AN APPARATUS FOR DISPENSING FOOD PRODUCTS, ESPECIALLY FROZEN OR DEEP-FROZEN PRODUCTS

The invention relates to an apparatus for automatically dispensing food products, especially frozen food products and preferably deep-frozen products. The apparatus comprises a frame (12) that mounts means (14) for storing and dispensing the food products (15) and means (16), in the form of microwave ovens, for heating the food products. The means for storing and dispensing the food products (15) comprise a cold storage cell (18) which contains the food products and whose interior is refrigerated by suitable cooling means (20).
Description

An apparatus for dispensing food products, especially frozen or deep-frozen products

Technical field

The present invention relates to an apparatus for automatically dispensing food products, especially refrigerated food products and preferably frozen and/or deep-frozen products.

Background art

Dispensing machines for refrigerated products (ice creams) are known. These comprise a mounting framework forming a compartment that houses the refrigerated products and the means for cooling the compartment.

In a dispensing machine of this kind, a user can select an ice cream product on a keyboard or directly on a display panel after inserting a coin, card or other token. The selected product is dispensed through an appropriate opening from where the user can remove it.

The ice creams are small and can be stored in large numbers in a relatively limited space. The cold storage cell that contains the products is therefore small and the cooling means can be mounted next to the storage cell itself.

Moreover, products of this kind (ice creams) are purchased at irregular intervals and do not have peaks of demand at any particular time of day. This means that vending machine businesses can employ a small number of people to check and replenish a large number of machines without allowing any of the machines to run short of product. Personnel can visit vending machine sites at different times and do not need to be present at all the sites in their network simultaneously. Thus, product storage capacity has not been felt as a problem in connection with prior art apparatus of this kind.

The same cannot be said for the catering sector, where, as the present inventor has perceived, apparatus capable of
automatically dispensing a selection of food products (for example ready-made hot meals) to be consumed at predetermined times of day (for example during the lunch break) would be very advantageous and would satisfactorily meet catering requirements without necessitating personnel especially employed in the preparation of meals, according to current practice.

In a large number of workplaces, internal catering or canteen services are not feasible owing to the limited number of people who would make use of such services.

Such workplaces, however, may not be located near a public catering service or a restaurant or, in many circumstances, it may not be possible for personnel to leave their place of work to have a meal at a catering point outside.

From another viewpoint, it is also felt that users should be able to choose from a wide selection of food products. Indeed, a machine that does not dispense a wide variety of products would not be greatly appreciated by consumers and would be ignored and left unused within a very short space of time.

Ready-made meals (consisting, for example, of pasta preparations) which are refrigerated or deep-frozen are also known. These are packaged and sold in the dishes out of which they can be eaten. For the purposes of automatic dispensing, however, food products of this kind have the disadvantage of being large and bulky: much larger, in fact, than the ice creams mentioned above.

Providing ready-made food products of this kind in a sufficiently wide range to suit the tastes of many different consumers without losing appeal and in sufficiently large quantities to be able to meet demand, which is concentrated at well-defined times of day (for example, during the lunch break) thus constitutes a major problem which has not, up to now, been tackled or solved.

Moreover, the aforementioned ice cream dispensing machines are designed to provide products that must be eaten cold and cannot, under any circumstances, be used for foods which must be eaten hot.
Summary of the invention

The aim of the present invention is, therefore, to overcome the above mentioned disadvantages.

Accordingly, the invention provides an apparatus for dispensing food products, particularly refrigerated food products and preferably frozen and/or deep-frozen products. The apparatus is characterised in that it comprises a frame that mounts means for storing and dispensing the food products and means for heating the food products, the means for storing and dispensing the food products comprising a cell for the storage of the food products and refrigerating means housed inside the storage cell.

In this way, it is possible to provide hot meals without employing personnel for the preparation of the meals.

According to one advantageous aspect of it, the mounting frame of the apparatus forms a compartment for housing the heating means, the refrigerating means being located behind the heating means.

