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(54) **A refrigerated module for dispensing ice-creams, deep-frozen products and the like**

(57) The module (13) comprises a container (14) with an internal evaporator (26) and a front opening (15) with which a motor-driven closing door (16) is associated. A recessed space (28) is formed inside the container (14) and contains at least one shelf or drawer type dispenser (106) having, defined internally, a plurality of parallel compartments (107) able to receive refrigerated products such as ice-cream and the like and provided with respective motor-driven devices (108) which can be operated in a controlled manner so as to cause dispensing by means of gravity of a product via the opening (15).

The door (16) can be opened in a motorized manner through a first predetermined angular amplitude and can be also opened manually through a second angular amplitude, which is greater than said first amplitude, owing to disengagement of an actuating connecting bar (22) from the door (16). The arrangement is such that the door (16) can be automatically engaged again with the connecting bar (22) as a result of the door (16) being manually closed again.

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Description

[0001] The present invention relates to a refrigerated module for dispensing ice-cream, frozen products and the like, for example inside a product vending machine of the generic type where a user, in return for payment of a sum of money given performed directly for example via a receiving slot or indirectly by means of debiting of a payment card or the like, is able to select a desired product and obtain dispensing thereof.

[0002] Such known product vending machines comprise a cabinet provided with a vertical front opening with which an at least partially transparent closing panel is associated, the cabinet having, defined internally, at least one recessed space inside in which a plurality of shelf or drawer type dispensers are arranged vertically above one another, each having, defined internally, a plurality of parallel compartments facing the abovementioned front opening and provided with respective motor-driven devices, for example motor-driven spirals, which can be operated in a controlled manner so as to cause the dispensing by means of gravity of a product via said front opening into an underlying receptacle which can be accessed from the outside.

[0003] One object of the present invention is to provide an extractable refrigerated module which can be used in such a product vending machine so that, in addition to the dispensing of conventional non-refrigerated products and if necessary refrigerated beverages, it is also possible to perform the dispensing of products which require conservation at a low temperature or which require deep-freezing, such as ice-cream, frozen products and the like.

[0004] These and other objects are achieved according to the invention with a refrigerated module, the main characteristic features of which are defined in the accompanying Claim 1.

[0005] Further characteristic features and advantages of the invention will become clear from the detailed description below, provided purely by way of a non-limiting example, with reference to the accompanying drawings in which:

Figure 1 is a front perspective view of a product vending machine of the type known per se inside which a refrigerated module according to the present invention is mounted;

Figure 2 is a front perspective view of the product vending machine according to Figure 1, shown with the front door or panel in the open condition;

Figure 3 is a front perspective view of a refrigerated module according to the present invention;

Figure 4 is a partial side perspective view of the refrigerated module according to Figure 3;

Figure 5 is a side view of said refrigerated module; and

Figure 6 is a partial perspective view which shows part of the abovementioned refrigerated module.

[0006] In Figures 1 and 2, 1 denotes overall a product vending machine of the type known per se.

[0007] Such a vending machine 1 comprises a cabinet 2 with an essentially parallelepipedal shape, having a vertical front opening 3 (Figure 2) with which a closing panel or door 4 is associated. This panel or door 4 has preferably a large transparent window 4a suitable for allowing a user to view the products contained in the vending machine.

[0008] The cabinet 2 has, defined internally, at least one recessed space 5 (Figure 2) which is open so as to face the door 4 and in particular the transparent window 4a.

[0009] A plurality of dispensing shelves or drawers 6 are mounted vertically above one another inside the recessed space 5. These dispensing devices are of the type known per se. Each of them comprises a plurality of parallel compartments 7 (Figure 2) which face the front opening 3 of the cabinet 2 and which are provided with motor-driven spirals 8 which can be rotationally operated in a controlled manner so as to cause feeding of products positioned beforehand between their spirals. The arrangement is such that a controlled rotation of a spiral 8 is able to cause dispensing of its product closest to the door 3 of the cabinet 2 by means of gravity towards an underlying chute 9 (Figure 2) which conveys the dispensed product towards a receptacle 9a which is provided in the door 4 and which the user can access manually via an opening or aperture 10 (Figure 1) which is preferably closed by a movable flap 11.

[0010] With reference to Figure 2, the bottom part of the recessed space 5 underneath the array of dispensing shelves or drawers 6 has a region 12 inside which a refrigerated module according to the present invention, denoted overall by 13, is mounted. This module 13 is arranged in a raised position with respect to the chute 9 for receiving and conveying the products dispensed by means of gravity.

[0011] With reference to Figures 3 to 5, the refrigerated module 13 comprises a container 14 in the form of a parallelepipedal box, with thermally insulated walls, having a front opening 15. This opening 15 of the container 14 has, associated with it, a closing door 16 which is rotatably articulated about an essentially horizontal axis adjacent to the upper side of said opening, by means of hinges 17.

