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(54)

A display cabinet

(57)

A refrigerated food display cabinet (1) comprises a storage region (2) in which food items to be displayed may be located, a front cover (3), and an optical sensor. The optical sensor acts to detect the presence of a customer in proximity to the display cabinet (1). A front opening (5) is provided to facilitate access to the storage region (2) by a customer wishing to select a displayed food item. The front cover (3) is pivotably movable between a first configuration in which the front opening (5) is covered, and a second configuration in which the front opening (5) is uncovered. The front cover (3) is automatically moved from the first configuration to the second configuration responsive to the presence of a customer in proximity to the front of the display cabinet (1) being detected. Upon elapse of a predetermined period of time without the presence of any customer in proximity to the front of the display cabinet (1) being detected, the front cover (3) is automatically moved from the second configuration to the first configuration.

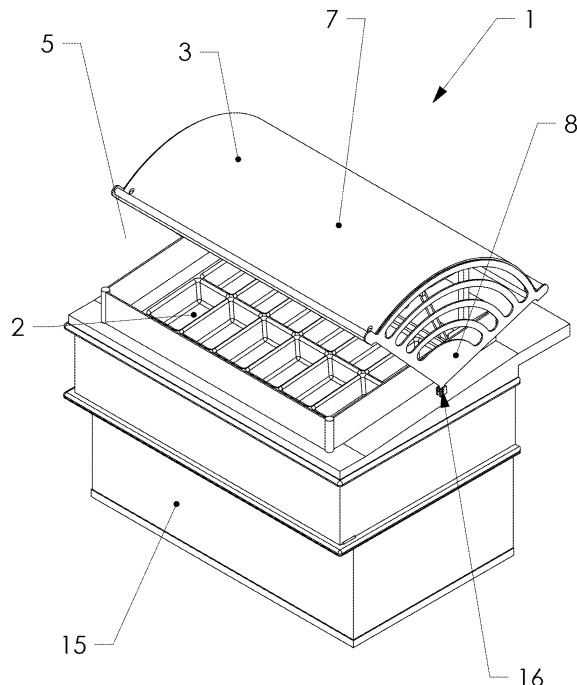


fig. 11

Description

Introduction

[0001] This invention relates to a display cabinet.

Statements of Invention

[0002] According to the invention there is provided a display cabinet comprising

a storage region in which one or more items to be displayed may be located,

a first opening to facilitate access to the storage region,

a first cover member movable between a first configuration in which the first opening is at least partially covered, and a second configuration in which the first opening is at least partially uncovered,

means to detect the presence of an object in proximity to the display cabinet, and

means to move the first cover member between the first configuration and the second configuration responsive to the presence of an object in proximity to the display cabinet being detected.

[0003] By covering the displayed items, this arrangement provides for optimum levels of hygiene. This is particularly important in the case where the items are food products.

[0004] By automatically moving the cover member to the uncovered configuration when a person approaches the display cabinet, this arrangement enables the person to quickly select a displayed item without manual effort being required to open the potentially heavy cover member.

[0005] In one embodiment of the invention the first cover member is pivotably movable between the first configuration and the second configuration. Preferably the movement means comprises an actuator member to transmit power from a power source to the first cover member. Ideally the actuator member comprises means to convert rotational movement to rectilinear movement. Most preferably the conversion means comprises a rack and pinion coupling. The actuator member may comprise a reciprocable element movable in a reciprocating manner to move the first cover member between the first configuration and the second configuration. Preferably the reciprocable element is movable in a rectilinear manner. Ideally the longitudinal axis of the reciprocable element is substantially straight. Most preferably the actuator member comprises means to convert rectilinear movement to rotational movement. The conversion means may comprise a cam element.

[0006] In another embodiment the movement means is configured to move the first cover member from the second configuration to the first configuration upon elapse of a predetermined period of time without the presence of any object in proximity to the display cabinet being detected. By waiting until the predetermined period of time has elapsed before closing the cover member, this arrangement provides enhanced safety to prevent anything becoming inadvertently impacted or caught by the cover member. Preferably the predetermined period of time is selectively adjustable.

[0007] In one case the display cabinet comprises means to selectively prevent movement of the first cover member. In this manner unnecessary movement of the cover member may be avoided, for example during cleaning or maintenance in proximity to the display cabinet after closure of a store. Preferably the movement prevention means comprises a user interface control member.

[0008] In another case the display cabinet comprises a second opening to facilitate access to the storage region. This arrangement enables the displayed items to be restocked, for example by a store employee, without affecting the display side of the cabinet. Preferably the second opening is configured to facilitate access to the storage region at least when the first cover member is in the first configuration. Ideally the display cabinet comprises a second cover member movable between a first configuration in which the second opening is at least partially covered, and a second configuration in which the second opening is at least partially uncovered. By covering the displayed items, this arrangement provides for optimum levels of hygiene. This is particularly important in the case where the items are food products.

[0009] In one embodiment the detection means comprises an optical sensor. Preferably the detection means comprises a passive infra-red sensor.

[0010] In another embodiment the first cover member comprises a transparent element. Preferably the first cover member comprises a support element.

[0011] In one case the display cabinet comprises means to cool one or more items to be displayed. This is particularly important in the case where the items are food products. The invention may provide a refrigerated display cabinet.

[0012] In another case the display cabinet comprises means to heat one or more items to be displayed.

[0013] The invention may provide a food display cabinet.

Brief Description of the Drawings

[0014] The invention will be more clearly understood from the following description of an embodiment thereof, given by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is an isometric view from the front of a display

cabinet according to the invention with a first cover member in a first configuration,

Fig. 2 is an elevation view from the front of the display cabinet of Fig. 1 with the first cover member in the first configuration,

Fig. 3 is a view along line G-G in Fig. 2,

Fig. 4 is a cross sectional side view of the display cabinet of Fig. 1 with the first cover member in the first configuration,

Fig. 5 is an enlarged, cross sectional side view of part of the display cabinet of Fig. 4,

Fig. 6 is another elevation view from the front of the display cabinet of Fig. 1 with the first cover member in the first configuration,

Fig. 7 is a view along line F-F in Fig. 6,

Fig. 8 is an enlarged, cross sectional side view of part of the display cabinet of Fig. 7,

Fig. 9 is an elevation view from the rear of the display cabinet of Fig. 1 with the first cover member in the first configuration and with a second cover member in a first configuration,

Fig. 10 is an elevation view from the rear of the display cabinet of Fig. 1 with the first cover member in the first configuration and with the second cover member in a second configuration,

Fig. 11 is an isometric view from the front of the display cabinet of Fig. 1 with the first cover member in a second configuration,

Fig. 12 is an elevation view from the front of the display cabinet of Fig. 1 with the first cover member in the second configuration,

Fig. 13 is a view along line H-H in Fig. 12,

Fig. 14 is an elevation view from the rear of the display cabinet of Fig. 1 with the first cover member in the second configuration, and

Fig. 15 is an elevation view of a movement prevention means part of the display cabinet of Fig. 1.

