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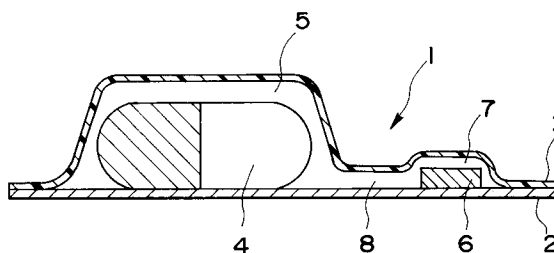
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**W-8000 München 80(DE)**(54) **Package.**

(57) A package comprising a moisture-impermeable sheet material and a moisture-impermeable package film sealedly bonded onto said sheet material. The package has first spaces to respectively contain articles to be packed, second spaces to respectively contain drying agents, and communicating spaces having a small area in its cross-section and respectively communicating the first spaces and the second spaces, between the sheet material and the package film. The articles to be packed and the drying agents are respectively contained in the first spaces and the second spaces, being held without contacting each other interposing the respective communicating spaces.

**FIG. 1**

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

This invention relates to a packaging technology, particularly, to one for keeping pharmaceuticals and foods under desired condition of water balance.

### 2. Related Art Statement

In general, a package shown in Fig. 6 is used for packaging pharmaceuticals of capsule or pill form. Namely, as shown in Fig. 6, a plurality of capsules 100 as articles to be packed is held in a so called PTP (Press Through Pack) package 101 which comprises a moisture-permeable package film having concave portions for receiving capsules and a moisture-impermeable sheet onto which the package film is sealed by heat. The package 101 is contained in a bag 102 made of aluminum etc., together with drying agent 103.

However, there are some problems found on this package. Namely:

- 1) Because of moisture permeability of the package film, once the bag 102 is broken, the moisture intrudes through the package film, so that water balance of the capsule 100 is deviated from a desired value.
- 2) As the results of 1), in the case where the above package form is employed for, for example, a powdery inhalant drug having hygroscopic property, the distribution ratio of the drug decreases rapidly by moisture absorption just after opening of the bag 102 and becomes lower than the standard value in short times, therefore preservation period of the content in the capsule 100 is very short. Similarly, designed performance of the package can not be maintained with other hygroscopic products to be packed.
- 3) As the results of 1) and 2), with respect to pharmaceuticals and foods susceptible to moisture, there is a threat of unfavorable consequences such as deterioration.

### SUMMARY OF THE INVENTION

One purpose of the present invention, therefore, is to offer packaging technology by which desired water balance or dryness can be maintained and dryness of the packed products can be reliably adjusted, even if the outside bag is unsealed.

Another purpose of the invention is to offer packaging technology which can reliably maintain the quality of the packed products.

Still another purpose of the invention is to offer convenient packaging technology where the

packed articles can be carried by one unit.

Further purpose of the invention is to offer packaging technology where it is easy to dispense medicines at dispensary etc.

Still further purpose of the invention is to offer packaging technology where it is possible to prevent erroneous eating of a drying agent.

More further purpose of the present invention is to offer packaging technology which is able to suppress the rise of costs.

Among the inventions disclosed, the outline of the representative one is described as follows;

Namely, a package of the invention comprises a moisture-impermeable sheet material and the moisture-impermeable packaging film being sealed onto the sheet material. The package has, between the sheet material and the packaging film, first spaces containing respectively articles to be packed, second spaces containing respectively drying agents, and communicating spaces which communicate the first spaces and the second spaces with each other respectively.

The above-described package according to the present invention reliably adjusts and/or maintains the water balance and the dryness of the packed products by selecting kind, largeness and shape of a drying agent so as to variably adjust its drying capability.

And both sheet material and package film, which constitute the package, are impermeable, so that moisture does not intrude into the interior of the package, and the deterioration of the packed articles by moisture absorption is prevented, even if the package is removed from the package bag as the outside bag. Therefore, the package according to the invention can be conveniently carried with even by one unit of the packed article and the drying agent.