[0012] A motor-driven opening device, denoted overall by 19 in Figures 3 to 5, is associated with the door 16.

[0013] In the example of the embodiment shown, this device comprises an electric motor 20, the shaft of which is connected to the door 16 by means of a mechanism including a rotating crank member 21 with which a first end 22a of a connecting bar 22 is eccentrically hinged, the other end 22b thereof being connected to the door 16 (Figures 3 and 4).

[0014] The end 22b of the connecting bar 22 is connected to the door 16 in a disengageable manner, in such a way that this door can be opened in a motorized manner

by means of activation of the motor 20, through a predetermined angular amplitude (for example 20°), and can be opened manually through a second and larger amplitude or angular extension (for example 160°), after disengagement of the connecting bar 22 from the door 16.

[0015] With reference to Figures 3 and 4, the end 22b of the connecting bar 22 is shaped essentially in the form of a fork with two fingers or prongs 22c and 22d defining between them a cavity inside which, when the door 16 is closed, a pin 23 fixed on the side of this door engages. The prong or finger 22c is conveniently longer than the other prong or finger 22d, for reasons which will become clear below.

[0016] The pin 23 is received with a certain amount of play inside the cavity defined between the prongs 22b and 22d of the connecting bar 22.

[0017] The arrangement is such that, when the door 16 is closed, the hinging mechanism between the end 22a of the connecting bar 22 and the crank member 21 is situated essentially in a bottom dead centre position (Figures 3 and 4). In this condition the pin 23 of the door is engaged between the prongs 22c and 22d of the connecting bar.

[0018] A first end of a gas spring 24, of the type known per se, is hinged laterally with the door 16. The other end of this gas spring 24 is hinged with a bracket 25 fixed to a side wall of the container 14 of the refrigerated module 13.

[0019] With reference to Figure 3, the arrangement is such that, when the door 16 is closed, the longitudinal axis of the gas spring 24 passes behind the axis of the hinges 17.

[0020] When the door is closed, the gas spring 24 acts against it, tending to apply a force onto it in the direction of the opening 15 of the container 14. Owing to the play present between the pin 23 and the connecting bar 22, the spring 24 is thus able to take up any play which with time could develop between the door 16 and the opening 15 following gradual compression of the seals arranged between them.

[0021] The mechanism connecting the door 16 to the container 14 of the refrigerated module 13 essentially operates in the manner described below.

[0022] When, starting from the closed door condition (Figures 3 and 4), the electric motor 20 is operated, the crank mechanism including the member 21 and the connecting bar 22 causes pivoting of the door 16 about the axis of the hinges 17, until it is brought into a predetermined angular opening position where it forms, for example, an angle of about 20° with respect to the plane of its starting position. In this condition, as will be seen below, it is possible to cause selective dispensing of a refrigerated product (ice-cream, frozen product or the like) contained inside the module 13.

[0023] During the course of this motorized opening of the door 16, the gas spring 24 is further compressed.

[0024] Once dispensing of the selected refrigerated product has been performed, the door 16 is closed again

following reactivation of the electric motor 20. The return of the door 16 into the closed position is facilitated on the one hand by the force of gravity and on the other hand by the action of the gas spring 24 which extends outwards again.

[0025] The motorized opening and closing movement of the door 16 is made possible by the fact that, when the door 4 of the product vending machine 1 is closed, there is a certain free space between the door 16 of the module 13 and the door 4 of the vending machine 1.

[0026] A recessed space 28 is defined inside the container 14 (Figure 5) and has, arranged inside it, at least one further shelf or drawer type dispenser 106, which is similar to the dispensers 6 described above, and also comprises a plurality of motor-driven spirals 108 (Figures 3 and 5). Each of these spirals is able to house and then dispense refrigerated products such as ice-cream and the like.

[0027] With reference to Figure 5, in a manner known per se, each spiral 108 can be rotationally operated by means of an associated electrically operated gear-motor unit 29 which is situated at the rear of the associated compartment.

[0028] The shelf or drawer 106 of the module 13, equipped with motor-driven spirals, can be conveniently extracted from this module so as to facilitate filling thereof with the products to be dispensed.

[0029] The container 14 of the module 13 is provided with an internal evaporator which is fixed, for example, on the underside of its top wall or incorporated inside this top wall, as shown in broken lines in Figure 5, where the coil of the evaporator is indicated by 26.

[0030] This evaporator 26 can be connected, by means of a twin flexible pipe 27 (Figures 2, 3 and 5) to a motor compressor/condenser unit, such as that denoted overall by 35 in Figure 2.

[0031] Conveniently, the evaporator 26 of the refrigerated module 13 is of the type which is ventilated, for example by means of a twin fan (not shown). This evaporator 26 has, associated with it, a temperature probe 30 (Figure 5), the signal of which can also be used for the purpose of performing periodic defrosting thereof.

