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(54) **Vending machine**

(57) Vending machine for items to be vended, comprising helical transport means, supporting means, and a collecting area for collecting the items by the customer, which machine has a reduced tendency for items to be stuck between the end of the support means and the collecting area. This can be achieved by either or both of:
- wherein upon rotation of the helical transport means

the lower end of the item to be vended is transported over a greater distance than the top end;
- wherein the end of the supporting means does not end straight but under an angle, similar (between -5° and +5°) to the last winding of the helical transport means.

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Description

[0001] The present invention relates to a vending machine for vending items, and more in particular to vending machines that contain the items to be vended supported on trays and separated and distributed by a rotatable helical transport means (e.g. coil).

[0002] Vending machines for distributing items upon insertion of coins, tokens, smart-cards, debit cards, credit cards or other value representation or payment are well known. A wide variety of products is offered to consumers in such way: often food items but also non-food items such as stamps, telephone cards, photographic film, umbrellas, condoms etcetera. Typical food items to be vended by machines include amongst others cans or bottles of beer or soft drink, sweet or savoury snack products such as e.g. chocolate or candy bars and packs of chips (crisps in the UK), packages of chewing gum, etcetera. Such products have all in common that a discrete number of (usually packed) vendable items (usually 1) is distributed at a time (e.g. one pack of chewing gum, one pack of chips, etcetera), contrary to vending machines that vend e.g. a portion of coffee or soup (powder or liquid). The present invention is not concerned with the latter type, but solely to vending machines that vend discrete items, usually one at a time, and which are usually packed in a packaging material (sachet, box, wrapper, bag, pouch, can, bottle, etcetera). This can be a single item (a chocolate bar) but also expressly includes packaged portions of e.g. soup powder (e.g. sachets) or snack noodles (e.g. ramen noodles wrapped in a wrapper): the packaging makes such items to be discrete items.

[0003] In a typical arrangement for vending such discrete items the vending machine contains a combination of supporting means and a helical transport means (e.g. a coil), or a plurality of such combinations. The supporting means can be a tray (optionally flat or with raised sides) or gutter or similar, usually mounted horizontally or under a sloping angle, with above it the helical transport means (e.g. a coil or elongated spring or spiral). The supporting means carries a row of items to be vended between the individual windings of the helical transport means. Upon payment of the correct amount, the helical transport means can be turned (by hand or automatically), thus transporting the items to be vended in one direction (to what will be referred to herein as the end of the helical transporting means and the end of the supporting means). When the item to be vended is transported far enough upon turning the helical transport means, it will eventually fall (by gravity) of the supporting means and out of the helical transport means to a collecting area accessible to the customer. Thus, a usual arrangement when looked from top to bottom comprises a helical transport means (transporting the items on rotation of said means), supporting means (doing part of the carrying of the items, what is not carried by the helical transport means), and collecting area. There can be "drop zone" or "slide zone" between the end of the helical transport

means and tray and the collecting area below, in which the articles to be vended fall or slide down to the collecting area.

[0004] A plurality of helical transport means may be operated in one vending machine, e.g. for allowing vending of different variety of items or for increased capacity. They may have each their own supporting means for the goods, or share (a larger) one. There may be a shared collecting area or a plurality of such areas.

[0005] The existing systems may be satisfactory to some extent, but occasionally the items to be vended get stuck after the helical transport means has transported the item over the supporting means, and prior to arriving of the item in the collecting area (e.g. in the "drop zone" or "slide zone"). This is may be less likely for heavy articles of fixed dimensions (e.g. bottles or cans of softdrink) but occurs typically for more lightweight materials packed in flexible packaging, such as bags of chips (crisps) or sachets of soup powder.

[0006] A solution can be to create much more space in the areas where the items tend to get stuck (larger than the largest diagonal of the item to be vended) but this leads to unpractically large machines or to few items than are kept in stock in the vending machine.

[0007] Thus, there is a need for a simple, cheap modifications to vending machines that result in less items to be vended which get stuck.

[0008] The present invention relates to a vending machine for (discrete) items to be vended, the vending machine comprising helical transport means (e.g. a coil), supporting means (e.g. a tray or gutter, and preferably located underneath the helical transporting means), and a collecting area (preferably below the tray or gutter) for collecting the items by the customer, wherein upon rotation of the helical transport means the lower end of the item to be vended is transported over a greater distance than the top end. It was found that with this arrangement, the chance is smaller that an item which is transported far enough and falls down to the collecting area becomes stuck in the "drop or slide zone" between end of the tray and the collecting area. Without wishing bound by theory, this is probably due to the fact that the item is brought in a more controlled sliding motion having a reduced tendency to rotate.

[0009] The difference of how much lower and top end needs to be transported depends on the vending machine internal geometry and the size and shape of the items to be vended, as well as the flexibility and nature of the packaging material of the item. The difference in top and lower end motion that gives the best results can easily determined by simple and routine experimentation. Preferably, the top end of the item is transported over 1-90% of the distance of the lower end.

