

DESCRIPTION

FRESHNESS KEEPING APPARATUS

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Technical Field

[0001] The present invention relates to a freshness keeping apparatus that stores fresh products and keeps their freshness.

10 Background Art

[0002] A refrigerating or freezing container described in Patent Document 1 and a freshness keeping container apparatus described in Patent Document 2 are known examples of a freshness keeping apparatus for storing fresh products and keeping their freshness.

15 [0003] In the refrigerating or freezing container described in Patent Document 1, an oxygen concentration and an ethylene concentration inside the container for storing fresh products such as agricultural products and fresh foods are controlled by a gas management system, while preventing the fresh products from drying using a humidity management system. In this manner,
20 degradation of the fresh products due to respiration, transpiration, and ethylene is prevented.

[0004] In the freshness keeping container apparatus described in Patent Document 2, a plasma generation unit forms an electric discharge space that is in communication with, is interposed in, or faces a forcible distribution path
25 of an atmosphere gas in a container for storing fresh products such as fruits, vegetables, flowers, seafood, and meats. In this manner, by decomposing a growth hormone such as ethylene in the atmosphere gas and sterilizing floating bacteria in the atmosphere gas, degradation of freshness of the fresh products is suppressed.

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Citation List

Patent Document

[0005] Patent Document 1: JP 2017-198410A

[0006] Patent Document 2: JP 2019-41757A

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Summary of Invention

Technical Problem

[0007] Incidentally, in order to improve a freshness keeping function for fresh products, it is desirable to humidify the fresh products by actively reducing the ethylene concentration as described in Patent Document 1 while forming a high-frequency electrical field as described in Patent Document 2 (paragraph 0038 in Patent Document 2). However, in Patent Document 1, since humidification using nitrogen water and spraying of nitrogen water are directly performed on the fresh products from above (paragraphs 0044 to 0047 and FIG. 1 in Patent Document 1), it is necessary to adjust the humidification method in accordance with the size and amount of the stored fresh products in order not to excessively humidify the fresh products. In addition, since nitrogen gas is injected into the container to discharge the air already present in the container from a ventilation hole in order to decrease the ethylene concentration (paragraph 0034 in Patent Document 1), there is a problem in that the humidified air is also discharged through the ventilation hole.

[0008] Also, water generally includes germs, and when the nitrogen water includes germs, it is not preferable, especially when the fresh products are foods. Although sterilization of floating bacteria in the atmosphere gas using plasma is mentioned in Patent Document 2 (paragraph 0007 in Patent Document 2), no method for efficiently sterilizing highly humid air is disclosed.

[0009] The present invention has been made in view of the above circumstances, and aims to provide a freshness keeping apparatus with which ethylene removal and humidification on the air can be performed while applying an electrical field to fresh products, and the humidification thereof can be cleanly

performed without direct spraying and the like on the fresh products.

Solution to Problem

[0010] In order to solve the above-described problem, a freshness keeping
5 apparatus according to the present invention is a freshness keeping apparatus
including a refrigerating or freezing storage for storing a fresh product, an
electrical field generation means for generating an electrical field in an
internal space of the storage, and an air conditioning means that is provided
in the internal space and is for conditioning the air in the internal space, and
10 the air conditioning means includes a box-shaped housing, an air inlet and an
air outlet that are provided in the housing, an ethylene gas decomposing filter
provided near the air inlet, an air path that is provided inside the housing and
through which the air inlet and the air outlet are in communication with each
other, a fan rotatably provided in the air path, a humidification means provided
15 at a position in the air path that is closer to the air outlet than the fan, and a
sterilization means provided at a position in the air path that is closer to the
air outlet than the humidification means, and due to rotation of the fan, the air
in the internal space passes through the ethylene gas decomposing filter via
the air inlet, is taken into the air path, passes through the fan, is humidified
20 by the humidification means, is sterilized by the sterilization means, and then
is blown from the air outlet.

[0011] The air inlet and the air outlet may be provided in a front surface of
the housing.

[0012] Also, the humidification means may include a water tank formed along
25 a wall surface of the air path, and a humidification element that absorbs water
stored in the water tank.

[0013] Further, the sterilization means may include a photocatalyst applied
to the wall surface of the air path, and a light source that emits light toward
the photocatalyst.

Advantageous Effects of Invention

[0014] According to the present invention, a freshness keeping apparatus can be provided with which ethylene removal and humidification on the air can be performed while applying an electrical field to fresh products, and the humidification can be cleanly performed without direct spraying and the like on the fresh products.

Brief Description of Drawings

[0015] FIG. 1 is an illustrative diagram showing the inside of a container of a freshness keeping container apparatus according to an embodiment of the present invention.

FIG. 2 is an illustrative diagram showing an example in which the installation position and installation orientation of an air conditioning device of the freshness keeping container apparatus in FIG. 1 have been changed.

FIG. 3 is an illustrative diagram showing the front surface and the left side surface of the air conditioning device of the freshness keeping container apparatus in FIG. 1.

