

Protective and Insulated Packaging Container Formed from a Blank of Material

Introduction

The present invention relates to a packaging container, and a blank of material that can be folded into the said container, for the containment of items and protection of the same from external effects including shock and vibration. In particular, the container can be used to contain items that require cushioning or isolation from external shock and external vibration. Furthermore, the container provides thermal insulation for its contents, including the retention of heat within the contents if the contents are warm and are to be kept warm, and the insulation of the contents from external heat if the contents need protection from heat. This thermal insulation also keeps the exterior surfaces of the container from reaching extremes of hot and cold so that the container can be handled comfortably by unprotected hands even when the contents are at extreme high or low temperatures, respectively. In particular, the container can be used to contain hot or cold foodstuffs that require to be kept hot or cold, respectively, for a period of time, by means of thermal insulation.

Background to the Invention

Most conventional containers used in the packaging of items protect the items by means of separate inserts placed within the containers together with the items. These inserts, usually referred to as packaging cushions or buffers, serve to isolate or cushion the items from external shock such as that due to a direct mechanical impact between the exterior surface of the container and the ground surface during a fall from some height to the ground, or from external vibration such as that experienced by the container during transit via some mode of transportation. If these inserts are made of polymeric materials, they contribute to the well-recognized adverse impact on the environment upon their disposal after use. If these inserts are made of materials like paperboard or moulded paper pulp, then their disposal is less harmful to the environment because they are bio-degradable, but still their addition to the total amount of materials used in the packaging may be considered excessive in some instances and hence contribute an unnecessary amount of waste upon their disposal.

Although protection from shock and vibration is usually required to a lesser extent in the field of food packaging, the adverse impact on the environment associated with the packaging of foodstuffs is also huge due to the widespread use of polymers in food packaging. In particular, self-contained and ready-to-heat foodstuffs such as instant meals usually come packed in disposable plastic containers of a bowl or cup-like shape. These plastic bowls or cups are often made of polymers such as polystyrene in the form of foam or rigid moulded containers. The foam type of container provides thermal insulation to preserve the heat within the contents as well as facilitate handling of the container by unprotected hands even when it is hot

on the inside. The rigid type of container provides negligible thermal insulation but is usually designed to have a grid or pattern of shallow ribs on its exterior surface to aid in its handling by unprotected hands when it is hot. These foam or rigid plastic containers are also common devices used in the sale of takeaway food from food outlets and restaurants, especially hot cooked food. In addition to the problems on the environment, the use of plastic containers also poses a possible danger to health due to the ingestion of polymers leached from the container into the food, especially in the case of hot food and liquids. One solution to these problems is the use of alternative materials such as, for example, paper. The use of paper-based containers such as paperboard boxes can avoid the said problems on the environment and the leaching of polymers into food. However, conventional disposable paper box containers are made of a single shell of paperboard and hence do not provide thermal insulation to help maintain the temperature of its food contents for a significant period of time, or to allow the handling of the hot container by unprotected hands. Furthermore, as materials like paperboard are not rigid, the closure lids of these paper box containers do not provide a tight seal around the opening of the box. Hence spillage of liquid contents out of the container is not controlled unless some additional layer of protection is provided such as the use of a plastic bag or wrapper to hold and surround the container.

Summary of the Invention

It is an object of this invention to provide a container that isolates its contents from the outer walls of the container so that the contents are cushioned from external shock and vibration transmitted through the exterior surface of the container, and furthermore the contents are insulated from external temperatures experienced by the exterior surface of the container. The cushioning and insulation effects are achieved by holding the contents inside an inner box element that is nested within a larger outer box element, with an envelope of air surrounding the inner box element and separating it from the walls of the outer box element. It is a further object of this invention that the said envelope of air is maintained by suspending the inner box element within the outer box element via panels linking the inner and outer box elements, instead of by inserting packaging cushions in between the two elements, so as to avoid the use of excessive or environmentally-harmful materials in the overall packaging. By suspending the inner box element within the outer box element, the former is cushioned from any shock or vibration experienced by the latter since there is no direct contact between the walls of the former and the latter. The envelope of air between the inner and outer box elements also provides the desired thermal insulation between the former and the latter.

