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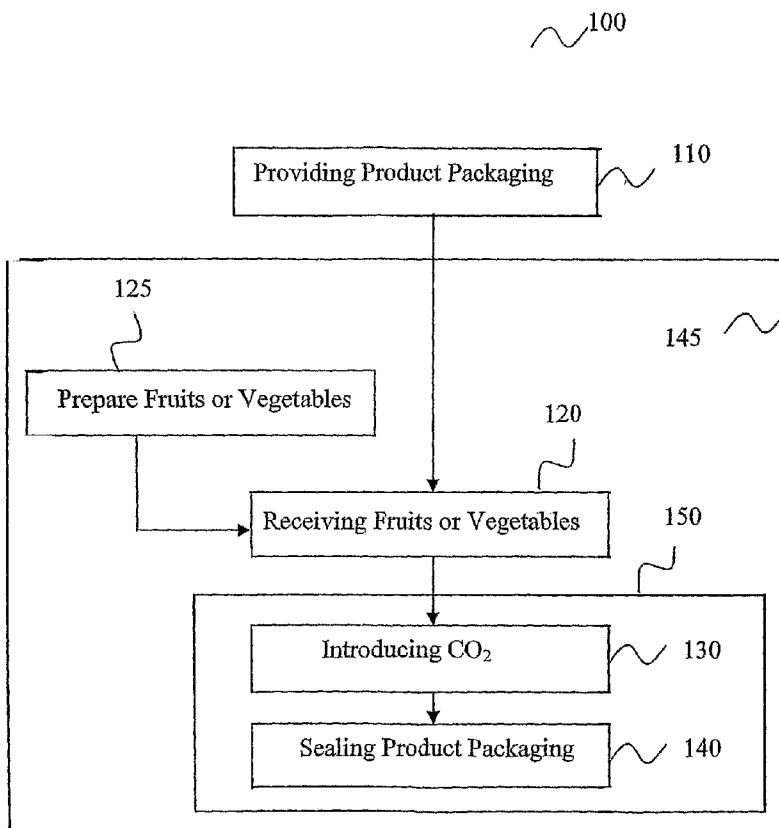
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[Continued on next page]

(54) Title: PACKAGED FLAVOR ENHANCED FRUITS OR VEGETABLES PRODUCTS



(57) Abstract: Methods of enhancing the flavor of fruits or vegetables within its own product packaging to extend the shelf-life and allow for mass production and mass distribution of the flavor enhanced fruits or vegetables, and the packaged flavor enhanced fruits or vegetables products produced by such methods. The methods comprise providing product packaging capable of retaining a positive pressure of CO<sub>2</sub>, receiving fruits or vegetables into the product packaging, introducing CO<sub>2</sub> into the product packaging, and sealing the product packaging containing the fruits or vegetables and CO<sub>2</sub>, and wherein the product packaging retains a positive pressure of CO<sub>2</sub>, and the fruits or vegetables absorb the CO<sub>2</sub> thereby enhancing the flavor of the fruits or vegetables within the product packaging. In one embodiment, the methods comprise freezing the carbonated packaged fruits or vegetables thereby trapping the flavor enhancing CO<sub>2</sub> within the fruits or vegetables to produce a frozen carbonated fruits or vegetables product, hi one embodiment, the fruits or vegetables received into the product packaging may be pureed to a consistency suitable for consumption as a smoothy or similar

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beverage product.



RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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**PACKAGED FLAVOR ENHANCED FRUITS OR VEGETABLES PRODUCTS**

## BACKGROUND OF THE INVENTION

[0001] The most popular snack foods have increasingly become heavily processed, pre-packaged for distribution, laden with preservatives to improve shelf-life, and inherently less nutritious than the traditional snack foods consumed in prior generations. Fresh fruits and vegetables continue to be replaced with pre-packaged snack foods that can be stored easily, served with minimal preparation, and, importantly, appeal to consumer tastes. These pre-packaged snack foods are often heavily processed with salts, sugars, and spices and consequently contribute to unhealthy dietary habits. Snack foods such as soft drinks, puffed corn products, fried potato chips, and other heavily processed items are routinely described as offering only empty calories to the consumer.

[0002] Perhaps the most widely consumed snack food considered to have little to no nutritional value is the soft drink. Carbonated soft drink beverages available today are made using syrups mixed with carbonated water. The syrups are commonly composed of a myriad of sweeteners (sugars or sugar substitutes), acids, preservatives, flavoring, and sometimes coloring for the final soft drink product. Sugar has been largely replaced by high fructose corn syrup, largely because it is less expensive and is somewhat sweeter, so less is needed. The artificial sweetener aspartame is a low-calorie sweetener and has largely replaced cyclamates and saccharin. The sweeteners neotame, acesulfame, and sucralose are sometimes used. Acids are added to soft drinks for extra bite and mouth feel. The primary acid used in colas, for example, is phosphoric acid. The primary acid used in citrus flavored drinks is typically citric acid. Carbonated water (carbonic acid,  $H_2CO_3$ ) is also mildly acidic. Sodium benzoate is used as a broad spectrum antimicrobial, inhibiting bacteria, molds, and yeasts. The high acid content of the soft drink is necessary for the preservative action. Sodium citrate buffers the acids, so the pH stays low (more acidic). It also emulsifies any fats or fat-soluble compounds in the flavorings, keeping them in solution. Potassium sorbate is added to inhibit yeasts and fungi. Ascorbic acid (Vitamin C) may be used as an anti-oxidant. Colors are added to soft drink beverages to improve appeal. In colas, for example, the color comes from caramel coloring (or burnt sugar). Fruit flavored drinks such as orange soda use Red 40 and other colors.

[0003] Other snack foods such as puffed corn products, fried potato chips, and so on include a similarly daunting list of preservatives, additives, and non-nutritional ingredients. Snack foods with increased nutritional value and high consumer appeal are therefore very

desirable. Prior efforts to develop an improved snack food include attempts to enhance the flavor of fruits or vegetables by exposing the fruits or vegetables to carbon dioxide (CO<sub>2</sub>), thereby leaving the fruits or vegetables with an effervescent quality, or “fizzy” quality, due to the absorbed CO<sub>2</sub>. If successful, the resulting carbonated fruits or vegetables would not only retain all their inherent nutritional value but also have added appeal and consumer excitement with the effervescent or “fizzy” character of the foods.

[0004] One method of producing carbonated fruits or vegetables has been described in U.S. Patent 5,968,573 by Kaufman, entitled “Method for enhancing the flavor of fruits and vegetables.” The U.S. Patent 5,968,573 is hereby incorporated by reference. The method disclosed provides that the fruits or vegetables are processed in a sealable enclosure to establish the carbonating effect and then removed from the sealed CO<sub>2</sub> environment and covered to prevent the CO<sub>2</sub> from escaping from within the fruits or vegetables. Extensive testing has revealed that this method can produce carbonated fruits or vegetables with effervescent qualities or “fizziness” lasting only long enough for immediate consumption. Once the fruits or vegetables are removed from the sealed CO<sub>2</sub> environment, the carbonation rapidly leaves the tissues of the fruits or vegetables. Testing shows that the carbonation can only be retained within the fruits or vegetables for several minutes. That is, the method is not capable of producing carbonated fruits or vegetables with sufficient shelf-life for mass market distribution or consumption. The method disclosed is not directed to solving the problems of extending shelf-life, methods to enhance the flavor of fruits or vegetables that yield products suitable for mass market distribution and consumption, and so forth.

[0005] The present invention particularly addresses these and other problems, as will be described in the detailed description herein, resulting in new packaged flavor enhanced fruits or vegetables products and methods for enhancing the flavor of fruits or vegetables within product packaging enabling mass market distribution and consumption of the new packaged products.

[0006] The foregoing and other objectives, features, and advantages of the invention will be more readily understood upon consideration of the following detailed description of the invention, taken in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0007] For a more complete understanding of the present invention, the drawings herein illustrate examples of the invention. The drawings, however, do not limit the scope of the invention. Similar references in the drawings indicate similar elements.

[0008] FIG. 1 illustrates a method for enhancing the flavor of fruits or vegetables within its own product packaging according to one embodiment of the present invention.

[0009] FIG. 2 illustrates a packaged flavor enhanced fruits or vegetables product according to one embodiment.

[0010] FIG. 3 illustrates, in one embodiment, an exemplary method for enhancing the flavor of fruits or vegetables within its own product packaging, the method involving a port for receiving CO<sub>2</sub> into the product packaging.

[0011] FIG. 4 illustrates, in one embodiment, an exemplary packaged flavor enhanced fruits or vegetables product of the method illustrated in Fig. 3.

