



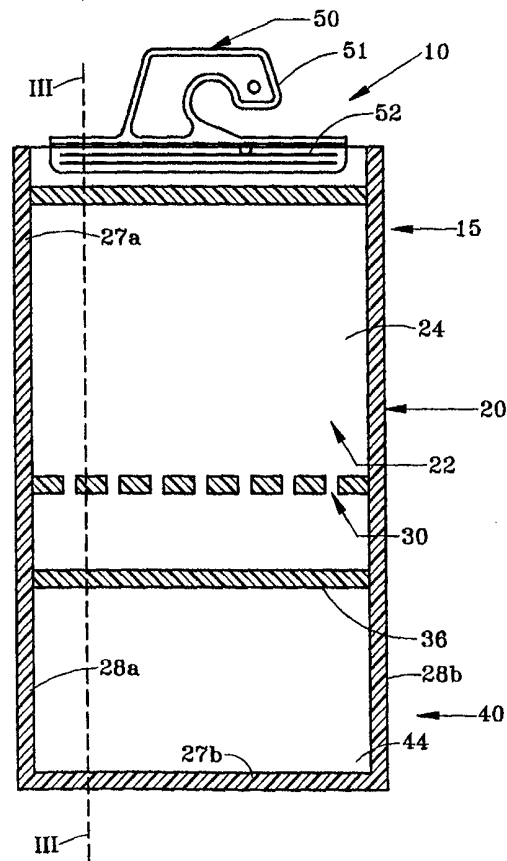
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US98/20325</p> <p>(22) International Filing Date: 28 September 1998 (28.09.98)</p> <p>(30) Priority Data: 08/941,996 1 October 1997 (01.10.97) US</p> <p>(71) Applicant (for all designated States except US): TETRA TECHNOLOGIES, INC. [US/US]; 25025 I-45 North, The Woodlands, TX 77380 (US).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): CUNANAN, Joaquin, Paz [US/US]; 2339 St. Croix Street, Kissimmee, FL 34741 (US). HEANER, David, Prince [US/US]; 1665 King Arthur Circle, Maitland, FL 32751 (US). HANLON, David, J. [US/US]; 31707 Hickory Court, Magnolia, TX 77355 (US).</p> <p>(74) Agent: D'AMBROSIO, Jo, Katherine; Sroufe, Payne, Lundeen &amp; D'Ambrosio, L.L.P., Suite 1230, 1700 West Loop South, Houston, TX 77027-3008 (US).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</p>	

(54) Title: DEHUMIDIFYING POUCH

(57) Abstract

A dehumidifying pouch comprising a container having a moisture-absorption compartment and a collection compartment, the moisture-absorption compartment comprising semi-permeable material that encloses a deliquescent desiccant material and an optional deodorizing material. The collection compartment comprises walls made of a moisture impervious material. The collection compartment is connected to the moisture-absorption compartment, preferably by a broken seal, so that liquids from the moisture-absorption compartment can be transferred to the collection compartment of the pouch. The semi-permeable material can comprise polyethylene or expanded polytetrafluoroethylene, individually or a combination thereof. The moisture impervious compartment can comprise either polyethylene film or polypropylene film. Alternatively, the dehumidifying pouch is comprised of one compartment having a moisture-absorption section and a moisture collection section. The dehumidifying pouch is non-spillable under normal use conditions and is disposable.



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## Dehumidifying Pouch

### FIELD OF THE INVENTION

The present invention relates to a dehumidifying and deodorizing pouch.

### BACKGROUND OF THE INVENTION

5 Atmospheric water vapor is problematic in many situations. This is particularly so in situations combining high humidity with close or closed environments such as crowded rooms or closets; the presence of hydrophilic materials; and intermittently opened containers of organic liquids such as gasoline. Some of the problems high humidity can cause are caking of dried  
10 powder and granular substances, increase growth of mildew and fungi, corrosion of metal surfaces, and water contamination of organic liquids (especially internal combustion engine fuels).

Trapped water can be a source of corrosion in a high humidity environment. Some powders and granules (salt, sugar, amino acids, etc.) can  
15 cake or form clumps when exposed to high humidity. A number of additives are known in the art for preventing such caking or clumping, such as aluminum silicate in table salt.

A limitation in known technologies of this field is that the desiccants used cannot be deliquescent. A deliquescent composition is one that melts away  
20 or dissolves gradually and becomes a liquid by attracting and absorbing moisture from the air. If a deliquescent composition were used in known dehumidifying devices, the resultant liquid would itself be a contaminant. Further, because deliquescent derived liquids contain chemicals and have chemical properties different from pure water, in the case of contact with food, they could be toxic.

