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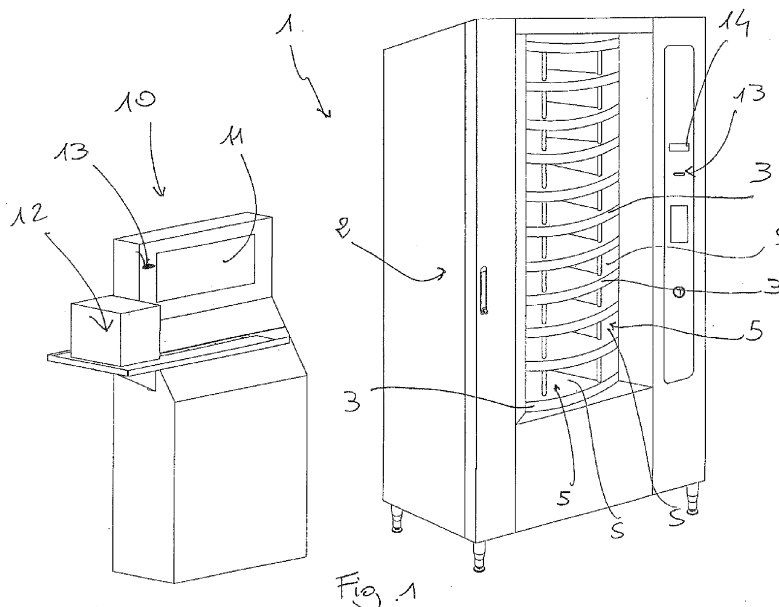
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(54) **Method for operating a vending machine**

(57) A method for operating a vending machine (1) which comprises a plurality of compartments (S) and motor means (6, 6a) adapted to move the access opening (5) of each compartment (S) to a load and pick up position for loading or picking up a product. The method entails selecting at least one product to be dispensed (Pn), by each user of a plurality of users, each user being identified by a user identification (IDk). Each selected product (Pn) is associated with the respective user identification (Idk) and with a compartment (Sij). After having prepared for each compartment to be loaded (Sij), the correspond-

ing selected product (Pn), the motor means (6, 6a) are actuated for moving the access opening (5) of each compartment to be loaded to the loading position and loading, into each compartment to be loaded, the selected product (Pn). Thereafter, the method entails receiving a user identification code (IDk) of a user and actuating the motor means (6, 6a) for moving the access opening (5) of the compartments (Sij) associated with the user identification received (IDk) to the pick up position for allowing the pick up of the products (Pn) contained in the compartments (Sij) associated with the user identification received (IDk).



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Description

[0001] The present invention relates to a method for operating a vending machine.

[0002] In a typical vending machine a user, after having found, selected and paid for a product, picks up said product from a vending machine lid. The products present into the vending machine are periodically loaded by an operator who replaces those expired and replenishes the empty compartments. However, such operating method of the vending machine is unsuitable for applications wherein the products must be dispensed quickly, for example in work canteens or in any case consumed in a short time being subject to quick perishability.

[0003] An example wherein said operating method is inadequate is represented by a work canteen wherein the vending machine must dispense fresh meals requested by the canteen's users every day. In such a situation, the canteen or the vending machine manager has two options.

[0004] A first option is to minimise the product loading so as to prevent most of the same from having to be trashed due to the product expiration. However, such option has the drawback of not providing an efficient service to the users since the user has a high likelihood of not finding the desired product.

[0005] A second option is to load the vending machine according to the expectations and to the users' pick up flows. Such option has the drawback of being highly uncertain with consequent risk of alternating maximum efficiency days with large waste days according to the needs, highly variable and unforeseeable, of a canteen's users.

[0006] It is therefore desirable to have a method for operating a vending machine which allows the waste of non-consumed products to be totally eliminated or minimised while meeting the users' needs of having the desired food available.