[0012] FIG. 5 illustrates a method for enhancing the flavor of fruits or vegetables within its own product packaging according to one embodiment of the present invention, the method involving a pressure chamber.

[0013] FIG. 6 illustrates one or more packaged flavor enhanced fruits or vegetables products within a pressure chamber according to the method illustrated in Fig. 5.

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0014] In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, those skilled in the art will understand that the present invention may be practiced without these specific details, that the present invention is not limited to the depicted embodiments, and that the present invention may be practiced in a variety of alternate embodiments. In other instances, well known methods, procedures, components, and systems have not been described in detail.

[0015] Parts of the description will be presented using terminology commonly employed by those skilled in the art to convey the substance of their work to others skilled in the art. For example, a person having ordinary skill in the art will be able to comprehend terms such as modified atmosphere, carbon dioxide (CO<sub>2</sub>), positive pressure, psi, carbonated, effervescent, carbonic acid, pasteurization, retort, heat sterilization, flash freezing, and so on in the context and intended meaning of the present invention and within the spirit and scope of the present invention.

[0016] The phrase "fruits or vegetables" is used herein to comprise any portion of a single type of fruit, any portion of a single type of vegetable, any portion of a mixture of fruits and vegetables, and so on. As will be discussed further, "fruits or vegetables" also comprises any portion of pre-processed fruits or vegetables, such as, but not limited to, whole

fruits or vegetables, pre-cut portions of fruits or vegetables, or any of a wide variety of processed or unprocessed fruits or vegetables retaining a suitable composition that allows for absorption of CO<sub>2</sub>.

[0017] For example, the fruits or vegetables may be processed insofar as the fruits or vegetables are harvested and cut as is commonly practiced for a particular variety of fruits or vegetables. Peaches, for instance, may be pitted and skinned whereas seedless grapes may be left whole or left in bunches (including portions of the vine) as (grapes) are typically presented in grocery produce displays. Further, the fruits or vegetables may be finely cut, blended, crushed, or pureed. The fruits or vegetables may be pureed to a consistency suitable for consumption as a smoothy or similar beverage product. The resulting puree will contain all the flesh, pulp, fiber, and juice of the original fruits or vegetables product, but it will be consumable as a beverage product.

[0018] The term “puree” is used herein to comprise a pulpy, thick fluid produced by very finely disintegrating a juicy food commodity such as fruits or vegetables. The puree may be obtained by finely mashing, blending, or crushing the fruits or vegetables to a smooth, pulpy, thick, liquid-like consistency. The resulting puree may be further pureed to decrease its viscosity (to improve fluid flow and consumability as a beverage). A puree is distinguished from various other (beverage) designations as shown in **Table 1** shown below.

**Table 1: Common Beverage Designations**

<b>Term</b>	<b>Criteria</b>	<b>Remarks</b>
Pure juice 100%	All juice	No adjustment; not from concentrate
Fresh squeezed	Not pasteurized	Held refrigerated
Chilled; ready to serve	All juice	Held refrigerated; made from concentrate or pasteurized juice
Not from concentrate	Single strength	Pasteurized after extraction
From concentrate	Made from concentrate	Reconstituted and pasteurized
Fresh frozen	Unpasteurized	Single strength; frozen after extraction

Juice blend	All juice	A mixture of pure juices
<b>Puree</b>	<b>Pulp-containing; made from finely disintegrated fruits or vegetables</b>	<b>More viscous than juices; 100% totally fruits or vegetables</b>
Nectar	Pulpy or clear	Sugar, water, and acid added; generally 25% to 50% juice
Nectar base	Requires reconstitution	Possesses sufficient flavor, acid, and sugar to require water dilution for consumption
Juice drink	Low in juice	Contains 10% to 20% juice
Juice beverage	Low in juice	Contains 10% to 20% juice
Juice cocktail	Low in juice	Contains 10% to 20% juice
Fruit plus "ade"	Lemonade	Contains >10% fruit juice, sugar, and water
Juice extract	Water extract	Fruit extracted by water, then concentrated
Fruit punch	Token juice	≤% juice plus natural flavors
Natural flavored	Token juice	Usually >1% juice

[0019] The term "smoothy" is used herein to generally describe a mixture of slush frozen pureed fruits or vegetables either alone or combined with milk, yogurt, another beverage or food product, and/or sweetened to taste, the smoothy having sufficient consistency to be consumed as a beverage.

[0020] Various terms may be used to qualitatively and quantitatively describe carbonation levels associated with food products. For example, a particular soft drink may contain three (3) volumes of CO<sub>2</sub>, indicating that three (3) units of CO<sub>2</sub> have been dissolved (or forced) into each unit of the liquid drink. This particular example may represent, using

different measurement terms, a CO<sub>2</sub> content level of approximately six (6) grams-per-liter. However, for purposes of describing the present invention it is more useful to describe the carbonation in terms of internal pressure (in pounds-per-square-inch or psi) of the CO<sub>2</sub> within the product packaging. For instance, the packaged flavor enhanced fruits or vegetables product may comprise product packaging with fruits or vegetables and a positive pressure of CO<sub>2</sub> wherein the positive pressure of CO<sub>2</sub> may be 10 psi.

**[0021]** Various operations will be described as multiple discrete steps performed in turn in a manner that is helpful for understanding the present invention. However, the order of description should not be construed as to imply that these operations are necessarily performed in the order they are presented, nor even order dependent. Lastly, repeated usage of the phrase “in one embodiment” does not necessarily refer to the same embodiment, although it may.

**[0022]** Turning now to **Fig. 1**, method steps **100**, according to one embodiment of the present invention, are illustrated in a flow chart. As shown, method steps **100** comprise providing product packaging **110**, receiving fruits or vegetables **120** into or at least proximate with the provided product packaging, before which the fruits or vegetables may have been prepared **125** (for example, as a puree), introducing CO<sub>2</sub> **130** into or proximate with the product packaging containing or proximate with the fruits or vegetables, and sealing the production packaging **140** with the fruits or vegetables and CO<sub>2</sub> inside the product packaging.

**[0023]** Method steps **100** may further comprise one or more bactericidal methods **145** to reduce microbial growth and improve the shelf-life of the fruits or vegetables. The selected bactericidal method **145** may include any acceptable method of reducing microbial growth and depends upon the nature of the fruits or vegetables chosen, the intended food product to be produced, and other factors, and the selected bactericidal method **145** may be added in any order within the method steps **100**. For illustrative purposes, a number of bactericidal methods are mentioned herein. For example, the bactericidal method **145** may comprise washing the fruits or vegetables in water or any of a number of sanitizers such as solutions containing chlorine, ozone, hydrogen peroxide, bromine, acids, and so on. The washed fruits or vegetables may then be pureed (method step **125**) and further packaged and carbonated according to the method steps **100**. The bactericidal method **145** may comprise pasteurization. For example, pureed fruits or vegetables may be batch or flash pasteurized to kill vegetative bacterial cells and various pathogens. Batch pasteurization typically involves elevating the temperature of the food product to 63-66 degrees Celsius for approximately 30



minutes whereas flash pasteurization typically involves elevating the temperature to around 72 degrees Celsius for approximately 15 seconds. Another bactericidal method **145** may involve elevating the temperature of the fruits or vegetables to approximately 121 degrees Celsius, raising the pressure to approximately 15 psi, and holding the temperature and pressure for around 15 minutes, effectively pressure cooking as the method of killing all forms of microorganisms as well as bacterial endospores. Yet another bactericidal method **145** may comprise utilizing a retort process. A typical retort process involves elevating the temperature of the food within the package it is to be sold in using superheated steam and holding the temperature for a predetermined period of time. For example, the sealed packaged flavor enhanced fruits or vegetables product from method step **140** may be placed in a retort process heating the product to approximately 125 degrees Celsius for up to 90 minutes. Still another bactericidal method **145** may comprise irradiation pasteurization or pulsed ultraviolet light exposure or other methods not mentioned herein.

[0024] The method steps **100** may further comprise freezing **150** the carbonated packaged fruits or vegetables thereby trapping the flavor enhancing CO<sub>2</sub> within the fruits or vegetables to produce a frozen carbonated fruits or vegetables product. In one embodiment, the freezing **150** step may be added to the method steps **100** as shown, as CO<sub>2</sub> is introduced **130**, prior to sealing the product packaging **140**, following sealing the product packaging **140**, or simultaneous with introducing the CO<sub>2</sub> **130** and sealing the product packaging **140**. Any of a wide variety of freezing processes may be used. In one embodiment, method steps **100** are performed in a refrigerated environment, and the temperature is reduced so that the packaged flavor enhanced fruits or vegetables become frozen after the introduced CO<sub>2</sub> has been absorbed by the fruits or vegetables, thus trapping the flavor enhancing CO<sub>2</sub> within the fruits or vegetables. In another embodiment, freezing **150** occurs following sealing flavor enhanced fruits or vegetables within its product packaging. Freezing **150** may be accomplished, for example, using readily available refrigeration and freezing equipment. Alternatively, freezing **150** may be accomplished using flash freezing techniques. Such flash freezing may involve liquid nitrogen or some other cryogenic agent which is safe for human consumption.