Detailed Description

[0015] Referring to the drawings there is illustrated a refrigerated food display cabinet 1 according to the invention. In this case the display cabinet 1 comprises a salad bar.

[0016] The display cabinet 1 comprises a base 15, a storage region 2 in which food items to be displayed may be located, a refrigeration unit to cool the food items, a curved front cover 3, a flat rear cover 4, an optical sensor 9, and an actuator member.

[0017] The optical sensor 9 is provided in this case in the form of a passive infra-red sensor (Fig. 8). The optical sensor 9 acts to detect the presence of an object, such as a customer, in proximity to the front of the display cabinet 1. In this case the optical sensor 9 is configured to detect the presence of an object at the height above the ground at which a typical adult's knee would be. The sensitivity of the optical sensor 9 may be selectively adjusted.

[0018] A large front opening 5 is provided to facilitate access to the storage region 2 from the front of the display cabinet 1 by a customer wishing to select a displayed food item.

[0019] The front cover 3 comprises a transparent element 7 provided in this case in the form of a sheet of toughened glass, and a support plate 8 at each side of the transparent element 7. The front cover 3 is pivotably movable about a horizontal pivot axis 16 between a first configuration in which the front opening 5 is covered (Figs. 1 to 10), and a second configuration in which the front opening 5 is uncovered (Figs. 11 to 15).

[0020] The front cover 3 is automatically moved from the first configuration to the second configuration responsive to the presence of a customer in proximity to the front of the display cabinet 1 being detected. The speed of movement of the front cover 3 is selected to be sufficiently slow to avoid impacting or catching a customer's hand or arm. Upon elapse of a predetermined period of time, for example 30 seconds, without the presence of any customer in proximity to the front of the display cabinet 1 being detected, the front cover 3 is automatically moved from the second configuration to the first configuration. This predetermined period of time may be selectively adjusted.

[0021] The actuator member acts to transmit power from a power source, such as an electric motor, to the front cover 3. The actuator member comprises a rack and pinion coupling 13, a reciprocable arm 14, and a cam element 12 (Figs. 4 and 5). The longitudinal axis of the reciprocable arm 14 is straight, and the cam element 12 is 'L'-shaped.

[0022] The rack and pinion coupling 13 is coupled to the reciprocable arm 14 to convert the rotational movement of the electric motor to rectilinear movement of the reciprocable arm 14. The upper end of the reciprocable arm 14 is pivotably attached to the lower end of the cam element 12, and the upper end of the cam element 12 is fixedly attached to the support plate 8 of the front cover 3. In this manner the rectilinear movement of the reciprocable arm 14 is converted to rotational movement of the front cover member 3. The reciprocable arm 14 moves in a reciprocating manner to move the front cover 3 between the first configuration and the second configura-

tion. In this case the stroke length of the reciprocable arm 14 is 180 mm. The speed of movement of the reciprocable arm 14 is selected to be sufficiently slow, for example 5 mm/s, to avoid the front cover 3 impacting or catching a customer's hand or arm.

[0023] The actuator member also comprises a damper element for smooth, controlled movement of the front cover 3.

[0024] A small rear opening 6 is provided to facilitate access to the storage region 2 from the rear of the display cabinet 1 by a store employee wishing to restock fresh food items in the storage region 2. The rear opening 6 facilitates access to the storage region 2 when the front cover 3 is in the first configuration (Fig. 3), but not when the front cover 3 is in the second configuration (Fig. 13).

[0025] A disable switch 11 is provided at the rear of the display cabinet 1 to enable a store employee to selectively temporarily prevent the automatic movement of the front cover 3 (Figs. 14 and 15). In this manner it is possible for the store employee to restock fresh food items in the storage region 2 without the risk of the front cover 3 moving to the second configuration which could otherwise impact or catch the employee's hand or arm.

[0026] The rear cover 4 comprises a non-transparent element 10 provided in this case in the form of a mirror (Figs. 9 and 10). The reflective side of the mirror 10 faces towards the front of the display cabinet 1. The rear cover 4 is slidably movable between a first configuration in which the rear opening 6 is covered (Fig. 9), and a second configuration in which the rear opening 6 is uncovered (Fig. 10).

[0027] In use, when a customer approaches the display cabinet 1, the optical sensor 9 detects the presence of the customer in proximity to the front of the display cabinet 1. Responsive to the presence of the customer in proximity to the front of the display cabinet 1 being detected, the electric motor is activated. The rotational movement of the electric motor is converted to rectilinear movement of the reciprocable arm 14 by means of the rack and pinion coupling 13. The rectilinear movement of the reciprocable arm 14 is converted to rotational movement of the front cover member 3 by means of the cam element 12. In this manner the front cover 3 automatically moves from the first configuration in which the front opening 5 is covered, to the second configuration in which the front opening 5 is uncovered. The customer may then select a displayed food item from the storage region 2 through the front opening 5 from the front of the display cabinet 1.

[0028] Upon elapse of the predetermined period of time, without the presence of any customer in proximity to the front of the display cabinet 1 being detected, the front cover 3 automatically moves from the second configuration to the first configuration.

[0029] To restock the storage region 2, the disable switch 11 is engaged by a store employee to selectively prevent the automatic movement of the front cover 3. The rear cover 4 is slid from the first configuration in which

the rear opening 6 is covered, to the second configuration in which the rear opening 6 is uncovered. The store employee then restocks fresh food items in the storage region 2 from the rear of the display cabinet 1 through the rear opening 6. When the store employee has finished restocking the storage region 2, the rear cover 4 is slid from the second configuration to the first configuration. The disable switch 11 is disengaged to enable further automatic movement of the front cover 3.

[0030] In an alternative embodiment the display cabinet may comprise means to heat one or more food items to be displayed.

[0031] The invention is not limited to the embodiment hereinbefore described, with reference to the accompanying drawings, which may be varied in construction and detail.

Claims

1. A display cabinet comprising

a storage region in which one or more items to be displayed may be located,
a first opening to facilitate access to the storage region,
a first cover member movable between a first configuration in which the first opening is at least partially covered, and a second configuration in which the first opening is at least partially uncovered,
means to detect the presence of an object in proximity to the display cabinet, and
means to move the first cover member between the first configuration and the second configuration responsive to the presence of an object in proximity to the display cabinet being detected.