Thus, the apparatus can contain a large number of products but occupies very little floor space.

Therefore, a considerable amount of space is available inside the apparatus not only for the active compartments, from which the product is dispensed, but also for an additional storage compartment. This means that the storage space provided by the apparatus is optimised in relation to its footprint.

According to another aspect of the invention, the product storing and dispensing means of the apparatus comprise a plurality of compartments each accommodating a row of food products and means for feeding the products towards the end where the products are transferred from or allowed to drop out of the respective compartment. More specifically, the means for supporting the products within the compartments are constituted by the feed means themselves, which consist of a vertical, rotating spiral element where, between one coil and another, there is a space or gap designed to accommodate a food product.

Thanks to the vertical configuration of the product support and feed means, it is possible to keep a large number of products while occupying very little floor space and maintaining a
relatively simple structure.

Other advantageous aspects of the apparatus according to the present invention are set out in the claims.

**Brief description of the drawings**

The technical characteristics and advantageous aspects of the invention are apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate preferred embodiments of the invention provided merely by way of example without restricting the scope of the inventive concept, and in which:

- Figure 1 is a schematic perspective view of a first preferred embodiment of the apparatus according to the present invention;

- Figure 2 is a schematic front view, with the front door open, showing the lower inside section of the first preferred embodiment;

- Figure 3 is a schematic side view, with a cutaway to illustrate the lower inside section of the first preferred embodiment, with the front door open;

- Figure 4 is a horizontal cross section, schematically illustrating, in the first preferred embodiment of the apparatus, a top view of a row of compartments supported on a respective shelf;

- Figure 5 is schematic front view of the row of compartments shown in Figure 4;

- Figure 6 is a schematic side view of a compartment of the first preferred embodiment;

- Figure 7 is a schematic front view, with the front door open, showing the lower inside section of a second preferred embodiment of the apparatus according to the invention;

- Figure 8 is a schematic side view, with a cutaway of the lower portion to illustrate the lower inside section and the front product compartments in the second preferred embodiment of the apparatus according to the invention;

- Figure 9 is a schematic top view of the surface on which the products are fed towards the dispensing area in the second
preferred embodiment of the apparatus according to the invention;
- Figure 10 is a schematic front view of a third preferred embodiment of the apparatus according to the present invention;
- Figure 11 is a schematic front view of a fourth preferred embodiment of the apparatus according to the present invention.

Description of the preferred embodiments of the invention

Figures 1 to 6 illustrate a first preferred embodiment 10 of the apparatus for dispensing food products 15, especially refrigerated, frozen and/or deep-frozen food products 15.

The apparatus advantageously comprises a frame 12 that mounts means 14 for storing and dispensing the food products 15 and means 16 for heating the food products.

The means 14 for storing and dispensing the food products 15 in turn comprise a storage cell 18, which contains the food products, and means 20 for cooling the storage cell 18.

More specifically, as clearly shown in Figure 4, the storage cell 18 comprises an outer casing 22 and an inner casing 23, insulated by interposed insulating material 24 of suitable thickness.

Inside the cell 18 there are cooling surfaces, which are not illustrated in the accompanying drawings, whose cooling effect is accomplished by a refrigerant fluid (for example, the fluid known as "R507" in the field, or traditional Freon), which contacts the surfaces through a circuit that also extends outside the cell (even the refrigerant circuit is not shown in the accompanying drawings). The refrigerant circuit leads out of customary cooling means comprising a power-driven compressor, a tank for the refrigerant fluid, a condenser and an evaporator. In the drawings, the cooling means in the cell are generically indicated in their entirety by the numeral 20.

The heating means preferably consist of one or more microwave ovens 16. However, other food heating means might also be used.

The dispensing apparatus according to the invention comprises appropriate food product payment and selection means. As shown in the drawings, the payment means may comprise a slot 26
into which a coin, banknote, card or other token may be inserted.

The payment and selection means may be of well known type and are not therefore described in detail so as not to unduly complicate the present description.