[0025] In one embodiment, providing product packaging **110** comprises providing a product packaging with at least one opening large enough for receiving the fruits or vegetables **120**, thereafter CO<sub>2</sub> is introduced into the product packaging containing the fruits or vegetables (method step **130**) and, finally, the product packaging is sealed (method step

140). In one embodiment, enough CO<sub>2</sub> is introduced and sealed within the product packaging containing the fruits or vegetables that there remains in the product packaging a positive pressure of CO<sub>2</sub>. In one embodiment, this positive pressure is approximately 25 psi to 40 psi, sufficient pressure to thoroughly carbonate the fruits or vegetables therein. In another embodiment, the positive pressure is approximately 10 psi, enough to maintain desirable levels of carbonation within the fruits or vegetables wherein the fruits or vegetables may have been pre-carbonated prior to insertion into the product packaging. In various embodiments, the positive pressure of CO<sub>2</sub> may differ depending upon the desired “fizziness” of the fruits or vegetables.

[0026] In one embodiment, one or more of method steps **100** are performed in a refrigerated environment to minimize respiration of the fruits or vegetables and improve the absorption of CO<sub>2</sub> into the fruits or vegetables within the product packaging. In one embodiment, the fruits or vegetables are sealed in the product packaging with a 100% saturation level CO<sub>2</sub> environment within the product packaging containing the fruits or vegetables. In one embodiment, the fruits or vegetables are sealed in the product packaging with a carbon dioxide rich but less-than-100% carbon dioxide atmosphere. In one embodiment, the atmosphere within the sealed product packaging comprises enough pressurized gaseous carbon dioxide to allow carbon dioxide to be absorbed by the fruits or vegetables as well as a small amount of oxygen, just enough to prevent anaerobic conditions within the sealed produce packaging.

[0027] In one embodiment, the carbon dioxide rich atmosphere comprises around 95% to 99% carbon dioxide plus 1% to 5% oxygen. The atmosphere may comprise a majority of carbon dioxide (or enough pressurized carbon dioxide to allow absorption by the fruits or vegetables within the product packaging), a small amount of oxygen (or just enough to prevent anaerobic conditions within the product packaging), and other gases.

[0028] Method steps **100** may be accomplished using gas flushing or modified atmosphere packaging equipment, such equipment improved to allow for sealing the product packaging **140** such that the product packaging containing the fruits or vegetables is capable of retaining a positive internal pressure of CO<sub>2</sub>. In one embodiment, the gas flush equipment directly introduces enough CO<sub>2</sub> into the product packaging containing the fruits or vegetables to achieve the positive pressure of CO<sub>2</sub>. In an alternate embodiment, a source of CO<sub>2</sub> comprises the CO<sub>2</sub> introduced in step **130**, and a positive pressure of CO<sub>2</sub> results from a release of CO<sub>2</sub> generated by a CO<sub>2</sub> generating material. In yet another embodiment, a source

of CO<sub>2</sub> supplements the CO<sub>2</sub> introduced in step 130, and the source of CO<sub>2</sub> maintains the positive pressure of CO<sub>2</sub> introduced into the product packaging containing the fruits or vegetables (step 130).

[0029] Variations and alterations to method steps 100 may be made without disturbing the spirit and scope of the claimed method 100. Such variations and alterations may include, but are not limited to, rearranging the order of the steps 100, adding sub-steps, and so on. In one embodiment, for example, method 100 comprises providing product packaging 110, receiving fruits or vegetables 120 into the product packaging, introducing CO<sub>2</sub> 130 by first evacuating all non- CO<sub>2</sub> gasses from the product packaging containing the fruits or vegetables and then introducing the CO<sub>2</sub> into the product packaging, and, finally, sealing the product packaging 140 containing the fruits or vegetables and CO<sub>2</sub> therein.

[0030] Next, Fig. 2 illustrates a packaged flavor enhanced fruits or vegetables product 200 produced using method steps 100, according to one embodiment of the present invention. As shown in Fig. 2, packaged flavor enhanced fruits or vegetables product 200 comprises product packaging 210 containing fruits or vegetables 220 and a positive pressure of CO<sub>2</sub> in the space 230 within product packaging 210. In one embodiment, packaged flavor enhanced fruits or vegetables product 200 further comprises a sealed area 240 into which the fruits or vegetables 220 were received and into which CO<sub>2</sub> was introduced into product packaging 210.

[0031] Product packaging 210 may comprise any number of a wide variety of commercially materials and shapes capable of retaining a positive pressure of CO<sub>2</sub> gas. For example, product packaging 210 may comprise a plastic cup and sealed area 240 may comprise a heat sealed material, the combination similar to containers used for packaging yogurts and other foodstuffs. In one embodiment, product packaging 210 comprises a plastic bag material, and sealed area 240 comprises a (heat, chemically, or ultrasonically) welded closure of the plastic bag material. In one embodiment, product packaging 210 comprises a metallic cup or bottle material such as aluminum or tin. In one embodiment, sealed area 240 comprises a pull-to-open type openable top similar to those used for a variety of foodstuffs such as puddings, fruit cocktails, and so on. Likewise, in one embodiment, product packaging 210 comprises a glass container with a suitable sealed area 240. Sealed area 240 may comprise any number of materials. In one embodiment, sealed area 240 comprises a screw-on or crimped metallic bottle-cap type top.

[0032] Product packaging **210** is not limited to the materials described herein. Any material that is capable of retaining a positive pressure of CO<sub>2</sub> may be used for product packaging **210** and sealed area **240**. Also, product packaging **210** and sealed area **240** may comprise any shape or proportion. In one embodiment, product packaging **210** comprises two sheets of material, and sealed area **240** comprises a perimeter seal completely sealing the two sheets of material about fruits or vegetables **220** and retaining a positive pressure of CO<sub>2</sub> within the resulting packaged flavor enhanced fruits or vegetables product **200**.

[0033] Product packaging **210** and sealed area **240** may comprise a darkened or opaque material to reduce or eliminate light intrusion upon fruits or vegetables **220**, thereby reducing photosynthesis, respiration, or other processes and improving the shelf-life of packaged flavor enhanced fruits or vegetables product **200**.

[0034] Regarding fruits or vegetables **220**, as previously mentioned, any portion of a single fruit, medley of fruits, single vegetable, medley of vegetables, combination of fruits and vegetables, and so forth may be used. Any fruits or vegetables containing water may be carbonated to achieve a “fizzy” or effervescent quality. Different fruits and vegetables absorb CO<sub>2</sub> differently depending upon temperature, freshness of the fruits or vegetables, percentage water content, and so on. As a specific example, fruits or vegetables **220** may comprise pureed sweetened strawberries. Once packaged and flavor enhanced using method steps **100**, the packaged flavor enhanced fruits or vegetables product **200** comprises packaged “fizzed” pureed sweetened strawberries, ready for mass market distribution and consumption.

[0035] Practicing the present invention to obtain packaged flavor enhanced fruits or vegetables products such as packaged flavor enhanced fruits or vegetables product **200** may comprise any processed or unprocessed fruits or vegetables, cut or uncut, mixed or unmixed, and so forth (as prepared in method step **125**). As previously mentioned, fruits or vegetables **220** may include pureed fruits or vegetables or fruits or vegetables prepared in various other ways. For example, fruits or vegetables that have been fortified with vitamins, minerals, or other nutrients may comprise fruits or vegetables **220**. Fruits or vegetables **220** may also comprise additional healthful ingredients such as, but not limited to, antioxidants, protein powders, and yogurt. Moreover, fruits or vegetables **220** may comprise fruits or vegetables that have been previously exposed to CO<sub>2</sub>.

