



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**17.08.2005 Bulletin 2005/33**

(51) Int Cl.7: **B65B 31/02**

(21) Application number: **04003246.8**

(22) Date of filing: **13.02.2004**

(84) Designated Contracting States:  
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR  
HU IE IT LI LU MC NL PT RO SE SI SK TR**  
Designated Extension States:  
**AL LT LV MK**

- **Bade, Siegfried**  
**24568 Oersdorf (DE)**
- **Widmer, Meat**  
**6003 Luzern (CH)**
- **Villiger, Daniel**  
**6207 Nottwil (CH)**
- **Stadelmann, Patrick**  
**6034 Inwil (CH)**

(71) Applicant: **Cryovac, Inc.**  
**Duncan, S.C. 29334 (US)**

(74) Representative: **De Carli, Elda**  
**Sealed Air S.r.l.,**  
**Via Trento 7**  
**20017 Passirana di Rho (MI) (IT)**

(72) Inventors:  
• **Staempfli, Jorg**  
**5213 Villnachern (CH)**  
• **Huijser, Wim**  
**4562 AL Hulst (NL)**

(54) **Vacuum packaging apparatus and process**

(57) There is described an apparatus (1) for vacuum packaging a product in a bag, comprising: a cover (2) hinged to a base member (3), said cover (2) and said base (3) being provided of an upper and lower divider walls (11, 12) cooperatively defining a first vacuum chamber (4); a second vacuum chamber (5) adjacent to said first chamber and an aperture (15) connecting said first and second chambers for passing therethrough the

bag neck (9a); said apparatus further comprising means (6, 7) to evacuate said first and second chambers independently of each other; and means (21) to close said receptacle; characterized in that means (10) are present to admit air in the first vacuum chamber (4) and means (16, 16a) are present on the aperture (15) to reduce the passage of air from one chamber to the other. Also described is the vacuum packaging process.

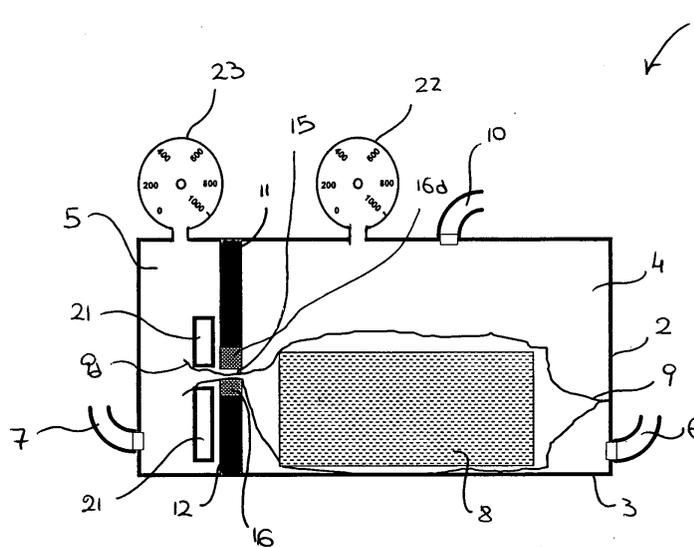


FIGURE 1

**Description**

**[0001]** The present invention relates to an apparatus and method for vacuum packaging a product in a flexible receptacle, such as a bag.

