

(10) International Publication Number
WO 2016/018954 A1(43) International Publication Date
4 February 2016 (04.02.2016)(51) International Patent Classification:
B65D 83/04 (2006.01)(21) International Application Number:
PCT/US2015/042546(22) International Filing Date:
28 July 2015 (28.07.2015)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/030,054 28 July 2014 (28.07.2014) US

(72) Inventor; and

(71) Applicant : **FOUGERE, Bruce** [CA/US]; 621 South Elmwood Ave., Oak Park, IL 60304 (US).(72) Inventors: **REMY, Steve**; 1807 W Sunnyside, Unit 2C, Chicago, IL 60640 (US). **LIU, Hua**; Rooms 2102-03 China Insurance Bldg., 141 Des Voeux Road Central, Central Hong Kong, Hong Kong (CN). **XIAO, Ke**; Rooms 2102-03 China Insurance Bldg., 141 Des Voeux Road Central, Central Hong Kong, Hong Kong (CN).(74) Agent: **YOSPIN, Matthew**; One Boston Place, Suite 2600, Boston, MA 02108 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,

BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

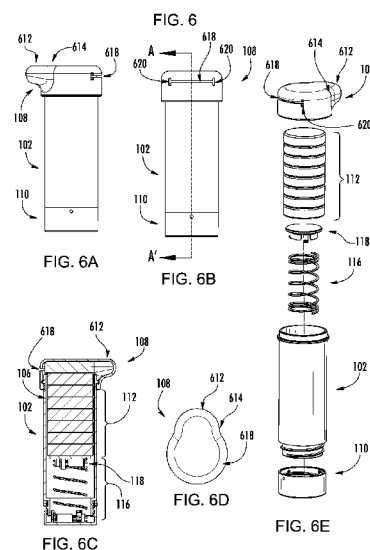
— of inventorship (Rule 4.17(iv))

Published:

— with international search report (Art. 21(3))

— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(54) Title: DEVICE FOR STORING AND DISPENSING FOOD ITEMS



(57) Abstract: A device for storing and dispensing food items for a customizable nutrition supply is provided. The food items are loaded by the user, allowing customization of nutritional content and sequence. The device may be portable and operated with one hand, and is sufficiently sealed to store the food items securely, away from air, dust, and moisture. When the device is operated by being opened or triggered, it dispenses the next food item, so that the user may dispense the food item directly into the user's mouth. The device then closes or is closed.

DEVICE FOR STORING AND DISPENSING FOOD ITEMS

FIELD OF THE INVENTION

[0001] The presently disclosed subject matter relates to storing and dispensing food items, and more specifically, to devices and methods for portable storage containers that protect food items, and that dispense the food items individually.

BACKGROUND OF THE INVENTION

[0002] People engaged in high-performance endeavors and endurance sports, such as triathlons, long-distance running, and long bicycle rides, have significant needs for nutrition during their competition or performance. In the course of a 50 km run or a 100 mile bike ride, a 160-lb person may burn 600 to 800 calories per hour. Furthermore, a person's nutritional needs are not limited solely to replacement of calories expended in the endeavor: endurance athletes also need to replace particular types of nutrition, and may need them at specific stages of the workout or competition. For example, an endurance athlete may need some fat content in his or her food at the start of a long workout, a higher percentage of carbohydrates in the middle, and proteins at the end for an effective recovery. Based on an individual's size, gender, and level of exertion during an athletic effort, and based on environmental conditions, people will have different nutritional needs, both in terms of quantity and content of food.

[0003] The current state of food marketed to athletes does not fully meet these needs. Most food items targeted to athletes are based on technology of processed food, specifically that of taking a mixture of food items and forming it into a bar shape. Some such products, often referred to generically as energy

bars, are shaped more like traditional chocolate bars and others like thicker granola bars, while some are smaller bite-sized pieces, and still other products are more like a viscous goo and not a solid or malleable bar. These nutritional items fall short in several ways in the context of athletic competitions, and especially in endurance athletics.

[0004] One shortcoming of the current food technologies is that it can be difficult to take in sufficient calories with the currently existing energy bar products. A typical energy bar contains 200 to 250 calories, and a person, for the purposes of example only, such as a 160-lb pound male playing basketball or boxing, engaged in a typical athletic effort may burn 600 to 800 calories per hour, while a person in an endurance event may burn 600 to 1,000 calories (for example, refer to research by, Dr. Edward Howley, Professor of Health and Exercise Science at the University of Tennessee, available at http://hes.utk.edu/f_s/howley.html). The need to carry and keep organized multiple nutrition sources is difficult for people engaged in high-performance endeavors. Second, such nutritional sources are typically sealed in high-barrier films, which are most easily opened with two hands. When engaged in a competition, or a non-competitive but demanding event, it may be difficult or impractical to use both hands to open an energy bar. Attempting to open such a nutritional product using only one hand is quite difficult, and using only one hand plus one's teeth is challenging and unhygienic, and can often result in the loss of the energy bar. Additionally, serious injuries can result from a loss of concentration or control when a user is

distracted with an attempt to open a bar, whether the user is bicycling, running, or engaged in another activity.

[0005] Third, using current nutritional products, it is very difficult to customize one's food intake. A user can customize the amount eaten, such as by cutting the bars up in advance, or eating portions of a package, but not the content of an individual bar, and so it is difficult or impossible to customize an order of nutrition, such as fats, then carbohydrates, then protein. Further, even if it is possible to find an arrangement of energy bars or other relatively suitable foods that would provide a desired order of nutrition, attempting to stack them in order in a bag or pocket would be cumbersome. Repeatedly finding the right bar and then opening it would be prohibitively challenging, especially in the context of an activity where opening a single bar is difficult. The ability to customize nutritional content and the order in which one eats the food items is lacking in the current art. Also lacking in the current art is a way to securely store, carry, and dispense food using only one hand.

SUMMARY OF THE INVENTION

[0006] The present invention meets all these needs, by disclosing devices and systems for storing, protecting, and dispensing food items. The device comprises a dispenser which may be opened and loaded with food items, so that a user can place food items into the device for later dispensing and consumption. The user can choose the content of the nutrition to be consumed by choosing particular food items, and can customize the order of nutrition to be consumed by

placing the food items in any particular order. Once closed, the device securely stores and protects the food items, keeping them free of dust and moisture.

[0007] The device can be loaded with sufficient calories to offset the calorie deficit created by activity and support a person engaged in an extreme or endurance event, such as a triathlon, marathon, or any athletic activity that creates a calorie deficit. The present invention is simple to operate, in contrast to the current art relating to energy bars and other foods intended for athletic and endurance endeavors.

[0008] The present invention allows only one disc (a food item) to be dispensed per actuation. The device advances another disc into the ready position. This cycle can then be repeated until the device is empty. In various embodiments, the device may have a trigger mechanism actuating an ejector and opening a dispenser slot cover, so that when the user presses the trigger, the device's dispenser slot cover opens, a food item is ejected, and the cover then closes and the device advances all the remaining food items, so that the next one is ready for dispensing. It has been found advantageous to all the user to hold the device in one hand and activate the trigger using a finger or the thumb of that hand. The food item may be dispensed directly into the user's mouth, so that true one-handed operation is possible. This is a necessary feature for many use cases of the present invention, such as bicycling, in which a user may want to keep one hand on the handlebars and use the other to pick up the present invention and dispense a food item directly into the user's mouth. This one-handed system also allows users to leave their gloves on and still eat, which is important for winter

sport athletes such as alpine skiers, cross-country skiers, snowboarders, and others.

[0009] Furthermore, the present invention can be used to customize the nutritional profile that a user takes in, by loading food items with different caloric and nutritional content into the device in any order. In this way, the present invention can be used to supply the user with a desired amount, order, and mix of food and nutrition, and can deliver it directly to the user for one-handed consumption without significant risk of dropped or lost food.

