The present invention relates to a one-piece food container with an integral hinge and one or more latching mechanisms, a full perimeter seal, and ribbed or ridged support structures. The food container is fabricated from hybrid bio-based and polymeric material that has heat resistance capabilities. In particular, the present apparatus and method utilize a hybrid slurry of simple, abundant and renewable materials, such as food or plant starch and calcium carbonate (limestone), and a polymeric material, that uses high temperature and high pressure presses. An optional coating, such as wax, is applied to the surface of the food container. The present invention one-piece food container has a plurality of ridges that are incorporated into the container to provide rigidity and resisting folding or bending. Lastly, the one-piece food container has enough rigidity and strength to be stackable for efficient storage for distribution to a user. The resulting one-piece food container is strong, light, heat-resistant, and attractive.
ONE-PIECE FOOD CONTAINER HAVING AN INTEGRAL HINGE WITH LATCHING MECHANISMS AND A FULL PERIMETER SEAL

FIELD OF THE INVENTION

[0001] The present invention relates generally to a food container apparatus comprised of a hybrid of bio-based and polymeric materials, and in particular to an one-piece food container apparatus having a full perimeter seal, integral hinge, one or more latching mechanisms, ridge support structures and having heat resistance capability.

BACKGROUND OF THE INVENTION

[0002] A popular type of disposable food container is a hinged one-piece takeout container having a clamshell configuration. These containers are typically made by thermo-forming a sheet of plastic or polymeric foam material into two adjacent trays interconnected by an integral hinge. The two adjacent trays are disposed on either side of the hinge mechanism and respectively define a bottom container tray and a top lid tray. The container is held closed by some type of latching mechanism.

[0003] Hinged one-piece clamshell containers may be constructed from foam materials including expanded polystyrene commonly known as Styrofoam. The latching mechanism on foam clamshell containers typically comprises at least one tab-shaped projection incorporated into the top lid tray that engages with a corresponding slot or recess in the bottom container tray. Foam clamshell containers are one of the cheapest solutions of the industry and are not considered environmentally conscious.

[0004] A disadvantage of one-piece hinged takeout containers is that they are somewhat cumbersome to handle. In their open configuration the attached lid and the bottom tray of a typical one-piece hinged takeout container almost doubles in size and occupies a large area on the eating surface. Also, the typical fabrication materials for the one-piece container package does not convey to the consumer an environmentally conscious resource, is wasteful, and is responsible for a high volume of waste that is filling up waste disposal dumping sites at an ever increasing pace. In addition, most one-piece or clamshell containers are not heat resistant and therefore cannot be use in a oven environment or used with hot food.

[0005] Nonetheless, the one piece hinged container has several advantages because it obviates the need to stack multiple components for each size and shape which avoids the risk of running out of one of the container components. In addition, using a one-piece hinged containers eliminate the problem associated with incorrect lid sizes.

[0006] Due to some of the inherent disadvantages of one-piece containers and their materials of construction, which are generally viewed as a cheap, non-upscale, dining ware.

[0007] Two-piece containers typically comprise a bottom tray or base that can be sealed against, or at least engaged, with a top cooperating lid or cover. The base usually has an upwardly projecting sidewall terminating into a rim. The inside surface of the lid is configured to fit around the outside surface of the base and may have an increased shaped central portion to accommodate an increase in food volume within the base. Some two-piece containers utilize a base tray or unit that have a heat-sealed or adhesive sealed thin plastic lid that is pulled away from the bottom tray to expose the food contained inside. Generally once the thin plastic lid is removed, it cannot be used to re-seal the bottom tray.

[0008] One of the problems with two-piece containers is that the food establishment has to store at least two separate items in the form of a base container and its corresponding cover or lid. Thus, a food establishment ends up storing both container bases and lids for each container size and container type with all the risk of running short of one item or getting the wrong lid or having a ill-fitting lid. And if the thin plastic lid is utilized, a sealing machine must be maintained on-site for meeting the purpose of sealing food inside the bottom tray for service or delivery.

[0009] In addition, two-piece containers are generally held together by closure mechanisms that rely generally on an effective friction fit between the outside surface of the container and the inside surface of the lid. Often times the closure mechanism is not secure enough for general carrying convenience and take-out situations.

[0010] Disposable food dishes and food service containers are increasingly being used in today's society as it is convenient for environmental conscious needs. The food dishes and food containers are generally used a single time and then disposed of by the user. But typical food service dishes and containers formed of plastic polymer materials, such as polystyrene (Styrofoam) or other plastic, which does not biodegrade significantly. Food service products may also be formed of paper. However, such paper is frequently coated with a plastic coating, also making it resistant to biodegrading.