Moreover, it is possible to eliminate the erroneous eating of drying agent, because packed articles and drying agents are housed in separate spaces from each other.

### BRIEF DESCRIPTION OF THE DRAWINGS

The above and other purposes, and novel characteristics of the invention will be more apparent when referred to the following descriptions given in conjunction with the accompanying drawings, in which:

Fig. 1 is an enlarged cross-sectional view of one unit of an embodiment of the package according to the present invention;

Fig. 2 is a plan view of an embodiment of the package according to the present invention;

Fig. 3 is a graphical representation showing the preservation effect of the package according to the invention in comparison with the prior art;

Fig. 4 is an enlarged cross-sectional view of a package of another embodiment according to the invention;

Fig. 5 is an enlarged cross sectional view of a further embodiment of the package according to the invention; and

Fig. 6 is a plan view of the package of the prior art.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

### Embodiment 1

Referring now to the drawings, Fig. 1 is an enlarged cross-sectional view of one unit of a package of one embodiment according to the present invention. Fig. 2 is a plan view of this embodiment of the package of the present invention. Fig. 3 is a graphical presentation showing the preservation effect of this package according to the present invention in comparison with the prior art.

In this embodiment, a package 1 comprises a moisture-impermeable sheet material 2 laminated by, for example, aluminum foil or a plastic film, and a moisture-impermeable package film 3 sealedly bonded onto the sheet material 2, for example by heat sealing.

The package film 3 is made, for example, of moisture-impermeable plastic film, being preferably transparent or translucent. For example, the package film 3 may be made of transparent resin such as polyvinylchloride film having moisture-impermeability.

As shown in Figs. 1 and 2, the package film 3 in this embodiment is formed to be provided with spaces 5 (the first spaces) to respectively contain capsules 4 as articles to be packed, spaces 7 (the second spaces) to respectively contain drying agents 6, and communicating spaces 8 to respectively communicate the spaces 5 and the spaces 7 each other, in concave shapes, while the package film 3 is sealedly bonded to the sheet material 2 at all portions except for these spaces 5, 7 and 8.

The sheet material 2 can be broken, for example, by the nail of person's finger to take out the capsule 4.

The communicating space 8, as shown in Figs. 1 and 2, is lower in height and narrower in width than the spaces 5 and 7, defining a constricted part, and the cross-sectional area of the communicating space 8 is smaller than the outside dimensions of the capsule 4 and the drying agent 6. Therefore, the capsule 4 or the drying agent 6 received in the space 5 or 7 does not move from its space 5 or 7 to the communicated space 7 or 5, thus, both capsule 4 and drying agent 6 are contained independently in respective spaces 5 or 7

without contacting each other.

Further, the package 1 in this embodiment is scored separation lines 9, for example, as intermittently cut lines or continuous groove lines to define each unit 1a so that it is possible to easily separate a combination of one capsule 4 and drying agent 6 as one unit 1a from other unit 1a. In this embodiment, for purpose of an example, one package 1 contains ten units 1a. However, it does not mean to restrict to ten. Thus, it is convenient for separating and carrying by one or more units because it is possible to separate easily every each units 1a.

The whole package 1 is contained in the bag 10, as an outside bag comprising a moisture-impermeable material such as aluminum foil etc.

Next, the method of production and the operation of this embodiment are explained.

At first, in case of producing the package 1 of the embodiment, the spaces 5 to contain capsule, the spaces 7 to contain drying agent, and the communicating spaces 8 are formed in concave shapes in the moisture-impermeable package film 3 of a plastic film.

Then, the capsules 4 and the drying agents 6 with prescribed largeness are respectively set into the spaces 5 to contain capsule and the spaces 7 to contain drying agent. And in this state, all portions of the package film 3 except for the spaces 5, 7 and 8 are sealed with the moisture-impermeable sheet material 2 by using a method such as the heat sealing method. Next, the separation lines 9 such as intermittently cut line or continuous groove line are provided for the package 1 to make every one combination of a capsule 5 and a drying agent 6 as one unit 1a.

