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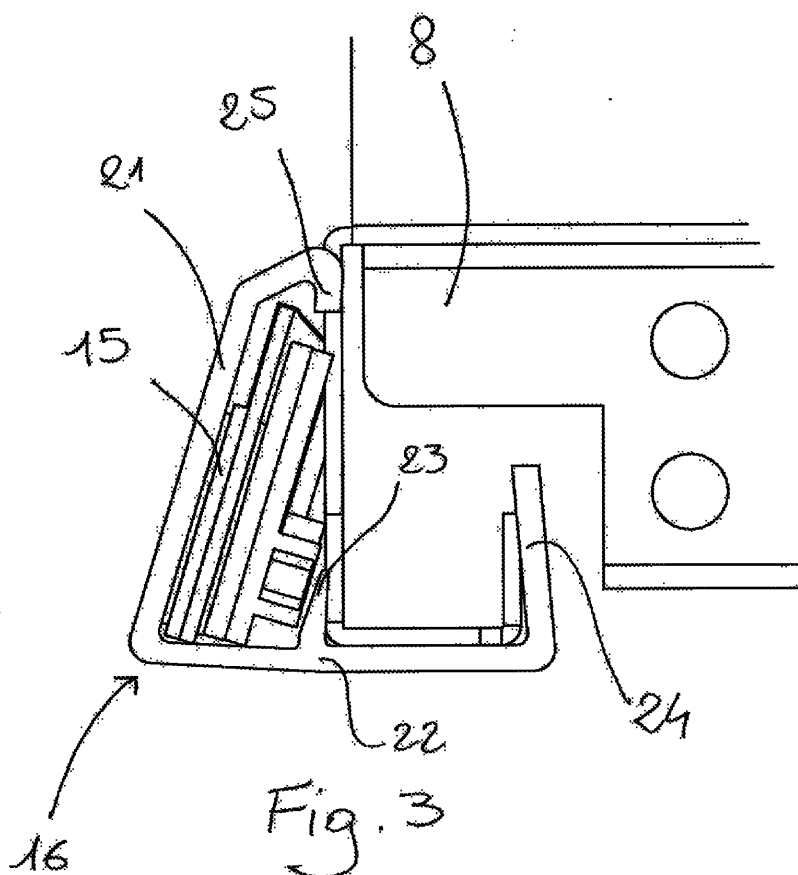
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(54) **Vending machine**

(57) The present invention concerns a vending machine accessory comprising one or more trays (8) with at least one housing for receiving a product to be dispensed, said vending machine comprising at least one

display located in the proximity of said housing, in such a position as to be visible from an external user, a vending machine comprising such accessory and a method of operating same.



Description

[0001] The present invention relates to a display and vending machine having a display bar and a method for programming a display and vending machine or glass front vending machine.

[0002] As used herein the term display and vending machine is intended to indicate vending machines having a front portion that allows an external user to view the products being sold. Such front portion may be, for instance, a glass panel of a given size, e.g. extending over a substantial portion of the front of the vending machine.

[0003] In this type of vending machine, the products to be dispensed are generally placed on trays having special systems for allowing delivery of products into a pick-up volume, from which they can be picked up by a user once he/she has paid for them.

[0004] In prior art vending machines, an indication is provided close to each product, for the user to make the proper selection on suitable selection means and obtain delivery of the desired product. Thus, for example, if a user wants to buy a product located in position 36A, he/she shall simply enter "36A" in a suitable keypad to select the desired product.

[0005] To facilitate the purchase, the price of each product is also typically indicated: in the proximity of the product, close to the indication of the selection number and/or on the display of the selection means, once selection has been made by the user.

[0006] since price indication near the product has been given to date using removable segmented labels, such indication may not always match with the cost that will be debited to the buyer by the control electronics upon selection.

[0007] This kind of error may occur because products often have very similar prices, or because products have been replaced by different products and their price has not been changed, or for yet other causes.

[0008] Furthermore, "static" devices like those described above also have the drawback of not providing information to the user about temporary unavailability of certain products, e.g. due to the occurrence of external conditions, such as failures but also to commercial policies aimed at segmenting the purchase of products (consumption of alcoholic beverages, for example, may be discouraged by the authorities at particular times).

[0009] Also, for easy reading of information, these devices need an external lighting source that might not be available (or be expensive to use) in the night time.

[0010] Finally, "static" devices do not give the user any clear and prompt confirmation of the selected product.

[0011] In the light of the prior art as described above, it is clearly desirable to provide an apparatus that at least partially obviates at least some of the above drawbacks.

[0012] In view of the above prior art, the object of the present invention is to provide a display bar for a vending machine, as well as a vending machine comprising such a display bar that might achieve the above results.

[0013] According to the present invention, this object is fulfilled by a display and vending machine as defined in claim 1 or a method as defined in claim 9.

[0014] The characteristics and advantages of the present invention will appear from the following detailed description of one practical embodiment, which is given as a non limiting example with reference to the annexed drawings, in which:

- 10 - Figure 1 is a schematic perspective view of a vendor of the type concerned herein;
- Figure 2 is a schematic perspective view of a further vendor of the type concerned herein;
- 15 - Figure 3 is a side view of an accessory of the present invention mounted to the end portion of a tray of a vendor as shown in Figures 1 and 2;
- Figure 4 is a side view of an accessory similar to that of Figure 3;
- 20 - Figure 5 is a block diagram representing one of the initialization procedures for the vendors of Figures 1 and 2.

