VENDING MACHINE FOR CYLINDRICAL ARTICLES

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This invention relates to vending machines, and more particularly to such machines of the coin operated type adapted to the dispensing of packaged goods, such as bottled soft drinks and the like.

One of the objects of our invention is to provide a vending machine wherein effective use is made of package holding space within the machine, and from which space the packages are sequentially fed by gravity into a double row column from sloping shelves on opposite sides of the column, and in which the column of packages is disposed in an alternating staggered relationship for individual release by a single dispensing control mechanism.

Another object of the invention is to provide a vending machine for packaged articles wherein said articles await singular release for dispensing in a double row vertical column, in which the columns laterally overlap, with the articles in contact and supported by two movable elements operable in timed sequence by a single driven actuating mechanism to release the lowermost article of the column while those above it are supported and lowered.

As a further object, our invention comprehends the provision of a dispensing control mechanism for effecting singular release of articles from a double row vertical column in which the articles overlap in alternate relationship laterally of the column, and in which mechanism two driven article supporting elements are actuated from a common power source and in predetermined relationship to release the lowermost article from the column, support the remaining articles in the column while the one is released, and lower the articles of the column so that another is positioned for release.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings in which similar characters of reference indicate similar parts through the several views.

Referring to the three sheets of drawings,

Fig. 1 is a front elevational view of a storage and vending unit for a vending machine embodying a preferred form of our invention;

Fig. 2 is a fragmentary side elevational view of the lower portion of the storage and vend-
portance that the articles shall be fed automatically to a dispensing control mechanism by a structure having little likelihood of jamming or getting out of order in other ways.

In the disclosed embodiment of our invention, we have provided an effective and efficient storage and dispensing unit which not only has the aforementioned desirable characteristics, but which also is relatively simple and easily refilled. As depicted in the drawings, the storage and dispensing unit 19 is preferably constructed as a unitary assembly, which assembly includes a base frame 25 forming a part of a support structure, and which base frame includes a front and rear lateral support members 26 and 27 respectively secured together near their lateral mid-portions by parallel frame members 28 and 29 which frame members 28 and 29 define an opening 31 through the mid-portion of the base structure and are disposed equidistantly on opposite sides of a lateral center line of the base.

At opposite sides of the base frame 25, side panels 30 and 32 are secured to and supported by side channel members 33 and 34 respectively, while side channel members are secured to the outer edges of the lateral members 26 and 27. It is by preference also, that the width of the side panels 30 and 32 is dependent somewhat upon the length of the articles which are to be dispensed, and that they are disposed in opposed relationship at the longitudinal mid-portions of the side channel members and spaced somewhat from each of the front and rear lateral support members 26 and 27. At the opposite sides of the side panels 30 and 32, we have provided flanges 35, 36, 37, and 38 for stiffening purposes. Also, a front panel 39 (shown in Figs. 2 and 3 and removed for purposes of disclosure in Fig. 1) is secured to and covers the space between the fronts of the opposed side panels 30 and 32.

Extending inwardly of the frame structure from the panel 30 is substantially parallel and vertically spaced relationship is a series of shelves 40 which, at their outer ends, have integrally formed flanges 42 secured to the inner surface of the side panel 30 by spot welding or the like. In like manner, the panel 32 carries a series of vertically spaced and substantially parallel shelves 43 having integral mounting flanges 44 secured to the panel 32 by spot welding or the like. In the disclosed structure, the shelves 40 and 43 also have integral flanges 45 and 46 respectively extending along the edges thereof remote from the front panel 35. The shelves of each series slope downwardly toward the shelves of the other series; the downward slope and vertical spacing of the shelves being such that articles such as bottles 47 are received for free movement between the shelves and will be moved by gravity inwardly along the shelves. The last shelf 48 extending inwardly of each series is usually located against one of the parallel frame members 28 and 29, and all of the shelves preferably terminate substantially at the planes of the opposed surfaces of the parallel frame members 28 and 29, so that their inner ends define an open channel 49 of each series. It is also so arranged that the lateral dimensions of the articles to be dispensed, that the articles gravitating into the channel 49 from the shelves 40 and 43 form a double row column, with the articles of one row laterally overlapping and vertically staggered with respect to those of the other row. With this arrangement of parts, the articles or bottles in the double row column are in contact, and gravitate downwardly as articles are released from the bottom of the column. It may be noted that as the articles are singly released at the bottom of the column, the bottommost article of the column is first on one side of the column and then on the other. It may be further be noted that the articles pass from the holding and dispensing structure 19 through the opening 31 between the parallel frame members 28 and 29.