For the purpose of sale etc., the package 1 thus produced is contained into the bag 10 as outside bag, having moisture-impermeability, by every prescribed number of unit 1a, for example ten units 1a.

Further, the production process described above may be carried out in automatic manufacturing line, not shown, as of the substantially totally automated manufacturing work.

According to this embodiment, the space 5 to contain capsule 4 is communicated through the communicating space 8 to the space 7 to contain drying agent 6, and both the sheet material 2 and the package film 3 heat-sealed to each other have the moisture-impermeability, therefore the dryness of the capsule 4 is controlled just by drying agent 6 even after the opening of the outside bag, and the capsule 4 does not absorb any moisture from the outside. Therefore, when the drying agent is selected properly in its kind, amount, largeness and shape to obtain the best dryness of the capsule 4, and the capsule 4 and the drying agent 6 are set into their own spaces 5 and 7 respectively, then

the capsule 4 is maintained usually at the best dryness or water balance, and unfavorable phenomenon such as deterioration of the content of the capsule 4 by intrusion of moisture or cracking of the capsule 4 by excessive drying can be prevented from occurring.

Further, the package 1 in this embodiment is made up of the moisture-impermeable tight-sealed units, i.e. 1a units, therefore it is convenient to separate each unit 1a at the separation line 9 and to carry with these separated units.

Moreover, in this embodiment, the capsule 4 is not contaminated by the drying agent 6, because the communication space 8 has smaller cross sectional area than both outside dimensions of the capsule 4 and the drying agent 6 and communicates the spaces 5 and 7 which contain respectively the capsule 4 and the drying agent 6 without contacting each other. Further, an accident of eating the drying agent 6 in place of the capsule 4 can be prevented, because the drying agent 6 is not taken out simultaneously with the capsule 4, when a portion of the sheet material 2 corresponding to the containing space 5 is broken to take out the capsule 4.

The inventors compared the operational effects of the package 1 according to the present invention with the prior art described in Fig. 6 and obtained the results shown in Fig. 3. In this comparison, stability of a powdery inhalant agent in capsule which is preserved at 25° C-83% RH is evaluated for respective packages by the distribution ratio of KI-111 onto Stage -2+3+4 of MLI (Multi-Stage Liquid Impinger) following the time elapsed just after opening the bags 10 and 102 as outside bags. According to this comparison, the package 1 showed the sufficient stability through whole 28 days, but in the prior art, the distribution decreased since a day after opening and showed much lower value than the standard value (30%) at 3 days. By this comparison, it is proved that we obtain extremely favorable stability in the package of the present invention compared with the conventional package.

#### Embodiment 2

In Fig. 4, is shown an enlarged cross-sectional view of another embodiment of the package according to the present invention. This Embodiment 2 is substantially same as Embodiment 1 except for containing, for example, the pills 4a in respective pill containing spaces 5a (the first space) in place of capsules as articles to be packed.

Even in this Embodiment 2, the properties including largeness, kind and shape of the drying agent 6 can be selected depending on the desired rate of dryness of the pill 9.

The excellent various operational effects explained in Embodiment 1 are also obtained in this Embodiment 2.

#### Embodiment 3

Fig. 5 shows the enlarged cross-sectional view of further embodiment of the package according to the present invention. The package 1 in this Embodiment 3 is an example in which the powder 4b as an article to be packed is set into a powder containing bag 4c having moisture permeability, and then it is contained in a powder containing space 5b (the first space).

In this Embodiment 3, also the excellent operational effects are obtained substantially same to above Examples 1 and 2.

Further, when the powder containing bag 4c in this Embodiment 3 is made of, for example, an edible film, one can take the inner powder 4b by taking the powder containing bag 4c itself after taking it out by breaking the sheet material 2 with nail.

As described above, the invention made by the inventors is explained based upon the embodiments. However, it should be understood that the present invention is not restricted to above embodiments and many variations are possible without departing from the scope of the invention.

