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(54) **TUBE GLASS PACKAGING BODY**

(57) A tube glass packaging body 10 of the present disclosure includes: a plurality of tube glass assemblies 20 each including a tube glass group including a plurality of accumulated tube glasses and a binding film that binds the tube glass group; a packaging film 80 covering the tube glass assemblies 20; and a dehumidifying agent 70 disposed inside the packaging film 80.

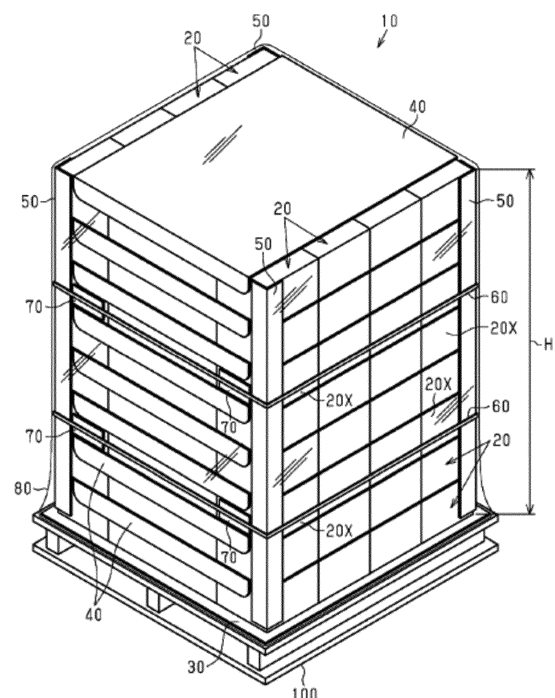


FIG. 1

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Description

Technical Field

[0001] The present invention relates to a tube glass packaging body.

Background Art

[0002] Patent Literature 1 describes a tube glass packaging body including a base, a plurality of tube glasses stacked on the base, and a shrink film wrapping the tube glasses.

Citation List

Patent Literature

[0003] Patent Literature 1: JP 2015-129016 A

Summary of Invention

Technical Problem

[0004] In the above-described tube glass packaging body, depending on storage conditions, water droplets may be deposited on inner surfaces of the tube glasses due to dew condensation of the tube glasses. Due to the water droplets deposited on the inner surfaces of the tube glasses, an alkali component contained in the tube glasses may be eluted into the water droplets. In this case, when the water droplets deposited on the inner surfaces of the tube glasses evaporate, the alkali component that has eluted into the water droplets may precipitate, as powdery foreign matter. This powdery foreign matter is referred to as "alkali blooming" in the present specification.

[0005] An object of the present invention is to provide a tube glass packaging body in which powdery foreign matter due to storage conditions is less likely to be formed in tube glasses.

Solution to Problem

[0006] Hereinafter, means for solving the above problem will be described.

A tube glass packaging body of the present disclosure includes: a plurality of tube glass assemblies each including a tube glass group including a plurality of accumulated tube glasses and a binding film covering at least one end portion of the tube glass group and binding the tube glass group; a packaging film wrapping the tube glass assemblies; and a dehumidifying agent disposed inside the packaging film.

[0007] In the tube glass packaging body, the dehumidifying agent may be disposed between the packaging film and the binding film.

In the tube glass packaging body, the dehumidifying

agent disposed between the packaging film and the binding film may be disposed in a region of the binding film that covers a side surface of the tube glass group.

[0008] In the tube glass packaging body, the tube glass assemblies may be stacked in a vertical direction, and the dehumidifying agent may be disposed in an upper region, the upper region being at the same level as or above a middle position in the vertical direction of the stacked tube glass assemblies.

[0009] In the tube glass packaging body, the dehumidifying agent may be disposed between the binding film and at least one end surface of the tube glass group. In the tube glass packaging body, the tube glasses may each have a length of 500 mm or greater.

[0010] In the tube glass packaging body, the tube glasses may be any system of borosilicate glass, soda lime glass, and aluminosilicate glass.

Specifically, the tube glass packaging body, when having a composition containing, in mass%, from 50 to 80% of SiO₂, from 1 to 20% of Al₂O₃, from 1 to 20% of B₂O₃, and 5% or more of Li₂O+Na₂O+K₂O, corresponds to these glass systems.

[0011] In the tube glass packaging body, the tube glasses may be for a use in a pharmaceutical container or a physicochemical container. These intended applications require a high degree of cleanliness on the inner surfaces of the tube glasses.

Advantageous Effects of Invention

[0012] The tube glass packaging body according to the present disclosure can suppress formation of powdery foreign matter in the tube glasses caused by storage conditions.

Brief Description of Drawings

[0013]

FIG. 1 is a perspective view of a tube glass packaging body according to an embodiment.

FIG. 2 is a perspective view of a tube glass assembly of the tube glass packaging body.

FIG. 3 is a perspective view of the tube glass packaging body in the middle of packaging.

FIG. 4 is a perspective view of the tube glass packaging body in the middle of packaging.

FIG. 5 is an enlarged photograph of a tube glass in the tube glass packaging body of the present embodiment left in a high humidity environment.

FIG. 6 is an enlarged photograph of a tube glass in a tube glass packaging body of a comparative example left in a high humidity environment.

FIG. 7 is a perspective view of a tube glass assembly according to a modified example.

Description of Embodiments

[0014] An embodiment of the tube glass packaging body will be described below.

FIG. 1 illustrates a tube glass packaging body 10 disposed on a pallet 100.

As illustrated in FIG. 1, the tube glass packaging body 10 includes: a plurality of tube glass assemblies 20, which is stacked in a plurality of layers, in a state of being arranged in a plurality of rows; a first sheet 30 disposed under the tube glass assemblies 20 at the lowermost layer; and a second sheet 40 disposed on the tube glass assemblies 20 at each layer. The tube glass packaging body 10 includes: a plurality of protective members 50 that are positioned at four corners of the tube glass packaging body 10 and protect the tube glass assemblies 20; a plurality of binding members 60 that bind the stacked tube glass assemblies 20; a dehumidifying agent 70 that absorbs moisture contained in gas; and a packaging film 80 that wraps the tube glass assemblies 20.

