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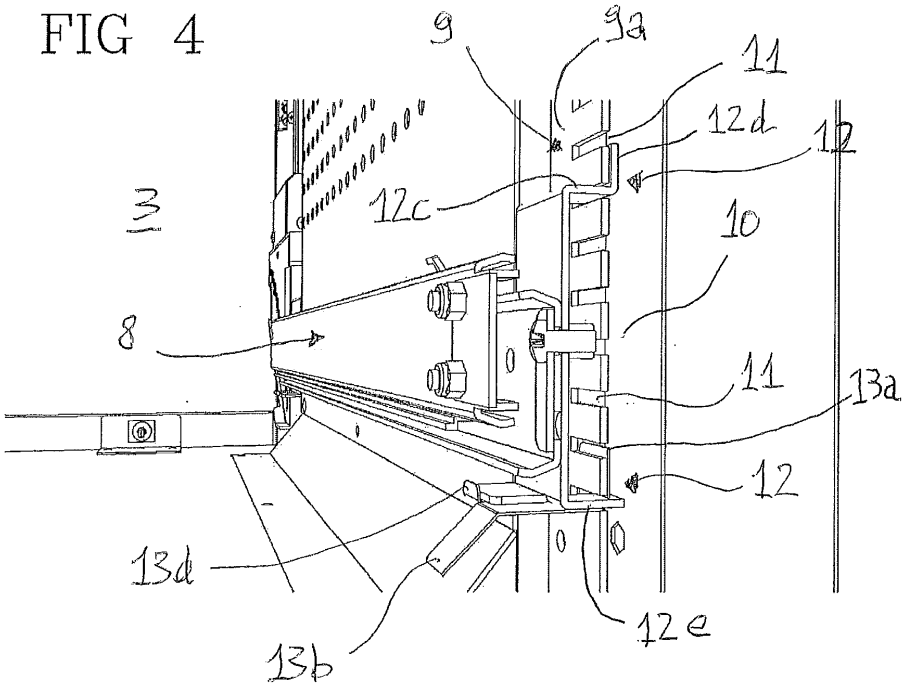
(54) VENDING MACHINE WITH SUPERIMPOSED TRAYS

(57) A vending machine with superimposed trays comprises a storage area (3) for products to be dispensed, a plurality of trays (5) accommodated in the storage area (3), at least one pair of horizontal guides (8), associated with at least one of the trays (5) to allow the tray to be at least partially pulled out of the storage area (3), each guide (8) of the pair of horizontal guides being rigidly joined to a respective pair of vertical uprights (9). Each upright (9) comprises a plurality of identical, superimposed through openings (11), each guide (8) comprising appendages (12) adapted to be freely introduced into respective through openings (11) of the uprights, the appendages (12) inhibiting translation of the guide (8) relative to its respective uprights (9) and allowing rotation of the guide (8) about an axis of rotation perpendicular to the uprights (9), relative to its respective uprights. A stop member (13) for each guide has an appendage (13a) that can be freely introduced into an opening (11) of a respective upright (9) and can be secured by mechanical interference to its respective guide (8) to inhibit rotation of the guide (8).

FIG 4



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Description

[0001] The present invention relates to a vending machine with superimposed trays.

[0002] As used herein, the term vending machine with superimposed trays means a vending machine comprising a storage area for products offered for sale, which are arranged in orderly rows on trays (or plates) accommodated within the storage area.

[0003] In terms of structure, such vending machines comprise a cabinet, which is closed by a front wall, usually having a transparent area, a plurality of trays accommodated inside the cabinet in a product storage area and adapted to support corresponding products arranged in rows, a drop channel situated between the trays and the front wall and a pickup station communicating with the drop channel, and through which the user can pick up the selected product.

[0004] The trays are adapted to be partially pulled out of the storage area so as to project out of it. This feature facilitates the replenishing work by the vending machine operators, as they are allowed to operate on each tray in the pulled state. It shall be noted that the trays are vertically spaced not more than as required to store the various products, to maximize the number of trays contained in the vending machine.