[0015] Referring to the figures, numeral 1 generally designates a vending machine comprising a portion 2, such as a transparent panel, e.g. made of glass or a polymeric material, that allows a user to view the products 3 to be dispensed. The products 3 to be dispensed are generally contained in an interior volume 4 delimited by a frame 5, in which the portion 2 is formed. The portion 2 may be included, for instance, in the front panel 6, which is advantageously hinged to the rest of the frame 5 about a vertical axis. The front side 7 of the vendor 1 may be advantageously divided into a selection portion 7a, comprising a selection interface (such as a numerical keypad), a pick-up portion 7b, comprising an opening for access to the pick-up volume and a display portion 7c, comprising the portion 2, which may advantageously coincide with substantially the whole display portion 7c.

[0016] As used herein, the term pick-up volume is intended to indicate a volume within the vendor that can be reached from outside through the opening, and is designed to allow the user to pick up the product 3 after delivery thereof from its housing and to remove the purchased product from the vendor.

[0017] In the vendor 1, the products 3 may be arranged on trays 8. Advantageously, a vendor 1 may contain up to seven trays 8 one above the other in its interior volume 4. The trays 8 may have a rectangular (or square) shape, if they are designed to be stationary during ordinary operation, or a circular shape, if they are designed to be moved during ordinary operation.

[0018] The trays are generally equipped with delivery means 9 for delivering the products 3, which are adapted to move the products 3 from their housing on the tray 8 into the pick-up volume.

[0019] While for simplicity reference will be made below to rectangular trays, it shall be understood that the

skilled person may make changes to the teachings hereof and easily adapt them to circular trays. Likewise, such changes will be deemed to lead to a product that is perfectly equivalent to the one described herein, in both functional and structural terms.

[0020] The delivery means 9 may include, for instance, a motor (not shown), coupled to one or two coils 11, whose turns define - with the trays 8 - a plurality of housings 12 for the products 3.

[0021] Therefore, each row of housings 12 is driven by a single motor that causes the rotation of the one or two coils, for the housings 12 to move forward towards the front panel.

[0022] Each housing is generally arranged to contain a single product 3, so that as the housings 12 move towards the front panel, the front product is carried to a position in which it is no longer supported by the tray 8 and is caused to fall into the pick-up volume.

[0023] Multiple rows of housings 12 are generally arranged on each tray 8. The trays can typically hold eight to ten coils 11, which may be driven by motors coupled to either a single coil or two adjacent coils 11.

[0024] Some trays 8 may be equipped with one or more front supports 14, for easier delivery of particularly high products (such as bottles). According to one embodiment, each front support 14 comprises a metal sheet having a first end attached under the tray 8 and a second free end that is shaped to facilitate delivery of particularly high products.

[0025] In order to facilitate the forward movement of particularly high products from the back of the vending machine 1 to the front 7, some trays 8 may be equipped with one or more support elements 30 for supporting the products 3.

[0026] Each support element 30 is housed in a corresponding spiral 11 and extends from the back of the vending machine 1 to the front 7, to the front supports 14. particularly, each support element 30 is in a position in which it does not interfere with the rotation of the spiral 11.

[0027] The delivery means 9 may include, for instance, a motor (not shown), coupled to one or two spirals 11, whose turns define - with the trays 8 - a plurality of housings 12 for the products 3,

[0028] Thus, in a vending machine 1 of the present type there may be up to seven trays 8, each having a variable number of spirals 11, generally eight or ten.

[0029] A motor may drive either one or two adjacent spirals 11. Two adjacent spirals 11 driven by a single motor will be preferably disposed in a mirrorlike arrangement, so that the housing defined thereby can have twice the unit width.

[0030] In other words, each motor has a row of product delivering housings 12 associated therewith, whether the row is formed of one or two spirals 11.

[0031] A front support 14 may or not be present in front of each row.

[0032] Typically, an indicator element is provided in the immediate vicinity of each row of housings 12, and

contains information representative of the position of the row of housings and the price that has been set for the product contained therein.

[0033] Namely, such indicator element is placed on the edge of the tray, facing towards the portion 2, for the information to be readable from outside.

[0034] Reference will be made herein to a display 15. This word shall not be intended as any indicator element, but namely an indicator element that allows the information contained therein to be changed by simply using electric power.

[0035] According to the present invention, a plurality of indicator elements is replaced by one or more displays 15 disposed in an accessory 16 for vending machines.

[0036] As more clearly explained below, in the accessory 16 of the present invention, multiple physical displays 15 may be coupled together and behave as a single logical display. Likewise, a single large physical display may be also caused to behave as a plurality of logical displays.

[0037] Therefore, in the present description, the context will clarify from time to time whether logical or physical displays are concerned. Such distinction is not particularly relevant because, in technical terms and for the purposes of the present invention, a plurality of small physical displays that act as a single logical display is perfectly equivalent to a single physical display that acts as a plurality of logical displays.

[0038] Thus, an accessory may be mounted to the front of the tray 8 instead of the above mentioned indicator elements, where the indicator elements are to be placed. Such accessory 16 comprises a plurality of physical displays 15 and connection means for making a connection between the accessory 16 and the control and monitoring unit (not shown) of the vendor 1.

[0039] Therefore, for proper data display, both the width of each housing 12 defined by the spirals 11 and the presence (or absence) of the front support 14 shall be accounted for.

[0040] The accessory may include a plurality of physical display, preferably up to eight or ten displays, arranged on a common support. The physical displays preferably have a rectangular shape and are in side-by-side relation by their short sides. Advantageously, the displays are transparent, and are for instance LCD displays.

[0041] The displays include front and a back sides: the front side is the one from which information can be properly read; the back side is the one opposite to it.

[0042] A reflecting layer may be placed adjacent to the back side so that the displays are illuminated with ambient light or illumination means 18, such as LED or electroluminescent lamp devices.

[0043] The electroluminescent lamp improves uniformity of LCD illumination, but LEDS may reach the same results with the interposition of a thin layer of light diffusing material 19 between the illumination means and the LCD display. Alternatively, a different technology may be implemented, using a display known as "cholesteric".