When the holding and dispensing structure is initially filled, articles are placed in the channel between the shelf ends and on the successive shelves until the column and shelves are filled to their capacity. As the articles are then removed at the bottom of the column, articles from the shelves gravitate sequentially into the column and downwardly through the column. As shown in Figs. 1 and 3, the lowermost shelf such as 43 of one series has on its upper surface a switch plate 49 which may be either thin and resilient or hinged near its outer end, as at a line 50 (Fig. 3), with the outer end thereof secured to the shelf. The switch plate 49, near its inner end, engages a switch actuating lever 52 and is biased upwardly away from the shelf surface. The switch actuating lever 52, in turn, actuates a switch 53 in response to movements of the switch plate. Thus, as long as there is an article on the shelves, the switch plate carries the switch plate 49, the weight of that article on the switch plate will hold the switch in one of its operating positions. However, when the last article is removed from the switch plate, the switch 53 will be changed to the other of its operating positions and will remain in the latter position until additional articles are placed in the holding and dispensing structure and on the shelf which carries the switch plate.

In the preferred embodiment of our invention which is disclosed herein, we effect control of the dispensing of articles from the lower end of the double row column and through the opening 31 by two movable article-retaining elements 54 and 55, both of which are actuated in a predetermined manner and sequence, singly to release the lowermost article of the column and to retain and lower the remaining article of the column. By preference, the article-retaining elements which we have utilized have ball type mid-portions displaced from an axis of lateral swinging movement and are so disposed with reference to the lateral mid-portions of the lower end of the channel 49 that they are separately movable into engagement with articles of either row. That is, the article-retaining element 54 has a ball type mid-portion 56 displaced from an axis of swinging movement defined by aligned end portions 57 and 58, its inner end sliding against one of the parallel frame members 28 and 29, and its outer end engaging in rotational movement in bearing bores 59 and 60 in lateral support strips 62 and 63 respectively. In like manner and displaced below the article-retaining elements 54, the article-retaining element 55 has a ball type mid-portion 56 displaced from an axis of swinging movement defined by aligned end portions 65 and 66, its inner end engaging in rotational movement in bearing bores 67 and 68 respectively in the lateral support strips 62 and 63. These ball type article-retaining elements extend longitudinally across the opening 31 between the parallel frame members 28 and 29, with the axes of their respec...
tive aligned end portions displaced vertically from one another in a plane which is substantially midway between the planes defined by the opposed ends of the shelves 40 and 43.

At their front or forward ends, the article-retaining elements 54 and 55 are provided with crank type end portions 69 and 70 respectively, which crank type end portions, in the present instance, each lie in the general plane of their respective end bearing portions and mid-portions. The crank type end portions 69 and 70 have forwardly projecting ends 72 and 73 respectively.

At a position spaced forwardly of the crank type end portions 69 and 70, a shaft 74 is supported for rotation by laterally displaced support brackets 75 and 76 which are secured to the front lateral support member 26 of the base frame. Between the support brackets 75 and 76, a cam 77 is mounted upon and drivingly connected to the shaft 74. The cam 77 has a channel type track 78 which is substantially concentric with the axis of the shaft 74 and has axially displaced dwell and swing portions 19 and 80 respectively which slidably receive and control the positions of the ends 72 and 73 of the article-retaining elements.

Normally and when the disclosed mechanism is at rest, the cam and article-retaining elements occupy positions substantially as shown in Fig. 5. As there shown and viewed, the middle portion of the article retaining element 55 underlies and supports the lowermost article of the column which, in the instance shown, is the lowermost article of the left hand row. The articles above that lowermost one, and in both rows, are supported through the said lowermost article. As viewed in Figs. 4 and 5, the direction of rotation of the shaft 74 and cam 77 is such that the forward surface of the cam moves downwardly. Thus, from the normal position shown in Fig. 5, the end 73 of the article retaining element 55 is entering one swing portion 85 of the cam, so that the mid-portion 64 of that article-retaining element will be swung away from its supporting position beneath the bottommost article during the first part of the cam movement. The end 72 of the article retaining element 54, however, enters the dwell portion 79 of the cam which is of substantially the same length as the swing portion 80. As the bottommost article is released by the retaining element 55, the retaining element 54 remains in a position such that the mid-portion 64 thereof engages the succeeding article and thus supports the remaining articles of the column.

The cam 77 turns one-half of a revolution for the release of each article. It has two similar dwell portions on opposite sides thereof and also has similar swing portions on its opposite sides, all joined at their ends to provide a continuous channel. The previously described release of the bottommost article, in the present instance, during which release the upper articles are supported by the retaining element 54, requires about half of the shaft and cam movement necessary for the article. During the latter part of the cam movement, the end 73 of the article-retaining element 55 rides in a dwell portion of the cam and thus stays under the row to which it was moved during the first part of the cam movement. The end 72 of the article retaining element 54, however, moves laterally during the latter part of the cam movement to let the articles supported thereby gravitate downwardly to a position for dispensing another article from the other row and by a similar sequence of operations with the movements of the article-retaining elements alternating in directions for the successive dispensing operations.