The payment means are positioned on the front 11a of the apparatus, at a large selection area 11'b where the available food products are named or illustrated and where there is a button 30 or similar means for selecting the desired food product. The apparatus may also include means for indicating whether a particular product is available or has run out. These may consist of a LED which is green when the related product is available or red when the product is finished.

The products, once selected, are fed towards the dispensing area, as described in more detail below, and can be collected from a dispensing door 32 forming part of an opening giving access to the interior of the apparatus.

The numeral 27 in Figure 1 denotes the exterior of a coin box or a token box that can be used in the dispensing apparatus according to the invention.

In the first preferred embodiment, the frame 12 presents an outer covering, that is essentially prismatic in shape, and defines on the inside of it a compartment 12a for housing the heating means 16, which can be accessed from the outside through corresponding openings 16' made at the top 11c of the front face of the outer covering. Looking in more detail, with reference to Figure 3, the microwave ovens 16 protrude from the front of the top front face 11c of the covering of the apparatus.

Advantageously, the means 20 for cooling the product storage cell 18 are located above the storage cell and behind the heating means 16. Thus, the apparatus can contain a large number of products in the storage cell 18 but occupies a minimum of floor space.

Since the heating means 16 are mounted above the food product dispensing area 24, the food product may be safely taken out of the respective oven without the risk of its being contaminated by other users who are, at that moment, selecting other products.
This arrangement is especially preferred. The advantage of the arrangement is that the apparatus extends upwards, providing more storage space for the food products while at the same time limiting the footprint of the apparatus.

Other arrangements, for example, with the heating means positioned laterally with respect to the product dispensing area, should be considered possible without departing from the scope of the invention. For hygiene, it is preferable for the openings giving access to the heating means once the product has been heated to be positioned well clear of the floor on which the apparatus rests and on which other users tread.

As illustrated, the means for heating the food products are accessible from the front 11a of the apparatus, that is to say, the same side as that from which the food products are taken out of the dispensing apparatus through the door 32 for dispensing the deep-frozen products or the like.

The frame 12 further comprises a large front door 12a giving access to the product storage cell 18 for the purposes of replenishing the apparatus with products.

Advantageously, the upper compartment 12a that houses the heating means 16 presents, behind the heating means 16 themselves, a large area 12' for the passage of cooling air which may be used both by the ovens 16 and by the cooling means 20.

The apparatus comprises a plurality of ovens 16 for heating the food products. More specifically, the first preferred embodiment comprises microwave ovens whose doors open from the front and which can therefore be easily accessed by users.

The ovens are arranged in horizontal rows, each consisting of a pair of ovens on two or more levels. More specifically, in the first preferred embodiment, the ovens 16 are mounted on three levels, at different heights, one above the other.

The cold storage cell 18 comprises a plurality of compartments 36, each accommodating a row 38 of food products 15 and means 40 for feeding the products towards the end 42 where the products are transferred from or allowed to drop out of the respective compartment 36.

There are also means for supporting the products 15 within
the compartments 36 and means 46 for guiding and laterally retaining the products 15.

The feed means 40 consist of a rotating spiral element where, between one coil 40' and another, there is a space or longitudinal gap designed to accommodate a respective food product 15. By rotating the feed spiral by a predetermined amount, corresponding to a full rotation of the spiral mounting shaft 40a, the products 15 are fed forward and the one at the front is allowed to drop off the shelf 44 that supports the products.

In particular, to stop the rotating feed motion of the product feed means, each spiral has at the back of it a microswitch actuated by a cam attached to the rotating means and whose profile is designed to actuate the microswitch in order to stop the feed means after the spiral has performed one full turn to release a corresponding food product.

As it drops, the product is guided by suitable surfaces into an appropriate compartment at the dispensing door. The surfaces that guide the product as it drops are not illustrated in detail in the accompanying drawings, whilst the receiving compartment might consist, for example, of a cavity made in a dispensing door 32 shaped substantially like a wedge with an open top, as can be inferred from Figure 3, which is of well known type and therefore not described in further detail.

