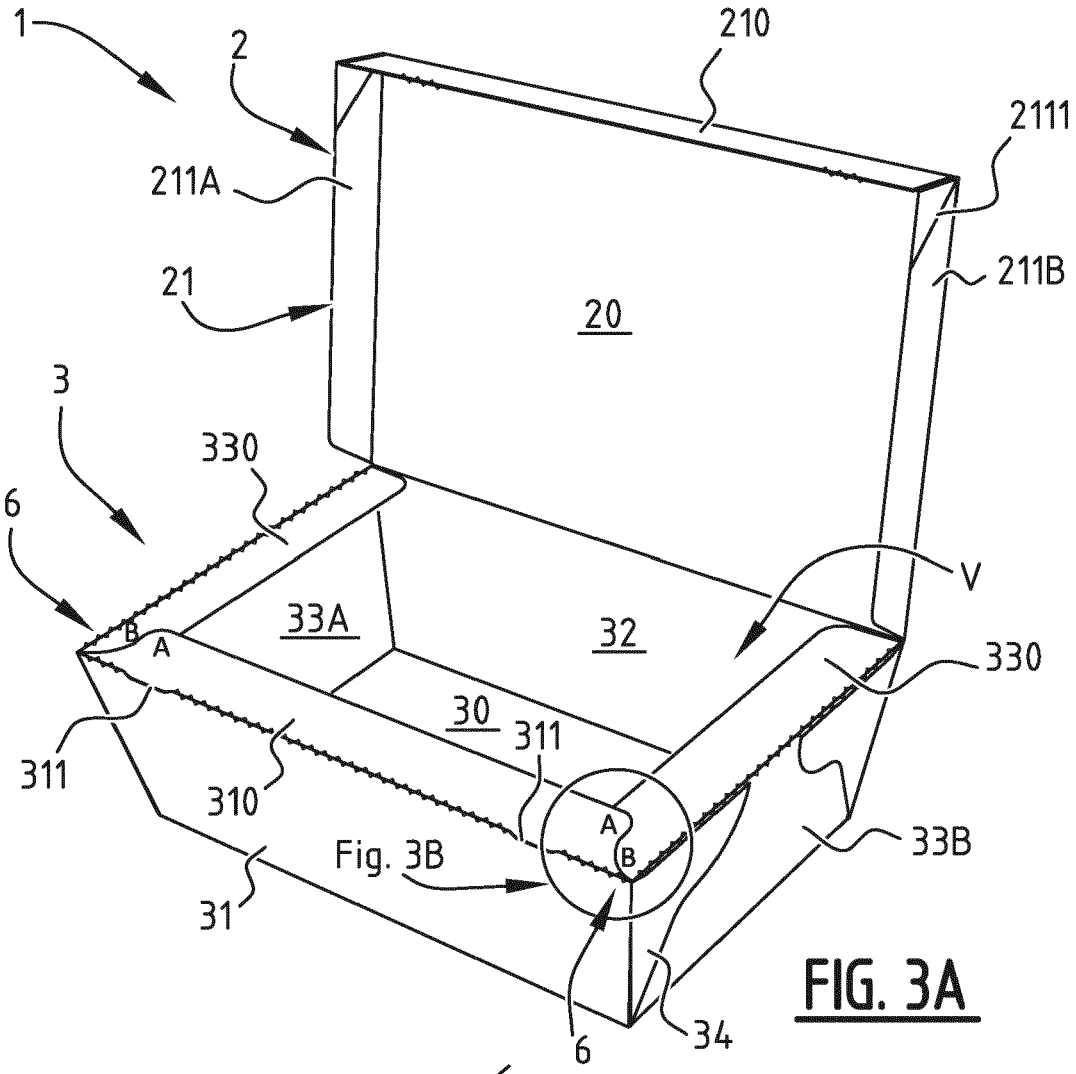
FIG. 2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211A
211B
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V
33A
32
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311
310
A
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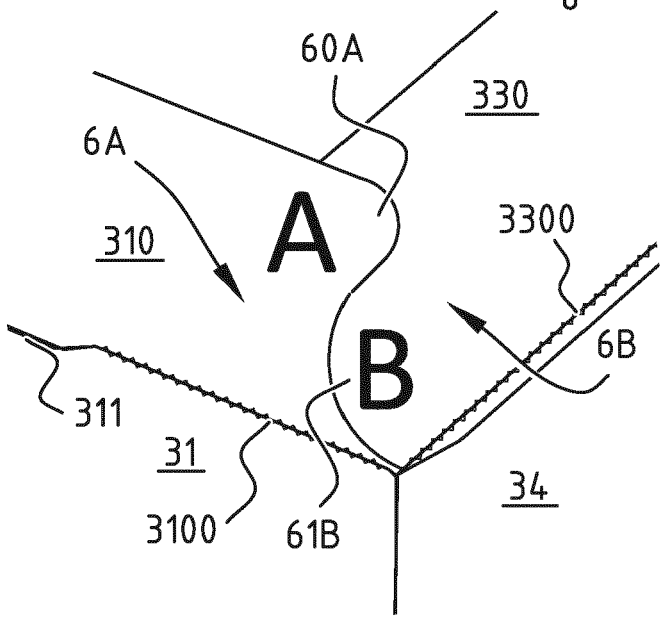
Fig. 3B
31
6
34

