(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 517 235 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
05.03.2025 Bulletin 2025/10

(21) Application number: **23193621.2**

(22) Date of filing: **28.08.2023**

(51) International Patent Classification (IPC):
F25D 25/04 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
F25D 25/04; F25D 23/10; F25D 31/007; F25D 2400/10; F25D 2500/06

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(71) Applicant: **BSH Hausgeräte GmbH**
81739 München (DE)

(72) Inventors:
- **Liese, Eric Joachim**
  81373 München (DE)
- **Malekshahi, Rahim**
  85521 Ottobrunn (DE)
- **Sagoo, Kiran Pal**
  82256 Fürstenfeldbruck (DE)

Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) COOLING APPLIANCE WITH AN ITEM ACCESS UNIT

(57) A cooling appliance (100) for a kitchen of a household is described. The cooling appliance (100) comprises an opening lid (103) which is configured to provide access to the interior (105) of the cooling appliance (100), such that the access is limited to a top region of the interior (105) of the cooling appliance (100). Furthermore, the cooling appliance (100) comprises an item access unit (200) which is located within the interior (105) of the cooling appliance (100), which comprises a plurality of different item holders (201) and which is configured to move a selected one of the plurality of item holders (201) into the top region of the interior (105) of the cooling appliance (100), such that a user is enabled to access the selected item holder (201) via the opening lid (103).

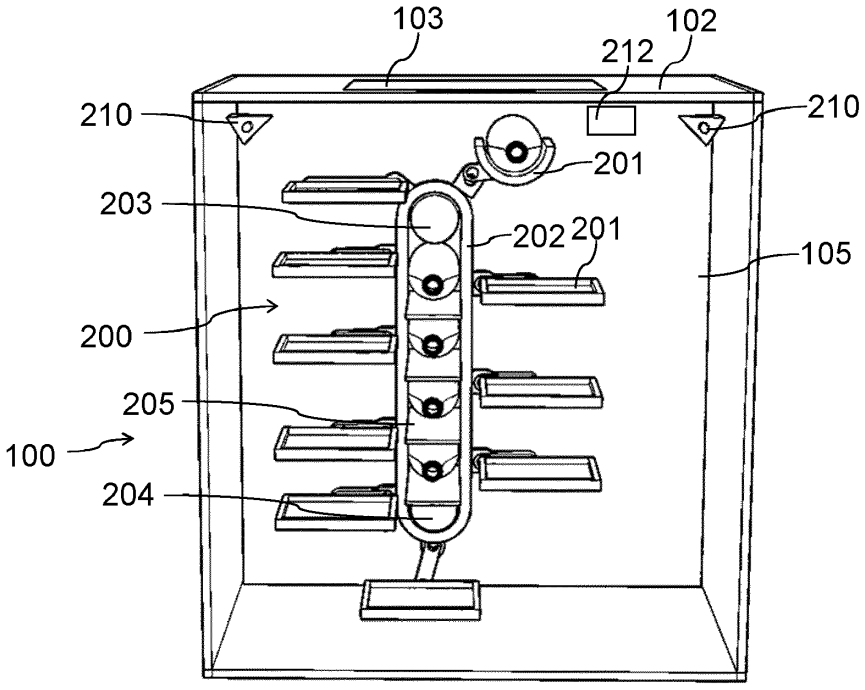

Fig. 2a

EP 4 517 235 A1

Description

[0001] The present document relates to a cooling appliance, such as a refrigerator or a freezer. In particular, the present document relates to providing access to different items within a cooling appliance in a comfortable and energy efficient manner.

[0002] Within a household one or more cooling appliances, such as a refrigerator and/or a freezer, may be used for cooling different items, notably food items. The present document addresses the technical problem of energy efficiency and comfort-of-use of such a cooling appliance. The technical problem is solved by the independent claim. Preferred examples are described in the dependent claims.

[0003] According to an aspect, a cooling appliance (in particular a refrigerator) for a kitchen of a household is described. The cooling appliance may be configured to be integrated within the worktop of a kitchen, in particular such that the opening lid (which is also referred to herein as an access hatch) of the cooling appliance is aligned with the worktop. The cooling appliance typically comprises a (cuboid shaped) housing. Furthermore, the cooling appliance is typically configured to cool the interior of the housing (e.g., to a temperature of 10° Celsius or less). The housing may comprise a bottom wall (which is facing the floor that the cooling appliance is placed on) and a top wall (which is opposite to the bottom wall and which may be aligned with the worktop). Furthermore, the housing may comprise side walls, in particular a side wall at the front side, which is facing a user of the cooling appliance. The side walls span from the bottom wall to the top wall of the housing.

[0004] The cooling appliance comprises an opening lid (also referred to as an access hatch) which is configured to provide access to the interior of the cooling appliance, such that the access is limited to the top region of the interior of the cooling appliance. The opening lid may be located at the upper (i.e., top) housing wall of the housing of the cooling appliance, wherein the upper (i.e., top) housing wall and/or the opening lid typically have a horizontal orientation.

[0005] The interior of the cooling appliance typically exhibits a certain height between the bottom wall and the top wall of the housing of the cooling appliance. The top region of the interior of the cooling appliance may start at the top wall of the housing of the cooling appliance and may be limited to a distance from the top wall of the housing of the cooling appliance of 20% or less of the height.

[0006] Furthermore, the cooling appliance comprises an item access unit which is located within the interior of the cooling appliance, which comprises a plurality of different item holders and which is configured to move a selected one of the plurality of item holders into the top region of the interior of the cooling appliance, such that a user of the cooling appliance is enabled to access the selected item holder via the opening lid. Some or all of the item holders may be trays onto which one or more items, in particular food items, may be placed.

[0007] Hence, a cooling appliance is described which provides locally constrained access to the cooled interior of the housing of the cooling appliance only via the top region of the cooling appliance. Furthermore, the cooling appliance comprises an item access unit which is configured to selectively place different item holders (notably trays) within the top region. By doing this, an energy efficient and comfortable access to the different items within the interior of the cooling appliance may be provided. In comparison, conventional cooling appliances may be less energy efficient because every time somebody opens the front door the cold air flows out of the cooling appliance (as it has a higher density than warm air) and warmer air streams into the cooling appliance, which needs to be cooled down again after the access to the stored food items.

[0008] The item access unit may comprise a conveyor belt, especially a vertical conveyor belt. The main axis of the conveyor belt may be oriented vertically. Furthermore, the item access unit may comprise a drive pulley and a tail pulley, which are configured to move the conveyor belt. The drive pulley and the tail pulley may be aligned along a vertical line (which is vertical with respect to the floor that the cooling appliance is placed on). The conveyor belt may have a certain length along the vertical direction, which is dependent on the height of the housing of the cooling appliance. The length along the vertical direction is typically 5 times or more, or 10 times or more, larger than the (horizontal) diameter of the pulleys.

[0009] The plurality of item holders may be attached to a corresponding plurality of attachment points of the conveyor belt. The item holders of the plurality of item holders may each be attached to the conveyor belt using a hinge. The hinges may ensure that the individual item holders which are attached to the conveyor belt are each maintained horizontally during a complete revolution of the respective item holder. By doing this, items may be placed in a secure manner onto the different item holders.

[0010] The plurality of item holders may e.g., comprise 5 or more, or 10 or more item holders. The item holders may be arranged in a distributed manner along the conveyor belt. The item holders may be uniformly spaced from one another along the longitudinal extension of the conveyor belt.

[0011] The cooling appliance may comprise a fixing mechanism which is configured to selectively hold the item holder which is positioned in the top region of the interior of the cooling appliance in a defined and stable position. By doing this, the comfort-of-use of the cooling appliance may be further increased. Especially, it may be avoided that food items fall down because of a wobbly item holder during the access procedure.

[0012] The item access unit may comprise one or more additional stationary item holders which are positioned between the drive pulley and the tail pulley and which are surrounded by the conveyor belt. As a result of this, the

available space within the interior of the housing of the cooling appliance may be used in a particularly efficient manner.

