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(71) Applicant: **DAINT S.R.L.**
36070 Castelgomberto (VI) (IT)

(72) Inventor: **GUGLIELMI, Roberto**
36015 Schio (Vicenza) (IT)

(74) Representative: **Manfrin, Marta et al**
Società Italiana Brevetti S.p.A.
Stradone San Fermo 21 sc. B
37121 Verona (VR) (IT)

(54) AUTOMATIC DISPENSING MACHINE OF FROZEN PRODUCTS

(57) The present disclosure relates to an automatic dispensing machine (100) of frozen products which comprises, in a supporting frame (10), a storage region (20) comprising one or more shelves (21a, 21b, 21c) configured to each contain a plurality of frozen products to be dispensed. The automatic dispensing machine (100) further comprises a dispensing region (40) accessible by a user for taking a product and cooling means (30) to cool the storage region (20), or first chamber, at a freezing temperature or deep-freezing. The automatic distributing machine (100) further comprises separation means (S), interposed between the storage region (20) and the dispensing region (40) and configured to separate the storage region (20) from the dispensing region (40) at least in an operative closing position wherein the separation means are configured to prevent direct communication between the storage region (20), or first chamber, and the dispensing region (40). The present disclosure has as further object a method for distributing frozen products by means of an automatic dispensing machine (100) of frozen products.

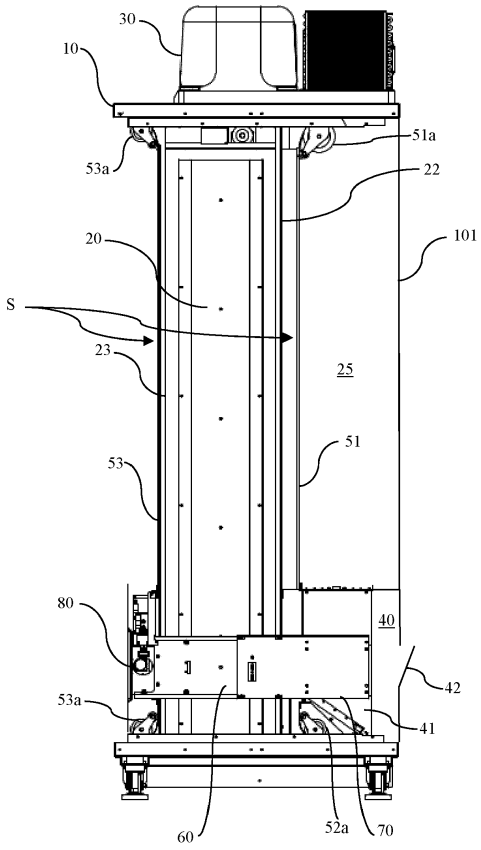

Fig. 3

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Description

[0001] The present disclosure refers in general to the field of automatic dispensing machines for the dispensation of products. More specifically, the present disclosure refers to an automatic dispensing machine of frozen products such as, for example, packaged ice cream, or consumer products in frozen status.

[0002] Automatic dispensing machines for products are very popular nowadays.

[0003] A typical example is that of automatic dispensing machines for pre-packaged products, such as snacks or crisps, which are nowadays widespread in many places, from offices to industries, from schools to hospitals, where a user can take a desired product directly from the automatic dispensing machine.

[0004] These automatic dispensing machines typically include a supporting frame, one or more shelves or ledges each configured to contain a plurality of products to be dispensed and a device for moving a product to be dispensed from one of said shelves towards an environment outside the automatic dispensing machine.

[0005] Automatic dispensing machines of frozen products such as ice cream are less common. Generally, like traditional automatic dispensing machines, frozen product dispensing machines comprise a supporting frame that defines a storage region typically comprising a plurality of shelves or ledges each configured to contain a plurality of frozen products to be dispensed. The automatic dispensing machines of frozen products further include means for cooling the storage region to a temperature close to -20° C.

[0006] At the basis of the present disclosure, there is a recognition by the inventor of the present disclosure, that the known automatic dispensing machines of frozen products have high energy consumption especially at the distributing time.

[0007] Starting from said recognition and in order to overcome the aforementioned drawback, an automatic dispensing machine and a process for dispensing a product by means of an automatic dispensing machine according to the independent claims is made available.

[0008] Secondary characteristics of the present disclosure are defined in the respective dependent claims.

[0009] At the basis of the present disclosure there is the recognition that until now the energy consumption was mainly due to the fact that, during the distribution of a frozen product, the storage region is put in direct communication with the external environment.

[0010] In other words, in the known automatic dispensing machines of frozen products there is no isolation of the storage region from the environment outside the automatic dispensing machine during the distributing phase of the product. This drawback, especially if the automatic dispensing machine is arranged in very hot places, causes a direct heat exchange between the external environment and the storage region during the distributing phase which causes a rapid increase in the temperature inside the storage region. It follows that in known dispensing machines, the means for cooling the storage region, mainly due to the high temperature difference between the external environment and the storage region, are activated very frequently. This continuous activation causes high energy consumption and consequent high maintenance costs of the automatic dispensing machine.

[0011] The automatic dispensing machine of frozen products according to the present disclosure is structured so as to prevent direct communication between the storage region and the environment outside the automatic dispensing machine, especially at the distributing phase of the product.

[0012] In particular, the automatic dispensing machine of frozen products according to the present disclosure includes, in a supporting frame, a storage region in turn comprising one or more shelves each of which is configured to contain frozen products to be dispensed. The automatic dispensing machine according to the present disclosure further comprises a dispensing region accessible by a user for picking up a product to be dispensed and cooling means for cooling the storage region to a freezing or deep-freezing temperature. The automatic dispensing machine also comprises separation means interposed between the storage region and the dispensing region configured to separate or isolate the storage region from the dispensing region at least in a first operative closing position in which these separation means prevent direct communication between the storage region and the dispensing region. In other words, the automatic dispensing machine according to the present disclosure includes a dispensing region which is interposed between the storage region and the environment outside the automatic dispensing machine and which in this operative closing position is separate from the storage region. It follows that, according to this aspect of the present disclosure, the heat exchange between the storage region and the dispensing region is minimized by the presence of the separation means. Furthermore, according to this aspect, a direct heat exchange between the storage region and an environment outside the automatic dispensing machine is prevented or greatly reduced.

[0013] The expression "direct communication" can be widely understood.

[0014] In particular, the expression "direct communication" can be understood as meaning that the two spaces/chambers or zones are separated in such a way that at least at the distributing phase of the product, a direct heat exchange between the two zones is not possible, and therefore when the product is taken from the dispensing region it cannot be accessed directly, for example with the hand, or that there is no opening, such as to allow a rise in temperature in the storage region at the distributing phase.

[0015] The lack of direct communication is obtained through a wall, a panel, a thermal sheet or any other separation structure that can be easily moved between an open position that allows the passage of the product

at the moment of distribution to a closed position that allows to keep as much as possible the cold in the storage region.

[0016] According to a further preferred aspect of the present disclosure, the separation means are arranged at least in a front facade area of the storage region in front of said one or more shelves, while the dispensing region is located in a bottom area under said front facade of the storage region. According to this aspect, moreover, the automatic dispensing machine comprises a device for moving the separation means along the front facade between an operative passage position in which products are allowed to pass from said storage region to the dispensing region and said operative closing position, and vice versa. It follows that the separation means are movable between a first position which allows the passage of products between the storage region and the dispensing region and a second position, or closing position, which isolates the storage region from the dispensing region, thus limiting the heat exchanges between these two areas and allowing savings in electricity consumption.

[0017] According to a preferred aspect of the present disclosure, the automatic dispensing machine comprises a collection board configured to collect a product to be dispensed. Specifically, this collection board is arranged in the front facade area of the storage region and is fixed to the separation means. Furthermore, the movement device is configured to move said collection board with a vertical movement between the dispensing region and one of the shelves of the storage region, and vice versa, together with the separation means.

[0018] Preferably, the collection board is located in the bottom area, under the front facade of the storage region when the separation means are in the aforementioned operative closing position so that the separation means completely close the facade area. In other words, the closed position of the separation means corresponds to the dispensing position and to the rest position of the collection board.

[0019] It follows that the thermal exchanges between the storage region and the dispensing region are limited and occur only when the collection board is located at one of the shelves of the storage region, and, in such conditions, the separation means are in the operative passage position.

[0020] According to a further preferred aspect, a front area of the automatic dispensing machine placed in front of the front facade area of the storage region defines an intermediate chamber of the automatic dispensing machine in which the collection board is movable between the dispensing region and one of the shelves of the storage region. In this way, the storage region exchanges heat with said intermediate chamber, avoiding high heat changes that occur when a product is dispensed between the storage region and the environment outside the automatic dispensing machine in known products.

