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(54) Title: PROCESS FOR PRODUCING A PACKAGED FOOD PRODUCT

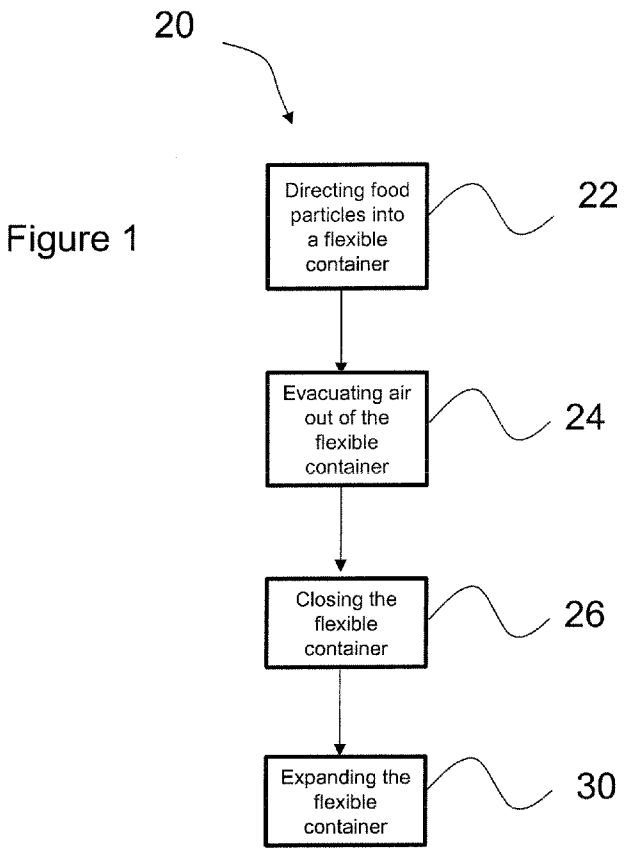

Figure 1

(57) Abstract: A method of producing a packaged food product begins by directing a plurality of food particles into a flexible container to at least partially fill the flexible container. A quantity of air is then evacuated out of the flexible container to create a vacuum within the flexible container. Next, an opening in the flexible container is sealed or closed. Air is then allowed to seep through a sidewall of the container after closing or sealing the flexible container to permit air to gradually flow back into the flexible container to gradually dissipate the vacuum within the flexible container.

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PROCESS FOR PRODUCING A PACKAGED FOOD PRODUCT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of United States Provisional Patent Application Serial No. 60/946,460 for a PROCESS FOR PRODUCING PACKAGED FOOD PRODUCT, filed on June 27, 2007, which is hereby incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The subject invention relates generally to a method of producing a packaged food product.

2. Description of the Prior Art

[0003] Extracting excess air from a flexible food container will reduce the volume of the flexible container, thereby reducing the overall size of the package. It is known in the art to create and maintain a vacuum in the flexible container. Such a vacuum remains in effect until the flexible container is opened to release the vacuum. For example, European Patent Application No. EP 0 441 189 to Satake, et al. teaches a method of vacuum packing a cereal product by directing food particles into a flexible container, evacuating air out of the flexible container to create a vacuum, and then sealing the flexible container to permanently maintain the vacuum.

SUMMARY OF THE INVENTION

[0004] In summary, the invention is a method of producing a packaged food product. A plurality of food particles are directed into a flexible container to at least partially fill the flexible container. A quantity of air is then evacuated out of the flexible container to create a vacuum within the flexible container. Next, an opening in the flexible container is sealed or closed. Air is then allowed to seep through a sidewall of the container after closing or sealing the flexible container to permit air to gradually flow back into the flexible container to gradually dissipate the vacuum within the flexible container.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Advantages of the present invention will be readily appreciated, as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

[0006] Figure 1 is a flow-chart of a method in accordance with an exemplary embodiment of the subject invention; and

[0007] Figure 2 is a flow-chart of a method in accordance with an alternative exemplary embodiment of the subject invention.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENT

[0008] A method of producing a packaged food product is shown in the Figures, and generally indicated at **20**.