[0010] These aspects of the present invention, and other disclosed in the Detailed Description of the Drawings, represent improvements on the current art. This summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description of the Drawings. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The foregoing summary, as well as the following detailed description of various embodiments, is better understood when read in conjunction with the appended drawings. For the purposes of illustration, there is shown in the drawings exemplary embodiments; but, the presently disclosed subject matter is not limited to the specific methods and instrumentalities disclosed. In the drawings, like reference characters generally refer to the same components or steps of the device throughout the different figures. In the following detailed

description, various embodiments of the present invention are described with reference to the following drawings, in which:

[0012] FIG. 1 shows exploded views of an exemplary inventive device, with an exploded perspective view in FIG. 1A, an exploded side elevation view in FIG. 1B, and an exploded side cross-section view in FIG 1C.

[0013] FIG. 2 shows exploded perspective views of another exemplary device, with the device including the container and top cap shown in FIG. 2A, and the device without the container or top cap shown in FIG. 2B to show the inner components more clearly.

[0014] FIG. 3 shows multiple views of the outside of the exemplary device of FIG. 2, with a perspective view of the container with top cap in FIG. 3A, a perspective view of the container without top cap in FIG. 3B, and side and front elevation views of the container with top cap in FIG. 3C.

[0015] FIG. 4 shows an exemplary trigger assembly, in a top view in FIG. 4A, a perspective view in FIG. 4B, and a side view in FIG. 4C.

[0016] FIG. 5 illustrates multiple views of another exemplary embodiment of the device, with a cross-sectional elevation view of the top of the tube without top cap in FIG. 5A, a cross-sectional elevation view of the top of the tube with top cap in FIG. 5B, a perspective view of a top cap in FIG. 5C, a side elevation of a top cap in FIG. 5D, and a front elevation of a top cap in FIG. 5E.

[0017] FIG. 6 illustrates multiple views of an exemplary embodiment of the device, with a side elevation view in FIG. 6A, a front elevation view in FIG. 6B, a

side cross section view in FIG. 6C, a top view of the top cap in FIG. 6D, and an exploded perspective view in FIG. 6E.

DETAILED DESCRIPTION

[0018] The presently disclosed invention is described with specificity to meet statutory requirements. But, the description itself is not intended to limit the scope of this patent. Rather, the claimed invention might also be embodied in other ways, to include different steps or elements similar to the ones described in this document, in conjunction with other present or future technologies. Moreover, although the term “step” may be used herein to connote different aspects of methods employed, the term should not be interpreted as implying any particular order among or between various steps herein disclosed unless and except when the order of individual steps is explicitly described.

[0019] The present subject matter discloses devices and systems for storing, protecting, and dispensing food items. It has been found advantageous to have, as shown in Fig. 1, the present invention comprise a device 100 for storing and dispensing food items for a customizable nutrition supply, in which the device comprises a container 102 that is approximately cylindrical in lateral cross-section perpendicular to the long axis 104, though the lateral cross-section need not be identical along the length of the long axis 104 of the container 102. In other embodiments, the container 102 may be triangular, rectangular, or another shape in lateral cross-section and may have one or more sidewalls 106 that define the outside of a cylinder, or that are planar and perpendicular to a lateral cross-section, creating a container 102 shaped like a triangular or rectangular

prism. In still other embodiments, the container 102 may have sidewalls 106 that are not planar but instead are curved or faired. In yet other embodiments, such sidewalls 106 may not be identical to each other. The sidewalls 106 of the container 102 together with the top cap 108 and bottom cap 110, if present in that embodiment of the present invention, form the exterior of the device 100. It has been found advantageous to have the container 102 comprise a solid surface, exclusive of openings including but not limited to those for loading food items 112 and dispensing food items 112, as described below. In some embodiments, it is desirable to build the device 100 with a container 102 that has one or more openings or perforations.

[0020] The container 102 may, in some embodiments, have a dispenser opening 114 positioned on the container towards or at the top or bottom of the container 102, through which the food items 112 may be dispensed, as discussed in more detail below. The dispenser opening 114 may, in some embodiments of the present invention, be positioned on the side of the container 102 so that the longer dimension of the dispenser opening 114 is oriented perpendicular to the long axis of the container 102, and so the smaller dimension of the dispenser opening 114 runs parallel to the long axis of the container 102, and may be sized to be large enough to allow just one of the food items 112 through at one time. In other embodiments, the dispenser opening 114 of the container 102 may be a top cap 108 or other part that opens to dispense food items 112, or through which one or more of the food items 112 may be retrieved by the user.

[0021] The device 100 has one or more food item advancers 116 which may be any one or more of a tension spring, a compression spring, a torsion spring, or other spring types. The food item advancer 116 may be affixed at or near the bottom of the container 102 or to the bottom cap 110 to one or more food item advancer attachers 124, and to a pusher plate 118. The food item advancer 116 is compressed as the food items 112 are loaded, and then the food item advancer 116 push the pusher plate 118 which pushes the food items 112 toward a top dispenser opening 114 or an openable top cap 108 for dispensing the food items 112. In other embodiments, the food item advancer 116 may be attached to food item advancer attacher 124 at or near to the top of the container 102, and then extended as the food items 112 are loaded, so that the food item advancer 116 pull the pusher plate 118 and thus the food items 112 up towards the dispenser opening 114 or openable top cap 108. In still other embodiments, the dispenser opening 114 may be at the bottom of the container 102, and the food item advancer 116 may then be attached at or near the top or bottom of the container 102 to, respectively, push or pull the food items 112 down towards the bottom dispenser opening 114.

[0022] In still other embodiments of the present invention, as shown in Fig. 2, the food item advancer 116 may be a constant-force spring assembly 202. In this or other embodiments, the container 102 may have pusher plate alignment guides 230 on the sides of the container, and the pusher plate 118 may have a plurality of pusher plate aligners 232 that slidably engage with the pusher plate alignment guides 230, allowing the pusher plate 118 to slide up and down inside the

container 102 on the pusher plate alignment guides 230. The top cap 108 may be removably engaged with the pusher plate alignment guides 230, held by friction or other means, or the top cap 108 may have a top cap aligner 240 to ensure only one alignment is possible with the container 102. The constant-force spring assembly 202 may be contained inside of the top cap 108.

[0023] The constant-force spring assembly 202 may comprise a constant-force spring 204, a spring spool 206, a spring housing 208, and a string 210. The spring housing 208 may be a cylinder, with a housing floor, a housing top, and housing sides, and the spring housing 208 is held in place in the container 102 by the pusher plate alignment guides 230, by friction or other means. The spring housing 208 also has a housing post 212 in its center, extending from the housing floor to the housing top. The spring housing 208 also has a housing string hole 214 in the housing sides.

[0024] The spring spool 206 is located inside of the spring housing 208. The spring spool 206 may be roughly a cylinder, with a spool floor, a spool top, and spool sides, and may have spool rims 216 defined by the diameters of the spool top and spool floor, which may be equal to each other and larger than the exterior diameter of the spool sides. The housing post 212 passes through the spring spool 206, allowing the spring spool 206 to spin freely within the spring housing 208. The spring spool 206 also has a spool string hole 218 in the spool sides.

