

(19)



(11)

EP 1 794 518 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
19.08.2009 Bulletin 2009/34

(21) Application number: **05700418.6**

(22) Date of filing: **12.01.2005**

(51) Int Cl.:
F25D 23/00 (2006.01)

(86) International application number:
PCT/CN2005/000044

(87) International publication number:
WO 2006/026898 (16.03.2006 Gazette 2006/11)

(54) **A FRESH KEEPER**

FRISCHHALTEVORRICHTUNG

COMPARTIMENT FRAICHEUR

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

(30) Priority: **06.09.2004 CN 200420093067**

(43) Date of publication of application:
13.06.2007 Bulletin 2007/24

(73) Proprietor: **AB ELECTROLUX
105 45 Stockholm (SE)**

(72) Inventors:
• **XAVIER, Hue
I-31010 Orsago (IT)**

• **YANG, Simin
Changsha,
Hunan 410000 (CN)**

(74) Representative: **Samzelius, Roger Mikael et al
AB Electrolux
Group Intellectual Property
105 45 Stockholm (SE)**

(56) References cited:
**WO-A-20/05114070 CA-A1- 2 326 906
CN-Y- 2 273 396 CN-Y- 2 442 207
JP-A- 2002 206 853 KR-A- 2003 038 997
US-A- 3 680 941 US-A1- 2003 115 892**

EP 1 794 518 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

Technical field

5 **[0001]** The invention relates to a fresh keeper. More particularly, the invention relates to a fresh keeper for a refrigerating apparatus.

Background art

10 **[0002]** The two most important factors affecting the shelf-life of refrigerated food are temperature and humidity. So far most of the attention has been aimed at controlling just the temperature of the refrigerators; there are not a method and a device keeping fresh by controlling the humidity.

15 **[0003]** Several fresh keepers have been used in refrigerating apparatus. A kind of fresh keeper is widely used at present. This fresh keeper consists of a simple single-layer drawer which was not sealed well, thus the temperature in the drawer is not stable and water diffuses quickly while the temperature and the humidity of ambience and their variation have influence on those inside the drawer, thereby the food contained in the drawer is easy to perish or dehydrate.

20 **[0004]** A kind of sealed box is also used to keep fresh. Some sealed material are used in the sealed box while the sealed box could not well prevent water from diffusing, because the vapor pressure of air in the box forces the humidity in the box to balance with that of ambience through a small aperture, therefore water would diffuse quickly and the temperature would not be stable if there is even a small aperture, even if the food is stored in a sealed box.

25 **[0005]** There is further a fresh keeper to adjust the humidity thereof by means of a mechanical adjusting structure, but the mechanical adjusting structure could not keep the humidity inside the box stable exactly.

30 **[0006]** US 2003115892 A1 discloses a food storage compartment comprising a lower section, an upper section, a receptacle, a partition plate and an inner housing. The food storage compartment according to US 2003115892 further comprises a thermoelectric device to establish a flow of temperature controlled air. The outer housing is integrated with the electric circuitry and the internal air streams of the refrigerator for powering the fan and circulating cold air through the device, and the inner housing is fixedly mounted in the outer housing.

35 **[0007]** US 3680941 discloses a housing holding a drawer. The housing is fixedly mounted in the refrigerator.

40 **[0008]** A fresh keeper according to the preamble of claim 1 is known from US 2003115892 and US3680941.

45 **[0009]** The prior device keeping fresh above can not provide stable humidity and temperature which is useful to keep vegetable and fruits fresh.

Contents of the invention

50 **[0010]** The object of the invention is to provide a fresh keeper which can ensure stable temperature and higher humidity thereof, therefore the invention could prevent the water contained in the food from diffusing.

55 **[0011]** To achieve the object of the invention a fresh keeper according to claim 1 is provided.

60 **[0012]** According to the invention, said outer drawer consists of a left sidewall, a right sidewall, a back and a bottom, said inner drawer consists of a left sidewall, a right sidewall, a back, a bottom and a front, said front is single-layer or double-layer.

65 **[0013]** According to the invention, said outer drawer and inner drawer is opened on top.

70 **[0014]** According to the invention, an isolating device is provided between said inner drawer and said outer drawer.

75 **[0015]** According to the invention, said isolating device is at least one protrusion provided outside said inner drawer or inside said outer drawer.

80 **[0016]** According to the invention, said isolating device is a flange provided on at least one sidewall of said inner drawer.

85 **[0017]** According to the invention, two integrated guides are provided on the edge of the bottom of said outer drawer such that said inner drawer could be supported on the integrated guides.

90 **[0018]** According to the invention, at least one cylindrical portion is provided on the bottom outside said inner drawer or the top inside said outer drawer.

95 **[0019]** According to the invention, said lid is formed with transparent material or translucent material.

100 **[0020]** According to the invention, said gap is 5mm-30mm.

105 **[0021]** According to the invention, said gap is 10mm.

110 **[0022]** According to the invention, one or more movable dividing plates are put in said inner drawer.

115 **[0023]** The invention, as compared with the prior art has following advantages:

First, the fresh keeper is equivalent to be thickened due to the air isolating layer in the invention so that the effect of heat preservation is improved, thereby the temperature inside the fresh keeper is not easily influenced by ambience, and the temperature inside the fresh keeper is more stable.