[0009] In an exemplary embodiment, the method is preformed in use with a bagging machine. The method may be performed with an existing vertical form, fill and seal bagging machine while in no way adversely affecting the overall speed of the bagger. Alternatively, the method may be employed with a bagging machine, other than that specifically mentioned herein. One such alternative may include, but is not limited to a horizontal form, fill and seal bagging machine.

[0010] The method begins at step **21** by forming a flexible container. The flexible container may be preformed or manufactured by any means known in the art. In an exemplary embodiment, the bagging machine includes a hollow tube member having a sheet of packaging film disposed thereabout. The packaging film is advanced over the tube member by a pair of belt conveyors disposed on opposite sides of the tube member and sealed by a longitudinal sealing device which longitudinally joins, via heat and pressure, the ends of the packaging film to form a package blank.

[0011] The bagging machine includes a first sealing device and a second sealing device that is vertically spaced from the first sealing device. The first sealing device creates a bottom seal, via heat and pressure. The first sealing device seals the bottom of the package blank to create a flexible container having a closed bottom, sidewalls and an opening at the top. The second sealing device, which will be discussed in further detail below, seals the top of the package after the food particles have been fed into the opening of the flexible container from the tube member and the vacuum has exhausted the excess air.

[0012] The flexible container is air permeable. The flexible container can be formed from any low oxygen barrier laminate. Examples include, but are not limited to any food grade material, such as for example, low density polyethylene, high density polyethylene, polypropylene, a food grade polymer, nylon or any combination thereof. The permeability of the laminate can be selected to control the amount of time that the vacuum is maintained. This will be explained in more detail in conjunction with subsequent steps.

[0013] At step **22**, a plurality of food particles are directed into the flexible container through an opening to at least partially fill the flexible container. While in the exemplary embodiment, the food particles are fed into the opening of the flexible container through the tube member of the vertical form, fill and seal machine, the food product may be fed into the flexible container by any other means known in the art. A wide range of food products can be packaged utilizing the present invention. Examples of relatively smaller food particles include, but are not limited to, rice, grains, vegetables, fruits, cereal, and snack foods. Examples of relatively larger food particles include, but are not limited to, frozen fish, frozen chicken, other frozen meats and meat products. The invention can be practiced in relatively large, bulk packaging and/or in relatively small packaging.

[0014] At step **23** of the exemplary embodiment, the flexible container is enclosed within a vacuum chamber. In this optional step, the vacuum chamber surrounds the flexible container in order to draw a vacuum in the flexible container.

[0015] At step **24** of the exemplary embodiment, a quantity of air is evacuated to create a vacuum within the flexible container. Evacuating the air results in a flexible container that has a decreased or reduced size. By evacuating the air, the flexible container is shaped for placement in a carton. The vacuum evacuates about 85% - 100 % of the air from the flexible container, preferably 90% - 95% of the air.

[0016] In the exemplary embodiment of the invention, evacuating the air to create the vacuum is accomplished by a rotary vacuum chamber that is positioned to enclose the flexible container. When enclosed, the vacuum chamber will draw air from the flexible container. The rotary vacuum chamber may be a attached to the vertical form, fill and seal machine, or it may be a separate piece of machinery along the packaging line. Other vacuums may be utilized to create the vacuum. Such vacuums include but are not

limited to a vacuum wand that is inserted into the opening of the flexible container to draw the air out of the flexible container or any other vacuum known in the art.