[0015] As illustrated in FIG. 2, the tube glass assembly 20 includes a tube glass group 22 including a plurality of accumulated tube glasses 21 and a binding film 23 that binds the tube glass group 22.

The tube glass 21 has a cylindrical shape with both end portions open. The tube glass 21 has an inner diameter of, for example, several mm to ten and several mm, and a full length of, for example, 500 mm or greater. The tube glass 21 is for a use in, for example, pharmaceutical containers and physicochemical containers such as ampules, syringes, and vials.

[0016] The tube glass 21 is made of borosilicate glass and contains SiO_2 , Al_2O_3 , B_2O_3 , and R_2O as essential components. Here, R is one or more elements selected from Li, Na, and K. The composition of the borosilicate glass serving as the material of the tube glass 21 is not particularly limited, but preferably contains, in mass%, from 50 to 80% of SiO_2 , from 1 to 20% of Al_2O_3 , from 1 to 20% of B_2O_3 , and 5% or more of " $\text{Li}_2\text{O}+\text{Na}_2\text{O}+\text{K}_2\text{O}$ ". Here, the " $\text{Li}_2\text{O}+\text{Na}_2\text{O}+\text{K}_2\text{O}$ " means a total content value of Li_2O , Na_2O , and K_2O . Hereinafter, the reason why the composition range of each component is defined as described above will be described. In the description below, the symbol "%" means "mass%" unless otherwise indicated.

[0017] SiO_2 is one of the components that form a glass network. A content of SiO_2 is preferably from 50% to 80%, from 55% to 78%, or from 60% to 76%, and particularly preferably from 65% to 75%. When the content of SiO_2 is too low, the chemical durability decreases, and the acid resistance and water resistance required of the container decrease. In addition, an alkali component such as Na_2O easily moves out from the glass network, which causes alkali blooming. On the other hand, when the content of SiO_2 is too large, liquid phase viscosity decreases, and devitrification easily occurs in the production process, leading to decrease in productivity.

[0018] Al_2O_3 is a component that suppresses devitri-

fication of glass and improves chemical durability and hydrolysis resistance. In addition, it is a component that reinforces the glass network and prevents an alkali component such as Na_2O moving out from the glass network, that is, prevents alkali blooming. A content of Al_2O_3 is preferably from 1 to 20%, from 2 to 18%, or 4 to 15%, and particularly preferably from 6 to 12%. When the content of Al_2O_3 is too low, the effects described above may not be obtained. Meanwhile, when the content of Al_2O_3 is too large, the viscosity of glass increases. This increases a working temperature and also increases an amount of heat required for processing into a container.

[0019] B_2O_3 is a component that not only lowers a melting point of the glass, but also raises the liquid phase viscosity, and suppresses devitrification. A content of B_2O_3 is preferably from 1 to 20%, from 3 to 18%, or from 5 to 16%, and particularly preferably from 7 to 14%. Too low a content of B_2O_3 increases the working temperature and also increases the amount of heat required for processing into a container. On the other hand, when the content of B_2O_3 is too large, hydrolysis resistance and chemical durability are reduced, and thus an alkali component such as Na_2O easily moves out from the glass network and alkali blooming easily occurs.

[0020] Na_2O is a component that lowers the viscosity of glass. A content of Na_2O is preferably from 1 to 15%, 2 to 12%, or 3 to 10%, and particularly preferably from 4 to 8%. Too low a content of Na_2O increases the working temperature and also increases the amount of heat required for processing into a container. On the other hand, when the content of Na_2O is too large, the hydrolysis resistance is reduced. Na_2O is a component that causes alkali blooming. Therefore, the tube glass packaging body of the present disclosure is particularly effective for tube glasses containing Na_2O .

[0021] Similarly to Na_2O , K_2O is also a component that lowers the viscosity of glass. A content of K_2O is preferably from 0 to 10%, from 0.1 to 8%, from 0.2 to 6%, or from 0.5 to 5%, and particularly preferably from 1 to 4%. Too low a content of K_2O increases the working temperature and also increases the amount of heat required for processing into a container. On the other hand, when the content of K_2O is too large, the hydrolysis resistance is reduced. K_2O is also a component that causes alkali blooming. Therefore, the tube glass packaging body of the present disclosure is particularly effective for tube glasses containing K_2O .

[0022] When the K_2O and Na_2O components are used in combination, the hydrolysis resistance is improved by virtue of the mixed alkali effect. In order to improve the hydrolysis resistance, a mass ratio of $\text{K}_2\text{O}/\text{Na}_2\text{O}$ is preferably from 0.0 to 1.0, from 0.1 to 0.8, or from 0.15 to 0.6, and particularly preferably from 0.2 to 0.5. If this ratio is small, the hydrolysis resistance decreases. On the other hand, if this ratio is large, the working temperature is increased, and the amount of heat required for processing into a container is also increased, leading to deterioration in productivity.

[0023] Similarly to Na_2O and K_2O , Li_2O is a component that lowers the viscosity of glass. However, addition of Li_2O easily causes erosion of refractories at the time of glass melting. Therefore, a content of Li_2O is preferably from 0 to 5%, from 0 to 3%, or from 0 to 1%, and particularly preferably from 0 to 0.5%. Unless otherwise specified, it is preferable to use an alkali metal oxide other than Li_2O .

[0024] A total content value of Li_2O , Na_2O , and K_2O content is preferably 5% or more, and particularly preferably from 5 to 20%. A low total content value of these components increases the working temperature. In addition, when the total content value of these components is too large, the chemical durability and hydrolysis resistance are reduced.

[0025] It should be noted that various components besides those described above can be added to the borosilicate glass as the material of the tube glass 21. Other materials of the tube glass 21 include soda lime glass and aluminosilicate glass.

