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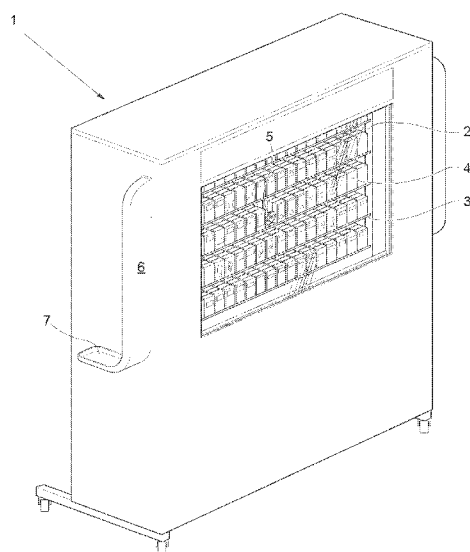
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(54) **Title:** STORAGE SYSTEM

Fig.1



(57) **Abstract:** A storage system (1) for storing products for automatic retrieval comprises a transparent storage interface (2) adapted to enable viewing of the products (4) in the storage system, and a dispensing device (6) for dispensing products from the storage system. A positioning device (9a, 9b) is adapted to determine the position of an interaction from a person, such that the person can select a product from the storage system (1) by interacting with an area of the transparent storage interface for selecting a displayed product to be dispensed. A single automated retrieving member (10) is adapted to retrieve at least two different products at different positions. The positioning device and the retrieving member are connected to a control unit (15) adapted to control the retrieving member in response to input from the positioning device, so that the retrieving member can retrieve one of the at least two different products from the storage system. The storage system allows the customer to view the actual products that can be purchased from the storage system at the same time as it provides protection against theft.

STORAGE SYSTEM

TECHNICAL FIELD

[0001] The invention relates generally to a storage system and more particularly to a storage system for storing products of r automatic retrieval. The invention also relates to machines and registers comprising such a storage system.

BACKGROUND

[0002] Shoplifting and more advanced theft have always been a problem in the retail industry and vendors have always tried to keep products that are valuable and/ or easy to steal either behind a counter, close to the cash registers or in areas where members of the staff are present.

[0003] The recent development in the line of products offered by supermarkets has been towards more expensive products that in many instances are easy to steal, due to a small format. Examples of such products are tobacco, shaving accessories, batteries and prescription-free drugs. The small and valuable products are very often important sources of income for a supermarket and since the shipping and handling costs of small valuable products are very small in combination with the products consuming very little floor-space, the products tend to be high-margin products.

[0004] The market currently offers storage systems that enable the storage of valuable products in safe locations distanced from the customers. The products are for example accessed through a system in the store providing a representation of the product either as a small plastic card or via an electronic interface. The customer is able to obtain the real product by, in the case with the electronic interface, the electronic interface providing the customer with a receipt that the customer uses at the protected storage area, or in the case with the plastic card, by the customer using the plastic card at the protected storage area to obtain the purchased product.

[0005] A key element in selling products in a supermarket is displaying the product in an attractive and accessible way. The hurdle for the customer to purchase a product should be as low as possible since the accessibility of the products is an important factor with a substantial impact on the sales of the particular product. Providing a way of ensuring that the customer has easy access to valuable products at the same time as the valuable products are provided with adequate protection against theft would provide a great benefit.

[0006] Restocking and making sure that the products are properly displayed are some of the most time consuming tasks in a supermarket. The recent development in shelf systems used in supermarkets has been towards providing shelf systems that automatically optimize the display of products while providing as large storage space as possible, such that the shelves need restocking as seldom as possible.

SUMMARY

[0007] A storage system for storing products for automatic retrieval is provided. The storage system comprises a transparent storage interface adapted to allow viewing of the products (4) in the storage system, and a dispensing device (6) for dispensing products (4) from the storage system, wherein the storage system comprises a positioning device adapted to determine the position of an interaction from a person, such that the person can select a product from the storage system by interacting with an area of the transparent storage interface for selecting a displayed product to be dispensed. The storage system is characterized by a single automated retrieving member adapted to retrieve at least two different products at different positions from the storage system, and a control unit, wherein the positioning device and the single automated retrieving member are connected to the control unit, and wherein the control unit is adapted to control the single automated retrieving member in response to input from the positioning device, so that the single automated retrieving member can retrieve one of the at least two different products from the storage system. The

storage system allows the customer to view the actual products that can be purchased from the storage system at the same time as it provides protection against theft.