[0013] As indicated above, the interior of the cooling appliance spans from the bottom wall to the top wall of the housing of the cooling appliance. The cooling appliance may comprise a front door at the front side of the housing of the cooling appliance. The front door may be configured to provide access to a region at the front side of the interior of the cooling appliance, which spans from the bottom wall to the top wall of the housing of the cooling appliance. By providing an additional front door, items may be placed within the cooling appliance in a particularly comfortable manner. Thus, when a consumer returns from the supermarket, he may easily refill the cooling appliance by using the front door, wherein during normal operation he preferably uses only the opening lid at the top to avoid that cold air unnecessarily streams out of the cooling appliance.

[0014] The cooling appliance typically comprises a user interface, which is configured to allow the user to select an item, which is to be accessed through the opening lid. The user interface may be enabled for natural language processing, thereby providing a particularly comfortable user interaction.

[0015] The cooling appliance may comprise a sensor, in particular a camera, which is configured to capture sensor data regarding items placed within the item access unit. Furthermore, the cooling appliance may comprise a control unit, which is configured to identify the items placed within the item access unit based on the sensor data. This identification may be performed e.g. by an artificial neural networks, which has been trained to be able to recognize food items.

[0016] The cooling appliance may comprise a dedicated object recognition region, in which a plurality of cameras are located, which observe an item holder passing by preferably from different angles. When an item on the item holder could not be recognized, it may be possible to drive the conveyor belt more slowly and/or to reverse the driving direction to allow for a closer scrutiny of the item. The images taken by the plurality of cameras (preferably from different perspectives) may be combined to recognize the item. In comparison to conventional cooling appliances this may allow for a higher object recognition rate.

[0017] The control unit may be configured to determine for an, in particular for each, identified item the item holder of the plurality of item holders that the identified item is placed on. By doing this, a stock list of the items which are placed within the item access unit and of the item holders that the respective items are placed on may be managed in an efficient and reliable manner.

[0018] The control unit may be configured to determine, in particular via the user interface of the cooling appliance, a particular item that the user of the cooling appliance wants to access. Based on the managed stock list, the item access unit may be caused to move the item holder that the particular item is placed on into the top region of the interior of the cooling appliance. Furthermore, it may be indicated to the user via the user interface that the particular item is ready for access at the top region of the interior of the cooling appliance. As a result of this, a particularly energy efficient and comfortable access to individual items may be provided.

[0019] The technology described in this disclosure may provide an optimized cooling appliance for accessing stored food items by voice. A user may e.g. simply say to the cooling appliance: "Hey fridge, pass me the butter" and the cooling appliance will provide the butter at a predetermined position. This may be especially convenient for visually impaired persons or while working through a recipe when cooking. The speech recognition may be performed by the cooling appliance itself (possibly with the aid of a backend server) and/or by being connected to a smart speaker like the Smart Kitchen Dock of Bosch. Thus, the cooling appliance preferably comprises a communication module, which could be based e.g. on Wi-Fi and/or Bluetooth.

[0020] In comparison to a conventional cooling appliance, no gripper arm is needed to pass a food item to the user. Moreover, object recognition in conventional cooling appliances may be difficult as many food items are located in front of other food items, which then are difficult to recognize. The cooling appliance described in this disclosure may allow for a much higher object recognition rate because food items may be easier to observe from multiple angles, e.g. due to the continuous and/or stepless movement of the conveyor belt and/or due to the above described dedicated object recognition region.

[0021] It should be noted that the systems including their preferred embodiments as outlined in the present document may be used stand-alone or in combination with the other systems disclosed in this document. In addition, the features outlined in the context of a system are also applicable to a corresponding method. Furthermore, all aspects of the systems outlined in the present document may be arbitrarily combined. In particular, the features of the claims may be combined with one another in an arbitrary manner.

[0022] The invention is explained below in an exemplary manner with reference to the accompanying drawings, wherein

Figures 1a to 1c show a cooling appliance integrated within a worktop of a kitchen;

Figures 2a to 2b show different views of an item access unit within a cooling appliance;

Figures 3a to 3c show different views of an item access unit;

Figures 4a to 4b show an example item holder of an item access unit; and

Figures 5a to 5c show an example fixing mechanism for fixing an item holder that is positioned at the access hatch of the cooling appliance.

[0023] As outlined above, the present document is directed at increasing the energy efficiency and the comfort-of-use of a cooling appliance. In this context, Figures 1a to 1c show different views of a cooling appliance 100, which is integrated within the worktop 110 of a kitchen. The cooling appliance 100 comprises a housing (e.g., a cuboid shaped housing) with an upper (i.e., top) housing wall 102. The upper housing wall 102 may be parallel to and/or aligned with the worktop 110 of the kitchen. The upper housing wall 102 comprises an access hatch (i.e., an opening lid) 103, which may be opened by a user to give access to the interior 105 of the cooling appliance 100. By providing an access at the top of the housing of the cooling appliance 100, a particularly energy efficient access may be provided.

[0024] The cooling appliance 100 may further comprise a front door 101 which may be opened by the user to provide a particular comfortable and/or relatively large access to the interior 105 of the cooling appliance 100 (e.g., for placing a relatively large number of items within the interior 105 of the cooling appliance 100). The front door 101 may be positioned at the front side of the housing of the appliance 100, which is facing the user.

[0025] The cooling appliance 100 may further comprise a user interface 104, which allows the user to interact with the cooling appliance 100. In particular, the user interface 104 may be used to change a setting (such as the cooling temperature) of the cooling appliance 100 and/or to select an item holder of the item access unit of the cooling appliance 100, which should be positioned at the access hatch 103 (i.e., within the top region of the cooling appliance 100).

[0026] Figures 2a to 2b show different views of an item access unit 200, which is located within the interior 105 of the cooling appliance 100. The item access unit 200 comprises a conveyor belt 202 with a drive pulley 203 and a tail pulley 204. The conveyor belt 202 is arranged vertically within the interior 105 of the cooling appliance 100, such that the conveyor belt 202 is moving upwards from the tail pulley 204 to the drive pulley 203, and downwards from the drive pulley 203 to the tail pulley 204 (or vice versa).

[0027] The item access unit 200 comprises a plurality of item holders 201, e.g., trays and/or bottle holders, which are attached to the conveyor belt 202. Adjacent item holders 201 may be spaced at substantially equal distances to one another. In the example shown in Fig. 2a, the item access unit 200 comprises ten different item holders 201, which are attached to different attachment points of the conveyer belt 202.

[0028] By moving the conveyor belt 202 different item holders 201 may be positioned directly below the access hatch 103 (i.e., in the top region of the cooling appliance 100), such that the user can access the one or more items which are placed on the item holder 201 that is positioned below the access hatch 103 in a comfortable and rapid manner, thereby further increasing the energy efficiency of the cooling appliance 100.

[0029] The item access unit 200 may comprise one or more stationary and or fixed item holders 205, in particular bottle holders, which are located between the drive pulley 203 and the tail pulley 204 (surrounded by the conveyor belt 202). The one or more stationary item holders 205 may be accessed via the front door 101 of the cooling appliance 100.

[0030] The cooling appliance 100 may comprise one or more sensors 210, in particular cameras, which are configured to capture sensor data with regard to the interior 105 of the cooling appliance 100. A control unit 212 of the cooling appliance 100 may be configured to analyze the sensor data to identify the one or more items, which are placed within the item access unit 200, in particular, which are placed on the different item holders 201, 205 of the item access unit 200. This information may be used to enable a user to select a particular item using the user interface 104 of the cooling appliance 100. The control unit 212 may then cause the item access unit 200 to position the item holder 201 with the selected item below the access hatch 103 of the cooling appliance 100, thereby providing a particularly comfortable and energy efficient access to the items, which are located within the cooling appliance 100.

[0031] Figures 3a to 3c show different views of the item access unit 200. In particular, it is illustrated how the different item holders 201 are coupled to the conveyor belt 202 via respective hinges 301, which are configured to maintain the individual item holders 201 in a horizontal orientation, during a complete revolution of the respective item holder 201. As a result of this, items may be placed on the item holders 201 in a reliable manner.