[0032] Conveniently, a tray for collecting the defrosting water is associated with the evaporator 26. Respective defrosting resistors are associated with the evaporator 26 and with this tray, and said resistors are conveniently controlled in a varied manner. The defrosting resistor of the evaporator 26 is controlled so that it is automatically deactivated when the temperature of the evaporator 26 reaches a predetermined value above 0°C.

[0033] On the other hand, conveniently the duration T of the power supply current to the defrosting resistor of the drip tray is correlated to the number of times N the door 16 is opened after the last previous defrosting operation, by means of an equation of the type $T=A+NxB$, where A is a fixed value which may be varied for the first defrosting operation in relation to the subsequent defrosting operations, and B is an experimentally determined

value.

[0034] Defrosting of the evaporator 26 is controlled in a temperature-regulated manner, with a small difference in temperature between the ON condition and the OFF condition, which involves the use of compressors with a high starting torque.

[0035] Owing to the measures described above, inside the container 14 of the refrigerated module 13 it is possible to ensure a high uniformity of temperature in all points of the recessed space 28 and, over time, during the temperature-regulation transients, the defrosting operations and subsequently replenishing of the module 13 with new products. This allows the temperature of the (ice-cream) products to be kept within a restricted range (for example between -18° and -21°C), thus ensuring a high and constant level of quality of the ice-cream (optimum aroma, softness of the product and absence of "burning" sensation on consumer's tongue).

[0036] As already described above, in the case of the door 16 of the refrigerated module 13, two different opening modes are possible:

- for dispensing of a product, opening of the door 16 is limited to a value for example of about 20° , so as not to interfere with the door 4 of the product vending machine 1; and
- during filling or replenishing with products and/or for periodic cleaning of the drawer-type dispensing device 106, the door 4 of the product vending machine 1 is opened and there are no problems of interference of the door 16 with the door 4; in this instance the door 16 may be swung open manually, almost completely, upwards.

[0037] Manual opening of the door 16 is permitted owing to the possibility of disengagement of the pin 23 of this door and the end fork of the connecting bar 22. In fact, if, from the closed position, the door 16 is rotated manually upwards, after a certain angular travel the pin 23 is disengaged from the fork 22b of the connecting bar 22. The connecting bar 22 then passes into a standby position, which is partially shown in broken lines in Figure 4, owing to the action of the force of gravity, preferably assisted by the action of a low-force auxiliary recall spring 36 (Figures 3 and 4). In this standby position, the connecting bar 22 rests for example on the bracket 25 which, by means of one or more folds, "expands" with respect to the side of the container 14.

[0038] The door 16 may then be further pivoted upwards until it is nearly fully open. During this pivoting movement, the gas spring 24 initially offers resistance to the movement of the door, and after then overcoming a dead point, it extends outwards again, tending to assist the upward pivoting movement of the door 16.

[0039] Once the operations of filling with products and/or cleaning of the drawer-type dispenser 106 have been completed, the door 16 may be closed again manually. During the return pivoting movement into the closed

position, the gas spring 24 is first compressed, resisting slightly the movement of the door, and then, after passing beyond a certain position, it extends outwards again and helps facilitate closing again of the door. During the end part of the angular return movement of the door 16, its pin 23 moves again towards the side of the prong or finger 22c of the connecting bar 22 which faces the other prong or finger 22d, until it is positioned inside the cavity defined between these prongs or fingers. Once this condition has been reached, further pivoting of the door 16 into the closed position causes the return movement of the connecting bar 22 into the rest position shown in Figure 4. During manual closing of the door, a kind of automatic engagement between the door 16 and the connecting bar 22 occurs, with a view to subsequent motorized opening.

[0040] The solution described above has numerous advantages.

[0041] Firstly, it is possible to open the door 16 manually at any time, and then close it again without it being possible to forget to engage again this door with the connecting bar. Moreover, when the door has been manually opened, it is not necessary to keep it manually in the open position since this is performed by the gas spring 24.

[0042] The play envisaged between the pin 23 and the forked end 22b of the connecting bar 22 has the effect of automatically taking up the play associated with wear of the seals.

[0043] During the course of normal operation, if a product to be dispensed is accidentally trapped between the door 16 and the opening 15 of the module 13, the connecting bar 22 may automatically disengage from the pin 23 and continue its movement until the crank member 21 reaches the bottom dead centre position. The trapped product is therefore not damaged since the force exerted on it by the door 16 as a result of gravity and the recall action due to the gas spring 24 is of a generally limited nature. In this case the refrigerated module must not necessarily be taken out of service: subsequent selection of another product is likely to cause freeing of the previously trapped product and restoration of normal operating conditions.

[0044] In the example of use described above in connection with Figures 1 and 2, the refrigerated module 13 is mounted in the region 12 of the recessed space 5 of the cabinet 2 in such a way that it can be extracted through the front opening 3 of this cabinet. Moreover, conveniently, the motor compressor/condenser unit 35, which is associated with and connected to this module 13, is also mounted so as to be extractable through the front opening 3 of the cabinet 2, conveniently together with the module 13, without having to interrupt the connection pipes 27.