[0008] The use of a single automated retrieving member reduces the amount of moving parts in the system which decreases the number of parts which could be malfunctioning and thereby creates a more reliable and easier to maintain system.

[0009] According to one embodiment the transparent storage interface is operable for allowing manual access to the stored products, which facilitates restocking.

[00010] According to one embodiment the control unit is further adapted to enable the selection of multiple products to be dispensed substantially faster than the dispensing of the products, such that multiple products can be selected without the customer having to wait for the dispensing.

[00011] According to one embodiment, the control unit is further adapted to monitor the number of products currently in the storage system.

[00012] The storage system is for example connected to a register system for use in a store in which case the register system could comprise a dispense area to which the storage system dispenses the product such that the product can be accessed by the customer or a personnel member managing the register system. The storage system could further be connected to a payment system for receiving payment corresponding to the selected product.

[00013] The storage system is in another example connected to a vending machine, in which case the vending machine further comprises an automated payment system for receiving payments corresponding to the selected product.

[00014] It should be appreciated that any embodiment or feature of an embodiment could be combined in any way if such combination is not clearly contradictory.

BRIEF DESCRIPTION OF DRAWINGS

[00016] The embodiments are now described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 shows a storage system in a top perspective view.

5 Fig. 2 shows a storage system with the positioning devices in a top perspective view.

Fig. 3 shows the inside of a storage system in a top perspective view.

DETAILED DESCRIPTION

[00017] The invention will now be described in more detail in respect of preferred embodiments and with reference to the accompanying drawings. All examples herein
10 should be seen as part of the general description and therefore possible to combine in any way in general terms. Again, individual features of the various embodiments may be combined or exchanged unless such combination or exchange is clearly contradictory to the overall function of the device.

[00018] A storage system for storing products for automatic retrieval is provided. The
15 storage system has a transparent storage interface that allows the customer to view the actual products that can be purchased from the storage system at the same time as it provides protection against theft. The storage system comprises positioning means able to determine the position of an interaction with the transparent storage system by the customer such that the customer pressing or pointing at the transparent storage inter-
20 face can be linked to the dispensing of a particular product from the storage system, i.e. such that the customer can select a product to purchase by pressing or pointing at the transparent storage interface. The storage system allows the producers to display the products as they actually appear and facilitates the selection process for the customer, since the product does not need to be represented by a picture or model of
25 the product. Furthermore, the interaction does not need to be coded in accordance

with a grid, which is the normal way selection is performed in a vending machine, which reduces the risk of errors.

[00019] The storage system could for example be a part of a cash register, in which case the products could be dispensed such that the person operating the register

5 and/ or the customer can access the product. In other embodiments, the storage system could be a part of an automated vending machine, in which case automated means for payment can be connected to the storage system.

[00020] Fig. 1 shows the storage system according to one embodiment. The storage system 1 comprises a transparent storage interface 2 in the form of a window 2

10 adapted to enable viewing of the products 4 in the storage system 1. The products 4 are placed on shelves 3 which could be part of a shelf system that enables automatic feeding of the products 4 in the storage system 1. An optical marker, such as a barcode or smartcode, could be placed at the front of the shelf 3 indicating what products 4 are placed on the shelf and enabling the system to automatically be

15 updated when new products are added and/ or old products are removed and/ or products are relocated within the storage system 1.

[00021] The storage system 1 further comprises a positioning device adapted to determine the position of an interaction by a person with the transparent storage interface 2, such that the person can select a product from the storage system 1 by interacting

20 with an area of the transparent storage interface 2. The transparent storage interface displays a plurality of different products 4 behind the same transparent storage interface which creates the impression that the products 4 are displayed in the same way as products are displayed on normal shelves of a store. The storage system 1 further comprises a dispensing device 6 for dispensing products from the storage

25 system to a dispensing area 7.