[0025] The constant-force spring 204 sits inside of the spring spool 206, with the constant-force spring 204 attached to the housing post 212 at or near the

innermost part of the constant-force spring 204. At the outermost part of the constant-force spring 204, the string 210 is attached to the constant-force spring 204. The string 210 passes through the spool string hole 218, is wound around the spring spool 206 one or more times, where it is constrained from slipping off of the spring spool 206 by the spool rims 216. The string 210 then passes through the housing string hole 214 and then through the trigger assembly string hole 404 of the trigger assembly 400, described below, and along the outside of the stack of the food items 112 without making contact with the food items 112. In this or other embodiments of the present invention, the pusher plate 118 may have a pusher plate string hole 224, and the string 210 may pass from the trigger assembly string hole 404 to the pusher plate string hole 224. In some embodiments, the pusher plate 118 may have two or more pusher plate string holes 224, and the string 210 may pass from the trigger assembly string hole 404, through one pusher plate string hole 224, under or the pusher plate 118 or through a channel in the pusher plate 118, through the other pusher plate string hole 224, and up along the opposite side of the stack of food items 112 to attach to a fixed point in the device 100, which may be the container 102, the spring housing 208, or other suitable point as will be apparent to one of skill in the art, in order to prevent the pusher plate 118 from twisting inside of the container, and/or to ensure a smooth operation of the constant-force spring assembly 202 as the food item advancer 116.

[0026] In some such embodiments of the present invention, when the trigger assembly 400 is operated by the user and rotates about the location of the trigger

assembly placement 302, as shown in FIG. 3, the trigger assembly 400 pinches the string 210, preventing it from pulling up the pusher plate 118 while the trigger assembly 400 is dispensing one of the food items 112, as described in greater detail below. When the trigger 402, as shown in FIG. 3 and in greater detail in the views of the trigger assembly 400 in FIG. 4, is released or returned to its rest position, the trigger assembly 400 rotates back and releases the string 210 from being pinched. The constant-force spring 204 then coils more, as the topmost of the food items 112 has been dispensed, pulling the string 210 which pulls the pusher plate 118, advancing the stack of food items 112 and moving the next of the food items 112 into the ready position, to be dispensed next.

[0027] In other embodiments of the invention, there are rocker arms 128 affixed to the interior of the container 102, and which are constructed as elastically attached to or part of the container 102, such that the rocker arms 128 may be moveably engaged against the food items 112 or may be pushed out of the way of the food items 112. When the top cap 108 is open, as shown in FIG. 5A, the rocker arms 128 spring in towards the interior of the container 102, and pinch in to the food items 112 or into space between food items 112. The rocker arms 128 are positioned to pinch into the second of the food items 112 in the stack, or into the space between it and the first of the food items 112. This allows the first of the food items 112, in the so-called “ready position”, to be dispensed, in this embodiment by the user grabbing the topmost of the food items 112 or by shaking it or tipping it out of the container 102, while the second and the rest of the food items 112 are blocked from advancing. When the top cap 108 is closed,

as shown in FIG. 5B, the pry arms 502 come into contact with the rocker arms 128, and push the rocker arms 128 elastically towards the sides of the container 102, so that the rocker arms 128 are no longer preventing the food items 112 from advancing. By means of the rocker arms 128, the food item advancer 116 is controlled to advance the food items 112 towards the dispenser opening 114 by only one of food items 112, that is, by a distance equal or nearly equal to the thickness (in the direction of the long axis 104 of the container 102) of only one of the food items 112. The top cap 108 is shown in more detail in FIG. 5C, FIG. 5D, and FIG. 5E, showing the pry bars 502, the cover hinge 504 that is present in some embodiments of the invention and is rotatably engaged with the container opening hinge 130 that is present in some embodiments, and the cover catchment 506 that is present in some embodiments, and which engages with the cover closure mechanism 132 that is present in some embodiments.

[0028] It has been found advantageous in the present invention to have the device 100 further comprise a pusher plate 118 attached to the food item advancer 116 at the end of the food item advancer 116 distal to the food item advancer attacher 124, for instance if the food item advancer 116 is to push the food items 112 toward the dispenser opening 114. As will be apparent to one skilled in the art, in some embodiments of the present invention, it may be desirable to have the pusher plate 118 attached to the food item advancer 116 proximal to the food item advancer attacher 124. It has been found advantageous to have the pusher plate 118 comprise a flat or approximately flat piece shaped roughly like the cross-sectional profile of the container 102.

[0029] It has been found to be advantageous to have the pusher plate 118 further comprise one or more pusher plate catchments, and the container 102 has one or more pusher plate retainers that align with the pusher plate catchments. The container 102 may also comprise one or more pusher plate catchment release mechanisms, which are operated by the user with catchment release mechanism actuators on the outside of the container 102. The catchment release mechanism actuators may be buttons, levers, or other means. In alternative embodiments, the container 102 may have an opening for the user to directly actuate the pusher plate catchment release mechanisms.

[0030] In some embodiments of the invention, the pusher plate 118 further comprises a plurality of pusher plate aligners 232, and the container 102 has one or more pusher plate alignment guides 230 that align with the plurality of pusher plate aligners 232. The plurality of pusher plate aligners 232 may be protrusions, bumps, slots, or other suitable means of slidably engaging with the pusher plate 118, to guide it as it is pushed or pulled by the food item advancer 116, along the pusher plate alignment guides 230, which may be slots, tracks, or other suitable means.

[0031] In some embodiments of the invention, the pusher plate 118 and food item advancer 116 are placed by the user in the container 102, and then latched into place by pusher plate retainers at the end of the container proximate or distal to the dispenser opening 114, allowing the user to easily load the food items 112 individually or in a stack in such an order that they are lined up to be dispensed in the order desired by the user. In some embodiments of the invention, a

latching bottom cap 110 may be placed and latched on the bottom of the container 102, and the food item advancer 116 and pusher plate 118 then inserted from the top cap 108, aligned with the pusher plate alignment guides 230, with the food item advancer 116 then compressed or moved to the bottom of the container 102, at which point the pusher plate catchments are engaged with the pusher plate retainers, locking the pusher plate 118 and allowing loading of the food items 112. The bottom cap 110 may be affixed to the container 102 by means of protrusions 120 that fit into slots 122 in the container 102, or the bottom cap 110 may be threaded to match threads on the container 102, so that the bottom cap 110 screws on. In other embodiments of the invention, the food item advancer 116 may be affixed to a latching bottom cap 110 and then inserted into and latched to the container 102, and thereafter the user may insert the pusher plate 118 into the container 102. In some embodiments, the pusher plate 118 has pusher plate catchments which engage with the pusher plate retainers, locking the pusher plate 118 and allowing loading of the food items. In still other embodiments of the present invention, a user may load a stack of food items 112 into the container by creating the stack and then placing the container 102 over it, or by other means. In any of these embodiments or others, the bottom cap 110, food item advancer 116, and pusher plate 118 may be affixed together by means of screw threads or clips, and then may be attached to the container 102 by any means as described herein for attaching the bottom cap 110, or other means. As will be apparent to one of skill in the art, other arrangements are

possible, and those provided here are by way of illustration only, without limiting the subject matter claimed.

[0032] It has been found to be advantageous in the present invention to have the dispenser opening 114 optionally closed off by means of a dispenser cover 406 which is sized and shaped to fit and seal the dispenser opening 114. The dispenser cover 406 functions to keep moisture, dust, and air out of the interior space of the container 102 and away from the food items 112. In some embodiments of the present invention, the dispenser cover 406 may be seated in its sealed position against a gasket of silicone, rubber, or other suitable material placed around or inside of the dispenser opening 114. In embodiments where the dispenser opening 114 is in the side of the container 102, the dispenser opening 114 may be configured to open by rotating around the long axis 104 of the container 102, or may be configured to slide up or down parallel to the long axis 104. In either of the foregoing embodiments, the dispenser cover 406 may be configured to open to the inside or outside of the container 102, and may be configured so that it closes and seals the dispenser opening 114 while slightly biased to the inside or outside of the outer surface of the container 102, or so that the dispenser cover 406 seals the dispenser opening 114 and is flush with the outer surface of the container 102.

[0033] In embodiments of the present invention where the dispenser opening 114 is part or all of the top cap 108 or bottom cap 110 of the container 102, the dispenser cover 406 may be configured to flip open, with one edge or side hinged to the container 102, and the opposite edge of the dispenser cover 406

rotating around that cover hinge 504, defining an angle which runs parallel to the long axis 104 of the container 102. In other embodiments, the dispenser cover 406 may be configured to rotate open, perpendicular to the long axis 104.