[0036] Still referring to **Fig. 2**, product packaging space **230**, in one embodiment, comprises introduced CO<sub>2</sub>. The introduced CO<sub>2</sub>, in one embodiment comprises enough CO<sub>2</sub> so that there is a positive pressure of CO<sub>2</sub> retained in the packaged flavor enhanced fruits or

vegetables product **200**. In another embodiment, a CO<sub>2</sub> generating material may be introduced into space **230**, the material generating enough CO<sub>2</sub> to maintain a positive pressure of CO<sub>2</sub> within product packaging **210** containing fruits or vegetables **220** and having sealed area **240** sealed. In one embodiment, the CO<sub>2</sub> generating material introduced into space **230** comprises dry ice. The CO<sub>2</sub> generating material introduced into space **230** may comprise a CO<sub>2</sub> releasing substance such as products commercially available from CO<sub>2</sub> Technologies™. The CO<sub>2</sub> generating material introduced into space **230** may release enough CO<sub>2</sub> to create a positive pressure of CO<sub>2</sub> within space **230**. In one embodiment, space **230** provides a 100% CO<sub>2</sub> saturation level environment for fruits or vegetables **220**. In one embodiment, space **230** provides a carbon dioxide rich but less-than-100% carbon dioxide atmosphere. In one embodiment, the atmosphere within the sealed product packaging comprises enough pressurized gaseous carbon dioxide to allow carbon dioxide to be absorbed by the fruits or vegetables as well as a small amount of oxygen, just enough to prevent anaerobic conditions within the sealed product packaging.

[0037] Moving now to **Fig. 3**, enhancing the flavor of fruits or vegetables within its product packaging comprises method steps **300**, according to one embodiment. As shown, method steps **300** comprise providing product packaging **310**, receiving fruits or vegetables **320**, before which the fruits or vegetables may have been prepared **325** (for example, as a puree), vacuum sealing the product packaging with a port blocked **330**, introducing CO<sub>2</sub> through the port **340**, and sealing the port **350**. Method steps **300** may also comprise one or more bactericidal method **145** and freezing **150** as described previously.

[0038] In one embodiment, vacuum sealing the product packaging with a port blocked **330** comprises evacuation of non- CO<sub>2</sub> gasses from the product packaging containing the fruits or vegetables and then sealing the product packaging leaving an openable area (or port) through which CO<sub>2</sub> may be introduced into the product packaging. In one embodiment, the port is blocked to prevent gaseous flow through the port and to thereby favorably assist the evacuation of non- CO<sub>2</sub> gasses from the product packaging containing the fruits or vegetables.

[0039] According to one embodiment, introducing CO<sub>2</sub> through the port **340** comprises flowing enough CO<sub>2</sub> through the port (or opening) into the product packaging containing the fruits or vegetables to create a positive pressure of CO<sub>2</sub> within the product packaging. In one embodiment, this positive pressure is approximately 25 psi to 40 psi, sufficient pressure to thoroughly carbonate the fruits or vegetables therein. In another

embodiment, the positive pressure is approximately 10 psi, enough to maintain desirable levels of carbonation within the fruits or vegetables wherein the fruits or vegetables may have been pre-carbonated prior to insertion into the product packaging. In various embodiments, the positive pressure of CO<sub>2</sub> may differ depending upon the desired “fizziness” of the fruits or vegetables.

[0040] In one embodiment, one or more of method steps 300 are performed in a refrigerated environment to minimize respiration of the fruits or vegetables and improve the absorption of CO<sub>2</sub> into the fruits or vegetables within the product packaging. In one embodiment, the fruits or vegetables are sealed in the product packaging with a 100% saturation level CO<sub>2</sub> environment within the product packaging containing the fruits or vegetables.

[0041] In an alternate embodiment, a source of CO<sub>2</sub> comprises the CO<sub>2</sub> introduced in step 340, and a positive pressure of CO<sub>2</sub> results from a release of CO<sub>2</sub> generated by a CO<sub>2</sub> generating material. In yet another embodiment, a source of CO<sub>2</sub> supplements the CO<sub>2</sub> introduced in step 340 and the source of CO<sub>2</sub> maintains the positive pressure of CO<sub>2</sub> introduced into the product packaging containing the fruits or vegetables (step 340).

[0042] In one embodiment, sealing the port 350 comprises closing the port (or opening) resulting in a packaged flavor enhanced fruits or vegetables product suitable for mass distribution and consumption. As will be discussed, the port may comprise any opening through which CO<sub>2</sub> may be introduced (method step 340). It follows, therefore, that sealing the port 350 may involve different processes depending upon the material properties and functional properties of the port. For example, if the port comprises an opening held closed but not sealed in method step 330, subsequently sealing the port 350 may comprise a similar sealing process as in step 330 but without the vacuum aspect.

[0043] Referring now to Fig. 4, a packaged flavor enhanced fruits or vegetables product 400 produced using method steps 300 is illustrated, according to one embodiment of the present invention. As shown in Fig. 4, packaged flavor enhanced fruits or vegetables product 400, in one embodiment, comprises the packaged flavor enhanced fruits or vegetables product 200 with port 450 added. In one embodiment, port 350 comprises a portion of sealed area 240 left open for introducing CO<sub>2</sub> through the opening (method step 340). In one embodiment, port 350 comprises a one-way check valve capable of permitting CO<sub>2</sub> to flow into space 230 and retaining a positive pressure of CO<sub>2</sub> therein. In another embodiment, port 350 comprises a sealable plastic tube at least large enough to allow the

flowing CO<sub>2</sub> into space 230. In one embodiment, port 450 comprises a plastic tube sealable using commercially available (heat, chemical, or sonic) welding equipment. Methods for sealing port 450 are well known in the art and need not be described in further detail.

Likewise, one skilled in the art will be able to substitute a wide variety of materials, configurations, and devices comprising port 450.

[0044] Next, **Fig. 5** illustrates method steps 500 for producing one or more packaged flavor enhanced fruits or vegetables product using a pressure chamber. As shown, method 500 comprises providing product packaging 510, receiving fruits or vegetables into the product packaging 520, before which the fruits or vegetables may have been prepared 525 (for example, as a puree), placing one or more of the product packaging containing fruits or vegetables into a pressure chamber 530, evacuating non- CO<sub>2</sub> gasses from the pressure chamber 540, introducing CO<sub>2</sub> into the pressure chamber 550, and sealing the one or more product packaging containing fruits or vegetables within the pressure chamber 560. Method steps 500 may also comprise one or more bactericidal method 145 and freezing 150 as described previously.

[0045] In one embodiment, placing one or more of the product packaging (step 530) comprises placing one or more of the product packaging as in **Fig. 2** into a pressure chamber. In one embodiment, placing one or more of the product packaging (step 530) comprises placing one or more of the product packaging as in **Fig. 4** into a pressure chamber.

[0046] According to one embodiment, introducing CO<sub>2</sub> into the pressure chamber 550 comprises flowing enough CO<sub>2</sub> into the pressure chamber to create a positive pressure of CO<sub>2</sub> within the product packaging therein. In one embodiment, this positive pressure is approximately 25 psi to 40 psi, sufficient pressure to thoroughly carbonate the fruits or vegetables therein. In another embodiment, the positive pressure is approximately 10 psi, enough to maintain desirable levels of carbonation within the fruits or vegetables wherein the fruits or vegetables may have been pre-carbonated prior to insertion into the product packaging. In various embodiments, the positive pressure of CO<sub>2</sub> may differ depending upon the desired "fizziness" of the fruits or vegetables.

[0047] In one embodiment, one or more of method steps 500 are performed in a refrigerated environment to minimize respiration of the fruits or vegetables and improve the absorption of CO<sub>2</sub> into the fruits or vegetables within the product packaging. In one embodiment, within the pressure chamber, the fruits or vegetables are sealed in the product packaging with a 100% saturation level CO<sub>2</sub> environment within the product packaging

containing the fruits or vegetables. In one embodiment, within the pressure chamber, the fruits or vegetables are sealed in the product packaging with a carbon dioxide rich but less-than-100% carbon dioxide atmosphere. In one embodiment, the atmosphere within the sealed product packaging comprises enough pressurized gaseous carbon dioxide to allow carbon dioxide to be absorbed by the fruits or vegetables as well as a small amount of oxygen, just enough to prevent anaerobic conditions within the sealed product packaging.

[0048] **Fig. 6** illustrates one or more packaged flavor enhanced fruits or vegetables product within a pressure chamber according to the method illustrated in **Fig. 5**. As shown in **Fig. 6**, pressure chamber **610** contains one or more packaged flavor enhanced fruits or vegetables product **200**. Pressure chamber **610** may be used as shown, with product packaging as in **Fig. 2**, or with product packaging as in **Fig. 4**, or with other variations of product packaging as described previously.