[00022] Fig. 2 discloses an embodiment in which the transparent storage interface 2 is operable for allowing manual access to the stored products 4. Manual access is in

particular required for easy restocking of the shelves 3 of the storage system 1. The transparent storage interface 2 is operable by means of the storage interface being slidably fixated to rails 8 on the left and right side of the storage system 1, respectively. The operation of the transparent storage interface 2 could be performed
5 by means of a powered device, such as an electric motor, or by means of manual force in which case the transparent storage interface 2 can be manually slid. Since the transparent storage interface slides on the inside of the outer housing of the storage system 1, the products 4 can be accessed and the storage system 1 be restocked without the need for large floor space, i.e. the storage system provides good protection
10 of the products 4 whilst having a compact format suitable for most locations. The operable transparent storage interface 2 could further comprise a lock such that a key is required for accessing the products 4 in the storage system 1.

[00023] The storage system 1 according to any one of Figs. 1 – 3, further comprises a positioning device comprising a first 9a and second 9b sensing element adapted to
15 sense the presence of the person's hand in a first and second axis, respectively, and thereby determine the position of the interaction from the person. The sensing elements 9a, 9b could for example comprise IR sensing elements projecting a plurality of IR rays across the transparent storage interface 2 such that the position of a customer's hand in relation to the products 4 seen through the transparent storage interface 2 can be
20 determined by the person's hand crossing the IR rays. An advantage with using IR sensing elements is that the transparent storage interface 2 could be a normal sheet of glass, or a transparent material providing extended protection, such as layers of glass sandwiched with for example polycarbonate materials such as Armormax, Makro-clear, Cyrolon, Ilexan or Tuffak. Providing a passive sheet of glass facilitates cleaning
25 of the transparent storage interface since the glass is not damaged by water or detergents. In alternative embodiments, the IR sensing elements could be replaced by the transparent storage interface 2 being touch sensitive, having the same purpose of

determining the position of the customer's hand in relation to the products in the storage system 1.

[00024] Fig. 3 shows the storage system 1 disclosed with reference to Figs. 1 and 2.

In Fig. 3 a single automated retrieving member 10 adapted to retrieve the products 4

5 from the storage system 1 is shown. The single automated retrieving member 10 is movable along an X axis and a Y axis and is adapted to retrieve products 4 from all shelf-positions in the storage system. The single automated retrieving member 10 is slidably fixated to a first transversal beam 11 and fixedly fixated to a drive belt 13 propelled by a first motor 12a enabling the positioning of the retrieving member 10

10 along the X-axis. The first transversal beam 11 is in turn slidably fixated to a right and left second beams 14 and fixedly fixated to drive belts 13 propelled by interconnected electric motors 12b enabling the positioning of the retrieving member 10 along the Y-axis. Since the single automated retrieving member 10 is adapted to retrieve the products 4 from passive shelves 3, the shelves 3 do not need to have any moving
15 parts. Shelves having no moving parts facilitate restocking and decrease the number of parts which could be malfunctioning and thereby create a more reliable and easier to maintain system.

[00025] According to one embodiment, the retrieving member 10 is completely passive and by its shape enables the retrieving of products 4 from all storage positions
20 on the shelves 3 such that the selected products 4 can be retrieved using only two electrical motors which significantly reduces complexity and thereby the cost of maintenance.

[00026] The storage system 1 further comprises a control unit 15 to which the single automated retrieving member 10 and the positioning device are connected. The
25 control unit 15 is able to interact with the positioning device (9a; 9b of fig. 2) and the retrieving member 10, such that the control unit 15 can control the single automated retrieving member 10 in response to input from the positioning device 9a; 9b.

[00027] According to one embodiment, the control unit 15 could further be adapted to enable the selection of multiple products to be dispensed substantially faster than the dispensing of the products, i.e., the selections made by the customer interacting with the transparent storage interface is stored in the memory of the control unit 15. The control unit then sequentially requests the retrieving member 10 to retrieve and dispense the selected products via the dispensing device 6. By enabling the customer to make several product choices the customer does not have to wait for a product to be dispensed before selecting the next product. The multiple choice scheme makes the shopping experience to a greater extent resemble the manual shopping of products.