2. A display cabinet as claimed in claim 1 wherein the first cover member is pivotably movable between the first configuration and the second configuration.

3. A display cabinet as claimed in claim 1 or 2 wherein the movement means comprises an actuator member to transmit power from a power source to the first cover member.

4. A display cabinet as claimed in claim 3 wherein the actuator member comprises means to convert rotational movement to rectilinear movement.

5. A display cabinet as claimed in claim 3 or 4 wherein the actuator member comprises a reciprocable element movable in a reciprocating manner to move the first cover member between the first configuration and the second configuration.

6. A display cabinet as claimed in claim 5 wherein the reciprocable element is movable in a rectilinear manner.
7. A display cabinet as claimed in claim 5 or 6 wherein the longitudinal axis of the reciprocable element is substantially straight. 5
8. A display cabinet as claimed in any of claims 3 to 7 wherein the actuator member comprises means to convert rectilinear movement to rotational movement. 10
9. A display cabinet as claimed in any of claims 1 to 8 wherein the movement means is configured to move the first cover member from the second configuration to the first configuration upon elapse of a predetermined period of time without the presence of any object in proximity to the display cabinet being detected. 15 20
10. A display cabinet as claimed in claim 9 wherein the predetermined period of time is selectively adjustable. 25
11. A display cabinet as claimed in any of claims 1 to 10 wherein the display cabinet comprises means to selectively prevent movement of the first cover member. 30
12. A display cabinet as claimed in any of claims 1 to 11 wherein the display cabinet comprises a second opening to facilitate access to the storage region.
13. A display cabinet as claimed in claim 12 wherein the second opening is configured to facilitate access to the storage region at least when the first cover member is in the first configuration. 35
14. A display cabinet as claimed in any of claims 1 to 13 wherein the detection means comprises an optical sensor. 40
15. A display cabinet as claimed in claim 14 wherein the detection means comprises a passive infra-red sensor. 45

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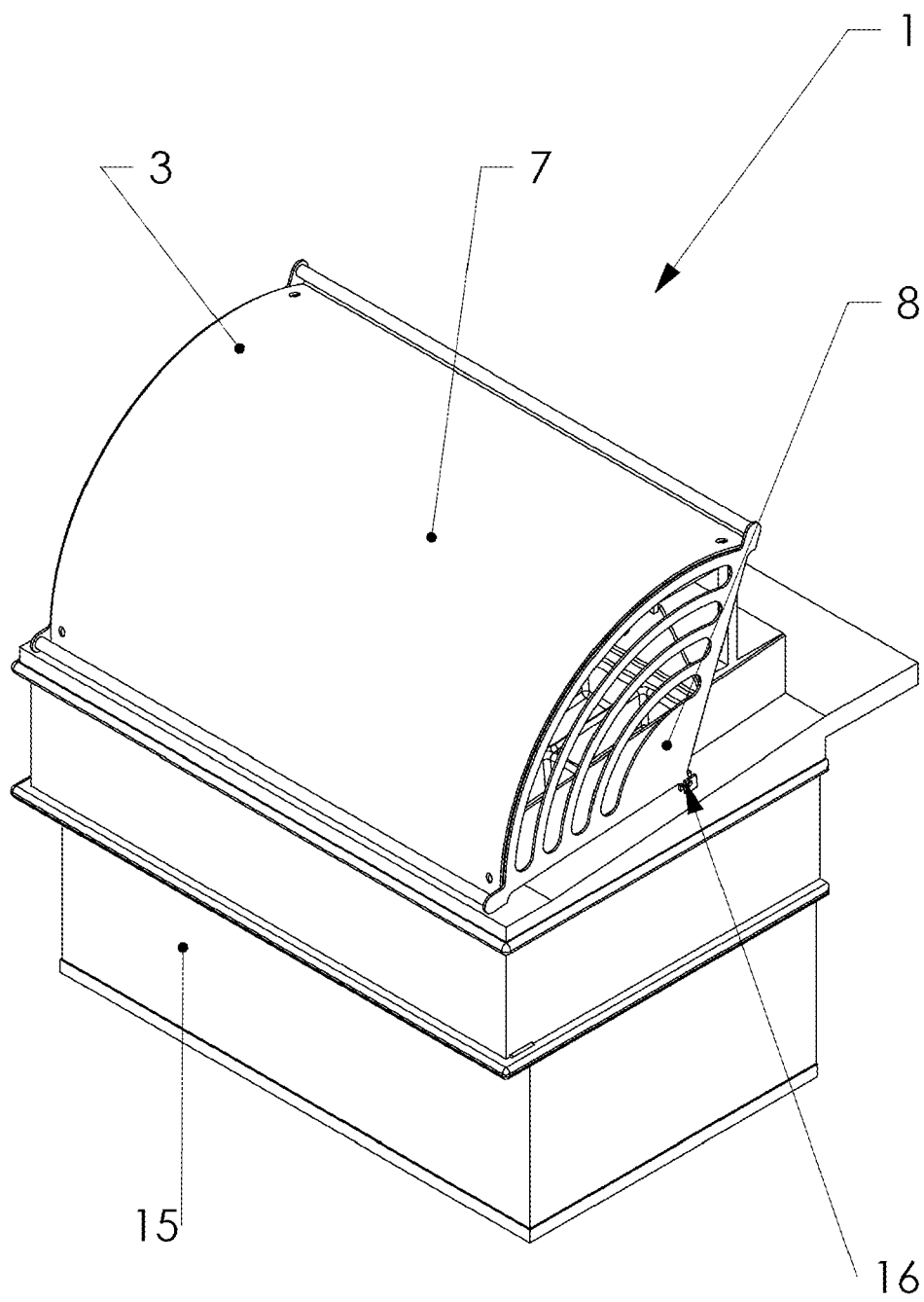