[0021] According to a preferred aspect of the present disclosure, at least in the operative closing position, the separation means are arranged at each of said one or more shelves, i.e. in front of and facing said one or more shelves so as to close the storage region. Advantageously therefore, each shelf of the storage region is singularly or individually separated, or divided, from the separation means in the operative closing position, from the dispensing region. In this way it is possible to obtain a better thermal insulation of the storage region.

[0022] In practice, said one or more shelves are arranged one above the other along a main development direction of the automatic dispensing machine and define said storage region. Preferably, this main development direction of the automatic dispensing machine is a vertical or height direction. Preferably, said one or more shelves are arranged one above the other for the entire height of the storage region.

[0023] Preferably also, the separation means, in the operative closing position, develop along said main development direction of the automatic dispensing machine, preferably over the entire height of the storage region. Even more preferably, the separation means in the operative closing position develop along said main development direction of the automatic dispensing machine and are arranged at least in a front facade area of the storage region. Consequently, according to a preferred embodiment, the separation means in the operative closing position are configured to separate, at least in a front facade area of the storage region, each shelf of said one or more shelves from the dispensing region, preferably along said main development direction of the automatic dispensing machine.

[0024] According to another preferred aspect of the present disclosure, the separation means comprise a first separator element configured as a flexible panel in front of said front facade area of the storage region. This first separator element is connected, for example in a top area, on one side to a first roller associated with the supporting frame and on the other to the collection board. The first separator element can then be rolled up and unrolled in this first roller according to the movement of the collection board.

[0025] Preferably, the separation means comprise a second separator element configured as a flexible panel in front of said front facade area of the storage region, wherein said second separator element is connected on one side, in a bottom area, to a second roller associated with the supporting frame and on the other hand to the collection board so as to be able to be rolled up, and unrolled from, respectively, the second roller according to the movement of the collection board. Preferably, the collection board is interposed, or in an intermediate position, between the first separator element and the second separator element. In this way a gap or opening is defined between the first and the second separator element at the collection board. According to these aspects, the overall configuration is such that a movement of the collection board towards one of the shelves of the storage

region or towards the dispensing region corresponds to a rolling up of one between the first separator element and the second separator element on the respective first roller or second roller and a corresponding unrolling of the other between said first separator element and second separator element from the respective first roller or second roller, and the passage area remains in the zone of the collection board. The separator elements therefore extend in front of the shelves. It follows that the separation means are movable elements which allow to isolate the storage region when they are in the operative closing position, at the same time allowing the passage of a product to be dispensed from that storage region to the dispensing region.

[0026] According to a further preferred aspect of the present disclosure, the automatic dispensing machine of frozen products further comprises a pusher member associated with a rear facade of the storage region, or arranged symmetrically to the collection board with respect to the supporting frame. This pusher member is configured to push or move a product to be dispensed from one of the shelves in the storage region to the collection board. In addition, the movement device is further configured to move the pusher member from or to one of the shelves together with the collection board.

[0027] Preferably, further separation means are arranged in the rear facade area of the storage region, and comprise a third separator element configured as a flexible panel in front of said rear facade area of the storage region, or first chamber, and connected on one side to a third roller associated with the supporting frame and on the other side with the pusher member, to be rolled up and unrolled by the third roller respectively as a function of the movement of said pusher member. The separation means further comprise a fourth separator element configured as a flexible panel in front of said rear facade area of the storage region and connected on one side to a fourth roller associated with the supporting frame and on the other side to the pusher member, for being rolled up, and unrolled from, respectively, the fourth roller according to the movement of said pusher member.

[0028] The overall configuration is such that a movement of said pusher member from or to one of said one or more shelves corresponds to a rolling up of one between said third separator element and fourth separator element on the respective third or fourth roller and a corresponding unrolling of the other between said third separator element and fourth separator element from the respective third roller or fourth roller. The separator elements therefore extend behind the shelves. It follows that the separation means are movable elements which allow to isolate the storage region when they are in the operative closing position, at the same time allowing to move a product to be dispensed from one of the shelves of the storage region to the collection board.

[0029] It is to be understood that if there are other systems for collecting and pushing the product, the number of separator elements may vary.

[0030] According to a preferred aspect, the first separator element and/or the second separator element and/or the third separator element and/or the fourth separator element are thermal sheets.

[0031] According to a further aspect of the present disclosure, a method is made available for dispensing frozen products through an automatic dispensing machine of frozen products. This method involves a step of providing an automatic dispensing machine comprising in a supporting frame a storage region which includes one or more shelves configured to contain a plurality of frozen products to be dispensed. The automatic dispensing machine also includes a dispensing region accessible by a user for picking up a product and cooling means to cool the storage region to a freezing or freezing temperature. The method includes the further step of moving a product to be dispensed from one of the shelves in the storage region to the dispensing region and subsequently to an environment outside the automatic dispensing machine. Furthermore, the method provides for the closure of the storage region when the product to be dispensed is moved from the storage region to the dispensing region before it can be dispensed. Advantageously therefore, a product to be dispensed is moved from the storage region to the dispensing region and, before being dispensed, the storage region is closed, or isolated with respect to the dispensing region, avoiding direct thermal exchanges between the storage region and the environment outside the automating dispensing machine.

[0032] According to an aspect of the present disclosure, the closure of the storage region is carried out by means of separation means which are interposed between the storage region and the dispensing region and which are configured to separate or isolate the storage region with respect to the dispensing region at least in an operative closing position in which the separation means are configured to prevent direct communication between these two regions.

[0033] According to one aspect, the step of moving a product from one of the shelves to the dispensing region comprises a step of moving with a vertical movement a collection board between the dispensing region and one of said one or more shelves and a step of moving a product to be dispensed from one of the shelves in or on the collection board. The collection board is also fixed to the separation means and is moved by the movement device together with the separation means. In other words, the collection board is moved together with the separation means from the dispensing region to the shelf where the product to be dispensed is arranged. The latter is then moved from said shelf to the collection board.

[0034] In practice, moving the collection board moves the separation means between the passage position and the closing position.

[0035] According to a further preferred aspect, the separation means comprise a first and a second separator element configured as a flexible panel connected respectively on one side to a first and a second roller associated

with the supporting frame and on the other side to the collection board.

[0036] The collection board is therefore interposed between the first separator element and the second separator. A movement of said collection or surface board from or to one of said one or more shelves causes a rolling up of one between said first separator element and said second separator element on the respective first roller or second roller and a corresponding unrolling of the other between said first separator element and second separator element from the respective first roller or from the second roller respectively.

[0037] According to a preferred aspect of the present disclosure, the step of moving a product to be dispensed from one of the shelves in the collection board, or collection surface, is carried out by means of a pusher member configured to push or move a product to be dispensed from a shelf to the collection board. According to this aspect, the movement device is configured to move this pusher member towards one of the shelves together with the collection board. Advantageously therefore, the collection board and the pusher member are moved by a single movement device.

[0038] According to a further preferred aspect, the separation means comprise a third and a fourth separator element configured as a flexible panel and connected respectively on one side to a third and a fourth roller associated with the supporting frame and on the other side with the pusher member. The pusher member is therefore interposed between the third separator element and the fourth separator element. A movement of said pusher member from or to one of said one or more shelves causes a rolling up of one between said third separator element and said fourth separator element on the respective third roller or fourth roller and a corresponding unrolling of the other between said third separator element and fourth separator element from the respective third or fourth roller. In other words, the separation means are movable between an operative closing position and an operative passage position. It follows that the separation means allow the storage region to be isolated from the dispensing region in an operative closing position, when the collection board is in a rest position or in a dispensing position, while allowing the passage of products when these separation means are brought into an operative passage position.

[0039] Further advantages, characteristics and methods of use of the object of the present disclosure will become clear from the following detailed description of its embodiments, presented by way of non-limiting example.

[0040] It is however evident that each embodiment of the object of the present disclosure can have one or more of the advantages listed above; in any case it is not required that each embodiment present all the listed advantages simultaneously.

[0041] Reference will be made to the figures of the attached drawings, wherein:

- Figure 1 is a perspective view of an automatic dispensing machine according to the present disclosure;
Figure 2 represents a front view of an automatic dispensing machine according to the present disclosure without the covering walls;
Figure 3 represents a side view of an automatic dispensing machine according to the present disclosure without the covering walls;
- Figure 4 shows a perspective view of an automatic dispensing machine according to the present disclosure without the covering walls;
- Figure 5 shows a further perspective view of an automatic dispensing machine according to the present disclosure without the covering walls.

[0042] With reference to the attached figures, an embodiment of an automatic dispensing machine for frozen products is indicated with the reference number 100.