[0032] Figures 4a and 4b shows further details regarding the hinge 301. The hinge 301 may comprise a first arm 401 which is attached to the belt 202 and a second arm 402 which is coupled to the item holder 201 via a pivot joint 403. The first arm 401 and the second arm 402 are coupled to one another via a joint 404 that allows the first arm 401 and the second arm 402 to be held at different angles with respect to one another, as the item hold 201 revolves around the pulleys 203, 204.

[0033] Figures 5a to 5c show a fixing mechanism 500, which allows the item holder 201 that is positioned below the access hatch 103 to be maintained at a fixed and stable position, thereby enabling the user to remove an item from the item holder 201 in a comfortable and secure manner.

[0034] Hence, the cooling appliance 100 may provide an opening lid 103 at the top, such that the cold air is preserved inside when opening the cooling appliance 100. An elevator mechanism (i.e., an item access unit) 200 is described, wherein the different shelves (i.e., item holders) 201 are connected to a vertical conveyor belt 202. The user may select the shelf 201 that is to be moved to the top, where it can be accessed via the opening lid 103.

[0035] Based on the sensor data of the one or more sensors 210, the different items, which are located within

the cooling appliance 100, in particular within the item access unit 200, may be identified, thereby providing a reliable stock management. The control unit 212 may be configured to maintain a stock list of available items.

[0036] The user may select an item from the stock list of available items via the user interface 104. The user interface 104 may be configured to provide natural language processing (NLP) to allow the user to interact with the cooling appliance 100 using speech. The user may name the item, and the user interface 104 may understand the spoken words. If the item is available, the item holder 201 that comprises the item may be placed at the top position of the item access unit 200. On the other hand, if the item is not available, the user interface 104 may propose an alternative item, which is available within the cooling appliance 100 (e.g., using artificial intelligence).

[0037] The opening lid 103 for providing access to the interior 105 of the cooling appliance 100 may be positioned at the top portion on the front side of the cooling appliance 100, e.g. having the size of a typical kitchen drawer.

[0038] The cooling appliance 100 described herein enables an energy efficient storage of (food) items. Furthermore, accessibility to and/or visibility of the different items is improved, thereby increasing the comfort for the user. Stock management may be improved due to an improved visibility of the different items and due to an improved computer vision.

[0039] It should be noted that the description and drawings merely illustrate the principles of the proposed methods and systems. Those skilled in the art will be able to implement various arrangements that, although not explicitly described or shown herein, embody the principles of the invention and are included within its spirit and scope as defined by the appended claims. Furthermore, all examples and embodiment outlined in the present document are principally intended expressly to be only for explanatory purposes to help the reader in understanding the principles of the proposed methods and systems. Furthermore, all statements herein providing principles, aspects, and embodiments of the invention, as well as specific examples thereof, are intended to encompass equivalents thereof.

Claims

1. A cooling appliance (100) for a kitchen of a household; wherein the cooling appliance (100) comprises,

   - an opening lid (103) which is configured to provide access to an interior (105) of the cooling appliance (100), such that the access is limited to a top region of the interior (105) of the cooling appliance (100); and
   - an item access unit (200) which is located within the interior (105) of the cooling appliance (100), which comprises a plurality of different item holders (201) and which is configured to move a selected one of the plurality of item holders (201) into the top region of the interior (105) of the cooling appliance (100), such that a user is enabled to access the selected item holder (201) via the opening lid (103).

2. The cooling appliance (100) of claim 1, wherein

   - the item access unit (200) comprises a conveyor belt (202), preferably a vertical conveyor belt (202); and
   - the plurality of item holders (201) is attached to a corresponding plurality of attachment points of the conveyor belt (202).

3. The cooling appliance (100) of claim 2, wherein an item holder (201) is attached to the conveyor belt (202) such that the item holder (201) is maintained horizontally during a complete revolution of the item holder (201).

4. The cooling appliance (100) of any of claims 2 to 3, wherein the cooling appliance (100) comprises a fixing mechanism (500) which is configured to selectively hold the item holder (201) which is positioned in the top region of the interior (105) of the cooling appliance (100) in a defined and stable position.

5. The cooling appliance (100) of any of claims 2 to 4, wherein

   - the item access unit (200) comprises a drive pulley (203) and a tail pulley (204), which are configured to move the conveyor belt (202); and
   - the item access unit (200) comprises one or more stationary item holders (205) which are positioned between the drive pulley (203) and the tail pulley (204) and which are surrounded by the conveyor belt (202).

6. The cooling appliance (100) of any of claims 2 to 5, wherein the item holders (201) of the plurality of item holders (201) are each attached to the conveyor belt (202) using a hinge (301).

7. The cooling appliance (100) of any previous claim, wherein an item holder (201) is a tray onto which an item, in particular a food item, may be placed.

8. The cooling appliance (100) of any previous claim, wherein

   - the opening lid (103) is located at a top housing wall (102) of a housing of the cooling appliance (100); and
   - the top housing wall (102) and/or the opening

lid (103) have a horizontal orientation.

9. The cooling appliance (100) of any previous claim, wherein

- the interior (105) of the cooling appliance (100) spans from a bottom wall to a top wall of a housing of the cooling appliance (100);
- the cooling appliance (100) comprises a front door (101) at a front side of the housing of the cooling appliance (100); and
- the front door (101) is configured to provide access to a region at the front side of the interior (105) of the cooling appliance (100) which spans from the bottom wall to the top wall of the housing of the cooling appliance (100).

10. The cooling appliance (100) of any previous claim, wherein

- the interior (105) of the cooling appliance (100) exhibits a certain height between a bottom wall and a top wall of a housing of the cooling appliance (100);
- the top region of the interior (105) of the cooling appliance (100) starts at the top wall of the housing of the cooling appliance (100) and is limited to a distance from the top wall of the housing of the cooling appliance (100) of 20% or less of the height.

11. The cooling appliance (100) of any previous claim, wherein the cooling appliance (100) comprises

- a sensor (210), in particular a camera, which is configured to capture sensor data regarding items placed within the item access unit (200); and
- a control unit (212) which is configured to identify the items placed within the item access unit (200) based on the sensor data.

12. The cooling appliance (100) of claim 11, wherein the control unit (212) is configured to

- determine for an, in particular for each, identified item the item holder (201) of the plurality of item holders (201) that the identified item is placed on; and
- manage a list of the items which are placed within the item access unit (200) and of the item holders (201) that the respective items are placed on.

13. The cooling appliance (100) of claim 12, wherein the control unit (212) is configured to

- determine, in particular via a user interface (104) of the cooling appliance (100), a particular item that the user of the cooling appliance (100) wants to access;
- based on the managed list, cause the item access unit (200) to move the item holder (201) that the particular item is placed on into the top region of the interior (105) of the cooling appliance (100); and
- in particular, indicate to the user via the user interface (104) that the particular item is ready for access at the top region of the interior (105) of the cooling appliance (100).

14. The cooling appliance (100) of any previous claim, wherein the cooling appliance (100) comprises a user interface (104) which is configured to allow the user to select an item, which is to accessed through the opening lid (103), using natural language processing.

15. The cooling appliance (100) of any previous claim, wherein the cooling appliance (100) is configured to be integrated within a worktop (110) of a kitchen, in particular such that the closed opening lid (103) is aligned with the worktop (110).

Amended claims in accordance with Rule 137(2) EPC.

1. A cooling appliance (100) for a kitchen of a household; wherein the cooling appliance (100) comprises,

- an opening lid (103) which is configured to provide access to an interior (105) of a housing of the cooling appliance (100), such that the access which is provided by the opening lid (103) is limited to a top region of the interior (105) of the cooling appliance (100);
- an item access unit (200) which is located within the interior (105) of the cooling appliance (100), which comprises a plurality of different item holders (201) and which is configured to move a selected one of the plurality of item holders (201) into the top region of the interior (105) of the cooling appliance (100), such that a user is enabled to access the selected item holder (201) via the opening lid (103); wherein
  - the item access unit (200) comprises a conveyor belt (202);
  - the plurality of item holders (201) is attached to a corresponding plurality of attachment points of the conveyor belt (202);
  - the item access unit (200) comprises a drive pulley (203) and a tail pulley (204), which are configured to move the conveyor belt (202); and

- the item access unit (200) comprises one or more stationary item holders (205) which are positioned between the drive pulley (203) and the tail pulley (204) and which are surrounded by the conveyor belt (202); and

- a front door (101) at a front side of the housing of the cooling appliance (100); wherein the front door (101) is configured to provide access to the one or more stationary item holders (205).