[0011] It would be a benefit if disposable food dishes were formed of at least 50% bio-based material and the remaining percentage of a polymeric material that could have biodegradable or compostable capabilities, especially if such material is a renewable resource. The manufacturing of such food service items should be as efficient as possible in order to provide reliable, low cost production at competitive pricing and meet the goal of using fabrication renewable bio-based materials.

SUMMARY OF THE INVENTION

[0012] The present invention relates to a one-piece food container with an integral hinge and one or more latching mechanisms, a full perimeter seal, a plurality of ridge support structures and fabricated from a hybrid bio-based and polymeric material that has heat resistance, and alternately may be biodegradable and/or compostable. The one-piece food container has a bottom portion and top portion that are joined together with the integral hinge. In the preferred embodiment, the one-piece food container has two latching mechanisms that engage together to removably secure the top portion to the bottom portion. There is also a pair of ear tabs near the outer edge of the top and bottom portion that are offset and are designed to facilitate the separation of the latching mechanism engaged top and bottom portions. The one-piece food container also has a plurality of ridges that are incorporated into strategic locations both on the top and bottom portions to provide rigidity and resisting folding or bending.

[0013] Regarding the fabrication process, the present invention one-piece food container utilizes a hybrid bio-based and polymeric material. The fabrication process starts with a hybrid slurry of simple, abundant and renewable materials, such as food or plant starch and calcium carbonate (limestone) and a percentage of common polymeric materials.
that are formed into the present invention food containers using high temperature and high pressure presses. The hybrid slurry is molded into shape and once molded, the molded food containers are subjected to a trimming process. After being trimmed, the food containers are optionally subjected to another process for coating the food contacting surfaces with a biodegradable film. An optional further step provides a coating, such as wax, to the surface of the plate, dish or food container opposite the film. Lastly, the one-piece food container has enough rigidity and strength to be stackable for efficient storage for distribution to a user. The resulting one-piece food container is strong, light, heat-resistant, and attractive.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a inside open perspective view of the one-piece food container having an integral hinge with one or more latching mechanisms including full perimeter seal and showing in more detail a ribbing or ridge structure that provides superior rigidity and structural support.

[0015] FIG. 1B is a copy of a picture of the food container having an integral hinge with one or more latching mechanism and a full perimeter seal in an inside view open configuration.

[0016] FIG. 2 is a top open perspective view of the food container having an integral hinge with one or more latching mechanisms and a full perimeter seal.

[0017] FIG. 3 is a bottom open perspective view of the food container having an integral hinge with one or more latching mechanisms and a full perimeter seal.

[0018] FIG. 4 is a top close up perspective view of the food container having an integral hinge with one or more latching mechanisms and a full perimeter seal.

[0019] FIG. 5 is a back side closed perspective view of the food container having an integral hinge with one or more latching mechanisms and a full perimeter seal.

[0020] FIG. 6 is a front side closed perspective view of the food container having an integral hinge with one or more latching mechanisms and a full perimeter seal.

[0021] FIG. 7 is a side closed perspective view of the food container having an integral hinge with one or more latching mechanisms and a full perimeter seal.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] Now referring to FIG. 1, which shows the one-piece inside open perspective view of the food container having an integral hinge 12 with one or more latching mechanisms 22a, 22b, 24a, 24b and including full perimeter seal 30, 32 whereby the food container is fabricated from hybrid bio-based and polymeric material and also showing in more detail a ribbing or ridge supports that provide superior rigidity and structural support. The bottom food portion container 14 forms a one-piece configuration by securing the top food portion 16 with an integral hinge mechanism 12 located on the back of the food container. The bottom food container portion 14 has a right opening ear tab 18a and a left opening ear tab 18b. On the top food portion 16 there is a corresponding right opening ear tab 20a and a left opening ear tab 20b. When the top food portion 16 is closed onto the bottom food container portion 14, the corresponding ear tabs come together so that an individual can separate and pull apart the ears to facilitate opening the present invention container when the top and bottom latching mechanisms are engaged.