5

BACKGROUND OF THE INVENTION

**[0002]** A number of methods and apparatuses are available in the prior art for vacuum packaging food products in flexible containers such as bags or pouches. For instance, US 3,832,824 discloses a method and an apparatus wherein a filled bag is placed in a vacuum chamber which has two portions, the first portion enclosing the mouth of the bag and the second portion enclosing the product-containing part of the bag. Initially vacuum is applied only in the portion of the chamber in which the product is contained causing the wall of the bag to "balloon" away from the enclosed product thereby allowing a more efficient removal of air from within the bag; vacuum is then applied also in the portion of the chamber in which the mouth of the bag is located, consequently evacuating the interior of the "ballooned" bag; when the evacuation of the bag is complete the bag can be closed and atmospheric pressure re-established inside the chamber. Such a process can be successfully applied only to products that can tolerate a long evacuation step or a high vacuum, wherein the term high vacuum indicates a very low pressure level. In fact, when packaging products having a porous structure, such as certain types of cheeses, the high vacuum applied can remove air out of the product so that the structure of the product will be damaged. Methods for the vacuum packaging of sensitive products are disclosed in US 4,583,347 and in US 4,922,686, both describing a single-chamber apparatus having an air admission valve located on the cover of the vacuum chamber for allowing air inside the chamber during the vacuumization step. The admission of air in the vacuum chamber once or more times during the vacuumization stage of the process generates a pulsating effect which facilitates the extraction of air from within the bag without the need of generating a high level of vacuum. To carry out such process the apparatus described in US 4,583,347 and in US 4,922,686 relied on one air extraction duct located close to the mouth of the bag, so that the amount of air extracted from the side of the chamber holding the product and the speed of air extraction depend on how much the passage between one side of the chamber and the other is obstructed by the bag and the product, often leading to non uniform levels of vacuum from one package to the other during high speed packaging operations. Therefore the need still exist for an apparatus and a method for reliably packaging articles under vacuum in a flexible receptacle, such as a bag.

10

15

20

25

30

SUMMARY OF THE INVENTION

**[0003]** Accordingly, a first object of the present invention is an apparatus for vacuum packaging a product in a flexible receptacle, such as a bag, comprising a first vacuum chamber and a second vacuum chamber adjacent to it and an aperture connecting the two chambers for passing the neck of the receptacle, means to evacuate the first and second chambers and means to close the package when its evacuation is completed characterised in that means are present in the aperture to prevent the passage of air from one chamber to the other and air admission means are present in the first chamber.

35

**[0004]** A second object of the present invention is a method of vacuum packaging a product in a flexible receptacle, comprising the steps of loading the article in the receptacle, extracting gas from around the exterior of the receptacle to lower the surrounding pressure, extracting gas from within the receptacle, partially restoring the pressure surrounding the exterior of the receptacle, further extracting gas from around the exterior of the receptacle, and again partially restoring the pressure surrounding the exterior of the receptacle, then further extracting gas from around the exterior of the receptacle before closing the receptacle characterised in that the extraction of air from within the receptacle is independent of the extraction of air from around the receptacle and constant in time.

40

45

**[0005]** These and other objects, advantages, and features of the invention will be more readily understood and appreciated by reference to the detailed description of the invention and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

50

**[0006]**

Fig. 1 is a section of an apparatus according to the present invention in which the vacuum chambers of the apparatus are closed;

55

Fig. 2 is a view similar to Fig. 1 showing the apparatus during operation when vacuum is applied in the chamber containing the product.

DETAILED DESCRIPTION OF THE INVENTION

**[0007]** Figure 1 shows a section of the vacuum packaging apparatus 1 of the invention. As used herein, the phrase "vacuum packaging" refers to a method wherein at least one product is placed in a receptacle having one opening, such as a bag, then the receptacle is evacuated and closed.