25 In high humidity situations, involving relatively close or closed environment such as a clothes or storage closet, camper or similar space, the relatively high water vapor extraction capabilities of a deliquescent is more

desirable than other types of desiccants. Deliquescents have been used for such applications, but known devices utilize open containers.

### SUMMARY OF THE INVENTION

The inventors of the present invention have invented a dehumidifying pouch that is both non-spillable under normal use conditions and disposable because it is made from inexpensive materials. Surprisingly, the dehumidifying  
5 pouch comprises a material that is deliquescent as well as desiccant and may also contain deodorizing material. One embodiment of the dehumidifying pouch solve the afore mentioned problems by comprising a container having a moisture-absorption compartment and a collection compartment; the moisture-absorption compartment comprises a semi-permeable material, preferably a  
10 membrane, enclosing deliquescent desiccant material and an optional deodorizing material.

Conveniently, the moisture-absorption compartment is connected to the collection compartment so that liquid moisture from the moisture-absorption compartment is transferred to the collection compartment. In one aspect of the  
15 invention, the semi-permeable material, preferably a membrane, comprises a polymer. A preferred polymer can comprise polyethylene or expanded polytetrafluoroethylene, individually or a combination thereof. A preferred collection compartment can comprise walls made of a moisture-impervious material. Preferably, the moisture-impervious material comprises laminated film,  
20 more preferably, the material comprises polyethylene film. Alternatively, the moisture impervious material comprises polypropylene film.

In another preferred aspect of this invention, the desiccant material comprises a salt selected from the group consisting of alkali metal halides, alkaline earth metal halides, iron halides and aluminum halides, individually or a  
25 combination thereof. One preferred desiccant material can further comprise a fragrance. A preferred deodorizing material can comprise activated carbon, zeolite or molecular sieves, individually or in a combinations thereof. In one embodiment, a preferred pouch can be comprised of transparent material.

Conveniently preferred collection compartment is connected to the moisture-absorption compartment by a broken seal so that liquid from the moisture-absorption compartment is transferred by gravity to the moisture-absorption compartment. In a preferred embodiment, the pouch comprises a hanger for  
5 hanging the pouch above ground level.

In another preferred embodiment, the dehumidifying and deodorizing pouch comprises a container comprising a first panel and a second panel, the first panel opposite the second panel and the first and second panels forming at least two enclosed compartments, the compartments comprising a moisture-  
10 absorption compartment and a collection compartment. Preferably, the first panel comprises a moisture-impervious material in the area of both the moisture-absorption compartment and the collection compartment, whereas the second panel comprises a moisture-impervious material in the area of the collection  
15 compartment and semi-permeable material, preferably a membrane, in the area of the moisture-absorption compartment. The moisture-absorption compartment encloses a deliquescent desiccant material and deodorizing material. Conveniently, the moisture-absorption compartment is connected to the collection compartment so that liquid moisture from the deliquescing desiccant in  
20 the moisture-absorption compartment is transferred to the collection compartment.

In one preferred embodiment, the first panel comprises moisture-impervious material in the area of the collection compartment and semi-permeable material, preferably a membrane, in the area of the moisture-  
25 absorption compartment. In this embodiment, the first panel comprises moisture-impervious material in the area of the collection compartment and both moisture-impervious material and semi-permeable material in the area of the moisture-absorption compartment.

In another preferred embodiment, the dehumidifying and deodorizing pouch comprises a container having a first panel and a second panel with the first panel opposite the second panel and the first and second panels forming at least two enclosed compartments, a moisture-absorption compartment and a collection compartment. Preferrably, the first panel and second panel can be comprised of a moisture-impervious material in the area of the collection compartment and semi-permeable material in the area of the moisture-absorption compartment. A preferred moisture-absorption compartment can enclose a deliquescent desiccant material and deodorizing material. Preferably, the moisture-absorption compartment is connected to the collection compartment and separated from the collection compartment by a broken seal so that liquid moisture from the moisture-absorption compartment is transferred to the collection compartment.

Alternatively, another preferred first panel comprises moisture-impervious material in the area of the collection compartment and both moisture-impervious material and semi-permeable material, preferably a membrane, in the area of the moisture-absorption compartment. A preferred semi-permeable material can comprise a polymer. A preferred polymer can comprise polyethylene or expanded polytetrafluoroethylene, individually or a combination thereof. The preferred moisture-impervious material of the collection compartment can comprise polyethylene film or polypropylene film.

The preferred deliquescent desiccant material comprises a salt selected from the group consisting of alkali metal halides, alkaline earth metal halides, iron halides and aluminum halides, individually or a combination thereof. The deliquescent desiccant material can further comprise a fragrance. The deodorizing material preferably comprises activated carbon, zeolite or molecular sieves, individually or in a combinations thereof.