2. The cooling appliance (100) of claim 1, wherein the conveyor belt (202) is a vertical conveyor belt (202).

3. The cooling appliance (100) of any previous claims, wherein an item holder (201) is attached to the conveyor belt (202) such that the item holder (201) is maintained horizontally during a complete revolution of the item holder (201).

4. The cooling appliance (100) of any previous claims, wherein the cooling appliance (100) comprises a fixing mechanism (500) which is configured to selectively hold the item holder (201) which is positioned in the top region of the interior (105) of the cooling appliance (100) in a defined and stable position.

5. The cooling appliance (100) of any previous claims, wherein the item holders (201) of the plurality of item holders (201) are each attached to the conveyor belt (202) using a hinge (301).

6. The cooling appliance (100) of any previous claim, wherein an item holder (201) is a tray onto which an item, in particular a food item, may be placed.

7. The cooling appliance (100) of any previous claim, wherein

- the opening lid (103) is located at a top housing wall (102) of the housing of the cooling appliance (100); and
- the top housing wall (102) and/or the opening lid (103) have a horizontal orientation.

8. The cooling appliance (100) of any previous claim, wherein

- the interior (105) of the cooling appliance (100) spans from a bottom wall to a top wall of the housing of the cooling appliance (100); and
- the front door (101) is configured to provide access to a region at the front side of the interior (105) of the cooling appliance (100) which spans from the bottom wall to the top wall of the housing of the cooling appliance (100).

9. The cooling appliance (100) of any previous claim, wherein

- the interior (105) of the cooling appliance (100) exhibits a certain height between a bottom wall and a top wall of the housing of the cooling appliance (100); and
- the top region of the interior (105) of the cooling appliance (100) starts at the top wall of the housing of the cooling appliance (100) and is limited to a distance from the top wall of the housing of the cooling appliance (100) of 20% or less of the height.

10. The cooling appliance (100) of any previous claim, wherein the cooling appliance (100) comprises

- a sensor (210), in particular a camera, which is configured to capture sensor data regarding items placed within the item access unit (200); and
- a control unit (212) which is configured to identify the items placed within the item access unit (200) based on the sensor data.

11. The cooling appliance (100) of claim 10, wherein the control unit (212) is configured to

- determine for an, in particular for each, identified item the item holder (201) of the plurality of item holders (201) that the identified item is placed on; and
- manage a list of the items which are placed within the item access unit (200) and of the item holders (201) that the respective items are placed on.

12. The cooling appliance (100) of claim 11, wherein the control unit (212) is configured to

- determine, in particular via a user interface (104) of the cooling appliance (100), a particular item that the user of the cooling appliance (100) wants to access;
- based on the managed list, cause the item access unit (200) to move the item holder (201) that the particular item is placed on into the top region of the interior (105) of the cooling appliance (100); and
- in particular, indicate to the user via the user interface (104) that the particular item is ready for access at the top region of the interior (105) of the cooling appliance (100).

13. The cooling appliance (100) of any previous claim, wherein the cooling appliance (100) comprises a user interface (104) which is configured to allow the user to select an item, which is to accessed

through the opening lid (103), using natural language processing.

14. The cooling appliance (100) of any previous claim, wherein the cooling appliance (100) is configured to be integrated within a worktop (110) of a kitchen, in particular such that the closed opening lid (103) is aligned with the worktop (110).