[0026] The binding film 23 is preferably made of a material having high gas barrier properties and appropriate stretchability. The material for the binding film 23 may be, for example, a resin material such as polypropylene, polyethylene, or polyvinyl chloride. In the present embodiment, the binding film 23 is a shrink film that shrinks due to heat, but may be substituted with a stretch film or the like. The binding films 23 cover regions excluding a middle region in a longitudinal direction of the tube glass group 22, that is, regions of both end portions of the tube glass group 22, and binds the tube glass group 22. At a boundary between the region covered with the binding film 23 and the region not covered with the binding film 23, there may be a slight gap through which gas can pass. In addition, in the tube glass assembly 20, openings at both ends of the tube glass 21 are not completely covered by the binding film 23. Therefore, in the tube glass packaging body 10, the gas inside the packaging film 80 can enter the tube glass 21.

[0027] As illustrated in FIG. 2, the tube glass assembly 20 is formed by arranging in parallel and stacking the plurality of tube glasses 21 with their end portions aligned. In the example illustrated in FIG. 2, the tube glasses 21 are aligned in six rows and stacked in five layers, and the tube glass assembly 20 as a whole has a substantially rectangular parallelepiped shape. In the following description, in the binding film 23, a portion that covers an end surface of the tube glass group 22 is also referred to as front surface of the binding film 23, and a portion that covers a side surface of the tube glass group 22 is also referred to as side surface of the binding film 23. Here, the end surface of the tube glass group 22 is a surface formed by a set of end surfaces of the plurality of tube glasses 21 forming the tube glass group 22. Further, the side surface of the tube glass group 22 is a surface formed by a set of surfaces exposed to the outside among the side surfaces of the plurality of tube glasses 21 forming the tube glass group 22.

[0028] As illustrated in FIG. 1, the plurality of tube glass assemblies 20 are arranged in parallel and stacked in a state where their end portions are aligned. In the example illustrated in FIG. 1, the tube glass assemblies 20 are arranged in four rows and stacked in eight layers.

[0029] As illustrated in FIG. 1, the first sheet 30 and the second sheet 40 each have a substantially rectangular shape in a plan view, the first sheet 30 has the same size as the pallet 100, and the second sheet 40 is one size smaller than the pallet 100. In the vertical direction, the first sheet 30 is disposed between the packaging film 80 including a first film 81 and a second film 82, which will be described later, and the plurality of tube glass assemblies 20 forming the lowermost layer. On the other hand, the second sheet 40 is disposed on the plurality of tube glass assemblies 20 forming each layer. In the second sheet 40, both end portions in an arrangement direction of the tube glass assemblies 20 are bent downward over the longitudinal direction of the tube glass assemblies 20. Thus, misalignment in the arrangement direction of the tube glass assemblies 20 forming each layer can be suppressed.

[0030] The protective member 50 is an elongated member having a substantially L-shaped cross-section orthogonal to the longitudinal direction. A length of the protective member 50 in the longitudinal direction corresponds to a height of the stacked tube glass assemblies 20. The protective member 50 can be made of, for example, corrugated cardboard. The protective member 50 covers and protects four sides extending in the vertical direction, which are formed by stacking the tube glass assemblies 20 in a plurality of layers while the tube glass assemblies 20 are arranged in a plurality of rows.

[0031] The binding member 60 is, for example, a binding band. The binding member 60 binds the plurality of tube glass assemblies 20 together with the four protective members 50 inside the packaging film 80. Specifically, the binding member 60 presses the four protective members 50 against the tube glass assemblies 20 and thus binds the tube glass assemblies 20. In the present embodiment, two binding members 60 are provided at an interval in the vertical direction, but any number of binding members 60 can be employed. The binding member 60 may be substituted with a film member such as a shrink film or a stretch film, or may be substituted with a rope or a tape for binding.

[0032] The dehumidifying agent 70 contains a substance capable of absorbing moisture, and the substance include silica gel, calcium oxide, and calcium chloride. The dehumidifying agent 70 may have a bag shape or may have a sheet shape. The dehumidifying agent 70 keeps low humidity in a space surrounded by the packaging film 80.

[0033] The dehumidifying agent 70 is disposed in an upper region at the same level as or above a middle position in the vertical direction and a lower region below the middle position in the stacked tube glass assemblies 20. As illustrated in FIG. 1, when the height of the stacked

tube glass assemblies 20 is "H", the dehumidifying agent 70 disposed in the upper region is disposed at a position of preferably 0.5 H or higher, more preferably 0.6 H or higher, and even more preferably 0.7 H or higher from the bottom surface of the lowermost tube glass assembly 20. On the other hand, the dehumidifying agent 70 disposed in the lower region is preferably disposed at a position of lower than 0.5 H, more preferably 0.4 H or lower, and even more preferably 0.3 H or lower from the bottom surface of the lowermost tube glass assembly 20.

[0034] In the present embodiment, the dehumidifying agent 70 is attached to some of the tube glass assemblies 20 among the plurality of the tube glass assemblies 20. In the following description, the tube glass assembly 20 to which the dehumidifying agent 70 is attached is referred to as "tube glass assembly 20X".

[0035] Specifically, the dehumidifying agent 70 is attached to be positioned in a region of the side surface of the binding film 23 that is not covered with the second sheet 40 or the protective member 50 in the tube glass assembly 20X. In the present embodiment, the dehumidifying agent 70 is inserted between the side surface of the binding film 23 and the binding member 60 and thus attached to the side surface of the binding film 23. In another embodiment, the dehumidifying agent 70 may be pasted to the side surface of the binding film 23 using an adhesive tape or an adhesive.

[0036] The packaging film 80 is preferably made of a material having high gas barrier properties and appropriate stretchability. The material for the packaging film 80 may be, for example, a resin material such as polypropylene, polyethylene, or polyvinyl chloride. In the present embodiment, the packaging film 80 is a shrink film that shrinks due to heat, but may be substituted with a stretch film or the like. The stacked tube glass assemblies 20 and the dehumidifying agent 70 are disposed in a space covered with the packaging film 80. In addition, the dehumidifying agent 70 is disposed between the binding film 23 for the tube glass assembly 20 and the packaging film 80.

(Tube glass packaging method)

[0037] A tube glass packing method for forming the plurality of tube glass assemblies 20 into the tube glass packaging body 10 will be described.