In still another embodiment the preferred preferred dehumidifying and deodorizing pouch comprises a container having a first panel and a second panel, the first panel opposite the second panel and the first and second panels forming an enclosed compartment. Preferrably, the compartment can enclose  
5 deliquescent desiccant material alone or both deliquescent desiccant and deodorizing material. Preferably, the first panel comprises a moisture-impervious material and the second panel comprises semi-permeable material.

In another preferred embodiment, the dehumidifying pouch comprises a container having a first panel and a second panel, the first panel opposite the  
10 second panel so that the first and second panels form at least two enclosed compartments, the compartments comprising a moisture-absorption compartment and a collection compartment. Preferably, the first panel comprises a moisture-impervious material in the area of both the moisture-absorption compartment and the collection compartment and the second panel  
15 comprises a moisture-impervious material in the area of the collection compartment and semi-permeable material in the area of the moisture-absorption compartment. Preferably, the moisture-absorption compartment encloses deliquescent desiccant material. More preferably, the moisture-absorption compartment is connected to the collection compartment so that liquid moisture  
20 from the moisture-absorption compartment is transferred to the collection compartment.

A preferred moisture-absorption compartment can further contain a deodorizing material comprising activated carbon, zeolite or molecular sieve, individually or in a combination thereof. Preferably, the polymer comprising the moisture-  
25 absorption compartment comprises polyethylene or expanded polytetrafluoroethylene, individually or a combination thereof.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front sectional view of a dehumidifying and deodorizing pouch according to the present invention.

Fig. 2 is a front sectional view of an alternative embodiment of the dehumidifying and deodorizing pouch according to the present invention.

5 Fig. 3 is a cross-sectional view of the invention as shown in Fig 1, taken along line III - III.

Fig. 4 is a side view of an alternative embodiment of a dehumidifying and deodorizing pouch according to this invention.

10 Fig. 5 is a side view of a further alternative embodiment as shown in Fig. 4.

#### DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made in detail to the present preferred embodiment of the invention as depicted in the accompanying drawings and example. It has been found that a preferred embodiment of the dehumidifying and deodorizing bag 10 as shown in Fig. 1, the pouch 10m can comprise a container 15 having two compartments 20, 40, one compartment 20 for absorbing moisture vapors from the surrounding atmosphere, the other compartment 40 for receiving liquid moisture from the moisture-absorption compartment 20. Preferably, the moisture-absorption compartment 20 contains a deliquescent desiccant and also optionally includes a deodorant and/or air freshener. In this preferred embodiment, a hanger 50 is used so that the pouch 10 can be hung in any closed room or closet that has a problem with humidity and/or odors. The desiccant contained within the moisture-absorption compartment 20 absorbs moisture vapors. As the desiccant becomes saturated with moisture vapors and deliquesces, the liquefied desiccant transfers to the collection compartment 40. Because the materials comprising the pouch 10 are

inexpensive, the dehumidifying and deodorizing pouch 10 may be disposed when the collection compartment is full even though the deliquescent desiccant could otherwise continue to absorb moisture vapors.

The container 15, as illustrated in Fig. 3, is formed by a front panel 22 sealed along edges to a back panel 26. In this preferred embodiment, a broken seal 30 separates the moisture-absorption compartment 20 from the collection compartment 40 so that deliquescent formed in the moisture-absorption compartment 20 can be transferred to the collection compartment 40 by gravity if the pouch 10 is hung so that the moisture-absorption compartment 20 is above the collection compartment 40.

The moisture-absorption compartment 20 comprises semi-permeable material, preferably a membrane, that allows diffusion of moisture vapors into the moisture-absorption compartment 20. The diffusion is not reversible under normal use conditions. Preferably, the semi-permeable membrane is a polymer material. More preferably, the semi-permeable membrane comprises polyethylene, commonly sold under the tradename, TYVEK, or, expanded polytetrafluoroethylene, available under the mark, GORTEX. In one embodiment, the entire moisture-absorption compartment 20 is comprised of semi-permeable material. Alternatively, the moisture-absorption compartment 20 is comprised in part of semi-permeable material and in part moisture-impervious material. The rate of moisture uptake by the moisture-absorption compartment 20 is controlled by the amount of semi-permeable material used to make the compartment 20. Moisture uptake can be reduced by reducing the amount of semi-permeable material used to form the moisture-absorption compartment 20.