**[0008]** Vacuum packaging apparatus 1 includes a cover 2 hinged to base member 3 which is divided by lower chamber divider wall 12 which cooperates with the upper divider wall 11 to separate apparatus 1 into the two chambers 4 and 5. Upper divider wall 11 is optionally removable from cover 2. The first and larger chamber 4 is the product chamber in which the portion of a receptacle or bag 9 containing a product 8 is placed. The receptacle opening (9a) or bag neck is extended into the second and smaller chamber 5 through aperture 15. Aperture 15 is formed in the wall which divides chambers 4 and 5 when the cover 2 is rotated into position. Gaskets 16 and 16a on the lower divider wall (12) and on the upper divider wall (11), respectively, hold the bag neck in place without choking it and isolate first chamber 4 from second chamber 5. The first chamber 4 is evacuated through vacuum port 6 and the second chamber is evacuated through vacuum port 7. Air admission port 10 admits air into the first chamber. A receptacle-closing unit 21 is located in one of the chambers. Although figures 1 and 2 show the receptacle-closing unit 21 located in chamber 5, the mechanism could also be located in chamber 4. Suitable receptacle-closing units are for instance heat sealing bars, impulse sealing bars or clipping mechanisms. In a preferred embodiment of the apparatus of the invention the receptacle-closing unit 21 is a pair of opposed heat sealing bars. The apparatus further includes a pressure sensing mean 22 in chamber 4 and optionally a second pressure sensing mean 23 in chamber 5 and a programmable logic control system (not shown) which monitors and sequences each phase of the apparatus during operation and in particular controls the operation of vacuum ports 6 and 7, of air admission port 10 and of heat sealing bars 21.

**[0009]** To perform the process according to the present invention the operator of apparatus 1 places the bag 9 filled with product 8 in the first chamber 4 and brings the neck of the bag down over gasket 16 and across sealing bars 21, so that the open end of the bag 9a is located in the second chamber 5. When cover 2 is rotated in the closed position, the neck of the bag will be held in place, without being choked, by gaskets 16 and 16a on the lower and upper dividing walls, respectively. Suitable materials for gaskets 16 and 16a are for instance flexible plastic materials such as rubber and foams. Gaskets 16, 16a and the bag neck fill the aperture between chambers 4 and 5 so that very little air is leaked from one chamber to the other. Once the chamber is closed evacuation of chamber 4 begins through vacuum port 6. Any conventional vacuum pump which is well known in the art may be used to evacuate chamber 4. In this first phase, shown in Fig. 2, bag 9 will balloon outwardly due to the pressure difference between the interior of the bag 9 and the chamber 4. When the pressure in chamber 4 reaches a value P1, set by the operator, evacuation of the second chamber 5 begins through vacuum port 7. Due to its smaller size the evacuation of chamber 5 will proceed more rapidly than the evacuation of chamber 4, so that the vacuum level in chamber 5, and consequently within bag 9, will drop below that in chamber 4 causing the bag to collapse back onto product 8. When the pressure in chamber 4 reaches a value P2 a signal is sent to a control unit to stop evacuation of chamber 4. Due to the time needed for the effective closing of vacuum port 6 and to the minimal passage of air from one chamber to the other, the pressure in chamber 4 will drop further from value P2 to value P3. When the pressure inside chamber 4 reaches value P3 air is allowed into the chamber through air admission port 10 to return to pressure value P2. Air admission port 10 is then closed and vacuum is applied again through port 6 until the pressure is reduced to value P3. The air admission-evacuation cycle between pressure values P2 and P3 respectively is repeated at least once and usually more times until the desired packaging result is obtained, at which time bag 9 is closed by operation of heat sealing bars 21. Vacuum port 7, connected to chamber 5, is held in the open position throughout the air admission-evacuation cycles carried out in chamber 4. Pressure values P1, P2, P3 and the time during which the air admission-evacuation cycles are repeated are set by the operator in the programmable logic control at the beginning of the operations and are chosen according to the nature of the product being packaged. In general pressure value P1 ranges from 500 to 950 mbar, preferably from 600 to 900 mbar; pressure value P2 ranges from 200 to 800 mbar, preferably from 250 to 650 mbar; pressure value P3 is set to be from 20 to 130 mbar lower than P2, preferably from 30 to 100 mbar lower than P2. The time period during which the air admission-evacuation cycles are repeated is usually from 3 to 20 seconds, preferably from 5 to 15 seconds.