[0038] As illustrated in FIGS. 3 and 4, the tube glass packaging method of the present disclosure includes: a stacking step of piling up components of the tube glass packaging body 10 on the pallet 100; and a sealing step of forming the packaging film 80.

[0039] As illustrated in FIG. 3, in the stacking step, first, the rectangular first film 81 is stacked on the pallet 100, and then the first sheet 30 is stacked on the first film 81. The first film 81 is larger than the pallet 100 and the first sheet 30 in a plan view, and a peripheral edge portion thereof protrudes from the pallet 100. Thereafter, the tube glass assemblies 20 are stacked on the first sheet 30.

[0040] In the example illustrated in FIG. 3, the tube glass assemblies 20 arranged in four rows are stacked in eight layers. The second sheet 40 is disposed on the tube glass assemblies 20 at each layer, so that the tube glass assemblies 20 and the second sheets 40 are alternately stacked in the vertical direction.

[0041] As illustrated in FIG. 3, after all of the tube glass assemblies 20 are stacked on the pallet 100, the four protective members 50 are assembled to the four corners of the stacked tube glass assemblies by the two binding members 60, and bound together with the tube glass assemblies 20. Thereafter, the dehumidifying agent 70 is inserted between the tube glass assembly 20X and the binding member 60. Finally, as illustrated in FIG. 4, this is covered with the bag-shaped second film 82.

[0042] In the sealing step, the tube glass assemblies 20 covered with the second film 82 are put into a heating device (not illustrated) together with the pallet 100. As a result, as illustrated in FIG. 1, the first film 81 and the second film 82 thermally shrinks. Specifically, the first film 81 and the second film 82 are thermally welded to each other to form a single integrated film, and this integrated film, the packaging film 80, is brought into close contact with the tube glass assemblies 20. Thus, the packing of the tube glass assembly 20 is completed, and, as a result, with this packing, the displacement of the tube glass assemblies 20 in the space covered with the packaging film 80 is restricted.

[0043] Next, a comparison result between the present embodiment and a comparative example will be described with reference to FIGS. 5 and 6. The glass used for the test was borosilicate glass containing, in mass%, 70% of SiO₂, 20% of B₂O₃, 5% of Al₂O₃, 1% of CaO, 1% of BaO, 2% of Na₂O, and 1% of K₂O.

[0044] FIG. 5 is an enlarged photograph of the surface of the tube glass 21 of the present embodiment, when the tube glass packaging body 10 including the dehumidifying agent 70 was left in an atmosphere at a temperature of 20°C and a humidity of 65% for 720 hours. On the other hand, FIG. 6 is an enlarged photograph of the surface of the tube glass 21 of the comparative example, when a tube glass packaging body including no dehumidifying agent 70 was left in the atmosphere under the same conditions.

[0045] As shown in FIG. 5, in the case where the dehumidifying agent 70 was provided, even if the tube glass 21 was left in the high-humidity environment, dew condensation was not likely to occur on the inner surface of the tube glass 21, and thus foreign matter caused by alkali blooming was not observed on the inner surface of the tube glass 21.

[0046] On the other hand, as shown in FIG. 6, in the case where the dehumidifying agent 70 was not provided, when the tube glass 21 was left in the high-humidity environment, dew condensation was likely to occur on the inner surface of the tube glass 21, and thus foreign matter caused by alkali blooming was generated on the inner surface of the tube glass 21. In FIG. 6, a large number

of white dots are foreign matters caused by alkali blooming.

[0047] From the above results, it was demonstrated that, in the case of the present embodiment, the problem of generation of foreign matter due to alkali blooming is suppressed during storage of the tube glass 21.

[0048] Next, the effects of the present embodiment will be described.

(1) When the gas inside the tube glass 21 contains a large amount of moisture due to the production process of the tube glass 21, dew condensation may occur on the inner surface of the tube glass 21 depending on the storage environment of the tube glass packaging body 10. In this case, an alkali component such as Na present in the material of the tube glass 21 is eluted into the moisture deposited on the inner surface of the tube glass 21. Then, when the moisture evaporates, the alkali component such as Na precipitates, as powdery foreign matter, on the inner surface of the tube glass 21.

In the tube glass packaging body 10 of the present disclosure, the tube glass assemblies 20 and the dehumidifying agent 70 are disposed in the interior of the packaging film 80, and thus, when the gas present in the space inside the tube glass 21 contains moisture, the moisture can be removed by the dehumidifying agent 70. As a result, the tube glass packaging body 10 can suppress dew condensation on the inner surface of the tube glass 21 and can also suppress generation of powdery foreign matter on the tube glass 21, regardless of the storage condition.

(2) The dehumidifying agent 70 is disposed between the packaging film 80 and the binding film 23. That is, since the binding film 23 is interposed between the tube glass 21 and the dehumidifying agent 70, direct contact between the dehumidifying agent 70 and the tube glass 21 can be avoided. Accordingly, it is possible to avoid a problem such as attachment of foreign matter to the tube glass 21 caused by, for example, direct contact between the tube glass 21 and the dehumidifying agent 70.

(3) Assuming a case where a gas containing moisture moves into the space inside the packaging film 80, the gas is likely to pass through a gap between the tube glass group 22 and the binding film 23 and enters the inside of the tube glass 21. That is, in the tube glass group 22, the gas easily goes through a gap at a boundary between the region covered with the binding film 23 and the region not covered with the binding film 23, and moves into the interior of the tube glass 21. In the tube glass packaging body 10, the dehumidifying agent 70 is disposed in the region of the binding film 23 covering the side surface of the tube glass group 22, and thus moisture can be efficiently removed even when the gas moves into the space inside the packaging film 80 as in the case

described above.

(4) During the storage of the tube glass packaging body 10, the temperature inside the tube glass packaging body 10 may rise due to a change in outside air temperature. At this time, the gas heated in the packaging film 80 rises. In the tube glass packaging body 10, the dehumidifying agent 70 is disposed in an upper region at the same level as or above the middle position in the vertical direction of the stacked tube glass assemblies, which makes it possible to efficiently remove the moisture contained in the gas that rises by being heated in the packaging film 80.