It is another object of this invention to provide a leak-proof container that can be used to hold liquid contents. This is achieved by forming the inner box element via a continuous closed loop of wall panels and web panels adjoined to the perimeter of the base panel of the inner box element. Furthermore, even if the closure lid does not provide a tight seal around the opening at the top of the inner box element, any spillage of liquid contents out of the inner box element will still be contained within the outer box element

and so there will be no spillage out of the container. In addition to holding items that need protection and insulation from external shock, vibration or temperatures, the container can also be used as a food packaging device as well as a cooking utensil wherein dry or wet foodstuff can be cooked by the addition of hot water, by microwaving, by steaming or by some other heating processes. The closure lids of both the inner and outer box elements are also oriented and can be opened in the same direction so as to provide easy and unobstructed access to the contents contained in the inner box element, and this is particularly advantageous when the container is used for packaging and serving foodstuff.

It is another object of this invention to provide a container that can be changed alternatively from a configuration in which the inner box element is nested within the outer box element to another configuration in which the inner box element is still attached to but hung outside of the outer box element. The former configuration is the normal configuration which facilitates the use of the invention as a packaging container while the latter configuration, referred to as its stackable configuration, is a space-saving feature of the invention that allows the container to be stacked with multiple units of like containers during storage or transportation of these containers in bulk. It is a further object of this invention to provide a container that can be constructed from one or more blanks of foldable material like, for example, paperboard so that environmental and health problems associated with the use of other packaging materials like polymers can be avoided. Although the container can be constructed from two or more blanks, the use of a single blank can reduce its cost of manufacture, facilitate its use in a production context and improve its structural strength during its service as a packaging container.

Accordingly, in a first aspect, this invention provides a packaging container made from one or more blanks of foldable material, with the said container comprising

- an outer box element that includes an outer base panel used to fashion a base for the said outer box element, outer side panels used to fashion the sides of the said outer box element, and an outer lid panel used to fashion a top lid for the said outer box element;

- at least one inner box element that includes an inner base panel used to fashion a base for the said inner box element, inner side panels used to fashion the sides of the said inner box element, and an inner lid panel used to fashion a top lid for the said inner box element;

- at least one suspension panel;

- characterized in that the or each said inner box element is adjoined or attached to at least one suspension panel by an articulation, with the said suspension panel further adjoined or attached to the said outer box element by another articulation, to hold the said inner box element suspended within the interior of the said outer box element and to keep the base, sides and top lid of the said inner box element away from direct contact with any of the base, sides or top lid of the said outer box element.

In a second aspect, this invention provides a blank of material for constructing the said packaging container.

Brief Description of the Drawings

Additional features and advantages of this invention will be readily apparent from the following description of a preferred embodiment of the invention, provided by way of example only, and made with reference to the accompanying drawings which represent the preferred embodiment.

Figure 1 shows a top plan view of a blank from which the container can be constructed.

Figure 2 shows a perspective view of the container in its stackable configuration wherein the inner box element is hung outside of the outer box element.

Figure 3 shows a view similar to that of Figure 2, but with hidden lines revealed.

Figure 4 shows a view similar to that of Figure 2, but with both the inner box element and the outer box element sectioned to show their respective interiors.

Figure 5 shows a perspective view of the container in its normal configuration wherein the inner box element is nested and suspended within the outer box element, with the lids of both said elements in the open condition.

Figure 6 shows a view similar to that of Figure 5, but with hidden lines revealed.

Figure 7 shows a view similar to that of Figure 5, but with the lid of the inner box element in the closed condition and the lid of the outer box element in the open condition.

Figure 8 shows a view similar to that of Figure 5, but with the lids of both the inner box element and the outer box element in the closed condition.

Figure 9 shows a view similar to that of Figure 8, but with hidden lines revealed.

Detailed Description of One Preferred Embodiment of the Invention

With reference to Figure 1, a blank 200 in accordance with one preferred embodiment of this invention will be described. The said blank is preferably made from a piece of sheet material such as stiff paperboard, corrugated paperboard, or any other appropriate material.