[0045] Owing to these characteristic features, the module 13 and the associated unit 35 may be easily mounted and removed.

[0046] In regions with a temperate climate, the use of the module 13 of the associated unit 35 is generally of a

seasonal nature, i.e. dependent upon the seasons in which ice-cream and the like are consumed. During the colder seasons, the module 13 and the associated unit 35 may be easily removed from the vending machine and additional shelf or drawer type dispensers 6 with motor-driven spirals, similar to those described above, may be installed in place of the module 13 in the region 12. These additional dispensers may therefore be used for products (for example chocolate products), the seasonal nature of which essentially complements that of ice-cream or the like.

[0047] The possibility of mounting and removing the module 13 of the associated unit 35 through the front opening 3 of the product vending machine 1 is particularly advantageous since it does not involve moving the vending machine 1 as a whole, which moving operation in certain mounting and/or operating conditions of the vending machine 1 could be not only difficult, but even impossible.

[0048] With reference in particular to Figures 3 and 6, conveniently the drawer-type dispenser 106 inside the refrigerated module 13 has a plurality of compartments 107 for products to be dispensed by means of respective motor-driven spirals 108. The compartments 107 are separated from each other by partitions 40, at least some of which each comprise an essentially vertical bottom wall portion 40a and an overlying wall portion 40b which is inclined with respect to the vertical.

[0049] As a result of this solution it is possible to increase the capacity for positioning products with a tapered general configuration, in particular cone-shaped ice-cream, which may be arranged with the tapered end or tip directed downwards. As a result of this arrangement it is possible to increase the quantity of these products substantially beyond the number which could be positioned and dispensed if the partitions 40 were normal straight vertical walls.

[0050] As can be seen in particular in Figure 6, conveniently the upper portions 40b of the two innermost partitions 40 may be inclined so as to diverge from one another in the upwards direction. Moreover, the inclined upper portions 40b of the other partitions 40 which are situated relatively further outwards may conveniently have an inclination which is less accentuated than that of the portions 40b of the innermost partitions 40.

[0051] Conveniently the refrigerated module 13 is provided internally with a device for preventing overturning of the products to be dispensed. This anti-overturning device is denoted overall by 41 in Figure 6 and in the embodiment shown comprises a horizontal flap 42 connected at the ends to an upper cross-piece 43, by means of two lateral connecting arms 44. The cross-piece 43 is mounted rotatably about a horizontal axis, between two uprights 45 which extend upwards from the outermost side walls of the drawer-type dispenser 106.

[0052] The pivoting flap 42 of the anti-overturning device 41 is intended to be struck by the top part of a product during dispensing from one of the compartments 107 of

the dispenser 106. The flap 42, and the associated arms 44, are conveniently made of a light material, for example a plastic material or aluminium, so that the resistance offered to the movement of the product during dispensing is not excessive, but is sufficiently simple to prevent it overturning and causing a possible blockage in the falling path towards the receptacle 9a.

[0053] Preferably, although not necessarily, the flap 42 on its bottom side has a shaped formation 42a (Figure 6) to which essentially vertical flanges or flaps can be fixed in an essentially rigid manner, being positioned in front of compartments 107 containing products with a relatively small height which the flap 42 alone would not be able to prevent overturning.

[0054] A strip 46 (Figure 6) with a corresponding shape and bearing, for example, advertising messages and/or decorative patterns, etc., may be applied to the front side of the flap 42. This strip 46 is visible from the outside, as can be seen in Figures 1 to 3.

[0055] Obviously, without modifying the principle of the invention, the embodiments and the constructional details may be greatly varied with respect to that described and are illustrated purely by way of a non-limiting example, without thereby departing from the scope of the invention, as defined in the accompanying claims.

Claims

1. Refrigerated module (13) comprising a container (14) provided with an internal evaporator (26) and having a front opening (15) with which a motor-driven closing door (16) is associated, said door being hinged rotatably about a substantially horizontal axis adjacent to the upper side of the front opening (15) of the module (13); the container (14) having, formed inside it, a recessed space (28) containing at least one shelf or drawer type dispenser (106) having, defined internally, a plurality of parallel compartments (107) facing said front opening (15) and able to receive refrigerated products such as ice-cream, frozen products and the like and provided with respective motor-driven devices (108) which can be operated in a controlled manner so as to cause dispensing by means of gravity of a product via said opening (15);
control means able to cause in sequence, with a view to dispensing a product contained in the refrigerated module (13), motorized opening of the door (16), selective activation of a motor-driven device (106) for dispensing the desired product and motorized closing again of said door (16);
said control means including an actuating motor (20) connected to said door (16) by means of a transmission mechanism (21, 22) which comprises a rotating crank member (21) connected to said actuating motor (20) and a connecting bar (22) on the one hand hinged with said rotating crank member (21) and on

the other hand connected to the door (16) in a disengageable manner, so that the door (16) can be opened in a motorized manner through a first predetermined angular amplitude and moreover can be opened manually through a second angular amplitude, which is greater than said first amplitude, owing to disengagement of the connecting bar (22) from the door (16); the arrangement being such that the door (16) can be automatically engaged again with the connecting bar (22) as a result of the door (16) being manually closed again.

