STORAGE SHELF CONSTRUCTION FOR VENDING MACHINES

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2 Claims. (Cl. 221—104)

This invention relates generally to vending machines of the type having shelves for the storage of vendable articles, and more particularly to an improved construction thereof which provides for more positive unloading movement of the articles, adjustment for handling different sizes and kinds of article containers, and in general more trouble-free operation.

An embodiment of the invention is disclosed herein in conjunction with a vending machine of the kind shown in the co-pending application of Almon C. Woodruff, Serial No. 295,895, filed June 27, 1952, for Beverage Vending Machine, now Patent No. 2,735,578. As the principles of the subject invention are hereinafter explained, their advantageous use in the vending machine of the aforesaid application will be apparent, and it will also be seen that they will have use in other kinds of vending machines.

The vending machine disclosed in application Serial No. 295,895 a plurality of storage shelves are provided for storage of beverage containers in standing position, each shelf and an associated dispensing conveyor, being a separate unit for vending a particular item. By the use of these independent storage and dispensing units, the vending machine can handle several different kinds of beverages or similar articles and thus increase its sales effectiveness. The arrangement of containers on each shelf is in a linear alignment of rows and columns to uniformly cover a rectangular storage area. As disclosed, the shelf extends transversely of the machine interior and from front to back of the depth thereof. A line of containers extending from front to back is designated as a row while a line extending laterally is designated as a column. The dispensing conveyor extends from front to back along one edge of the shelf and is adapted to hold a complete row of containers. When the conveyor is unloaded, the adjacent row of containers on the storage shelf is loaded onto the conveyor and simultaneously the subsequent rows of containers move over one place so as to be in position for further loading operations.

In order to accomplish the movement of the containers from the storage shelf onto the dispensing conveyor the shelf is inclined downwards towards the conveyor and the containers slide onto the conveyors under the force of gravity. One of the problems with such an arrangement is that the containers or other articles to be dispensed may be imperfect or irregular so that they do not slide well. Another problem is to avoid tipping the containers over and prevent jamming or other irregular loading such as would cause malfunctioning of the machine. As was previously mentioned, it is desirable that the machine be capable of handling different kinds and sizes of merchandise, and for flexibility of operation it is necessary that each shelf be adapted for use with all types of containers. Improvements in the stability and dispensing characteristics of the storage shelves must therefore be made in such a manner as to not interfere with the flexibility of storage and use.

With the foregoing in mind it is a major object of this invention to provide container-actuated advancing means for insuring positive and simultaneous movement of an entire row of containers during a loading cycle of a shelf and conveyor unit of the character described.

An equally important object of the invention is to provide anti-tip means for maintaining all of the containers in an upright position during storage and loading movement, and cooperating with said containers to further cause uniform and simultaneous movement.

A further object of the invention is to provide advancing means which are of simplified construction and do not interfere with the storage of different kinds and sizes of containers.

It is also an object of the invention to provide anti-tip means which are easily adjustable for cooperation with different sizes and types of containers.

Another object of the invention is to provide advancing means having a plurality of free-turning rollers arranged to support rows of containers in such a manner that motion is imparted to the rollers from containers in the row, to cooperatively advance other containers in the same row.

A still further object of the invention is to provide anti-tip means in the form of a roller which itself causes cooperative advancing movement of all of the containers in a row.

An additional object of the invention is to provide a construction of the foregoing means which is rugged and durable so as to give long and trouble-free service.

These and other objects and advantages of the invention will become apparent from the following detailed description of a preferred embodiment thereof and from an inspection of the accompanying drawings in which:

Figure 1 is a partial front elevation of the interior of a vending machine incorporating the invention;

Figure 2 is an enlarged front detail partially in section of the lower end construction of a storage shelf, and an adjacent conveyor;

Figure 3 is a cross section taken along the line 3—3 of Figure 2;

Figure 4 is a plan detail of a portion of the storage shelf; and

Figure 5 is an enlarged detail taken in the circle 5 of Figure 3.

Referring now to the drawings the invention is illustrated in conjunction with a vending machine of the kind disclosed fully in the aforesaid application, Serial No. 295,895, although its use is not so limited. As is seen in Figure 1, the vending machine has a large rectangular housing or cabinet 10 which may be refrigerated for the storage and vending of cold beverages such as milk dispensed in individual containers or cartons C. The walls of cabinet 10 define a rectangular chamber 11 which has substantial depth and extends from side to side of the cabinet.