[0049] In one embodiment, introducing CO<sub>2</sub> into pressure chamber (method step **550**) comprises flowing enough CO<sub>2</sub> into pressure chamber **610** so as to create a positive pressure of CO<sub>2</sub>. As the pressure of CO<sub>2</sub> becomes positive in pressure chamber **610**, the pressure of CO<sub>2</sub> within product **200** also becomes positive since the CO<sub>2</sub> is able to freely enter the unsealed product packaging **210**. Likewise, as the pressure of CO<sub>2</sub> becomes positive in pressure chamber **610**, in one embodiment, the pressure of CO<sub>2</sub> within product **400** contained inside pressure chamber **610** becomes positive since the CO<sub>2</sub> is able to freely enter port **450**. In one embodiment, subsequent to introducing enough CO<sub>2</sub> to achieve a positive pressure of CO<sub>2</sub> within the product packaging containing the fruits or vegetables the product packaging is sealed, thereby resulting in one or more packaged flavor enhanced fruits or vegetables product such as product **200** or product **400**. The methods described herein may be scaled up for high volume production of packaged flavor enhanced fruits or vegetables. In one embodiment, pressure chamber **610** is capable of operating on a large number of products such as product **200**.

[0050] As described herein, the present invention provides methods for enhancing the flavor of fruits or vegetables within its own product packaging to extend the shelf-life and allow for mass production and mass distribution of the flavor enhanced fruits or vegetables, and the present invention provides packaged flavor enhanced fruits or vegetables products produced by such methods. The methods comprise providing product packaging capable of retaining a positive pressure of CO<sub>2</sub>, receiving fruits or vegetables into the product packaging, introducing CO<sub>2</sub> into the product packaging, and sealing the product packaging



containing the fruits or vegetables and CO<sub>2</sub>, and wherein the product packaging retains a positive pressure of CO<sub>2</sub>, and the fruits or vegetables absorb the CO<sub>2</sub> thereby enhancing the flavor of the fruits or vegetables within the product packaging.

**[0051]** Although a person having skill in the art may comprehend alterations and modifications of the present invention after having read the foregoing description, it is to be understood that the particular embodiments shown and described by way of illustration are in no way intended to be considered limiting. References to details of particular embodiments are not intended to limit the scope of the claims. Rather, it will be appreciated that many variations, modifications, and embodiments are possible, and all such variations, modifications, and embodiments are to be regarded as being within the spirit and scope of the invention.

**[0052]** The terms and expressions which have been employed in the foregoing specification are used therein as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding equivalents of the features shown and described or portions thereof, it being recognized that the scope of the invention is defined and limited only by the claims which follow.

## CLAIM(S)

1. A method of enhancing the flavor of fruits or vegetables within its own product packaging to extend the shelf-life and allow for mass production and mass distribution of the flavor enhanced fruits or vegetables, the method comprising:
  - providing product packaging capable of retaining a positive pressure of CO<sub>2</sub>,
  - receiving fruits or vegetables into said product packaging,
  - introducing CO<sub>2</sub> into said product packaging,
  - sealing said product packaging containing said fruits or vegetables and said CO<sub>2</sub>, and
  - freezing said product packaging containing said fruits or vegetables, wherein said product packaging retains said positive pressure of CO<sub>2</sub>, and said fruits or vegetables absorb said CO<sub>2</sub> thereby enhancing the flavor of said fruits or vegetables within said product packaging.
2. The method of claim 1, further comprising one or more bactericidal methods to reduce microbial growth and improve shelf-life of said fruits or vegetables.
3. The method of claim 1, wherein said introducing CO<sub>2</sub> into said product packaging comprises creating a 100% CO<sub>2</sub> saturation environment for said fruits or vegetables or creating a carbon dioxide rich but less-than-100% carbon dioxide saturation environment with just enough oxygen to prevent anaerobic conditions within said product packaging.
4. The method of claim 1, further comprising evacuating non- CO<sub>2</sub> gases from said product packaging prior to said introducing CO<sub>2</sub> into said product packaging.
5. The method of claim 1, wherein said introducing CO<sub>2</sub> into said product packaging comprises adding enough CO<sub>2</sub> into said product packaging to establish said positive pressure of CO<sub>2</sub> within said product packaging.
6. The method of claim 5, wherein said positive pressure of CO<sub>2</sub> comprises a positive pressure of approximately 10 psi.
7. The method of claim 5, wherein said positive pressure of CO<sub>2</sub> comprises a positive pressure of between 25 psi and 40 psi.

8. The method of claim 1, wherein said introducing CO<sub>2</sub> into said product packaging comprises inserting a CO<sub>2</sub> generating material into said product packaging, wherein said CO<sub>2</sub> generating material dispenses CO<sub>2</sub> within said product packaging and generates enough CO<sub>2</sub> to establish said positive pressure of CO<sub>2</sub> within said product packaging.

9. The method of claim 1, wherein said introducing CO<sub>2</sub> into said product packaging comprises inserting a source of CO<sub>2</sub> into said product packaging, said source of CO<sub>2</sub> comprising dry ice.

10. The method of claim 1, further comprising adding one or more of vitamins, nutrients, antioxidants, protein powders, milk, and yogurt to said fruits or vegetables prior to said step of introducing CO<sub>2</sub> into said product packaging.

11. The method of claim 1, wherein said steps of introducing CO<sub>2</sub> into said product packaging and sealing said product packaging containing said fruits or vegetables and said CO<sub>2</sub> comprise the steps of:

vacuum sealing said product packaging containing said fruits or vegetables leaving a port area that may be opened and large enough for flowing CO<sub>2</sub> into said product packaging containing said fruits or vegetables,

introducing CO<sub>2</sub> into said product packaging through said port, and  
sealing said port.

12. The method of claim 1, wherein said steps of introducing CO<sub>2</sub> into said product packaging and sealing said product packaging containing said fruits or vegetables and said CO<sub>2</sub> comprise the steps of:

placing one or more said product packaging containing said fruits or vegetables into a pressure chamber,

evacuating said pressure chamber to remove non- CO<sub>2</sub> gases,

introducing CO<sub>2</sub> into said pressure chamber, and

sealing said one or more product packaging containing said fruits or vegetables within said pressure chamber.

13. A packaged flavor enhanced fruits or vegetables product produced according to the method comprising:
- providing product packaging capable of retaining a positive pressure of CO<sub>2</sub>,
  - receiving fruits or vegetables into said product packaging,
  - introducing CO<sub>2</sub> into said product packaging,
  - sealing said product packaging containing said fruits or vegetables and said CO<sub>2</sub>, and
  - freezing said product packaging containing said fruits or vegetables, wherein said product packaging retains said positive pressure of CO<sub>2</sub>, and said fruits or vegetables absorb said CO<sub>2</sub> thereby enhancing the flavor of said fruits or vegetables within said product packaging.
14. The product of claim 13, further comprising one or more bactericidal methods to reduce microbial growth and improve shelf-life of said fruits or vegetables.
15. The product of claim 13, wherein said introducing CO<sub>2</sub> into said product packaging comprises creating a 100% CO<sub>2</sub> saturation environment for said fruits or vegetables or creating a carbon dioxide rich but less-than-100% carbon dioxide saturation environment with just enough oxygen to prevent anaerobic conditions within said produce packaging.
16. The product of claim 13, wherein said introducing CO<sub>2</sub> into said product packaging comprises adding enough CO<sub>2</sub> into said product packaging to establish said positive pressure of CO<sub>2</sub> within said product packaging.
17. The product of claim 16, wherein said positive pressure of CO<sub>2</sub> comprises a positive pressure of approximately 10 psi.
18. The product of claim 16, wherein said positive pressure of CO<sub>2</sub> comprises a positive pressure of between 25 psi and 40 psi.
19. The product of claim 13, wherein said introducing CO<sub>2</sub> into said product packaging comprises inserting a CO<sub>2</sub> generating material into said product packaging, wherein said CO<sub>2</sub> generating material dispenses CO<sub>2</sub> within said product packaging and generates enough CO<sub>2</sub> to establish said positive pressure of CO<sub>2</sub> within said product packaging.

20. The product of claim 13, wherein said introducing CO<sub>2</sub> into said product packaging comprises inserting a source of CO<sub>2</sub> into said product packaging, said source of CO<sub>2</sub> comprising dry ice.

21. The product of claim 13, further comprising adding one or more of vitamins, nutrients, antioxidants, protein powders, milk, and yogurt to said fruits or vegetables prior to said step of introducing CO<sub>2</sub> into said product packaging.

22. The product of claim 13, wherein said steps of introducing CO<sub>2</sub> into said product packaging and sealing said product packaging containing said fruits or vegetables and said CO<sub>2</sub> comprise the steps of:

vacuum sealing said product packaging containing said fruits or vegetables leaving a port area that may be opened and large enough for flowing CO<sub>2</sub> into said product packaging containing said fruits or vegetables,

introducing CO<sub>2</sub> into said product packaging through said port, and  
sealing said port.