**[0010]** Suitable settings for the packaging of sensitive products such as Raclette cheese and pate according to the process of the invention are reported in the following table:

PRODUCT	P1 (mbar)	P2 (mbar)	P3 (mbar)	Time (s)
Raclette cheese	800	450	400	5
Pate	800	500	400	12

**[0011]** In one embodiment of the apparatus of the present invention, upper chamber divider wall 11 is connected to

vacuum chamber cover 2 through a lateral guide and held in place by means of a clamp. When needed it can be disengaged from cover 2 and removed from the apparatus by manually releasing the clamp. This can be conveniently done when the products to be packaged are hard, non-porous products and therefore are not damaged by a high vacuum packaging process.

5 **[0012]** The apparatus described above offers several advantages with respect to prior art ones. First of all it allows to pack both sensitive and non-sensitive products by simply removing upper chamber divider wall 11. Furthermore, when packaging sensitive products, the possibility of independently controlling the level of vacuum in the two chambers offers a great reliability in the end result in particular in packaging processes with high turnovers.

10 **Claims**

15 **1.** An apparatus (1) for vacuum packaging a product in a flexible receptacle such as a bag, comprising: a cover (2) hinged to a base member (3), said cover (2) and said base (3) being provided of an upper and lower divider walls (11, 12) cooperatively defining a first vacuum chamber (4); a second vacuum chamber (5) adjacent to said first chamber and an aperture (15) connecting said first and second chambers for passing therethrough the bag neck (9a); said apparatus further comprising means (6, 7) to evacuate said first and second chambers independently of each other; and means (21) to close said receptacle; **characterized in that** means (10) are present to admit air in the first vacuum chamber (4) and means (16, 16a) are present on the aperture (15) to reduce the passage of air from one chamber to the other.

20 **2.** The apparatus according to claim 1 wherein the means (16, 16a) for reducing the passage of air from one chamber to the other are foam gaskets.

25 **3.** The apparatus according to claim 1 wherein the receptacle closing means (21) are heat sealing bars.

**4.** A process for vacuum packaging a product in a flexible receptacle, such as a bag, comprising the steps of:

- 30 - loading the product (8) in the bag (9);
- placing the product containing portion of said bag in the first vacuum chamber (4) and the bag neck (9a) in the second vacuum chamber (5) of the apparatus according to claim 1;
- closing the cover (2) of the apparatus;
- extracting air from said first chamber (4) thereby causing at least part of said bag (9) to move away from said product (8);
- 35 - subsequently extracting air from said second chamber (5) and consequently from within said bag (9);
- partially re-pressurizing and re-evacuating said first chamber (4) while maintaining said second chamber (5) under constant vacuum;
- repeating the re-pressurizing re-evacuating step in said first chamber (4) at least once; and
- 40 - closing said opening (9a)

**characterised in that** the extraction of air of air from said first chamber (4) is independent of the extraction of air from said second chamber (5).