[0023] The bottom food container portion 14 has a right bottom latching mechanism 22a that has a protruding portion designed to removably engage the right top concave or depressed portion 22b. On the other side, the bottom food container portion 14 has a left bottom latching mechanism 24a that has a protruding portion designed to removably engage the left top concave or depressed portion 24b. It is anticipated by the Applicant that a single removable latching mechanism, or more than two, could be used with the present invention food container. In addition, the location of the top and corresponding bottom latches can be located in different positions along the outer edge of the top and bottom portions. Additionally shown is a protruding full perimeter sealing ridge 30 that encircles the entire perimeter of the bottom food container portion 14. Also shown is that the right bottom 22a and left bottom 24a protruding latching portions become integrated with the protruding full perimeter sealing ridge 30. Also shown is a plurality of left bottom side rib supporting structures 38 and a plurality of back bottom rib supporting structures 40. Contained with the bottom food container portion 14 is the food storage cavity 42.

[0024] Now addressing only the top food container portion 16, the Figure shows a full perimeter receiving channel or groove 32 as a part of full perimeter sealing mechanism. On the outside surface of the full perimeter receiving channel or groove 32 is a top portion reinforcing perimeter ridge 34 and a plurality of top portion perimeter ridge protruding tabs 36. The top portion 16 also has a right dimple-configured stop 44 and a left dimple-configured stop 46.

[0025] The present invention food container 10 having an integral hinge 12 with one or more latching mechanisms 22a, 22b, 24a and 24b and including full perimeter seal 30, 32 whereby the food container is fabricated from a hybrid slurry of simple, abundant and renewable materials, such as food or plant starch and calcium carbonate (limestone) and percentage of common polymer that are formed into food containers using high temperature and high pressure press. The bio-based material is defined as a material made from substances derived from living (or once-living) organisms. This definition could include many common materials such as wood and leather, but it typically refers to modern materials that have undergone more extensive processing. Bio-based materials are often biodegradable, but this is not always the case. Some examples of bio-based materials include, but are not limited to, cellulose fibers, casein poly-lactic acid, bio-plastics (including soy, oil-based plastics) engineered wood-products (such as oriented strand board and particle board), zein (natural biopolymer which is abundant corn protein), cornstarch, plant starches and potato derivatives. Polymeric component materials may be petroleum based or soybean based.

[0026] During production, the present invention food container utilizes a hybrid slurry made according to a specific recipe that combines at least 50% of a bio-based material comprising calcium carbonate (limestone), starches such as potatoes and an amount of fiber, which may include recycled fibers, along with water, and the remaining percentage comprising a polymeric material. It is anticipated by the Applicant the other recipes with different bio-based materials, and different percentages of the bio-based/polymeric formulas, can be utilized with the present invention food container. In production, a quantity of the hybrid slurry is placed into a specifically configured top and bottom mold cavity. The mold is
closed and the hybrid slurry is treated with high pressure press and exposed to a high temperature for baking. For example, the high pressure press can be a 120 ton press, although this is dependent on the product design and matrix of molds. The heat is controlled by a heat control system specifically designed for the high pressure press. Once the container product is formed in the mold, the mold is opened and the product removed. The molded products are removed from the molds and are trimmed for removing flashing. After being trimmed, the food containers may be transferred to another station for alternately coating the food contacting surfaces with a biodegradable film. An optional further step provides a wax or other coating to the surface of the food container.

[0027] The hybrid slurry and final food container product material is primarily sourced from a renewable source, gluten and GMO-free, and FDA approved for food use. The final food container product can be used in a microwave, is dishwasher safe, and is heat-resistant in a range of 100-250 degrees Fahrenheit. Moisture resistance and insulation properties are generally very good to excellent when compared to other common disposable tableware materials.

[0028] The present invention one-piece food container has a plurality of ridges that are incorporated into strategic locations on the top and bottom portions of the container to provide rigidity and resisting folding or bending. Lastly, the one-piece food container with an integral hinge and one or more latches, a full perimeter seal, and fabricated from a hybrid bio-based and polymeric material that has heat resistance capabilities and has enough rigidity and strength to be stackable for efficient storage for distribution to a user. The result is one-piece food container is strong, light, heat-resistant, and attractive.

[0029] FIG. 1B copy of a picture of the present invention food container 10 having an integral hinge 12 with one or more seals and a full perimeter seal that is fabricated from hybrid bio-based and polymeric material in an inside view open configuration. Shown in the bottom food container portion 12 are the right 22a and the left 24a protruding latching mechanisms, the food storage cavity 42. The top food container portion 16 shows the receiving channel or groove full perimeter seal 32, and the right top concave or depressed latching mechanism 22b and left top concave or depressed latching mechanism 24b. Connecting the bottom food container portion 14 to the top food container portion 16 is the integral hinge mechanism 12.