Second, because of the double-layer structure used in the invention, an air layer is formed. The pressure of the vapor in the air layer is much more than that in the inner drawer, thus it is difficult for the vapor in the inner drawer to diffuse into the air layer, and thereby the moisture in the inner drawer is ensured so that the humidity therein is kept to be a higher value.

Description of figures

[0024] The invention is described in more detail below, with reference to the accompanying drawings, in which:

Figure 1 is an exploded view of the fresh keeper according to the first embodiment of the invention;
 Figure 2 is a sectional view of the fresh keeper in figure 1, in the tightly engaged state;
 Figure 3 is an exploded view of the fresh keeper according to the second embodiment of the invention;
 Figure 4 is a sectional view of the fresh keeper in figure 3, in the tightly engaged state;
 Figure 5 is a sectional view taken along line A-A in figure 4;
 Figure 6 is an exploded view of the fresh keeper according to the third embodiment of the invention;
 Figure 7 is a sectional view of the fresh keeper in figure 6, in the tightly engaged state;
 Figure 8 is an exploded view of the fresh keeper according to the forth embodiment of the invention;
 Figure 9 is a sectional view of the fresh keeper in figure 8, in the tightly engaged state;
 Figure 10 is a sectional view taken along line B-B in figure 9;
 Figure 11 is a graph showing the comparison between the variation of the relative humidity in the fresh keeper of the invention and that in the vegetable drawer of prior art;
 Figure 12 is a graph showing the comparison between the variation of the temperature in the fresh keeper of the invention and that in the vegetable drawer of prior art.

Embodiment of the invention

[0025] The fresh keeper shown in figure 1 consists of a lid 1, an outer drawer 2 and an inner drawer 3. The inner drawer 3 could be several drawers in which different foods may be put. The inner drawer 3 is smaller than the outer drawer by a predetermined size. When the inner drawer 3 is put into the outer drawer 2, the lid 1 is installed on the outer drawer 2, a front wall 4 of the inner drawer 3 lies against two sidewalls, a bottom and the lid 1 of the outer drawer 2, thereby a sealed space is formed inside the inner drawer 3. At least one protrusion 5 is provided in the sidewalls and the bottom of the inner drawer 3, when the inner drawer 3 is set in the outer drawer 2, a desired distance is kept between the inner drawer 3 and the outer drawer 2 due to the protrusion 5, thus an air insulation is formed between the inner drawer 3 and the outer drawer 2, as shown in figure 2, the protrusions 5 could also be provided on the sidewall and the bottom of the outer drawer 2. The gap of the air insulation between the inner drawer 3 and the outer drawer 2 is 5mm-30mm because of the difference of their sizes. Preferably, the gap is 10mm. Preferably, the front 4 of the inner drawer is double-layer.

[0026] A flange 6 may be provided in the predetermined position of the two sidewalls and the back of the inner drawer 3, the flange 6 is preferably provided on the top, as shown in figure 3, thus a desired distance exists between the sidewalls and the back of the outer drawer 2 and those of inner drawer 3; preferably, two integrated guides 8 are provided on the edge of the bottom of the inner drawer 2, as shown in figure 5, thus the inner drawer 3 is supported on the integrated guides 8 of the outer drawer 2, when the fresh keeper is in close state, a desired distance exists between the bottom of the inner drawer and that of the outer drawer, as shown in figure 4.

[0027] As shown in figure 6, an outer drawer 2 having four sidewalls and a bottom, and an inner drawer 3 having four sidewalls and a bottom could also be used, the inner drawer 3 could be put into the outer drawer 2 directly, a cylindrical portion 7 is provided on the bottom of said inner drawer 3, the cylindrical portion 7 could also be provided in the corresponding position inside said outer drawer 2, therefore a desired distance exists between the bottom of the inner drawer and that of the outer drawer. A flange 6 could be provided at predetermined position in the four sidewalls of the inner drawer 3, the flange is preferably set on the top, as shown in figures 6 and 7, therefore a desired distance exists between the sidewalls of the inner drawer 3 and those of the outer drawer 2 when the inner drawer 3 is put into the outer drawer 2. The distance between the sidewalls and the bottoms of the two drawers forms an air isolating layer. When the lid 1 covers the outer drawer 2, a sealed space is formed inside. Preferably, a handle may be provided on the lid 1 to facilitate to open/close the lid 1.

[0028] The outer drawer 2 may also be formed integrally with said lid 1, a flange 5 is provided on the left and right sidewalls of the inner drawer 3 respectively, a flange 10 is also provided on the left and right sidewalls of the outer drawer 2 respectively, as shown in figure 8, a stiffener 9 extending in the direction parallel to the back is provided on the lid of the outer drawer 2 at the distance from the back of the outer drawer, as shown in figure 9, when the inner drawer 3 is put into the outer drawer 2, the flanges 5 of the inner drawer 3 could overlap with the flanges 10 of the outer drawer 2,

the back of the inner drawer could put against the stiffener 9, therefore a distance could be formed between the left and right sidewalls, the back, the bottom of the inner drawer and those of the outer drawer.

[0029] A removable dividing plate which divides the inner drawer into several areas is provided in the inner drawer 3 to facilitate to store the food.

[0030] Perishable products like vegetables that are not closely packed in moisture proof material stand the risk of dehydration. To avoid this they require an environment with high (>95%) and stable relative humidity and a low (-1-0°C) and stable temperature to keep them fresh. The fluctuations of temperature and humidity should lie within $\pm 0.5^\circ\text{C}$ and $\pm 5\%$ respectively.