fig. 1

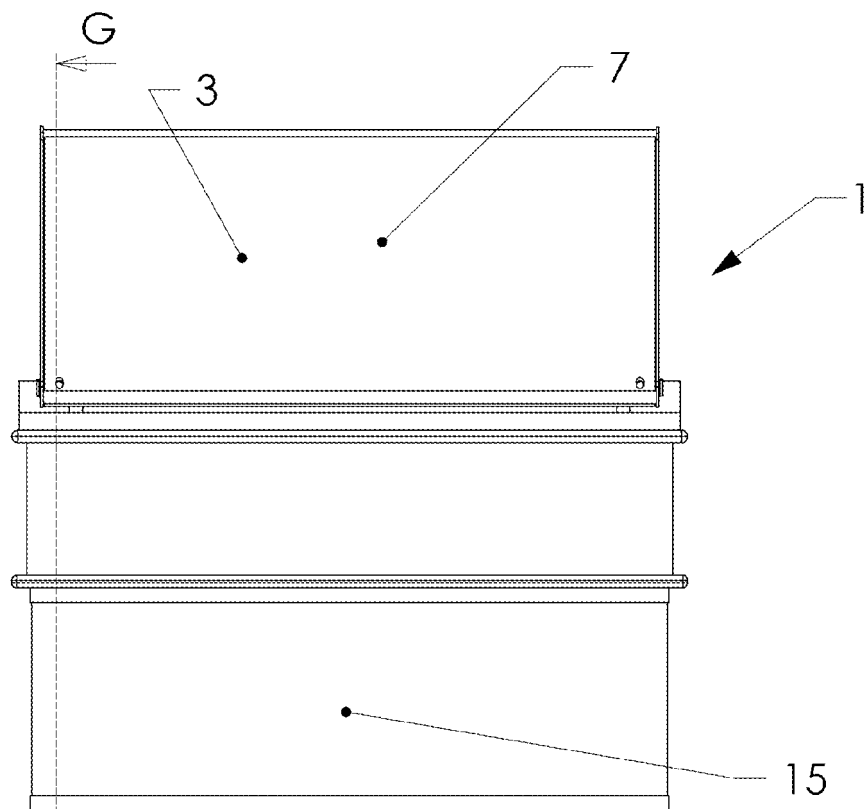


fig. 2

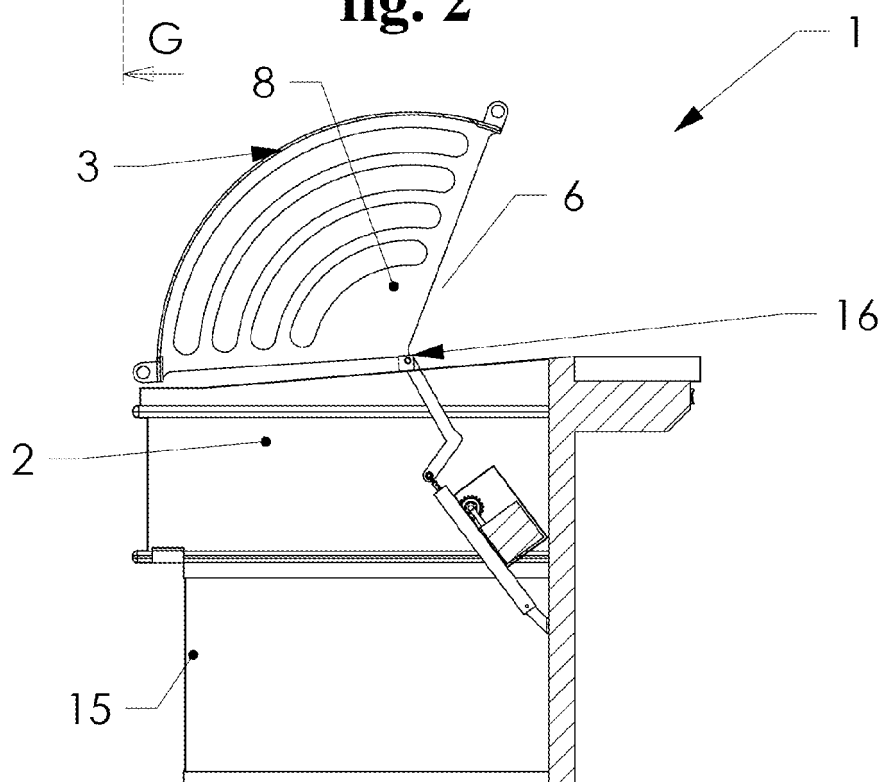
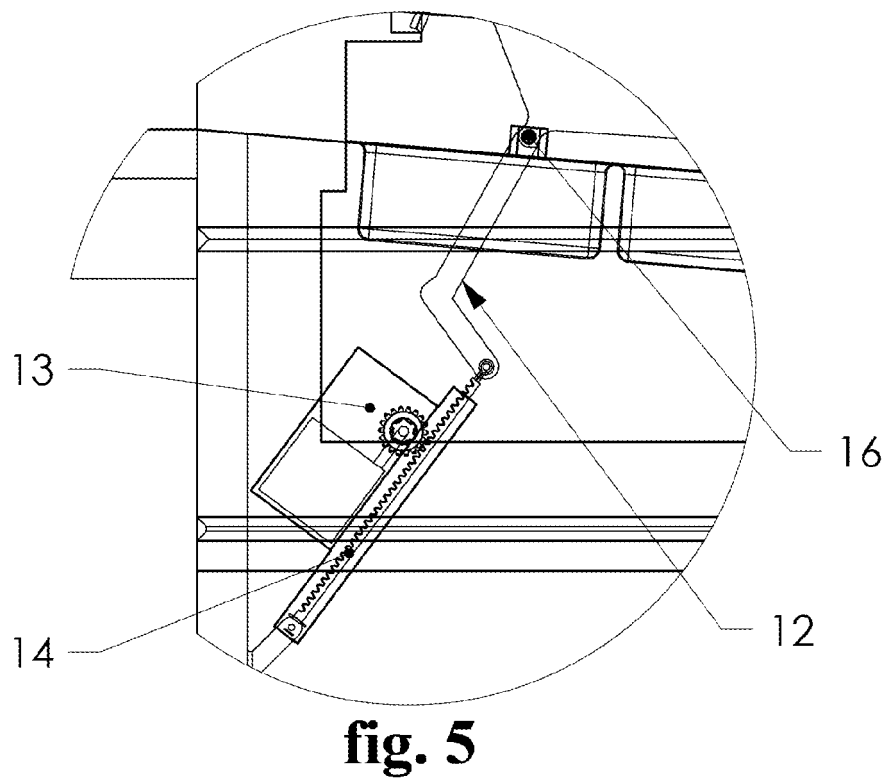
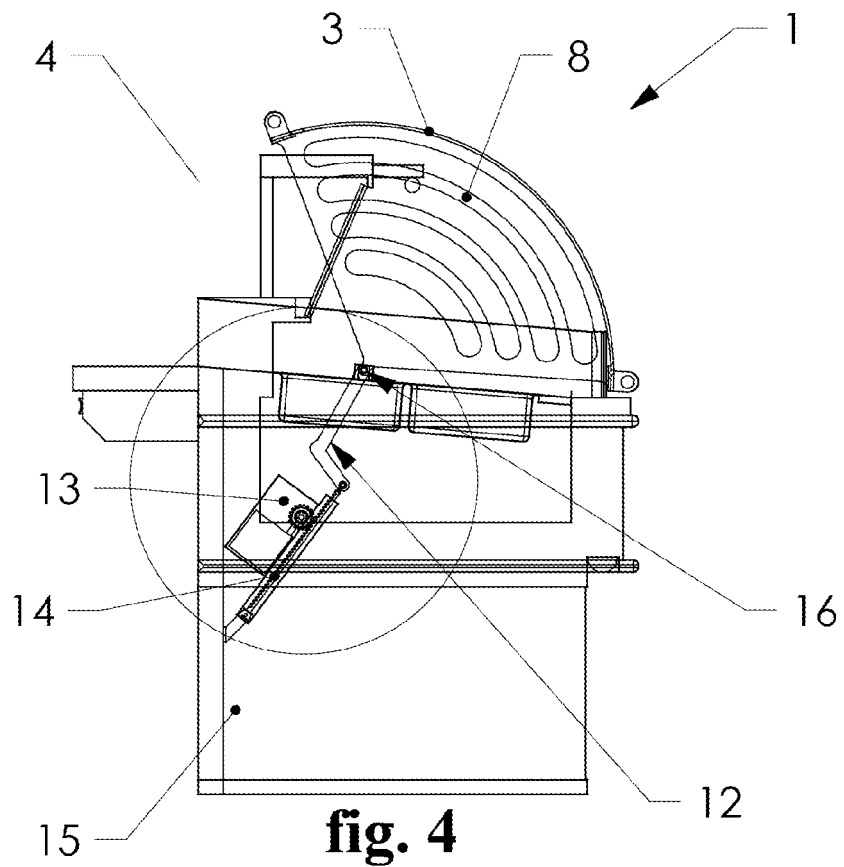