[0034] The presently disclosed invention may further comprise a trigger 402, which both actuates the dispenser cover 406, and actuates a food item dispenser 408. Actuating the dispenser cover 406 may comprise a direct connection between the trigger 402 and the dispenser cover 406 such that pushing the trigger 402 directly slides or rotates the dispenser cover 406 to its open position. Such a direct connection between the trigger 402 and the dispenser cover 406 may be a solid part, or a connection by means of one or more parts connected with lever or rocker connections, cams, gears, springs, or other suitable mechanism, as will be apparent to one of skill in the art. In other embodiments, actuating the dispenser cover 406 may comprise releasing a dispenser cover catch 506 such that the dispenser cover 406 springs open, impelled by dispenser cover opening means, which may be a separate spring, or a part or extension of the container 102 that is elastic and extended to exert force upon the dispenser cover 406, or may be other suitable means for opening the dispenser cover 406. In any embodiments, the dispenser cover 406 may close automatically upon release of the trigger 402 due to one or more dispenser cover closing means which may be springs attached to the dispenser cover 406 or the trigger 402, or other suitable means of closing the dispenser cover 406. In alternative embodiments, the dispenser cover 406 may need to be closed manually by the user. In some embodiments, the trigger 402 may be a protrusion that slides

circumferentially along the surface of the container 102, describing an arc around the long axis 104 of the container 102, or which slides in another direction. In other embodiments, the trigger 402 may be a button that is depressed by the user, or a latch that is pressed in a direction parallel to the long axis 104, perpendicular to the long axis 104, or in a combination of those two orientations, or the trigger may be part of a trigger assembly 400, as discussed below. In some such embodiments of the present invention, the trigger 402 actuates the dispenser cover catch 506, and the dispenser cover opening means thereupon open the dispenser cover 406. In other embodiments of the invention, the user may directly operate the dispenser cover catch 506 to open the dispenser cover 406.

[0035] Upon the dispenser cover 406 opening, it has been found to be advantageous in the present invention to have the food item dispenser 408 actuated, and push one of the food items 112 out of the dispenser opening 114. The food item dispenser 408 may, in some embodiments, be actuated by means of the dispenser cover opening means, or in alternative embodiments by other food item dispenser actuating means, which may be a spring or other suitable means for operating the food item dispenser 408, and which are operably coupled to the trigger 402. The food item dispenser actuating means can operate only when the dispenser cover 406 is open. In some embodiments of the present invention, after the food item dispenser 408 has dispensed one of the food items 112 through the dispenser opening 114, the food item dispenser 408 returns to its ready position, impelled by the release of the trigger 402 releasing

the food item dispenser actuating means, or by other means. The dispenser cover 406 returns to its closed position, releasing the pusher catchment protrusions which in some embodiments of the disclosed invention operate to impede the pusher plate 118 while the dispenser cover 406 is open, and by releasing the pusher catchment protrusions, the food item advancer 116 can advance the pusher plate 118 and the food items 112 further towards the dispenser opening 114 by a distance of the thickness of one of the food items 112, thus placing another of the food items 112 in the ready position to be next dispensed. In other embodiments, the trigger 402 is moved manually back to the ready position.

[0036] In some embodiments of the disclosed invention, the trigger 402, food item dispenser 408, and dispenser cover 406 may be made as a one-piece trigger assembly 400, which further comprises a trigger assembly mount 410 that attaches the trigger assembly 400 to the container 102 at the trigger assembly placement 302. In such embodiments of the invention, when the user operates the trigger 402, the trigger assembly 400 rotates at the location of the trigger assembly placement 302, and the dispenser cover 406 portion of the trigger assembly 400 reveals the dispenser opening 114 while the food item dispenser 408 both pushes the topmost of the food items 112 out the dispenser opening 114, and blocks the food items 112 from further advancing. When the trigger assembly 400 is moved back, either by mechanical or manual means, the dispenser cover 406 again covers the dispenser opening 114 and the food item dispenser 408 moves out of the way of the stack of food items 112, allowing the

next of the food items 112 to advance into the ready position. In some such embodiments of the present invention, the trigger assembly 400 further comprises a trigger assembly string hole 404, through which the string 210 of a constant-force spring assembly 202 may pass.

[0037] The container 102 comprises a food item insertion opening 126. In some embodiments, the food item insertion opening 126 is the bottom of the container 102, with a bottom cap 110 which is reversibly attachable to the container 102. The bottom cap 110 may latch to the inside or outside of the container 102, or may latch into the sides of the container 102 with protrusions 120 that latch into slots 122 of the container 102, or may screw onto the container with threading on the bottom cap 110 matching threading on the container 102. In other embodiments, the food item insertion opening 126 is an opening that runs the length of the container 102, parallel to the long axis 104, with a hinge that runs the length of the container 102 parallel to the long axis 104 diametrically opposed to the food item insertion opening 126.

[0038] In alternative embodiments of the invention, the device may further comprise a cartridge, which is concentric with and narrower than the container 102. The cartridge is inserted into the container 102 aligned with the long axis 104. The cartridge may be loaded with food items 112 before insertion into the container 102. The cartridge may have a cartridge food item opening that aligns with the dispenser opening 114. The cartridge may have pusher-cartridge alignment means that align a pusher plate 118 with the cartridge as the food item advancer 116 advance the pusher plate 118 inside of the cartridge towards the

dispenser opening 114. In other embodiments, the cartridge may have cartridge slots that allow the pusher plate catchments to slidably engage, protruding from inside of the cartridge through the cartridge slots, with the plurality of pusher plate retainers of the container 102.

[0039] In some embodiments, the trigger 402 actuates the dispenser cover 406, and actuates a food item dispenser 408, dispensing food items 112 from the cartridge, through the cartridge food item opening and the dispenser opening 114. The cartridge may also comprise cartridge-container alignment means, which may be slidably engaged with cartridge-container alignment guides affixed to or part of the interior of the container 102, to ensure that the cartridge is properly aligned within the container 102.

[0040] With reference to FIG. 6, FIGS. 6A and 6B illustrate an embodiment of the present invention, depicting a container 102, a bottom cap 110, and a top cap 108. FIG. 6C further illustrates this embodiment of the present invention with a cross-sectional view, taken along the transect A-A' in FIG. 6B, further illustrating in cross-section a container 102, a bottom cap 110, and a top cap 108, a plurality of food items 112, food item advancer 116, a pusher plate 118, and sidewalls 106. Each of FIGS. 6A – 6C further depict the top cap 108. It has been found to be advantageous to have the top cap 108 comprised, in some embodiments, of a moderately flexible and elastic material including but not limited to silicone, and to have the top cap 108 further comprise a pusher knob 612, a flexional region 614, and a flexible dispenser slot 618. The pusher knob 612 extends away from the container 102 and may be pressed by a user towards the flexible dispenser

slot 618 at the front of the container 102. The pusher knob 612 flexes, relative to the rest of the top cap 108, at the flexional region 614, contacting with the inside surface of the pusher knob 612 the topmost of the plurality of food items 112, and pushing the topmost of the plurality of food items 112 into and out through the flexible dispenser slot 618. After the topmost of the plurality of food items 112 has been moved out through the flexible dispenser slot 618, and the user has released the pusher knob 612, the next of the plurality of food items 112 is advanced by the food item advancer 116 towards the top cap 108.