Figures 1 and 3, for example, illustrate an embodiment that uses semi-permeable membrane on one side of the moisture-absorption compartment 20 in a two-compartment pouch 10. Preferably, the opposite side of the moisture-absorption compartment and the collection compartment are comprised of

moisture-impervious material. The pouch 10 comprises two panels 22, 26: a two-part front panel 22a, 22b and a single back panel 26. The panels 22, 26 are sealed along their top edges 27a, 27b and side edges 28a, 28b and sealed with a broken seal 30 from one edge 28a to the other edge 28b so that liquids from the moisture-absorption compartment 20 can flow down by gravity into the collection compartment 40. The front panel 22a, 22b is formed from two different materials, semi-permeable material in the area of the moisture-absorption compartment 22a and moisture-impervious material in the area of the collection compartment 22b. The two materials are joined to form a seal 36. Because water vapor pressure is greater in the surrounding atmosphere, moisture vapors enter the pouch 10 by passing through the semi-permeable membrane 22a in the area of the moisture-absorption compartment 20, the vapors are absorbed by the desiccant until it deliquesces, and the deliquescent then flows down into the collection compartment 40.

In other embodiments, the amount of semi-permeable material used to form the front panel 22a of the moisture-absorption compartment 20 can be varied to vary the rate of moisture uptake. In an alternate embodiment (not shown), a moisture-impervious cover material can be removably attached to the semi-permeable material so that the user can vary the rate of moisture uptake by removing the cover material.

The semi-permeable material preferably comprises polyethylene, commonly sold under the tradename, TYVEK, or expanded polytetrafluoroethylene, available under the mark, GORTEX. The moisture-impervious material can be laminated. Preferably, the moisture-impervious material is comprised of a polyolefin film such as polyethylene, more preferably, 6 mil polyethylene film. Alternatively, the moisture-impervious material is comprised of polypropylene film. In another aspect of the dehumidifying and deodorizing pouch 10, either the moisture-absorption semi-permeable material or

the moisture-impervious material used to form the pouch can be comprised of transparent material.

In another aspect of the invention, all seals 30, 36 on the pouch 10 should be tight enough to prevent leakage if dropped from a height of 10 feet when the  
5 moisture-absorption compartment 20 is filled with 16 ounces of desiccant and the collection compartment 40 is 75% full of liquid.

In still another aspect, the desiccant material used for moisture absorption is preferably comprised of a salt selected from the group consisting of alkali metal halides, alkaline earth metal halides, iron halides and aluminum halides,  
10 individually or combinations thereof. One preferred desiccant material is comprised of calcium chloride. The deodorizing material can be activated carbon, zeolite or molecular sieves, individually or in combinations thereof. In an alternative embodiment, the desiccant material can further comprise a fragrance.

In a preferred embodiment, the dehumidifying and deodorizing pouch 10  
15 has hangers 50, 55 so that the pouch 10 can be hung above the ground or floor. In one embodiment as illustrated in Fig. 1, the hanger 50 is a hook 51 that is sealed to the container 15 of the pouch 10. Preferably the hook 51 is comprised of a polymer having enough strength to bear the weight of the container when it is at its fullest with desiccant and liquid. In another embodiment as illustrated in  
20 Fig. 2, the hanger 50 is an extension 55 of the container 15. The extension 55 defines one or more holes 56a, 56b for hanging. Preferably the extension 55 is reinforced to bear the weight of the pouch 10.

In an alternate embodiment as illustrated in Fig. 4, the dehumidifying and deodorizing pouch 60 comprises a container 61 enclosing one compartment 66.  
25 Preferably, the container 61 comprises a first panel 62 and a second panel 64. The edges 63a, 63b of the first panel 62 are sealed to the edges 65a, 65b of the second panel 64. Preferably, the first panel 62 is comprised of a moisture-absorption material. The moisture-absorption material can be semi-permeable

material, preferably a membrane, comprising polyethylene, commonly sold under the tradename, TYVEK, or, expanded polytetrafluoroethylene, available under the mark, GORTEX. The second panel 64 is comprised of a moisture-impervious material, preferably a polyolefin such as polyethylene or polypropylene.

5 Alternatively, the material of the second panel 64 is laminated. In one preferred embodiment, the first panel 62 is the upper panel and the second panel 64 is on the bottom and rests on the ground or wherever the pouch 60 is placed. In this way, liquids will not leak out of the pouch 10 from the moisture-absorption membrane. In one embodiment, the material of the first and second panels 62,

10 64 are transparent. Fig 5 illustrates still another alternative embodiment 70 of a one-compartment dehumidifying and deodorizing pouch 60 that can be used with a hanging device 68.

The compartment 60, 70, as shown in Figs. 4 and 5, can contain a desiccant or both a desiccant and a deodorant as described above for Fig. 1. The

15 desiccant material is preferably comprised of a salt selected from the group consisting of alkali metal halides, alkaline earth metal halides, iron halides and aluminum halides, individually or combinations thereof. Preferably, the desiccant material is comprised of calcium chloride. The deodorizing material can be activated carbon, zeolite or molecular sieves, individually or in combinations

20 thereof. In an alternative embodiment, the desiccant material can further comprise a fragrance.