2. Refrigerated module according to Claim 1, in which the end (22b) of the connecting bar (22) connected to the door (16) is shaped essentially in the manner of a fork able to receive with play a corresponding pin (23) mounted on the door (16), positioning means (25) being associated with the connecting bar (22) so that, when the door (16) is opened manually, the connecting bar (22) is disengaged from said pin (23) and is arranged in a standby position where it is able to receive in said forked end (22b) the pin (23) of the door (16) during the subsequent movement for closing it again.
3. Refrigerated module according to Claim 1 or 2, in which said actuating motor (20) is connected to the bottom wall of the container (14) of said refrigerated module (13).
4. Refrigerated module according to any one of the preceding claims, in which said evaporator (26) is incorporated in or arranged close to the top wall of the container (14).
5. Refrigerated module according to one of the preceding claims, in which an external refrigerating apparatus (25) is associated with said evaporator module (26) and comprises a unit including a motor compressor and a condenser.
6. Refrigerated module according to the preceding claim, in which the evaporator (26) of the refrigerated module (13) is connected to said external refrigerating circuit (35) by means of flexible pipes (27).
7. Refrigerated module according to any one of the preceding claims, in which said evaporator (26) of the refrigerated module (13) has, associated with it, control means (30) able to allow defrosting thereof in a temperature-regulated manner.
8. Refrigerated module according to Claim 7, in which said evaporator (26) has, associated with it, a tray for collecting the drip water produced during defrosting of said evaporator (26), said tray having associated defrosting means able to perform defrosting of the tray in a predetermined manner depending on

the number of times (N) the door (16) of the module (13) is opened after the previous defrosting operation.

9. Refrigerated module according to any one of the preceding claims, in which the shelf or drawer type dispenser (106) comprises a plurality of compartments (107) which are separated from each other by means of a plurality of partitions (40), at least some of which have a respective bottom wall portion (40a) which is essentially vertical and an overlying wall portion (40b) having an inclination with respect to the vertical.
10. Refrigerated module according to Claim 9, in which the respective inclined wall portions (40b) of the innermost partitions (40a) diverge from each other in the upwards direction.
11. Refrigerated module according to Claim 10, in which the inclined wall portions (40b) of the outermost partitions (40) have inclinations less pronounced than the inclinations of the inclined portions (40b) of the innermost partitions (40).
12. Refrigerated module according to any one of the preceding claims, in which the front opening (15) is provided in its vicinity with an anti-overturning device (41) including a member (42, 46) pivoting about a horizontal axis adjacent to the upper side of said front opening (15), said pivoting member extending into a raised position with respect to the motor-driven dispensing devices (108) and being able to interfere with the movement of a product being dispensed.
13. Product vending machine (1), comprising in a manner known per se a cabinet (2) having a vertical front opening (3) with which an at least partially transparent closing panel (4) is associated; the cabinet (2) having, defined internally, at least one recessed space (5) containing, mounted therein, a plurality of shelf or drawer type dispensers (6) which are vertically arranged above each other and each of which has, defined internally, a plurality of parallel compartments (7) which face said front opening (3) and which are provided with respective motor-driven devices (8) which can be operated in a controlled manner so as to cause dispensing by means of gravity of a product via said front opening (3) towards an underlying receptacle (9) which can be accessed from the outside.
14. Vending machine according to Claim 13, in which said refrigerated module (13) is interchangeable with a plurality of shelf or drawer type dispensers (6) of the vending machine (1).