[0007] The object of the present invention therefore is to provide a method for operating a vending machine having such functional features as to meet the above-mentioned needs while solving the disadvantages mentioned above with reference to the prior art. Such object is achieved by a method for operating a vending machine according to claim 1.

[0008] Further features and advantages of the method for operating a vending machine according to the present invention will appear more clearly from the following description of a preferred embodiment thereof, given by way of a non-limiting example with reference to the annexed figures, wherein:

figure 1 shows a vending machine adapted to operate according to the method of the present invention, figure 2 shows details of the vending machine of figure 1, figure 3 shows a diagram of the data flow according to the method of the present invention.

[0009] With reference to the figures, reference numeral 1 denotes a vending machine.

[0010] The vending machine 1 comprises a plurality of compartments S separate from each other, each compartment S having an access opening 5 for accessing the interior of the compartment for loading or picking up a product P. On the front part, the vending machine 1 comprises a plurality of movable lids 5a for closing and opening the access openings 5 of compartments S.

[0011] According to an embodiment, the vending machine 1 comprises a frame 2, at least one tray, in the example a plurality of trays 3, turnably seated within frame 2 about an axis of rotation.

[0012] Each tray 3 comprises a plurality of compartments that globally form the plurality of compartments S.

[0013] The vending machine 1 further comprises motor means adapted to move the access opening 5 of each compartment S to a load and pick up position for loading or picking up a product P.

[0014] In particular, the motor means comprise first motor means 6 adapted to rotate trays 3 about the axis of rotation thereof for moving the access opening 5 of each compartment S of each tray 3 to the load and pick up position and second motor means 6a adapted to actuate lids 5a for opening and closing the access openings 5 of each compartment S. The vending machine 1 also comprises processing means 7 adapted to receive and process a plurality of data and control means 8 in signal communication with the motor means 6, 6a and with the data processing means 7 for actuating the motor means 6, 6a as a function of the plurality of data received and processed by the processing means 7. Advantageously, the processing means 7 comprise data storage means 7a.

[0015] The method provides for the selection, by a plurality of users U, of at least one product P_n, with n=1...N, where N is the number of selectable products.

[0016] Each user U is uniquely identified by a user identification ID_k, with k=1...K, where K is the number of users. Hereinafter, the user shall be indicated with reference to his/her user identification ID_k for shortness.

[0017] The selection of products P_n by the users may take place at the vending machine 1 or remotely.

[0018] According to a first embodiment, the vending machine 1 comprises a user interface unit 10, advantageously operatively connected to the data processing means 7 and adapted to allow a user to display the selectable products P_n and make the selection of one or more of them. To this end, the user interface unit 10 may comprise a touchscreen 11 or a screen and one or more data input devices, for example keyboard and mouse. The user interface unit 10 may further comprise a printing device 12 adapted to issue a paper receipt of the products selected by the user.

[0019] According to a second embodiment, the product selection may be made remotely, for example by a personal computer with access to the Internet or to an Intranet.

[0020] Upon the selection, products P_n selected by each user ID_k are associated with the respective user identification ID_k.

[0021] For example, products P1-P4 being available, user ID1 selects P1 and P3, user ID2 selects P2 and user ID3 selects P1, P4. The following table of product-user identification association is thus obtained.

TABLE A

	P1	P2	P3	P4
ID1	X	-	X	-
ID2	-	X	-	-
ID3	X	-	-	X

[0022] To this end, the user interface unit 10 may comprise a user authentication device 13, for example a chip card reader, USB keys or other equivalent devices, whereby the user authenticates himself/herself for allowing his/her user identification code ID_k to be associated with products P_n selected by the same user. As an alternative, the user authentication may be carried out by the same user interface 10, for example with a password entered by touchscreen 11 or a keyboard.

[0023] In case of remote selection of products P_n, the user uses an authentication tool, for example password or chip card or key or other equivalent means so that products P_n selected thereby are associated with his/her user identification code ID_k.