[0044] In addition to the displays, the accessory may also include control electronics for such displays (either of logical or physical type), for receiving instructions from the control and monitoring unit and control the illumination means and the displays according to such instructions.

[0045] Advantageously, the accessory includes a printed circuit 20 with all the displays of the accessory connected thereto. The printed circuit 20 is substantially as long as the accessory, which is in turn designed to be attached all over the length of the front side of a drawer of a vending machine.

[0046] The printed circuit also has a front side facing towards the displays and a back side opposite to it. Advantageously, the displays are connected to the back of the printed circuit. The connection required for data and power transfer has a sufficient mechanical resistance as to avoid the need for any Mechanical anchoring arrangement between the display and the printed circuit. Advantageously, the connection extends above the top edge of the printed circuit.

[0047] It was also found that maximum information displaying clarity is obtained when the total length of the displays substantially matches the length of the accessory, i.e. when the maximum dimension of each display is equal to the width of the coils that define the product receiving housings 12 (with the display being oriented on the vendor so that its maximum dimension extends along a horizontal direction, parallel to the front panel of the vendor).

[0048] The data connection between each printed circuit of each accessory and the control and monitoring unit (or controller) remote from the accessory is made according to a serial protocol. This substantially reduces the size increase that would be otherwise required to handle a plurality of accessories in the same dispenser.

[0049] The accessories share a common wire for connection to the remote control and monitoring unit.

[0050] The accessory may be equipped with an indexing element, e.g. a mechanical actuator such as a pushbutton or a microswitch, that can generate a confirmation signal for the control and monitoring unit during the initial programming procedure, the number of accessories in the vendor has to be set.

[0051] The control and monitoring unit may switch into a mode in which it waits for a confirmation signal to assign a reference to each accessory that has been mounted.

[0052] For instance, the vendor initialization procedure may include an initial step in which the control and monitoring unit is put into a mode in which it waits for a signal indicative of the presence of a first accessory or a signal indicative of the absence of such first accessory.

[0053] Once the signal has been received (from the indexing element if the accessory is present and from the selection means if the accessory is absent), the control and monitoring unit may repeat the procedure for a second accessory, until all possible positions have been covered.

[0054] Obviously, the first accessory will be related to the first row of motors, the second accessory to the second row of motors, and so forth.

[0055] Advantageously, the indexing element is placed proximate to the shorter side of the accessory, which has a substantially rectangular shape.

[0056] Then, the accessory may be connected to each tray by a support 20, preferably made of a transparent polymeric material, as shown in Figures 2 and 3. Such support 20 is formed, for instance, by extrusion and has a front side 21 and a lower side 22, that form together an acute angle. The lower side 22 may include an upwardly directed protrusion 23 and an end portion 24, also directed upwards and forming an acute angle with the lower side 22 and the front side 21.

[0057] Still in the embodiment of Figures 2 and 3, the upper end portion 25, facing towards the protrusion 23, is shown.

[0058] It can be seen that the lower side and the front side define a first volume for snap engagement with an end of a tray 8 and a second volume for holding the accessory in front of the end of the tray 8.

[0059] This construction is believed to provide the best combination of simple fabrication, easy assembly and reduced size. With this construction the dimensions of the above described "static" indicator elements could be maintained, and no change to the standard was required.

[0060] As shown in figure 4, the control and monitoring unit cyclically repeats a data display procedure, for showing the prices on the video display. This procedure determines whether the display is a single or a double display. The term "double display" in the figure is intended to mean that the logical display is composed of two physical displays, and relates to the case in which a single motor is connected to two coils to define the row of housings.

[0061] Thus, a vendor with a plurality of trays may have one or more accessories mounted thereto, advantageously one accessory for each tray,

[0062] This will provide a matrix of logical displays that matches the matrix of product receiving housings (or motors) and a matrix of physical displays that matches the matrix of coils on the trays. Due to the above mentioned reasons, the two matrices are not necessarily coincident.

[0063] According to a first embodiment, a display and vending machine comprises one or more trays 8, each comprising at least one housing for receiving a product 3 to be dispensed, and at least one display placed in the proximity of the housing, for the display to be visible to an external user. Advantageously, the display is connected by serial connection to an external device, such as a control and monitoring unit adapted to generate a first signal for the display. This first signal may be generated, for instance, by a data input device, such as a numerical keypad.

[0064] In another embodiment, a vending machine comprises first and second displays, operationally independent of each other, and first and second housings,

each adapted to receive at least one product to be dispensed. The first display is in the proximity of the first housing (i.e. at a minimum distance of not more than a few centimeters from the housing and at a maximum distance of not more than about ten centimeters) and the second display is in the proximity of the second housing.

[0065] The first and second displays may be illuminated by respective first and second illumination means,

[0066] Advantageously, the first and second illumination means may illuminate respective first and second displays with different colors; at least one of them may illuminate its own display with at least two different colors. Advantageously, the vendor may have some displays comprising illumination means of a first color and other displays comprising illumination means of a second color, differing from the first.

[0067] Accessories like the one described above may include illumination means of the same color or of different colors. The accessories may be provided either as having all the illumination means of the same color (single-color accessories), with the illumination means of two different accessories having different colors, or as having illumination means of different colors within the same accessory (multicolor accessories).

[0068] Therefore, the vendor may include single-color accessories only, of either the same or different colors, or Multicolor accessories. Possible applications of multicolor accessories will be clearer hereinafter.

[0069] Advantageously, at least one of the illumination means may illuminate its own display with at least three, preferably at least four different intensities (in addition to the off level), to obtain a gradual increase of light intensity. It should be considered that the provision of two illumination levels only (in addition to the off level) allows a single change of light intensity that occurs almost instantaneously and may not be perceived by a user whose attention is focused on something else at that time.

[0070] The provision of at least four illumination levels affords a gradual, not instantaneous variation, allowing the user to focus his/her attention to it before the end of the event.