(5) The gas cooled in the packaging film 80 descends. In the tube glass packaging body 10, the dehumidifying agent 70 is disposed in the lower region below the middle position, which makes it possible to efficiently remove the moisture contained in the gas descending by being cooled in the packaging film 80.

(6) The longer the length of the tube glass 21, the slower the flow of air inside the tube glass 21 becomes. However, according to the above-described tube glass packaging body 10, even when the tube glass 21 to be packaged has a length of 500 mm or greater, for example, the action and effect described above can be achieved.

[0049] The present embodiment can be modified as follows. The present embodiment and the following modifications can be implemented in combination as long as there is no technical contradiction.

- In the tube glass packaging body 10, the dehumidifying agent 70 may also be disposed at a position different from the position described in the above embodiment as long as the dehumidifying agent 70 is disposed inside the packaging film 80.

- For example, as illustrated in FIG. 7, a tube glass assembly 20A may include a dehumidifying agent 70A disposed between at least one end surface of the tube glass group 22 and a front surface of the binding film 23. In this case, it is preferable that the dehumidifying agent 70A has a sheet shape. In the tube glass packaging body 10A according to the modification example, the dehumidifying agent 70A can be disposed at a position very close to an opening of the tube glass 21. Therefore, the tube glass packaging body 10A according to the modified example can efficiently remove moisture contained in a gas inside the tube glass 21.

- The dehumidifying agent 70 may be disposed between the front surface of the binding film 23 and the packaging film 80.

- The dehumidifying agent 70 may be disposed only in the vicinity of the tube glass assembly 20 disposed

at the lowermost layer, or may be disposed only in the vicinity of the tube glass assembly 20 disposed at the uppermost layer. For example, the dehumidifying agent 70 may be disposed on the uppermost second sheet 40 or may be disposed under the first sheet 30.

· As long as one end of the tube glass 21 is open, the other end may not be open.

· The cross-sectional shape of the tube glass 21 orthogonal to the longitudinal direction may not be circular. The cross-sectional shape of the tube glass 21 orthogonal to the longitudinal direction may be, for example, elliptical or rectangular.

· The intended application, material, and shape of the tube glass 21 can be changed from those listed in the above embodiment. Similarly, the number of tube glasses 21 forming the tube glass assembly 20 and the number of tube glass assemblies 20 forming the tube glass packaging body 10 can be changed as appropriate.

Reference Signs List

[0050]

10, 10A: Tube glass packaging body
20, 20A, 20X: Tube glass assembly
21: Tube glass
22: Tube glass group
23: Binding film
30: First sheet
40: Second sheet
50: Protective member
60: Binding member
70, 70A: Dehumidifying agent
80: Packaging film
100: Pallet

Claims

1. A tube glass packaging body comprising:

a plurality of tube glass assemblies each comprising a tube glass group including a plurality of accumulated tube glasses and a binding film covering at least one end portion of the tube glass group and binding the tube glass group; a packaging film wrapping the tube glass assemblies; and a dehumidifying agent disposed inside the packaging film.

2. The tube glass packaging body according to claim 1, wherein

the dehumidifying agent is disposed between the packaging film and the binding film.

3. The tube glass packaging body according to claim 2, wherein the dehumidifying agent is disposed in a region of the binding film that covers a side surface of the tube glass group.

4. The tube glass packaging body according to any one of claims 1 to 3, wherein

the tube glass assemblies are stacked in a vertical direction, and the dehumidifying agent is disposed in an upper region, the upper region being at the same level as or above a middle position in the vertical direction of the stacked tube glass assemblies.

5. The tube glass packaging body according to claim 1, wherein the dehumidifying agent is disposed between the binding film and at least one end surface of the tube glass group.

6. The tube glass packaging body according to any one of claims 1 to 5, wherein the tube glasses each have a length of 500 mm or greater.

7. The tube glass packaging body according to any one of claims 1 to 6, wherein the tube glasses are any one of borosilicate glass, soda lime glass, and aluminosilicate glass.

8. The tube glass packaging body according to any one of claims 1 to 7, wherein the tube glasses have a composition containing, in mass%, from 50 to 80% of SiO₂, from 1 to 20% of Al₂O₃, from 1 to 20% of B₂O₃, and 5% or more of Li₂O+Na₂O+K₂O.

9. The tube glass packaging body according to any one of claims 1 to 8, wherein the tube glasses are for use in a pharmaceutical container or a physicochemical container.