[0041] The flexional region 614 may comprise a more flexible material than the other part or parts of the top cap 108, by use of a different material or composition of matter, or the flexional region 614 may be made of thinner material than the remainder of the top cap 108, or may have its relatively higher flexibility than the rest of the top cap 108 accomplished in another manner now known or later invented. The flexional region 614 may be one band wrapping around the top cap 108, as depicted in FIG. 6A, or may be more than one discrete area of the top cap 108, as the flexional region 614 appears in FIG. 6D. FIG. 6D is a top cross-section of an exemplary top cap 108, showing a pusher knob 612, a flexional region 614, and a flexible dispenser slot 618.

[0042] The flexible dispenser slot 618 may be a simple slit across the top cap 108. It has been found to be advantageous to have the flexible dispenser slot 618 further comprise a plurality of dispenser slot flexors 620 to allow the flexible dispenser slot 618 to open sufficiently to allow the pusher knob 612 to expel the topmost of the plurality of food items 112 through the flexible dispenser slot 618.

[0043] FIG. 6E provides an exploded perspective view of an embodiment of the device 100, illustrating the bottom cap 110, the container 102, the food item advancer 116, the pusher plate 118, the plurality of food items 112, and the top cap 108, further comprising the pusher knob 612, the flexional region 614, the flexible dispenser slot 618, and the dispenser slot flexors 620.

[0044] Certain embodiments of the present invention were described above. From the foregoing it will be seen that this invention is one well adapted to attain all the ends and objects set forth above, together with other advantages, which are obvious and inherent to the system and method. It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. It is expressly noted that the present invention is not limited to those embodiments described above, but rather the intention is that additions and modifications to what was expressly described herein are also included within the scope of the invention. Moreover, it is to be understood that the features of the various embodiments described herein are not mutually exclusive and can exist in various combinations and permutations, even if such combinations or permutations were not made express herein, without departing from the spirit and scope of the invention. In fact, variations, modifications, and other implementations of what was described herein will occur to those of ordinary skill in the art without departing from the spirit and the scope of the invention. As such, the invention is not to be defined only by the preceding illustrative description.

Accordingly, we claim:

- 1 A device for storing and dispensing food items for a customizable nutrition supply, the device comprising:
 - a container;
 - a food item advancer; and
 - a dispenser opening.
- 2 The device of claim 1, in which the container is approximately cylindrical.
- 3 The device of claim 1, in which the container further comprises sidewalls that are faired.
- 4 The device of claim 1, in which the container further comprises a solid surface exclusive of an opening for loading food items.
- 5 The device of claim 1, in which the dispenser opening is an opening in the sidewalls of the container.
- 6 The device of claim 1, in which the dispenser opening is an open end of the container.
- 7 The device of claim 1, in which the container further comprises a solid surface with a plurality of openings or perforations.
- 8 The device of claim 1, in which the device further comprises a top cap.
- 9 The device of claim 8, in which the dispenser opening is an opening in the top cap.
- 10 The device of claim 1, in which the device further comprises a bottom cap.
- 11 The device of claim 10, in which the dispenser opening is an opening in the bottom cap.
- 12 The device of claim 1, in which the food item advancer is a spring.

- 13 The device of claim 1, in which the food item advancer is affixed near the bottom of the container with a food item advancer attacher.
- 14 The device of claim 10, in which the food item advancer is affixed to the bottom cap with a food item advancer attacher.
- 15 The device of claim 1, in which the device further comprises a pusher plate removably affixed to the food item advancer.
- 16 The device of claim 15, in which
- the container further comprises pusher plate alignment guides; and
 - the pusher plate further comprises a plurality of pusher plate aligners; and
 - the pusher plate alignment guides and the plurality of pusher plate aligners slidably engage.
- 17 The device of claim 1, in which the food item advancer is affixed near the top of the container with a food item advancer attacher.
- 18 The device of claim 8, in which the food item advancer is affixed to the top cap with a food item advancer attacher.
- 19 The device of claim 8, in which the container further comprises rocker arms.
- 20 The device of claim 8, in which the top cap further comprises pry arms.
- 21 The device of claim 8, in which the container further comprises a container opening hinge, and in which the top cap further comprises a cover hinge, with the container opening hinge rotatably attached to the cover hinge.
- 22 The device of claim 8, in which the container further comprises a container opening hinge, and in which the top cap further comprises a cover hinge, with the container opening hinge rotatably engaged to the cover hinge.

- 23 The device of claim 8, in which the container further comprises a container catchment, and in which the top cap further comprises a cover closure mechanism, with the container catchment reversibly engageable with the cover closure mechanism.
- 24 The device of claim 15, in which
- the pusher plate further comprises a plurality of pusher plate catchments; and
 - the container further comprises a plurality of pusher plate retainers that engage with the plurality of pusher plate catchments; and
 - the container further comprises a plurality of pusher plate catchment release mechanisms.
- 25 The device of claim 15, in which the pusher plate further comprises pusher plate retainers which reversibly engage with the container to latch the pusher plate in place.
- 26 The device of claim 10, in which the bottom cap may be reversibly attached to the container.
- 27 The device of claim 26, in which the food item advancer may be reversibly attached to the bottom cap.
- 28 The device of claim 8, in which the top cap further comprises a moderately flexible and elastic material.
- 29 The device of claim 8, in which the top cap further comprises a pusher knob and a flexional region; and the dispenser opening further comprises a flexible dispenser slot in the top cap.

30 The device of claim 29, in which the flexional region further comprises a more flexible material than the remainder of the top cap.

31 The device of claim 29, in which the flexional region further comprises a band wrapping around the top cap.

32 The device of claim 29, in which the flexional region further comprises a plurality of regions of the top cap.

33 The device of claim 29, in which the flexible dispenser slot further comprises a plurality of dispenser slot flexors.

34 The device of claim 8, in which the top cap has a top cap aligner for alignment with the container.

35 A device for storing and dispensing food items for a customizable nutrition supply, the device comprising:

a container;

a cartridge concentric with and narrower than the container;

a food item advancer; and

a dispenser opening.

36 The device of claim 35, in which the cartridge further comprises a cartridge food item opening.

37 The device of claim 35, in which the device further comprises a pusher plate disposed within the cartridge.

38 The device of claim 37, in which the cartridge further comprises pusher-cartridge alignment means to align the pusher plate with the cartridge.

- 39 The device of claim 37, in which the cartridge further comprises cartridge slots; and the pusher plate further comprises pusher plate catchments; and the container further comprises pusher plate retainers; and the pusher plate catchments protrude through the cartridge slots to slidably engage with the pusher plate retainers.
- 40 The device of claim 35, in which the cartridge further comprises cartridge-container alignment means; and the container further comprises cartridge-container alignment guides, and the cartridge-container alignment means are slidably engaged with the cartridge-container alignment guides.
- 41 A device for storing and dispensing food items for a customizable nutrition supply, the device comprising:
- a container;
 - a food item advancer comprising a constant-force spring assembly; and
 - a dispenser opening.
- 42 The device of claim 41, in which the constant-force spring assembly further comprises:
- a spring housing further comprising a housing post and a housing string hole;
 - and
 - a spring spool situated within the spring housing, with the housing post passing through the spring spool, and with the spring spool further comprising a spool floor, a spool top, and spool sides with a spool string hole in the spool sides; and
 - a string; and

a constant-force spring inside the spring spool, with the constant-force spring attached to the housing post and to the string.

43 The device of claim 42, in which the string:

passes through the spool string hole;
is wound around the spring spool; and
passes through the housing string hole.

44 The device of claim 43, in which the device further comprises a trigger assembly having a trigger assembly string hole, and a pusher plate having a plurality of pusher plate string holes; with the string passing through the trigger assembly string hole to the plurality of pusher plate string holes, and the string passing from the plurality of pusher plate string holes to attach to a fixed point in the device.

45 The device of claim 44, in which the trigger assembly further comprises a dispenser cover, a food item dispenser, and a trigger; and in which the trigger assembly is rotatably attached to the container with a trigger assembly mount at a trigger assembly placement, such that the trigger assembly, when rotated, pinches the string, reveals the dispenser opening with the dispenser cover, blocks a food item from advancing, and ejects a food item through the dispenser opening with the food item dispenser, and when rotated in the opposite direction, releases the string, covers the dispenser opening with the dispenser cover, and allows the food items to advance.