For example, shapes and allocation of the spaces for articles to be packed and drying agents, or of communication spaces are not restricted by the embodiments. The constituent materials of sheet material 2 and a package film 3 can also be variably selected.

The above description is made to the cases where the present invention is applied to the packages of pharmaceutical capsules, pills and powder, however, the invention is not restricted to those cases, and, for example, it can also be applied to foods, agricultural chemicals, etc. with other product shape like a globule etc.

Effects attained by the representative invention disclosed above are outlined as follows.

- 1) The package comprises the moisture-impermeable sheet material and the moisture impermeable package film which is sealedly bonded to the sheet material, and has the first spaces respectively containing articles to be packed, the second spaces respectively containing drying agents, and the communicating spaces respectively communicating the first and the second spaces each other, between the sheet material and the package film, so that dryness or water balance of the packed articles can be always kept at the most suitable condition by the drying agent even after the opening of the outside bag and good quality of the

article can be maintained just until it is used.

2) According to 1), the deterioration of the packed articles brought by insufficient drying and the cracking of the packed article caused by excessive drying, can be prevented effectively by adjusting in advance the drying capability of the drying agent by selecting its large-

ness, kind, amount, and shape.  
3) According to and in addition to 1), any unfavorable accidents caused by direct contacting of the packed article and the drying agent can be eliminated, as the cross-sectional area of the communicating space is smaller than the outside dimensions of both the packed article and the drying agent which are contained in the first and the second spaces respectively without contact each other.

4) It is very beneficial and convenient that, according to 1) or 3), the dryness of the packed article is kept always in the best condition, even in case of carrying with one unit or several units, as the package consists of tight-sealed units having the moisture impermeability with every one unit.

5) Adding to 4), it is more convenient for carrying or storing in even one or plural units by dividing the package, because plural combinations of the first space, the second space and the communicating space are provided in said package film, and the separating line which separates each combination as one unit is provided in the package film and the sheet material.

6) According to 1), the trouble of erroneous taking of the drying agent can be prevented, because the drying agent is not taken out from the package even if the sheet material of the portion corresponding to the packed article is broken to take out the article.

7) According to 1), pharmaceuticals can be easily dispensed at a dispensary etc.

8) According to 1), the package with excellent effects can be obtained only by adding a line for supplying the drying agents to the conventional package manufacturing technology, and changing the mold to form spaces for articles to be packed and the drying agents, and the communicating spaces, thus suppressing the increase in the manufacturing costs.

## Claims

1. A package comprising a moisture-impermeable sheet material and a moisture-impermeable package film sealedly bonded onto the sheet material, characterized in that:

first spaces to respectively contain articles to be packed, second spaces to respectively contain drying agents, and communicating

spaces to respectively communicate the first spaces and the second spaces each other, are provided between the sheet material and the package film.

2. The package according to claim 1, wherein:  
said first spaces, said second spaces, and said communicating spaces are formed in concave shapes in said package film.
3. The package according to claim 1, wherein:  
said communicating spaces have a cross-section area smaller than outside dimensions of said articles to be packed and said drying agents, and  
the articles to be packed and the drying agents are respectively contained in said first spaces and said second spaces without contacting each other interposing the communicating spaces respectively.
4. The package according to claim 1, wherein:  
a plurality of combinations of said first space, said second space and said communicating space are provided onto said package film, and  
separating lines are provided to both said package film and said sheet material to be able to separate each combination as one unit.
5. The package according to claim 1, wherein:  
said package film is made of a transparent resin.
6. The package according to claim 1, wherein:  
said package film is made of polyvinylchloride film having moisture-impermeability.
7. The package according to claim 1, wherein:  
said articles to be packed are pharmaceuticals or foods.