[0071] If there is a temperature difference in the vendor between two different portions of the interior volume, then the differences in color and/or intensity of the illumination means may be related to the different temperatures in the different portions.

[0072] For instance, two different housings having two different temperatures may be associated to two displays that are illuminated in different manners according to temperature. For instance, the displays proximate to the housings at higher temperature may be illuminated with a red component, and the displays proximate to the housings at lower temperature may be illuminated with a blue component.

[0073] Should the vendor comprise means for generating different temperatures at a first housing and a second housing (without relying on natural temperature stratification), e.g. by providing a different concentration of

cold air inlets for two different housings, the illumination differences as described above may be set according to the operation of such means for generating different temperatures.

5 **[0074]** The vendor may also include one or more interior volume temperature sensors, that can transmit a signal to the control and monitoring unit (or controller), which may generate different intensities and/or colors for different illumination means, in response to such signal.

10 **[0075]** Otherwise, the color and/or intensity differences between the illumination means may be related to the type of products contained in different housings. For example, color and/or intensity differences may denote dietetic and non dietetic, sweet and salted, or solid and liquid products.

15 **[0076]** Conversely, considering a vendor with at least three displays, each at a corresponding housing, a state may be envisaged in which one of the three displays is only highlighted relative to the others, by having a different color, a different brightness, or by flashing.

20 **[0077]** It is highly probable that any vendor has at least three displays, the accessory described herein advantageously comprising more than two displays.

[0078] In such vendor, it can be envisaged that a user may act on the position of the highlighted display by operating "relative" control means. In other words, the control means allow the user to define a new position for the highlighted display relative to the current position, and not in absolute terms.

25 **[0079]** For example, the selection may be moved by using the arrow keys (up - down - right - left) of the keypad, a trackball device, or possibly a touch screen.

[0080] The advantages of this mode of operation consist in that, once the user has expressed his/her interest in buying a product (e.g. by touching the input means of the vendor, or introducing credit or credit availability therein), one of the displays (e.g. a predetermined or a user-selected display) may be highlighted.

35 **[0081]** Now, if the user actually intends to go ahead with the purchase of the product contained in the housing that corresponds to the highlighted display, he/she may proceed to the purchase by confirming his/her selection; if for any reason the highlighted product does not match with the desired product, the selection may be "corrected" much more easily by simply using the above mentioned control means to displace the selection, instead of having to look for the code that corresponds to the desired selection and input it in the selection interface of the vendor.

40 **[0082]** One of the additional technical results achieved by displays illuminated according to the present invention consists in providing an immediate confirmation for the user about what he/she can buy based on various selection restraints (available credit, availability related to time or other requirements) upon selection.

55 **[0083]** A control method may be provided in which, once the user has introduced a credit element (such as a coin, a banknote or a key), the available credit is compared with the prices of the various products, and the

displays corresponding to the products with a cost not exceeding the available credit are only highlighted. As the available credit increases (e.g. by introduction of new coins or banknotes), the number of buyable (i.e. highlighted) products is updated in consideration of the new available credit.

[0084] Likewise, certain products may be excluded from those available for purchase, i.e. products that can only be sold at certain times of the day (e.g. certain laws forbid the sale of alcoholic beverages during the night) or only to certain classes of people (such as tobacco that can only be sold to adults). All these restraints may be expressed by product highlighting arrangements, such as by color, brightness or information written on the display.

[0085] For instance, the displays associated with products that can be sold to certain classes of people may be highlighted by illumination with a red component until the user has been confirmed to belong to the authorized classes, or the displays associated to products that cannot be sold at particular times of the day may be illuminated with a red component, and possibly with a different component (e.g. yellow) for a predetermined time before the start of the allowed sale (e.g. thirty minutes before the start of the period in which sale is authorized again).

[0086] All the above display highlighting processes may be simply combined together by convenient programming of the control and monitoring unit.

[0087] In general terms, the present description discloses a method for displaying first data in a vending machine comprising a controller, at least one housing for holding a product to be dispensed, at least one display placed in the proximity of the housing and connected to the controller by a data connection. The method comprises the steps of inputting the first data into the controller, transmitting the first data to the display via the data connection and displaying the information through the display.

[0088] The first data may be representative of the housing position and/or the price to be paid by a user for the vendor to dispense the product possibly contained in the housing.

[0089] Advantageously, before displaying the first data on the display, the controller receives second data, compares it with preset values, and records the relevant results. Depending on the result of the comparison, the first data may or not appear on the display.

[0090] The second data may be representative of the presence of a front support 14 proximate to the display that partially covers the view of the vendor to an external user. Here, the controller controls the display of the first data on the display in different manners depending on whether the front support 14 is present or not.

[0091] In this case, during first operation, the controller may require the assigned personnel to indicate, for each housing, whether the display associated with that housing is partially covered or not by such front support 14. Such confirmation may be designed to be given once for

the whole accessory, once for each housing or for the housings associated to a single coil.

[0092] Otherwise, a vendor may be provided in which such front supports 14 may directly transmit a presence signal to the control and monitoring unit.

[0093] If the front support 14 is present, the control means display the front data in the display portions that are not covered to the view of a user outside the vendor whereas, if the front support 14 is not present, the control means display the first data substantially all over the display.

[0094] Since the front support 14 may include an element located in the proximity of a central portion of the display, for the central portion to be covered to the view of a user, if such front support 14 is present, the first data will be only displayed in the side portions of the display.

[0095] According to a further embodiment, the second data is representative of time intervals during which the first data cannot be displayed. In this case, the display will be controlled for the first data not to be displayed during forbidden time intervals. Preferably, during such forbidden time intervals, the display is controlled to display third data representative of such condition. For instance, product delivery may be inhibited in the forbidden time intervals. Alternatively, product delivery may be inhibited at the price represented by the first data. In the latter case, the third data representative of the above mentioned inhibition condition may be representative of the new price at which delivery may be allowed, which may be higher or lower than the price represented by the first data.