### **EXAMPLE**

Conventional plastic cups used for containing desiccants were compared

25 to the dehumidifying and deodorizing pouch of this invention as follows:

The moisture absorption capabilities of a dry calcium chloride sample containing 80% calcium chloride and 20 % water were evaluated using a standard

DampRid™ small plastic cup and the dehumidifying and deodorizing pouch. An aliquot of 300g of calcium chloride pellets was evaluated for moisture absorption capabilities at 75 % relative humidity and 50 C utilizing a controlled humidity/controlled temperature environmental chamber. The average results of triplicate measurements are shown in the following table:

10

	80% CaCl <sub>2</sub> in Cup	80% CaCl <sub>2</sub> in Bag.
First drop formed (min)	~30	~60
2hr(% H <sub>2</sub> O absorbed)	4.4	2.0
4hr(% H <sub>2</sub> O absorbed)	7.8	6.4
7hr(% H <sub>2</sub> O absorbed)	11.3	10.4
24hr(%H <sub>2</sub> O absorbed)	36.9	33.9
30hr(%H <sub>2</sub> O absorbed)	43.9	40.1
48hr(%H <sub>2</sub> O absorbed)	51.9	44.2
72hr(%H <sub>2</sub> O absorbed)	56.9	47.6

15

The results indicate that the inexpensive dehumidifying and deodorizing pouch performs comparably to the conventional dehumidifying cup. The pouch of this invention is able to withdraw moisture from the surrounding atmosphere as

well as the previous known dehumidifying cup. The dehumidifying pouch, however, is easier to use because it is not subject to spills and it is disposable.

The foregoing description is illustrative and explanatory of preferred embodiments of the invention, and variations in the size, shape, materials and  
5 other details will become apparent to those skilled in the art. It is intended that all such variations and modifications which fall within the scope or spirit of the appended claims be embraced thereby.

## 1 CLAIMS:

2

1 1. A dehumidifying and deodorizing pouch comprising:

2 a container comprising a moisture-absorption compartment and a  
3 collection compartment;4 the moisture-absorption compartment comprising semi-permeable  
5 material enclosing deliquescent desiccant material and an  
6 optional deodorizing material;7 the moisture-absorption compartment connected to the collection  
8 compartment so that liquid moisture from the moisture-  
9 absorption compartment is transferred to the collection  
10 compartment.

1 2. A dehumidifying and deodorizing pouch comprising:

2 a container comprising a first panel and a second panel, the first  
3 panel opposite the second panel and the first and second  
4 panels forming at least two enclosed compartments, the  
5 compartments comprising a moisture-absorption compartment  
6 and a collection compartment;7 the first panel and second panel comprising a moisture-impervious  
8 material in the area of the collection compartment and semi-  
9 permeable material in the area of the moisture-absorption  
10 compartment;11 the moisture-absorption compartment enclosing a deliquescent  
12 desiccant material and deodorizing material;

13           the moisture-absorption compartment connected to the collection  
14           compartment and separated from the collection compartment  
15           by a broken seal so that liquid moisture from the moisture-  
16           absorption compartment is transferred to the collection  
17           compartment.

1   3. The dehumidifying and deodorizing pouch of claim 2 wherein the first  
2   panel comprises moisture-impervious material in the area of the collection  
3   compartment and both moisture-impervious material and semi-permeable  
4   material in the area of the moisture-absorption compartment.

1   4. The dehumidifying and deodorizing pouch of claims 1 or 3 wherein the  
2   semi-permeable material comprises a polymer.

1   5. The dehumidifying and deodorizing pouch of claim 4 wherein the  
2   polymer comprises polyethylene or expanded polytetrafluoroethylene,  
3   individually or a combination thereof.

1   6. The dehumidifying and deodorizing pouch of any one of the preceding  
2   claims wherein the collection compartment comprises walls made of a  
3   moisture-impervious material.

1   7. The dehumidifying and deodorizing pouch of claims 2 and 6 wherein the  
2   moisture-impervious material comprises laminated film.

1   8. The dehumidifying and deodorizing pouch of claims 2 and 6 wherein the  
2   moisture-impervious material comprises polyethylene film.

1   9. The dehumidifying and deodorizing pouch of claims 2 and 6 wherein the  
2   moisture-impervious material comprises polypropylene film.

1   10. The dehumidifying and deodorizing pouch any of the preceding  
2   claims wherein the desiccant material comprises a salt selected from the

3 group consisting of alkali metal halides, alkaline earth metal halides, iron  
4 halides and aluminum halides, individually or a combination thereof.