[0043] The automatic dispensing machine 100 of frozen products includes covering walls 110, or containment walls visible in Figure 1. Such containment walls or covering walls 110 have been removed from figures 2-5 to allow appreciating the inside of the automatic dispensing machine. 100. Inside said covering walls 110, as visible from Figures 2 to 5, the automatic dispensing machine 100 comprises in a supporting frame 10, a storage region 20, or first chamber, configured to contain the frozen products to be dispensed. More specifically, the storage region 20, or first chamber, comprises one or more shelves 21a, 21b, 21c, each configured to contain a plurality of frozen products to be dispensed. In other words, the latter are arranged in said one or more shelves 21a, 21b, 21c inside the storage region 20, or first chamber. Preferably, said one or more shelves 21a, 21b, 21c are arranged one above the other along a vertical, or height, direction of development of the automatic dispensing machine 100, preferably along the entire height of the storage region 20.

[0044] It follows, as can be seen from the figures, that the automatic dispensing machine 100 according to the present disclosure is normally arranged with a prevalent vertical elevation or extension with a plurality of shelves 21a, 21b, 21c arranged one above the other. It follows that, in the condition of use, an anterior zone, a posterior zone and lateral zones are identified. The anterior or front area is an area that is located in front of a user who, for example, watch and looks for products in shelves 21a, 21b, 21c. In the context of the present disclosure, any spatial reference, such as front, anterior, rear, side, below, above or similar spatial reference must be understood for clarity, but not in a limitative way, with reference to the aforementioned vertical arrangement of use of the automatic dispensing machine 100.

[0045] According to an aspect of the present disclosure, the storage region 20, or first chamber, comprises a front facade 22, configured to be visible, during use, by a user intending to purchase a product contained in

the automatic dispensing machine 100 and a rear facade 23, opposite to said front facade 22 and configured to be hidden or substantially hidden from a user. The front facade 22 is located in front of said one or more shelves 21a, 21b, 21c.

[0046] Preferably furthermore, the automatic dispensing machine 100 comprises a front wall 101 configured to allow the view of the products arranged inside the automatic dispensing machine 100 and wherein the front facade 22 of the storage region 20 faces the front wall 101. In other words, the front facade 22 is the face of the storage region 20 in front of all shelves 21a, 21b, 21c. It follows that inside the automatic dispensing machine 100 there is a front area arranged in front of the front facade area 22 of the storage region 20, which defines an intermediate chamber 25 of the automatic dispensing machine 100, as visible in Figure 3.

[0047] In order to preserve the frozen products to be dispensed, the automatic dispensing machine 100 also comprises cooling means 30 for cooling the storage region 20, or first chamber. In particular, these cooling means 30 are configured to cool the storage region 20, or first chamber, to a freezing or deep freezing temperature. For example, the cooling means are configured to cool the storage region 20 and maintain a temperature of between -15°C and -30°C, preferably around -20°C within this storage region 20, or first chamber.

[0048] The automatic dispensing machine 100 of frozen products further comprises a dispensing region 40, accessible by a user to pick up a product to be dispensed, for example through a door 42. In other words, the dispensing region 40 is a region or chamber inside the automatic dispensing machine 100 which is accessible, for example through a door, from an environment outside the automatic dispensing machine 100. It follows that, according to an aspect of the present disclosure, the dispensing region 40 is interposed between the storage region 20 and an environment outside the automatic dispensing machine 100 so that a product to be dispensed passes from the storage region 20 to the environment outside the automatic dispensing machine 100 passing through the dispensing region 40. Preferably, the dispensing region 40 is interposed between the front facade 22 of the storage region 20 and the environment outside the automatic dispensing machine 100.

[0049] Preferably furthermore, the dispensing region 40 of the automatic dispensing machine 100 is located in a bottom area 41 located under the front facade 22 of the storage region 20, or first chamber. In other words, the dispensing region is preferably located under the intermediate chamber 25 of the automatic dispensing machine 100.

[0050] Preferably, the dispensing region 40 is also cooled and/or the intermediate chamber 25 of the automatic dispensing machine 100 is/are cooled. For example, the dispensing region 40, and/or the intermediate chamber 25, can be cooled by said cooling means 30 or by a further cooling system. Preferably, the dispensing region 40 is cooled to a substantially intermediate temperature between that of the storage region 20 and the external environment. Even more preferably, the dispensing region 40 is cooled, and maintained at a temperature of between 0°C and 10°C, preferably at 4°C.

[0051] According to an aspect of the present disclosure, the automatic dispensing machine 100 comprises separation means S interposed between the storage region 20, or first chamber, and the dispensing region 40. According to an aspect of the present disclosure, the separation means S are arranged at least in an area of the front facade 22 of the storage region 20, or first chamber.

[0052] Specifically, these separation means S are configured to separate, or isolate, the storage region 20, or first chamber, with respect to the dispensing region 40 at least in an operative closing position. Advantageously therefore, in this operative closing position, the storage region 20 is separated, or divided, from the dispensing region 40 by the separation means S. It follows that in this operative closing position, the heat exchange between the storage region 20, or first chamber, and the dispensing region 40 is minimal.

[0053] According to a preferred aspect of the present disclosure, said separation means S, in said operative closing, are arranged in front of and facing each of said one or more shelves 21a, 21b, 21c. In practice, the separation means S in the operative closing position separate each shelf of said one or more shelves 21a, 21b, 21c from the dispensing region 40 of the automatic dispensing machine 100. In other words, the separation means S in the operative closing position are arranged along said front facade 22 of the storage region 20 and are configured to separate each shelf of said one or more shelves 21a, 21b, 21c from the dispensing region 40. In other words, the separation means S, in the operative closing position, develop along said main development direction of the automatic dispensing machine 100, preferably over the entire height of the storage region 20.

[0054] Preferably, the operative closing position corresponds to a rest state, or inactive, of the automatic dispensing machine 100, or to a situation wherein no product placed in the automatic dispensing machine 100 is in the dispensing phase, or to a situation wherein a product to be dispensing is in the dispensing region waiting for a user to take it from said dispensing region 40. Advantageously therefore, in this rest or non-active state, the presence of the separation means S minimizes the heat exchange between the storage region 20 and the dispensing region 40. The closing position corresponds to a resting position or a dispensing position of the collection board, so that when the product is dispensed to the user, the storage region 20 is closed.

[0055] The automatic dispensing machine 100 further comprises a movement device 60 of the separation means S. Preferably, the movement device 60 is configured to move the separation means S at least along the front face 22 of the storage region 20 between the operative closing position and an operative passage position

to allow a passage of products from the storage region 20, or first chamber, to the dispensing region 40, and vice versa.

[0056] According to an embodiment of the present disclosure, the automatic dispensing machine 100 of frozen products comprises a collection board 70, or collection surface. Preferably, the collection board 70, or collection surface, is configured to collect a product to be dispensed. Specifically, the collection board 70, or collection surface, is configured to collect a product to be dispensed from one of said one or more shelves 21a, 21b, 21c of the storage region 20, or first chamber. Preferably, moreover, the collection board 70, or collection surface, is arranged in the front facade area 22 of the storage region 20, or first chamber. Even more preferably, the collection board 70, or collection surface, is placed between the front facade 22 of the storage region 20 and the front wall 101 of the automating dispensing machine 100, in said intermediate chamber.

[0057] According to a preferred aspect, the collection board 70, or collection surface is fixed to the separation means S and is furthermore movable vertically together with said separation means S. In particular, the movement device 60 is configured to move the collection board 70, or collection surface, with a vertical movement between the dispensing region 40, a position corresponding to the operative closing position of the separation means S, and one of said one or more shelves 21a, 21b, 21c, together with the separation means S. The position of the collection board 70 at one of said one or more shelves corresponds to the operative passage position of the separation means S, in which a passage of a product to be dispensed from the storage region 20 to the collecting board 70 is allowed. Preferably, the movement device 60 is configured to move the collection board 70, or collection surface, into the intermediate chamber 25 of the automatic dispensing machine 100, between the dispensing region 40 and the shelf of said one or more shelves 21a, 21b, 21c containing a product to be dispensed. More specifically, in the operative closing position the collection board 70, or collection surface, is located in the bottom area 41, under the front facade 22 of the storage region 20, or first chamber. It follows that, in said operative closing position, the separation means S completely close the front facade area 22 of the storage region 20, or first chamber.

[0058] According to a preferred embodiment, the separation means S comprise a first separator element 51 configured as a flexible panel in front of the front facade area 22 of the storage region 20. Specifically, said first separator element 51 is connected to a first associated roller 51a to the supporting frame 10 and on the other to the collection board 70, or collection surface. Preferably, the first roller 51a is arranged in an upper region of the supporting frame 10, at the front face 22 of the storage region 20. In this way, the first separator element 51 can be rolled up on and unrolled respectively from the first roller 51a as a function of the movement of the collection board 70 or collection surface. More particularly, in the operative closing position the collection board 70 is arranged in the bottom area 41, under the front facade 22 of the storage region 20 and the first separator element 51 is completely unrolled with respect to the first roller 51a. In this configuration, the first separator element 51 completely closes the front facade 22 of the storage region 20, separating or isolating the storage region 20, or first chamber, from the dispensing region 40 and also from the intermediate chamber 25 of the automatic dispensing machine 100.

