July 8, 1969 P. A. JOHNSON 3,454,192

ARTICLE DISPENSING APPARATUS

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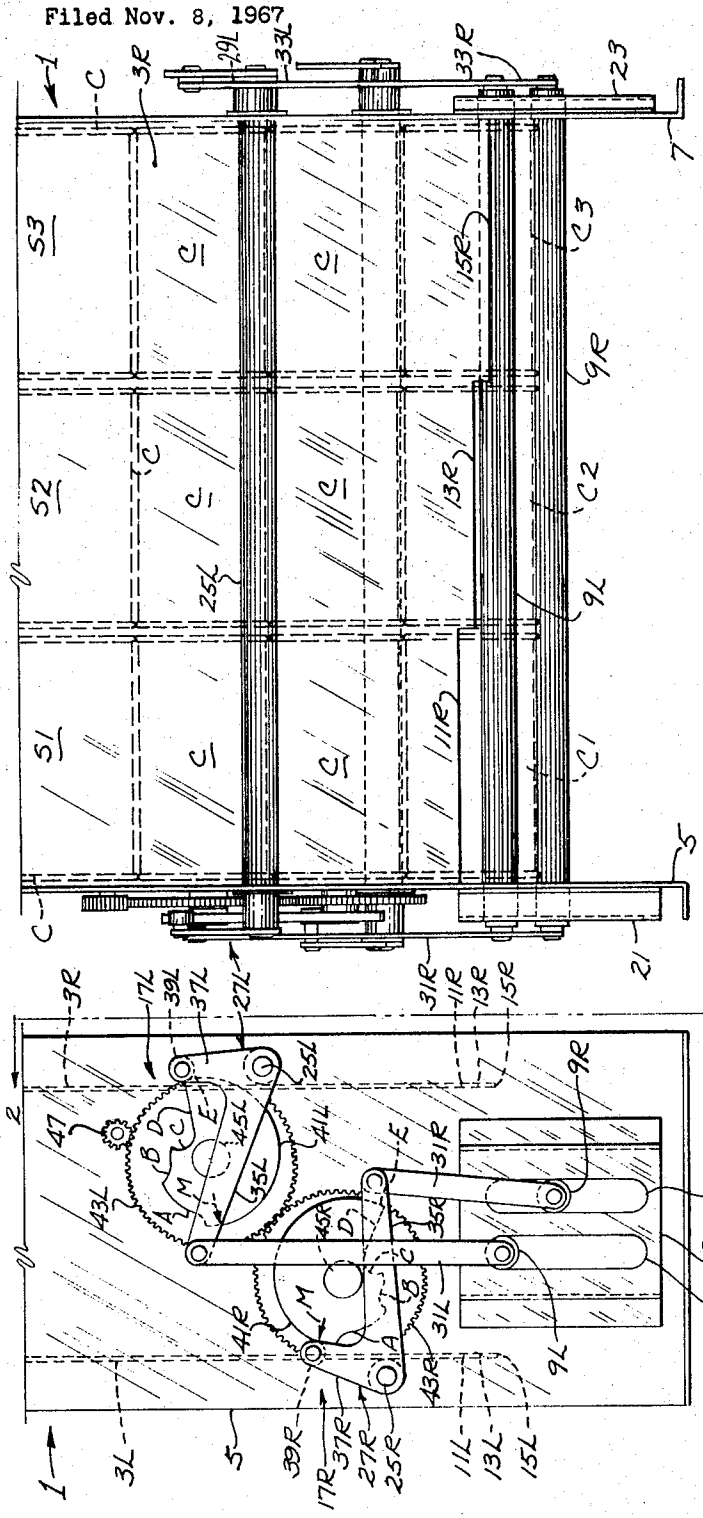


FIG. 2

FIG. 1

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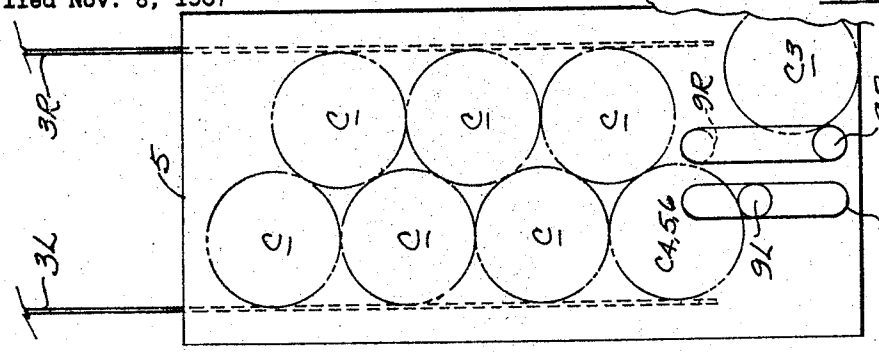