The said blank 200 includes an inner base panel 14 and an outer base panel 1. Adjoined to the inner base panel 14 are inner side panels 15a-b and 18a-b. In between and linking each pair of adjacent inner side panels 15b and 18a, 18a and 15a, 15a and 18b, and 18b and 15b is a pair of web panels 19a-b, 19c-d, 19e-f and 19g-h, respectively. The combined alternating sequence of the said inner side panels and said pairs of web panels 15b, 19a-b, 18a, 19c-d, 15a, 19e-f, 18b and 19g-h together in that order form a continuous closed loop of panels around and adjoined to the inner base panel 14. Extending from and adjoined to the inner side panel 18a is the inner lid panel 20, and further extending from and adjoined to the inner lid panel 20 is the inner lid tuck 21. Extending from the inner side panels 15a-b are suspension panels 16a-b, respectively. Extending from the suspension panel 16b is the suspension tab 17.

Adjoined to the outer base panel 1 are outer side panels 5a-b, with the outer side panel 5b further adjoined to the suspension panel 16a. Extending from and adjoined to the outer side panel 5a is the side flap 8. Furthermore, also adjoined to the outer side panel 5a are further outer side panels 9a-b. Adjoined to the outer side panel 9a is the outer lid panel 11, and further extending from and adjoined to the outer lid panel 11 is the outer lid tuck 13 and lid tabs 12a-b. In addition, adjoined to the outer base panel 1 are support panels 2a-b. Extending from and adjoined to the support panel 2a is the support base 3, while extending from and adjoined to the support panel 2b is the fastening flap 4. Adjoined to the outer side panel 5b are further fastening flaps 7a-b. In addition, adjoined to the outer side panel 9a is fastening flap 10a while adjoined to the outer side panel 9b is fastening flap 10b. Finally, a tab slot 6a is cut out along the crease line in between the side flap 8 and the outer side panel 5a, while a tab slot 6b is cut out along the crease line in between the outer side panel 5b and the suspension panel 16a.

With reference to Figures 2 and 3 and 4, a container 400 to be constructed from the blank 200 illustrated in Figure 1 will be described. The said container 400 comprises an inner box element 301, suspension panels 16a-b and the suspension tab 17, and an outer box element 302. Figures 2 and 3 and 4 show the container 400 in its stackable configuration, in which the inner box element 301 is positioned outside of the outer box element 302.

To erect the inner box element 301 that provides a hollow space within for the containment of items, the inner side panels 15a-b and 18a-b are folded downwards to a substantially vertical position with the adjoining web panels 19a-b, 19c-d, 19e-f and 19g-h simultaneously folded outwards and flat such that the said web panels are secured to the said inner side panels by the use of adhesives or some other means to be substantially flush with the surfaces of the said inner side panels. Although Figures 2 and 3 show that the web panels 19a-b, 19c-d, 19e-f and 19g-h are folded and secured to the inner side panels 18a-b, the said web panels can also be folded and secured to the inner side panels 15a-b or some other combinations of the inner side panels 15a-b and 18a-b. Furthermore, although Figures 2 and 3 and 4 show that the web panels 19a-b, 19c-d, 19e-f and 19g-h are folded and secured to the exterior surfaces of the inner side panels 18a-b, the said web panels can also be folded and secured to the interior surfaces of the inner side panels 18a-b, or

some other combinations of exterior and interior surfaces of the inner side panels 15a-b and 18a-b. The inner box element 301 is thereby formed, comprising the inner base panel 14, the inner side panels 15a-b and 18a-b, the web panels 19a-b, 19c-d, 19e-f and 19g-h, the inner lid panel 20 and the inner lid tuck 21.

When the inner box element 301 is erected, the inner side panels 15a-b and 18a-b are tapered towards the inner base panel 14. The said tapering feature is such that the angles formed between the said inner side panels and the said inner base panel, represented by the angles A and B for only one example corner of the inner box element 301 in Figure 2, are each greater than ninety degrees. The said tapering feature facilitates stacking of multiple units of containers similar to container 400 by allowing easier insertion of a corresponding part of another similar container unit into the hollow interior of the inner box element 301.