[0005] For this purpose, when a product change has to be made in a vending machine, the trays may be required to be repositioned, especially when the size of the new products is significantly different from those of the previous products. In prior art vending machines, this is by no way an easy task. This is because, in these vending machines, the trays are inserted and held in position by respective guides. The guides (either of telescopic type or more simply of rail type depending on the type of tray engaged thereby) are rigidly joined to metal uprights that are vertically arranged within the storage area, namely at the side ends thereof. Each guide is rigidly joined to two mutually parallel uprights, one of which is placed proximate to the front wall of the vending machine and the other is placed proximate to the rear wall thereof. Each guide is fastened to the uprights, usually by self-drilling screws that can engage and thread preexisting holes, which are appropriately formed and regularly spaced in the uprights (previous threading of each hole would be too expensive).

[0006] When a tray has to be displaced up or down, the screws that fasten the guides must be removed, repositioned at the new height and locked in position by tightening the self-drilling screws in the holes formed in the uprights. This is not an easy task, especially at the uprights located proximate to the back wall of the vending machine. Furthermore, the tray-repositioning task must be carried out by specially skilled personnel, or anyway personnel using adequate equipment, and this personnel profile does not necessarily correspond to that of operators in charge of product-replenishment, whereby a product-change will require two professional figures. Also, if any of the holes in the upright is damaged, e.g. because the screw is improperly inserted into that hole, the guide might no longer be fixed at the height set by the damaged hole, and the tray might no longer be positioned at that height. Since the above mentioned uprights are not exposed, as they are concealed by a panel, it is not unlikely that the holes to be threaded will not be engaged properly.

[0007] In light of the above, the object of the present invention is to provide a vending machine with superimposed trays that can obviate the above mentioned prior art drawbacks.

[0008] This object is fulfilled by a vending machine with superimposed trays as defined in one or more of the annexed claims.

[0009] Further features and advantages of the vending machine with superimposed trays of this invention, will be apparent from the following description of one preferred embodiment thereof, which is given by way of illustration and without limitation with reference to the accompanying figures, in which:

- Figure 1 shows a perspective view of a vending machine with superimposed trays of the present invention,
- Figure 2 shows a perspective view of a detail of the vending machine of Figure 1,
- Figure 3 is a perspective view of an element of the detail of Figure 2,
- Figure 4 is a partially sectional perspective view of a part of the detail of Figure 2, and
- Figure 5 is a lateral view the perspective view of Figure 4.

[0010] Referring to the accompanying figures, numeral 1 generally designates a vending machine of the present invention.

[0011] The vending machine 1 comprises a frame 2 that defines a storage area 3 for products to be dispensed.

[0012] In this example, the frame 2 comprises a top wall, a bottom wall, a rear wall and two side walls.

[0013] The vending machine 1 further comprises a front panel 4 that closes the frame 2. Particularly, the front panel 4 is hinged to the frame 2 to allow the front panel 4 to be opened and closed for product loading and maintenance purposes.

[0014] In accordance with one embodiment, the storage area 3 is refrigerated by refrigeration means located in a lower area of the frame, to refrigerate the products stored in the storage area 3. The products to be dispensed are placed on trays 5 (as diagrammatically shown in Figure 1). Particularly, the vending machine 1 comprises a plurality of trays 5 which are placed in the storage area 3 one above the other, from an upper tray to a lower tray. Each tray 5 has a plurality of seats (not shown) for holding the products to be dispensed. The front panel 4 of the vending machine may comprise a selection portion

6, for selection of the product to be dispensed, and an exposure portion made of a transparent material, for direct display of the products contained in the trays 5.

[0015] A drop channel is defined between the trays 5 and the front panel 4, where the products dispensed by the trays 5 are intended to be dropped in. In the preferred embodiment of the invention, the trays 5 are equipped with product dispensing members, which are adapted to displace the products from their seats on the tray 5 to the drop channel.

[0016] For the user to be able to pick up the selected product, the vending machine 1 comprises a pick-up area 7 (see Figure 1), having an opening closed by a door to allow and prevent access to the pick-up area 7 from the outside.

[0017] The trays 5 may have a rectangular (or square) shape and are adapted to be at least partially pulled out of the storage area 3 during product loading, such that the operator may easily reach all the seats designed to contain the products to be dispensed. For this purpose, the trays 5 are mounted to guides 8, as diagrammatically shown in Figure 2. The guides 8 may be, for instance, of fixed type and act as rails, such as the guide 8 as shown at the top of Figure 2, or of telescopic type, as shown in the bottom of Figure 2.