[0031] A test was performed on the fresh keeper of the invention with a 10mm air gap. A lettuce head was put in the fresh keeper as shown in figure 6 and one into the vegetable drawer of the prior art. Lettuce was chosen because it is a perishable vegetable with a large surface area. The duration of the test was 18 days without opening the refrigerator. Temperature and relative humidity were measured. -

[0032] The weight of each lettuce was measured before and after they were placed in the refrigerator, and the results are as follows:

	Initial weight (g)	Weight reduction (g)	Loss (%)
Fresh keeper of the invention	290	20.7	7
Conventional fresh keeper	313	57.7	18

[0033] From the test results, it can be seen that, the weight reduction of the lettuce in the fresh keeper of the invention is only 7% compared to 18% in the conventional vegetable drawer. It should be noted that, before the test started the lettuce head put into the conventional vegetable drawer was physically larger compared to the one put into the fresh keeper of the invention, and an appreciable difference could be observed when comparing the two lettuce heads after the test.

[0034] A test was performed on the fresh keeper of the invention as shown in figure 1. The results of the test show that, the relative humidity in the fresh keeper of the invention varies between 87-90%, and a fluctuation of only $\pm 1.5\%$ relative humidity is achieved much less than the allowable fluctuation of $\pm 5\%$, as shown in figure 11. Figure 11 is a graph showing the variation of the humidity in the fresh keeper of the invention and that in the vegetable drawer. It could be seen appreciably that the fluctuation of relative humidity in the fresh keeper of the invention is less than that in the vegetable drawer of the prior art. The temperature in the fresh keeper of the invention fluctuates between approximately 4.8-5.1 °C, a fluctuation of only $\pm 0.15^\circ\text{C}$, far below the desired value of $\pm 0.5^\circ\text{C}$, as shown in figure 12. Figure 12 is a graph showing the variation of the temperature in the fresh keeper of the invention and that in the vegetable drawer of the prior art. It could be seen appreciably that the fluctuation of relative humidity in the fresh keeper of the invention is far below that in the vegetable drawer of the prior art.

[0035] The results show that between the inner drawer and the outer drawer an air insulating layer is formed which has the damping effects to temperature and humidity so that the temperature and humidity inside the fresh keeper are kept stable.

[0036] For one skilled in the art, it is obvious that the invention is not limited to the above described preferable embodiments only, but it can be modified within the scope of the appended claims.

Claims

1. A fresh keeper for a refrigerating apparatus comprising a lid (1), an outer drawer (2) and at least one inner drawer (3) which is contained in said outer drawer, a gap is formed between the outer drawer and the inner drawer such that, when the lid is installed on the outer drawer (2), said outer drawer (2), said inner drawer (3) and said lid form a sealed space when they are in mounting state, **characterized in that** the outer drawer on the outside thereof is provided with a portion for engagement with a supporting part of the refrigerator so that the fresh keeper is slidably put into the refrigerator.
2. The fresh keeper according to claim 1, **characterized in that** said outer drawer (2) consists of a left sidewall, a right sidewall, a back and a bottom, said inner drawer (3) consists of a left sidewall, a right sidewall, a back, a bottom and a front, said front is a single-layer or double-layer front (4).
3. The fresh keeper according to claim 1, **characterized in that** each said outer drawer (2) and inner drawer (3) is opened on top.

4. The fresh keeper according to any one of claims 1 to 3, **characterized in that** an isolating device is provided between said inner drawer and said outer drawer.
5. The fresh keeper according to claim 4, **characterized in that** said isolating device is at least one protrusion (5) provided outside said inner drawer (3) or inside said outer drawer (2).
6. The fresh keeper according to claim 4, **characterized in that** said isolating device is a flange (6) provide on at least one sidewall of said inner drawer.
7. The fresh keeper according to claim 2, **characterized in that** two integrated guides (8) are provided on the edges of the bottom of said outer drawer (2) such that said inner drawer (3) could be supported on the integrated guides.
8. The fresh keeper according to claim 3, **characterized in that** at least one cylindrical portion (7) is provided on the bottom outside said inner drawer (3) or the top inside said outer drawer (2).
9. The fresh keeper according to any one of claims 1 to 3, **characterized in that** said lid is formed with transparent material or translucent material.
10. The fresh keeper according to any one of claims 1 to 3, **characterized in that** said gap is 5mm-30mm.
11. The fresh keeper according to claim 10, **characterized in that** said gap is 10mm.
12. The fresh keeper according to claim 1 or 2, **characterized in that** one or more small holes are provided on the inner drawer (3).
13. The fresh keeper according to claim 1 or 2, **characterized in that** one or more removable dividing plates are put in said inner drawer (3).