46 The device of claim 41, in which the device further comprises a top cap; and in which the constant-force spring assembly is disposed inside of the top cap.

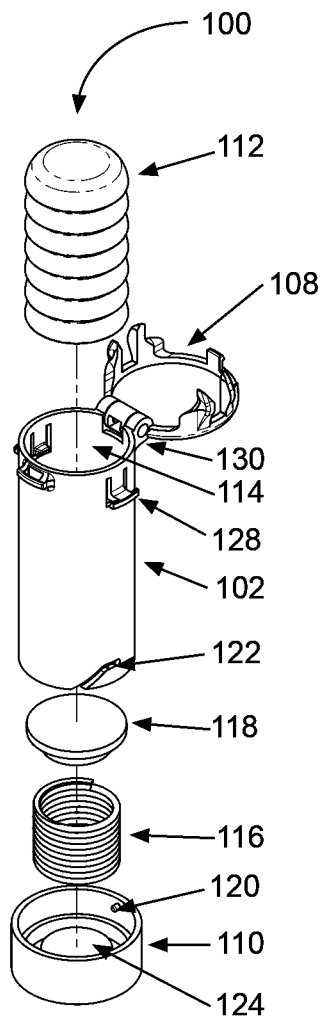


FIG. 1A

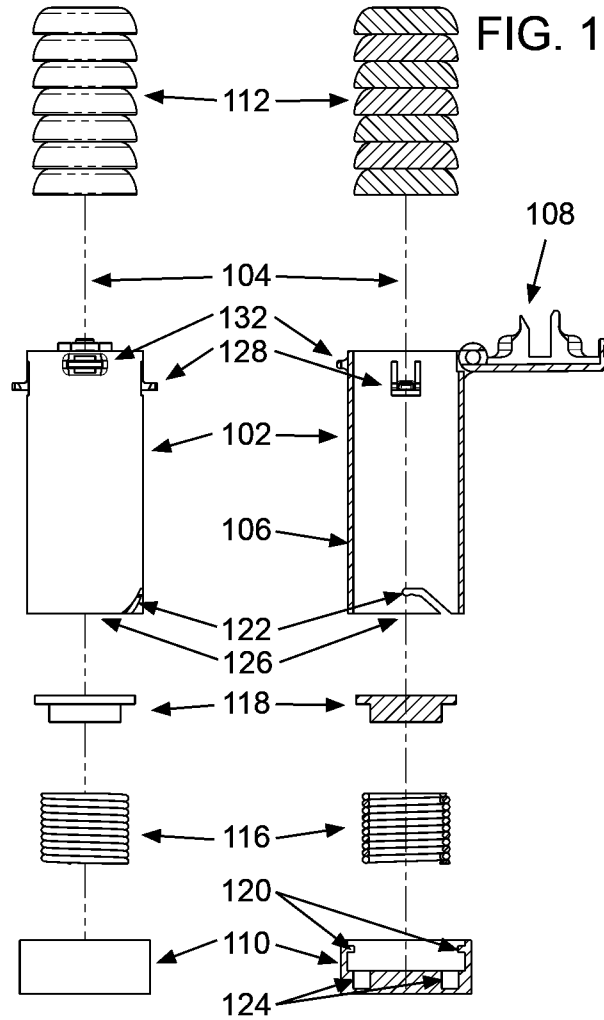
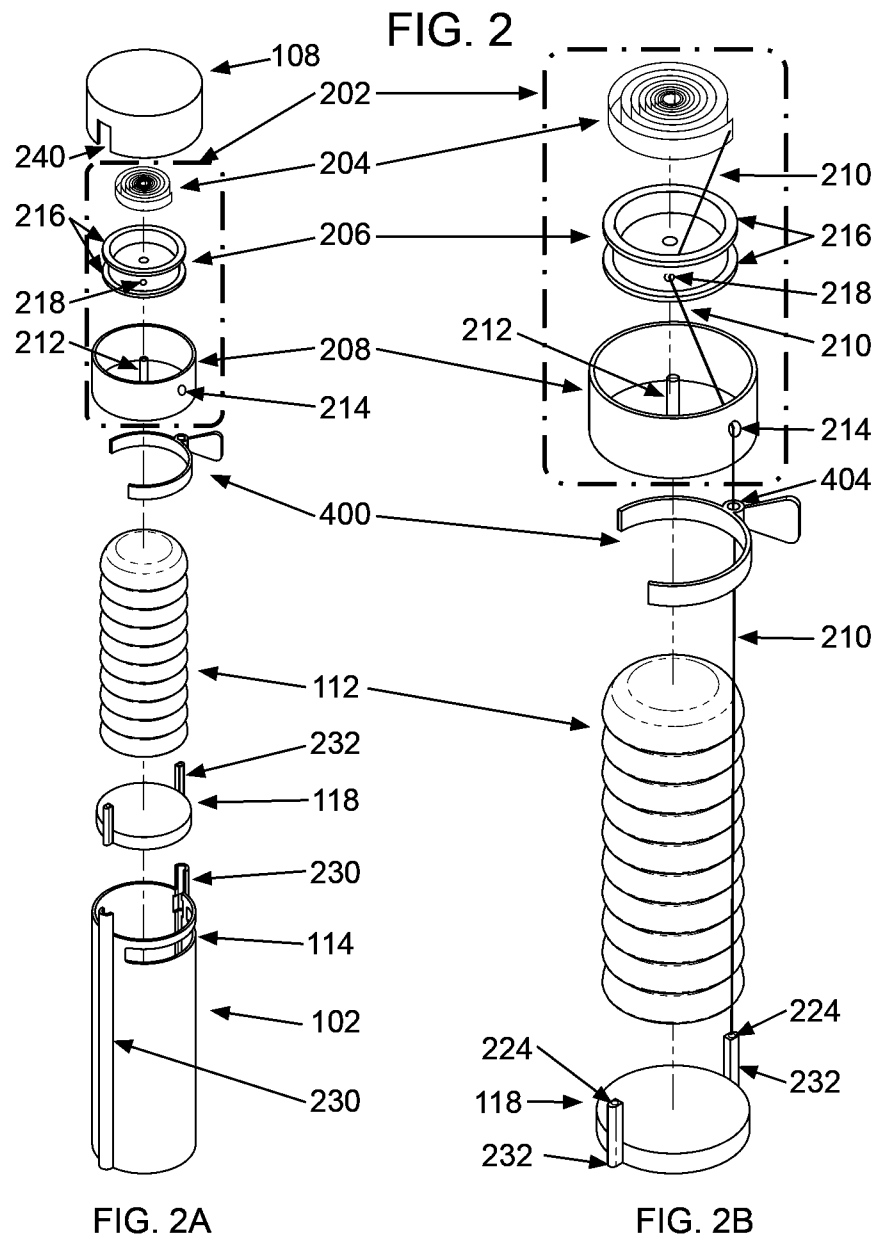