1 11. The dehumidifying and deodorizing pouch of claims 1 to 10 wherein  
2 the desiccant material further comprises a fragrance.

1 12. The dehumidifying and deodorizing pouch of claim 1 to 11 wherein the  
2 deodorizing material comprises activated carbon, zeolite or molecular  
3 sieves, individually or in a combination thereof.

1 13. The dehumidifying and deodorizing pouch of claims 1 to 12 wherein  
2 the pouch is comprised of transparent material.

1 14. The dehumidifying and deodorizing pouch of any of the preceding  
2 claims wherein the collection compartment is connected to the moisture-  
3 absorption compartment by a broken seal.

1 15. The dehumidifying and deodorizing pouch of claims 1 to 14 wherein  
2 the pouch comprises a hanger for hanging the pouch above ground level.

1 16. A dehumidifying pouch comprising:

2 a container comprising a first panel and a second panel, the first  
3 panel opposite the second panel and the first and second  
4 panels forming at least two enclosed compartments, the  
5 compartments comprising a moisture-absorption compartment  
6 and a collection compartment;

7 the first panel comprising a moisture-impervious material in the area  
8 of both the moisture-absorption compartment and the  
9 collection compartment;

10 the second panel comprising a moisture-impervious material in the  
11 area of the collection compartment and semi-permeable  
12 material in the area of the moisture-absorption compartment;  
13 the moisture-absorption compartment enclosing a deliquescent  
14 desiccant material material;  
15 the moisture-absorption compartment connected to the collection  
16 compartment so that liquid moisture from the moisture-  
17 absorption compartment is transferred to the collection  
18 compartment.

1 17. The dehumidifying pouch of claim 16 wherein the first panel comprises  
2 moisture-impervious material in the area of the collection compartment and  
3 semi-permeable material in the area of the moisture-absorption  
4 compartment.

1 18. The dehumidifying pouch of claim 16 wherein the first panel comprises  
2 moisture-impervious material in the area of the collection compartment and  
3 both moisture-impervious material and semi-permeable material in the  
4 area of the moisture-absorption compartment.

1 19. The dehumidifying pouch of claims 16 to 18 further comprising a  
2 deodorizing material comprising activated carbon, zeolite or molecular  
3 sieve, individually or in a combination thereof.

1 20. A dehumidifying and deodorizing pouch comprising:  
2 a container comprising a first panel and a second panel, the first  
3 panel opposite the second panel and the first and second  
4 panels forming an enclosed compartment,

5           the compartment enclosing desiccant material and deodorizing  
6           material.

1   21. The dehumidifying and deodorizing pouch of claim 20 wherein the first  
2   panel comprises a moisture-impervious material.

1   22. The dehumidifying and deodorizing pouch of claim 20 wherein the  
2   second panel comprises semi-permeable material.