[0096] In accordance with a further embodiment, the second data may be representative of the authorization that a user may have to purchase a given product, e.g. of the age of the user. In any case, such authorization is intended to be different from (and additional to) the authorization given due to the amount of money made available to buy the product.

[0097] In this case, the second data may captured, for instance, from a smart card reader (or the like), which obtains it directly or by processing the data in the smart card (which shall thus contain data representative of the age of the owner).

[0098] If no authorization is given, then the control and monitoring unit may stop the display of the first data for a predetermined time interval, advantageously after authorization check.

[0099] During such predetermined time interval, fourth data may be displayed, which are different from the first data, and are advantageously representative of the unauthorised condition. Such predetermined time interval may end approximately within one minute from the selection, and is preferably even shorter than is seconds.

[0100] A reverse case may be also provided, in which the first data representative of the price and/or display (and hence product) position is only displayed after the authorization check whereas the data displayed on the display is typically representative of the fact that, at that

time the vendor still requires an authorization before making the product available for delivery. In this case, once such authorization has been obtained, the vendor displays the first data on the display for a predetermined time interval. Such time interval may be not longer than one minute, preferably not longer than fifteen seconds, or end upon product delivery, or upon removal of the smart card from the reader.

[0101] In a further embodiment, the second data is representative of a vendor malfunction state or sold out product : when such state occurs, the display does not show the first data, and possibly replaces the first data with fifth data representative of the malfunction and/or sold-out product state.

[0102] Those skilled in the art will obviously appreciate that a number of changes and variants may be made to the arrangements as described hereinbefore to meet incidental and specific needs. For instance, the accessory may be rectilinear, as described above, or have a (semi) circular shape, allowing it to be mounted to circular trays.

[0103] All of these changes and variants fall within scope of the invention, as defined in the following claims.

Claims

1. An accessory for a vending machine comprising one or more trays comprising at least one housing for receiving a product to be dispensed, said vending machine comprising at least one display placed in the proximity of said housing in such a way to be visible to an external user.
2. An accessory as claimed in the preceding claim, comprising means for serial connection with a control and monitoring unit.
3. An accessory as claimed in any preceding claim, comprising an indexing element, in the form of a mechanical actuator that can be mechanically actuated from outside the vendor and is adapted to generate a confirmation signal.
4. An accessory as claimed in the preceding claim, wherein said mechanical actuator comprises a push-button.
5. An accessory as claimed in the preceding claim, wherein said indexing element is placed at one of the two sides of said accessory.
6. A vending machine comprising an accessory as claimed in any preceding claim, said vending machine comprising a control and monitoring unit and at least one tray comprising at least one housing for receiving a product to be dispensed, said accessory being mounted to said tray, preferably at the front edge of said tray and being connected to said control

and monitoring unit by a serial connection.

7. A vending machine comprising:

- first and second displays, operationally independent of each other;
- first and second housings, each adapted to receive at least one product to be dispensed;
- said first display being located in the proximity of said first housing and said second display being located in the proximity of said second housing;
- said at least one first and at least one second displays being adapted to be illuminated by respective first and second illumination means.

8. A vendor as claimed in the preceding claim, wherein said first illumination means and said second illumination means may illuminate the corresponding first and second displays with different colors.

9. A method for displaying first data in a vending machine, said method comprising the steps of:

- providing a vending machine comprising a controller, at least one housing for receiving a product to be dispensed, at least one display placed in the proximity of said housing and connected to said controller by a data connection;
- said first data being representative of the position of said housing and/or the price to be paid by a user for said vendor to dispense the product possibly contained in said housing ;
- inputting said first data into said controller provided in said vendor;
- transmitting said first data to said display by said data connection;
- displaying said information through said display.

10. A method as claimed in the preceding claim, wherein prior to the display of said first data on the display, the following steps are carried out:

- said controller receives second data;
- said second data is compared with preset values, and the result is recorded;
- depending on the result of said comparison, said first data is or not shown on said display.