Mounted within chamber 11 are a plurality of vending units, each comprising a storage shelf means 12 and an associated conveyor means 13. The units are arranged in vertically spaced relationship and if desired, each may be used to vend a different kind of beverage since the operation of each unit is independent of the others. Because the vending units are identical a description of one suffices to explain the present invention which is concerned with improving the storage, loading and overall operating characteristics of such a unit. However, before considering a single unit in detail the arrangement of the units within the cabinet and the operation thereof should briefly be noted.

Each shelf means 12 extends from front to back of chamber 11 and is inclined downwards from one side thereof towards the other. The lower edge of the shelf means, which may be designated as the unloading edge,
3 is spaced away from the adjacent chamber side wall and in the space defined therebetween the associated conveyor means 13 is mounted. The upper surface of each shelf means 12 thus provides a large rectangular area for the storage of beverage containers C which tend to move downwardly towards conveyor means 13 under the action of gravity. The manner in which the containers C are arranged upon shelf means 12 is best seen in Figures 1 and 4, the containers as illustrated being conventional rectangular type paper milk cartons which are commonly in use. Extending upwardly along shelf means 12 the cartons are arranged in parallel columns, while extending fore and aft the cartons are arranged in rows with each row consisting of a single carton from each column and vice versa. As can be appreciated, this arrangement makes maximum use of the available storage space.

Conveyor means 13 is located at the lower edge of shelf means 12 and has a traveling belt 15 thereon extending fore and aft of cabinet 11 and adapted to move forwardly along its upper surface. The length and width of belt 15 is such that it is adapted to hold thereon a complete row of containers C and it is so positioned that the belt lies adjacent to the edge of shelf means 12 and in effect constitutes a continuation thereof. Belt 15 is operated to move forwardly in steps so as to move cartons off the forward end of the belt one by one in response to the insertion of suitable coins in the vending machine. When belt 15 has been emptied of cartons C in the manner just described it is reloaded with a complete row of cartons from shelf means 12. It can thus be understood that during the loading cycle the thing that is desired is simultaneous advancing movement of all of the containers in the leading row onto the conveyor means, and movement of the subsequent rows over one place towards the unloading edge. At the same time it is apparent that any tipping of the container will cause jamming and improper loading of the conveyor means.

Considering the construction in more detail, the shelf means 12 has a built-up framework having inclined front and rear edge members 16 and 17, respectively, which are joined to a horizontal upper edge member 18. Hook-like brackets 19 are mounted on the right-hand side wall of cabinet 10 and engage under edge member 18 to removably support the upper end of each shelf means. A front vertical standard 20 is rigidly secured in cabinet 10 adjacent to the lower edges of the shelf means, and support pins 21 extend rearwardly therefrom to support the lower ends of the front edge members 16. Similar support pins 22 extend forwardly from the rear wall of cabinet 10 to support the rear edge members 17, as is best seen in Figure 3.

As can be appreciated, the open framework thus defined is easily removable from the vending machine for cleaning and repair purposes. The interior surface of the shelf means is formed by a plurality of elongated rollers 25 which extend from front to rear between the edge members 16 and 17 and lie in spaced parallel relationship from the bottom to the top of the shelf. Each roller 25 may be mounted on a central shaft 26 which extends outwardly for journaling in members 16 and 17 as is seen in Figure 3, and the rollers are free turning and as frictionless as possible. Preferably, rollers 25 are of a relative size such that several rollers are adapted to pass beneath a single container C as is seen in Figures 2 and 4.

Positioned at the lower or unloading edge of each shelf means 12, is the previously mentioned conveyor means 13 which has a carriage structure 28 pivotally mounted to support ears 29 by means of pivot pins 30. Ears 29 are secured to front standard 20 and to the rear wall of the cabinet in a suitable manner so that the pivotal axis of pins 30 extends horizontally fore and aft. Carriage 28 is thus adapted to rock up and down about the pivot axis and shift the position of belt 15 relative to shelf means 12 from a loading position shown in phantom outline in Figure 2, to the solid line position, wherein it is slightly above the level of the lower or unloading edge of the shelf means. Extended along the edge of carriage 28 adjacent to the shelf means and parallel to belt 15 is a flat blocking member or strip 32 which in the normal position is raised slightly above the unloading edge of the shelf means. This ledge or blocking member 32 normally prevents containers C from any downward movement, but during the loading cycle is depressed so that a complete row of containers C may advance downwardly onto the belt 15.

