Improvements in a user installable air vacuum port is disclosed that allows repeated opening and resealing of the package followed by removal of air and moisture by vacuuming. User supplied package can be zip type or other re-sealable container that is pre-filled with product or filled with product by a consumer. The consumer creates a hole through the side of the package and installs a universal air removal port through the created opening. Air is removed with a vacuum pump connected to the air removal port. When the food package is in vacuum the contour of the food contents is clearly delineated through the collapsed food container. When vacuum is partially or totally lost while the food package is stored, the loss of vacuum is readily observed and air can be again removed. The universal air removal port can be transferred to other bags for reuse.
UNIVERSAL AIR REMOVAL PORT U-ARP

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation-in-part of applicant’s co-pending application Ser. No. 12/973,679 filed Dec. 20, 2010 and is a continuation-in-part of Ser. No. 12/880,253 filed Sep. 13, 2008 now U.S. Pat. No. 8,056,471 issued Nov. 15, 2011 and is a continuation-in-part of applicant’s co-pending application Ser. No. 12/079,847 filed Mar. 27, 2008 the entire contents of which is hereby expressly incorporated by reference herein.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable

THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT

[0003] Not Applicable

INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC

[0004] Not Applicable

BACKGROUND OF THE INVENTION

[0005] 1. Field of the Invention

[0006] This invention relates to an air removal port. More specifically the air removal port can be added to an existing re-sealable bag that is not manufactured with an air removal port. The universal air removal port is added by puncturing a hole in the bag and installing the air removal port.

[0007] 2. Description of Related Art Including Information Disclosed Under 37 CFR 1.97 and 1.98

[0008] Many frozen foods are sold in plastic packages with built-in zipper strips for resealing. Some of them are vacuum sealed at the factory and others are not. After they are cut and opened, however, ordinary consumers cannot induce vacuum in the packages at their home kitchens. There is no consumer device on the market which allows removal of air from the resealed food packages.

[0009] The problem with presently designed factory sealed food packages is two-fold: the first being that ice is formed on the food content if the package is sealed without vacuum and the second being that no measures are provided to reseal the package for restoring the vacuum following opening of the sealed package for addition of food or for removing a portion of its content. In both cases, when the seal is broken to allow removal and/or addition of food, the entry of air and moisture into the package frequently causes ice formation. The result is a deterioration of the food and a reduction in flavor and edibility. Also the long term storage viability of the food contained therein is reduced upon resealing.

[0010] Various patents have been disclosed pertaining to closures and sealing systems for food packages, and they include U.S. Pat. Nos. 4,941,310; 5,009,828; 5,070,584; US 2003/0152296 A1; U.S. Pat. No. 6,692,147; B2; 2004/0114837 A1; 2004/0161178 A1; 2005/0196077 A1; 2005/0244083 A1; and 2007/0110340 A1. However, as noted, supra, none of the above patents provide a means that allows consumers to induce vacuum in the food package in order to solve the problem of ice formation and air and moisture contamination following opening of a food package to access the contents therein.

[0011] What is needed is a product to allow an ordinary consumer to make a resealed food packages in vacuum. Therefore, presented in this disclosure is an air removal device, referred to as a Universal Air Removal Port or U-ARP.

BRIEF SUMMARY OF THE INVENTION

[0012] It is an object of the universal air removal port to provide an inexpensive, flexible, plastic package for vacuum storage of food which enables a user to easily access the contents therein and, to reseal and vacuum the package for continued, long term storage at extremely low temperatures.

[0013] It is another object of the universal air removal port to create high vacuum pressure in the package, e.g. –90 kPa, is strong enough to shut off the air inflow into the interior of the food package but is weak enough to allow manual opening of the package. Opening of the built-in resealing zipper strips of the food package enables access to the food package for removal and/or addition of food. After a desired portion of the food is taken out of the package, the bag is reclosed so the vacuum can be reinstated by removing air from the interior of the package.

[0014] Periodic inspection of the film package during storage would be appropriate to determine if any migration of air through the plastic sidewalls of the package has occurred, causing a reduction in vacuum. This can be simply rectified by securing the aspirating pump vacuuming out any air, and moisture. The presented vacuum inducing device after being installed on the re-sealable food storage package represents a significant improvement of frozen food storage that requires repeated open and closure for food retrieval, resealing the package, and restoring a vacuum. Aspiration will restore the vacuum in the resealed the food package to enable storage at extremely low temperature, e.g. –60° C. with minimal ice formation on the stored food contents.