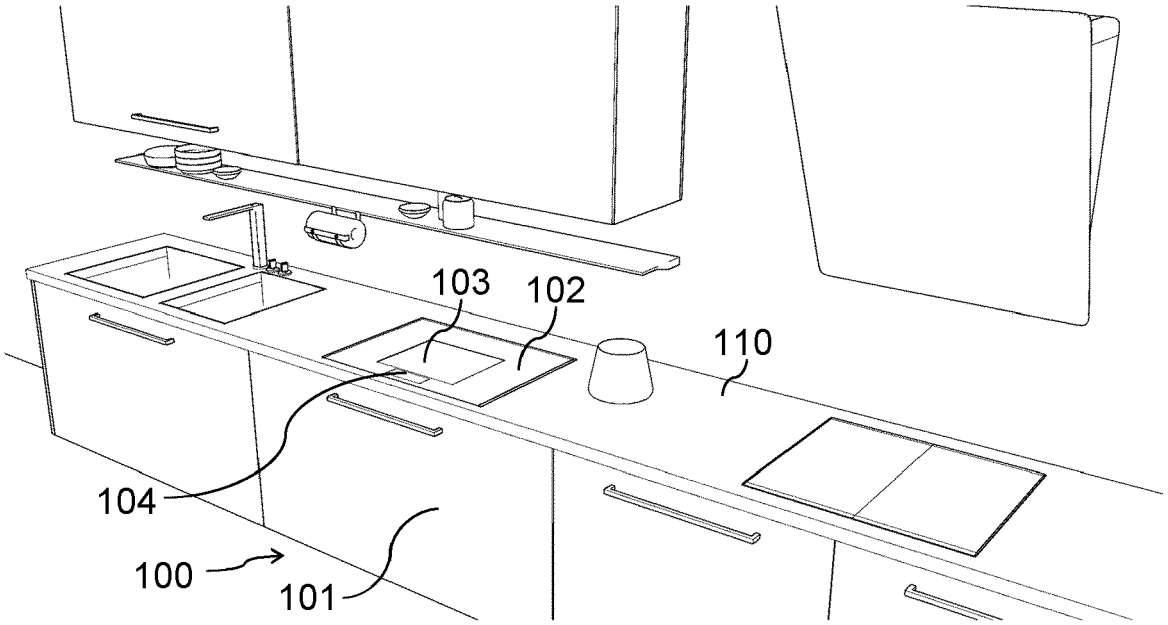

Fig. 1a

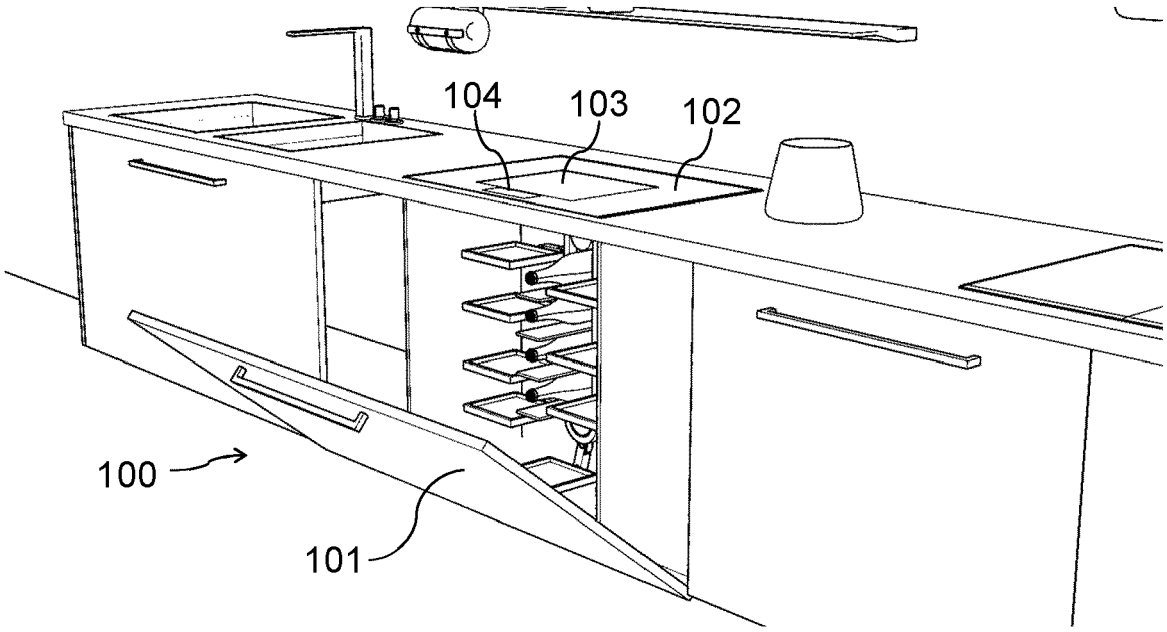

Fig. 1b

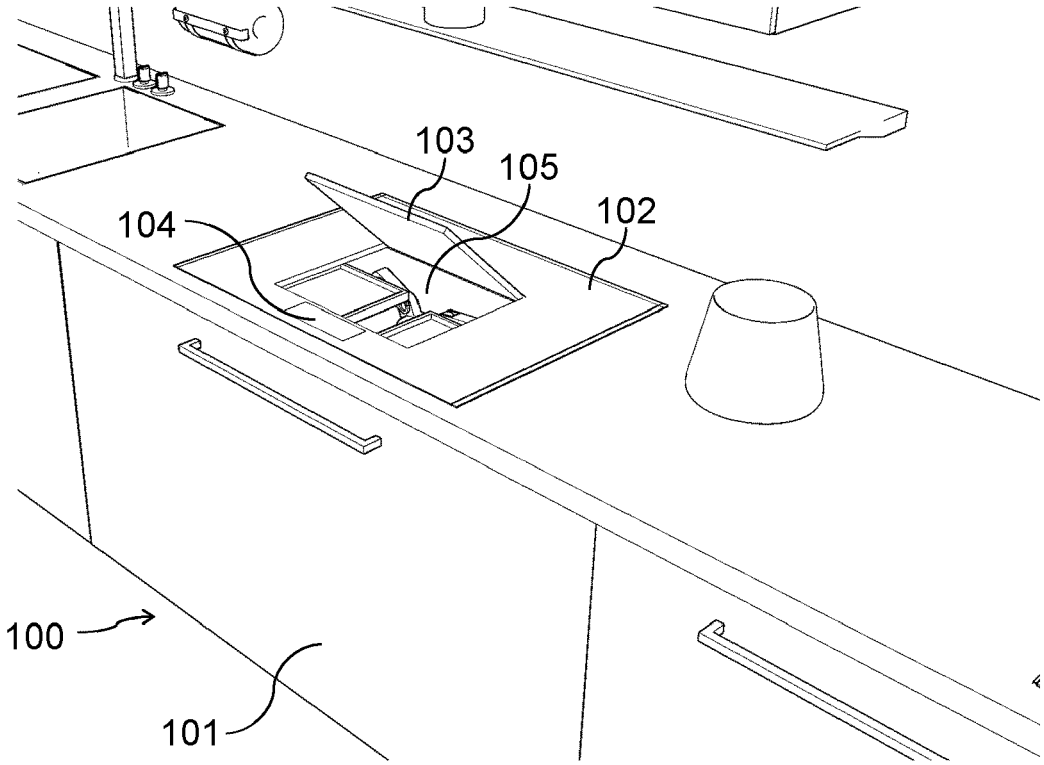
103
105
102
104
100
101

Fig. 1c

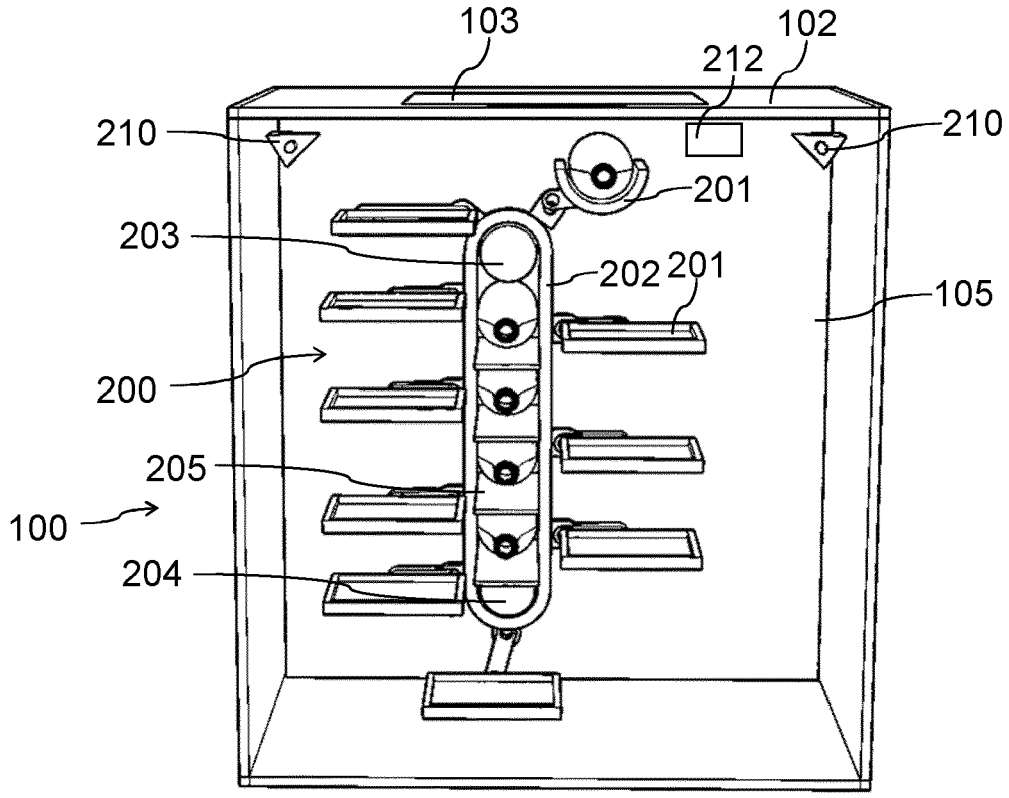
103
102
212
210
210
201
203
202
201
105
200
205
100
204