[00028] According to one embodiment the control unit 15 is further adapted to monitor the number of products 4 currently in the storage system 1. The monitored information can be used for notifying the product distributor of when restocking is necessary by the control unit 15 being connected to a central unit, or wirelessly connected to a mobile network. The monitored information could furthermore provide statistics on the purchase frequency of particular products or particular positions on the shelves 3, such that the storage system 1 could be modified in response to information with regards to historical purchase patterns of customers.

[00029] According to one embodiment, the storage system 1, according to any of the embodiments herein, is part of a register system for use in a store. The dispense area 7 of the storage system 1 could be a dispense area 7 in which the product can be accessed by the person purchasing the product and/ or a personnel member managing the register system.

[00030] According to one embodiment, the storage system 1 comprises a shelf system that enables automatic feeding of the products 4 in the storage system 1. The automatic feeding is enabled by means of for example a spring loaded pushing member mounted in the rear of the storage system 1 or by means of gravity. An optical marker, such as a barcode or smartcode, could be placed at the front of the shelf 3

indicating the product and enabling the system to be automatically updated when new products are added and/ or old products are removed and/ or products are relocated within the storage system 1. An optical marker could further be placed on the feeding device 31 enabling the system to automatically detect when the storage system 1 runs out of a particular product 4.

[00031] According to one embodiment, the storage system is adapted to be owned and managed by the distributor of the products 4 placed in the storage system 1. In embodiments where the distributor owns and manages the storage system 1, the storage system 1 could be configured such that only the distributor of the products 4 could manage the storage system 1.

[00032] It should be appreciated that in the detailed description above any embodiment or feature of an embodiment could be combined in any way if such combination is not clearly contradictory.

CLAIMS

1. A storage system for storing products for automatic retrieval, the storage system (1) comprising:
a transparent storage interface (2) adapted to allow viewing of the products (4)
5 in the storage system (1), and
a dispensing device (6) for dispensing products (4) from the storage system (1),
wherein
the storage system (1) comprises a positioning device (9a; 9b) adapted to
determine the position of an interaction from a person, such that the person can
10 select a product (4) from the storage system (1) by interacting with an area of
the transparent storage interface (2) for selecting a displayed product (4) to be
dispensed,
characterized by
a single automated retrieving member (10) adapted to retrieve at least two
15 different products (4) at different positions from the storage system (1), and
a control unit (15), wherein the positioning device (9a, 9b) and the single
automated retrieving member (10) are connected to the control unit (15), and
wherein the control unit (15) is adapted to control the single automated
retrieving member (10) in response to input from the positioning device (9a;
20 9b), so that the single automated retrieving member (10) can retrieve one of the
at least two different products (4) from the storage system (1).
2. The storage system according to of claim 1, wherein the positioning device
comprises a first (9a) and a second (9b) sensing element adapted to sense the
25 presence of the person's hand in a first and second axis, respectively, and
thereby determine the position of the interaction from the person.
3. The storage system according to claim 1 or 2, wherein the transparent storage
interface (2) is operable for allowing manual access to the stored products (4).

4. The storage system according to any of claims 1-3, wherein the control unit (15) is further adapted to enable the selection of multiple products substantially faster than the storage system dispenses the products (4).

5. The storage system according to any of claims 1-4, wherein the control unit (15) is further adapted to monitor the number of products currently in the storage system (1).