FIG.1

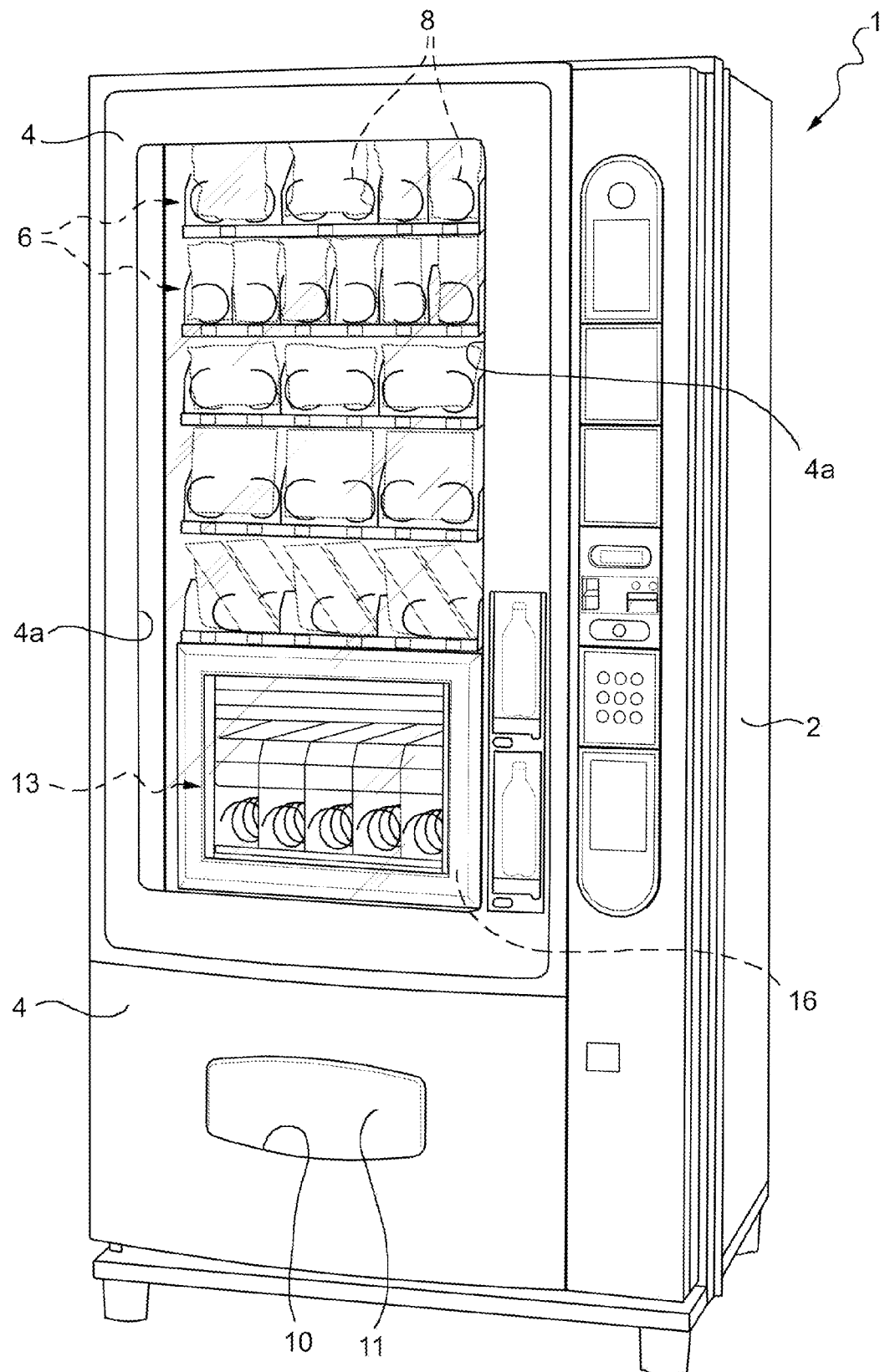