[0017] In an exemplary embodiment, the vacuum results in a pressure differential between the flexible container and the area outside of the flexible container of about 75 - 750 mmHg, preferably of about 75 – 250 mmHg, thus representing a reduction in the air pressure to below normal atmospheric pressure, which is about 760 mmHg. According to the exemplary embodiment, the evacuating step creates a pressure differential of at least 100 mmHg, and at least two-thirds of the air within the flexible container is removed. The air is evacuated through the opening in the flexible container and reduces the volume of the flexible container by about 15% - 50%, preferably 25% - 50%. In alternative embodiments of the invention, the air may be evacuated from the flexible container at a location other than the opening through which the food particles were directed.

[0018] At step **26** of the exemplary embodiment, the opening of the flexible container is closed and sealed. In an exemplary embodiment, the second sealing device, discussed above, seals the top of the package after the food particles have been fed into the opening of the flexible container from the tube member and the vacuum has exhausted the excess air. In the exemplary embodiment, the second sealing device is placed within the rotary vacuum chamber, discussed above, so that the vacuum is maintained during sealing.

[0019] At step **28** of the exemplary embodiment, the flexible container is placed or packaged into a carton. According to the exemplary embodiment, the flexible container holds a cereal product and is inserted into a paperboard carton. Due to evacuation of the air, the carton can be as much as 50% smaller than would be necessary with a non-vacuum packed container. Depending on the permeability of the laminate, the placing or packaging step can be performed immediately after the closing step, or at a time more remote from the closing step, as will be explained in more detail.

[0020] At step **30** of the exemplary embodiment, the flexible container expands within the carton by seeping air gradually across a porous boundary of the flexible container. The expanding step can be initiated immediately after the closing step and prior to the packaging step and can continue gradually over a period of time. According to the exemplary embodiment, the expanding step includes flowing air gradually across the low oxygen barrier laminate, and continues gradually during and after

the packaging step. The laminate may allow at least approximately 1.0 cc of air per day per square meter of the surface area of the flexible container to enter the flexible container. This allows the expanding step to begin immediately after the closing step, and continue gradually over a period of time. Seeping may begin prior to placing the flexible container into the carton and continue both during and after placing the flexible container into the carton.

[0021] The expanding step results in an increase in the air pressure within the flexible container, occurring gradually, until the air pressure within the flexible container is substantially equivalent to air pressure immediately outside the flexible container. The volume of the flexible container may increase gradually during the expanding step; however, the flexible container will conform to the shape of the paperboard carton and will not cause the carton to bulge.

[0022] The seepage or dissipation is controlled by the barrier within the flexible container. The higher the barrier, the lower the seepage. By controlling the dissipation over a period of time, the manufacturing process can be varied to suit different needs. For example, the expansion could occur relatively quickly, such as for one (1) hour after closing the flexible container, so that shortly after the flexible container is inserted in the carton, air pressure is restored. Alternatively, the expansion could occur relatively slowly, such as for six (6) weeks after closing the flexible container, in order to temporarily maintain a relatively high degree of vacuum. This would permit the flexible container to be shipped in the vacuum packed state and to be packaged into cartons at a remote location. The flexible container continues to expand throughout this process to achieve a non-vacuum packed appearance by the time the package reaches the customer. According to the exemplary alternative embodiment, the expansion to fully restore the air pressure with the flexible container preferably takes place in about one (1) day to two (2) weeks.

[0023] The vacuum shapes the product while decreasing the volume of the flexible container. The decreased flexible container size results in the need for a smaller carton which results in less cost to produce the carton. Reduced carton size may be easier to ship and requires less space on a shelf, which allows for more product in a given area. Further, the decreased flexible container size is easier to place in the container. The vacuum draws air from the flexible container, thus shaping the flexible for easy placement in the carton.

[0024] The foregoing invention has been described in accordance with the relevant legal standards, thus the description is exemplary rather than limiting in nature. Variations and modifications to the disclosed embodiment may become apparent to those skilled in the art and do come within the scope of the invention. Accordingly, the scope of legal protection afforded this invention can only be determined by studying the following claims.