[0059] According to an aspect of the present disclosure, the separation means S comprise a second separator element 52 configured as a flexible panel in front of the front facade area 22 of the storage region 20. According to this aspect, the second separator element 52 is connected on one side to a second roller 52a associated with the supporting frame 10 and on the other side with the collection board 70. Preferably, the second roller 52a is arranged in a lower region of the supporting frame 10, at the front facade 22 of the storage region 20 In this way, the second separator element 52 can be rolled on, and unrolled from, respectively, the second roller 52a as a function of the movement of the collection board 70, or collection surface.

[0060] The configuration of the first and second separator elements 51, 52 is therefore such that a movement of the collection board 70 towards one of the shelves 21a, 21b, 21c of the storage region 20 or towards the dispensing region 40 corresponds to a rolling up of one between said first separator element 51 and second separator element 52 on the respective first roller 51a or second roller 52a, and a corresponding unrolling of the other between said first separator element 51 and second separator element 52 from the respective first roller 51a or second roller 52a. For example, in the case of a movement of the collection board 70 from the bottom area 41, under the front facade 22 of the storage region 20 towards one of the shelves 21a, 21b, 21c, there is a rolling up of the first separator element 51 on the first roller 51a and a corresponding unrolling of the second separator element 52 from the second roller 52a.

[0061] In other words, when the collection board 70 is placed in the bottom area 41, the first separator element 51 is completely unrolled in the area of the front facade 22 of the storage region 20, or first chamber, while the second separator element 52 is completely rolled up on the second roller 52a. In the opposite case, i.e. in the case of a movement of the collection board 70 from one of the shelves 21a, 21b, 21c towards the dispensing region 40, there is an unrolling of the first separator element 51 and a rolling up of the second separator element 52.

[0062] Preferably moreover, the collection board 70, or collection surface, is in an intermediate or interposed position between the first separator element 51 and the second separator element 52. More in detail, a gap or opening is defined between the first separator element 51 and the second separator element 52 at the collection

board 70, or collection surface. Specifically, when the collection board 70 is at one of the shelves of the storage region 20, the separation means S are in said operative passage position. In this way, during the dispensing of a product, it is therefore possible to move the product to be dispensed from one of said one or more shelves 21a, 21b, 21c of the storage region 20, or first chamber, to the collection board 70, or collection surface, through the front facade area 22 of the storage region 20 and through said gap or opening defined between said first and second separator elements 51, 52.

[0063] According to a further aspect, the automatic dispensing machine 100 comprises a pusher member 80 associated with the rear facade 23 of the storage region 20, or first chamber. In other words, the pusher member 80 is arranged symmetrically to the collection board 70, or collection surface, with respect to the supporting frame 10. Furthermore, the pusher member 80 is movable vertically along said rear facade 23 of the storage region 20 , or first chamber, together with the collection board 70. In other words, the movement device is configured to move the pusher member 80 from or to one of said one or more shelves 21a, 21b, 21c together with the collection board 70, or collection surface. In particular, the pusher member 80 is configured to push or move a product to be dispensed from one of said one or more shelves 21a, 21b, 21c to the collection board 70, or collection surface.

[0064] According to a further aspect of the present disclosure, the separation means S are further arranged in the rear facade area 23 of the storage region 20, or first chamber. Preferably, the separation means S comprise a third separator element 53 configured as a flexible panel behind the rear facade area 23 of the storage region 20. The third separator element 53 is preferably connected on one side to a third roller 53a associated with the supporting frame 10 and on the other hand to the pusher member 80. Preferably, the third roller 53a is placed in an upper region of the supporting frame 10, at the rear facade 23 of the storage region 20, or first chamber. In other words, the third separator element 53 is arranged symmetrically with respect to the first roller 51 with respect to the supporting frame 10, or with respect to the storage region 20.

[0065] Similarly to the first separator element 51, the third separator element can be rolled up on, and unrolled from, respectively, the third roller 53a as a function of the movement of the pusher member 80, which moves together with the collection board 70 or collection surface. More particularly, in the operative closing position the collection plane 70 is placed in the bottom area 41, under the front facade 22 of the storage region 20, while the pusher member 80 is arranged under the rear facade 23 of the storage region 20. In this position, the third separator element 53 is completely unrolled with respect to the third roller 53a. In this configuration, the third separator element 53 completely closes the rear facade 23 of the storage region 20.

[0066] According to a further aspect of the present disclosure, the separation means S comprise a fourth separator element 54 configured as a flexible panel behind the rear facade area 23 of the storage region 20. According to this aspect, the fourth separator element 54 is connected on one side to a fourth roller 54a associated with the supporting frame 10, and on the other side with the pusher member 80. Preferably, the fourth roller 54a is placed in a lower region of the supporting frame 10, at the rear facade 22 of the storage region 20. In other words, the fourth separator element 54 is arranged symmetrically with respect to the second separator element 52 with respect to the supporting frame 10, or with respect to the storage region 20. In this way, the fourth separator element 54 can be rolled up on, and unrolled from respectively, the fourth roller 54a as a function of the movement of the pusher member 80, which moves with the collection board 70, or collection surface.

[0067] The configuration of the third and fourth separator elements 53, 54 is therefore such that a movement of the pusher member 80 which corresponds to a movement of the collection board 70 towards one of the shelves 21a, 21b, 21c of the storage region 20 or towards the dispensing region 40 corresponds to a rolling up of one between said third separator element 53 and fourth separator element 54 on the respective third roller 53a or fourth roller 54a and a corresponding unrolling of the other between said third separator element 53 and fourth separator element 54 from the respective third roller 53a or fourth roller 54a. For example, in the case of a movement of the collection board 70 from the bottom area 41, under the front facade 22 of the storage region 20 towards one of the shelves 21a, 21b, 21c, a vertical movement of the pusher member 80 occurs in the rear facade 23 and a rolling up of the third separator element 53 on the third roller 53a and a corresponding unrolling of the fourth separator element 54 from the fourth roller 54a. In other words, when the collection board 70 is placed in the bottom area 41, the pusher member 80 is placed in a bottom area of said rear facade 23 of the storage region 20, or first chamber. In this position, the third separator element 53 is completely unrolled in the area of the rear facade 23 of the storage region 20, or first chamber, while the fourth separator element 54 is completely rolled up on the fourth roller 54a. In the opposite case, i.e. in the case of a movement of the collection board 70 from one of the shelves 21a, 21b, 21c towards the dispensing region 40, there is an unrolling of the third separator element 53 and a rolling up of the fourth separator element 54.

[0068] It follows that a rolling up of the first separator element 51 and of the third separator element 53 take place synchronously to each other and synchronously respectively to an unrolling of the second separator element 52 and of the fourth separator element 54, and similarly an unrolling of the first separator element 51 and the third separator element 53 occur synchronously to each other and synchronously respectively to a rolling up of the second separator element 52 and the fourth

separator element 54.

[0069] According to a preferred aspect of the present disclosure, each separator element 51, 52, 53, 54 is a thermal sheet. Preferably, this thermal sheet is transparent. In other words, according to a preferred embodiment, the first separator element 51 and/or the second separator element 52 are preferably transparent thermal sheets. In this way, the products arranged within the storage region 20 are visible from an environment outside the automatic dispensing machine 100. Preferably, the third separator element 53 and the fourth separator element 54 are also thermal sheets, preferably transparent.

[0070] The present disclosure has as further object a method for dispensing frozen products by means of an automatic dispensing machine 100 of frozen products.

[0071] According to an aspect of the present disclosure, the method subject of the present disclosure comprises a step of providing an automatic dispensing machine 100 of frozen products which includes, in a supporting frame 10, a storage region 20, or first chamber. This storage region 20 is configured to contain one or more frozen products to be dispensed. For this purpose, the storage region 20 comprises one or more shelves 21a, 21b, 21c, each configured to contain a plurality of frozen products to be dispensed. For storing frozen products, the automatic dispensing machine 100 preferably comprises cooling means 30 for cooling the storage region 20, or first chamber, at a freezing or sub-freezing temperature. Furthermore, the automatic dispensing machine 100 comprises a dispensing region 40 accessible by a user for a withdrawal of a product to be dispensed.

[0072] The method object of the present disclosure further comprises a step of moving a product to be dispensed from one of said one or more shelves 21a, 21b, 21c of the storage region 20, or first chamber, to the dispensing region 40 and, subsequently, to an environment outside the automatic dispensing machine 100.