Fig. 2a

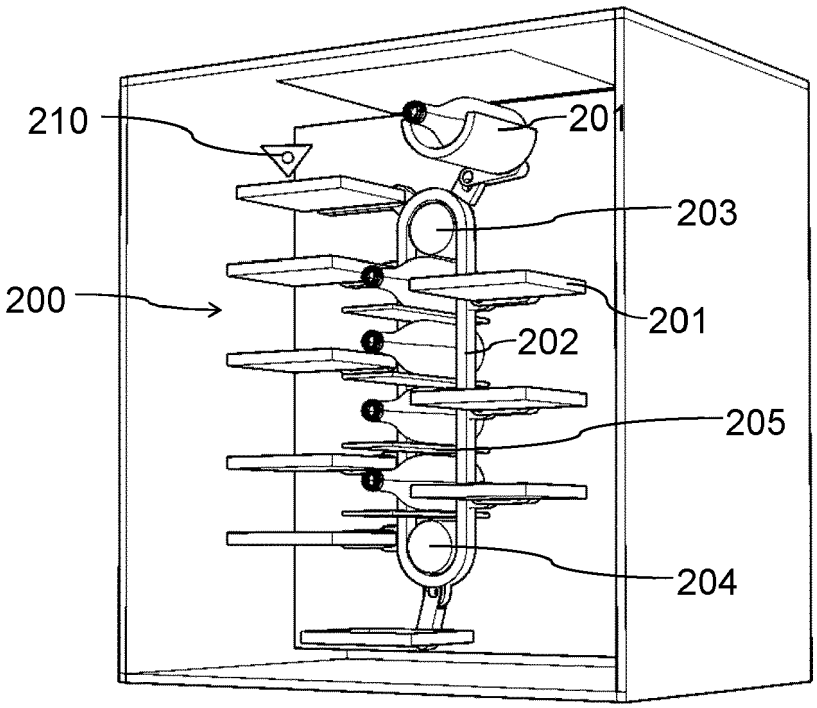

Fig. 2b

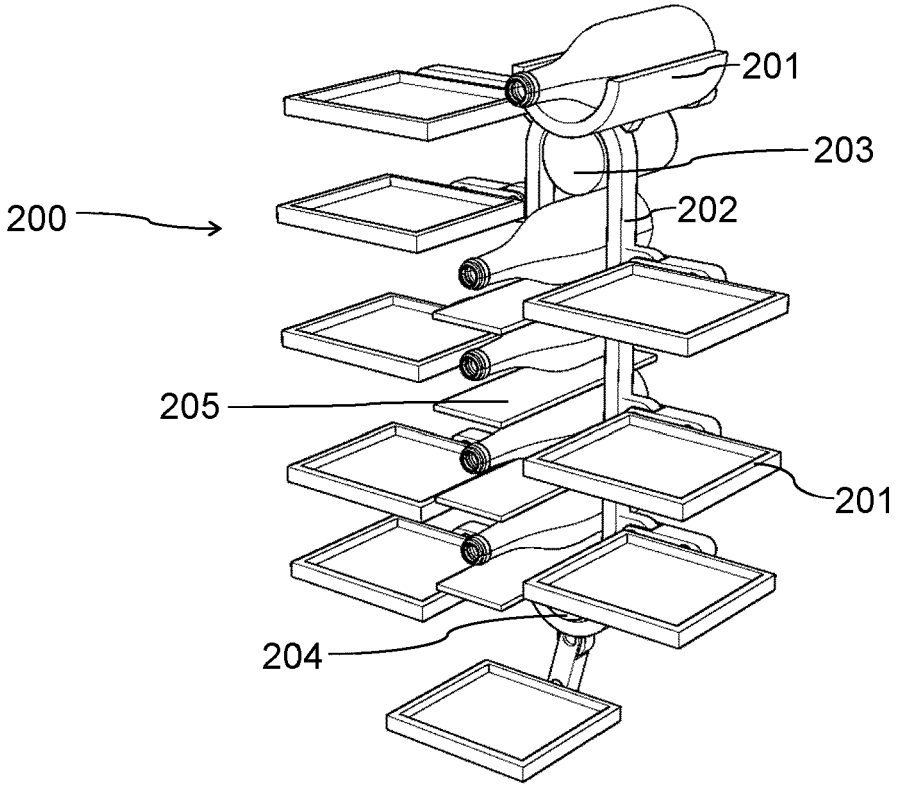

Fig. 3a

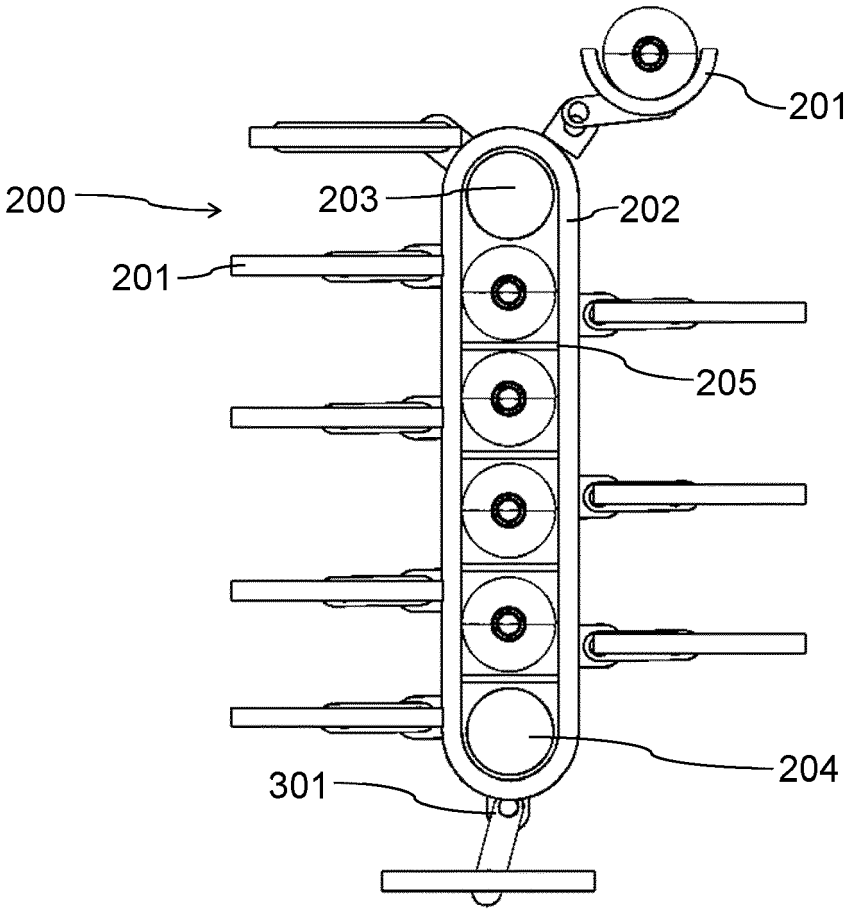

Fig. 3b

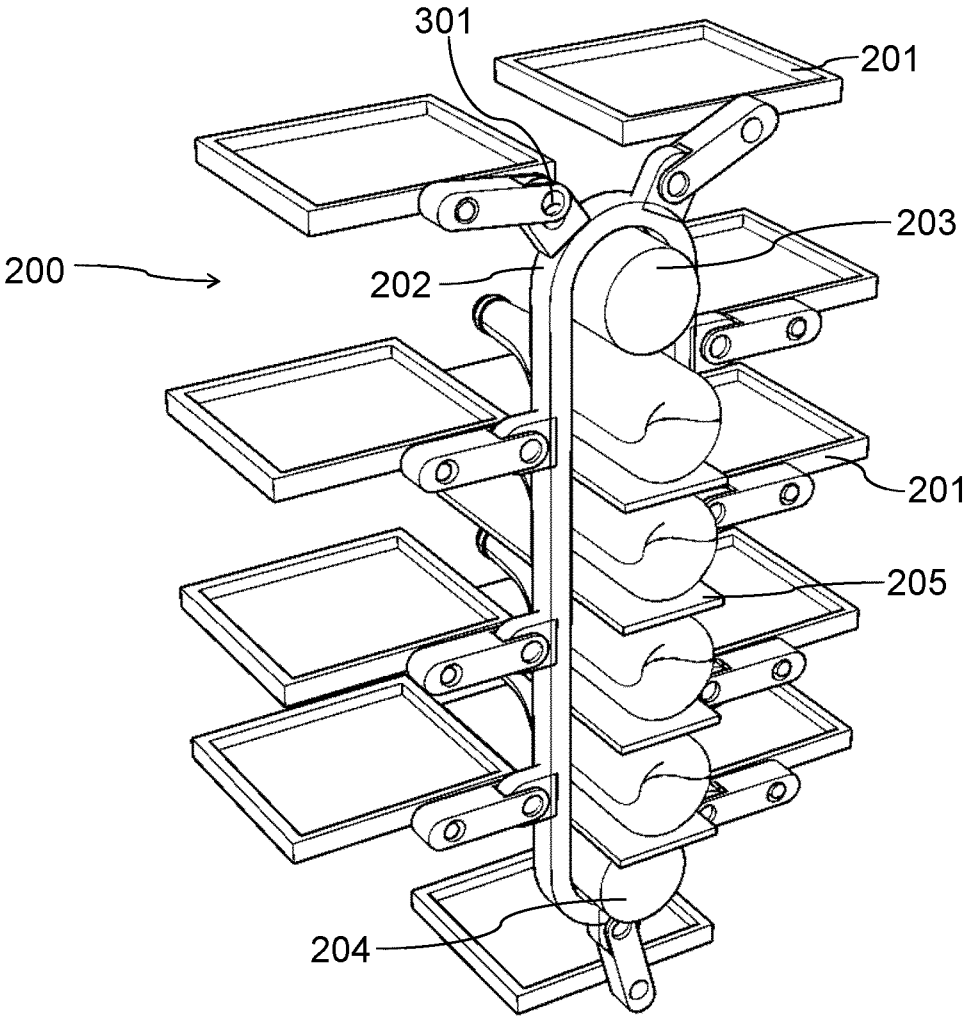

Fig. 3c

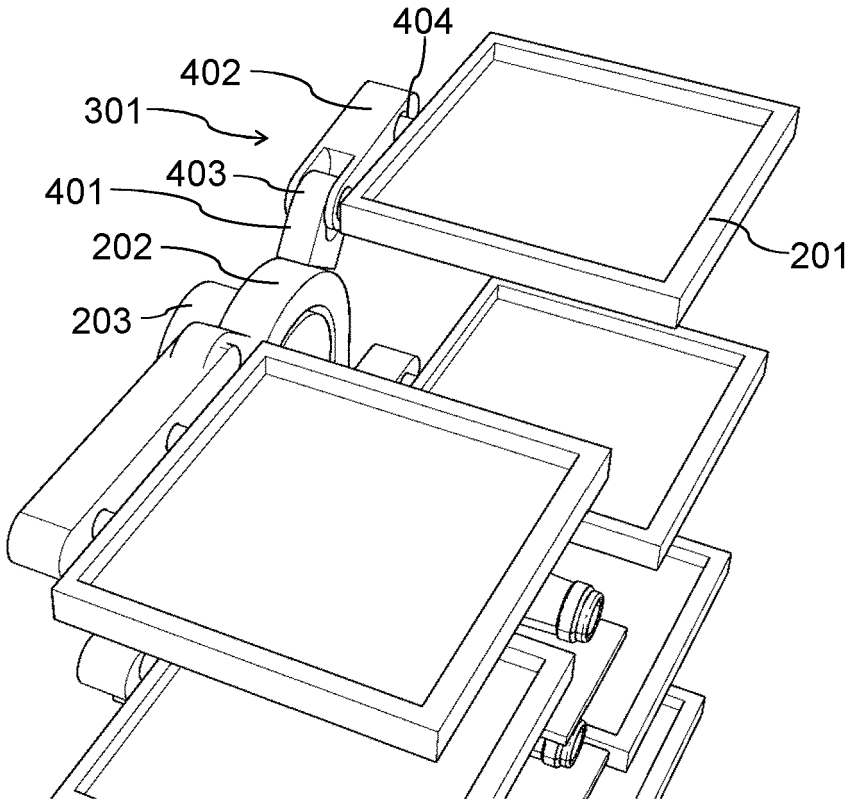

Fig. 4a

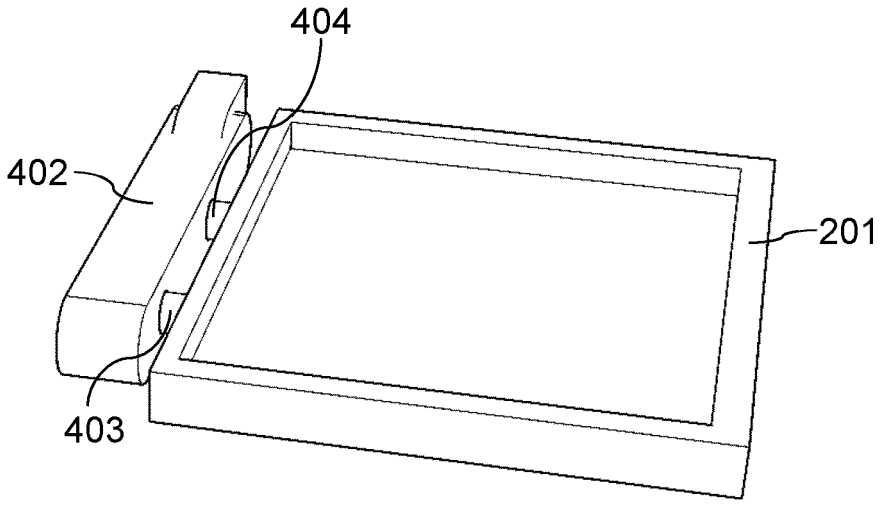

Fig. 4b

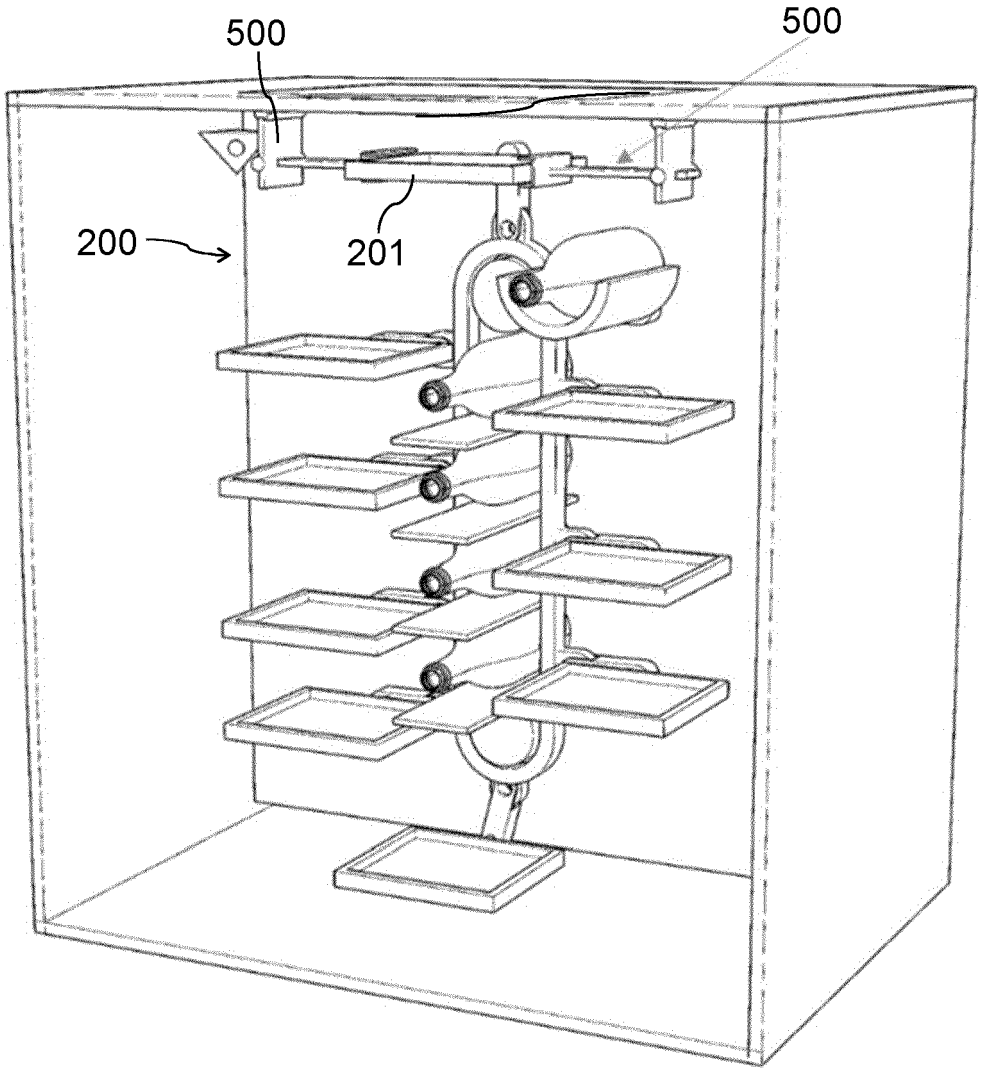

Fig. 5a

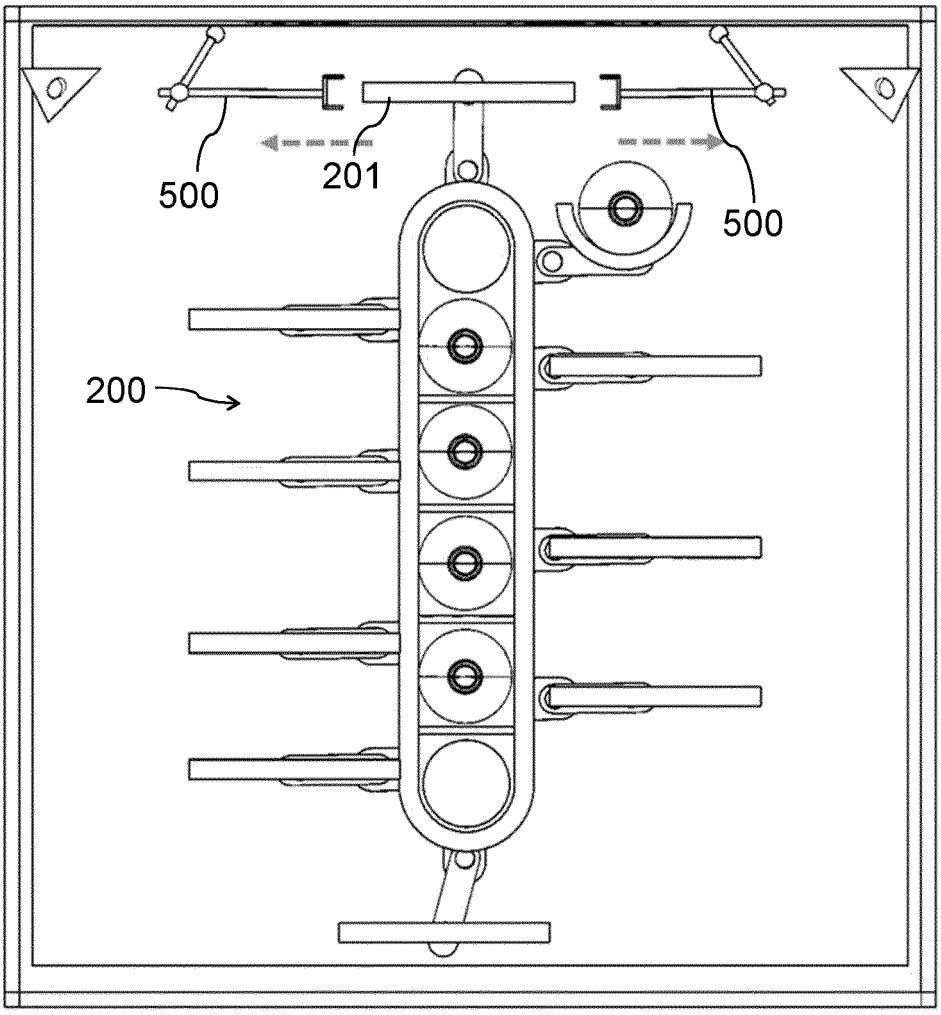

Fig. 5b

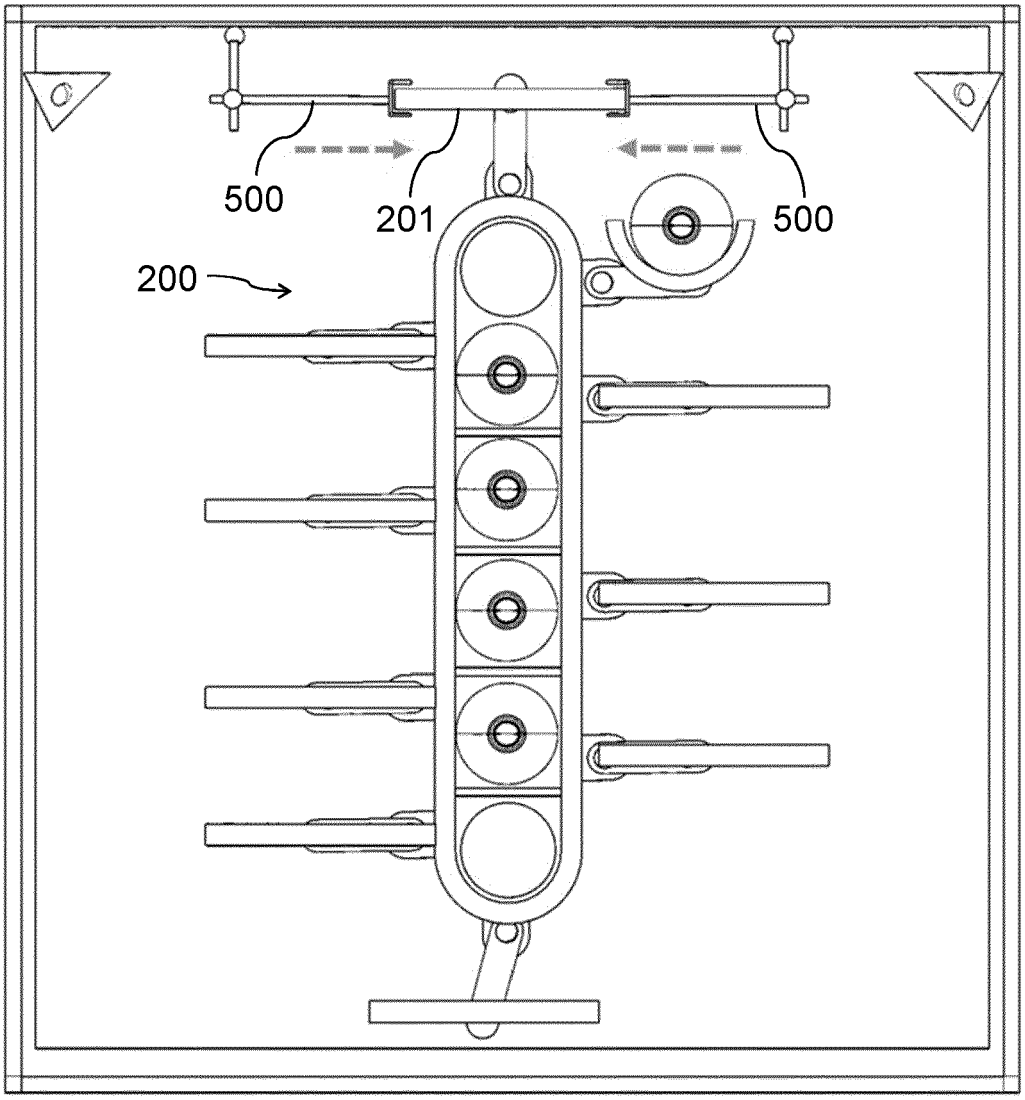

Fig. 5c

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 23 19 3621

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	US 2019/316836 A1 (NA JUNG-HWAN [KR]) 17 October 2019 (2019-10-17) * abstract; figures 1-3 * * paragraphs [0020] - [0032] *	1,2,4,5, 7,10-13, 15	INV. F25D25/04