[0024] The data related to the products selected by the users are collected or in any case provided to a centre designed for preparing the selected products. In particular, a plurality of containers is prepared wherein each container contains one of the selected products.

[0025] Advantageously, each container is provided with identification means of the product contained therein, so as to facilitate the subsequent loading of the same into the vending machine 1.

[0026] In one embodiment, the product identification means comprise a label whereon a code is shown, for example alphanumerical, which uniquely identifies a product P_n.

[0027] In order to allow a correct loading of the selected products P_n into vending machine 1 and subsequent pick up of such products selected by each user from said vending machine 1, each product P_n and the respective user identification ID_k, as per table A, are associated with a compartment S_{ij} of vending machine 1, where i identifies the i-th tray and j the j-th compartment of that tray, with i=1...I, where I is the number of trays and j=1...J(i), where J(i) is the number of compartments of the i-th tray.

[0028] The following table of product-user identification association with compartments S_{ij} of vending machine 1 is thus obtained.

TABLE B

	P1	P2	P3	P4
ID1	S11	-	S12	-
ID2	-	S13	-	-
ID3	S21	-	-	S21

[0029] In this way, one compartment S_{ij} is uniquely associated with a product P_n and with a user identification ID_k so that the plurality of products selected by users P_n and the corresponding user identifications ID_k identify a plurality of compartments to be loaded. Such association may be made upon loading products P_n or advantageously, before such operation.

[0030] In the first case, an operator loads each product associating each compartment S_{ij} with product P_n loaded therein and the relevant user identification ID_k. To this end, the operator may use a data input keyboard or a barcode reader or RFID labels which through the data processing means 7 allows the data to be stored to the storage means 7a.

[0031] In the second case, advantageously, the compartment S_{ij} association with selected product P_n and respective user identification ID_k is carried out remotely and the data of the plurality of compartments to be loaded S_{ij} with the respective products to be loaded P_n and user identifications ID_k are received by the data processing means 7 of vending machine 1 and stored to the storage means 7a.

[0032] The loading of products P_n, that is, of the containers wherein the products to be loaded are arranged, is carried out after the operator's authentication with his/her authentication code.

[0033] The reading of the operator's authentication code then starts a product loading procedure that entails the actuation of motor means 6, 6a for moving the access opening 5 of each compartment to be loaded S_{ij} to the loading position for loading the selected product P_n associated with such compartment S_{ij}.

[0034] To this end, vending machine 1 comprises means 14 for indicating to the operator the products P_n to be loaded into compartments S_{ij} which are moved to the loading position in a sequence.

[0035] For example, such indication means 14 may be of the visual type, for example a display whereon the code of the product to be loaded is shown, corresponding to the code shown on the label of the container wherein the product is contained, or sound type, for example a speaker that tells the operator the code of the product to be loaded. According to an embodiment, the vending machine 1 may comprise verification means for verifying whether the product introduced into a compartment S_{ij} by an operator actually matches the product to be introduced. Such verification means may be an rfid tag arranged on each product container and an rfid reader arranged in the proximity of each access opening to the

compartments.

[0036] Once the products have been loaded into the respective compartments, the vending machine 1 is adapted to dispense to each user the products selected thereby prior to the loading thereof into the same vending machine 1.

[0037] In order to obtain the selected products, a user IDk therefore authenticates himself/herself on the vending machine 1 with his/her user identification IDk. The vending machine 1 then receives, that is, reads the user identification IDk of a user. The user authentication may take place in one of the modes described above with reference to the authentication in the product selection step.

[0038] The data processing means 7 receive the user identification IDk and based on table B, that is, on the association between compartments Sij and the user identifications IDk stored to the storage means 7a, acquire the data of compartments Sij associated with the user identification IDk of the authenticated user and by the control means 8, they actuate the motor means 6, 6a for moving the access opening of compartments Sij associated with said user identification IDk to the pick up position in a sequence, for allowing the pick up of the products contained in such compartments Sij.