FIG. 6

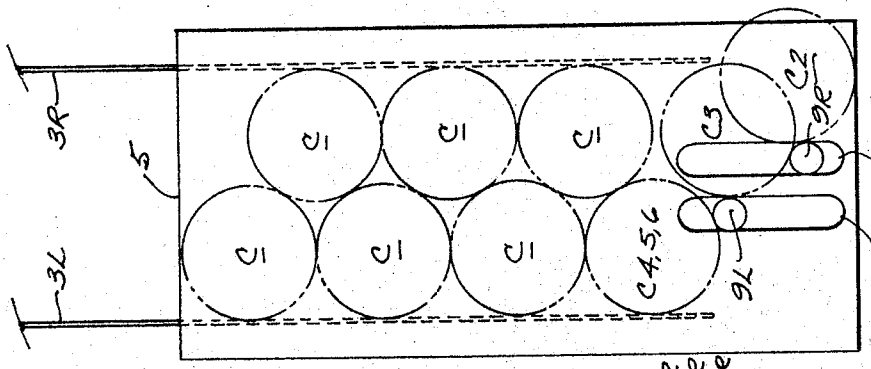


FIG. 5

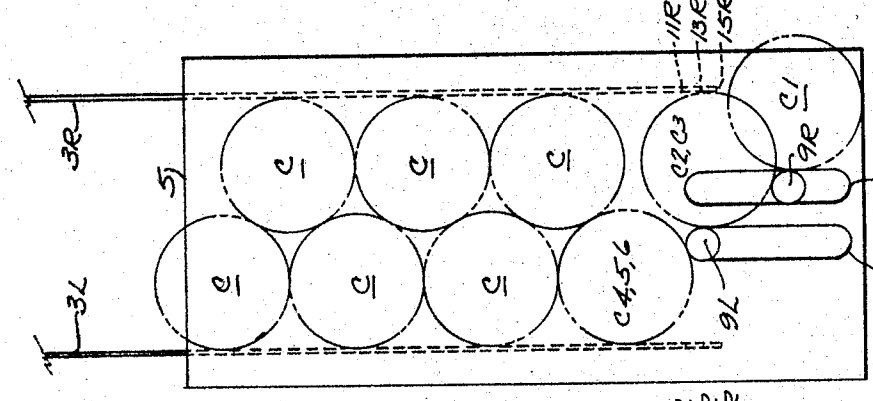


FIG. 4

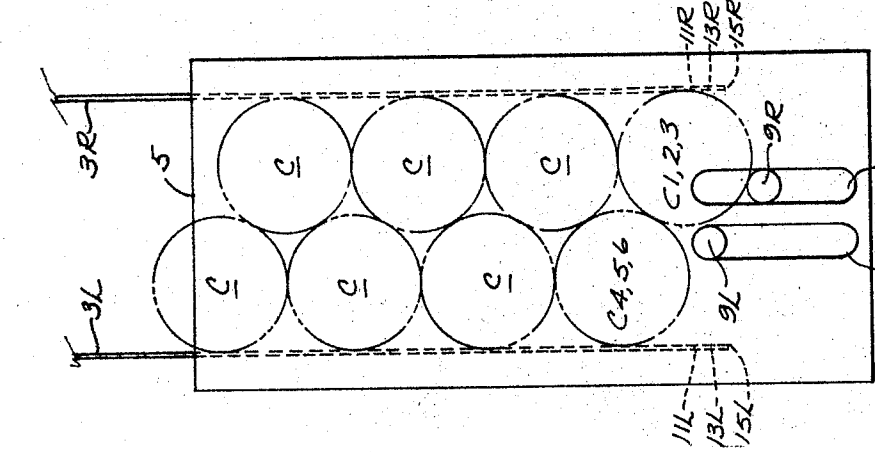


FIG. 3

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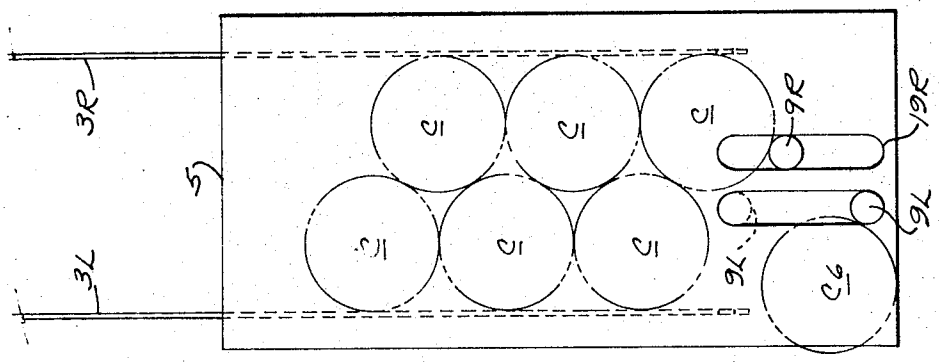


FIG. 9

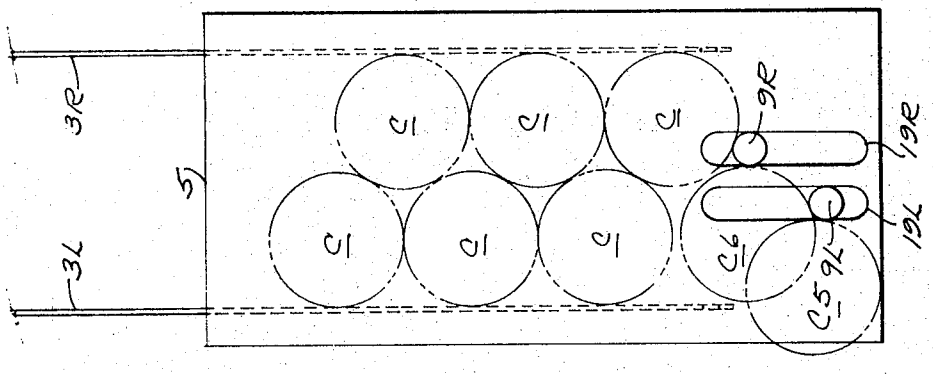


FIG. 8

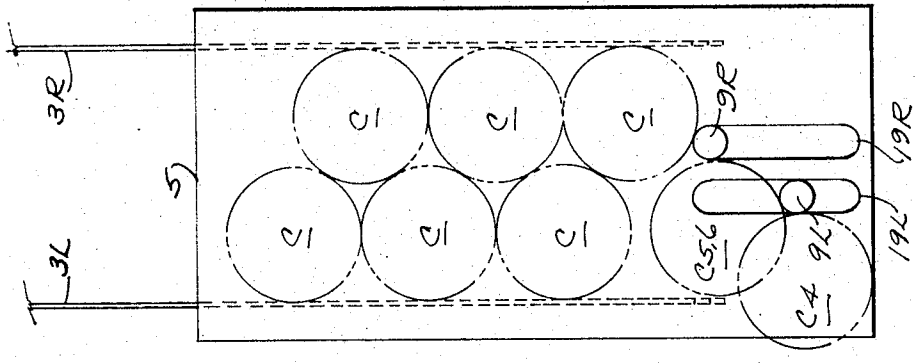


FIG. 7

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3,454,192

ARTICLE DISPENSING APPARATUS

Philip A. Johnson, deceased, late of Olivette, Mo., by Emma M. Johnson, surviving spouse and heir, Olivette, Mo., assignor to UMC Industries, Inc., St. Louis, Mo., a corporation of Delaware

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Int. Cl. B65g 59/10, 59/00
U.S. Cl. 221—67 15 Claims

ABSTRACT OF THE DISCLOSURE

An article dispenser for use in a vendor dispensing articles such as cans of beverage. The dispenser includes a column having side walls for holding three staggered stacks of articles one behind another, and a pair of vertically movable laterally spaced support bars extending underneath the articles for supporting the stacks. Each of the side walls has a lower stepped formation providing three vertically spaced horizontal edge portions. A cam mechanism effects movement of the support bars for successive lateral discharge of the lowermost articles on one side of the staggered stacks under the edge portions on one side wall, and the lowermost articles on the other side of the staggered stacks under the edge portions on the other side wall.

Background of the invention

This invention relates to article dispensing apparatus, and more particularly to such apparatus for use in a vendor to dispense articles such as cans or the like from a plurality of staggered stacks thereof.