[0010] The above can in a practical way be achieved when the vending machine comprises a bumper located at or beyond the end of the helical transport means and lower than the top end of the items to be vended, to prevent the top end of the item to be transported over the

same distance as the lower end of the item upon rotation of the helical transport means. The bumper can suitably be stationary, and e.g. be part of the housing or frame of the vending machine, or e.g. (when more than one set of helical transport means and supporting means are used on top of each other) be part of the supporting means of the above lying pair of supporting means and helical transport means.

[0011] Yet a further improvement in preventing the chance of items to be blocked between helical transport means and collecting area in a vending machine, wherein the helical transport means comprises at least one winding and the supporting means is located underneath the helical transport means and wherein the end of the supporting means makes an angle with the last winding at the end of the helical transport means of between -5° and $+5^\circ$.

[0012] Such arrangement is contrary to the conventional arrangement. In the conventional arrangement the supporting means usually is a rectangular gutter or tray, and thus the end of the supporting means ends perpendicular to the longitudinal axis of the helical transport means. As the windings of the helical transport means make an angle of about $6-25^\circ$, at the end of the helical transport means when an item is to be vended, there is a situation that just before the item falls off the supporting mean and/or out of the helical transport means, it is at one side still supported by the supporting means before being fully free of the helical transport means, but under the influence of the gravity it starts to drop off the supporting means. As it is still supported partly on one side and dropping at the other side, the item has a tendency to be rotated, which may increase the chances of becoming blocked.

[0013] Thus, the end of the supporting means preferably ends not straight but under an angle, similar (between -5° and $+5^\circ$, preferably between -4° and $+4^\circ$, most preferably equal) to the last winding of the helical transport means.

[0014] This alternative shape of the supporting means can be used beneficially together with the arrangement as referred above, or can be used separately. Thus, the invention further relates to a vending machine for items to be vended, comprising helical transport means comprising at least one winding, supporting means located underneath the helical transport means, and a collecting area for collecting the items by the customer, wherein the end of the supporting means at the last winding of the helical transport means makes an angle with the last winding at the end of the helical transport means of between -5° and $+5^\circ$.

[0015] Means currently employed aimed to improve transport of the item to be vended off the supporting means and out of the helical transport means towards the collecting area is a so-called "vane" at or near the end of the helical transport means. This can also be employed with either or both of the two modifications as disclosed above. Thus, the invention further relates to a

vending machine according to the present invention, wherein the last winding of the helical transport means comprises a vane.

Claims

1. Vending machine for items to be vended, comprising helical transport means, supporting means, and a collecting area for collecting the items by the customer, wherein upon rotation of the helical transport means the lower end of the item to be vended is transported over a greater distance than the top end.
2. Vending machine according to claim 1, wherein the top end of the item is transported over 1-90% of the distance of the lower end.
3. Vending machine according to claim 1-2, wherein the vending machine further comprises a bumper located at or beyond the end of the helical transport means and lower than the top end of the items to be vended, to prevent the top end of the item to be transported over the same distance as the lower end of the item upon rotation of the helical transport means.
4. Vending machine according to claim 1-3, wherein the helical transport means comprises at least one winding and the supporting means is located underneath the helical transport means, and wherein the end of the supporting means makes an angle with the last winding at the end of the helical transport means of between -5° and $+5^\circ$.
5. Vending machine for items to be vended, comprising helical transport means comprising at least one winding, supporting means located underneath the helical transport means, and a collecting area for collecting the items by the customer, wherein the end of the supporting means makes an angle with the last winding at the end of the helical transport means of between -5° and $+5^\circ$.
6. Vending machine according to claim 1-5, wherein the last winding of the helical transport means comprises a vane.



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EUROPEAN SEARCH REPORT

Application Number
EP 05 07 6053

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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Y	* abstract * * figures 2,3,6,13 * * column 2, line 56 - column 3, line 19 * * column 4, line 22 - line 43 * * column 5, line 30 - line 51 * -----	4	
X	DE 21 42 389 A1 (SCHLAF, STANLEY ORVILLE, WINFIELD, MO. ; SCHLAF, STANLEY ORVILLE, WINF) 1 March 1973 (1973-03-01)	5	
Y	* page 9, paragraph 1 * * figure 2 * -----	4	
X	US 3 828 971 A (OFFUTT E,US ET AL) 13 August 1974 (1974-08-13) * abstract * * figures 1,8,9 * * column 3, line 29 - line 51 * -----	1-3,6	
X	WO 01/29788 A (AUTOMATED MERCHANDISING SYSTEMS, INC) 26 April 2001 (2001-04-26) * the whole document * -----	1-3	TECHNICAL FIELDS SEARCHED (Int.Cl.7) G07F
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 13 July 2005	Examiner Diepstraten, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 05 07 6053

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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