Patentansprüche

1. Frischhalter für eine Kühlvorrichtung, der eine Deckplatte (1), eine Außenlade (2) und mindestens eine Innenlade (3) umfasst, die in der Außenlade enthalten ist, wobei zwischen der Außenlade und der Innenlade ein Zwischenraum ausgebildet ist, so dass wenn die Deckplatte auf der Außenlade (2) installiert ist, die Außenlade (2), die Innenlade (3) und die Deckplatte einen abgedichteten Raum ausbilden, wenn sie sich im Montagezustand befinden, **dadurch gekennzeichnet, dass** die Außenlade an ihrer Außenseite mit einem Teil ausgestattet ist, der für den Eingriff in einen Auflageteil des Kühlschranks vorgesehen ist, so dass der Frischhalter in den Kühlschrank geschoben werden kann.
2. Frischhalter gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Außenlade (2) aus einer linken Seitenwand, einer rechten Seitenwand, einer Rückwand und einer Bodenplatte besteht, und die Innenlade (3) aus einer linken Seitenwand, einer rechten Seitenwand, einer Rückwand, einer Bodenplatte und einer Frontseite besteht, wobei die Frontseite eine ein- oder zweischichtige Frontseite (4) ist.
3. Frischhalter gemäß Anspruch 1, **dadurch gekennzeichnet, dass** sowohl die Außenlade (2) wie auch die Innenlade (3) oben zu öffnen ist.
4. Frischhalter gemäß einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** zwischen der Innenlade und der Außenlade eine Isoliervorrichtung vorgesehen ist.
5. Frischhalter gemäß Anspruch 4, **dadurch gekennzeichnet, dass** die Isoliervorrichtung mindestens ein Vorsprung (5) ist, der außerhalb der Innenlade (3) oder innerhalb der Außenlade (2) vorgesehen ist.
6. Frischhalter gemäß Anspruch 4, **dadurch gekennzeichnet, dass** die Isoliervorrichtung ein Flansch (6) ist, der an mindestens einer Seitenwand der Innenlade vorgesehen ist.
7. Frischhalter gemäß Anspruch 2, **dadurch gekennzeichnet, dass** an den Kanten der Bodenplatte der Außenlade (2) zwei integrierte Führungen (8) angebracht sind, so dass die Innenlade (3) von den integrierten Führungen

getragen werden könnte.

8. Frischhalter gemäß Anspruch 3, **dadurch gekennzeichnet, dass** an der Unterseite außerhalb der Innenlade (3) oder der Oberseite innerhalb der Außenlade (2) mindestens ein zylindrischer Teil (7) vorgesehen ist.
9. Frischhalter gemäß einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** der Deckel aus transparentem Material oder lichtdurchlässigem Material gebildet ist.
10. Frischhalter gemäß einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** der Zwischenraum 5 mm bis 30 mm breit ist.
11. Frischhalter gemäß Anspruch 10, **dadurch gekennzeichnet, dass** der Zwischenraum 10 mm breit ist.
12. Frischhalter gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** in der Innenlade (3) ein oder mehrere kleine Löcher vorgesehen sind.
13. Frischhalter gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** in der Innenlade (3) eine oder mehrere bewegliche Trennplatten eingesetzt sind.

Revendications

1. Compartiment fraîcheur destiné à un appareil réfrigérateur comprenant un couvercle (1), un tiroir extérieur (2) et au moins un tiroir intérieur (3) qui est contenu dans ledit tiroir extérieur, un espace est formé entre le tiroir extérieur et le tiroir intérieur de telle sorte que, lorsque le couvercle est monté sur le tiroir extérieur (2), ledit tiroir extérieur (2), ledit tiroir intérieur (3) et ledit couvercle forment un espace étanche lorsqu'ils sont dans un état de montage, **caractérisé en ce que** le tiroir extérieur comporte sur une partie extérieure de celui-ci une partie destinée à un engagement avec une partie de support du réfrigérateur de telle sorte que le compartiment fraîcheur est disposé en coulissement à l'intérieur du réfrigérateur.
2. Compartiment fraîcheur selon la revendication 1, **caractérisé en ce que** ledit tiroir extérieur (2) se compose d'une paroi latérale gauche, d'une paroi latérale droite, d'une paroi arrière et d'un fond, ledit tiroir intérieur (3) se compose d'une paroi latérale gauche, d'une paroi latérale droite, d'une paroi arrière, d'un fond et d'une paroi avant, la paroi avant étant une paroi à simple épaisseur ou à double épaisseur (4).
3. Compartiment fraîcheur selon la revendication 1, **caractérisé en ce que** chacun dudit tiroir extérieur (2) et dudit tiroir intérieur (3) est ouvert sur le dessus.
4. Compartiment fraîcheur selon l'une quelconque des revendications 1 à 3, **caractérisé en ce qu'un** dispositif isolant est aménagé entre ledit tiroir intérieur et ledit tiroir extérieur.
5. Compartiment fraîcheur selon la revendication 4, **caractérisé en ce que** ledit dispositif isolant se compose au moins d'une saillie (5) disposée à l'extérieur dudit tiroir intérieur (3) ou à l'intérieur dudit tiroir extérieur (2).
6. Compartiment fraîcheur selon la revendication 4, **caractérisé en ce que** ledit dispositif isolant est une bride (6) aménagée sur au moins une paroi latérale dudit tiroir intérieur.
7. Compartiment fraîcheur selon la revendication 2, **caractérisé en ce que** deux guides incorporés (8) sont aménagés sur les bords du fond dudit tiroir extérieur (2) de telle sorte que le tiroir intérieur (3) peut être supporté par les guides incorporés.
8. Compartiment fraîcheur selon la revendication 3, **caractérisé en ce que** au moins une partie cylindrique (7) est disposée sur le côté extérieur de fond dudit tiroir intérieur (3) ou sur le côté supérieur intérieur dudit tiroir extérieur (2).
9. Compartiment fraîcheur selon l'une quelconque des revendications 1 à 3, **caractérisé en ce que** ledit couvercle est formé au moyen d'un matériau transparent ou d'un matériau translucide.
10. Compartiment fraîcheur selon l'une quelconque des revendications 1 à 9, **caractérisé en ce que** ledit espace a

EP 1 794 518 B1

une dimension située entre 5 mm et 30 mm.