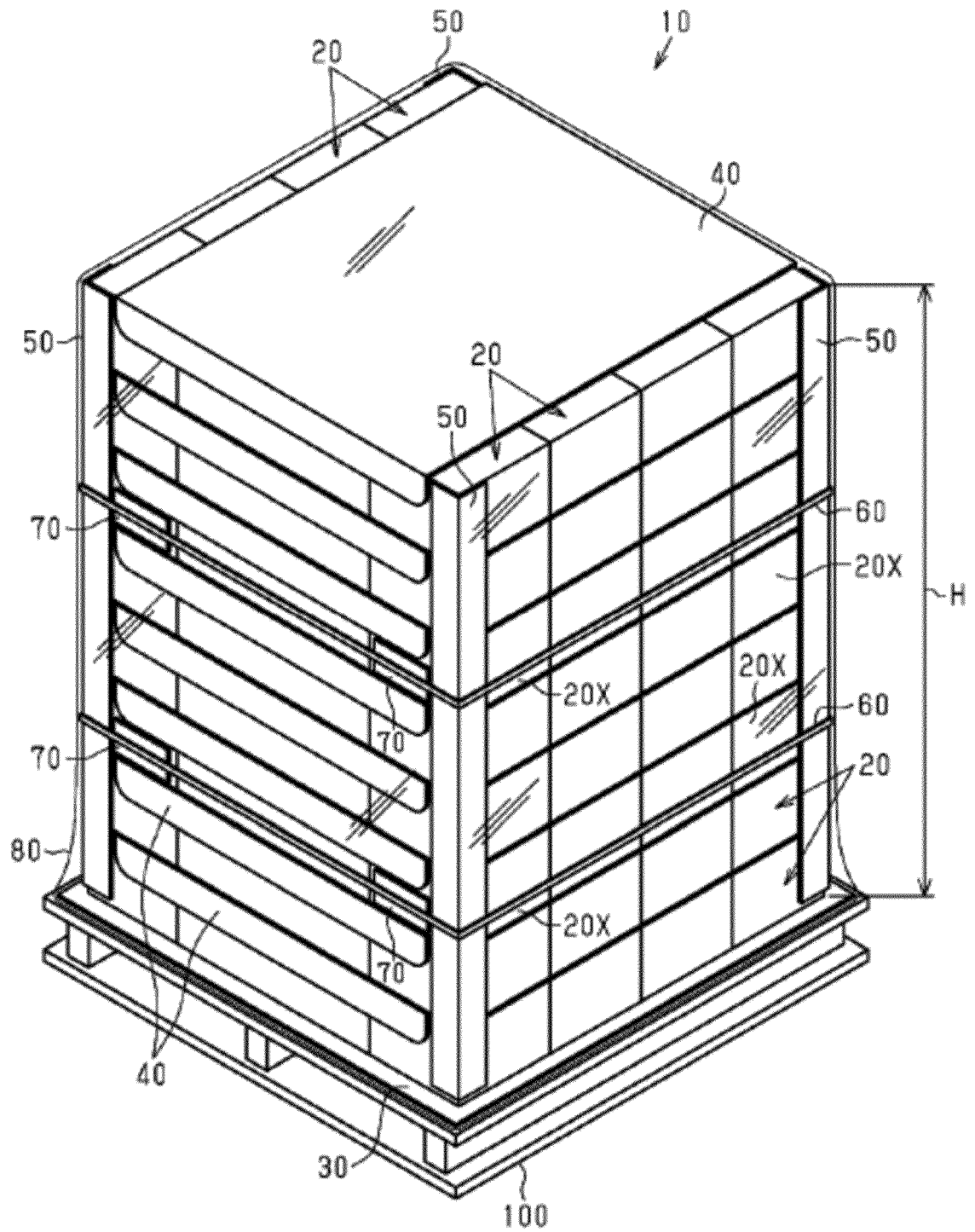


FIG. 1

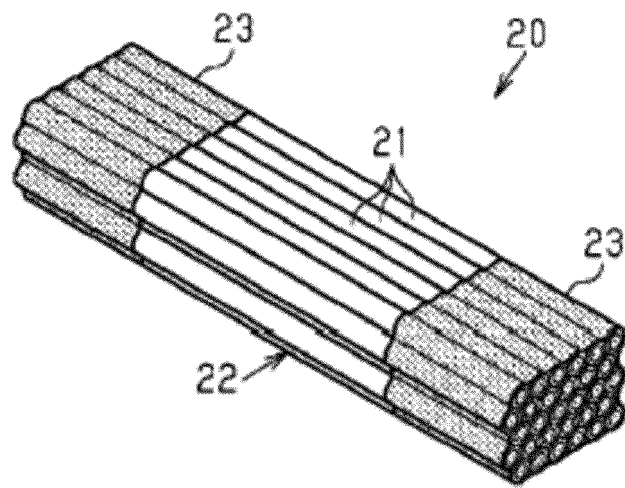


FIG. 2

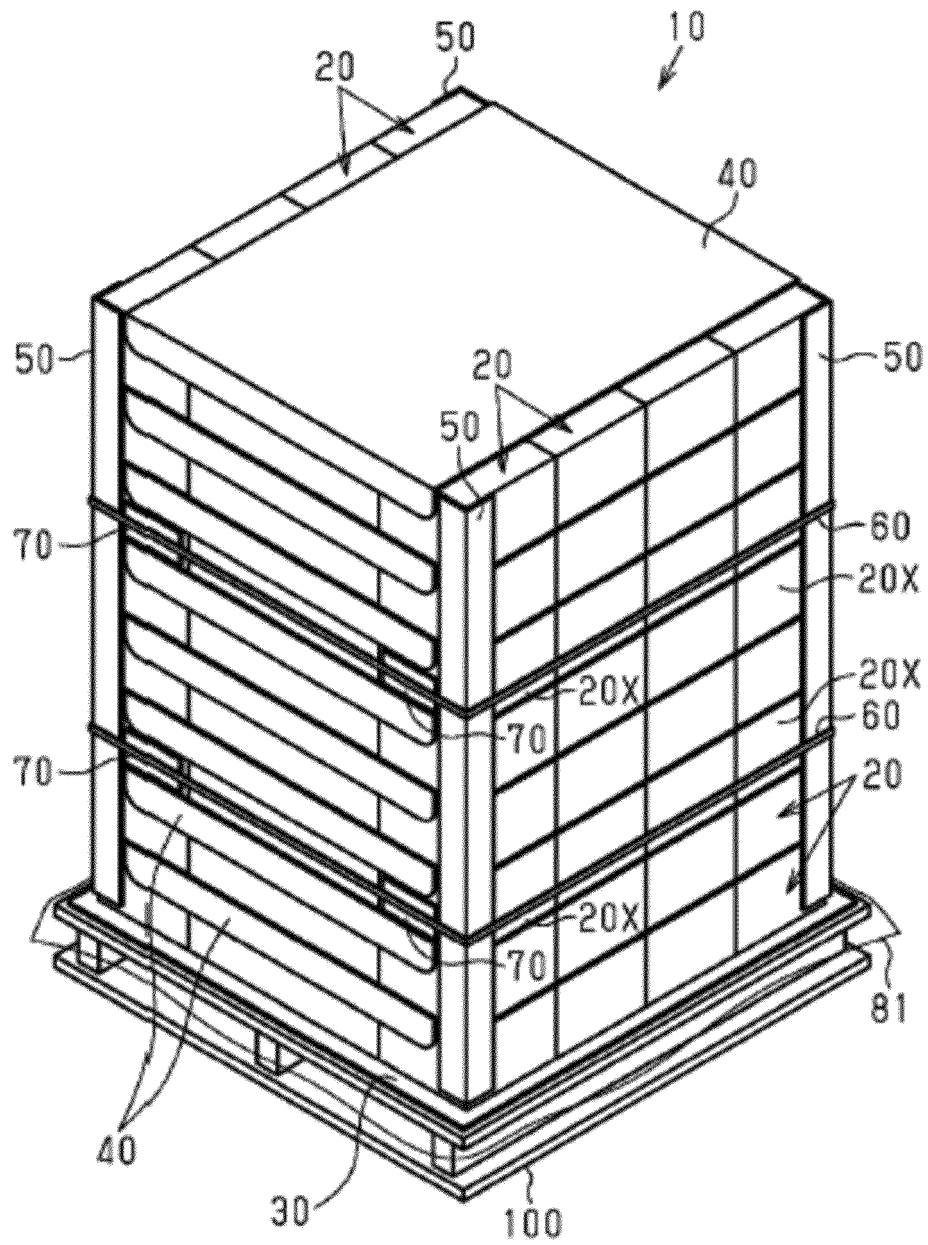


FIG. 3

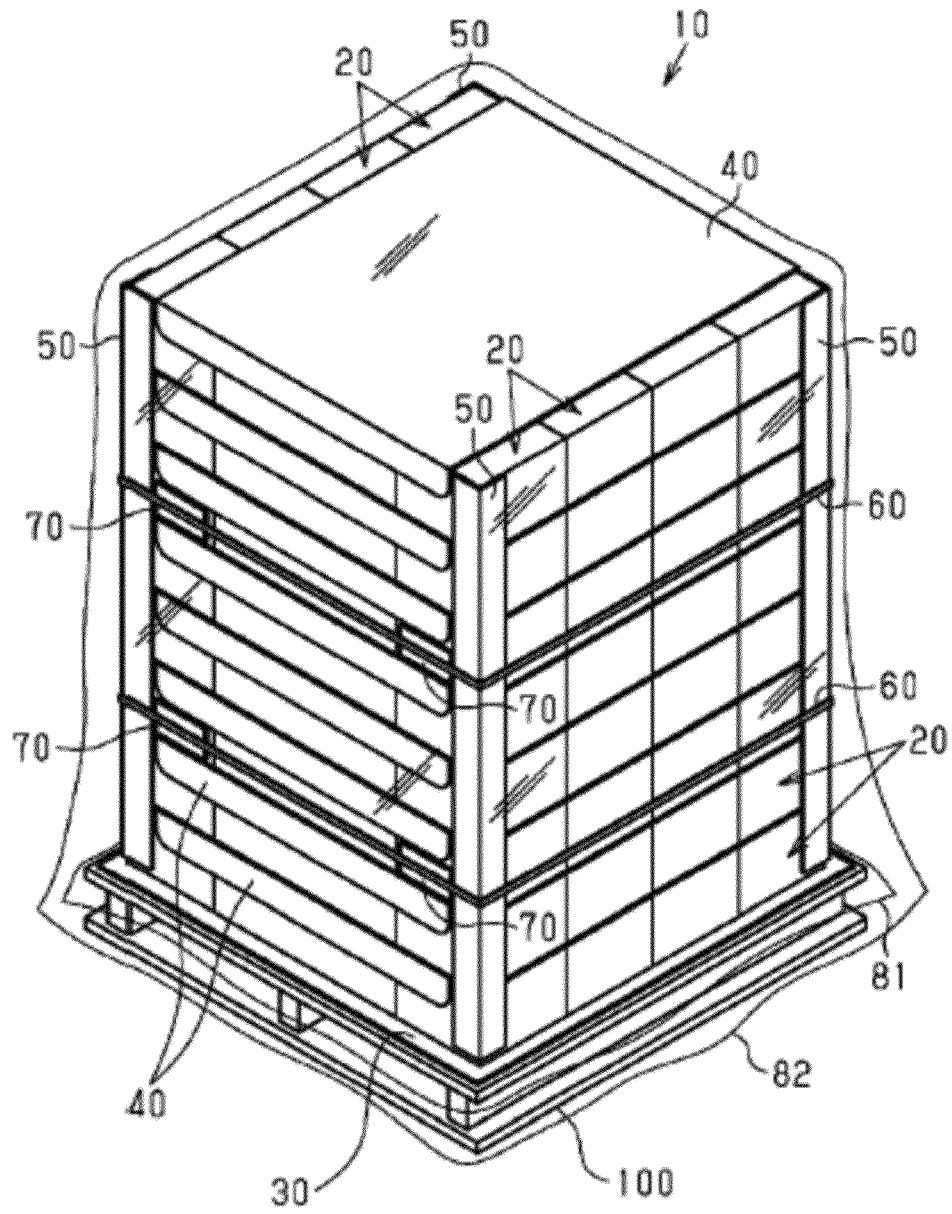


FIG. 4

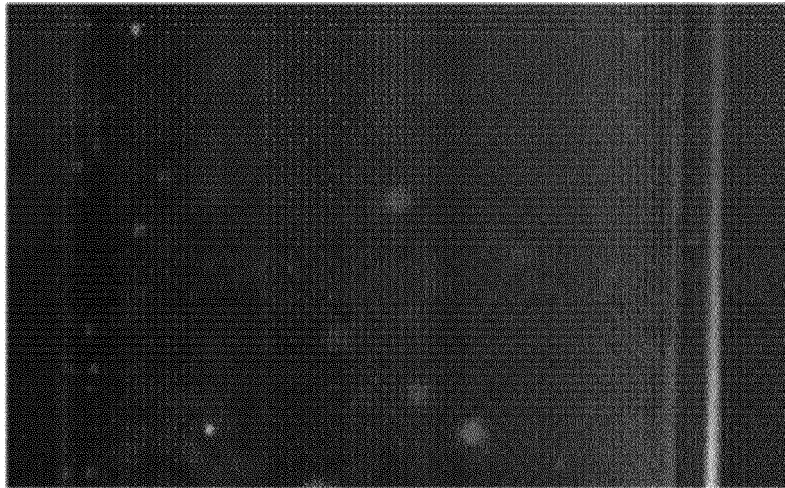


FIG. 5

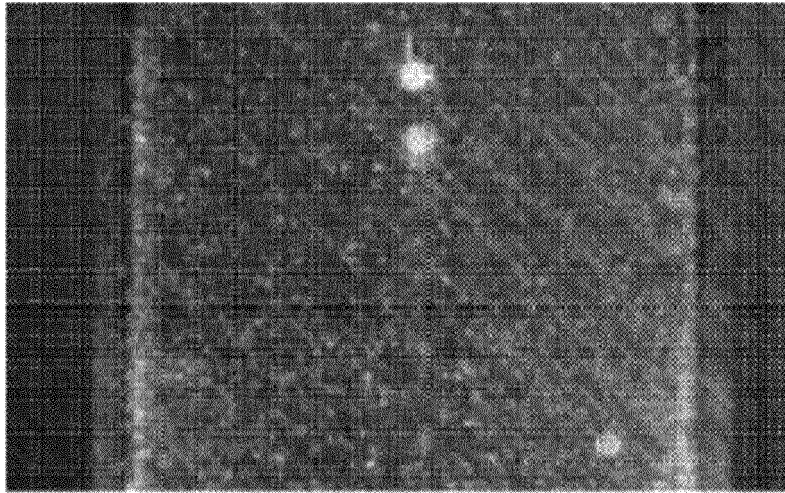


FIG. 6

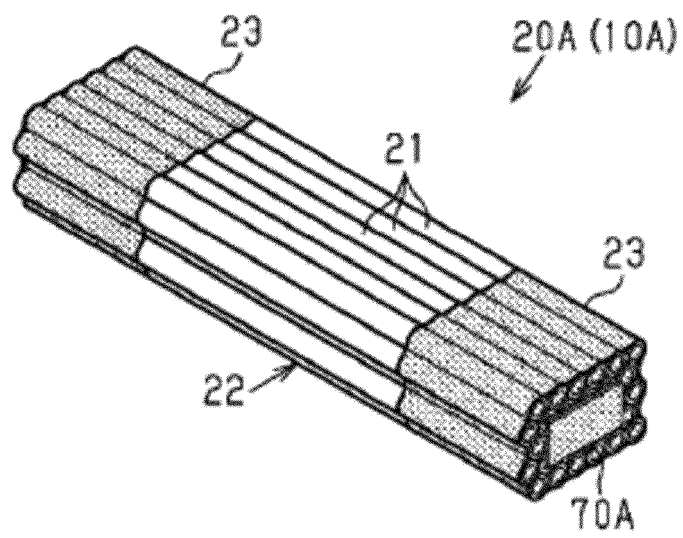


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/046405

A. CLASSIFICATION OF SUBJECT MATTER <i>B65D 85/30</i> (2006.01)i; <i>B65D 81/05</i> (2006.01)i; <i>B65D 81/26</i> (2006.01)i FI: B65D81/26 Q; B65D81/05 500A; B65D85/30 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) B65D81/05; B65D81/26; B65D85/30 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Published examined utility model applications of Japan 1922-1996 Published unexamined utility model applications of Japan 1971-2022 Registered utility model specifications of Japan 1996-2022 Published registered utility model applications of Japan 1994-2022 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)															