23. A method of enhancing the flavor of fruits or vegetables within its own product packaging to extend the shelf-life and allow for mass production and mass distribution of the flavor enhanced fruits or vegetables, the method comprising:

providing product packaging capable of retaining a positive pressure of CO<sub>2</sub>,

receiving pureed fruits or vegetables into said product packaging,

introducing CO<sub>2</sub> into said product packaging, and

sealing said product packaging containing said fruits or vegetables and said CO<sub>2</sub>,

wherein said product packaging retains said positive pressure of CO<sub>2</sub>, and said fruits or vegetables absorb said CO<sub>2</sub> thereby enhancing the flavor of said fruits or vegetables within said product packaging.

24. The method of claim 23, further comprising one or more bactericidal methods to reduce microbial growth and improve shelf-life of said fruits or vegetables.

25. The method of claim 23, wherein said introducing CO<sub>2</sub> into said product packaging comprises creating a 100% CO<sub>2</sub> saturation environment for said fruits or vegetables or

creating a carbon dioxide rich but less-than-100% carbon dioxide saturation environment with just enough oxygen to prevent anaerobic conditions within said product packaging.

26. The method of claim 23, further comprising evacuating non- CO<sub>2</sub> gases from said product packaging prior to said introducing CO<sub>2</sub> into said product packaging.

27. The method of claim 23, wherein said introducing CO<sub>2</sub> into said product packaging comprises adding enough CO<sub>2</sub> into said product packaging to establish said positive pressure of CO<sub>2</sub> within said product packaging.

28. The method of claim 27, wherein said positive pressure of CO<sub>2</sub> comprises a positive pressure of approximately 10 psi.

29. The method of claim 27, wherein said positive pressure of CO<sub>2</sub> comprises a positive pressure of between 25 psi and 40 psi.

30. The method of claim 23, wherein said introducing CO<sub>2</sub> into said product packaging comprises inserting a CO<sub>2</sub> generating material into said product packaging, wherein said CO<sub>2</sub> generating material dispenses CO<sub>2</sub> within said product packaging and generates enough CO<sub>2</sub> to establish said positive pressure of CO<sub>2</sub> within said product packaging.

31. The method of claim 23, wherein said introducing CO<sub>2</sub> into said product packaging comprises inserting a source of CO<sub>2</sub> into said product packaging, said source of CO<sub>2</sub> comprising dry ice.

32. The method of claim 23, further comprising adding one or more of vitamins, nutrients, antioxidants, protein powders, milk, and yogurt to said fruits or vegetables prior to said step of introducing CO<sub>2</sub> into said product packaging.

33. The method of claim 23, wherein said steps of introducing CO<sub>2</sub> into said product packaging and sealing said product packaging containing said fruits or vegetables and said CO<sub>2</sub> comprise the steps of:

vacuum sealing said product packaging containing said fruits or vegetables leaving a port area that may be opened and large enough for flowing CO<sub>2</sub> into said product packaging containing said fruits or vegetables,

introducing CO<sub>2</sub> into said product packaging through said port, and  
sealing said port.

34. The method of claim 23, wherein said steps of introducing CO<sub>2</sub> into said product packaging and sealing said product packaging containing said fruits or vegetables and said CO<sub>2</sub> comprise the steps of:

placing one or more said product packaging containing said fruits or vegetables into a pressure chamber,

evacuating said pressure chamber to remove non- CO<sub>2</sub> gases,

introducing CO<sub>2</sub> into said pressure chamber, and

sealing said one or more product packaging containing said fruits or vegetables within said pressure chamber.

35. A packaged flavor enhanced fruits or vegetables product produced according to the method comprising:

providing product packaging capable of retaining a positive pressure of CO<sub>2</sub>,

receiving pureed fruits or vegetables into said product packaging,

introducing CO<sub>2</sub> into said product packaging, and

sealing said product packaging containing said fruits or vegetables and said CO<sub>2</sub>,  
wherein said product packaging retains said positive pressure of CO<sub>2</sub>, and said fruits or vegetables absorb said CO<sub>2</sub> thereby enhancing the flavor of said fruits or vegetables within said product packaging.

36. The product of claim 35, further comprising one or more bactericidal methods to reduce microbial growth and improve shelf-life of said fruits or vegetables.

37. The product of claim 35, wherein said introducing CO<sub>2</sub> into said product packaging comprises creating a 100% CO<sub>2</sub> saturation environment for said fruits or vegetables or creating a carbon dioxide rich but less-than-100% carbon dioxide saturation environment with just enough oxygen to prevent anaerobic conditions within said product packaging.

38. The product of claim 35, wherein said introducing CO<sub>2</sub> into said product packaging comprises adding enough CO<sub>2</sub> into said product packaging to establish said positive pressure of CO<sub>2</sub> within said product packaging.

39. The product of claim 38, wherein said positive pressure of CO<sub>2</sub> comprises a positive pressure of approximately 10 psi.

40. The product of claim 38, wherein said positive pressure of CO<sub>2</sub> comprises a positive pressure of between 25 psi and 40 psi.

41. The product of claim 35, wherein said introducing CO<sub>2</sub> into said product packaging comprises inserting a CO<sub>2</sub> generating material into said product packaging, wherein said CO<sub>2</sub> generating material dispenses CO<sub>2</sub> within said product packaging and generates enough CO<sub>2</sub> to establish said positive pressure of CO<sub>2</sub> within said product packaging.

42. The product of claim 35, wherein said introducing CO<sub>2</sub> into said product packaging comprises inserting a source of CO<sub>2</sub> into said product packaging, said source of CO<sub>2</sub> comprising dry ice.

43. The product of claim 35, further comprising adding one or more of vitamins, nutrients, antioxidants, protein powders, milk, and yogurt to said fruits or vegetables prior to said step of introducing CO<sub>2</sub> into said product packaging.

44. The product of claim 35, wherein said steps of introducing CO<sub>2</sub> into said product packaging and sealing said product packaging containing said fruits or vegetables and said CO<sub>2</sub> comprise the steps of:

vacuum sealing said product packaging containing said fruits or vegetables leaving a port area that may be opened and large enough for flowing CO<sub>2</sub> into said product packaging containing said fruits or vegetables,

introducing CO<sub>2</sub> into said product packaging through said port, and  
sealing said port.