[0018] Irrespective of the specific type of guide 8, at least one pair of guides 8 is provided for each pull-out tray 5, and each guide operates on one of two opposed sides of the tray. The guides 8 are oriented horizontally, i.e. extend along a horizontal direction X. Each guide 8 is rigidly joined to a pair of uprights 9 which extend in a vertical direction Y. The uprights 9 are placed in the storage area and are attached, in pairs, to opposite side walls of the storage area. Thus, two parallel vertical uprights 9 are placed on each of the two side walls of the storage area. A first upright is located proximate to the front panel 4 and a second upright is located proximate to the rear wall of the vending machine.

[0019] Preferably, the uprights have a U-shaped section or anyway define a cavity 10 which extends throughout the length of the upright and faces away from the storage area 3. In the preferred embodiment of the invention, each upright 9 comprises a front wall 9a which faces the storage area 3. On the side that faces away from the storage area 3, the front wall 9a delimits the above mentioned cavity 10 (Figure 4). The uprights 9 comprise a plurality of identical, superimposed through openings. The through openings 11 are formed on the front wall 9a of the uprights 9 and put in communication the cavity 10 and the storage area 3. Preferably, the through openings have a rectangular shape. Preferably, two successive openings 11 are spaced at a distance ranging from 5 mm to 20 mm, more preferably about 10 mm.

[0020] Each guide 8 comprises appendages 12 that are adapted to be freely introduced into respective through openings 11 in the uprights 9, as shown in Figure 4. As used herein, the term "freely introduced" is intended as a direct introduction, which is obtained without using auxiliary tools or devices, such as screwdrivers or the like. These appendages may be either formed of one piece with the rest of the guide, such as in the case of rail guides, or rigidly joined to the guide by screws, bolts, rivets, or the like, such as in the case of telescopic guides.

[0021] In the preferred embodiment of the invention, each guide 8 comprises first and second pairs of appendages 12. The appendages of the first pair are located at a first end 8a of the guide 8, and particularly at the end that faces the front panel 4, whereas the appendages of the second pair are located at a second end 8b of the guide, particularly the end that faces the rear wall of the vending machine. The first appendages 12a of the first and second pairs of appendages 12 are adapted to be introduced into respective openings 11 of two uprights, located at the same height, as shown in Figure 2. Likewise, the second appendages 12b of the first and second pairs of appendages 12 are adapted to be introduced into respective openings 11 of two uprights, located at the same height below the openings that receive the first appendages 12a. The first appendages 12a comprise a first section 12c intended to extend through and rest upon the through opening 11 of its respective upright 9 and a second section 12d, which extends from the first one 12c, and is substantially perpendicular thereto (see Figures 4 and 5). The second section 12d abuts the front wall 9a on the side facing the cavity 10. The second appendage 12b only comprises a first section 12e which is intended to extend and rest upon the through opening 11 of its respective upright.

[0022] As the appendages 12 are introduced into the corresponding openings 11 of the guides 8, they inhibit translation of the guide 8 relative to the uprights 9 and allow rotation of the guide 8 about an axis of rotation (perpendicular to the uprights) relative to its respective uprights 9. Particularly, translation in a vertical direction Y is inhibited by the first sections 12c, 12e of the appendages 12 that extend through the openings 11 and rest thereupon. It shall be noted that the thickness of the appendages 12 is slightly smaller than the height of the openings 11, in other words the first sections of the appendages fit into the openings 11 slightly less than snugly. Translation in a first horizontal direction (referenced X in Figure 1) is inhibited once again by the first sections of the appendages 12 which abut the edges of the through openings 11. Translation along a second horizontal direction perpendicular to the first horizontal direction X is inhibited by the second sections 12d of the first appendages 12a, which abut the front wall 9a of the uprights, and by the body of the guides that abuts the uprights 9.

[0023] Thus, the guides 8 can hold the trays 5 in position. It shall be noted that the coupling between the guide 8 and the uprights 9 is obtained without using any tools (screw drivers, wrenches, or else) and any further connection members (screws, rivets, nuts or the like) and may be made by the same operator in charge of replen-

ishing the vending machine. Indeed, each guide 8 may be installed by simply introducing the first appendages 12a into their respective through openings 11 in the uprights 9 and rotating the guides 8 until the second appendages 12b are also introduced into their respective through openings 11. Now, the second section 12d of the first appendages 12a abuts the rear surface (the one that faces the cavity 10) of the front wall 9a of the uprights 9. Thus, the guide 8 is ready to receive the tray 5.