[0039] In this way it is possible to collect all the products selections from a plurality of users and load the vending machine 1 only with the products already requested and selected by the users. Upon the product dispensing, each user authenticates himself/herself on vending machine 1 that recognises him/her and allows access to the compartments wherein there are the products previously selected by the user. Thanks to this, a user may pick up products selected, that is, chosen before their loading into the vending machine 1.

[0040] Advantageously, the vending machine 1 comprises refrigerating means 20 and/or warming means 21 for refrigerating and thus keeping at a storage temperature and/or warming the products arranged into compartments S. The vending machine 1 may further comprise timer means (not shown in the figures) adapted to switch from a refrigeration mode to a warming mode so that at a predetermined time, the products contained into the loaded compartments Sij are ready to be dispensed to the user. This is particularly useful for the use in canteens where the users need to pick up the products at a predetermined time.

[0041] According to an embodiment, it is possible to provide a vending machine with warming means for dispensing products that require warming, such as hot first and second courses, and a vending machine without warming means for dispensing products that do not require warming, such as fruit, yoghurt, pudding, etc.

[0042] As it can be understood from the description, the method according to the present invention allows overcoming the drawbacks mentioned with reference to the prior art.

[0043] Thanks to the fact that it is possible to collect

all the product selections by a plurality of users and load the vending machine only with the products already requested and selected by the users, the method according to the invention allows totally eliminating or minimising the waste of non-consumed products while meeting the users' needs of having the desired food available.

[0044] Of course, a man skilled in the art may make several changes and variations to the method according to the invention in order to meet specific and incidental needs, all falling within the scope of protection defined in the following claims.

Claims

1. Method for operating a vending machine (1), said vending machine comprising:

- a plurality of compartments (S) separate from each other, each compartment (S) having an access opening (5) for accessing the interior of the compartment for loading or picking up a product,
- motor means (6, 6a) adapted to move the access opening (5) of each compartment (S) to a load and pick up position for loading or picking up a product,

said method comprising the following sequence of steps:

- a) selecting at least one product to be dispensed (Pn),
- b) loading the product to be dispensed (Pn),
- c) picking up the product to be dispensed (Pn), wherein:

said step a) comprises the following sequence of steps:

- a1) selecting at least one product to be dispensed (Pn), by each user of a plurality of users, each user being identified by a user identification (IDk),
- a2) associating each selected product (Pn) with the respective user identification (IDk),
- a3) associating each selected product (Pn) and the respective user identification (IDk) with a compartment (S) of said plurality of compartments for identifying a plurality of compartments to be loaded (Sij),

- said step b) comprises the following sequence of steps:

- b1) preparing, for each compartment to be loaded (Sij), the corresponding selected product (Pn) associated with said compartment to be loaded (Sij),
- b2) actuating said motor means (6, 6a) for

moving the access opening (5) of each compartment to be loaded to the loading position and loading, in each compartment to be loaded, the selected product (Pn) associated with said compartment to be loaded (Sij), said step c) comprises the following sequence of steps:

c1) receiving a user identification code (IDk) of a user of said plurality of users, c2) actuating said motor means (6, 6a) for moving the access opening (5) of the compartments (Sij) associated with the received user identification (IDk) to the pick up position for allowing the pick up of the products (Pn) contained in said compartments (Sij) associated with the received user identification (IDk).

2. Method according to claim 1, wherein said step a2) comprises a user authentication step for obtaining the user identifications (IDk) of the users that select at least one product (Pn).

3. Method according to claim 2, wherein said vending machine (1) comprises a user authentication device (13) adapted to receive the user identifications (IDk) of the users that select at least one product (Pn), said step a2) comprising the step of user authentication by said user authentication device (13).

4. Method according to any one of claims 1 to 3, wherein said vending machine (1) comprises:

- data processing means (7) adapted to receive and process a plurality of data, said data processing means comprising storage means (7a) adapted to store a plurality of data, wherein in said step a3), said data processing means (7) receive and store in the storage means (7a) the data relating to the compartments to be loaded (Sij) and the respective user identifications (IDk) and products to be loaded (Pn).