To erect the outer box element 302 that provides a hollow space within for nesting the inner box element 301, the support panels 2a-b are folded upwards until each form an acute angle with the outer base panel 1 and furthermore both the fastening flap 4 and the support base 3 are folded over to a substantially horizontal position with the fastening flap 4 secured along the corresponding border of the support base 3 by the use of adhesives or some other means. The outer side panels 5a-b are folded upwards to a substantially vertical position with the outer side panels 9a-b also in a substantially vertical position and folded inwards until the fastening flaps 10a-b adjoined to the outer side panels 9a-b, respectively, are secured to the corresponding borders of the outer base panel 1 by the use of adhesives or some other means. The fastening flaps 7a-b adjoined to outer side panel 5b are then secured to the corresponding borders of the outer side panels 9a-b, respectively, by the use of adhesives or some other means. The outer box element 302 is thereby formed, comprising the outer base panel 1, the support panels 2a-b, the fastening flap 4, the support base 3, the outer side panels 5a-b and 9a-b, the fastening flaps 7a-b and 10a-b, the side flap 8, the outer lid panel 11, the outer lid tuck 13 and the lid tabs 12a-b.

When the outer box element 302 is erected, the outer side panels 5a-b and 9a-b are tapered towards the outer base panel 1. The said tapering feature is such that the angles formed between the said outer side panels and the said outer base panel, represented by the angles C and D for only one example corner of the outer box element 302 in Figure 2, are each greater than ninety degrees. The said tapering feature facilitates stacking of multiple units of containers similar to container 400 by allowing easier insertion of a corresponding part of another similar container unit into the hollow interior of the outer box element 302.

In the stackable configuration of the container 400 as shown in Figures 2 and 3, the suspension panel 16b is adjoined to the inner box element 301 whereas the suspension panel 16a is adjoined to both the said inner box element and the outer box element 302. Figures 2 and 3 also show how the erected inner box element 301 is positioned outside of and yet connected to the erected outer box element 302. The orientation of the said inner box element with respect to the said outer box element, together with the said tapering feature of

both the said inner and outer box elements, allows the container 400 to be stacked with multiple units of like containers.

Figures 5 and 6 show the container 400 in its normal configuration, in which the inner box element 301 is nested and suspended within the interior of the outer box element 302. The said normal configuration is realized from the stackable configuration shown in Figures 2 and 3 by rotating the inner box element 301 about the crease line 103 until the said inner box element is nested within the interior of the outer box element 302, with the suspension tab 17 slotted into the tab slot 6a to attach and secure the suspension panel 16b onto the said outer box element so that the said outer box element suspends and carries the weight of the said inner box element and any contents held by the said inner box element. As the said inner box element is attached to the suspension panels 16a-b by an articulation each along the respective crease lines 104 and 106, and the said suspension panels 16a-b are in turn further attached to the said outer box element by an articulation each along the respective crease lines 103 and 105, the said inner box element is isolated and cushioned from any shocks or vibration experienced by the said outer box element. It is to be noted that the container 400 at its normal configuration can be returned to its stackable configuration by detaching the suspension tab 17 from the tab slot 6a and rotating the inner box element 301 about the crease line 103 until the said inner box element is released from the interior of the outer box element 302. As the inner box element 301 is formed by the web panels 19a-b, 19c-d, 19e-f and 19g-h folded flat and secured to the inner side panels 15a-b and 18a-b, the said web panels and said inner side panels form a continuous closed loop of panels in a substantially vertical and upright position around and adjoined to the inner base panel 14 to prevent any liquid contents held inside the said inner box element from leaking out of the same, thus rendering the said inner box element leak-proof in the normal configuration. In this normal configuration, the inner base panel 14 is also resting on the support base 3 such that the said support base serves as an elevated platform propped up by the support panels 2a-b to provide an additional support to hold the weight of the inner box element 301. Figures 5 and 6 also show both the inner box element 301 and the outer box element 302 in the open condition, wherein the inner lid panel 20 and the outer lid panel 11 are both raised and turned away to allow access to the interiors of the said inner box element and said outer box element, respectively. Both the inner lid panel 20 and the outer lid panel 11 are oriented in the same direction such that each is at the top of and thereby forms a top lid for the respective inner box element 301 and outer box element 302, and hinged along their respective crease lines 101 and 102 which are parallel to each other, and furthermore the directions of rotation for the opening of the two lids are the same, and their directions for closing are also the same. The similar orientations of both inner lid panel 20 and outer lid panel 11 provide easy and unobstructed access to any contents held in the inner box element 301 when both the said inner box element and the outer box element 302 are in the open condition.