CLAIMS

What is claimed is:

1. A method of producing a packaged food product comprising the steps of:

directing a plurality of food particles into a flexible container through an opening to at least partially fill the flexible container;

evacuating a quantity of air out of the flexible container to create a vacuum within the flexible container;

closing the opening of the flexible container; and

seeping air through a sidewall of the container after the closing step to permit air to gradually flow back into the flexible container.

2. The method as set forth in claim 1 further comprising the step of forming the flexible container of a gas permeable material for receiving the plurality of food particles.

3. The method as set forth in claim 1 wherein the evacuating step is further defined as evacuating the quantity of air out of the flexible container through the opening.

4. The method as set forth in claim 1 wherein the evacuating step is further defined as enclosing the flexible container within a vacuum chamber to evacuate the quantity of air out of the flexible container through the opening.

5. The method as set forth in claim 4 wherein the closing step is preformed within the vacuum chamber.

6. The method as set forth in claim 1 wherein the seeping step is further defined as increasing the air pressure gradually within the flexible container until the air pressure inside the flexible container is approximately equal to the air pressure outside the flexible container.

7. The method as set forth in claim 6 wherein the increasing the air pressure step is further defined as equalizing the air pressure inside the flexible container with the air pressure outside the flexible container from about one (1) hour to six (6) weeks.

8. The method as set forth in claim 6 wherein the increasing the air pressure step is further defined as equalizing the air pressure inside the flexible container with the air pressure outside the flexible container from about one (1) day to two (2) weeks.

9. The method as set forth in claim 1 wherein the evacuating step is further defined as reducing a volume of the flexible container by about 15% - 50%.

10. The method as set forth in claim 1 wherein the evacuating step is further defined as reducing the pressure differential between the flexible container and the area outside the flexible container by about 75 - 750 mmHg.

11. The method as set forth in claim 1 wherein the evacuating step is further defined as shaping the flexible container for placement in a carton.

12. The method as set forth in claim 1 further including the step of placing the flexible container into a carton after the closing the opening step.

13. A method of producing a packaged food product comprising the steps of:

forming a flexible container of a gas permeable material with a closed bottom, sidewalls and an opening for receiving a plurality of food particles;

directing the plurality of food particles into the flexible container through the opening of the flexible container to at least partially fill the flexible container;

enclosing the flexible container within a vacuum chamber;

evacuating a quantity of air out of the flexible container to create a vacuum within the flexible container;

sealing the opening of the flexible container after the evacuating step;

placing the flexible container into a carton; and

expanding the flexible container within the carton by seeping air gradually into the flexible container to gradually dissipate the vacuum in the flexible container.

14. The method as set forth in claim 13 wherein the expanding the flexible container step is further defined as initiating the seeping prior to the placing the flexible

container into the carton step and continuing the seeping during and after the placing the flexible container into the carton step.

15. The method as set forth in claim 13 wherein the sealing step is preformed within the vacuum chamber.

16. The method as set forth in claim 13 wherein the evacuating step is further defined as reducing a volume of the flexible container by about 15% - 50%.