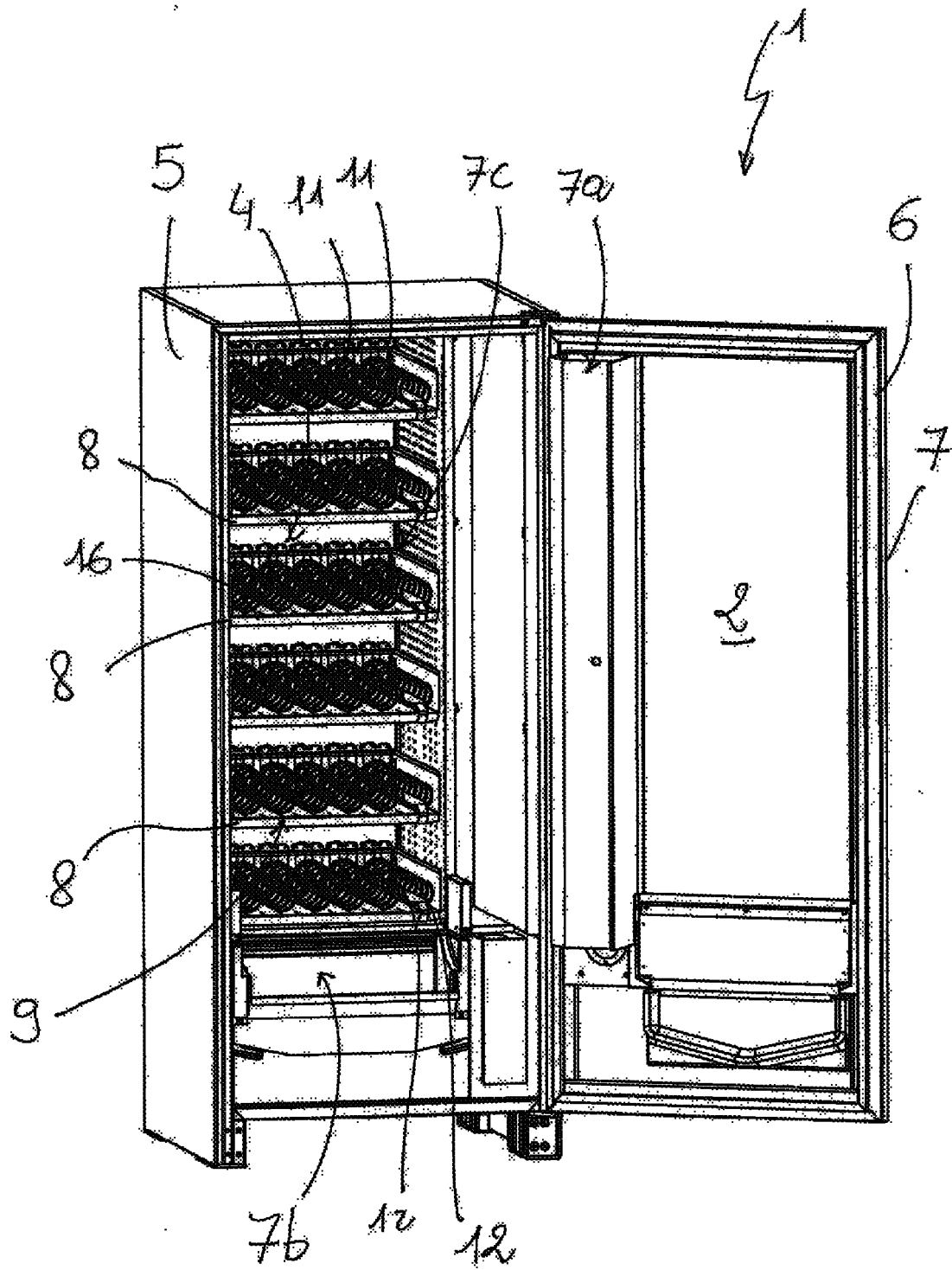
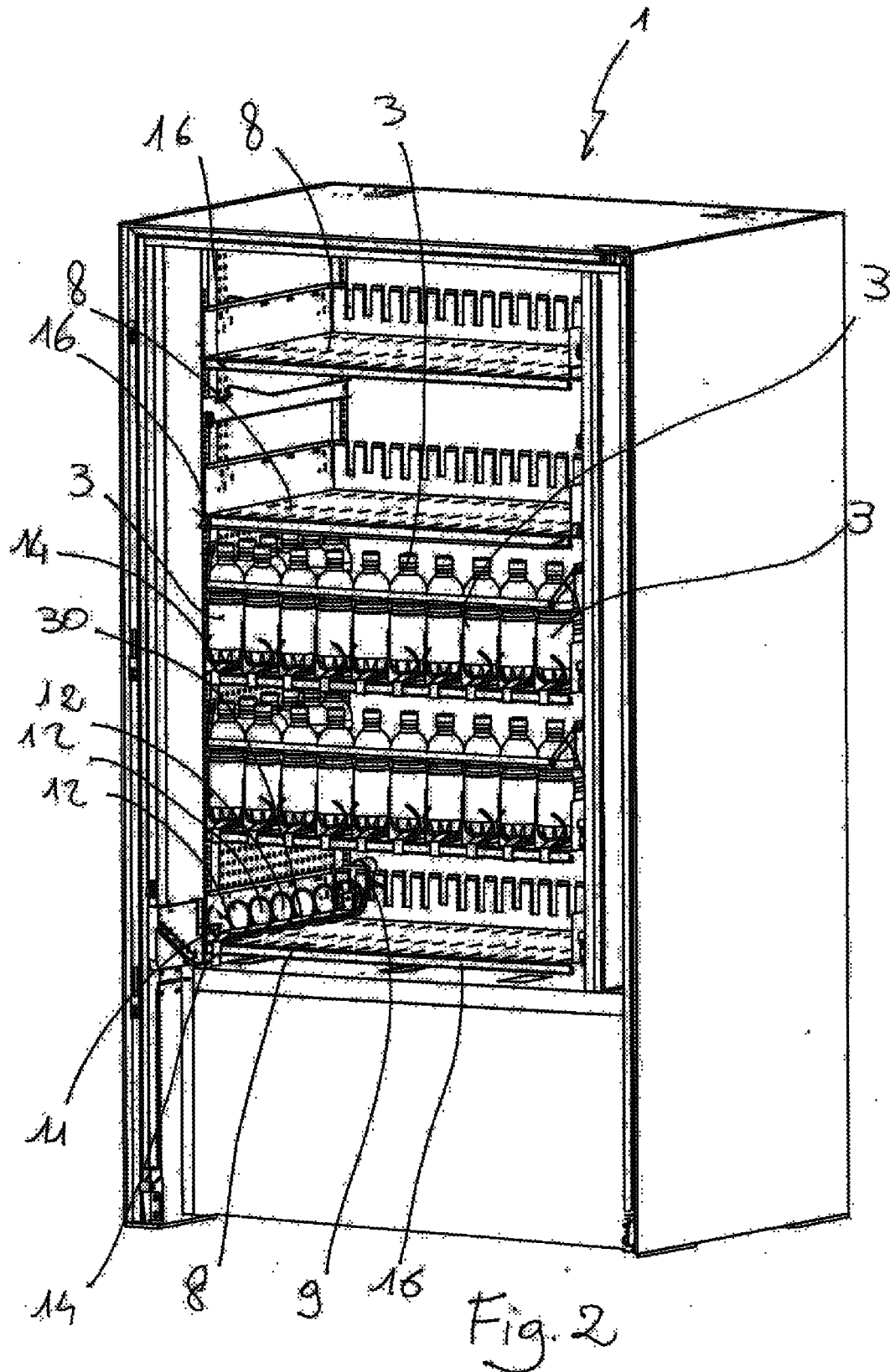