[0024] In order to inhibit rotation of the guide 8 about the horizontal axis, each guide is provided with a stop member 13 having an appendage 13a that is adapted to be freely introduced into an opening 11 of an upright 9. The stop member 13 is also adapted to be attached by mechanical interference to its respective guide 8, thereby inhibiting rotation thereof. The above mentioned mechanical interference attachment will be obtained without the help of tools, i.e. screwdrivers or the like, and requires no further elements, such as screws, rivets, nuts or the like. It shall be noted that it is important to inhibit rotation of the guide 8, even though when the tray is in the retracted state (i.e. in its operating configuration) the above mentioned degree of rotational freedom of the guide is irrelevant for operation. Indeed, when the tray 5 is pulled out for replenishing purposes, the guides are subjected to forces in the front area thereof (i.e. on the side that faces the front panel 4), which forces are (also) balanced by a force directed horizontally between two guides. This force generates a torque that tends to lift the second appendages 12b out of the uprights 9 and hence to rotate the guides about a horizontal axis, which is the horizontal axis about which the guides may rotate because they are unattached. The amount of rotation imparted to the guides 8 is not very large (it is of the order of about ten degrees), but it is enough to create potential drawbacks when pulling out and inserting back the trays 5.

[0025] In the preferred embodiment of the invention, the stop member 13 comprises a tab 13b that is adapted to be grasped by a user to disengage the stop member 13 from the guide 8, i.e. to release the mechanical connection between the stop member and the guide. Particularly, the stop member 13 comprises at least one elastically deformable portion for enabling and disabling the mechanical interference with the guide. Preferably, the entire stop member is elastically deformable. The elastic deformation is given by a combination of the material and thickness of the stop member 13. In the preferred embodiment of the invention (see Figure 3), the stop member 13 is made of a metal element in the form of a 1 or 2 mm-thick plate, such that it can be elastically deformed by a user. Particularly, the stop member 13 comprises a plate 13c with an appendage 13a extending from its first end and the tab 13b placed at its second end. The appendage 13a is orthogonal to the plate 13c such that it fits into an opening 11 of the upright 9 and comes to abutment against the rear surface of the front wall 9a thereof (as described for the second section 12d of the first appendages 12a). The plate 13c comprises at least a locking pawl 13d, preferably two of them, extending parallel to the appendage 13a and having the purpose of abutting a surface of the guide 8. The appendage 13b of the stop member 13 is adapted to be introduced into the through opening 11 of the upright 9 that is engaged by an appendage of the guide, and particularly the second appendage thereof (as shown in Figure 4). Thus, the appendage 13a and the pawl 13d act as a holding and constraining element for the guide, and particularly for the portion of the guide upon which the second appendage 12b abuts, thereby inhibiting any rotation thereof (see Figure 4). It shall be noted that, by acting upon the tab 13b, a force is exerted that can elastically deform the stop member 13 to disengage the pawl 13d from the guide 8 and allow rotation (and subsequent removal) of the guide itself.

[0026] It will be appreciated from the above that the vending machine of the present invention obviates the above mentioned prior art drawbacks.

[0027] Those skilled in the art will obviously appreciate that a number of changes and variants may be made to the invention as described hereinbefore to meet specific needs, without departure from the scope of the invention, as defined in the following claims.

Claims

1. A vending machine with superimposed trays, comprising:

- a storage area (3) for products to be dispensed,
- a plurality of trays (5) accommodated within said storage area (3), each tray (5) having a plurality of seats for holding products to be dispensed,
- at least one pair of horizontal guides (8) associated with at least one of said trays (5) for allowing said tray to be at least partially pulled out of said storage area (3),
- each guide (8) of said pair of horizontal guides being rigidly joined to a respective pair of uprights (9),

characterized in that

each upright (9) comprises a plurality of identical, superimposed through openings (11), each guide (8) comprising appendages (12) adapted to be freely introduced into respective through openings (11) of the uprights, said appendages (12) inhibiting translation of the guide (8) relative to its respective uprights (9) and allowing rotation of the guide (8) about an axis of rotation perpendicular to the uprights (9), relative to its respective uprights, a stop member (13) for each guide having an appendage (13a) that can be freely introduced into an opening (11) of a respective upright (9) and can be secured by mechanical interference to its respective guide (8) to inhibit said

rotation of the guide (8).