An operating solenoid 35 may be mounted on carriage 28 and pivotally connected thereto for pivotally rocking the carriage in the manner just described. The complete details of the control system for such a solenoid, and further details of the carriage construction may be found in the aforesaid application, Serial No. 295,695.

In and of themselves they form no new invention, and it is sufficient if the loading principles of the conveyor means 13 and its cooperation with shelf means 12 is understood.

When conveyor means 13 pivot downwardly to the loading position, the leading or bottom row of containers C is acted upon by gravity to advance onto belt 15. It is to be understood, that the leading row of containers C as well as each subsequent row is at this time supported on rollers 25, and as the containers advance the rollers are actuated by the containers to turn or rotate in a counterclockwise direction as viewed in Figure 2. If due to manufacturing imperfections, or any other reason, one container in a row does not advance freely under the action of gravity, it is nevertheless advanced by the rotation of rollers 25. Thus all containers in each row move uniformly and simultaneously for correct loading of conveyor means 13.

During loading and storage it is also desirable that the container C be prevented from tipping forwardly. To this end anti-tip means are provided in the form of an upper roller 40 which is adapted to engage the top surfaces of the containers C in the leading row of containers. Containers C as shown are of the peaked roof type and roller 40 in this instance engages the upper ridge of the containers. The position of roller 40 as is seen in Figure 2 is such that containers C cannot tip forwardly but at the same time are free to slide forwardly during the loading operation. It will be noted that roller 40 also functions as an advancing means similar to rollers 25 and further assures uniform advancement of all containers in the leading row.

In order that each shelf means 12 may be used with different types and sizes of containers, roller 40 is removably and adjustably held in position. As is best seen in the detail of Figure 5, roller 40 may have tubular end portions wherein plungers 41 are slidably mounted and urged outwardly by springs 42. The ends of rollers 40 are rolled inwardly at 15 to confine plungers 41, and extending outwardly from the plunger is a short stub shaft 43 which engages within a shaft opening 44 formed in support ear 29. By providing a vertical set of openings 44 along each ear 29 the vertical position of roller 40 may be adjusted to conform to different sizes of containers.

While a preferred embodiment of the invention has been described in considerable detail it is understood that modifications of design and construction can be made without departing from the scope of the invention. Therefore, we do not wish to be restricted to the foregoing except as is defined in the appended claims.

We claim:

1. In a vending machine: inclined storage shelf means arranged for a plurality of rows of containers to be stored therein in side-by-side relationship and having a lower unloading edge extending parallel to said rows;
conveyor means mounted in said machine and extending along said unloading edge for receiving the leading row of containers during a loading cycle; blocking means normally blocking the advancement of said leading row of containers from said shelf means to said conveyor means and movable during said loading cycle to a position free of said leading row of containers; brackets in said shelf means having pairs of shaft openings positioned at different relative heights to the storage surface of said shelf means with each pair being parallel to said unloading edge; and an anti-tip roller having a shaft spring loaded into engagement with one pair of said shaft openings, said roller being free turning and positioned to engage with the top surface of all of said containers in said leading row to hold said containers from tipping forwardly towards said unloading edge, said roller being turned by the advancing movement of any of said containers in said row to simultaneously advance the other containers in said row.

2. In a vending machine: inclined storage shelf means arranged for a plurality of rows of containers to be stored thereon in side-by-side relationship and having a lower unloading edge extending parallel to said rows; conveyor means mounted in said machine and extending along said unloading edge for receiving the leading row of containers during a loading cycle; blocking means normally blocking the advancement of said leading row of containers from said shelf means to said conveyor means and movable during said loading cycle to a position free of said leading row of containers; container-actuated advancing means comprising a plurality of elongated free turning rollers mounted on the upper surface of said shelf means in spaced parallel relationship with said unloading edge, with each of said rollers being in a line of engaging contact with the bottoms of all of said containers in one of said rows and there being at least one roller under each of said rows; brackets in said shelf means having pairs of shaft openings positioned at different relative heights to the storage surface of said shelf means with each pair being parallel to said unloading edge; and an anti-tip roller having a shaft spring loaded into engagement with one pair of said shaft openings, said roller being free turning and positioned to engage with the top surface of all of said containers in said leading row to hold said containers from tipping forwardly towards said unloading edge, said roller being turned by the advancing movement of any of said containers in said row to simultaneously advance the other containers in said row.

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