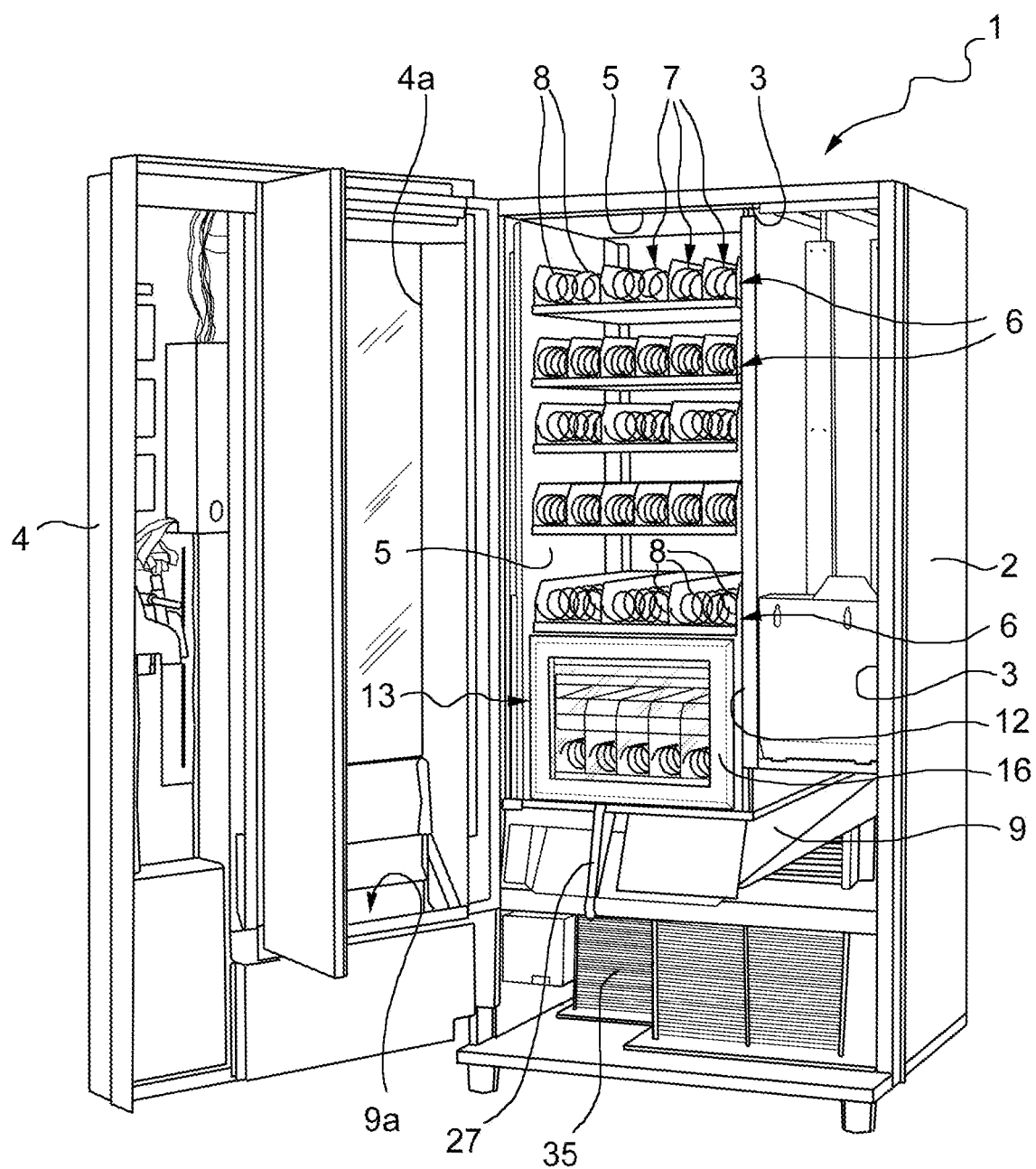