Fig. 1

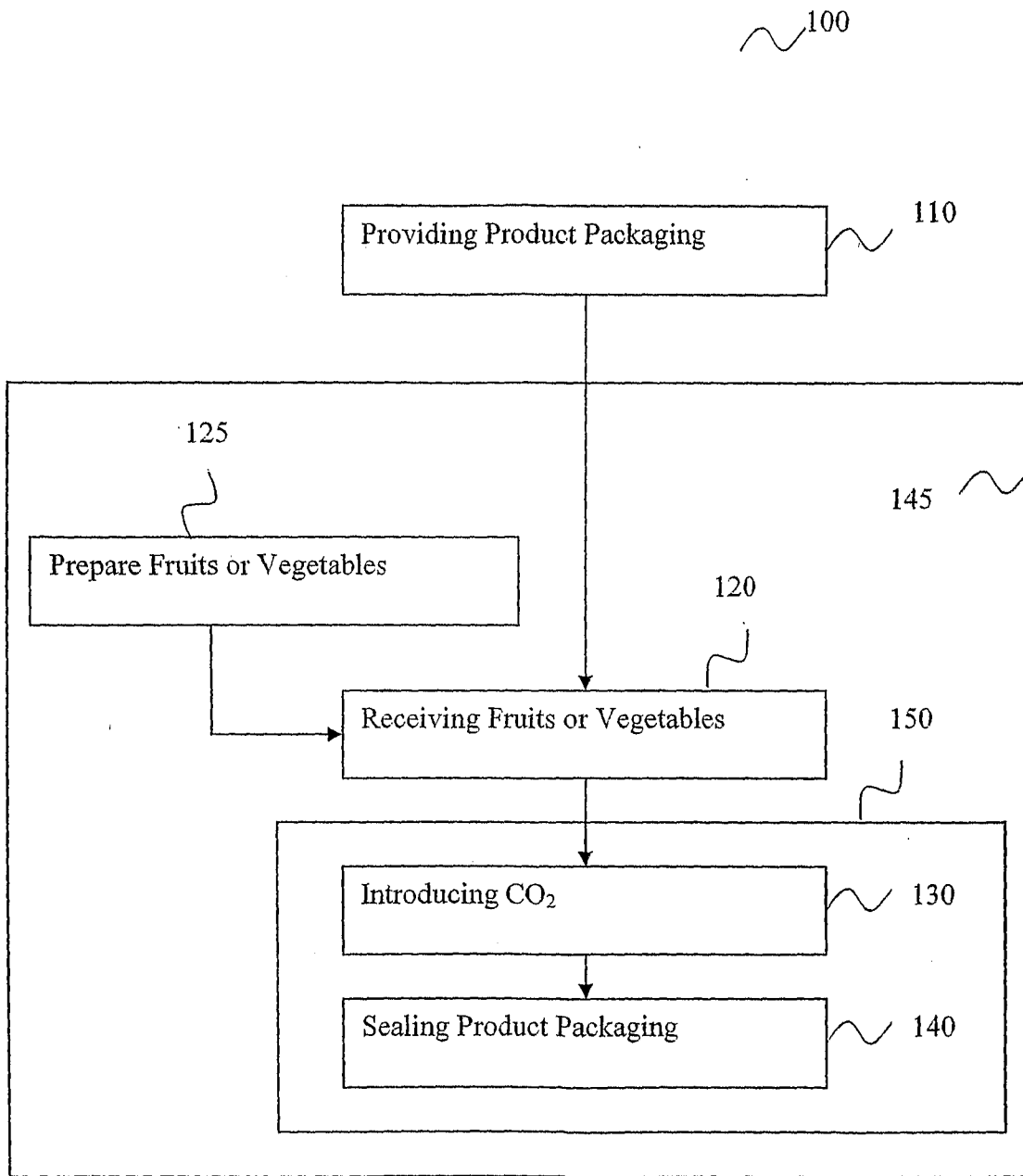


Fig. 2

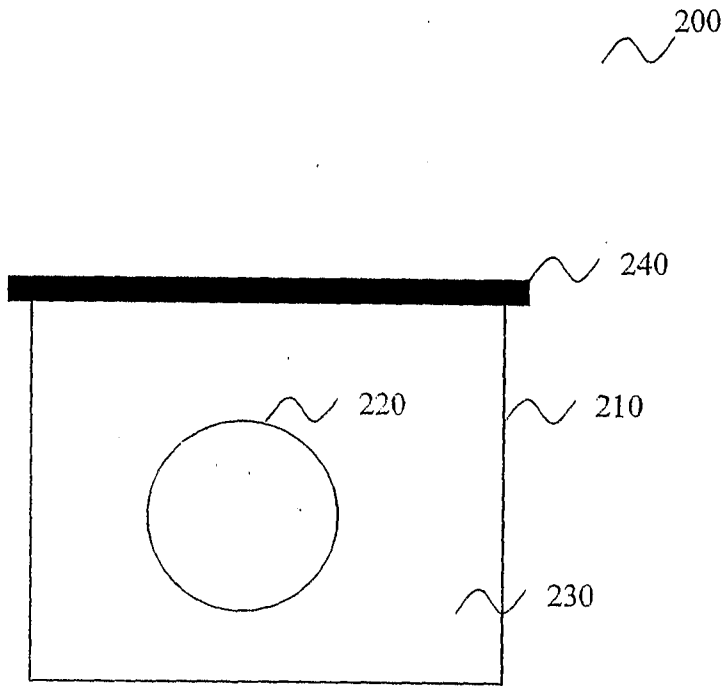


Fig. 3

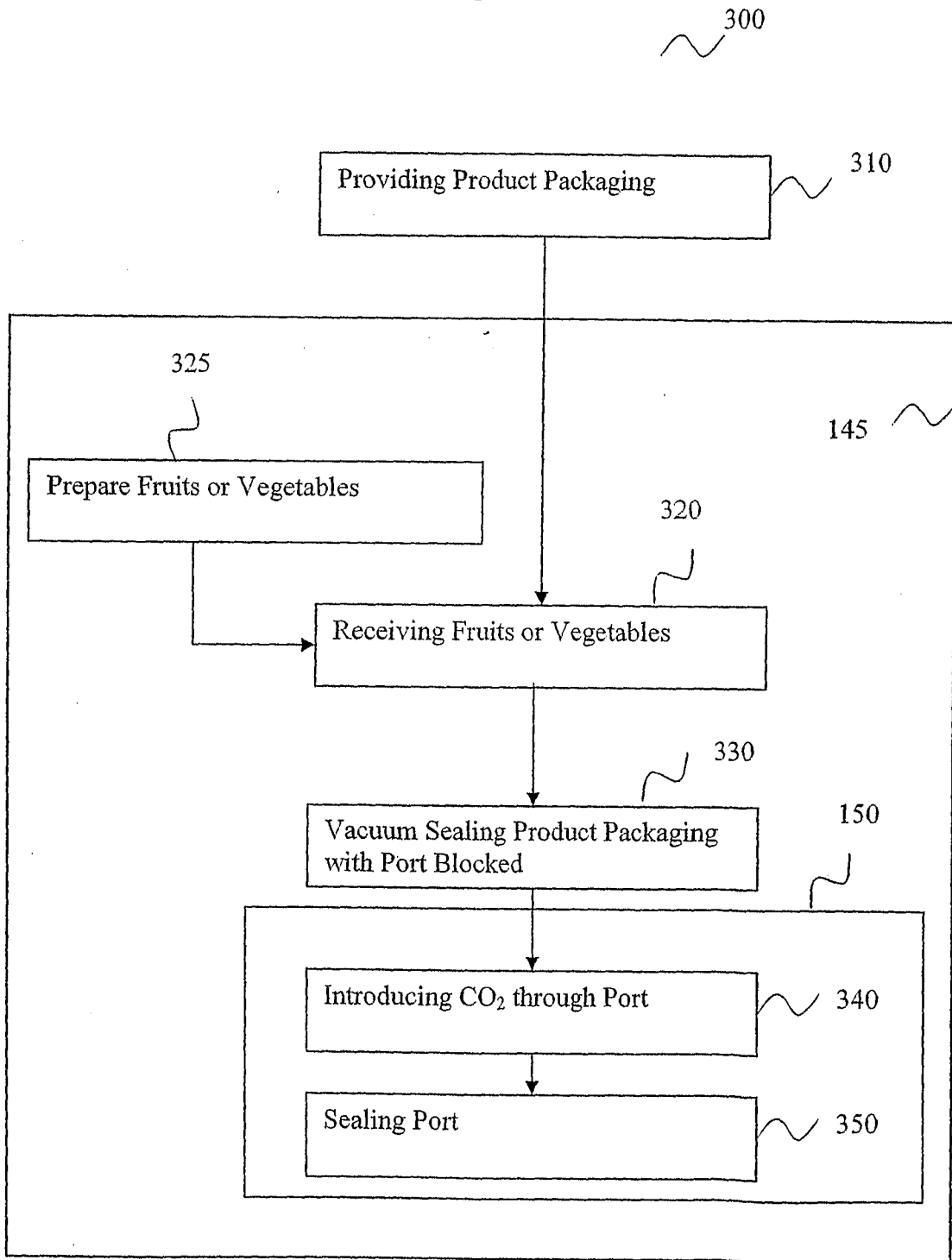


Fig. 4

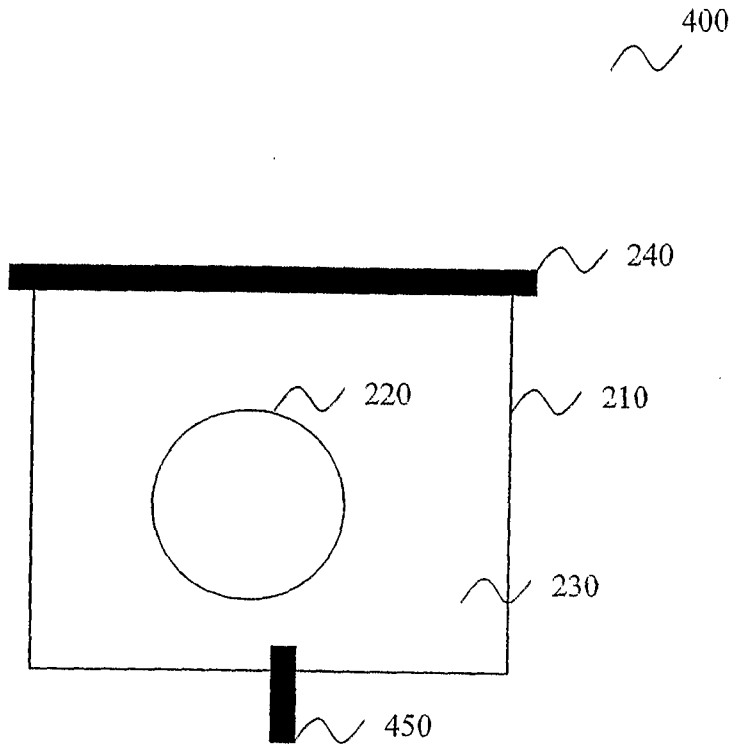


Fig. 5

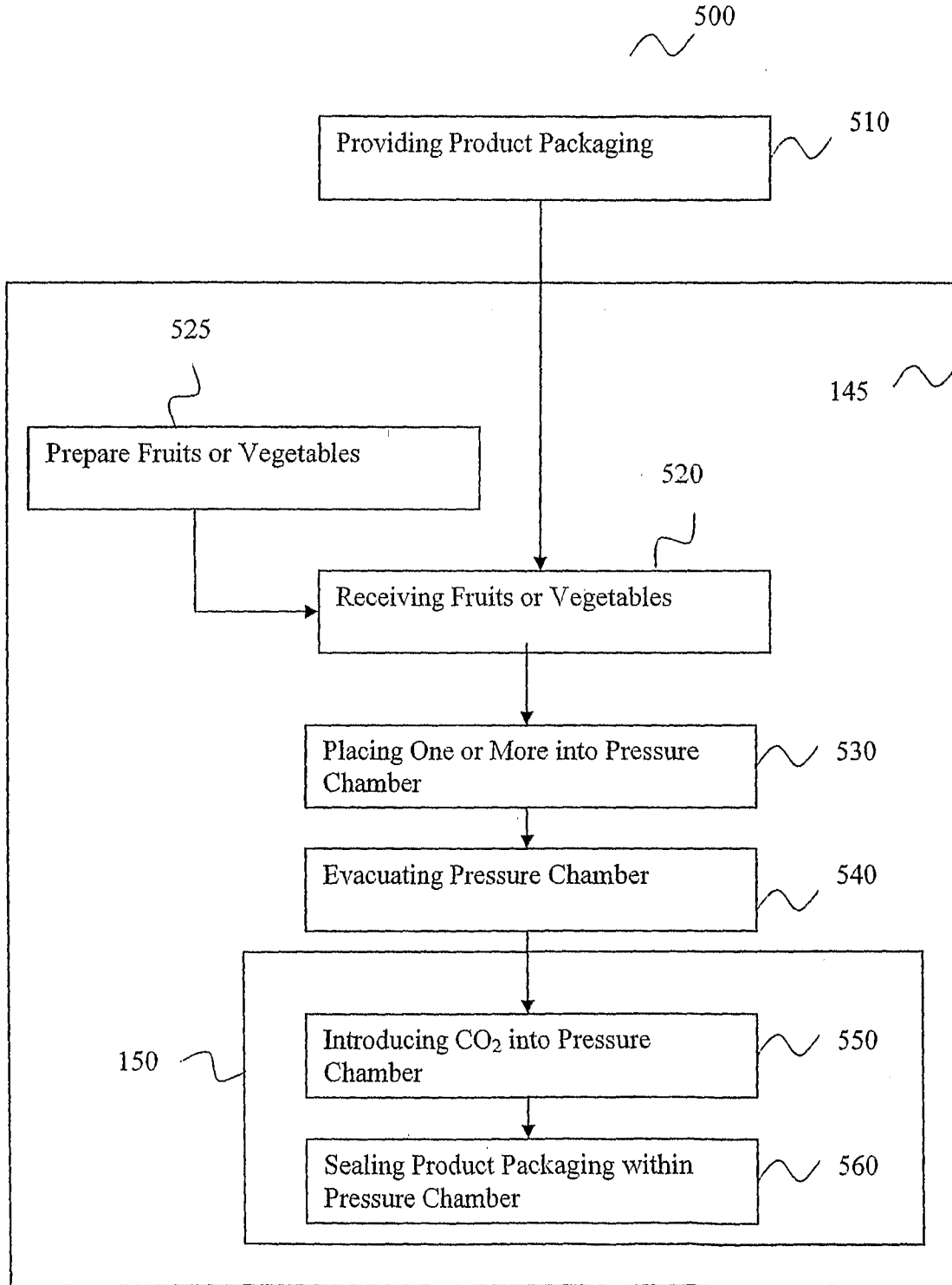
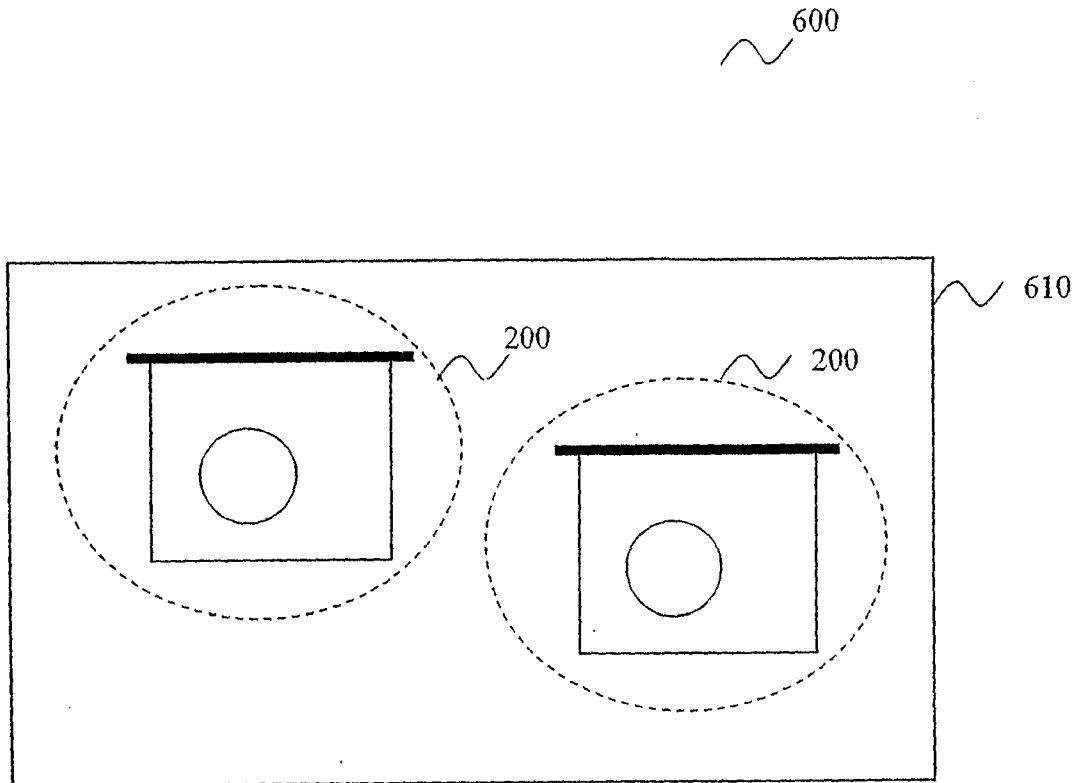


Fig. 6



# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US06/27320

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC: **A23B 4/16( 2007.01);B65B 25/06( 2007.01),55/00( 2007.01);A23C 3/037( 2007.01);A23K 1/00( 2007.01);A23L 1/212( 2007.01)**  
  
 USPC: 426/312,474,615,410  
 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)  
 U.S. : 426/312,474,615,410

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

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

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3,764,348 A (HUXSOLL et al) 09 October 1973 (09.10.1973) Column 2, Lines 20-29, Lines 30-49; Column 3, Line 19, Lines 39-22	1, 2, 10, 13, 14, 21