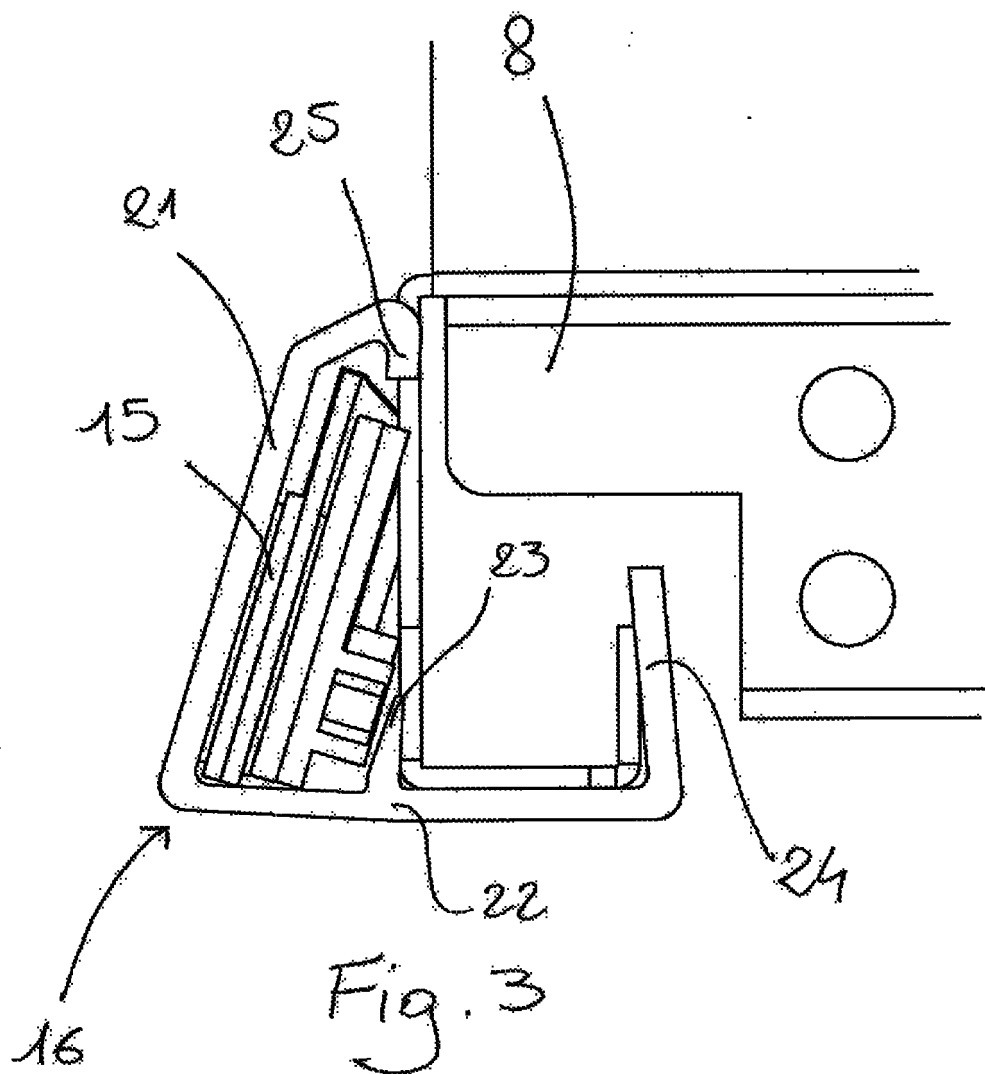