11. Compartiment fraîcheur selon la revendication 10, **caractérisé en ce que** ledit espace a une dimension de 10 mm.

5 **12.** Compartiment fraîcheur selon la revendication 1 ou la revendication 2, **caractérisé en ce que** un ou plusieurs petits trous sont aménagés sur le tiroir intérieur (3).

10 **13.** Compartiment fraîcheur selon la revendication 1 ou la revendication 2, **caractérisé en ce que** une ou plusieurs plaques de séparation amovibles sont disposées dans ledit tiroir intérieur (3).

10

15

20

25

30

35

40

45

50

55

Fig. 1

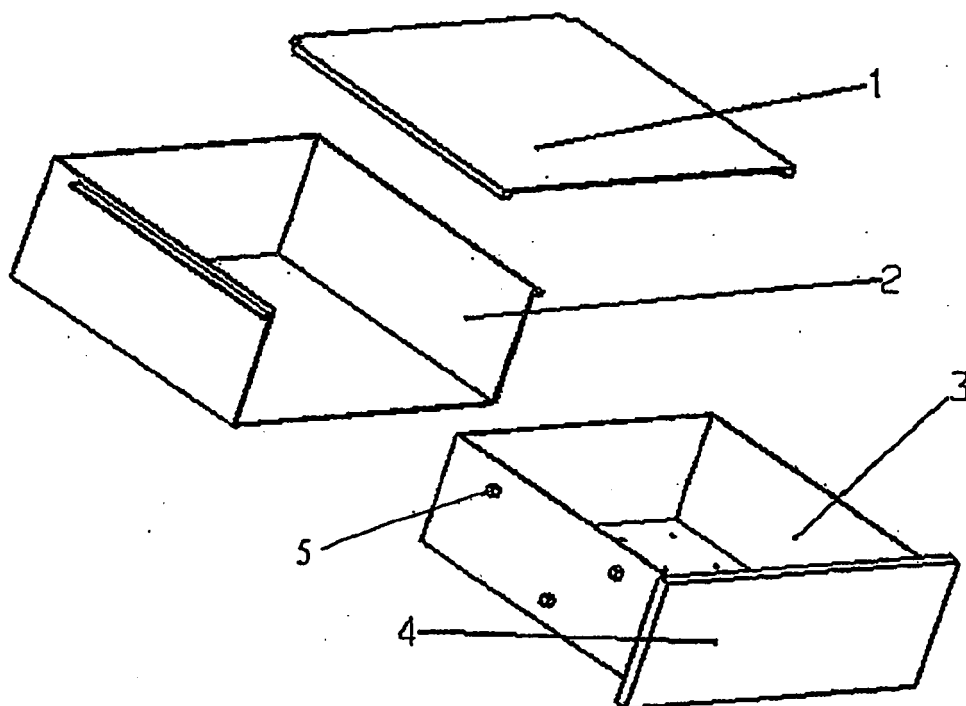


Fig. 2

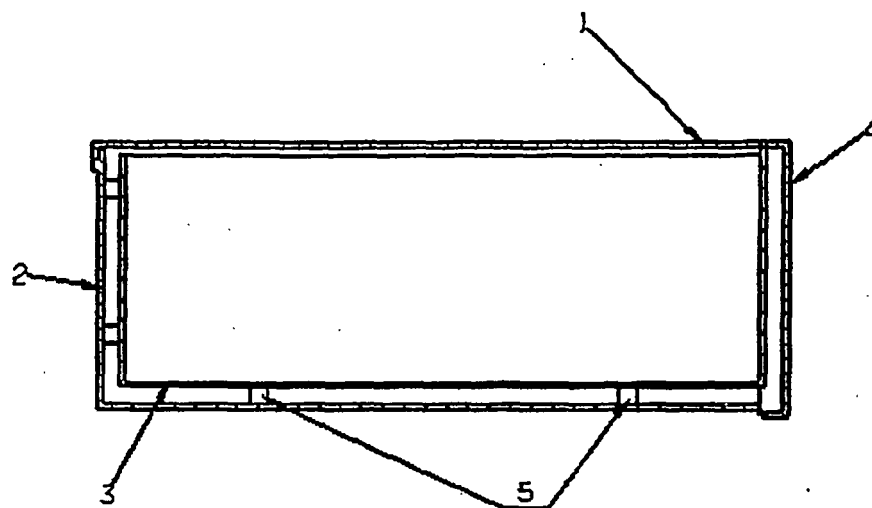