X	US 3,773,527 (RUGGERONE) 20 November 1973 (20.11.1973), Column 1, Lines 54-56, Lines 65-68; Column 2, Lines 1-13, Lines 14-38, Lines 40-42, Lines 54-57	23, 24, 25, 35-37, 42, 43
Y	US 4,055,931 (MYERS) 1 November 1977 (01.11.1977) Column 1, Lines 61-64; Column 2, Lines 2-9, 40-55, 64-68; Column 3, Lines 1-14; Column 4, Lines 4-5	3-5,7,11,12,15,16,18,22, 26,27,29,33,34,38,40,44
Y	US 5,968,573 A (KAUFMAN) 19 October 1999 (19.10.1999), Column 2, Lines 5-30, Column 4, Lines 6-20; Column 1, Lines 43-48	6,8,9,17,19,20,28,30,31,39,41,42
Y	JP 77027699 B (INOUE JAPAX RES) 21 July 1977 (21.07.1977) See Abstract	12,22,34,44

Further documents are listed in the continuation of Box C.  See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 25 October 2006 (25.10.2006)	Date of mailing of the international search report 25 NOV 2006
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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) 273-3201	Authorized officer Milton Cano Telephone No. (571)-272-4697  DEBORAH A. THOMAS PARALEGAL SPECIALIST <i>DAT</i>
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