FIG. 4 is an illustrative diagram showing the front surface and the right side surface of the air conditioning device in FIG. 3.

FIG. 5 is an illustrative diagram showing a cross section of the air conditioning device taken along line A-A in FIG. 4.

FIG. 6 is an illustrative diagram showing a cross section of the air conditioning device taken along line B-B in FIG. 4.

FIG. 7 is an illustrative diagram showing the inside of a container of another freshness keeping container apparatus according to an embodiment of the present invention.

FIG. 8 is an illustrative diagram showing the inside of the container of the freshness keeping container apparatus in FIG. 7 in a plan view.

Description of Embodiments

[0016] An embodiment of the present invention will be described with reference to the drawings.

[0017] As shown in FIG. 1, a freshness keeping container apparatus 1 according to the present embodiment includes a cuboid container 2, an electrode panel 4 provided in an internal space 3 of the container 2, a metal shelf 5, and an air conditioning device 6.

[0018] The container 2 is a fresh product storage for storing fresh products such as vegetables, fruits, fresh flowers, seafood, and meats, and the temperature of the internal space 3 is kept within a refrigerating or freezing temperature range by a cooling device, which is not shown.

[0019] The electrode panel 4 generates an electrical field (electric field) in the internal space 3 by a high voltage being applied thereto. The enzymes in the fresh products are activated due to the electrical field, and as a result of that, respiration of the fresh products is suppressed, and nutrient consumption thereof is reduced.

[0020] The metal shelf 5 is made of aluminum, for example, and is installed in an L shape in a plan view in the internal space 3. The fresh products are placed and stored on the metal shelf 5, and the air conditioning device 6 is also placed and installed on the metal shelf 5. In FIG. 1, the air conditioning device 6 is installed on the right end side of the metal shelf 5 in the X direction and faces in the Y direction. However, the position and orientation in which the air conditioning device 6 is installed are not limited. For example, as shown in FIG. 2, the air conditioning device 6 may also be installed on the left end side in the Y direction and face in the X direction.

[0021] As shown in FIGS. 3 to 6, the air conditioning device 6 includes a box-shaped housing 7, and an air inlet 8 and an air outlet 9 provided in the housing 7.

[0022] The housing 7 is formed in a cuboid shape, and includes a front surface 10, a rear surface 11, a top surface 12, a bottom surface 13, and side surfaces 14 and 15. A door 16 capable of opening and closing is provided in the upper

portion of the front surface 10, and an air outlet 9 is formed in the door 16.

[0023] The air inlet 8 is formed below the door 16 in the front surface 10, and an ethylene gas decomposing filter 17 is removably attached at (a position near) the air inlet 8 so as to cover the air inlet 8.

5 [0024] Handles 18 and 19 for carrying the air conditioning device 6 are formed on the side surfaces 14 and 15. A connection portion 20 to which a hose (not shown) for supplying water to the housing 7 is connected is provided on the side surface 14.

[0025] An air path 21 through which the air inlet 8 and the air outlet 9 are in
10 communication with each other is formed inside the housing 7. In the air path 21, a fan 22 that has a rotational axis extending in the vertical direction and is driven to rotate by a motor is provided substantially at the same height as an upper edge portion 23 of the ethylene gas decomposing filter 17.

[0026] A gutter-like water tank 24 is formed along wall surfaces of the rear
15 surface 11 and the side surfaces 14 and 15 in the air path 21. Water is supplied via the hose connected to the connection portion 20 and is stored in the water tank 24.

[0027] A humidification element 25 for absorbing and storing water that is stored in the water tank 24 is located above the water tank 24 substantially at
20 the same height as a lower edge portion 26 of the door 16 so as to cover the fan 22.

[0028] A photocatalyst 28 is applied to wall surfaces of the rear surface 11 and the side surfaces 14 and 15 that define a space 27 above the humidification element 25, of the air path 21. An LED light 29 that emits light toward the
25 photocatalyst 28 is provided on the top surface 12 that faces the space 27.

[0029] When the fresh products are stored in the freshness keeping container apparatus 1, the temperature of the internal space 3 of the container 2 is kept low, an electrical field is generated by the electrode panel 4, and thus degradation of the fresh products due to respiration is suppressed.

30 [0030] Also, the fan 22 of the air conditioning device 6 rotates, the air in the

internal space 3 passes through the ethylene gas decomposing filter 17 via the air inlet 8 to remove the ethylene in the air, and the air is taken into the air path 21. The air taken into the air path 21 passes through the fan 22, is humidified by the humidification element 25, is sterilized and deodorized by the photocatalyst 28 illuminated by the LED light 29, and then is blown from the air outlet 9.