Staggered stack can vendors of the prior art typically utilize one or more side-by-side staggered stack dispensing columns for vending the lowermost can from one of the stacks on each vend cycle. Although such dispensers have generally served the purpose, they have not proven entirely satisfactory under all conditions of use and for all purposes. For example, such dispensers, within practical limits of cabinet size, have limited storage capacity.

Summary of the invention

Among the several objects of the invention may be noted the provision of dispensing apparatus of the class described of high capacity adapted for successive dispensing of articles from a plurality of stacks, more particularly staggered stacks, arranged one behind the other in a dispensing column; the provision of such apparatus in which the articles are discharged laterally from the column; and the provision of such apparatus which is of simple and economical construction and which is easily loaded.

In general, a staggered-stack article dispensing apparatus of this invention comprises a column for holding a plurality of staggered stacks of articles one behind another. As will be understood, each staggered stack comprises a first series of articles (e.g., a right-hand series) and a second series of articles (e.g., a left-hand series). Two movable supports are provided, one for the first series of articles of all the stacks, and the other for the second series of articles of all the stacks. Means is provided for effecting lowering of the supports to dispense articles in a sequence involving successive dispensing of the bottom articles of one series followed by successive dispensing of the bottom articles of the other series. Other objects and features will be in part apparent and in part pointed out hereinafter.

Brief description of the drawings

FIG. 1 is a front elevation of the lower part of a dispensing column of this invention;

FIG. 2 is a side elevation of FIG. 1, on line 2—2 of FIG. 1; and

FIGS. 3–9 are partial diagrammatic front elevations of the column illustrating different positions of certain parts.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Description of the preferred embodiment

Referring to the drawings, dispensing apparatus constructed in accordance with this invention for use in a vendor for dispensing cans (such as cans of beverage) is shown to comprise a column designated in its entirety by the reference numeral **1** adapted to hold three staggered stacks of cans C, one behind another. The first and front staggered stack is designated **S1**, the second is designated **S2**, and the third and rear stack is designated **S3**. The column comprises left and right-hand side walls **3L** and **3R**, a partial front wall **5** and a rear wall **7**. The side walls are spaced a distance greater than the can diameter but less than twice the can diameter for staggered stacking of the cans in each of stacks **S1**, **S2**, **S3** as appears in FIGS. 3–9. Each of the stacks **S1** and **S2** in effect includes a left-hand vertical series of cans and a right-hand vertical series of cans. The front wall closes only the lower part of the front of the column for loading of the column with cans from the front.

A bar **9L** is provided for supporting the left-hand series of cans in the three staggered stacks and a bar **9R** is provided for supporting the right-hand series of cans in the three staggered stacks. These bars are vertically movable, as will appear. Each bar extends horizontally through the column from front to rear adjacent its bottom parallel to the side walls. Bar **9L** is offset to the left from the right-hand series of cans in the three stacks so that the right-hand cans may pass down on the right of bar **9L**; similarly, bar **9R** is offset to the right of the left-hand series of cans in the three stacks so that the left-hand cans may pass down on the left of bar **9R**. The lower edge of each of the side walls **3R** and **3L** is of stepped formation, having three vertically spaced generally horizontal edge portions, each somewhat longer than a can, under which cans C from the respective stacks **S1**, **S2** and **S3** may exit laterally as will appear. These lower edge portions of the left-hand side wall are designated **11L**, **13L** and **15L**, those of the right-hand side wall are designated **11R**, **13R** and **15R**. As appears in FIG. 2, the edge portions designated **11** are the highest, those designated **13** are the intermediate edge portions, and those designated **15** are the lowest.

This arrangement is such that by lowering bar **9R** supporting the bottom cans of the right-hand series of cans of stacks **S1–S3** from the FIG. 3 position to the FIG. 4 position, the bottom can of the right-hand series of stack **S1** will drop out laterally from the column under edge portion **11R**, but all other cans will be retained. By further lowering bar **9R** from the FIG. 4 to the FIG. 5 position, the bottom can of the right-hand series of stack **S2** will drop out laterally from the column under edge portion **13R**, but all other cans will be retained. By further lowering bar **9R** from the FIG. 5 to the FIG. 6 position, the bottom can of the right-hand series of stack **S3** will drop out laterally from the column under edge portion **15R**, but all other cans will be retained. After return of bar **9R** upward to its FIG. 7 position and on lowering bar **9L** from its FIG. 6 to its FIG. 7 position, the bottom can of the left-hand series of stack **S1** will drop out laterally from the column under edge portion **11L**, but all other cans will be retained. By further lowering bar **9L** from the FIG. 7 to the FIG. 8 position, the bottom can of the left-hand series of stack **S2** will drop out laterally from the column under edge portion **13L**, but

all other cans will be retained. By further lowering bar 9L from its FIG. 8 to its FIG. 9 position, the bottom can of the left-hand series of stack S3 will drop out laterally from the column under edge portion 15L, but all other cans will be retained. Then, after return of bar 9L to its dotted line position of FIG. 9 (corresponding to its FIG. 1 position), the cycle may be repeated.