[0073] In particular, the storage region 20, or first chamber, is closed when a product to be dispensed is moved from said storage region 20 to the dispensing region 40, before that product to be dispensed can be dispensed. In other words, the storage region 20 is closed before a user withdraws the product to be dispensed from the dispensing region 40.

[0074] According to an aspect of the present disclosure, this closure of the storage region 20, or first chamber, is carried out by means of separation means S. Preferably, these separation means S are interposed between the storage region 20, or first chamber, and the dispensing region 40. More particularly, the separation means S are configured to separate, or isolate, the storage region 20 with respect to the dispensing region 40 in an operative closing position. In this operative closing position, which corresponds to a rest position of the automatic dispensing machine 100, the separation means S are configured to prevent direct communication between the storage region 20 and the dispensing region 40. Preferably the separation means are moved in front of the shelves in a vertical direction, and leave a passage area open only to dispense the product.

[0075] Preferably, the step of moving a product to be dispensed in the storage region 40 comprises a step of moving with a vertical movement a collection board 70, or collection surface, between the dispensing region 40 and one of said one or more shelves 21a , 21b, 21c. In particular, the collection board 70 is fixed to the separation means S and is moved, together with these separation means S, by a movement device 60. Preferably, as described above, the dispensing region 40 is located in a bottom area 41, under a front facade area 22 of the storage region 20, or first chamber.

[0076] Preferably the separation means S comprise a first and a second separator element 51, 52 configured as a flexible panel and connected respectively on one side to a first and a second roller 51a, 52a, both associated with the supporting frame 10, and by the other side to the collection board 70, or collection surface. In this way, a movement of the collection board 70 from or to one of said one or more shelves from said dispensing region 40 causes a rolling up of one between said first separator element and said second separator element 51, 52 on the respective first or second roller 51a, 52a and a corresponding unrolling of the other between the first and second separator element 51, 52 from the respective first or second roller 51a, 52a.

[0077] Preferably, the step of moving a product to be dispensed in the storage region 40 comprises the further step of moving a product to be dispensed from one of said one or more shelves 21a, 21b, 21c to the collection board 70, or collection surface. According to an aspect of the present disclosure, this movement from one of the shelves 21a, 21b, 21c to the collection board 70 is carried out by a pusher member 80 configured to push or move a product to be dispensed from one of the shelves 21a, 21b, 21c on the collection board 70, or collection surface. According to the present embodiment, the pusher member 80 is arranged symmetrically to the collection board 70 with respect to the supporting frame 10, or with respect to the storage region 20. In other words, the pusher member 80 is associated with a rear wall 23 of the storage region 20 and is movable vertically with respect to said rear wall 23. Furthermore, the movement device is configured to move the pusher member 80 from or to one of said one or more shelves 21a, 21b, 21c together with the collection board 70.

[0078] According to a further preferred aspect, the separation means S comprise a third and a fourth separator element 53, 54, configured as a flexible panel and connected respectively on one side to a third and to a fourth roller 53a, 54a and on the other side to the pusher member 80.

[0079] In particular, a movement of the pusher member 80 from or to one of said one or more shelves 21a, 21b, 21c causes a rolling up of one between said third separator element 53 and said fourth separator element 54 on the respective third roller 53a or fourth roller 54a and

a corresponding unrolling of the other between said third separator element 53 and fourth separator element 54 from the respective third roller 53a or fourth roller 54a.

[0080] The overall operation of the automatic dispensing machine 100 of frozen products is briefly described below.

[0081] The automatic dispensing machine 100 is initially in a rest condition, or inactive. In this rest condition, the collection board 70 is located in the bottom area 41 located under the front facade 22 of the storage region 20, while the pusher member 80 is located under the rear facade 23 of the storage region 20. In this condition, moreover , the separation means S are in an operative closing position. In this operative closing position the first separator element 51 is completely unrolled with respect to the first roller 51a so as to completely close the front facade area 22 of the storage region 20. Similarly, the third separator element 23 is completely unrolled with respect to the third roller 53a so as to completely close the rear facade area 23 of the storage region. In this configuration, the heat exchange between the storage region 20 and the dispensing region 40 is minimized by the presence of the separation means S. The second and fourth separator elements 52, 54 are instead completely rolled up on the respective rollers.

[0082] Once a user has selected a frozen product to be dispensed, the movement device 60 moves, with a vertical movement upwards the collection board 70, together with the pusher member 80, up to the shelf containing the product to be dispensed. The upward displacement of the collection board 70 and of the pusher member 80 causes the first and third separator elements 51, 53 to roll up on the respective rollers and a corresponding unrolling of the second and third separator elements 52, 54 from the respective rollers .

[0083] Once the collection board 70 is at the shelf containing the frozen product to be dispensed, the separation means S are in the operative passage position and the pusher member 80 pushes said product to be dispensed from said shelf to the collection board 70. Specifically, the product to be dispensed passes through the gap or opening defined between the first separator element 51 and the second separator element 52 at the collection board 70.

[0084] Subsequently, the movement device 60 moves, with a vertical downward movement, the collection board 70, together with the pusher member 80, until the collection board 70 reaches the dispensing region 40, located in the bottom area 41. This downward movement of the collection board 70 and the pusher member 80 causes the second and fourth separator elements 52, 54 to roll up on the respective rollers and a corresponding unrolling of the first and third separator elements 51, 53 from the respective rollers.

[0085] Once the collection board 70 is in the dispensing region 40, the separation means S are again in said operative closing position.

[0086] At this point, a user can withdraw the product from the dispensing region 40.

[0087] The overall configuration of the automatic dispensing machine 100 is therefore such that direct heat exchanges between the storage region 20 and the environment outside the automatic dispensing machine 100 are avoided.

[0088] The object of the present disclosure has been so far described with reference to its embodiments. It is to be understood that other embodiments may exist which pertain to the same inventive core, all of which are within the scope of protection of the claims set out below.

Claims

1. Automatic dispensing machine (100) of frozen products comprising in a supporting frame (10) a storage region (20), or first chamber, which comprises one or more shelves (21a, 21b, 21c) each configured to contain a plurality of frozen products to be dispensed, wherein the automatic dispensing machine (100) further comprises a dispensing region (40) accessible by a user for picking up a product, cooling means (30) for cooling said storage region (20), or first chamber, at a freezing or deep-freezing temperature and separation means (S), interposed between said storage region (20), or first chamber, and said dispensing region (40), wherein said separation means (S) are configured to separate or to isolate said storage region (20), or first chamber, with respect to the dispensing region (40) at least in an operative closing position, and wherein in said operative closing position the separation means (S) are configured to prevent direct communication between said storage region (20), or first chamber, and said dispensing region (40).

2. Automatic dispensing machine (100) according to the preceding claim, wherein the separation means (S) are arranged at least in an area of a front facade (22) of the storage region (20), or first chamber, in front of said one or more shelves, wherein the dispensing region (40) is located in a bottom area (41) under the front facade (22) of the storage region (20), or first chamber, under said one or more shelves, and wherein the automatic dispensing machine (100) comprises a movement device (60) of the separation means (S) along the front facade (22) between the operative closing position and an operative passage position to allow a passage of products from the storage region (20), or first chamber, to the dispensing region (40).

3. Automatic dispensing machine (100) according to the preceding claim, further comprising a collection board (70), or collection surface, configured to collect a product to be dispensed, wherein the collection board (70), or collection surface, is arranged in the

front facade (22) area of the storage region (20), or first chamber, wherein the collection board (70), or collection surface, is fixed to the separation means (S) and wherein said movement device (60) is configured to move said collection board (70), or collection surface, with a vertical movement, between the dispensing region (40) and one of said one or more shelves (21a, 21b, 21c), together with the separation means (S).

4. Automatic dispensing machine (100) according to the preceding claim, wherein in said operative closing position, the collection board (70), or collection surface, is located in the bottom area (41), under the front facade (22) of the storage region (20), or first chamber, and said separation means (S) close said front facade (22) area.

5. Automatic dispensing machine (100) according to claim 3 or 4, wherein a front area in front of the front facade (22) of the storage region (20), or first chamber, defines an intermediate chamber (25) of the automatic dispensing machine (100), and wherein the movement device (60) is configured to move the collection board (70), or collection surface, in said intermediate chamber (25) between the dispensing region (40) and the shelf of said one or several shelves (21a, 21b, 21c) containing a product to be dispensed.

6. Automatic dispensing machine (100) according to anyone of the preceding claims in combination with claim 3, wherein said separation means (S) comprise a first separator element (51) configured as a flexible panel in front of said front facade (22) area of the storage region (20), or first chamber, and connected on one side to a first roller (51a) associated with the supporting frame (10) and on the other side to the collection board (70), or collection surface, to be rolled on, and unrolled respectively from, said first roller (51a) and consequently extended in front of said one or more shelves, according to the movement of said collection board (70), or collection surface.