Fig. 3

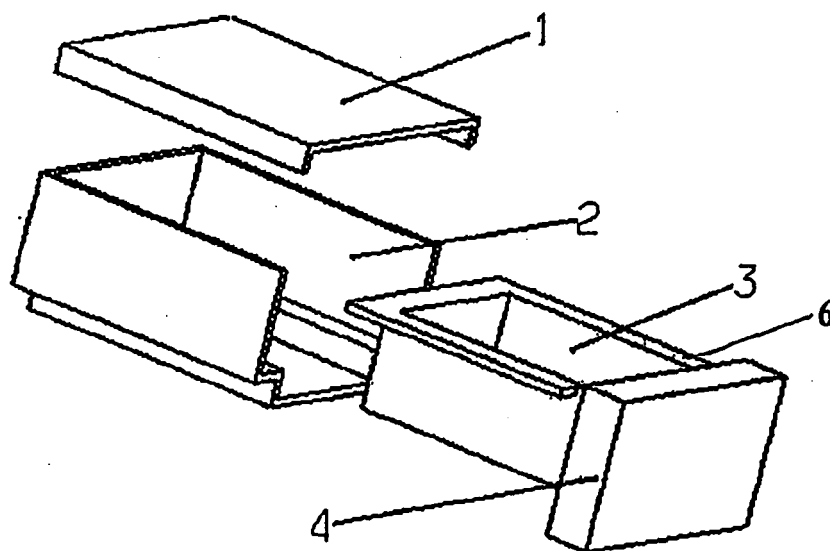


Fig. 4

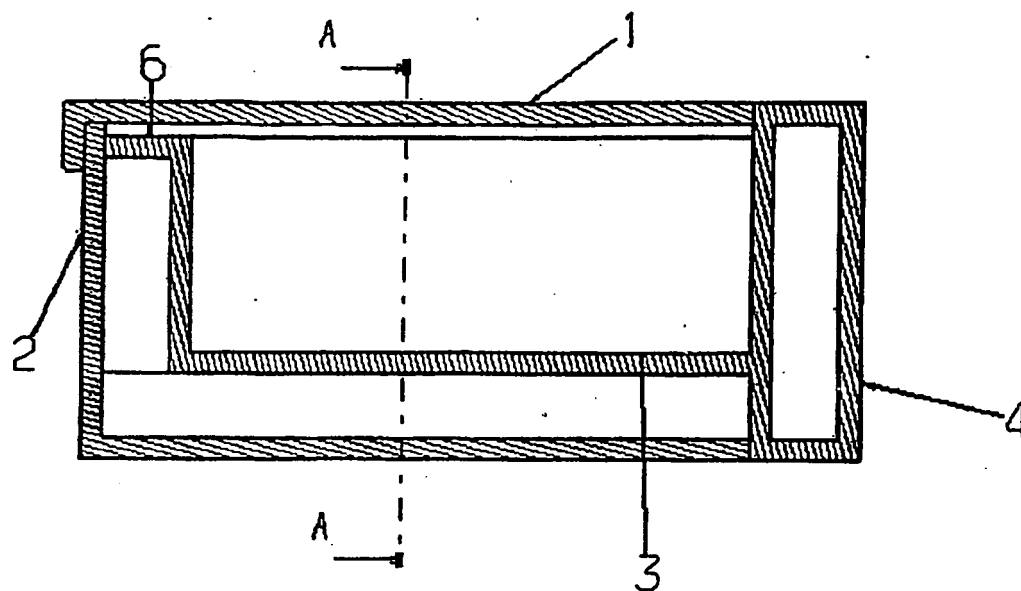


Fig. 5

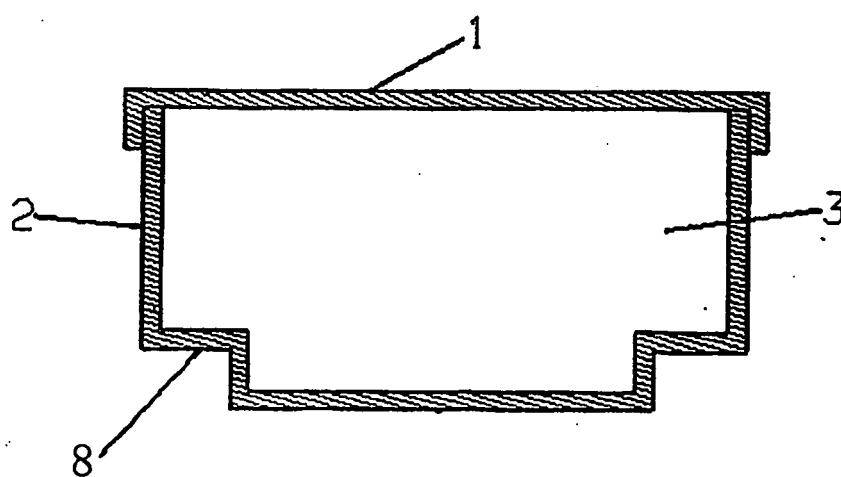


Fig. 6

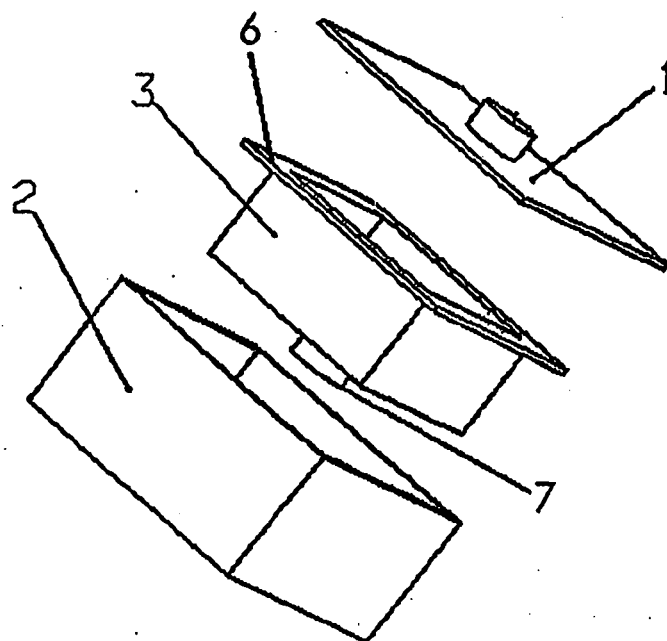


Fig. 7

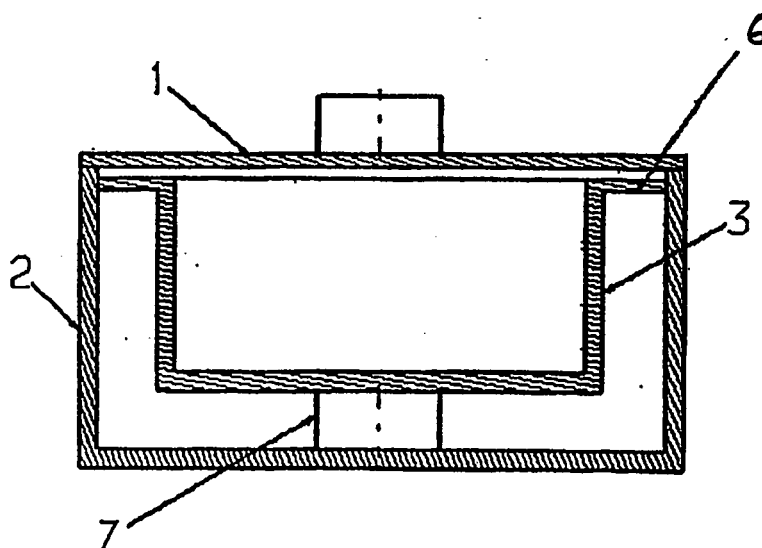


Fig. 8

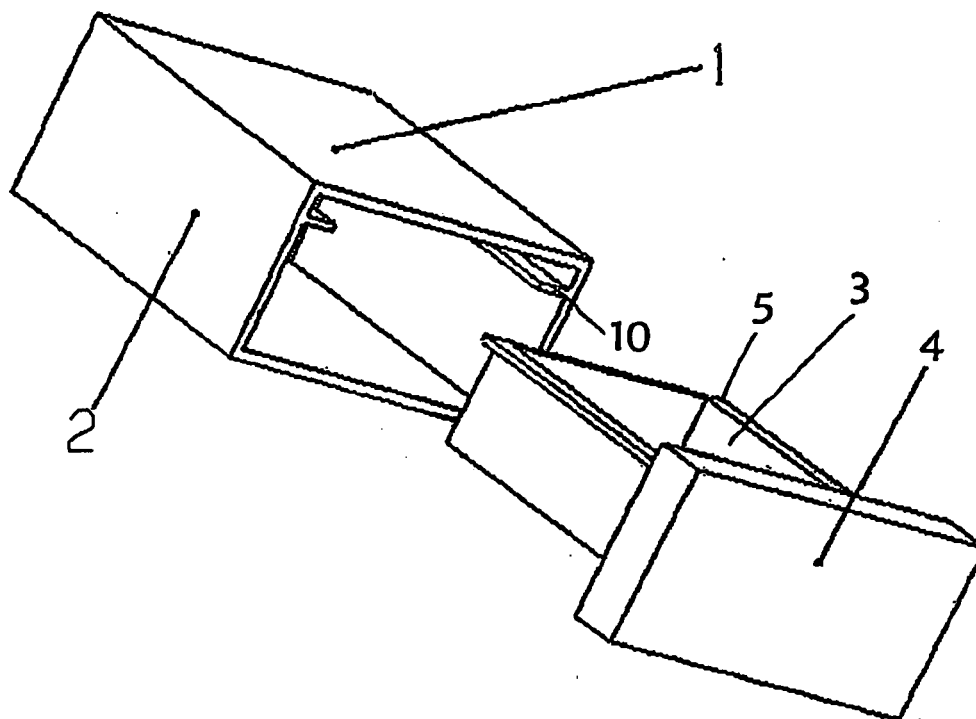


Fig. 9