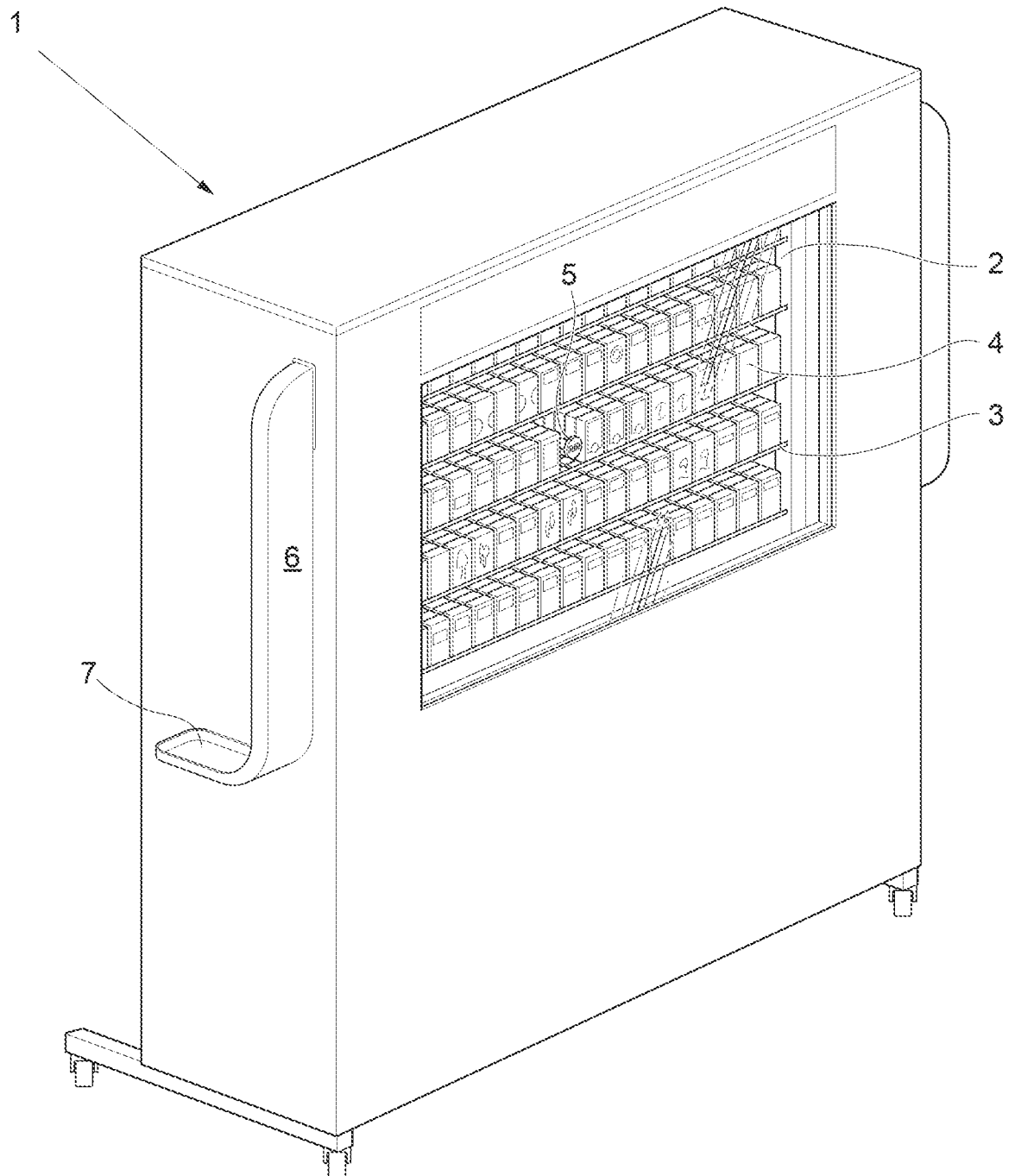
6. A register system for use in a store comprising a storage system according to any of claims 1-5, wherein the register system further comprises a dispense area (7) in which the product can be accessed by at least one of: the customer and a personnel member managing the register system, and wherein the dispensing device (6) is adapted to dispense the selected product from the storage system (1) to the dispense area (7).

7. A register system according to claim 6, wherein the storage system (1) is connected to a payment system for receiving payment corresponding to the selected product (4).

8. A vending machine comprising the storage system according to any one of claims 1-5, wherein the vending machine further comprises an automated payment system for receiving payments corresponding to the selected product (4).