An inner chute 82 is disposed below the dispensing mechanism and is preferably made of formed sheet metal with side portions secured to the inner surfaces of the parallel frame members 28 and 29. The inner chute slopes downwardly from its position below the dispensing mechanism and toward the chute 20, so that articles released by the vending mechanism drop to the inner chute and slide along that chute to the chute 20 and by their force of movement open a trap door 23 and emerge from the vending machine.

For actuating the dispensing control mechanism, we utilize a motor 83 carried by a bracket 84 from the front lateral support member 26 of the base frame. The motor 83 is drivingly connected to a shaft 85 through speed reducing gears 86. At one end, the shaft 85 is drivingly connected through a ratchet release clutch 87 to the shaft 74; the ratchet release clutch being of a conventional type, provided by preference, to relieve the driving force applied to the shaft 74 from the motor if, by some unusual circumstance, the vending mechanism should become jammed in the process of releasing an article.

On the end of the shaft 85, opposite the ratchet release clutch 87, a switch actuator 88 is mounted for rotation with the shaft. The switch actuator is so constructed and arranged that each time the motor 83 is started, as by the insertion of a coin through a coin slide, the switch actuator effects operation of a switch 89 after each cycle of dispensing movement of the cam 77 to stop the motor. In the present instance, the switch 89 is supported from the lateral support member 26 of the base frame.

As may be observed with respect to the described structure of our vending machine, the article storage and vending unit, which includes the shelf structure with the intermediate channel, the inner chute and the dispensing control mechanism including the drive and control unit, is assembled as an integral unitary structure for mounting within the outer enclosure 10. It may also be removed, as such, for repair service or replacement, if desired. In the present instance, the base frame is secured to the enclosure walls, and a plate 90 which is secured to the unit and extends along the back surface thereof has edge flanges 92 which are also removable secured to the housing wall.

From the foregoing description of the structure and operation of the preferred embodiment of our invention which is disclosed herein, it may be readily understood that we have provided a storage and vending unit for an article vending machine, which unit effectively utilizes space for the storage of articles to be vended and is so constructed and arranged that relatively few moving parts are employed and consistent, trouble-free operation is attained.

While we have illustrated a preferred embodiment of our invention, many modifications may be made without departing from the spirit of the invention, and we do not wish to be limited to the precise details of construction set forth, but desire to avail ourselves of all changes within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States, is:
1. In a vending machine for packaged articles, the combination comprising two bail type article-retaining elements extending across the mid-portion of the lower end of a channel through which said articles freely gravitate in a double row column with the articles of one row laterally overlapping and vertically staggered with respect to the articles of the other row, said elements having aligned end portions defining axes of swinging movement at the lateral mid-portion of the channel and each having a bail portion displaced from its axis, the axes of the article-retaining elements being spaced so that each is independently swingable relative to the other, said article-retaining elements also each having a crank-type end portion at one end of and extending from one of the end portions thereof, cam means drivingly engaging each of said crank type end portions and having dwell and swing portions proportioned and disposed at positions such that the bail portion of the article-retaining elements normally extend angularly downwardly and to opposite sides of the respective axes so as to underlie the bottom articles of the rows to support said articles, said cam means and the relative positions of engagement of the crank-type end portions therewith further being such that said article-retaining elements are swung in reverse directions from one side of the axis to the other in timed sequence to release the bottom article and to retain and lower the other articles, and means for driving the cam.

2. In a vending machine for packaged articles, the combination comprising two article-retaining elements having portions movable laterally at the lower end of a channel through which said articles freely gravitate in a double row column with the articles of one row laterally overlapping and vertically staggered with respect to the articles of the other row, each element having a path of movement extending across the lateral mid-plane of the channel, the said paths of movement of the article-retaining elements being spaced vertically of the channel so that each is independently swingable relative to the other, said article-retaining elements also each having a crank-type actuating portion extending from one of the end portions thereof, a single cam drivingly engaging each of said crank type actuating portions at spaced positions and having dwell and swing portions disposed at positions such that the depending bail portion of each article-retaining element normally extends laterally of the bail axis so that it underlies the bottom article of one row to support the articles, said cam also having said dwell and swing portions alternated so that the crank-type actuating portions effect swinging movements of said article-retaining elements in reverse directions and from one row to the other in timed sequence to one another to release the bottom article and to retain and lower the other articles, and means for driving the cam.

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