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Title: PLANT PRODUCT CONTAINER

Abstract: A plant product protection container comprises a top and bottom part interconnected by a flexible folding region and foldable with respect to each other between an open and closed position. In closed position, the parts enclose a receiving volume for receiving and retaining the plant product and have a shape to conform to at least a portion of the exterior surface of the plant. In open position, the parts allow the plant product to access the receiving volume. The folding region is made of a resilient material returning the top and bottom part from the open to the closed position.

Fig. 1A
Published:

— with international search report (Art. 21(3))
Plant product container

The present invention relates to a plant product protection container provided for receiving and protecting a plant product, the plant product protection container comprising a top and a bottom part interconnected by a flexible folding region such that the top and bottom part can be folded with respect to each other between an open position and a closed position, the top and bottom part in the closed position enclosing a receiving volume provided for receiving and retaining the plant product and having a shape to conform to at least a portion of the exterior surface of the plant product, the top and bottom part in the open position allowing the plant product to access the receiving volume, according to the preamble of the first claim. The invention further relates to a plant product assembly.

With a plant product as used in this application is meant a vegetable piece, such as for instance a cucumber, or a fruit piece, such as for instance a banana, or a flower.

Plant product damage can occur during handling, packing, transporting or storing as a result of mechanical impacts or compression forces exerted on the plant product. After having been damaged, the plant product is more susceptible to decay, even in case the damage is limited to the skin or outer part of the product. The damage may result in localized softening of the plant product or browning of the plant product, which is not desired. This is in particular true for fruit pieces.

Because plant products are delicate and susceptible to damage, numerous plant product protection containers have been developed to reduce the risk to plant product damage. However, the majority of these protection holders present the problem that they do not show a sufficient degree of compressibility or flexibility to permit absorbing impact in
such a way that there is a minimum risk of damaging the plant product.

US-A-2004/0208959 describes a fruit protection holder provided for receiving and protecting a fruit piece, in particular a banana, which tries to solve this problem. The fruit protection holder described in US-A-2004/0208959 is made of a compressible force absorption material. The holder comprises a first and a second force absorption element which are connected to each other with a hinge element providing a rotation axis about which said first and second force absorption element may rotate. Both the first and the second absorption element have a substantially planar surface configured to conform, in use, to a portion of the exterior surface of the banana. In order to retain the fruit piece between the first and second absorption element, the holder further comprises a closure element provided for holding the first and second absorption element together. However, closure elements are cumbersome and require additional manufacturing steps.

It is an aim of the present invention to provide an alternative plant product protection container.

This is achieved according to the present invention with a plant product protection container showing the technical features of the characterizing part of the first claim.

Thereto, the plant product protection container is characterised in that the folding region is made of a resilient material with a resiliency adapted to return the top and the bottom part from the open position to the closed position. As a result, the plant product protection container does not require a separate closure element for holding the bottom and top part together. In fact, after insertion of the plant product into the plant product protection container, the top and bottom part are forced from the open position to the closed position by the resiliency of the resilient material of the fording region and hold the plant product in place and protected within the receiving volume.

Because the folding region is made of a flexible resilient material, the plant product can be inserted into the protection holder by simply folding, i.e. rotating and hinging, away the top part from the second
bottom side edge. After insertion of the plant product into the protection holder, the resiliency of the folding region assures that the top part returns to its closed position. In closed position, the top and bottom part then form a receiving volume between which the plant product can be received and hold in place. The shape of the receiving volume assures that the plant product can be hold in place between the bottom and top part of the protection holder. As a result, there is no need to close off the protection holder with additional closure elements to avoid the plant product from falling out.

The bottom part is preferably delimited by a first bottom side edge, adjacent the folding region, and a second bottom side edge provided on a side of the bottom part opposite the first bottom side edge. In the closed position, the top part preferably comprises a top inner surface which at least partly overlaps with at least a part of the second bottom side edge. In rest, i.e. in closed position when no forces are exerted on the protection holder, the top part overlaps with at least a part of the second bottom side edge. The overlap is preferably loosely, which means that the top part may rest directly onto the second bottom edge or be provided on a limited distance above the second bottom edge.