fig. 3



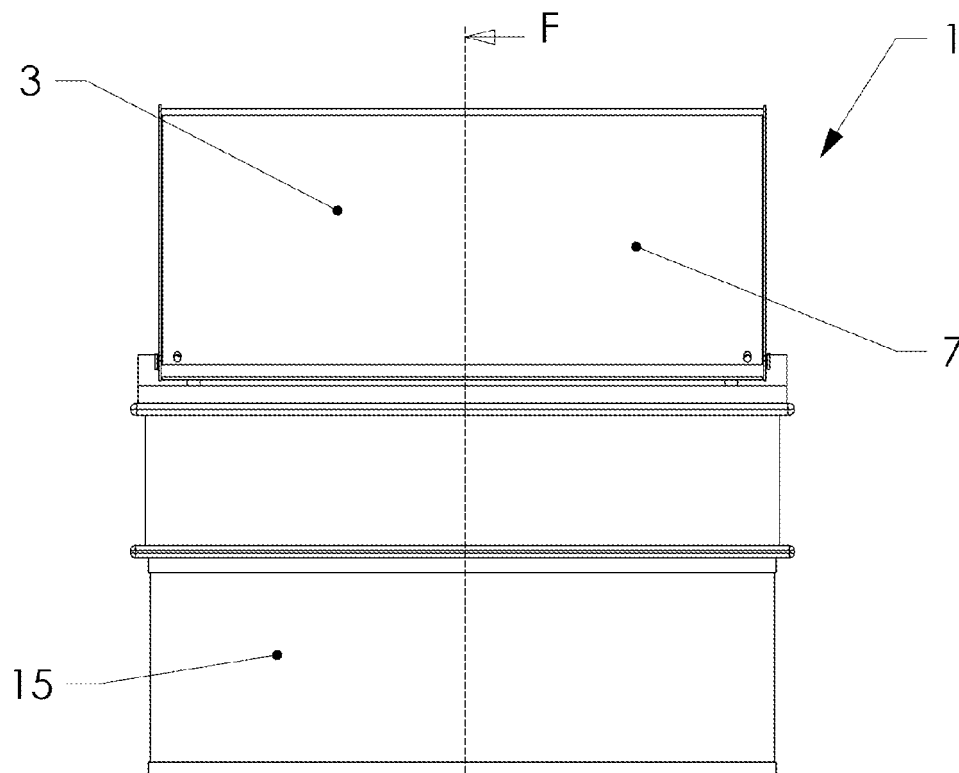


fig. 6

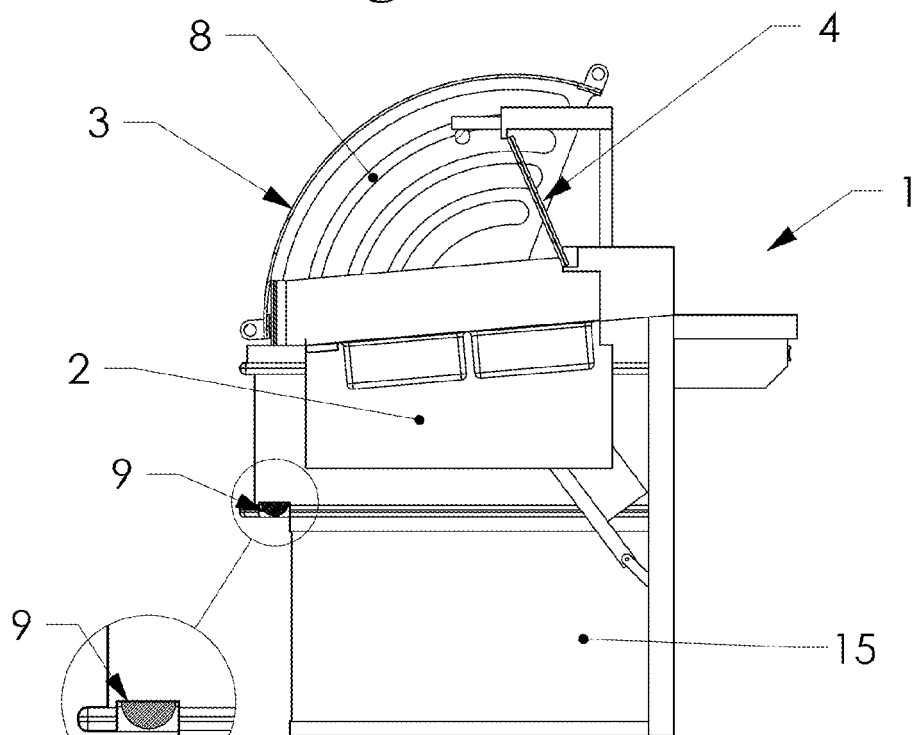


fig. 7