FIG.2



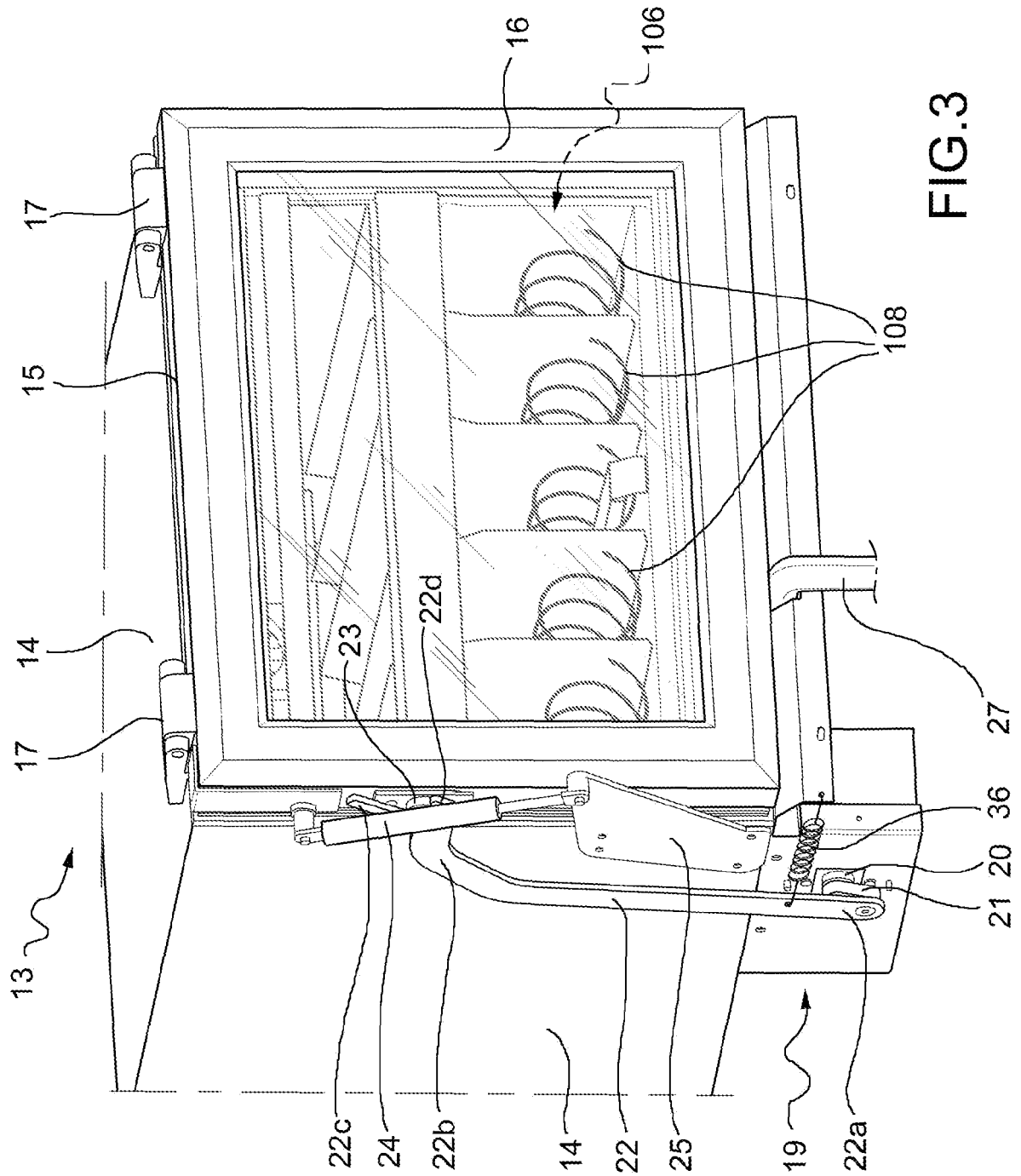


FIG.4

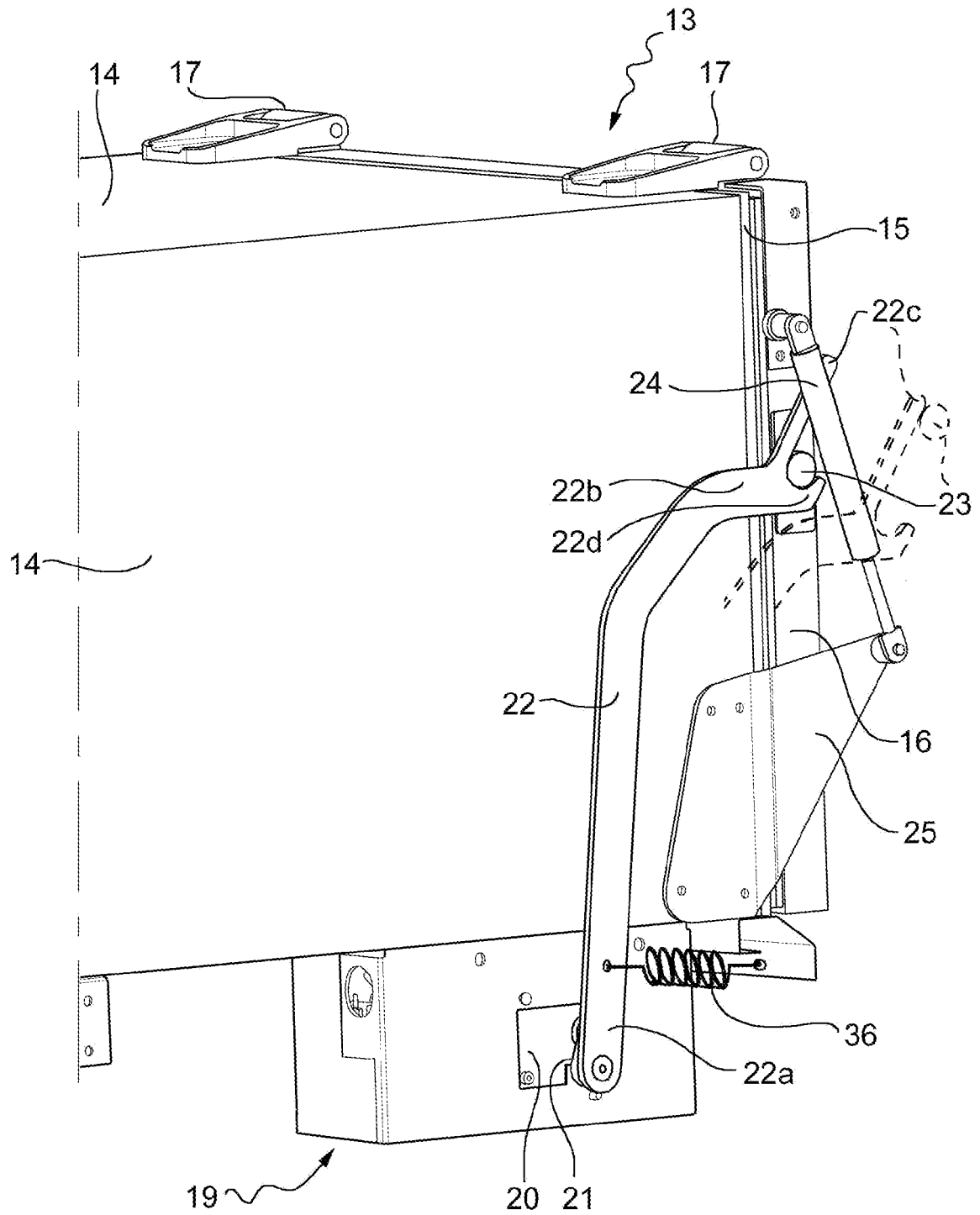


FIG.5