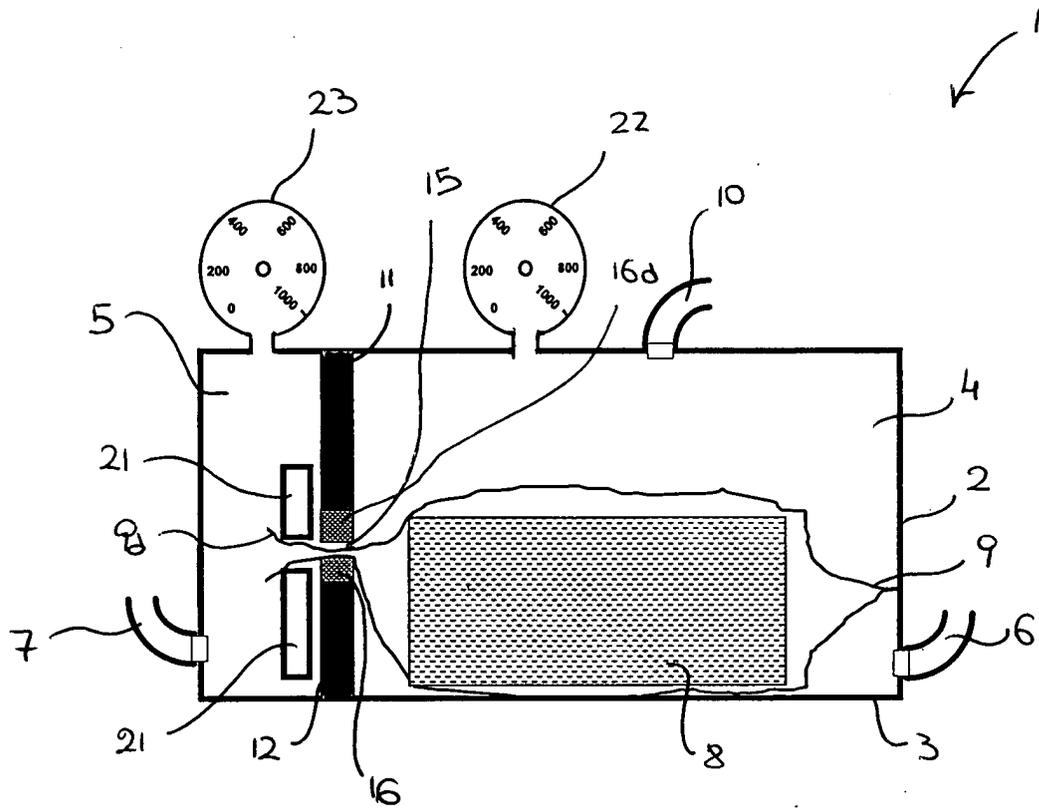


FIGURE 1

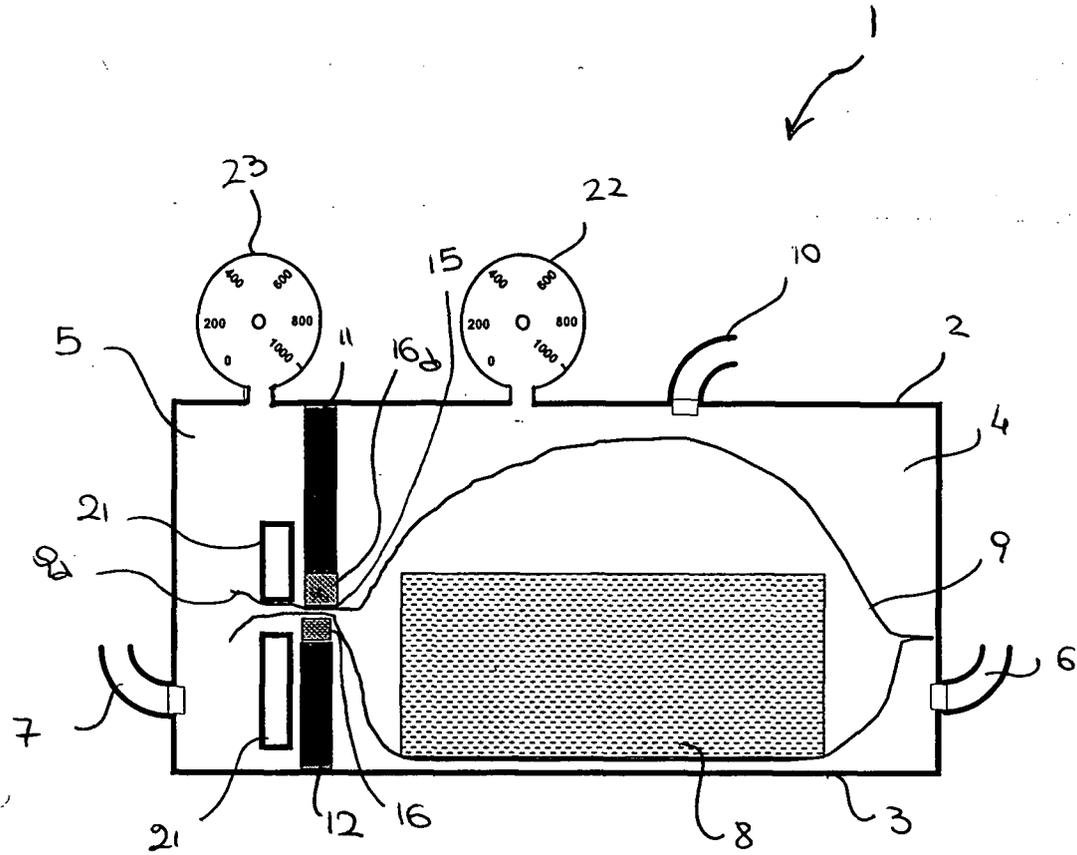


FIGURE 2



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 3 965 646 A (HAWKINS ROBERT STANLEY) 29 June 1976 (1976-06-29)	1-3	B65B31/02
Y	* column 7, line 29 - column 7, line 33; figures 4-7 * * column 4, line 46 - column 4, line 67 * -----	4	
Y	US 4 922 686 A (SEGOTA PIETRO) 8 May 1990 (1990-05-08) * column 4, line 60 - column 5, line 56; figure 3 *	4	
D,A	US 3 832 824 A (BURRELL W) 3 September 1974 (1974-09-03) * abstract * -----	1,4	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B65B
Place of search		Date of completion of the search	Examiner
Munich		14 July 2004	Farizon, P
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

1 EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 00 3246

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-07-2004

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3965646	A	29-06-1976	AR 207678 A1	22-10-1976
			AU 8741275 A	16-06-1977
			BR 7600808 A	14-09-1976
			CA 1034549 A1	11-07-1978
			CA 1060403 A2	14-08-1979
			DE 2558733 A1	09-09-1976
			FR 2302236 A1	24-09-1976
			GB 1518241 A	19-07-1978
			IT 1052041 B	20-06-1981
			JP 1234140 C	17-10-1984
			JP 51100885 A	06-09-1976
			JP 59009408 B	02-03-1984