Mechanism for controlling bar 9L is generally indicated at 17L, and mechanism for controlling bar 9R is generally indicated at 17R. Bars 9L and 9R extend horizontally through the lower part of the column from front to rear, being mounted for vertical sliding movement at their forward and rearward ends in vertical slots 19L and 19R in front wall 5 and an auxiliary front plate 21, and similar slots in the rear wall 7 and an auxiliary rear plate 23. The mechanism 17L for bar 9L includes a shaft 25L extending horizontally from the front to the rear of the column at an elevation above the upper ends of the slots 19L, 19R on the outside of the right side wall 3R, journalled in the front and rear walls 5 and 7. Bell cranks 27L and 29L are secured on the forward and rearward ends of this shaft, 27L being in front of the front wall 5, and 29L being in the rear of the rear wall 7. Links 31L and 33L are connected between the free ends of arms 35L of these bell cranks and the ends of bar 9L for suspending the latter and effecting vertical movement thereof. Arm 37L of bell crank 27L carries a cam follower roller 39L engaging a cam 41L clustered with a gear 43L on a shaft 45L journalled in front wall 5. The mechanism 17R for bar 9R is generally identical to mechanism 17L and its parts are designated by the same reference characters with the subscript R instead of L. Shaft 25R is located on the outside of the left-hand side wall 3L. Gears 43L and 43R intermesh, and a pinion 47 meshes with gear 43L for driving the latter and gear 43R to drive cams 41L and 41R. This pinion is driven through one revolution on each dispensing cycle by a suitable conventional single-revolution drive and is of such diameter in relation to gear 43L as to drive the latter and gear 43R through an angle of 60° (one-sixth of a revolution) on each cycle.

The left-hand series of cans in each of stacks S1–S3 bears on bar 9L, and the weight thereof effects gravity bias of cam follower roller 39L into engagement with cam 41L. Similarly, the right-hand series of cans in each of stacks S1–S3 bears on bar 9R, and the weight thereof effects gravity bias of cam follower roller 39R into engagement with cam 41R. Each cam is so developed as to have, in its first 60° of rotation from a home position (indicated by an index mark M) a first fall A, in its next 60° a second fall B, in its next 60° a third fall C followed by a steep rise D to a high dwell E which extends for the next 60°, from which there is a gradual fall back to the home position and beyond to the start of the first fall A. FIG. 1 shows the cam 41R in what may be referred to as the home position with cam follower roller 39R engaged with the cam 41R at the home index mark M of this cam. Gears 43R and 43L are meshed with cams 41R and 41L 180° out of phase, so that cam follower roller 39L engages cam 41L 180° around from the home index mark M on cam 41L, at the beginning of the high dwell E of cam 41L. The development of each of cams 41L and 41R is such that when in its home position (i.e., with the respective cam follower roller engaging the cam at the home index mark), the respective can supporting bars 9L, 9R occupy a starting or home position some distance below the upper ends of slots 19L and 19R, as shown for the right-hand bar 9R in FIGS. 1–3 and for the left-hand bar 9L in FIG. 6. On the first 60° of rotation of either cam from its home position, the respective bar is lowered one step to a first dispensing position, such as shown for the right-hand bar 9R in FIG. 4, and for the left-hand bar 9L in FIG. 7. On the next 60° of rotation of the cam, the bar is lowered a second step to a second dispensing position such as shown for the right-hand bar 9R in FIG. 5 and for the left-hand

9L bar in FIG. 8. On the next 60° of rotation of the cam, the bar is lowered a third step to a third dispensing position at the lower end of the slots, as shown for the right-hand bar 9R in FIG. 6 and for the left-hand bar 9L in FIG. 9, and then the bar is immediately raised (by the rise D of the cam) to the elevated position at the upper end of the slots, as shown for the left-hand bar 9L in FIGS. 1–3 and for the right-hand bar 9R in FIG. 7. On the next 60° of rotation of the cam, the bar remains in its elevated position. On the next 60° of rotation of the cam, the bar is lowered to a position intermediate its elevated and home positions, as shown for the left-hand bar 9L in FIG. 5 and for the right-hand bar 9R in FIG. 8.