FIG. 1

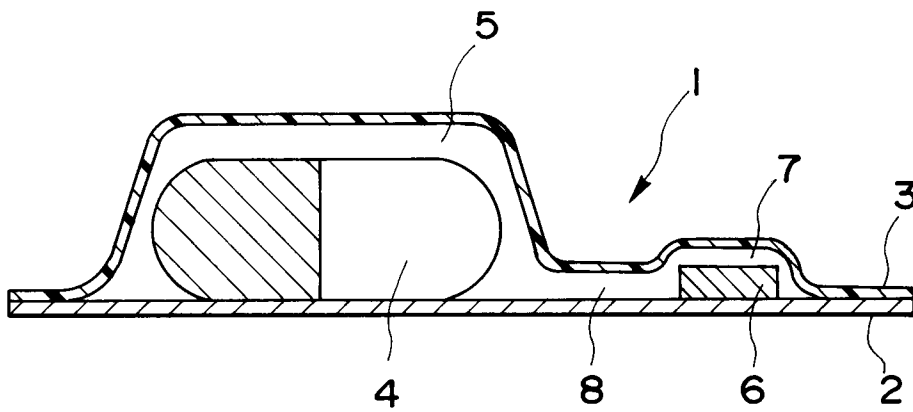


FIG. 2

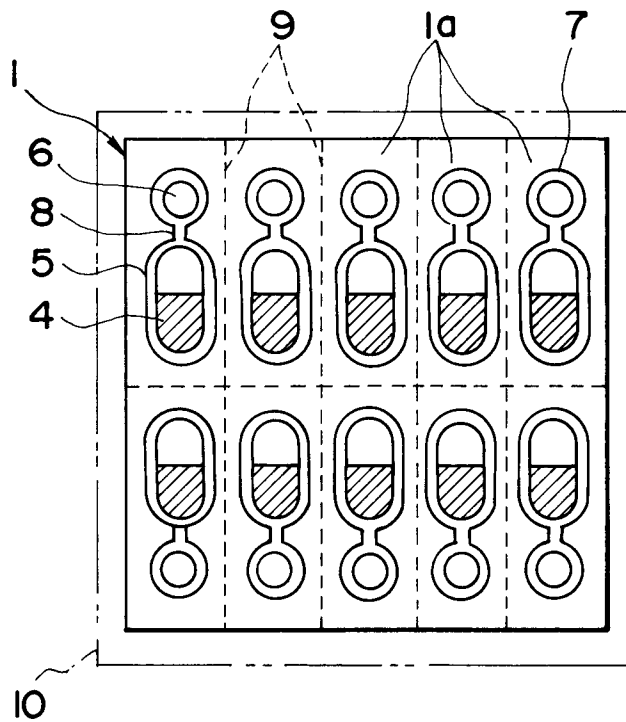


FIG. 3

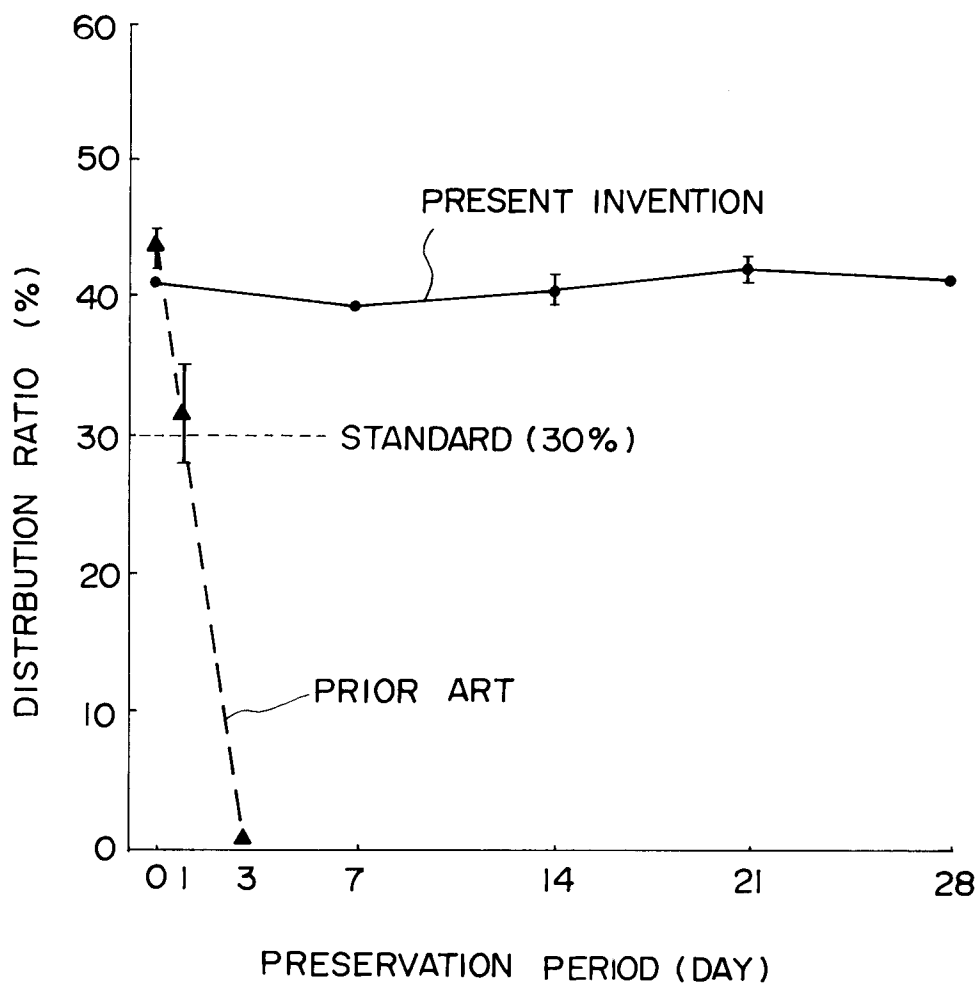