FIG. 1B

FIG. 1C



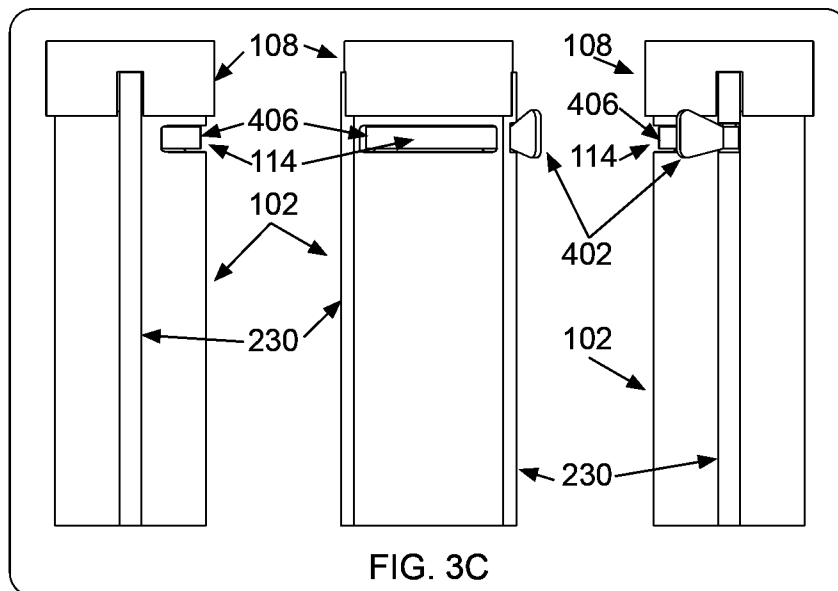
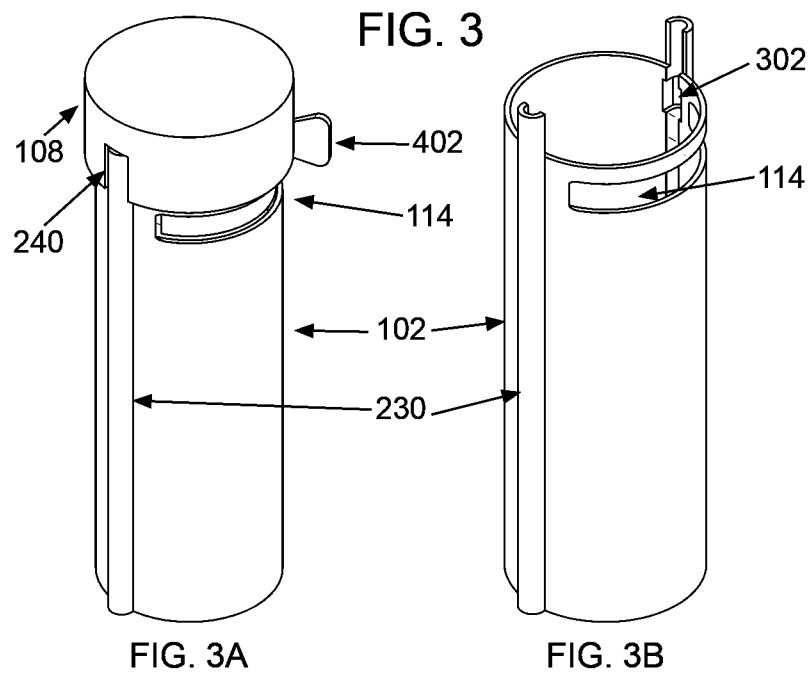


FIG. 4

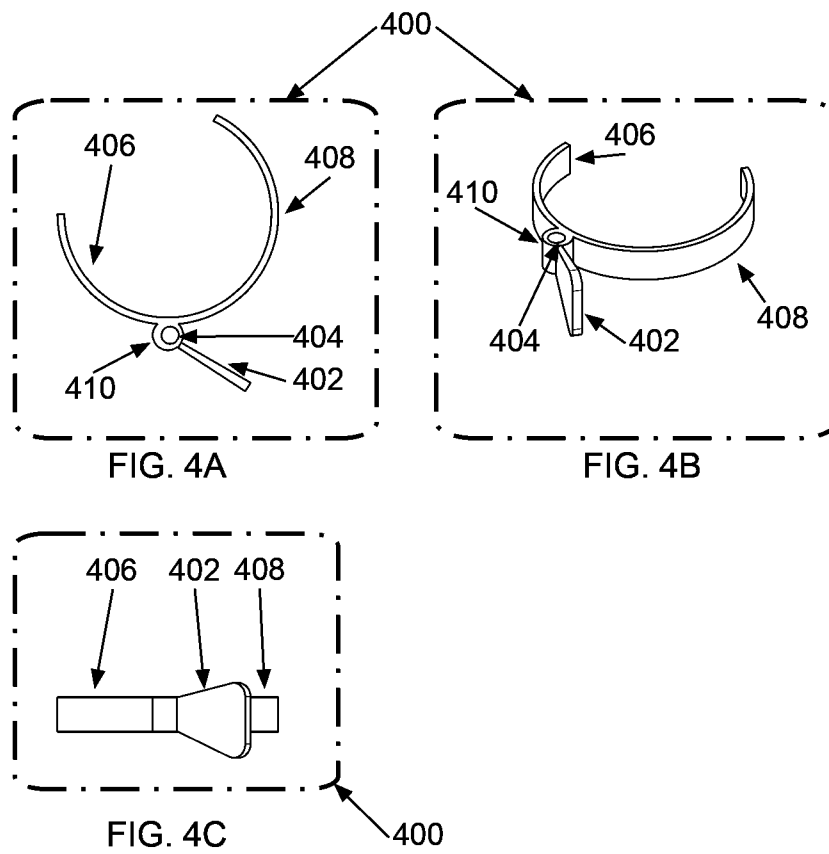
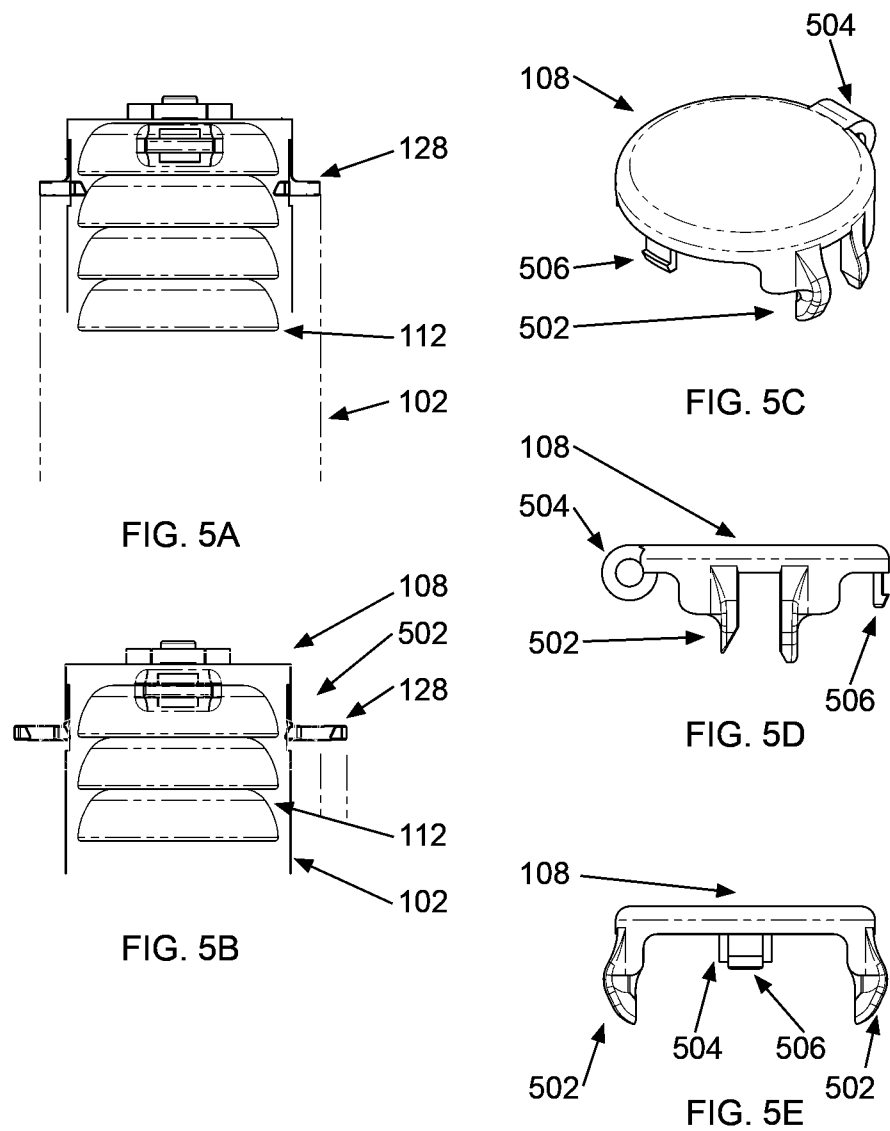
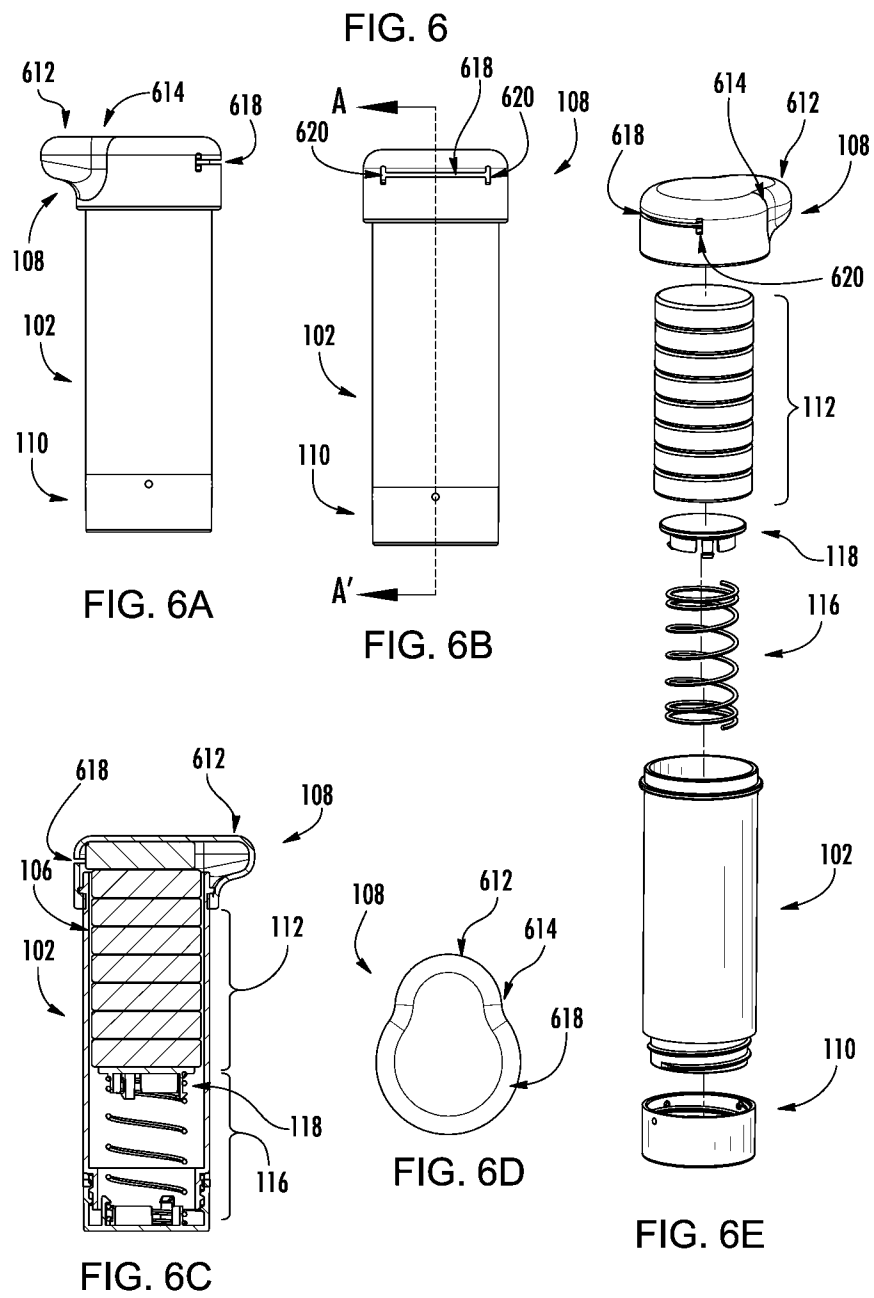