FIG. 3A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330
6A
A
310
3300
B
6B
311
31
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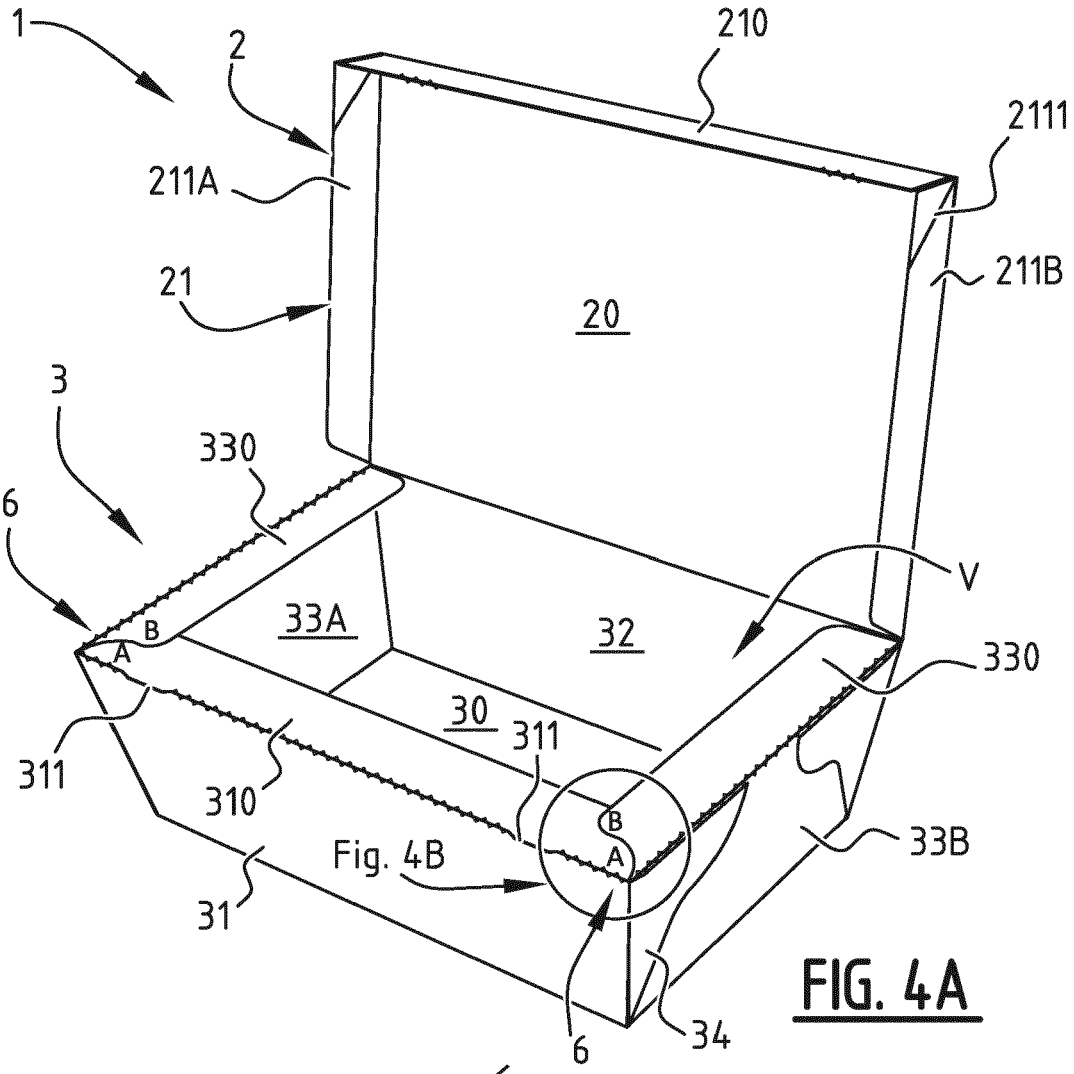
3100
61B

FIG. 3B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211A
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330
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330
Fig. 4B
33B
31
6
34

FIG. 4A

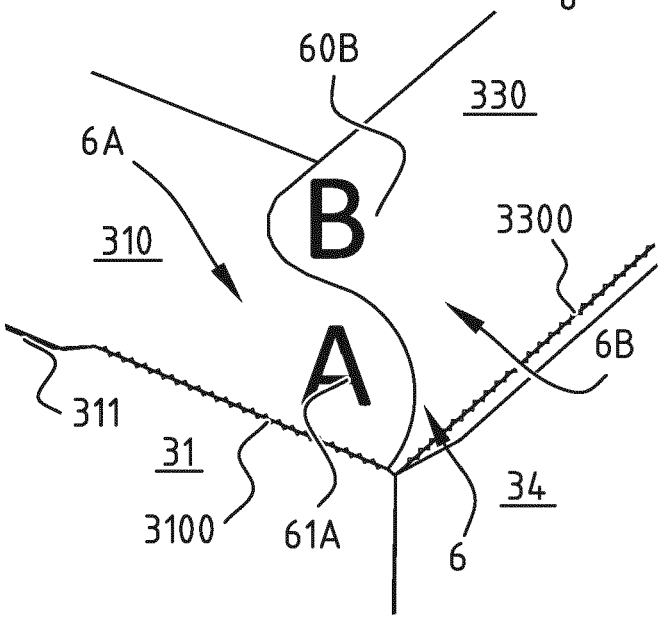
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FIG. 4B

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EUROPEAN SEARCH REPORT

Application Number
EP 22 17 4921

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Y	US 2017/217626 A1 (BORGERS ERIC [BE] ET AL) 3 August 2017 (2017-08-03) * figure 7 *	4,9	
A	US 4 844 330 A (ROOSA PAUL D [US] ET AL) 4 July 1989 (1989-07-04) * column 2, lines 46-51 *	14	

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B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 November 2022	Leijten, René

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82