			MX 142886 A	14-01-1981
			-----	
US 4922686	A	08-05-1990	IT 1139239 B	24-09-1986
			AR 228686 A1	30-03-1983
			AT 17213 T	15-01-1986
			AU 549772 B2	13-02-1986
			AU 8936682 A	21-04-1983
			BR 8205987 A	13-09-1983
			CA 1291412 C	29-10-1991
			DE 3268294 D1	13-02-1986
			DK 456382 A	17-04-1983
			EP 0077458 A1	27-04-1983
			FI 823503 A ,B,	17-04-1983
			IE 53415 B1	09-11-1988
			JP 58082823 A	18-05-1983
			NO 823431 A ,B,	18-04-1983
			NZ 202174 A	09-05-1986
ZA 8207527 A	30-05-1984			
-----				
US 3832824	A	03-09-1974	AR 200902 A1	27-12-1974
			AU 474917 B2	05-08-1976
			AU 6556374 A	14-08-1975
			BE 810814 A1	29-05-1974
			BR 7401671 A	11-11-1975
			CA 980238 A1	23-12-1975
			CH 570901 A5	31-12-1975
			DE 2404038 A1	23-01-1975
			DK 219774 A ,B,	10-02-1975
			FR 2235056 A1	24-01-1975
			GB 1436471 A	19-05-1976
			IT 1015830 B	20-05-1977
			JP 984110 C	22-01-1980
			JP 50021880 A	08-03-1975
			JP 54014989 B	11-06-1979

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 00 3246

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-07-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3832824 A		NL 7400964 A ,B,	31-12-1974
		SE 414481 B	04-08-1980
		SE 7403541 A	30-12-1974
		US 3928938 A	30-12-1975
		ZA 7400320 A	27-11-1974
-----			