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>JP 2020-100442 A (NIPPON ELECTRIC GLASS CO., LTD.) 02 July 2020 (2020-07-02) paragraphs [0032]-[0119], fig. 1-5</td> <td>1-9</td> </tr> <tr> <td>Y</td> <td>JP 2020-93966 A (NIPPON SHEET GLASS CO., LTD.) 18 June 2020 (2020-06-18) paragraph [0141]</td> <td>1-9</td> </tr> <tr> <td>Y</td> <td>JP 2016-78940 A (ASAHI GLASS CO., LTD.) 16 May 2016 (2016-05-16) paragraph [0035], fig. 1</td> <td>1-9</td> </tr> <tr> <td>A</td> <td>JP 2015-129016 A (NIPPON ELECTRIC GLASS CO., LTD.) 16 July 2015 (2015-07-16)</td> <td>1-9</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	JP 2020-100442 A (NIPPON ELECTRIC GLASS CO., LTD.) 02 July 2020 (2020-07-02) paragraphs [0032]-[0119], fig. 1-5	1-9	Y	JP 2020-93966 A (NIPPON SHEET GLASS CO., LTD.) 18 June 2020 (2020-06-18) paragraph [0141]	1-9	Y	JP 2016-78940 A (ASAHI GLASS CO., LTD.) 16 May 2016 (2016-05-16) paragraph [0035], fig. 1	1-9	A	JP 2015-129016 A (NIPPON ELECTRIC GLASS CO., LTD.) 16 July 2015 (2015-07-16)	1-9
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.													
Y	JP 2020-100442 A (NIPPON ELECTRIC GLASS CO., LTD.) 02 July 2020 (2020-07-02) paragraphs [0032]-[0119], fig. 1-5	1-9													
Y	JP 2020-93966 A (NIPPON SHEET GLASS CO., LTD.) 18 June 2020 (2020-06-18) paragraph [0141]	1-9													
Y	JP 2016-78940 A (ASAHI GLASS CO., LTD.) 16 May 2016 (2016-05-16) paragraph [0035], fig. 1	1-9													
A	JP 2015-129016 A (NIPPON ELECTRIC GLASS CO., LTD.) 16 July 2015 (2015-07-16)	1-9													
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Date of the actual completion of the international search 07 February 2022	Date of mailing of the international search report 22 February 2022														
Name and mailing address of the ISA/JP Japan Patent Office (ISA/JP) 3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915 Japan	Authorized officer Telephone No.														

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Information on patent family members

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		KR 10-2016-0045600 A	
JP 2015-129016 A	16 July 2015	(Family: none)	

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REFERENCES CITED IN THE DESCRIPTION

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