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Fig.1



2/3

Fig.2

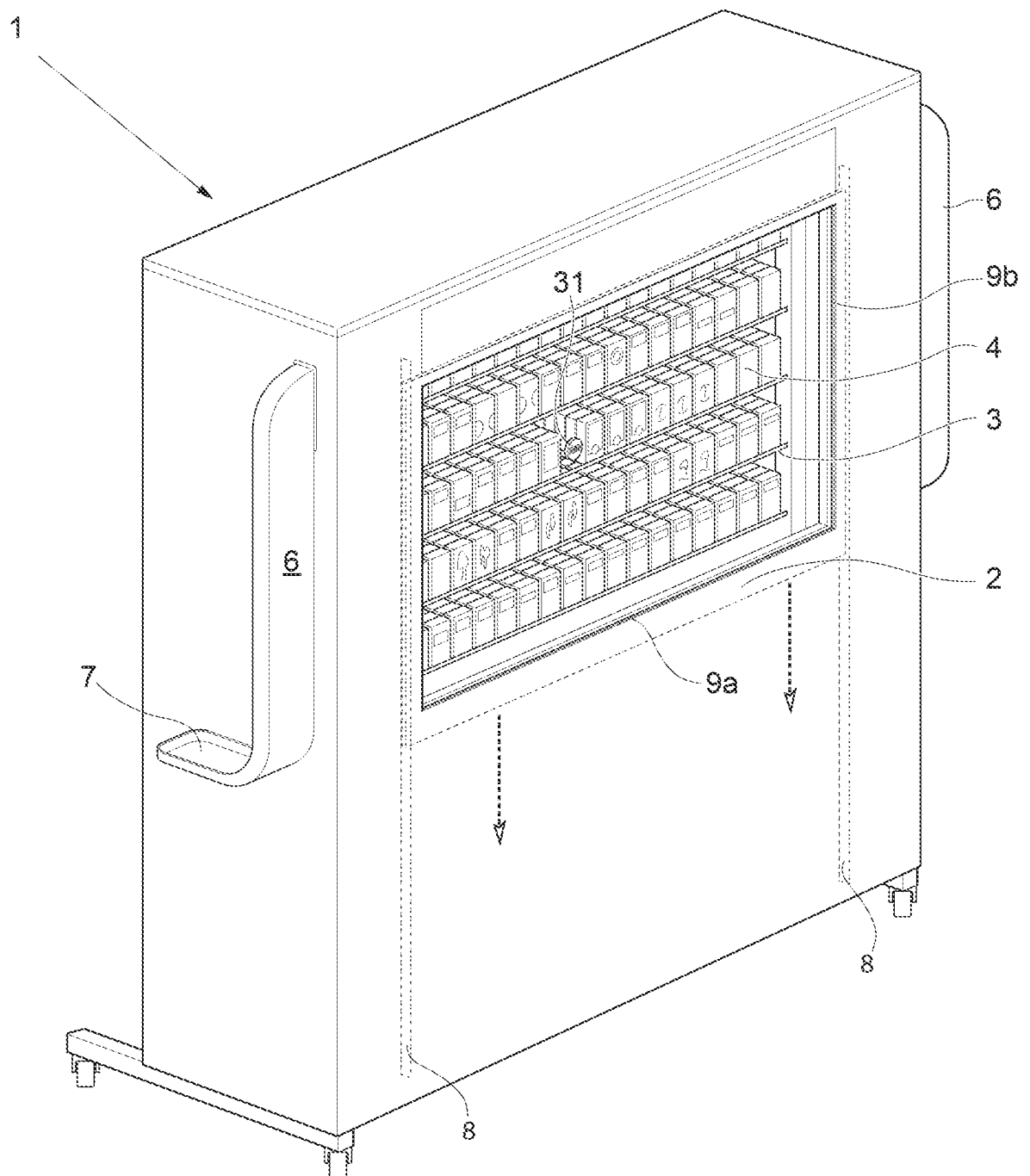
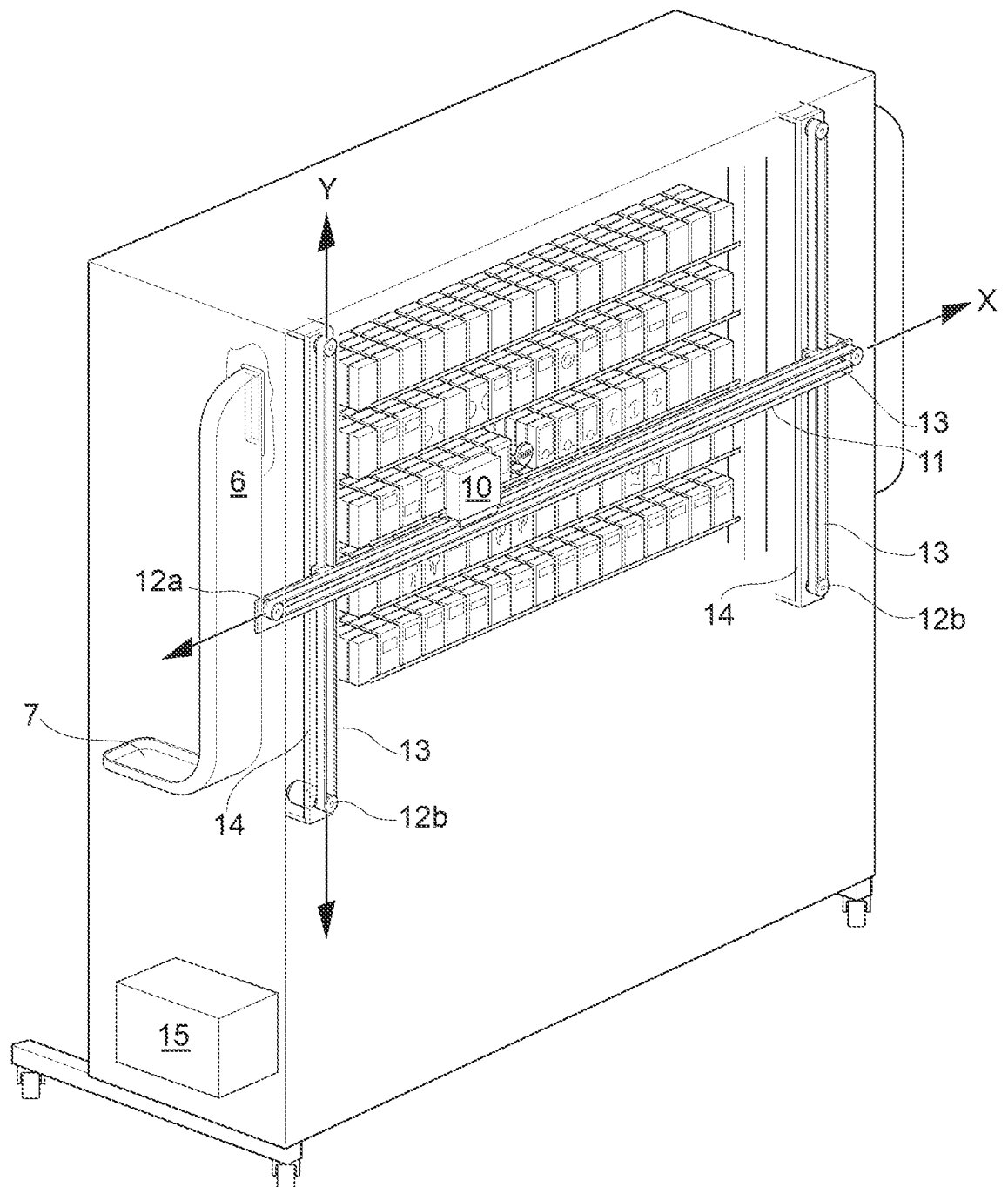


Fig.3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2012/050126

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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)

IPC: G07F

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

SE, DK, FI, NO classes as above

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

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1783705 A2 (BORRA ANGELO), 9 May 2007 (2007-05-09); figures 1,4; claims 1-10; See sections 0013, 0018-0029, 0038-0042, 0044, 0051-0052 --	1-8
A	US 20090139886 A1 (BLUST DONALD ET AL), 4 June 2009 (2009-06-04); figures 1B,2B,3,20; See Sections 0008, 0050, 0064, 105-109, 0137 --	1-8
A	JP 2000276637 A (NAKAI MEIHAN KK), 6 October 2000 (2000-10-06); See abstract in english --	1-8



Further documents are listed in the continuation of Box C.



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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5499707 A (STEURY RUDY), 19 March 1996 (1996-03-19); column 4, line 14 - column 4, line 38; column 6, line 5 - column 6, line 26; column 10, line 35 - column 10, line 44; figures 1,5,9 --	1-8
A	WO 0235484 A1 (JYPA AUTOMAATIO OY ET AL), 2 May 2002 (2002-05-02); figures 1,4 -- -----	1-8

Continuation of: second sheet

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Cited literature, if any, will be enclosed in paper form.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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