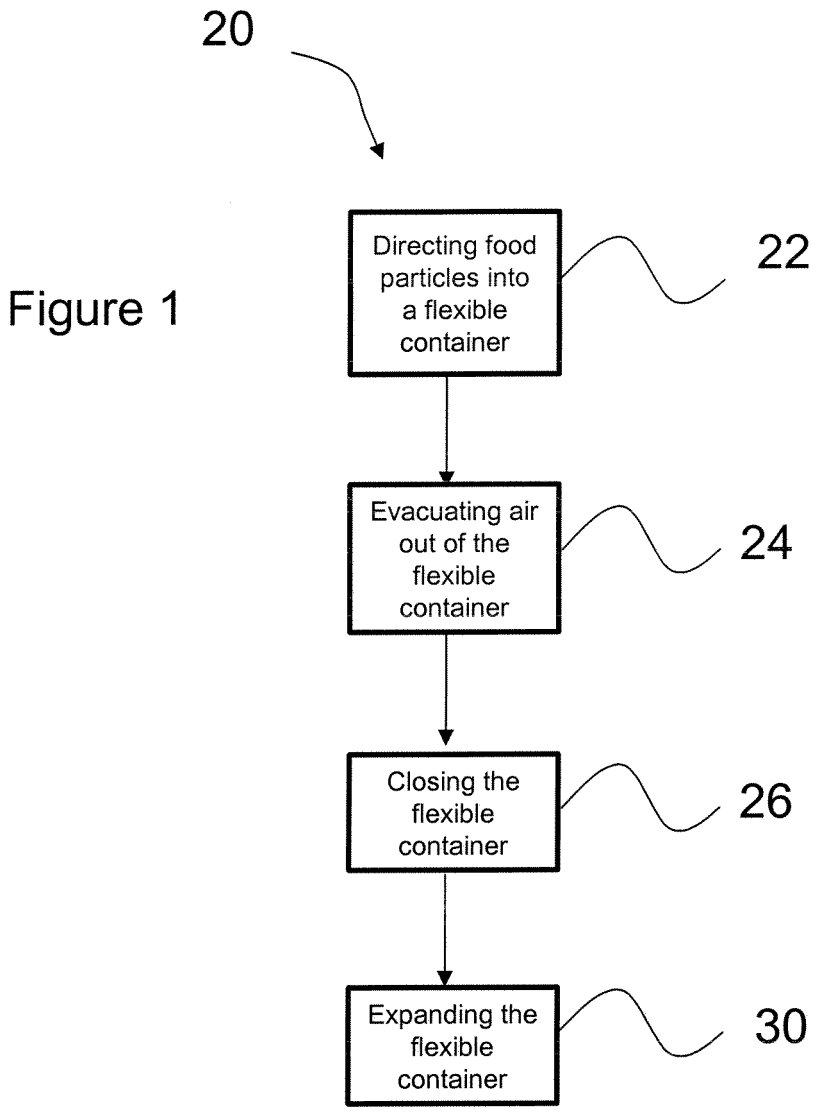
17. The method as set forth in claim 13 wherein the evacuating step is further defined as reducing the pressure differential between the flexible container and the area outside the flexible container by about 75 - 750 mmHg.

18. The method as set forth in claim 13 wherein the expanding the flexible container step is further defined dissipating the vacuum in the flexible container from about one (1) hour to six (6) weeks.

19. The method as set forth in claim 13 wherein the expanding the flexible container step is further defined dissipating the vacuum in the flexible container from about one (1) day to two (2) weeks.

20. The method as set forth in claim 13 wherein the evacuating step is further defined as shaping the flexible container for placement in the carton.