Figure 7 shows the container 400 in its normal configuration, with the outer box element 302 in the open condition and the inner box element 301 in the closed condition wherein the inner lid panel 20 is lowered until the inner lid tuck 21 is tucked into the interior surface of the said inner box element along the

corresponding border of the inner side panel 18b. With the inner box element 301 nested completely within the outer box element 302, even if the inner lid panel 20 in the closed condition as shown in Figure 7 does not provide a tight seal to prevent spillage of any contents out of the said inner box element, any spillage of contents will only fall into and be contained within the hollow space between the said inner box element and the said outer box element.

Figures 8 and 9 show the container 400 in its normal configuration, with the inner box element 301 and the outer box element 302 both in the closed condition wherein the outer lid panel 11 is lowered until the lid tabs 12a-b are slotted into the tab slots 6a-b, respectively, and furthermore the outer lid tuck 13 is tucked into the interior surface of the said outer box element along the corresponding border of the outer side panel 9b. With the inner box element 301 suspended and nested completely within the larger outer box element 302, the hollow space surrounding the former keeps the inner base panel 14, the inner side panels 15a-b and 18a-b, and the inner lid panel 20 of the said inner box element away from direct contact with the outer base panel 1, the outer side panels 5a-b and 9a-b, and the outer lid panel 11 of the said outer box element, thereby isolating the said inner box element from any shocks or vibration experienced by the said outer box element. Furthermore, the said hollow space also forms an envelope of air between the said inner box element and the said outer box element, and the said envelope of air surrounds the said inner box element to provide thermal insulation between the said inner box element and the said outer box element.

The invention thus conceived may be subject to numerous variations, modifications, additions and deletions without departing from the spirit and scope of the inventive concept. For example, although the embodiment described herein shows the inner base panel 14 and the outer base panel 1 to be squares, other shapes such as rectangles and octagons can be used instead. Moreover, some or all of the components can be substituted with technically equivalent elements. Hence it should be understood that the form of the present invention described herein and shown in the accompanying drawings is illustrative only and is not intended to limit the scope of the present invention.

Claims

1. A container made from one or more blanks of foldable material, with the said container comprising an outer box element that includes an outer base panel used to fashion a base for the said outer box element, outer side panels used to fashion the sides of the said outer box element, and an outer lid panel used to fashion a top lid for the said outer box element;
at least one inner box element that includes an inner base panel used to fashion a base for the said inner box element, inner side panels used to fashion the sides of the said inner box element, and an inner lid panel used to fashion a top lid for the said inner box element;
at least one suspension panel;
characterized in that the or each said inner box element is adjoined or attached to at least one suspension panel by an articulation, with the said suspension panel further adjoined or attached to the said outer box element by another articulation, to hold the said inner box element suspended within the interior of the said outer box element and to keep the base, sides and top lid of the said inner box element away from direct contact with any of the base, sides or top lid of the said outer box element.
2. A container according to claim 1, wherein the said sides of the or each said inner box element are formed by a continuous closed loop of inner side panels and web panels around and adjoined to the said inner base panel.
3. A container according to any of the preceding claims, wherein the said inner side panels of the or each said inner box element are tapered towards the said inner base panel.
4. A container according to any of the preceding claims, further comprising a support base used to provide additional support to hold the said inner box element, with the said support base itself being propped up by support panels each adjoined or attached to the said outer box element.
5. A container according to any of the preceding claims, wherein the said outer side panels of the said outer box element are tapered towards the said outer base panel.
6. A container according to any of the preceding claims, further comprising an articulation about which the or each said inner box element can be rotated until the said inner box element is released from the interior and positioned outside of the said outer box element, without disconnecting the said inner box element from the said outer box element.

7. A container according to any of the preceding claims, characterized in that the said top lid of the or each said inner box element and the said top lid of the said outer box element have hinges that are parallel to each other and, furthermore, the directions of rotation for opening of the two lids are the same and their directions for closing are also the same.
8. A container according to any of the preceding claims, made from a single blank of material.
9. A blank of material used to form a container according to any of the preceding claims.