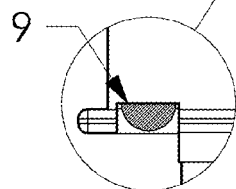


fig. 8

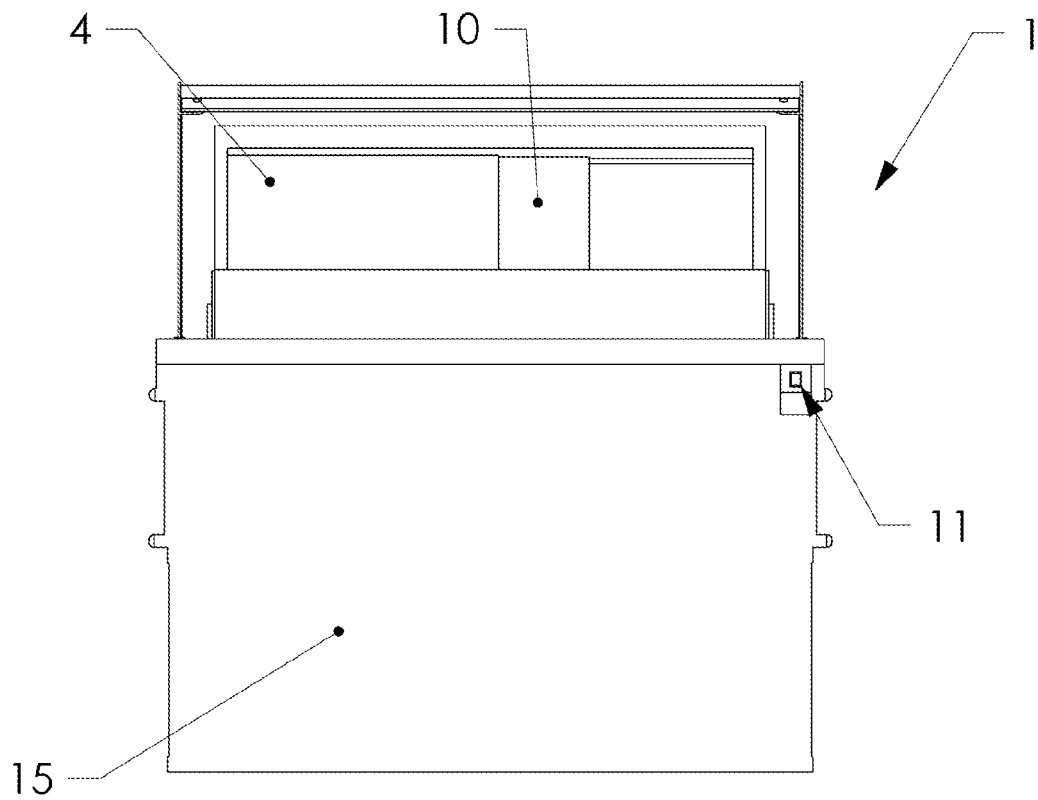


fig. 9

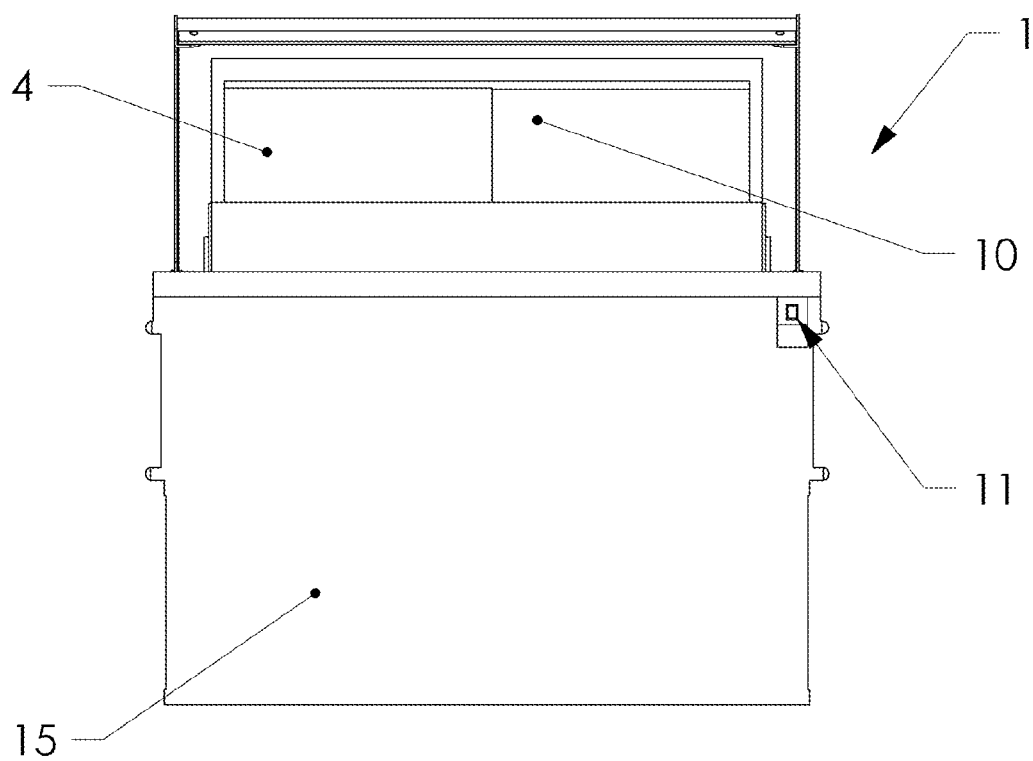