As shown in Figure 6, at the front end of each longitudinal row 38, on the respective pull-out shelf 44 there is a thin spring plate which tends to be pushed upwards by its own elastic action and which, under the weight of a product, trips a switch S2. The elements S1 and S2 constitute sensor means which, when the respective compartment is empty, issue a signal that indicates this condition. This is because, when the products in a row run out, the switch S2 is not tripped.

The apparatus further comprises a plurality of shelves 44 mounted at different heights and each designed to support a plurality of compartments 36 for the products. More specifically, there are three shelves 44, each supporting four compartments or rows of products.

The aforementioned guide means consist of first and second
vertical side walls 46, 46 supported by the shelves 44. The
intermediate side walls 46 separate adjacent compartments 36 from
each other.

As shown in more detail in Figure 3, the shelf 44 can be
pulled out of the cell 18, since it is slidably supported on
runners 49 and wheels 48, the latter being mounted on the sides of
the cell 18. In this way, the compartments can be easily filled
with products from above.

The spiral feed means 40 extend along a longitudinal axis
L40 and have coils 40' each of which, as it turns, engages a
corner portion of a product in such a way as to feed it forward
longitudinally.

As illustrated, in this first preferred embodiment, the
compartments extend horizontally.

The cold storage cell 18 also includes a spare storage
compartment R.

Advantageously, the spare product storage compartment R is
situated under the lowermost shelf 44.

As illustrated, the product storage cell 18 is essentially
in the shape of a prism with a quadrangular base. While the above
is an especially preferred shape, it will be understood that the
frame of the apparatus may have other shapes without departing
from the scope of the invention.

The apparatus according to the invention provides a
considerable amount of space inside it not only for the active
compartments 36, from which the product is dispensed, but also for
the spare storage compartment. This means that the storage space
provided by the apparatus is optimised in relation to its
footprint.

Preferably and advantageously, the means for cooling the
cold storage cell 18 for the products can lower the temperature in
the cell to -18°C, suitable for the storage of deep-frozen
products or the like. The cell might also be kept at a temperature
0 to -4°C suitable for the storage of frozen foods.

Figures 7 to 9 illustrate a second preferred embodiment 100
of the apparatus according to the invention.

The second preferred embodiment has several features in
common with the first preferred embodiment described above. For
brevity, these shared features are not described again.

Advantageously, in the second preferred embodiment, the
products are contained in compartments 136 which extend
vertically.

For each compartment 136 there are respective first and
second side walls 146, 146 for containing and guiding the
products. None of the side guide walls are shared with other
compartments 136.

Further, for each compartment 136, the first and second side
walls 146, 146 for containing and guiding the products extend
vertically and parallel with the direction in which the
compartment extends.

As illustrated, the vertical compartments 136 are arranged
in longitudinal rows consisting, in this case, of three vertical
compartments supported by shared pull-out means comprising an
upper bracket 144, which bears the longitudinally aligned
compartments 136 and which runs in longitudinal guide means 148
attached to the inside of the storage cell 18.

Advantageously, the vertical compartments 136 are open on
both longitudinal sides so that, once the row of compartments has
been pulled out of the storage cell 18 in a longitudinal
direction, the products 15 can be easily loaded from both sides of
the row of compartments.

Advantageously, in the second preferred embodiment, the
product support means are constituted by the coils of the feed
spiral 140, whose longitudinal axis extends in a vertical
direction. Under the effect of gravity, the products 15 weigh down
on the lower section of the coils 140' of the feed spiral 140.

When the spiral is turned by a predetermined amount, the
products held within the spiral coils are fed downwards, guided by
the side walls 146 and the product at the bottom of the row drops
onto means 150 that feed it towards the dispensing area.

Looking in more detail with reference also to Figure 9, the
means 150 for feeding the product towards the dispensing area are
located under the compartments 136 and comprise a supporting and
transfer surface 152 and a rear contact crossbar 154 that pushes
the product towards the dispensing area.