7. Automatic dispensing machine (100) according to the preceding claim, wherein said separation means (S) comprise a second separator element (52) configured as a panel and flexible in front of said front facade (22) area of the storage region (20), or first chamber, and connected on one side to a second roller (52a) associated with the supporting frame (10) and on the other side to the collection board (70), or collection surface, to be rolled on, and unrolled respectively from, said second roller (52a) and consequently extended in front of said one or more shelves, according to the movement of said collection board (70), or collection surface, wherein said collection board (70), or collection surface, is in an intermediate position between said first separator element (51) and said second separator element (52), and wherein a gap or opening is defined between said first separator element (51) and said second separator element (52) at the collection board (70), or collection surface.

8. Automatic dispensing machine (100) according to the preceding claim, wherein to a movement of said collection board (70), or collection surface, from or towards one of said one or more shelves (21a, 21b, 21c) or towards said dispensing region (40) corresponds a rolling up of one between said first separator element (51) and second separator element (52) on the first roller (51a) or second roller (52a) respectively and a corresponding unrolling of the other between said first separator element (51) and second separator element (52) from the first roller (51a) or from the second roller (52a) respectively.

9. Automatic dispensing machine (100) according to anyone of the claims from 2 to 8, comprising a pusher member (80) associated with a rear facade (23) of the storage region (20), or first chamber, or symmetrically arranged with the collection board (70), or collection surface, with respect to the supporting frame (10), said pusher member (80) being configured to push or to move a product to be dispensed from one of said one or more shelves (21a, 21b, 21c) towards the collection board (70), or collection surface, wherein the movement device (60) is further configured to move said pusher member (80) towards one of said one or more shelves (21a, 21b, 21c) together with said collection board (70), or collection surface, along said rear facade (23) of the storage region (20), or first chamber.

10. Automatic dispensing machine (100) according to the preceding claim, wherein further separation means (S) are arranged in the area of the rear facade (23) of the storage region (20), or first chamber, behind said one or more shelves, and comprise a third separator element (53) configured as a flexible panel behind said rear facade (23) area of the storage region (20), or first chamber, and connected on one side to a third roller (53a) associated with the supporting frame (10) and on the other side to the pusher member (80), to be rolled on, and unrolled respectively from, said third roller (53a) according to the movement of said pusher member (80), wherein said separation means (S) further comprise a fourth separator element (54) configured as a flexible panel behind said rear facade (23) area of the storage region (20), or first chamber, and connected on one side to a fourth roller (54a) associated with the supporting frame (10) and on the other side to the pusher member (80), to be rolled on, and unrolled respectively from, said fourth roller (54a) according to the

movement of said pusher member (80), wherein a movement of said pusher member (80) from or towards one of said one or more shelves (21a, 21b, 21c) or towards the dispensing region (40) corresponds to a rolling up of one between said third separator element (53) and the fourth separator element (54) on the third (53a) or fourth roller (54a) respectively and a corresponding unrolling of the other between said third separator element (53) and fourth separator element (54) from the third roller (53a) or fourth roller (54a) respectively.

11. Automatic dispensing machine (100) according to anyone of the preceding claims, wherein each separation means (S) is a thermal sheet.

12. Automatic dispensing machine (100) according anyone of the preceding claims, wherein in said operative closing position said separation means (S) are arranged in front of, and facing, said one or more shelves (21a, 21b, 21c).

13. Method for distributing frozen products by means of an automatic dispensing machine (100) of frozen products, wherein the method comprises the steps of:

- providing an automatic dispensing machine (100) comprising in a supporting frame (10) a storage region (20), or first chamber, which comprises one or more shelves (21a, 21b, 21c) each configured to contain a plurality of frozen products to be dispensed, the automatic dispensing machine (100) comprising a dispensing region (40) accessible by a user for picking up a product, cooling means (30) for cooling said storage region (20), or first chamber, to a freezing or deep-freezing temperature;
- moving a product to be dispensed from one of said one or more shelves (21a, 21b, 21c) in said storage region (20), or first chamber, to said dispensing region and subsequently to an environment external to the automatic dispensing machine (100)

wherein said storage region (20), or first chamber, is closed when said product to be dispensed is moved from said storage region (20), or first chamber, into said dispensing region (40) before it can be dispensed.

14. Method according to the preceding claim, wherein the closure of the storage region (20), or first chamber, is carried out through separation means (S) interposed between said storage region (20), or first chamber, and said dispensing region (40), wherein said separation means (S) are configured to separate or to isolate said storage region (20), or first chamber, with respect to the dispensing region at least in an operative closing position, and wherein in said operative closing position the separation means (S) are configured to prevent a direct communication between said storage region (20), or first chamber, and said dispensing region (40).

15. Method according to claim 13 or 14, wherein the step of moving a product to be dispensed from one of said one or more shelves (21a, 21b, 21c) in said storage region (20), or first chamber, to said dispensing region (40) comprises a step of moving with a vertical movement a collection board (70), or collection surface, between the dispensing region (40) and one of said one or more shelves (21a, 21b, 21c) together with the separation means (S), and a step of moving a product to be dispensed from one of said one or more shelves (21a, 21b, 21c) into the collecting board (70), or collection surface, said collection board (70), or collection surface, being fixed to the separation means (S) and moved by the movement device (60) together with said separation means (S).

16. Method according to the preceding claim, wherein the separation means (S) comprise a first separator element and a second separator element (51, 52) configured as a flexible panel, wherein the first separator element is connected respectively on one side to a first roller (51a) associated with the supporting frame (10) and on the other side to the collection board (70) and the second separator element (52) is connected respectively on one side to a second roller (52a) associated with the supporting frame (10) and on the other side to the collection board (70), wherein a movement of said collection board (70) towards one of said one or more shelves (21a, 21b, 21c) or towards the dispensing region (40) causes a rolling up of one between said first separator element (51) and said second separator element (52) on the first roller (51a) or second roller (52a) respectively and a corresponding unrolling of the other between said first separator element (51) and second separator element (52) from the first roller (51a) or second roller (52a) respectively.

17. Method according to claim 15 or 16, wherein the step of moving said product to be dispensed from one of said one or more shelves (21a, 21b, 21c) into the collection board (70), or collection surface, is carried out by means of a pusher member (80) configured to push or move a product to be dispensed from one of said one or more shelves (21a, 21b, 21c) to the collection board (70), or collection surface, wherein the movement device (60) is further configured to move said pusher member (80) towards one of said one or more shelves (21a, 21b, 21c) together with said collection board (70), or collection surface.

18. Method according to the preceding claim, wherein

the separation means (S) comprise a third separator element and a fourth separator element (53, 54) configured as a flexible panel, wherein the third roller is connected respectively on one side to a third roller associated with the supporting frame (10) and on the other side to the pusher member (80) and the fourth separator element is connected respectively on one side to a fourth roller (54a) associated with the supporting frame (10) and on the other side to the pusher member (80), and wherein a movement of said pusher member (80), towards one of said one or more shelves (21a, 21b, 21c) causes a rolling up of one of said third separator element (53) and said fourth separator element (54) on the third roller (53a) or fourth roller (54a) respectively and a corresponding unrolling of the other between said third separator element (53) and fourth separator element (54) from the third roller (53a) or fourth roller (54a) respectively.

19. Automatic dispensing machine according to anyone of the claims from 1 to 12 or method according to anyone of the claims from 13 to 18, wherein the automatic dispensing machine includes a collection board (70), and wherein the separation means close the storage region on a front facade in front of said one or more shelves (21a, 21b, 21c) when the collection board (70) is in a dispensing position and/or in a resting position.