[0031] The freshness keeping container apparatus 1 according to the embodiment includes a refrigerating or freezing container 2 for storing a fresh product, an electrode panel 4 for generating an electrical field in an internal space 3 of the container 2, and an air conditioning device 6 that is provided in the internal space 3 and is for conditioning the air in the internal space 3, and the air conditioning device 6 includes a box-shaped housing 7, an air inlet 8 and an air outlet 9 that are provided in the housing 7, an ethylene gas decomposing filter 17 provided near the air inlet 8, an air path 21 that is provided inside the housing 7 and through which the air inlet 8 and the air outlet 9 are in communication with each other, a fan 22 rotatably provided in the air path 21, a humidification element 25 provided at a position in the air path 21 that is closer to the air outlet 9 than the fan 22, and a photocatalyst 28 and an LED light 29 provided at a position in the air path 21 that is closer to the air outlet 9 than the humidification element 25, and due to rotation of the fan 22, the air in the internal space 3 passes through the ethylene gas decomposing filter 17 via the air inlet, is taken into the air path 21, passes through the fan 22, is humidified by the humidification element 25, is sterilized by a photocatalyst 28 and an LED light 29, and then is blown from the air outlet. 9. With this configuration, ethylene removal and humidification on the air can be performed while applying an electrical field to the fresh products.

[0032] Also, the humidification is performed inside the air conditioning device 6 by the humidification element 25, and the air humidified by the humidification element 25 is returned to the internal space 3 after being sterilized by the photocatalyst 28 and the LED light 29. Accordingly,

humidification can be cleanly performed without directly spraying the fresh foods or the like. Also, the ethylene removal is performed by the ethylene gas decomposing filter 17 before the humidification performed by the humidification element 25, and thus the humidity in the humidified air is not lost at the ethylene gas decomposing filter 17, and the ethylene gas decomposing filter 17 is not humidified due to the humidified air.

[0033] Since the air inlet 8 and the air outlet 9 are provided in the front surface 10 of the housing 7, even in the case where the air conditioning device 6 is placed on the metal shelf 5 and a shelf plate is located immediately above the air conditioning device 6, or fresh products are placed on both sides of the air conditioning device 6, the shelf and the fresh products do not obstruct the air that is taken in and blown out.

[0034] Further, since the door 16 is provided on the front surface 10, even in the case where the air conditioning device 6 is placed on the metal shelf 5 and a shelf plate is located immediately above the air conditioning device 6 or fresh products are placed on both sides of the air conditioning device 6, cleaning and maintenance of the interior of the housing 7 can be readily performed while the door 16 is open.

[0035] Although an embodiment of the present invention was described above as an example, the present invention is not limited to the above embodiment, and can be modified or the like as appropriate without departing from the spirit of the invention.

[0036] For example, although the above embodiment described an example in which the single electrode panel 4 is provided in the internal space 3 of the container 2, a configuration is also possible in which a pair of the electrode panels 4 are provided and the metal shelf 5 for storing the fresh products can be disposed between the pair of electrode panels 4 as shown in FIGS. 7 and 8.

[0037] Also, the air conditioning device 6 may be formed in one piece with the container 2 instead of being separate from the container 2. The form of the freshness keeping apparatus is not limited to a freshness keeping container

apparatus, and may be any form.

List of Reference Numerals

[0038] 5	1	Freshness keeping container apparatus (Freshness keeping apparatus)
	2	Container (Storage)
	3	Internal space
	4	Electrode panel (Electrical field generation means)
	6	Air conditioning device (Air conditioning means)
10	7	Housing
	8	Air inlet
	9	Air outlet
	10	Front surface
	17	Ethylene gas decomposing filter
15	21	Air path
	22	Fan
	24	Water tank
	25	Humidification element
	28	Photocatalyst
20	29	LED light (Light source)

CLAIMS

1. A freshness keeping apparatus comprising:
 - a refrigerating or freezing storage for storing a fresh product;
 - 5 an electrical field generation means for generating an electrical field in an internal space of the storage; and
 - an air conditioning means that is provided in the internal space and is for conditioning the air in the internal space,
 - wherein the air conditioning means includes:
 - 10 a box-shaped housing;
 - an air inlet and an air outlet that are provided in the housing;
 - an ethylene gas decomposing filter provided near the air inlet;
 - an air path that is provided inside the housing and through which the air inlet and the air outlet are in communication with each other;
 - 15 a fan rotatably provided in the air path;
 - a humidification means provided at a position in the air path that is closer to the air outlet than the fan; and
 - a sterilization means provided at a position in the air path that is closer to the air outlet than the humidification means, and
 - 20 due to rotation of the fan, the air in the internal space passes through the ethylene gas decomposing filter via the air inlet, is taken into the air path, passes through the fan, is humidified by the humidification means, is sterilized by the sterilization means, and then is blown from the air outlet.
- 25 2. The freshness keeping apparatus according to claim 1,
 - wherein the air inlet and the air outlet are provided in a front surface of the housing.
3. The freshness keeping apparatus according to claim 1 or 2,
 - 30 wherein the humidification means includes a water tank formed

along a wall surface of the air path, and a humidification element that absorbs water stored in the water tank.

4. The freshness keeping apparatus according to any one of claims 1 to
5 3,

wherein the sterilization means includes a photocatalyst applied to the wall surface of the air path, and a light source that emits light toward the photocatalyst.