As shown in Figure 9, the crossbar is driven by side chains 156, looped around corresponding sprockets 158, and moves first one way to push the product towards the dispensing door and then back, remaining above the surface 152.

As shown in Figure 9, the surface 152 has sections 158' that converge on the dispensing door in such a way as to guide the product towards the dispensing door.

In the second preferred embodiment, too, the cold storage cell 18 includes a spare storage compartment R'.

Advantageously, the spare product storage compartment R' is situated under the supporting and transfer surface 152.

Figure 10 illustrates a third preferred embodiment of the apparatus according to the invention. The third preferred embodiment 200 of the apparatus includes product payment and selection means. The payment means include a slot 26 into which payment for the product can be inserted and a slot 28 for change.

The payment and selection means are positioned on a lateral section or column 11'a of the front 11a of the apparatus, next to a large product selection area 11'b where the available food products are named or illustrated and where there is a button 30 or similar means for selecting the desired food product. The apparatus may also include means 31 for indicating whether a particular product is available or has run out. These may consist of a green light that indicates when the related product is available and a red light that indicates when the product is finished.

Figure 11 illustrates a fourth preferred embodiment 300 of the apparatus according to the present invention. The fourth preferred embodiment also has features in common with the other preferred embodiments described above. These shared features are denoted by the same reference characters and, for brevity, are not described again.

Advantageously, in the fourth preferred embodiment, the top frame section 12'd that houses the ovens 16, extends horizontally from the lower section 12d that houses the cold storage cell containing the food products. This configuration makes it possible
to provide a large number of ovens 16 at a height which makes them easily accessible to users.

More specifically, according to the fourth preferred embodiment, the top frame section 12'd extends from the lower section 12d on both sides so that its weight is equally distributed and well balanced.

In the fourth preferred embodiment, therefore, the ovens 16 are arranged in horizontal rows, each consisting of four ovens on two or more levels. More specifically, in the fourth preferred embodiment, the ovens 16 are mounted on two levels, at different heights, one above the other.

While the above is an especially preferred embodiment of the invention, it is evident that other configurations for the frame of the apparatus are imaginable.

It will be understood that the invention can be subject to modifications and variations without thereby departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by technically equivalent elements.
Claims

1. An apparatus (10, 100, 200, 300) for dispensing food products (15), especially refrigerated food products and preferably frozen and/or deep-frozen products, characterised in that it comprises a frame (12) that mounts means (14) for storing and dispensing the food products (15) and means (16) for heating the food products; the means for storing and dispensing the food products comprising a cell (18) for the storage of the food products and refrigerating means (20) housed inside the storage cell (18).

2. The apparatus according to claim 1, characterised in that the heating means (16) are positioned above the storage cell (18) that contains the food products.

3. The apparatus according to either of the foregoing claims, characterised in that the mounting frame (12) forms a compartment (12a) that houses the heating means (16), the means (20) for cooling the food products being positioned next to the heating means (16).

4. The apparatus according to any of the foregoing claims, characterised in that the mounting frame (12) forms a compartment (12a) that houses the heating means (16), the means (20) for cooling the food products being positioned behind the heating means (16).

5. The apparatus according to any of the foregoing claims, characterised in that the heating means (16) are positioned above the food product dispensing area (24).

6. The apparatus according to any of the foregoing claims, characterised in that the means for heating the food products are accessible from the same side as that on which the products are dispensed by the apparatus.

7. The apparatus according to any of the foregoing claims, characterised in that the upper compartment (12a) that houses the
heating means (16) has, behind the heating means (16) themselves, a large area for the passage of cooling air.

8. The apparatus according to any of the foregoing claims, characterised in that it comprises a plurality of means (16) for heating the food products.

9. The apparatus according to claim 8, characterised in that the heating means (16) are arranged in rows at different heights.

10. The apparatus according to any of the foregoing claims or according to the preamble to claim 1, characterised in that there are means (14) for storing and dispensing the food products (15) comprising a plurality of compartments (36, 136) each accommodating a row (38) of food products (15) and means (40, 140) for feeding the products towards the end (42, 142) where the products are transferred from or allowed to drop out of the respective compartment (36, 136).