Fig. 1





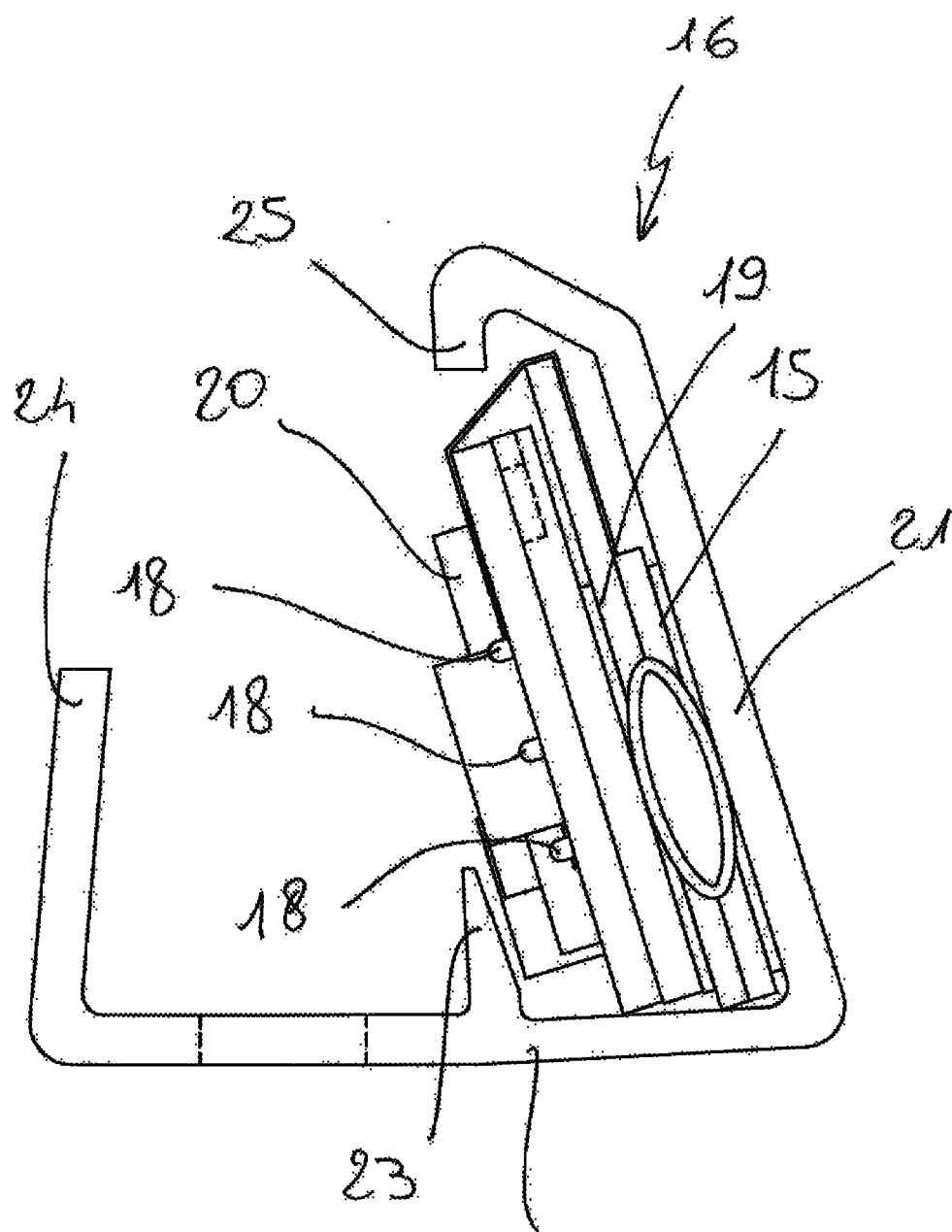


Fig. 4

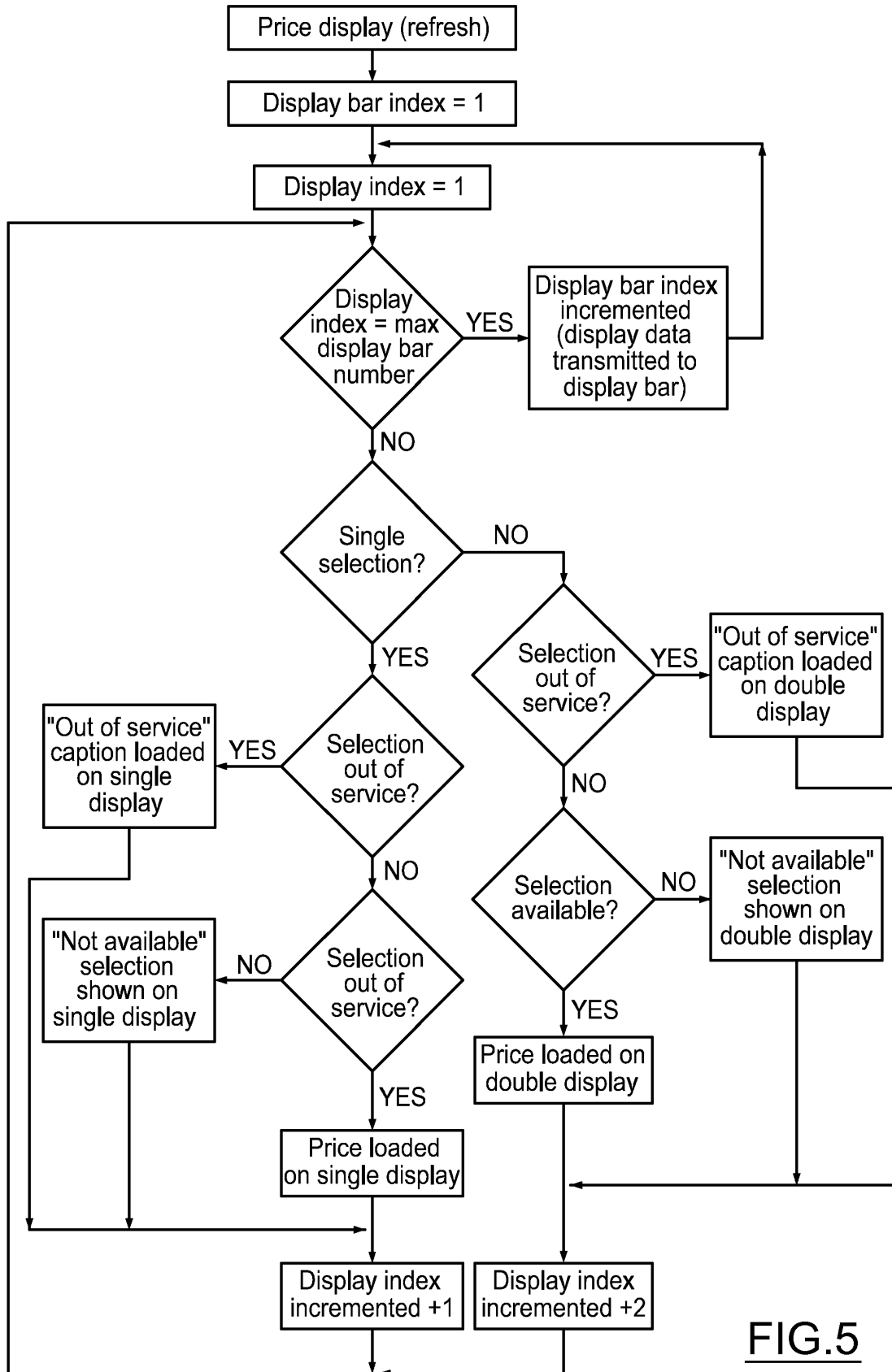


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 09 17 8083

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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