[0015] Various objects, features, aspects, and advantages of the present invention will become more apparent from the following detailed description of preferred embodiments of the invention, along with the accompanying drawings in which like numerals represent like components.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

[0016] FIG. 1 shows an exploded view of the installation of universal air removal port on food package wall.

[0017] FIG. 2 (A) illustrates the universal air removal port 201 is installed on the food package 203.

[0018] FIG. 2 (B) show hermetical sealing of the universal air removal port against the food package is generated by the adhesive inserts 202 and 204.

[0019] FIG. 3 shows an exploded view of tubular check valve installed on food package wall as an alternative to the conventional tubular one-way check valves that may be used instead of the box valve as shown in FIG. 1.

[0020] FIG. 4 illustrates the use of spatula 404, aspirating air from the food package.
FIG. 5 shows a perspective view of a user installable vacuum valve in a re-sealable bag.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 illustrates an exploded view of the box valve 101 installed on the food package. Circular hole 107 is punched out of food package 106 (only a portion is shown). In this drawing, compressed foam valve as described in the inventor’s U.S. Pat. No. 8,056,747 is used as the one-way check valve. Rectangular valve box 101 has a central protrusion 104 and contains compressed closed cell foam block 102. The amorphous viscid adhesive insert 105 with a central bore is interposed between the inferior rectangular surface 103 of the valve box 101 and the outside wall of the food package 106. Another adhesive insert 106 with a central bore 109 is bonded to the interior surface of the food package 106. A rectangular top plate 110 of an air intake sieve 111 is bonded to the adhesive insert 105. The 109 rectangular plate 110 prevents peeling of the adhesive insert 105 off the valve box 103 when strong pulling force is generated by the high vacuum pressure of the interior of the food package. Multiple small holes 112 created on the air intake sieve 111 minimize blocking of the air Intake hole of the universal air removal port by the food package wall or food content.

FIG. 2 shows how hermetical sealing of the universal air removal port is generated. FIG. 2A side view shows box valve 201 is bonded to the food package outside wall 203 by rectangular adhesive insert 202. Air intake sieve 207 is bonded to the interior wall of food package 203 by rectangular adhesive insert 204. Small air holes 214 minimize wrapping of the air intake opening by the food contents or food package wall. FIG. 2B Sectional View along the line 203-205 of FIG. 2A demonstrates vertical assembly of parts. Compressed foam block 206 is housed inside the valve box 201. Adhesive Inserts 202 & 204 bond the food package wall 203 to the valve box 201 and top plate 205 of the air intake sieve 207. Space between the valve housing and the air Intake sieve 213 is not completely closed but the compressed foam block facing the central bore of the valve box 212 is closed air-tight by interior vacuum pressure on the food package. FIG. 2C detail illustrates how hermetical sealing is established. The superior surface of the adhesive insert 202 is bonded to the inferior surface 208 of the valve box 201. Hermetical seal 208 is achieved by amorphous viscid adhesive filling the space to be bonded completely. Similarly, the superior surface of the food package 203 is bonded hermetically 209 to the adhesive 202. The inflow of atmospheric air into the food package is completely shut off by these two sealing surfaces. The top plate 205 of the air Intake sieve is bonded to the interior wall of the food package 203 by another adhesive insert 204. The bonded top plate 205 prevents peeling off of the bonded adhesive insert 209 from the interior surface of the valve box 208 when strong pulling force is generated by high vacuum pressure of the interior of the food package.

As an alternative, conventional tubular one-way check valve may be used instead of the box valve as shown in FIG. 1. FIG. 3 shows an exploded view of tubular check valve installed on food package wall. Tubular protrusion of the check valve 301 goes through the circular hole punched out on food package wall. Adhesive inserts of donut-shape 302 and 304 are interposed between the valve 301 and the food package 303, and food package 303 and the top plate 306 of the air intake sieve 307. When they are manually compressed they are hermetically bonded.