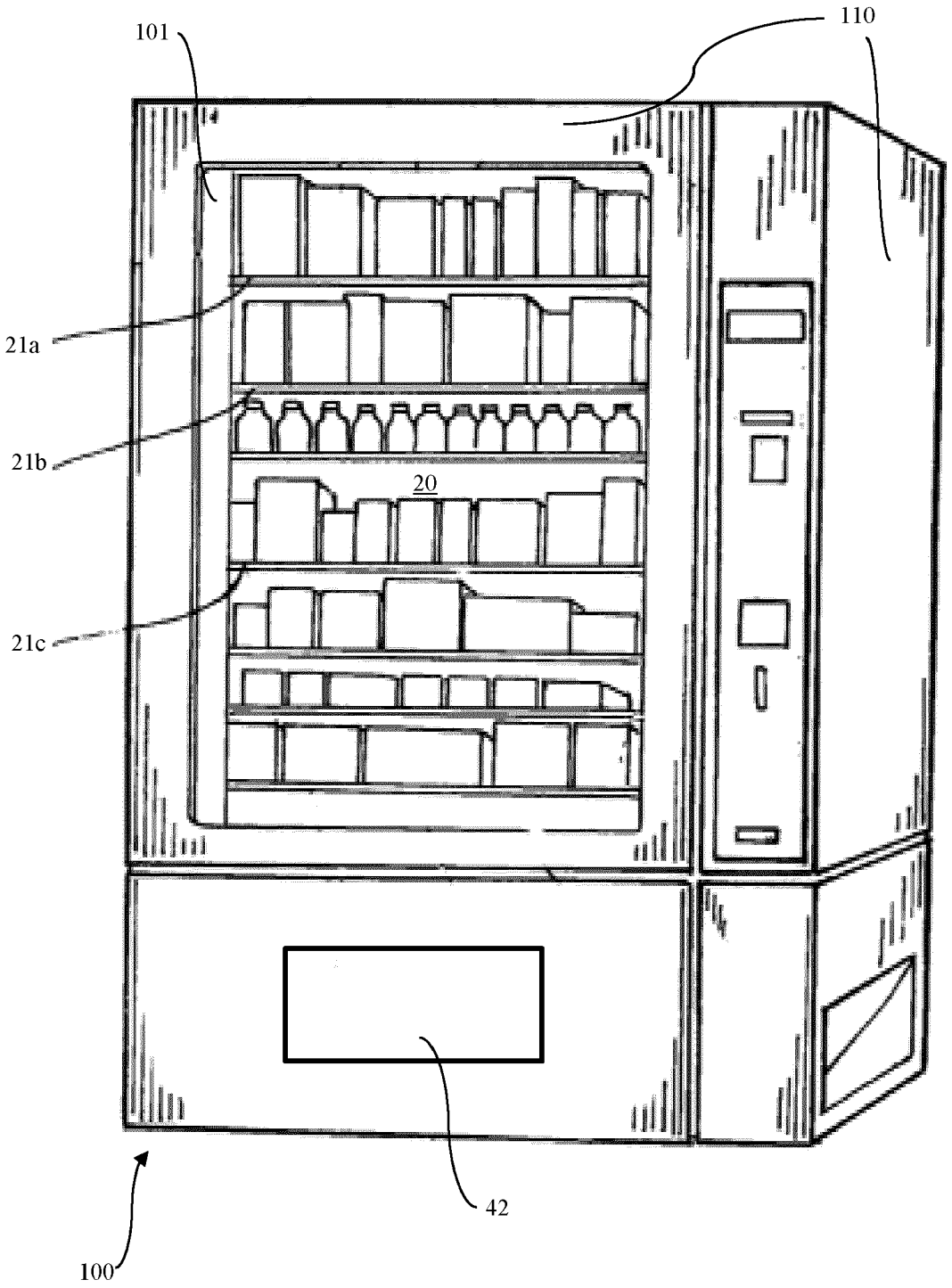

Fig. 1

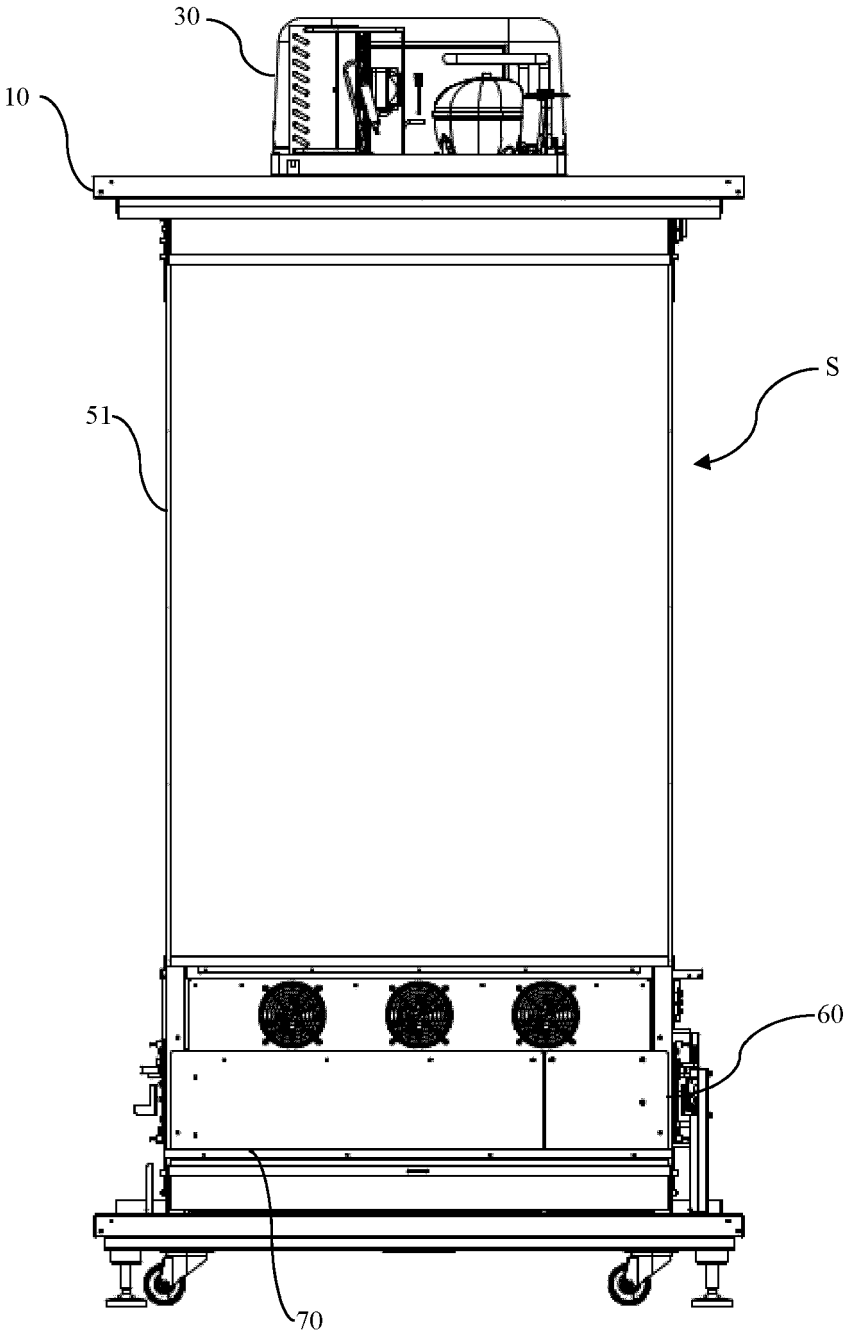

Fig. 2

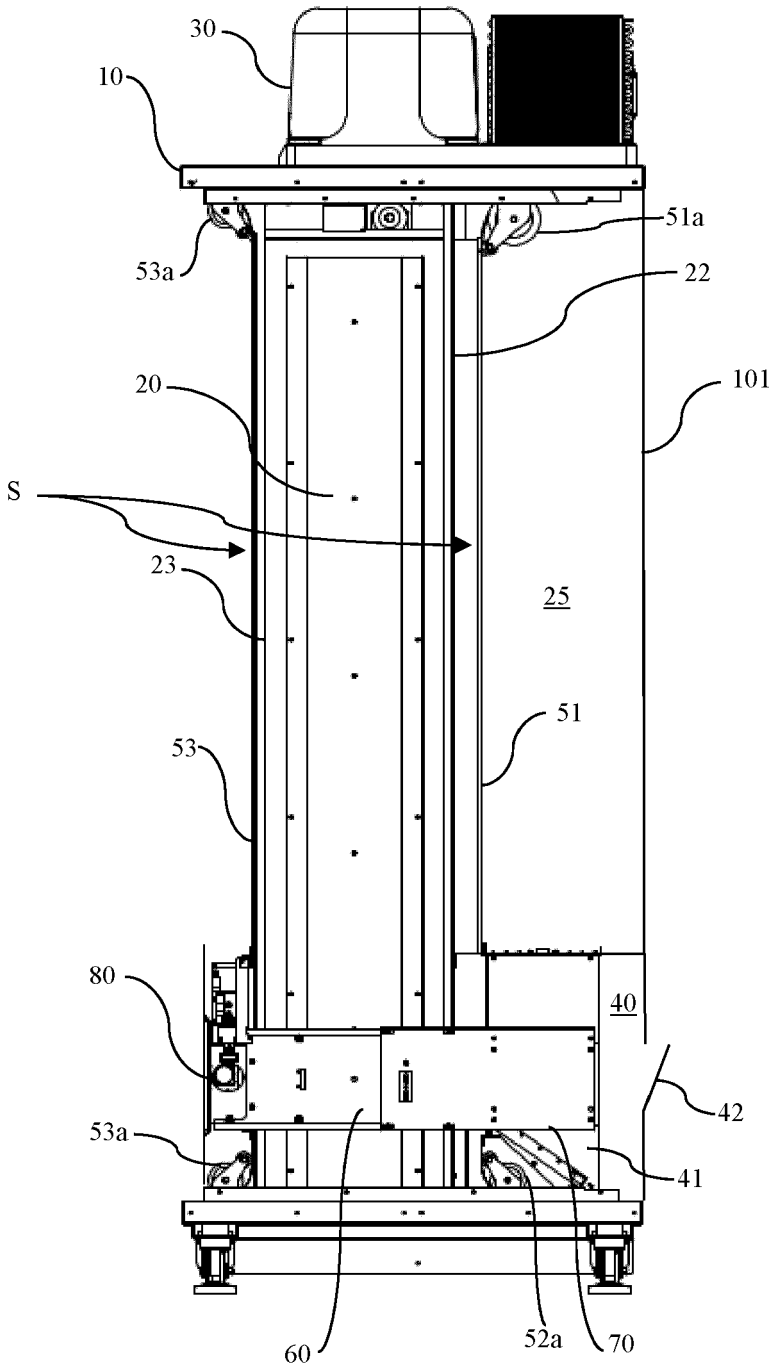

Fig. 3

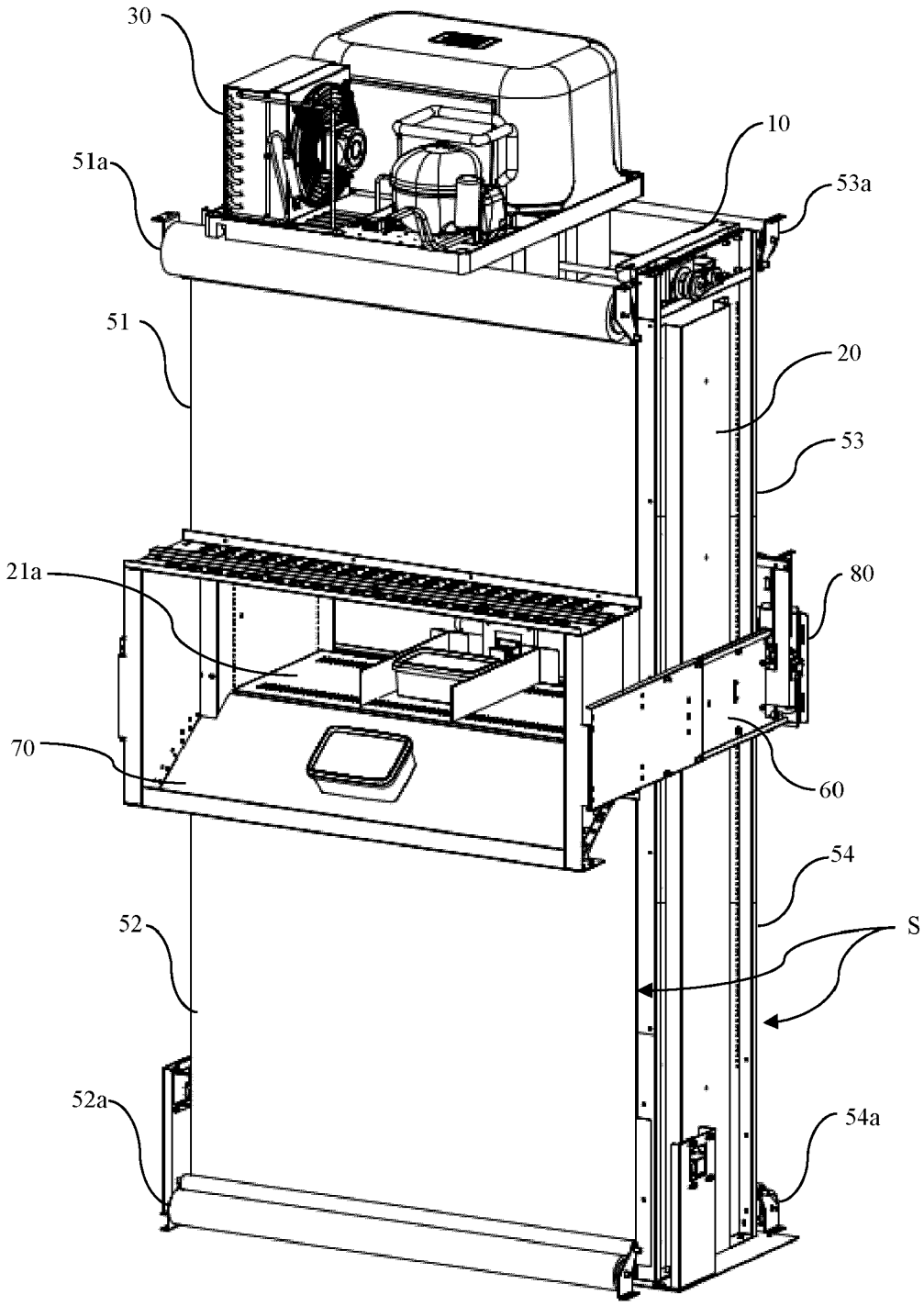

Fig. 4

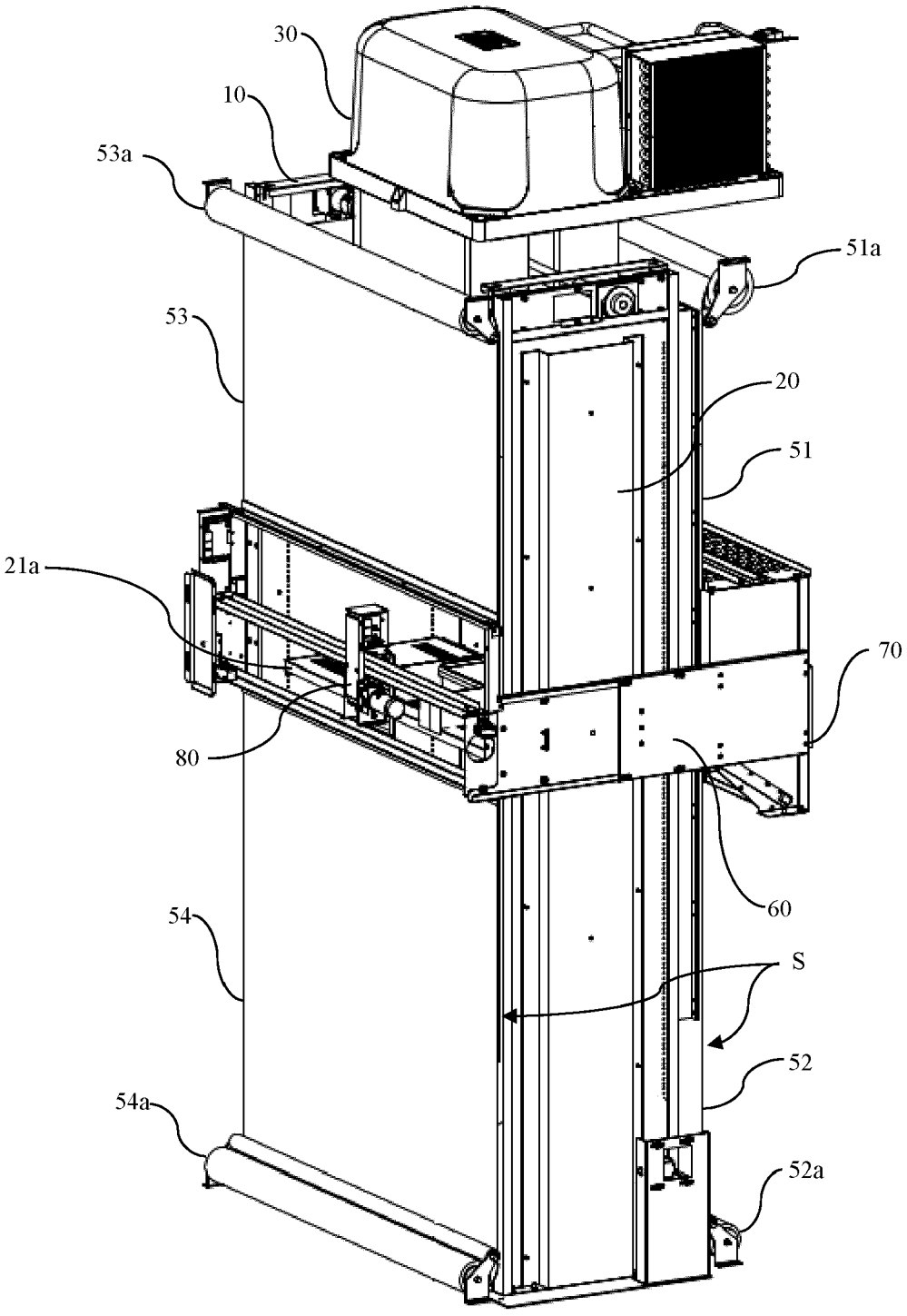

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 20 17 8295

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G07F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 August 2020	Pomocka, Marek

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