FIG. 4

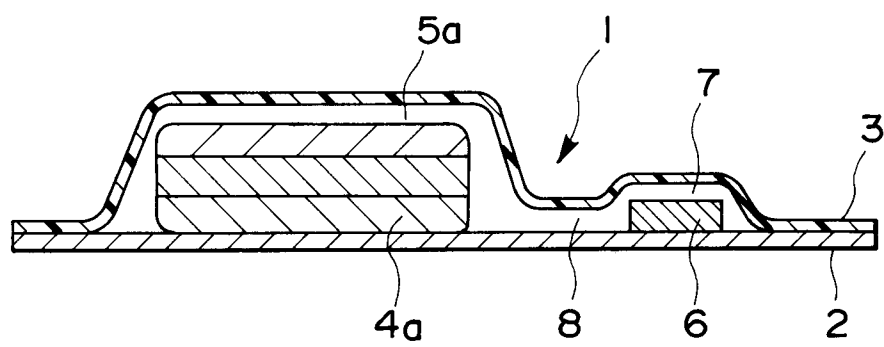
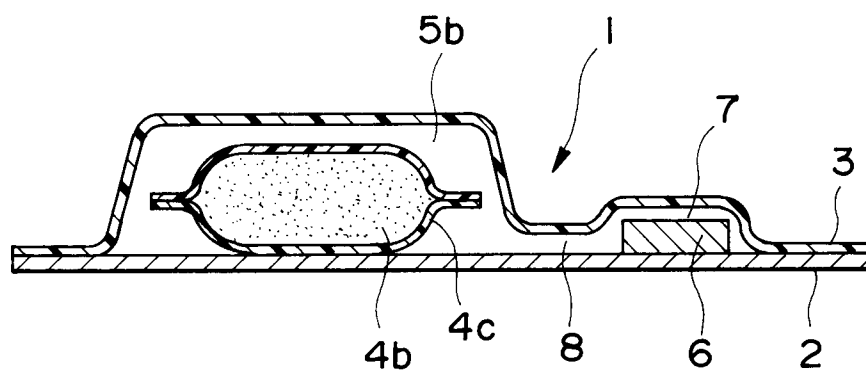


FIG. 5





**FIG. 6**  
PRIOR ART