5. Method according to claim 4, wherein said vending machine (1) comprises:

- indication means (14) in signal communication with said data processing means (7) and adapted to indicate the products to be loaded (Pn) in each compartment to be loaded (Sij) to an operator,
- control means (8) in signal communication with said motor means (6, 6a) and with said data processing means (7) for actuating said motor means (6, 6a) as a function of the plurality of data received and processed by said data

processing means (7), wherein in said step b2):

- said data processing means (7) receive an operator identification,

- said data processing means (7) acquire from said storage means (7a) the compartments to be loaded (Sij) and by said control means (8) actuate said motor means (6, 6a) for moving the access opening (5) of each compartment to be loaded to the loading position and allowing the operator to load, in each compartment to be loaded, the selected product (Pn) associated with said compartment to be loaded (Sij),
- said indication means (14) indicate the product (Pn) to be loaded in each compartment to be loaded (Sij) to the operator.

6. Method according to claim 5, wherein

- in said step c1), said data processing means (7) receive a user identification (IDk) of a user of said plurality of users,

- in said step c2), said data processing means (7) acquire from said storage means (7a) the compartment (Sij) associated with said user identification received (IDk) and by said control means (8) actuate said motor means (6, 6a).

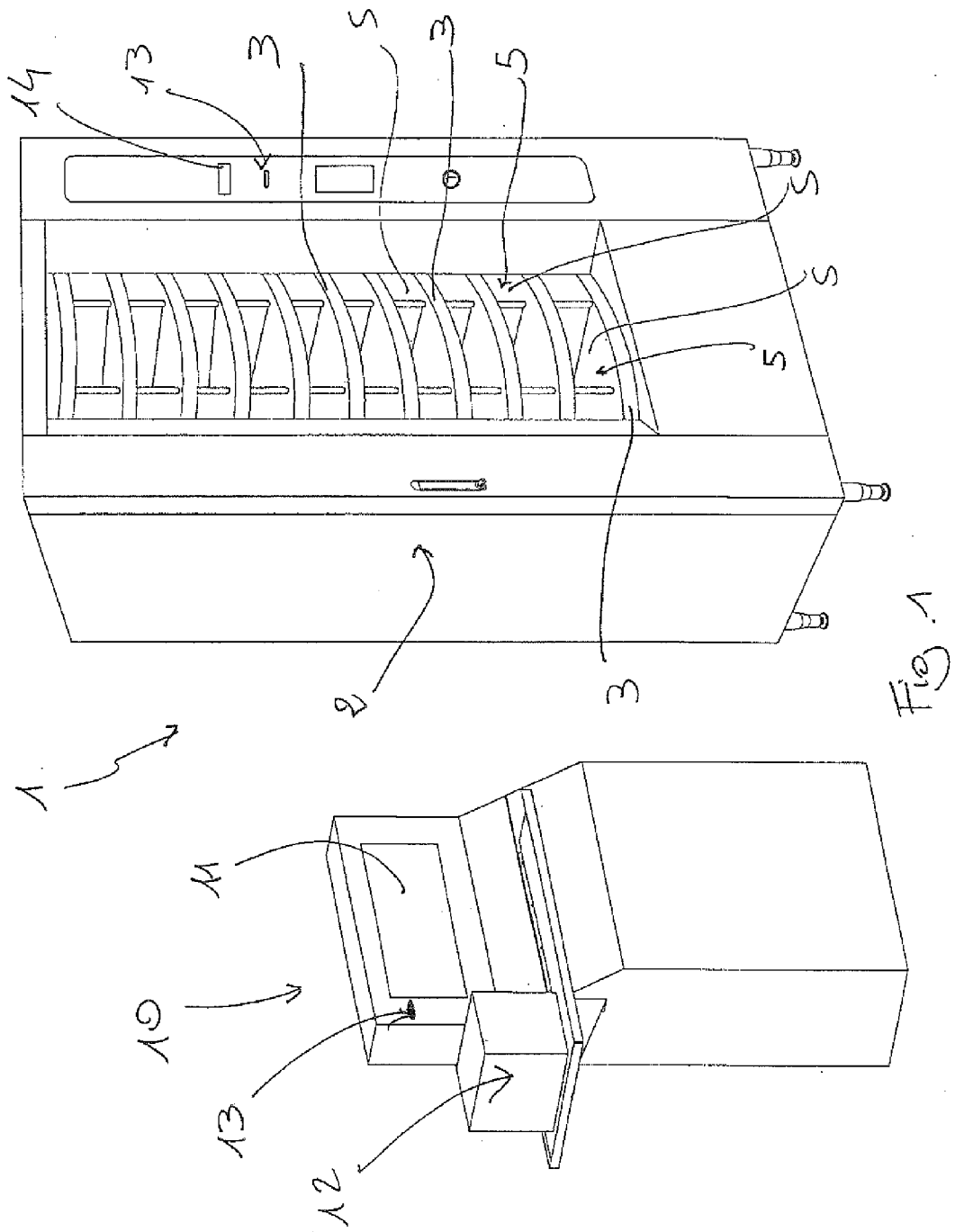


Fig. 1

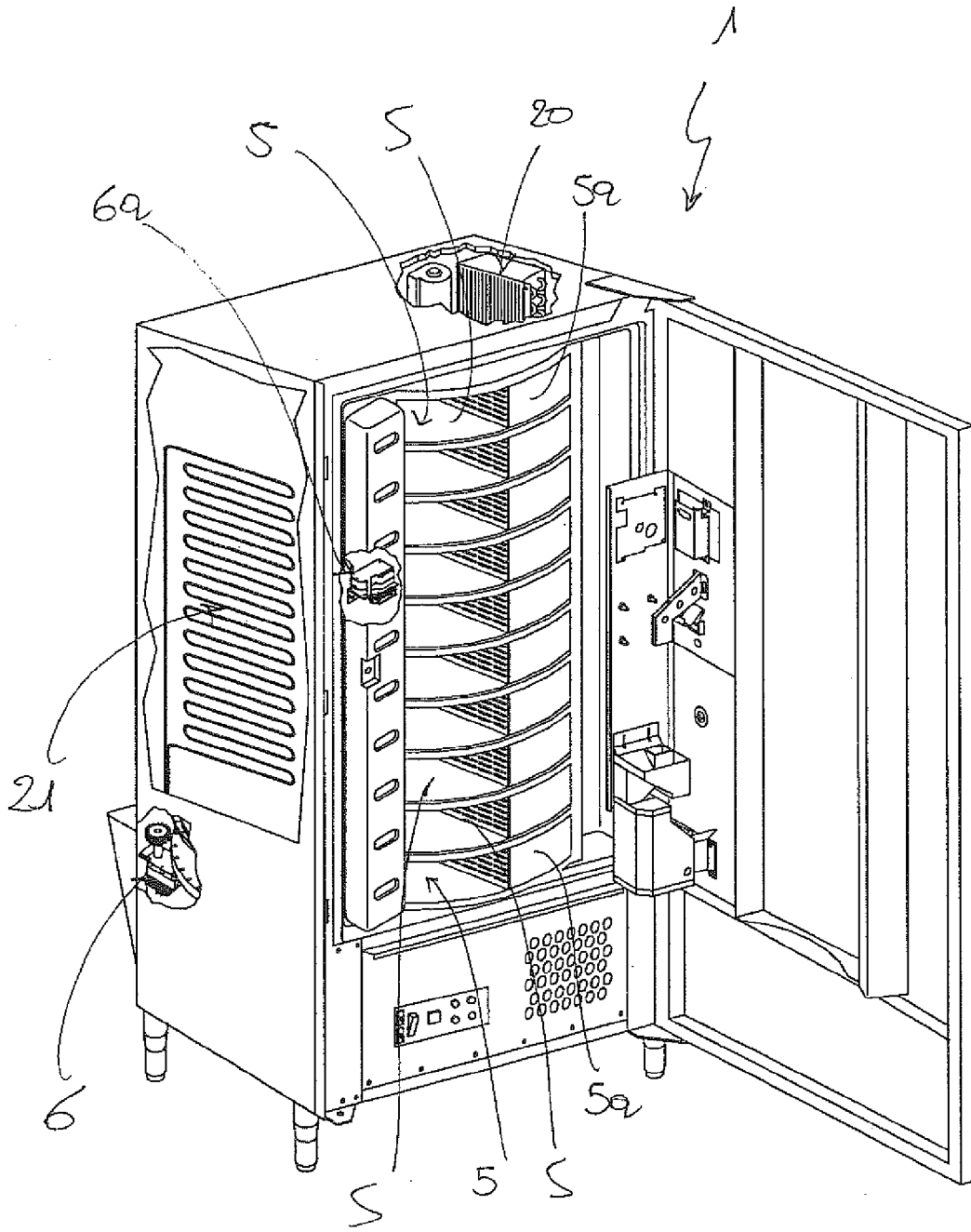


Fig. 2

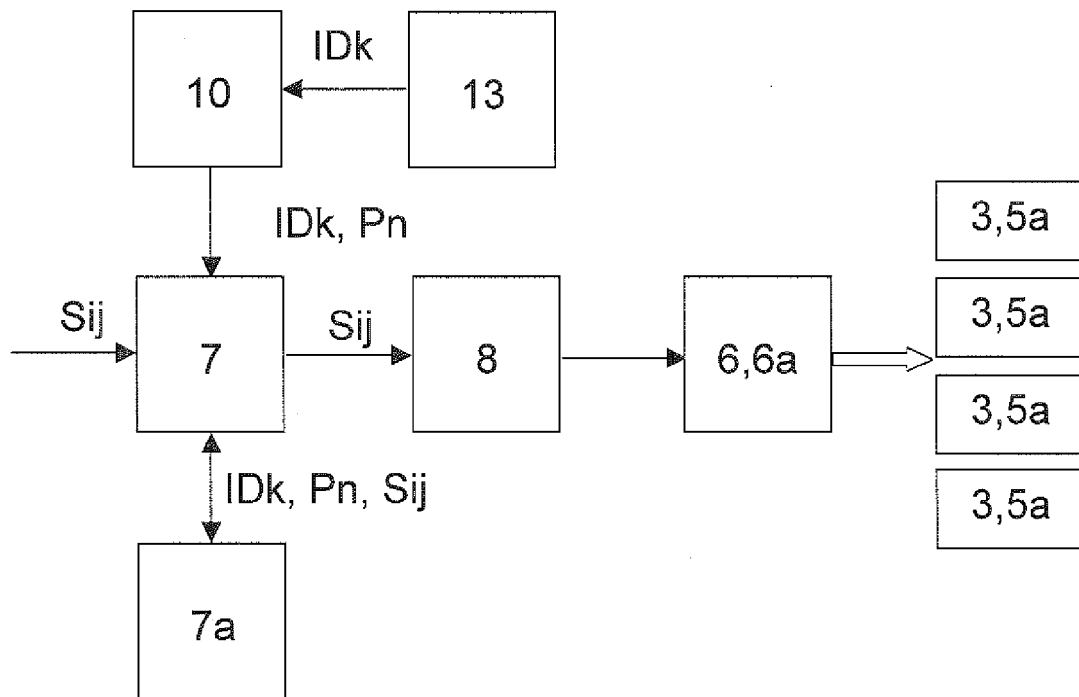


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 12 16 5752

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