As a result, the receiving volume forms a substantially closed volume, within which the plant product can be held and be protected. In fact, upon exertion of a mechanical or compression force on the top part of the protection holder, the top part is pushed with part of its inner surface against the second bottom side edge of the bottom part. Because the top part is pushed against the second bottom side edge, the mechanical or compression forces are spread over a large area and the risk to damage of the plant product can be minimized.

The receiving volume provided between the top and bottom part is preferably delimited by two open air end parts. This means that the plant product which is received within the space is exposed to the air, which reduces the risk to decay of the plant product. The two open air end parts also allow receiving and protecting plant products with varying sizes. The plant product can also be inserted into the receiving volume through one of the open air end parts of the plant product holder.
Preferably, the plant product protection container is made in one piece of a flexible resilient material. Such a plant product protection container allows simplifying the manufacturing process, which may result in a cheaper end product. In case the protection holder is made of a flexible resilient material, the part of the top part not overlapping with the second bottom side edge may be partly pushed inwardly upon exertion of the mechanical or compression force on the top part of the protection holder, thereby further spreading the mechanical or compression forces and further minimizing the risk to damage of the plant product.

Preferably, the material thickness of the top part is smaller than the material thickness of the bottom part. A plant product protection container in which the top part has a smaller material thickness than the bottom part, decreases the risk to plant product damage of the plant product received in it. This is due to the fact that both thicknesses can be optimized to meet their respective functions. The thickness of the bottom part can be chosen sufficiently thick to provide the plant product protection container with sufficient stability and to minimize the compression of the bottom part upon exertion of a force to the second bottom side edge. To simplify the folding away of the top part upon insertion of a plant product, the thickness of the top part is preferably chosen smaller than the thickness of the bottom part.

Preferably, the material thickness of the top and/or bottom part of the plant product protection container according to the present invention varies in longitudinal direction of the plant product holder. By varying the material thickness in longitudinal direction of the plant product holder, the plant product holder is more easily adjustable to varying sizes and/or shapes and/or curvatures of the plant product to be received within the holder. In fact, the material thickness is preferably smaller in parts which require a large amount of adjustability and larger in parts which require a less amount of adjustability.

Preferably, the top part of the plant product protection container according to the present invention comprises at least two top part elements between which a transversal recess is provided. The recess
provided between the top part elements is able to compensate to a certain extend to the different shapes/sizes/curvatures of the plant product received within the plant product protection container. As a result, the risk to damage of the plant product as a result of pressure exerted by the plant product holder to the plant product can be substantially reduced. Preferably, the recesses are provided in areas where a higher degree of adjustability is required.

More preferably, the bottom part extending from the transversal recess or recesses has a lower material thickness than the rest of the bottom part. A lower thickness of the bottom part in line with the transversal recess results in a higher adjustability of the plant product holder to varying sizes and/or shapes and/or curvatures of the plant product received within the plant product holder.

Preferably, the inner side of the bottom part and/or top part comprises a rough surface. Such a rough surface increases the frictional resistance between the plant product and the inner side and may reduce the risk to movement of the plant product within the plant product holder. If the risk to movement of the plant product can be reduced, the risk to damage of the plant product can also be reduced. The rough surface can be obtained by giving the material a rough surface during the manufacturing process or by applying a coating with a rough surface on the inner side of the bottom and/or top part.

The flexible folding region and/or the top part and/or the bottom part of the plant product protection container can be made of any flexible and resilient material considered suitable by the person skilled in the art, such as a thermoplastic material or thermoplastic foam.