X	US 1 785 954 A (HAYES FREDERICK S) 23 December 1930 (1930-12-23) * figures 1-4 * * page 1, line 55 - line 95 *	1-3,6,8, 9,14	
X	US 2006/137375 A1 (LISHMAN WILLIAM [CA]) 29 June 2006 (2006-06-29) * abstract; figures 1-10 * * paragraph [0021] - paragraph [0037] *	1,7,8, 10,15	
X	US 2008/092582 A1 (DORAN JOHN [US]) 24 April 2008 (2008-04-24) * the whole document *	1	
X	US 2009/229293 A1 (KIM BYUNG-CHUL [KR]) 17 September 2009 (2009-09-17) * the whole document *	1	TECHNICAL FIELDS SEARCHED (IPC) F25D
A	JP 2003 090661 A (HITACHI LTD) 28 March 2003 (2003-03-28) * the whole document *	1-15	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 February 2024	Bejaoui, Amin

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 19 3621

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

08-02-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2019316836 A1	17-10-2019	CN 109154468 A	04-01-2019
		KR 20170133004 A	05-12-2017
		US 2019316836 A1	17-10-2019
		WO 2017204417 A1	30-11-2017
US 1785954 A	23-12-1930	NONE	
US 2006137375 A1	29-06-2006	US 2006137375 A1	29-06-2006
		WO 2005118456 A1	15-12-2005
US 2008092582 A1	24-04-2008	NONE	
US 2009229293 A1	17-09-2009	KR 20060037947 A	03-05-2006
		US 2009229293 A1	17-09-2009
		WO 2006046844 A1	04-05-2006
JP 2003090661 A	28-03-2003	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82