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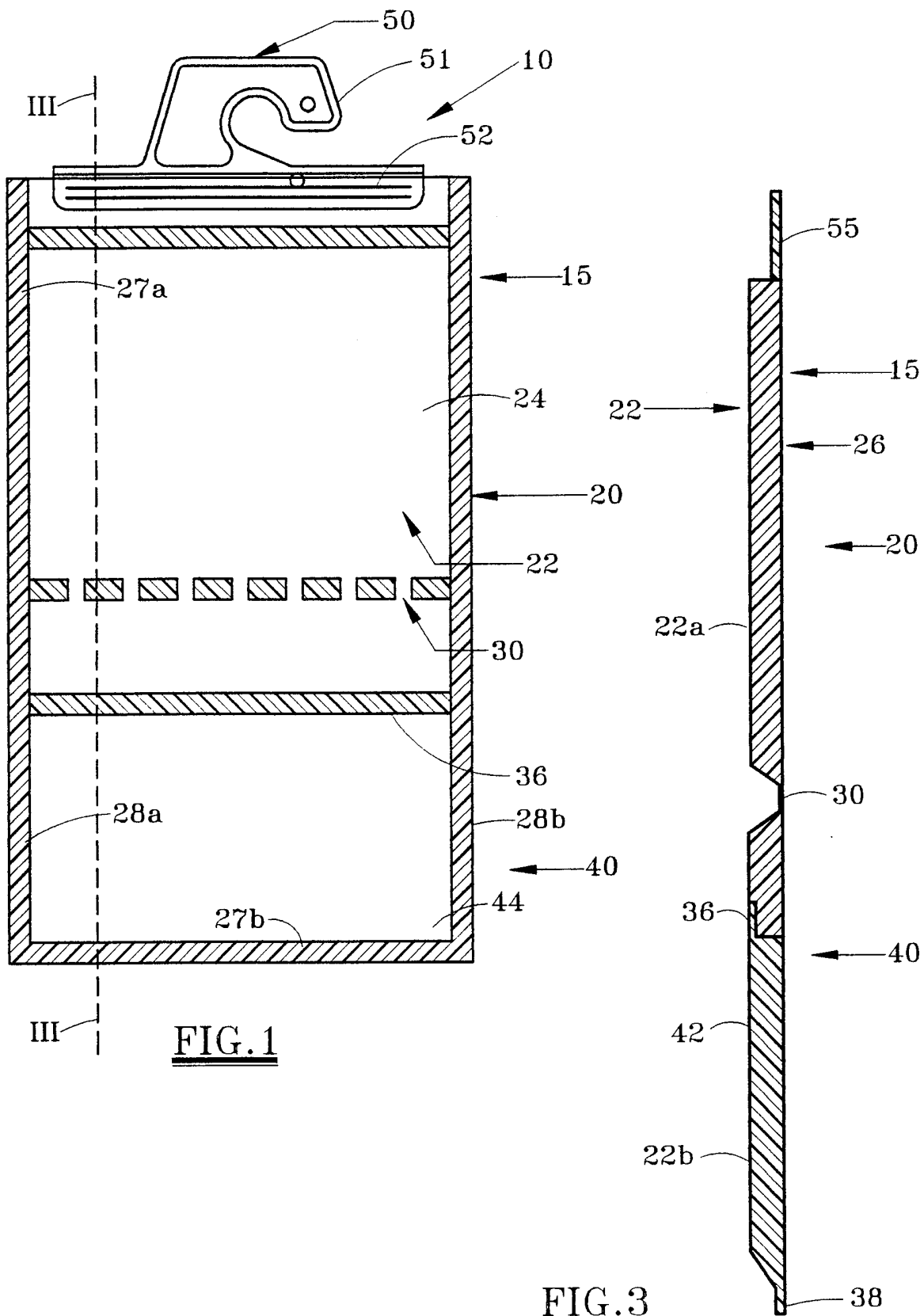
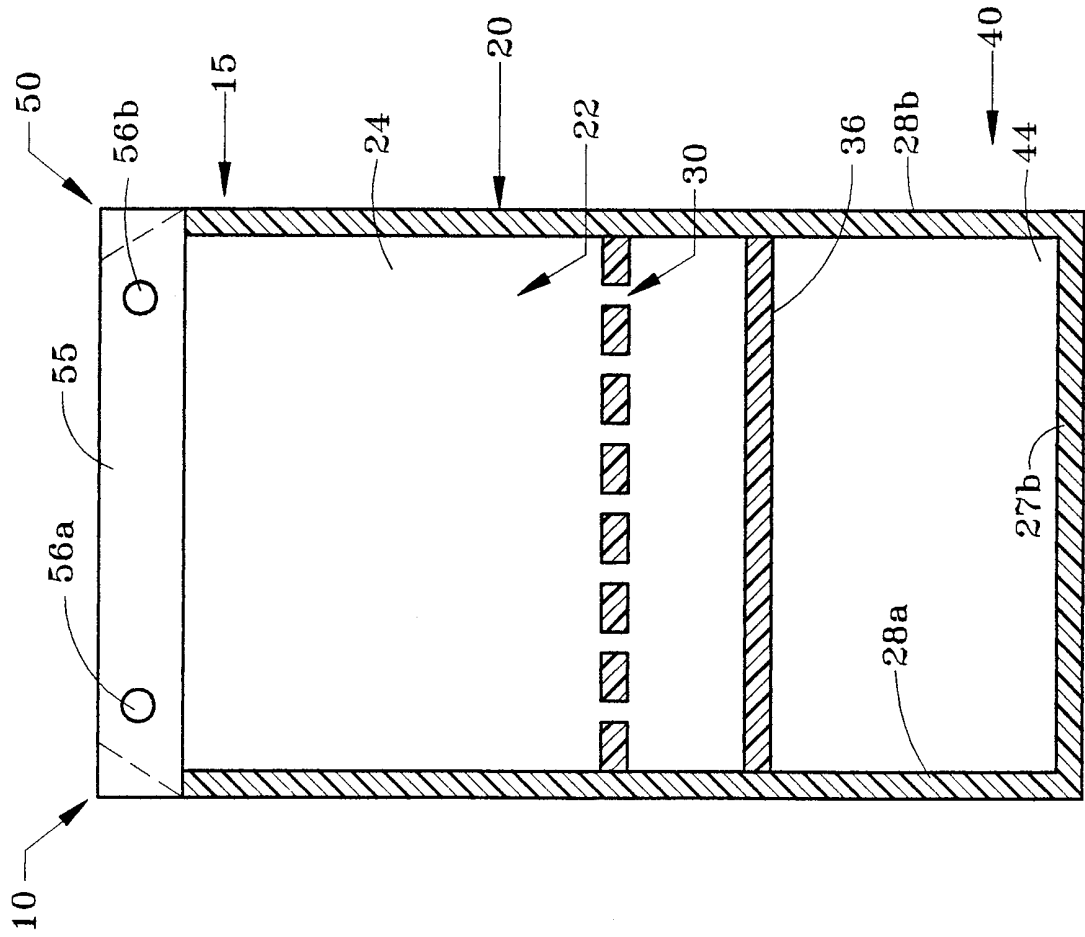
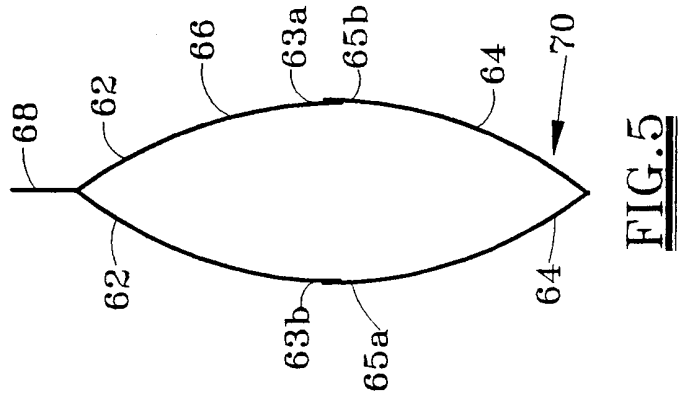
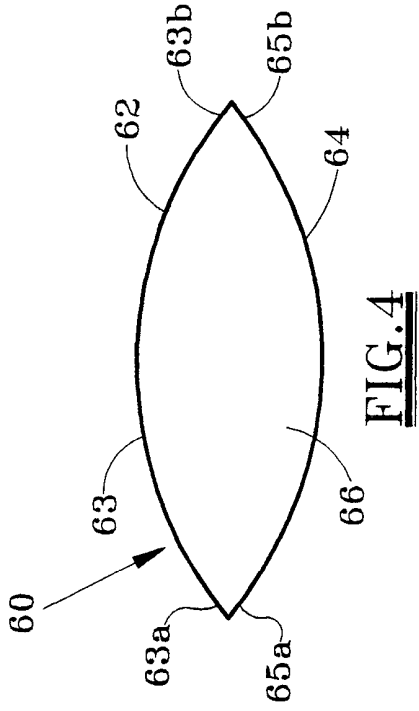