The invention is further related to a plant product assembly comprising a plant product protection container according to the invention and a plant product received and retained within the receiving volume of the plant product protection container. The assembly is in particular suitable for receiving and retaining a fruit piece, in particular a banana, because a banana is normally highly susceptible to damage during handling or transporting.
The invention is further elucidated in the appending figures and description of the figures.

Figures 1A-1C show a first embodiment of a plant product protection container according to the present invention.

In figure 1A a first side view is shown, in figure 1B a top view is shown and in figure 1C a second side view is shown.

Figures 2A-2B show a second embodiment of a plant product protection container according to the present invention.

In figure 2A a first side view is shown, in figure 2B a second side view is shown.

Figures 3A-3C show a third embodiment of a plant product protection container according to the present invention. In figure 3D a plant product assembly is shown comprising a plant product protection container as shown in figures 3A-3C and a banana.

In figure 3A a top view is shown, in figure 3B a bottom view is shown, in figure 3C a first side view is shown. In figure 3D a second side view of a plant product assembly is shown with a banana inserted in the protection holder.

Figures 1-3 show different preferred embodiments of a plant product protection container according to the present invention. Each of the embodiments of the plant product protection containers are provided for protecting and receiving a plant product. The plant product protection container shown in figure 1 is for instance suitable for receiving a substantially spherical plant product such as for instance an apple or an orange, while the plant product protection containers shown in figures 2 and 3 are more suitable for receiving a substantially longitudinal plant product, such as for instance a banana or cucumber.

The plant product protection container shown in figures 1-3 comprise a top 1 and a bottom 2 part which are interconnected by a flexible folding region 3. The bottom part 2 is delimited by a first bottom side edge 5, adjacent the folding region, and a second bottom side edge 6, provided on an opposite side of the bottom part. The top part 1 comprises a top inner surface 7. The top 1 and the bottom 2 part can be folded with
respect to each other between an open position (not shown) and a closed position (shown). In the closed position, the top and bottom part enclose a receiving volume 4 in which the plant product 12 can be received and retained. The receiving volume 4 has a shape which is adapted to conform to at least a portion of an exterior surface of the plant product such as to minimize the risk that the plant product 12 falls out of the receiving volume 4. In figure 1, the shape of the receiving volume 4 is oval or round, allowing an apple or orange with varying sizes to be received and retained within the receiving volume. In figures 2-3, the shape of the receiving volume 4 is curved, allowing a banana with varying curvature to be received and retained within the receiving volume. In the open position, the top inner surface 7 of the top part 1 is positioned on a distance from the second bottom side edge 6 of the bottom part 2 such to allow the plant product to be inserted into or removed from the receiving volume 4. The folding region has a resiliency which allows the top 1 and the bottom 2 part to be forced from the open position to the closed by the resiliency of the resilient material and hold the plant product 12 in place and protected within the receiving volume 4 in closed position.

In the embodiments shown in figures 1-3, the top inner surface 7 of the top part 1 overlaps with at least a part of the second bottom side edge 6 of the bottom part 2 when the bottom part 2 and top part 1 are in the closed position. On figures 1-3, a part of the overlapping area of the top inner surface of the top part is in direct contact with the second bottom side edge of the bottom part. Alternatively, the whole overlapping area of the top inner surface may be in direct contact with the second bottom side edge 6. Alternatively, part of the overlapping area or the whole overlapping area may be positioned on a limited distance from the second bottom side edge 6 of the bottom part when the bottom and top part are in the closed position. With limited distance is meant a distance which avoids the plant product from falling out of the plant product protection container. An overlap between at least a part of the second bottom side edge of the bottom part and the top inner surface of the top part is preferred because it minimizes the risk to damage of the plant product upon exertion of mechanical or compression
forces on the plant product protection container. Alternatively, the top part 1
does not overlap with at least a part of the second bottom side edge 6 of the
bottom part.