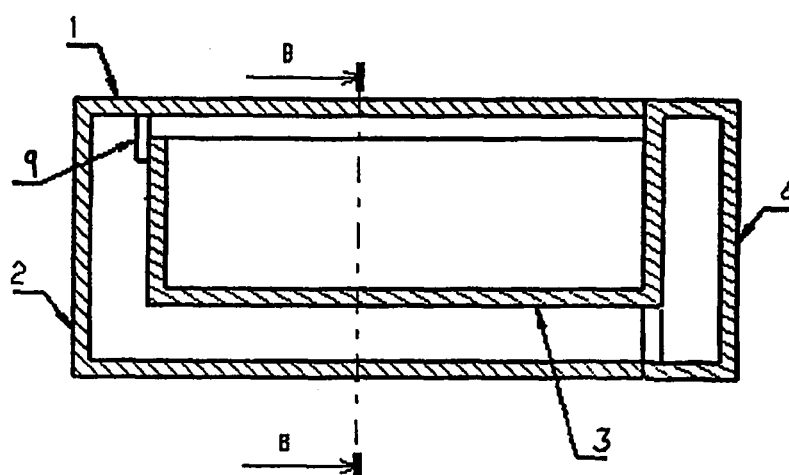


Fig. 10

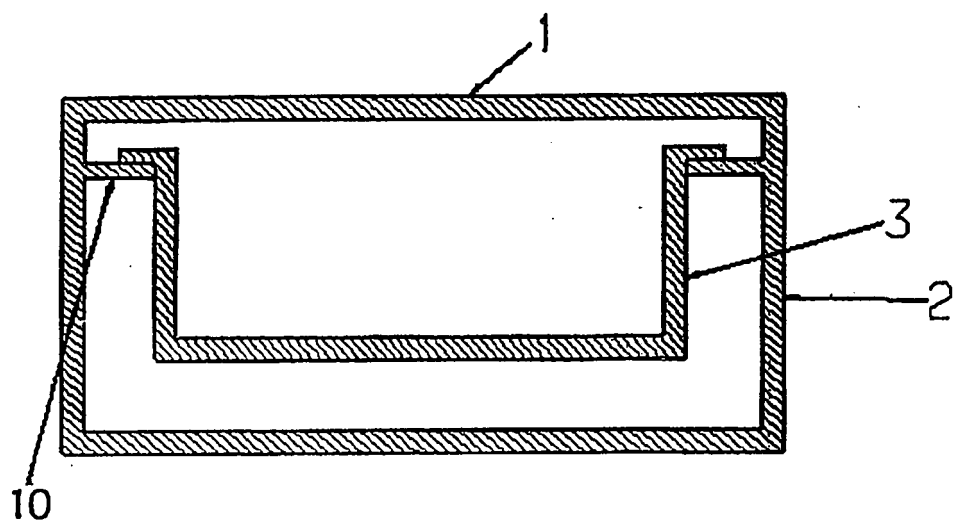


Fig. 11

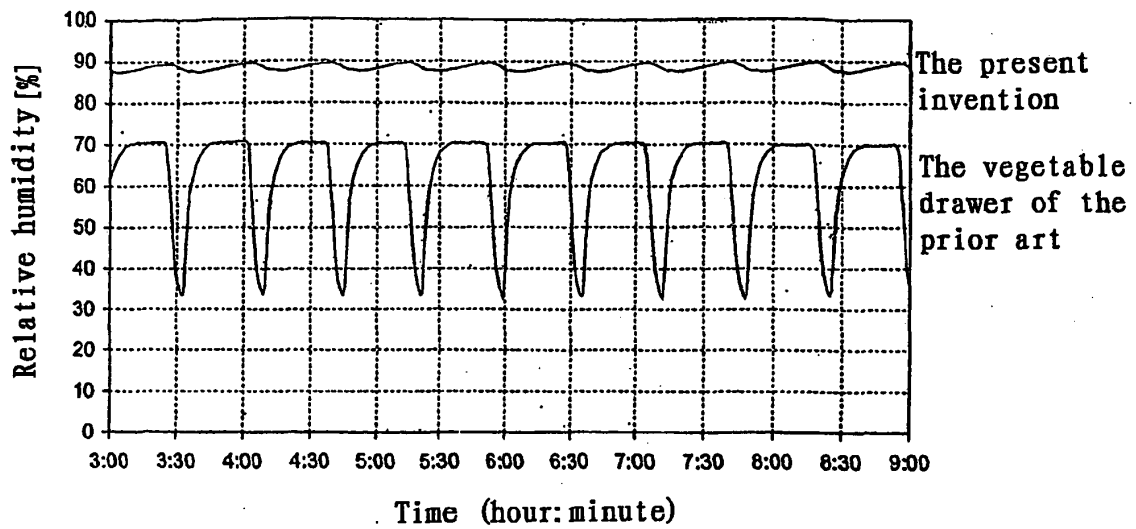
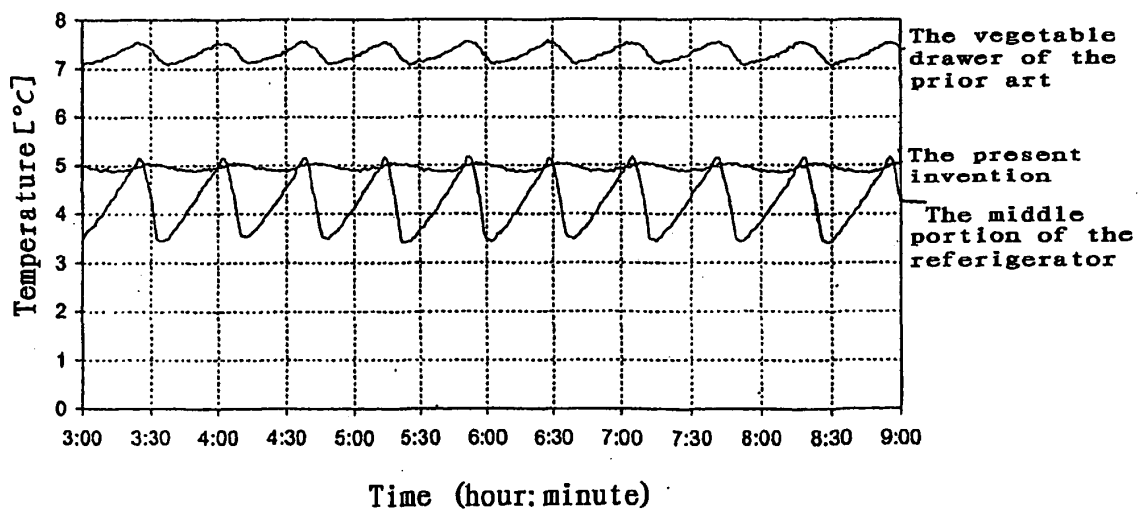


Fig. 12



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 2003115892 A1 [0006]
- US 2003115892 A [0006] [0008]
- US 3680941 A [0007] [0008]