Figure 1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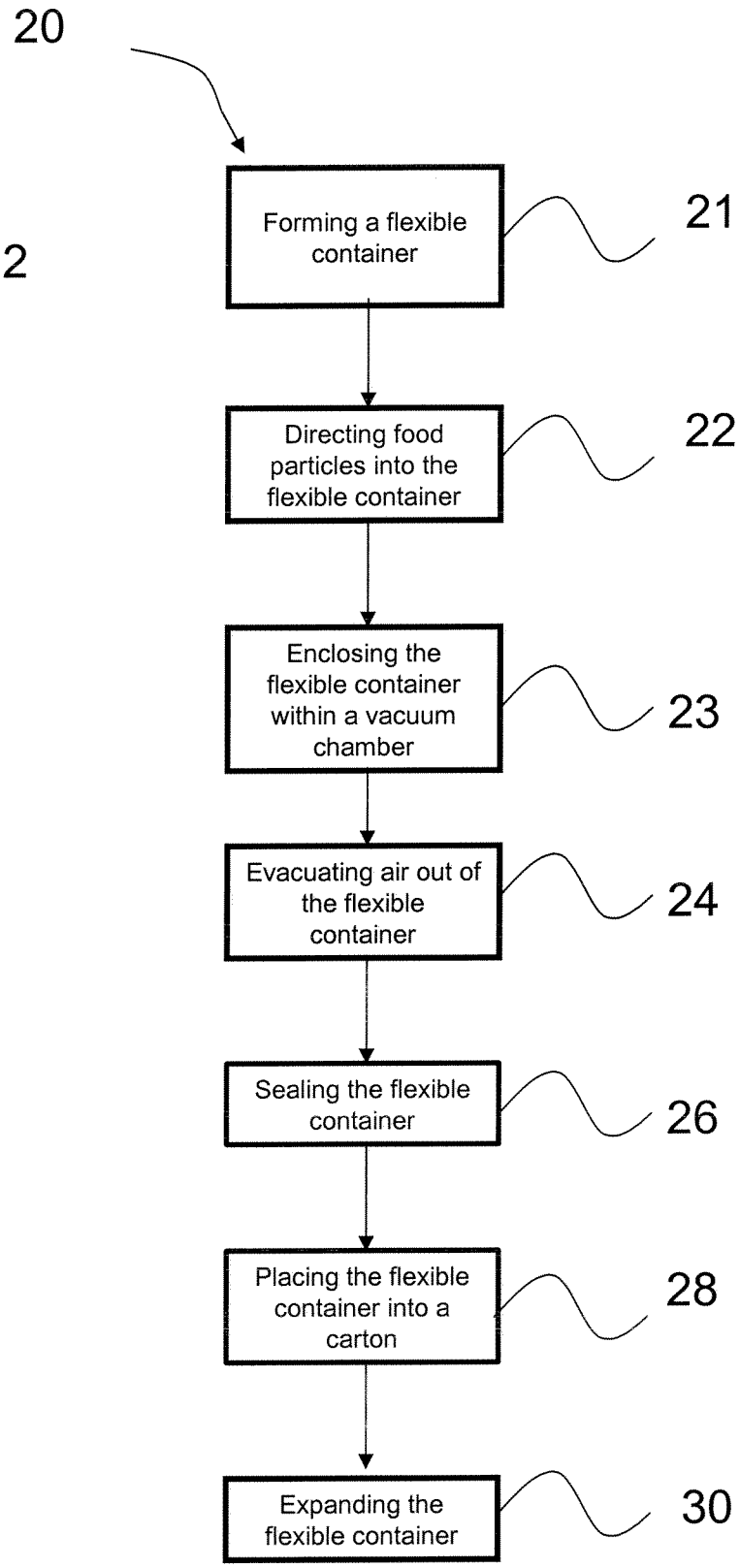
22
Evacuating air out of the flexible container
24
Closing the flexible container
26
Expanding the flexible container
30

Figure 2


20
Forming a flexible container
21
Directing food particles into the flexible container
22
Enclosing the flexible container within a vacuum chamber
23
Evacuating air out of the flexible container
24
Sealing the flexible container
26
Placing the flexible container into a carton
28
Expanding the flexible container
30

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/068496

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65B1/28 B65B9/20 B65D33/01

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)
B65B B65D

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 practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 03/062067 A (BLUEPRINT HOLDING B V [NL]; PRAKKEN NICOLAAS MARTIN [NL]) 31 July 2003 (2003-07-31) page 3, line 12 - page 4, line 22; figures	1,13
A	US 4 084 390 A (SCHMACHTEL FLORIAN ET AL) 18 April 1978 (1978-04-18) column 5, line 56 - column 7, line 20; figures	1,13
A	US 4 457 125 A (FISHBURNE FRANCIS B [US]) 3 July 1984 (1984-07-03) claims; figures	1,13
A	US 3 545 983 A (WOODS QUENTIN T) 8 December 1970 (1970-12-08) claims; figures	1

☐ 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

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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