fig. 10

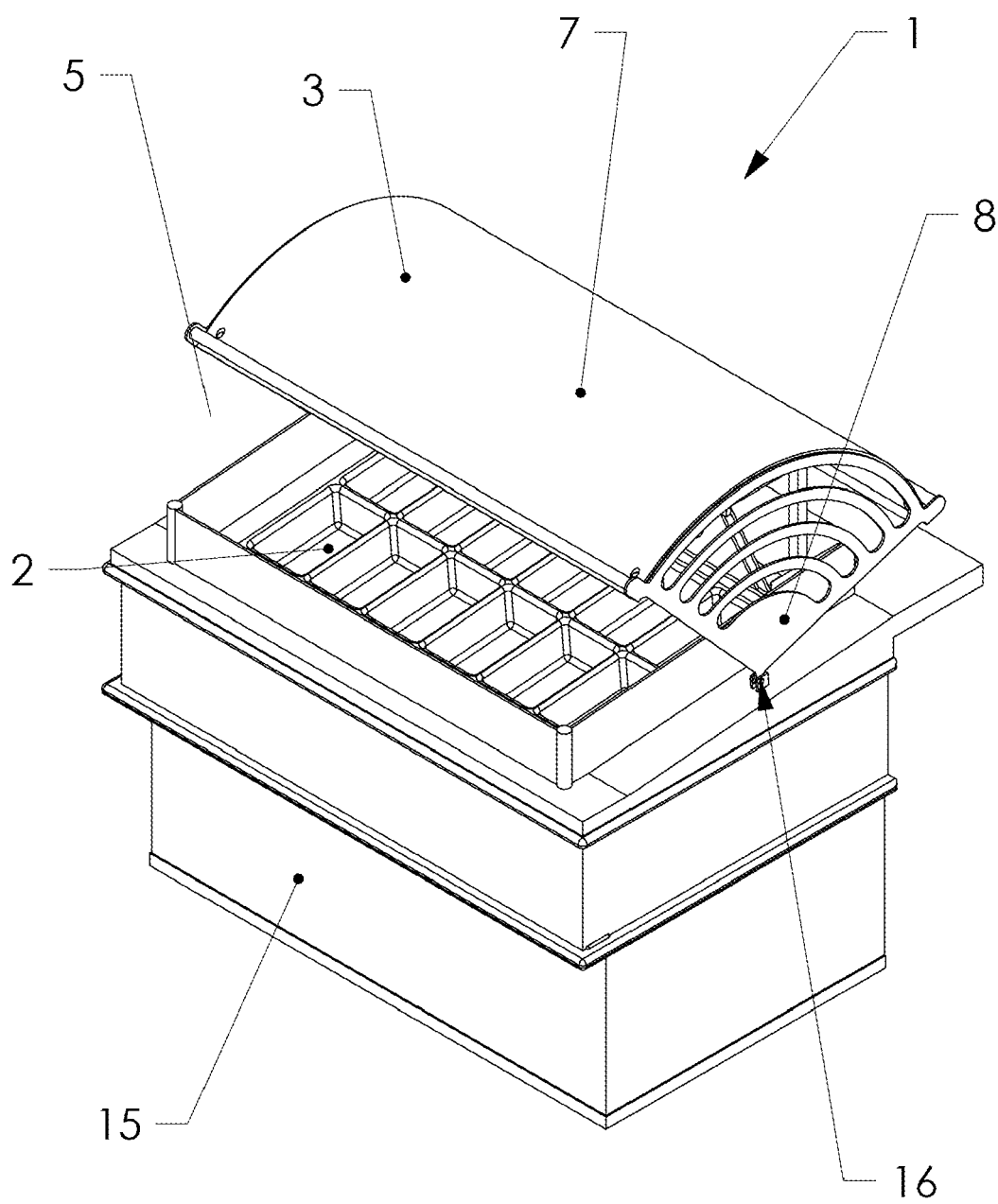
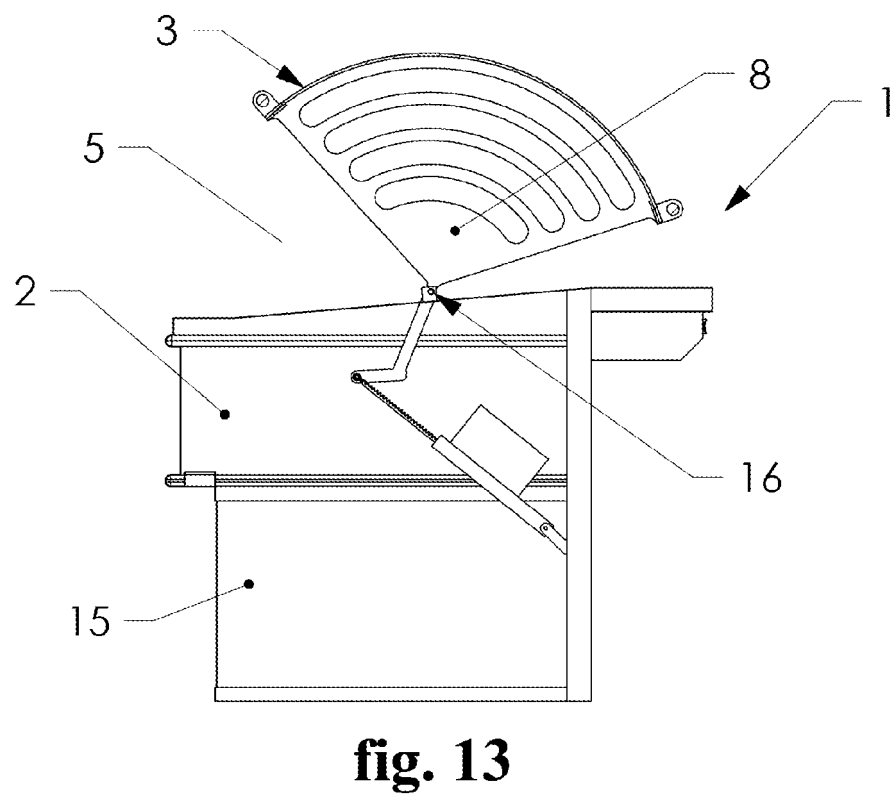
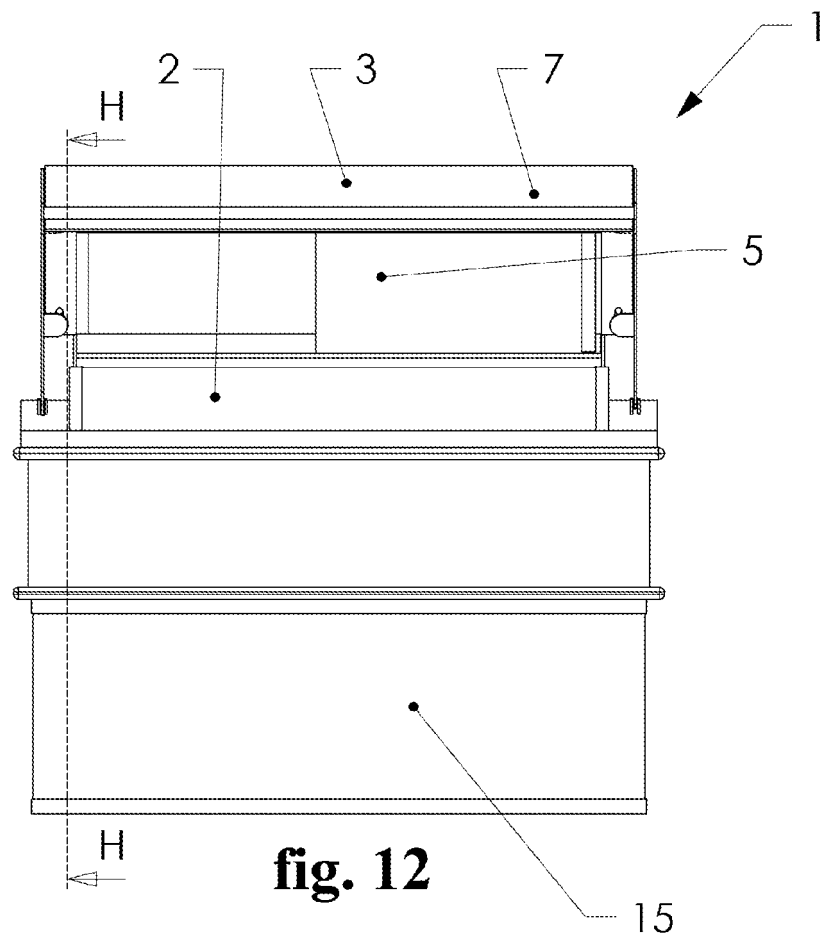