[0030] FIG. 2 is a top open perspective view of the food container 16 (on the top of the figure) having an integral hinge 12 with one or more latching mechanisms 22a, 22b, 24a, 24b, and a full perimeter seal 30, 32 that is fabricated from a hybrid bio-based and polymeric material. Shown on the bottom food container portion 14 is the plurality of bottom right 22a and left 24a latching mechanisms and a bottom right ear tab 18a and a bottom left ear tab 20a. Within the bottom food container portion 14 is the food storage cavity 42. Also shown is the plurality of right 38a left 38b bottom side rib supporting structures, a plurality of front bottom rib supporting structures 41 and a plurality of back bottom rib supporting structures 40. Since most of the weight of the food is contained with the cavity 42, the bottom food container portion 14 utilizes the rib supporting structures to maintain the integrity of the container. Also shown is the protruding full perimeter seal 30 on the bottom food container portion 14.

[0031] Further in FIG. 2, the top food container portion 16 (on the top of the figure) has a right concave or depressed latching mechanism 22b and a left concave or depressed latching mechanism 24b and a top right 18b and left 20b ear tabs. Top food container portion 16 has a full perimeter receiving channel or groove 32 that functions as a part of full perimeter sealing mechanism. On the outside surface of the full perimeter receiving channel or groove 32 is a top portion reinforcing perimeter ridge 34 and a plurality of top portion perimeter ridge protruding tabs 36. The top portion 16 also has a right dimple-configured stop 44 and a left dimple-configured stop 46.

[0032] FIG. 3 is a bottom open perspective view of the food container 10 having an integral hinge 12 with one or more latching mechanisms and a full perimeter seal that is fabricated from a hybrid bio-based and polymeric material. The bottom food container portion 14 (on the top of the figure) shows the right ear tab 18a and the left ear tab 20a. Also shown is the bottom surface of the right latching mechanism 50a and the bottom surface of the left latching mechanism 50b. The bottom surfaces 50a and 50b have a concave or depressed configuration as the other corresponding surface forms the protruding surfaces. Also shown is the plurality of right 38a left 38b bottom side rib supporting structures, a plurality of front bottom rib supporting structures 41 and a plurality of back bottom rib supporting structures 40.

[0033] Further in FIG. 3, the top bottom food container portion 16 shows the right ear tab 18b and the left ear tab 20b and the top outside surface 17 of the food container portion 16. The right stop 44b and dimple stop 46b are concave or depressed shaped in this side as the corresponding dimple stops form the protruding dimples on the other side. A full perimeter reinforcing structure 56 is also shown. The right top latching mechanism 52a and the left top latching mechanism 52b protrude from the top surface as the corresponding right and left latching mechanism are concave or depressed.

[0034] Connecting the bottom food container portion 14 to the top food container portion 16 is the integral hinge mechanism 12.

[0035] FIG. 4 is a top closed perspective view of the food container 10 having an integral hinge 12 with one or more latching mechanisms 58, 60 and a full perimeter seal fabricated from a hybrid bio-based and polymeric material. Shown in the closed configuration are the offset right top 20a and bottom 18a ear tabs and the offset left top 18b and bottom 20b ear tabs and the top outside surface 17 of the food container portion 16. The integral hinge mechanism 12 connects the top food container portion 16 to the bottom food container portion 14. When the food container is in a closed configuration the top right and the bottom right latching mechanism become removable engaged 60 and the top left and bottom left latching mechanism become removable engaged 58.

[0036] FIG. 5 is a back side closed perspective view of the food container 10 having an integral hinge 12 with one or more latching mechanisms and a full perimeter seal fabricated from a hybrid bio-based and polymeric material. Shown in this Figure is the bottom back side rib supporting structures 40, the bottom food container portion 14 and the top outside food container portion surface 17.