In the embodiments shown in figures 1-3, the
receiving volume is delimited by two open air end parts 8, 9. These open air
end parts 8, 9 allow receiving plant products 12 with varying size. On figure
3C for instance, the two open air end parts 8, 9 allow receiving bananas with
a varying length. Alternatively, one or both end parts 8, 9 may be partly or
completely closed.

In the embodiments shown in figures 1-3, the top
part 1 has a lower material thickness than the bottom part. The top part 1 has
a lower thickness than the bottom part 2 and is preferably chosen to allow an
easy removal of the top part away from the bottom part. The thickness of the
bottom part 2 is preferably chosen to minimize the compression of the bottom
part 2 upon exertion of forces to it. It has surprisingly been found that, in order
to have an optimum result, the bottom part 2 preferably has a thickness which
is substantially equal to four times the thickness of the top part 1.
Alternatively, the bottom 2 and top part 1 may have the same material
thickness or the thickness of the top part 1 may be higher than that of the
bottom part 2.

The material thickness of the bottom 2 and/or top
1 part may be the same or vary in longitudinal direction of the plant product
protection container, i.e. from one side end part to the other. A varying
thickness has the advantage that the plant product holder can be made more
adjustable to varying sizes and/or curvatures of the plant product 12. In the
plant product protection containers shown in figures 2 for instance, the
thickness of the bottom and/or top part of the plant product protection
container may for instance be smaller in those regions where the curvature of
the banana is more likely to vary, for instance in the middle part of the plant
product protection container.

In the embodiment shown in figures 1, the top
part 1 of the plant product protection container is made of one piece.
Alternatively, the top part 1 of the plant product protection container according
to the present invention can be made of two or more top part elements 10, 10' between which a transversal recess 11 is provided. In figures 2 for instance, the top part of the plant product protection container comprises two top part elements 10, 10' between which a transversal recess 11 is provided. In figures 3, the top part of the plant product protection container comprises three top part elements 10, 10', 10". Between each of the top part elements a transversal recess 11, 11' is provided. The transversal recess between the top part elements allows folding each of the top part elements separately away from the bottom part, which simplifies the handling and insertion of a plant product into the plant product protection container. The recesses 11, 11' between the top part elements 10, 10', 10" allow compensating for different shapes/sizes/curvatures of the plant product.

In order to provide a further adjustability to varying shapes/sizes/curvatures of the plant product, a part of the bottom part extending from the transversal recess/recesses has a lower material thickness than the rest of the bottom part.

The folding region 3 of the plant product protection container according to the present invention is made of a flexible resilient material with a resiliency adapted to force the top 1 and bottom 2 part from the open position to the closed position. The rest of the plant product protection container, i.e. the top and the bottom part, can be made of any material considered suitable by the person skilled in the art. Preferably, the top and the bottom part are also made of a flexible material. A flexible material makes the plant product protection container more adjustable to varying sizes of the plant product. More preferably, the top and bottom part are made of flexible resilient material. A flexible resilient material has a further advantage that, upon exertion of forces to the plant product protection container, part of the forces are compensated, such that risk to damage of the plant product is further minimized.

The material of the top and bottom part may be the same or differ. The same material simplifies the manufacturing process of the plant product protection container, while the use of a different material has the advantage that both materials can be adjusted to their specific use. In this
last case, the material of the bottom part can for instance be chosen to provide the plant product protection container with sufficient stability and to minimize the compression of the bottom part upon exertion of a force, while the material of the top part can for instance be chosen to simplify the folding away of the bottom part.

Alternatively, the plant product protection container can be made in one piece and of one single flexible resilient material. Such a plant product protection container simplifies the manufacturing process and may result in a cheaper end product.