fig. 11



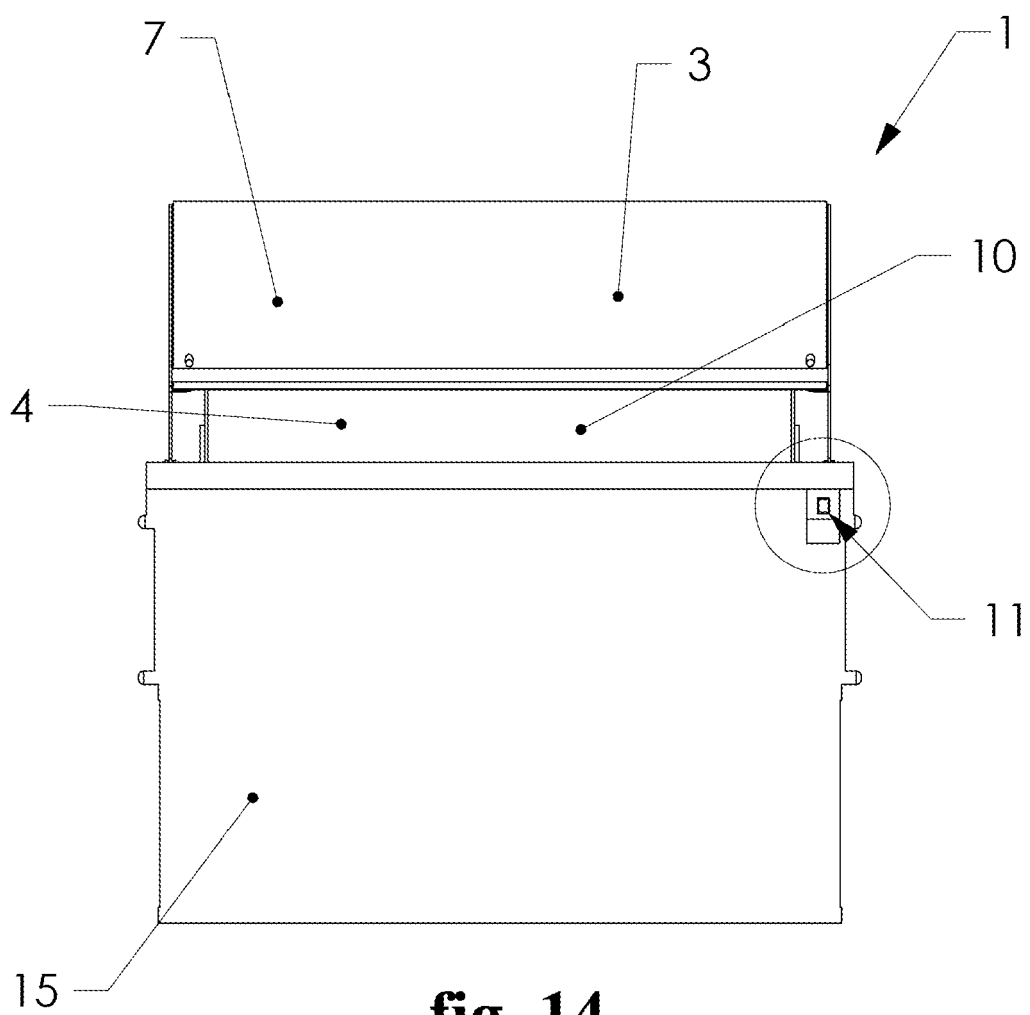


fig. 14

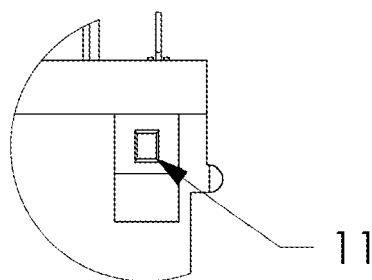


fig. 15



EUROPEAN SEARCH REPORT

Application Number
EP 09 15 2839

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 020 148 A1 (ISA SPA) 19 July 2000 (2000-07-19) * paragraph [0001] * * paragraph [0006] * * paragraph [0025] * * paragraph [0033] * * paragraph [0035] - paragraph [0042] * * paragraph [0045] - paragraph [0046] * * paragraph [0048] * * paragraph [0050] - paragraph [0053] * * paragraph [0056] - paragraph [0057] * * paragraph [0055] * * paragraph [0063] * * paragraph [0064] * * paragraph [0066] * * paragraph [0072] * * paragraph [0082] - paragraph [0088] * * paragraph [0094] * * paragraph [0097] - paragraph [0098] * * paragraph [0101] * -----	1-3,5, 9-10, 12-14	INV. A47F3/04 A47F5/00 A47F10/06 TECHNICAL FIELDS SEARCHED (IPC)
X	US 2 696 417 A (JOUK) 7 December 1954 (1954-12-07) * column 1, line 15 - column 3, line 19 * * column 4, line 21 - line 31; figures 3-5 * * -----	1-8,11, 14-15	A47F
X	US 2005/088062 A1 (AKIMOTO ET AL) 28 April 2005 (2005-04-28) * paragraph [0006] * * paragraph [0017] - paragraph [0019] * -----	1,3-10, 14	
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		8 July 2009	Jacquemin, Martin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EUROPEAN SEARCH REPORT

Application Number
EP 09 15 2839

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 3 013 406 A (SHARPE ET AL) 19 December 1961 (1961-12-19) * column 3, line 37 - column 4, line 11; figure 4 * -----	8	
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 8 July 2009	Examiner Jacquemin, Martin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 15 2839

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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08-07-2009

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