FIG. 5





INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 15/42546

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B65D 83/04 (2015.01)

CPC - B65D 83/0418

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC (8): B65D 83/04 (2015.01);

CPC: B65D 83/0418

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

IPC (8): B65D 83/04, G07F 11/14, 11/20, 11/22 (2015.01);

CPC: B65D 83/04, 83/0418

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Google, Google Patents, PatBase Search Terms Used: food, dispense, container, cylinder, tube, administer, spring, cap, raising, pez, round, objects, candy, assembly, coil, pipe, column, top, bottom, cover, lid, stopper, pellets, pills, hinge, joint, strip, region, flexible, bend, rubber, elastic, button, lever, release, actuator, band, circle,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- A	US 2013/0206786 A1 (DIAMOND et al.) 15 August 2013 (15.08.2013), entire document, especially fig 2, 4, 6-7, 10, 14, 17; para [0034], [0041]-[0044]	1-4, 6, 8, 12-13, 15-16, 19-22, 25, 35-40 ----- 24
X	US 5,178,298 A (ALLINA) 12 January 1993 (12.01.1993) entire document, especially fig 1-5; col 3, ln 31-40; col 3, ln 47-63	1, 5, 7-10, 14, 23, 26-27, 34
X --- Y	US 4,311,251 A (STERNBERG) 19 January 1982 (19.01.1982) entire document, especially fig 2-3; col 3, ln 1-15; col 3, ln 32-68	1, 8, 28-32 ----- 33
X	US 6,889,869 B2 (HALLIN) 10 May 2005 (10.05.2005), entire document, especially fig 1-2	1, 8, 10-11, 17-18
A	US 3,260,242 A (LIGUORI) 12 July 1966 (12.07.1966), entire document, especially fig 1-3; col 4, ln 37-55	24
Y	EP 0052457 A1 (JOHN WYETH & BROTHER LIMITED) 30 October 1981 (30.10.1981), entire document, especially fig 1, 3; col 5, ln 15-20; col 6, ln 1-5	33
A	US 5,785,206 A (CHAN) 28 July 1998 (28.07.1998), entire document	1-40
A	US 6,220,479 B1 (FISHMAN) 24 April 2001 (24.04.2001), entire document	1-40

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

6 October 2015 (6.10.2015)

Date of mailing of the international search report

04 JAN 2016

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-8300

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 15/42546

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

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

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

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

This International Searching Authority found multiple inventions in this international application, as follows:
This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-40, directed to a device with a cartridge concentric with and narrower than the container.

Group II: Claims 1-34, and 41-46 directed to a device with a constant force spring assembly.

** Claims 1-34 are generic to Groups I and II

--- see extra sheet ---

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-40

Remark on Protest

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

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 15/42546

Continuation of Box III:

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

SPECIAL TECHNICAL FEATURES

The invention of Group I includes the special technical feature of a cartridge concentric with and narrower than the container, not required by the claims of Group II.

The invention of Group II includes the special technical feature of a constant force spring assembly, not required by the claims of Group I.

COMMON TECHNICAL FEATURES

Groups I-II share the common technical features of a container; a food item advancer; and a dispenser opening. However, this shared technical feature does not represent a contribution over prior art as being anticipated by US 2013/0206786 A1 to Diamond et al. (hereinafter "Diamond"), a container (40, fig 4); a food item advancer (172, fig 4); and a dispenser opening (120, fig 4).

As the common technical features were known in the art at the time of the invention, these cannot be considered special technical feature that would otherwise unify the groups.

Therefore, Groups I-II lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.