The material of the flexible folding region and/or the top part and/or the bottom part of the plant product protection container may be any material considered suitable by the person skilled in the art, but preferably comprises a thermoplastic or foam material. The material can for instance be a foam of a thermoplastic material or an elastomer or a blend of two or more thermoplastic materials or elastomers. The thermoplastic material can for instance be polyurethane. The elastomer can for instance be a rubber, copolymer or block copolymer of for instance styrene with ethene, or ethene with propene,...
1. A plant product protection container provided for receiving and protecting a plant product, the plant product protection container comprising a top (1) and a bottom (2) part interconnected by a flexible folding region (3) such that the top (1) and bottom part can be folded with respect to each other between an open position and a closed position, the top (1) and bottom (2) part in the closed position enclosing a receiving volume (4) provided for receiving and retaining the plant product and having a shape to conform to at least a portion of the exterior surface of the plant product, the top (1) and bottom (2) part in the open position allowing the plant product to access the receiving volume (4), characterised in that the folding region (3) is made of a resilient material with a resiliency adapted to return the top (1) and the bottom (2) part from the open position to the closed position.

2. A plant product protection container according to claim 1, characterized in that the bottom part (2) is delimited by a first bottom side edge (5), adjacent the folding region, and a second bottom side edge (6), provided on a side of the bottom part opposite the first bottom side edge and in that the top part comprises a top inner surface (7) which overlaps with at least a part of the second bottom side edge (6) of the bottom part (2) when the bottom (2) and top (1) part are in the closed position.

3. A plant product protection container according to any one of claims 1-2, characterized in that the receiving volume (4) is delimited by two open air end parts (8, 9).

4. A plant product protection container according to any one of claims 1-3, characterized in that the plant product protection container is made substantially in one piece of the flexible resilient material.

5. A plant product protection container according to any one of claims 1-4, characterized in that the top part (1) has a lower material thickness than the bottom part (2).

6. A plant product protection container according to any one of claims 1-5, characterized in that the material thickness of the top part 1 varies in longitudinal direction of the protection holder.
7. A plant product protection container according to any one of claims 1-6, characterized in that the top part (1) comprises at least two top part elements (10, 10', 10'') between which a transversal recess (11, 11') is provided.

8. A plant product protection container according to claim 7, characterized in that a part of the bottom part extending from the transversal recess has a material thickness which is lower than the rest of the bottom part.

9. A plant product protection container according to any one of claims 1-8, characterized in that an inner side of the bottom part and/or top part comprises a rough surface.

10. A plant product protection container according to any one of claims 1-9, characterized in that the plant product protection container is at least partly made of a thermoplastic material.

11. A plant product protection container according to any one of claims 1-10, characterized in that the plant product protection container comprises a foam material.

12. A plant product protection container according to any one of claims 1-11, characterized in that the bottom part (2) has a thickness which is substantially equal to four times the thickness of the top part (1).

13. A plant product assembly comprising a plant product protection container according to any one of the preceding claims and a plant product (12) received and retained within the receiving volume (4).

14. A plant product assembly wherein the plant product is a banana.
**INTERNATIONAL SEARCH REPORT**

**A CLASSIFICATION OF SUBJECT MATTER**

**INV.** B65D85/34

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)

B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

**C. Documents considered to be relevant**

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<tr>
<td>X</td>
<td>US 5 427 244 A (IKEGUCHI SHIGETAKA [JP]) 27 June 1995 (1995-06-27) column 3, line 4 - column 4, line 63; figures 1-14</td>
<td>1-4,-5,-7, 10-11,-13</td>
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<td>X</td>
<td>US 6 612 440 B1 (AGULNIK DAVID B [CA]) 2 September 2003 (2003-09-02) column 3, line 36 - column 4, line 20; figures 1-3</td>
<td>1-2,-4,-5,- 9-11, 13-14</td>
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**X** Further documents are listed in the continuation of Box C

**X** See patent family annex

*Special categories of cited documents*

- **A** document defining the general state of the art which is not considered to be of particular relevance
- **E** earlier document but published on or after the international filing date
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Date of the actual completion of the international search

15 February 2010

Date of mailing of the international search report

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Name and mailing address of the ISA/

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Authorized officer

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