FIG. 1

FIG. 3



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/20325

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 B01D53/26

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

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B01D

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)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 212 029 A (ALIZOL SA) 4 March 1987	1, 2, 16, 20
A	see figures 1-5	3-15, 17-19, 21, 22
X	EP 0 685 257 A (FILIPITSCH & CO KEG C) 6 December 1995	20
A	see claims 1-8	1-19, 21, 22
A	FR 2 502 025 A (VASSEUR JEAN) 24 September 1982 see claims 1-12; figures 1-3	1-22
A	GB 2 161 093 A (FUMAKILLA LTD) 8 January 1986 see figures 1-10	1-22
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

26 January 1999

Date of mailing of the international search report

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# INTERNATIONAL SEARCH REPORT

Inter-    nal Application No PCT/US 98/20325
---

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 658 736 A (VASSEUR JEAN) 30 August 1991 see figures 1,2 -----	1-22
A	EP 0 686 422 A (SODEPAC INTERNATIONAL SA) 13 December 1995 see figures 1,2 -----	1-22
A	US 5 308 665 A (SADEK PAUL ET AL) 3 May 1994 -----	1-22
A	US 4 913 942 A (JICK JOHN J) 3 April 1990 -----	1-22
A	US 5 148 613 A (CULLEN JOHN S) 22 September 1992 -----	1-22

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 98/20325

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0212029 A	04-03-1987	FR 2585970 A	13-02-1987
EP 0685257 A	06-12-1995	RU 2045923 C	20-10-1995
		CA 2191465 A	14-12-1995
		WO 9533555 A	14-12-1995
		JP 10501168 T	03-02-1998
		US 5753357 A	19-05-1998
FR 2502025 A	24-09-1982	NONE	
GB 2161093 A	08-01-1986	NONE	
FR 2658736 A	30-08-1991	NONE	
EP 0686422 A	13-12-1995	FR 2720660 A	08-12-1995
US 5308665 A	03-05-1994	NONE	
US 4913942 A	03-04-1990	NONE	
US 5148613 A	22-09-1992	NONE	