11. The apparatus according to claim 10, characterised in that it comprises means (44, 140) for holding the products within the compartments (36, 136) and means (46, 146) for guiding and laterally retaining the products (15).

12. The apparatus according to claim 10 and 11, characterised in that the feed means (40, 140) comprise a rotating spiral element where, between one coil (40', 140') and another, there is a space designed to accommodate a food product (15).

13. The apparatus according to any of the foregoing claims from 10 to 12, characterised in that it comprises a plurality of shelves (44) mounted at different heights and each designed to accommodate a plurality of compartments (36) for the products.

14. The apparatus according to any of the foregoing claims from 10 to 13, characterised in that the guide means consist of first
and second vertical side walls (46, 46), supported by the shelves (44).

15. The apparatus according to any of the foregoing claims from 10 to 14, characterised in that the shelf (44) can be pulled out of the cell (18) so that the compartments can be filled from above.

16. The apparatus according to any of the foregoing claims from 10 to 15, characterised in that the spiral feed means (40) have coils (40'), each of which, as it turns, engages a corner portion of a product in such a way as to feed it forward longitudinally.

17. The apparatus according to any of the foregoing claims from 10 to 16, characterised in that the compartments (36) extend horizontally.

18. The apparatus according to any of the foregoing claims from 10 to 16, characterised in that the compartments (136) extend vertically.

19. The apparatus according to any of the foregoing claims from 10 to 18, characterised in that, for each compartment, the first and second side walls (146, 146) for containing and guiding the products extend vertically and parallel with the direction in which the compartment vertically extends.

20. The apparatus according to claim 18 and 19, characterised in that the product support means comprise coils (140') forming part of the feed spiral (140) whose longitudinal axis extends in a vertical direction.

21. The apparatus according to any of the foregoing claims from 10 to 20, characterised in that the vertical compartments (136) are arranged in longitudinal rows and are mounted on shared pull-out means.
22. The apparatus according to any of the foregoing claims from 10 to 21, characterised in that each vertical compartment (136) is open on both longitudinal sides so as to allow the products (15) to be placed in it.

23. The apparatus according to any of the foregoing claims from 10 to 22, characterised in that it comprises means (150) for receiving the product from the product compartments (136) and for feeding the product towards the dispensing area.

24. The apparatus according to claim 23, characterised in that the means (150) for feeding the product towards the dispensing area comprise a supporting and transfer surface (152) and a rear contact crossbar (154) that pushes the product towards the dispensing area.

25. The apparatus according to claim 23 or 24, characterised in that the surface (152) has specially shaped sections (158') that converge on the dispensing door in such a way as to guide the product towards the latter.

26. The apparatus according to any of the foregoing claims, characterised in that it comprises a spare product storage compartment (R, R').

27. The apparatus according to claim 26, characterised in that the spare product storage compartment (R) is located under the lowermost compartment shelf (44).

28. The apparatus according to claim 26, characterised in that the spare product storage compartment (R') is located under the supporting and transfer surface (152).

29. The apparatus according to any of the foregoing claims, characterised in that a top section (12'd) of the frame (12) that houses the heating means (16), extends horizontally from the lower section (12d) that houses the cold storage cell (18).
30. The apparatus according to any of the foregoing claims, characterised in that the storage cell (18) containing the products is essentially in the shape of a prism with a quadrangular base.
FIG. 11
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7 G07F9/10  G07F11/62  G07F11/42

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

**Date of the actual completion of the International search**

13 November 2003

**Date of mailing of the international search report**

26/11/2003

**Name and mailing address of the ISA**

European Patent Office, P.B., 5611, Patentlaan 2 NL-2280 HW Rijswijk Tel. (31-70) 340-2040, Tx. 51 651 epo nl, Facs (31-70) 340-0010

**Authorized officer**

Kling, J

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