2. A vending machine as claimed in claim 11, wherein said stop member (13) comprises a tab (13b) that is adapted to be grasped by a user to disengage the stop member (13) from the guide (8).

3. A vending machine as claimed in claim 1 or 2, wherein said stop member (13) comprises an elastically deformable portion for enabling and disabling said mechanical interference with said guide (8).

4. A vending machine as claimed in any of the preceding claims, wherein said appendage (13a) of the stop member (13) is adapted to be introduced into the same through opening (11) of the upright (9) that is engaged by an appendage (12) of the guide (8).

5. A vending machine as claimed in any of the preceding claims, wherein said stop member (13) comprises a plate (13c) with said appendage (13a) extending from an end thereof, said appendage (13a) being orthogonal to said plate (13c).

6. A vending machine as claimed in claim 5, wherein said plate (13c) comprises a locking pawl (13d) which extends parallel to said appendage (13a) and abuts a surface of said guide (8).

7. A vending machine as claimed in any of the preceding claims, wherein each guide (8) comprises first and second pairs of said appendages, the appendages (12) of the first pair being placed at a first end and the appendages of the second pair being placed at a second end of the guide (8), first appendages (12a) of the first and second pairs of appendages (12) being adapted to be introduced into respective openings of two uprights, said openings being at the same height.

8. A vending machine as claimed in any of the preceding claims, wherein each guide (8) comprises first and second pairs of said appendages (12), a first appendage (12a) of the first and second pairs comprising a first section (12c) intended to extend through and rest upon the through opening (11) of its respective upright (9) and a second section (12d) which extends from the first one (12c) and is substantially perpendicular to the first one (12c) and located on the opposite side of the upright (9) relative to the guide (8).

9. A vending machine as claimed in claim 8, wherein a second appendage (12b) of the first and second pairs comprises a first section (12e) which is intended to extend through and rest upon the through opening (11) of its respective upright (9), said stop member (13) being operative at one of said second appendages (12b).