[0037] FIG. 6 is a front side closed perspective view of the food container 10 having an integral hinge 12 with one or more latching mechanisms 58, 60 and a full perimeter seal fabricated from a hybrid bio-based and polymeric material. Shown in this Figure are the engaged latching mechanisms 58 and 60, the bottom food container portion 14 with front bot-
A food container comprising:

1. A first food container bottom portion and a second food container top portion;

2. An integral hinge mechanism, said integral hinge mechanism connecting said first food container bottom portion to said second food container top portion;

said first food container bottom portion having a food cavity section;

full perimeter seal, said first food container bottom portion having a first perimeter seal configuration, said second food container top having a second perimeter seal configuration, whereby said first perimeter seal configuration is designed to removable engage said second perimeter seal configuration resulting in a full perimeter seal, said full perimeter seal functions to removable seal said food cavity section;

one or more latching mechanisms, said one or more latching mechanisms designed removable engage said first food container bottom portion to said second food container top portion;

one or more first ear tabs extending from said bottom container bottom portion, said one or more ear tabs off-set to facilitate separation when said one or more latching mechanisms removable engage said first food container bottom portion to said second food container top portion;

a plurality of supportive structural ribbed sections incorporated on said bottom portion, said supportive structural ribbed sections function to provide rigidity and strength to said bottom portion; and

one or more supportive structural full perimeter supportive structural ribbed sections incorporated on said top portion; one or more supportive structural full perimeter supportive structural ribbed sections function to provide rigidity and strength to said top portion.

A food container as recited in claim 1, whereby said food container is fabricated from at least a 50 percent bio-based material remaining percentage of fabrication material is a polymeric material.

A food container as recited in claim 1, whereby said food container is fabricated from a biodegradable and/or compostable material.

A food container as recited in claim 3, whereby said biodegradable or compostable fabrication material is a combination of a food or plant starch and calcium carbonate and said remaining percentage is a polymeric material.

A food container as recited in claim 1, whereby food container is microwave compatible.

A food container as recited in claim 1, whereby food container is heat resistant within the range of 100-250 degrees Fahrenheit.

A food container as recited in claim 1, wherein said food container is FDA approved for food containment and delivery.

A food container as recited in claim 1, further comprising said food container is coated with a biodegradable or compostable coating.

A food container as recited in claim 1, whereby said food container is gluten and GMO-free.

A food container as recited in claim 1, whereby said food container is dishwasher safe.

A food container fabricated from at least 50 percent bio-based material, comprising:

a first food container bottom portion and a second food container top portion;

an integral hinge mechanism, said integral hinge mechanism connecting said first food container bottom portion to said second food container top portion;

said first food container bottom portion, said second food container top portion and said hinge mechanism, fabricated from hybrid material that is at least 50% bio-based;

full perimeter seal, said first food container bottom portion having a first perimeter seal configuration, said second food container top having a second perimeter seal configuration, whereby said first perimeter seal configuration is designed to removable engage said second perimeter seal configuration resulting in a full perimeter seal, said full perimeter seal functions to removable seal said food cavity section;

one or more latching mechanisms, said one or more latching mechanisms designed removable engage said first food container bottom portion to said second food container top portion;

one or more first ear tabs extending from said bottom container bottom portion, said one or more ear tabs off-set to facilitate separation when said one or more latching mechanisms removable engage said first food container bottom portion to said second food container top portion;

a plurality of supportive structural ribbed sections incorporated on said bottom portion, said supportive structural ribbed sections function to provide rigidity and strength to said bottom portion; and

one or more supportive structural full perimeter supportive structural ribbed sections incorporated on said top portion; one or more supportive structural full perimeter supportive structural ribbed sections function to provide rigidity and strength to said top portion.

A food container fabricated from at least 50 percent bio-based material as recited in claim 1, whereby the remaining percentage of fabrication material is a polymeric material.

A food container as recited in claim 1, whereby said food container fabricated from at least 50 percent bio-based material is a biodegradable and/or compostable material.

A food container fabricated from at least 50 percent bio-based material as recited in claim 1, whereby said biodegradable or compostable fabrication material is a combination of a food or plant starch and calcium carbonate and said remaining percentage is a polymeric material.

A food container fabricated from at least 50 percent bio-based material as recited in claim 1, whereby food container is microwave compatible.
16. A food container fabricated from at least 50 percent bio-based material as recited in claim 1, whereby food container is heat resistant within the range of 100-250 degrees Fahrenheit.

17. A food container fabricated from at least 50 percent bio-based material as recited in claim 1, wherein said food container is FDA approved for food containment and delivery.

18. A food container fabricated from at least 50 percent bio-based material as recited in claim 1, further comprising said food container is coated with a biodegradable or compostable coating.

19. A food container fabricated from at least 50 percent bio-based material as recited in claim 1, whereby said food container is gluten and GMO-free.

20. A food container fabricated from at least 50 percent bio-based material as recited in claim 1, whereby said food container is dishwasher safe.

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