FIG. 4 illustrates the spatula 404 inserted into the box valve 401; FIG. 4A Side View, FIG. 4B Perspective View, FIG. 4C sectional view along line 4C-4C of FIG. 4B, and FIG. 4D Isometric View. The protrusion 403 of the box valve 401 is inserted into the punched hole of food package (not shown). The wedge shape leading edge of the spatula 407 is pushed into the space between the bottom plate 402 of the valve box 401 and the foam block 406. The tube 405 of the spatula 404 is connected to vacuum pump (not shown). When the pump is turned on, the air from the interior of the food package (not shown) is aspirated into the central bore 408 of the protrusion 403 of the valve box 401, central bore 409 of the bottom plate 406 of the spatula 404, the central lumen 410 of the spatula and central bore 411 of the spatula tube 405. After the vacuum is induced in the interior of the food package, the spatula is pulled out. The compressed foam block 406 is sucked against the central bore 409 of the bottom plate 406, thereby shutting the inflow of atmospheric air into the food package.

FIG. 5 shows an exploded view of a user installable tubular vacuum valve in a re-sealable bag that is re-sealable with the use of zipper strips 51. After a circular hole 30 is punched out through one side of the open plastic package wall of the bag 50, the inlet leg 36 of one-way tubular check valve is inserted through the hole 30. Donut-shaped adhesive inserts 35 and 37 are placed on the inlet leg 36 on the outside and inside package 50 wall. After the valve 31 and the air intake sieve 34 are bonded, the air removal port is installed on the food package.

Thus, specific embodiments of a universal air removal port have been disclosed. It should be apparent, however, to those skilled in the art that many more modifications besides those described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the spirit of the appended claims.

1. An universal air removal port comprising:
   a user supplied re-closeable flexible sided container having interlocking surfaces;
   creating a hole in said user supplied re-closeable flexible sided container;
   placing an adhesive bonding element onto a first part of an air removal port;
   inserting said first part of an air removal port and said adhesive bonding element through said hole;
   securing a second part of said air removal port onto said first part, and
   wherein said air removal port further includes a one-way check valve.

2. The universal air removal port according to claim 1 wherein said universal air removal port provides a sufficient closing force to maintain a vacuum of about ~90 kPa and at a low temperature about ~20°C. to about ~60°C.

3. The universal air removal port according to claim 1 wherein said user supplied bag is selected from the group consisting of low and high density polyethylene, nylon, polyester, polyurethane, or laminate.

4. The universal air removal port according to claim 1 wherein said user supplied re-closeable flexible sided container is firmly sucked against a food content when said user supplied re-closeable flexible sided container is in a vacuumed condition.

5. The universal air removal port according to claim 1 that further includes a second adhesive bonding element placed
between said users supplied re-closeable flexible sided container and said second part of said air removal port.

6. The universal air removal port according to claim 1 wherein said first part of said air removal port has at least one opening for air to be drawn from within said user supplied re-closeable flexible sided container.

7. The universal air removal port according to claim 1 wherein said user supplied re-closeable flexible sided container is prefilled with consumable product.

8. The universal air removal port according to claim 1 wherein said one-way check valve is a compressed foam sponge or a flat valve that is held closed when a vacuum is drawn from said user supplied re-closeable flexible sided container.

9. The universal air removal port according to claim 1 wherein said adhesive bonding element eliminates surface imperfections between said users supplied re-closeable flexible sided container and said first or said second part of an air removal port.

10. The universal air removal port according to claim 1 wherein said first part and said second part of said air removal port are held together with an interference fit.

11. The universal air removal port according to claim 1 wherein said interlocking surfaces of said user supplied bag is a zippered closure.

12. The universal air removal port according to claim 1 wherein said interlocking surfaces comprises male and female interconnecting surfaces.

13. The universal air removal port according to claim 1 that further includes a hole punch.

14. The universal air removal port according to claim 1 wherein said first part and said second part of said air removal port are re-usable.

15. The universal air removal port according to claim 4 wherein a loss of vacuum is readily visible when food content within said supplied re-closeable flexible sided container is no longer clearly delineated.

16. The universal air removal port according to claim 4 wherein upon loss of said vacuumed condition, insertion of said vacuum pump into said universal air removal port enables removal of air and moisture therefrom.

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