FIG 1

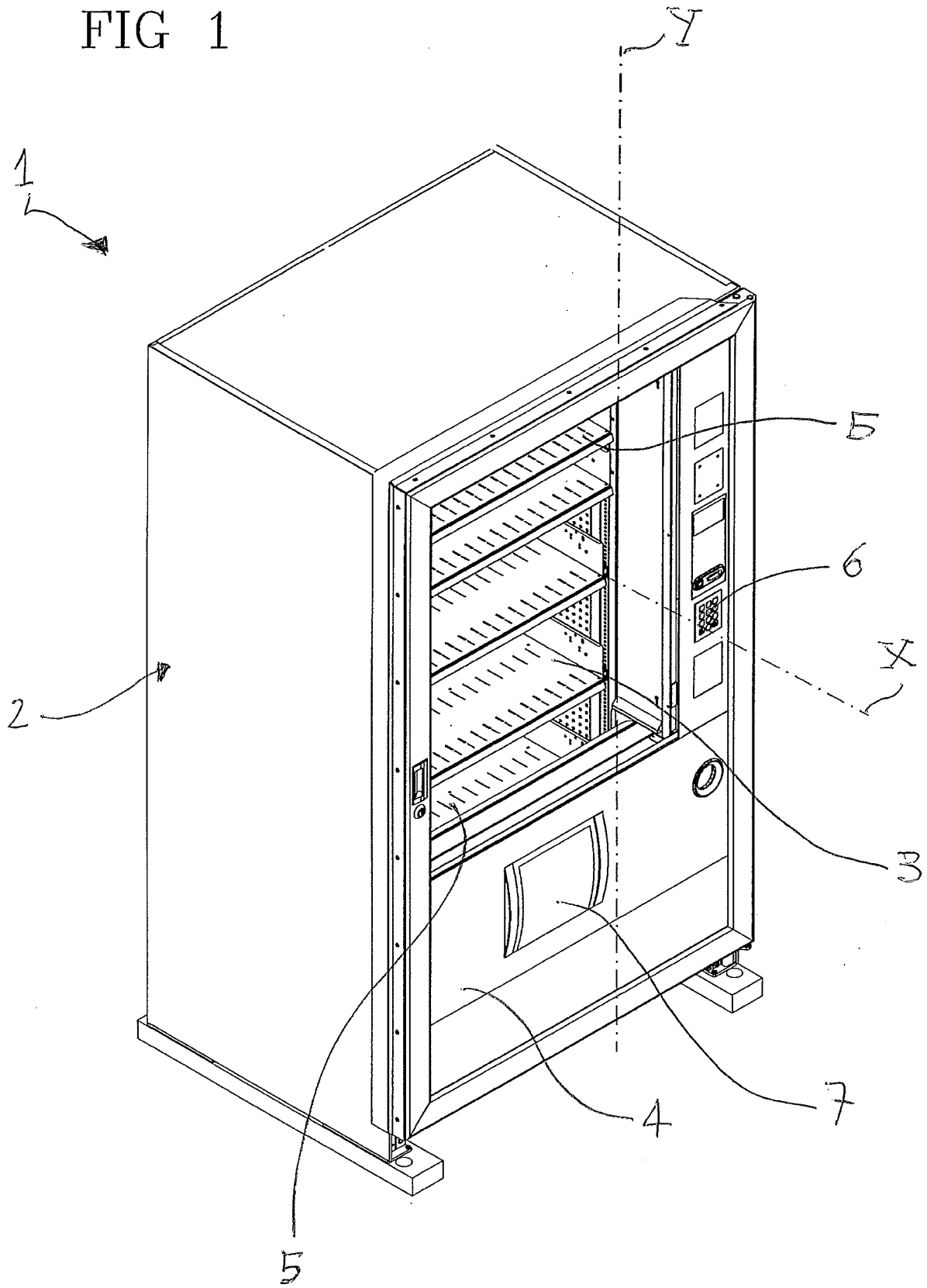

FIG 2

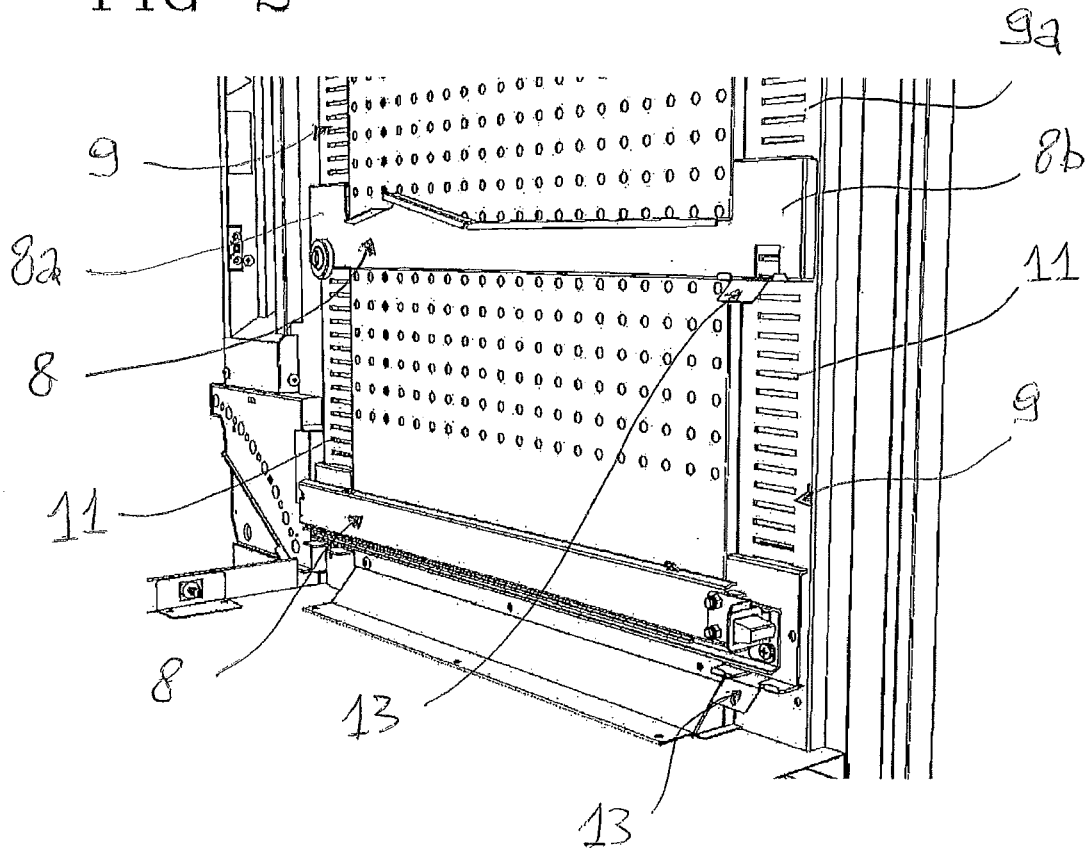

FIG 3

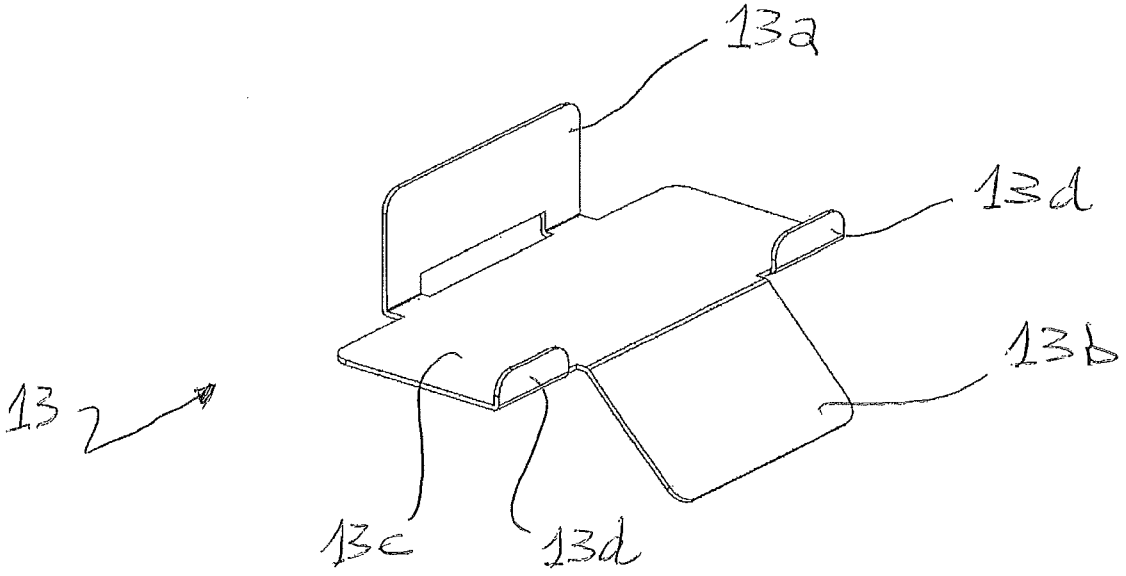

FIG 4

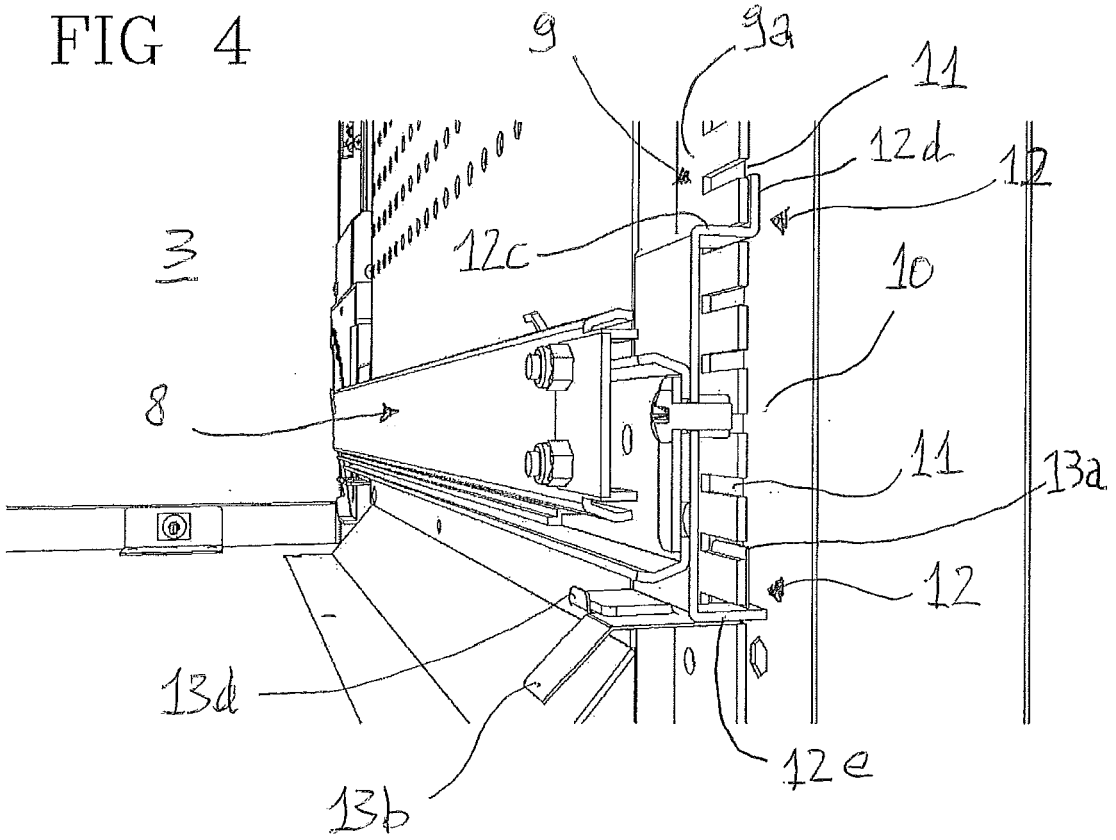
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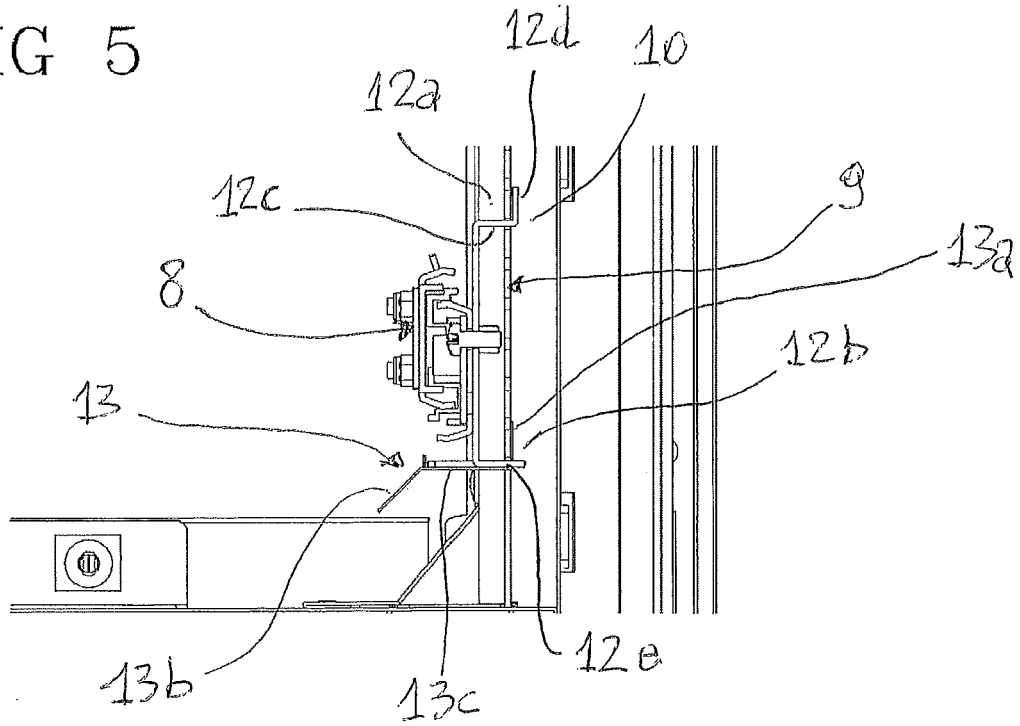
FIG 5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EUROPEAN SEARCH REPORT

Application Number
EP 15 20 2959

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	EP 0 258 954 A2 (FAWN ENG CORP [US]) 9 March 1988 (1988-03-09) * abstract * * page 1, line 2 - line 33 * * page 6, line 12 - line 24 * * page 11, line 1 - line 22 * * figures 1,9,10,11 * -----	1-9	INV. G07F11/38 G07F11/00
A	WO 00/30961 A1 (MICROMART LTD [IL]; AHARONOVITZ MICHA [IL]) 2 June 2000 (2000-06-02) * the whole document * -----	1-9	

TECHNICAL FIELDS SEARCHED (IPC)

G07F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 March 2016	Fyhr, Jonas

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