FIGS. 1–3 show the bars 9L and 9R and the elements of mechanisms 17L and 17R in the position occupied prior to a sequence involving dispensing on successive vend cycles of the right-hand bottom cans from stacks S1–S3 and then the left-hand bottom cans from stacks S1–S3. The right-hand bottom cans of stacks S1–S3 are specially designated C1, C2 and C3 (being the first three cans to be dispensed in this sequence), and the left-hand bottom cans of stacks S1–S3 are specially designated C4, C5 and C6 (being the next three cans to be dispensed in this sequence). Bar 9R occupies its home position; bar 9L occupies its elevated position. The bottom cans C1, C2 and C3 of the right-hand series of cans of the three staggered stacks S1–S3 bear on bar 9R, the vertical central plane of this series being offset to the right from bar 9R, so that the cans in this series also bear on the right-hand side wall 3R. With bar 9R in its home position, its elevation relative to the first lower edge portion 11R of the right side wall 3R is such that the central horizontal plane of can C1 is slightly above edge portion 11R, and the distance from bar 9R to the edge portion 11R, as well as the distances from bar 9R to edge portions 13R and 15R, are less than the can diameter, so that cans C1–C3 are all retained in the column. By reason of the staggered stacking of the cans in stacks S1–S3, the bottom cans C4–C6 of the left-hand series of cans of the three stacks are all held above the left-hand bar 9L by cans C1–C3, as appears in FIG. 3. The vertical central plane of the left-hand series of cans in each of the three staggered stacks is offset to the left from bar 9L, and the cans in these series bear on the left-hand side wall. The central horizontal plane of cans C4–C6 is well above the lower edge portions 11L, 13L and 15L of the left side wall 3L.

Operation is as follows:

Assuming that the parts are in the position shown in FIGS. 1–3, on the first vend cycle, pinion 47 is driven clockwise through a single revolution to rotate gear 43L counterclockwise through 60° and to rotate gear 43R and cam 41R clockwise through a first 60° interval. This results in lowering of bar 9R one step to its first dispensing position at the level shown in FIG. 4. This lowers all three staggered stacks S1–S3, and cans C1–C3 (the bottom cans of the right-hand series of cans in stacks S1–S3) move down to the point where their central horizontal plane is below the level of lower edge portion 11R of the right side wall 3R, but still above the level of lower edge portion 13R of this side wall. The distance from bar 9R to edge portion 11R is then greater than the can diameter, and can C1 rolls to the right off bar 9R as illustrated in FIG. 4 under edge portion 11R and drops out of the column laterally. However, cans C2 and C3, as well as all the other cans in the column, are retained. Cans C2 and C3 separate from the adjacent cans, bearing on bar 9R, and cans C4–C6 (the bottom cans of the left-hand series of cans in the three staggered stacks) come down to bear on bar 9L (which remains in its elevated position), as shown in FIG. 4, and bar 9L is thus responsible for holding up the three staggered stacks (except for cans C2 and C3).

On the second vend cycle, pinion 47 is driven clockwise through a single revolution to rotate gear 43L and

cam 41L counterclockwise and gear 43R and cam 41R clockwise through a second 60° interval. This results in lowering of bar 9R a second step to its second dispensing position at the level shown in FIG. 5. It also results in lowering of bar 9L to its intermediate position of FIG. 5 so that the three staggered stacks move downward to the position shown in FIG. 5, and it is to be noted that bar 9L remains responsible for holding up the three staggered stacks (except for cans C2 and C3). Cans C2 and C3 move down to the point where their central horizontal plane is below the level of lower edge portion 13R of the right side wall 3R, but still above the level of lower edge portion 15R of this side wall. The distance from bar 9R to edge portion 13R is then greater than the can diameter, and can C2 rolls to the right off bar 9R as illustrated in FIG. 5 under edge portion 13R and drops out of the column laterally. However, can C3 and all the other cans in the column are retained.

On the third vend cycle, pinion 47 is driven clockwise through a single revolution to rotate gear 43L and cam 41L counterclockwise and gear 43R and cam 41R clockwise through a third 60° interval. This results in lowering of bar 9R a third step to its third dispensing position at the level shown in FIG. 6, followed by quick upward return of the bar 9R to its elevated position as shown in phantom in FIG. 6. It also results in lowering of bar 9L to its home position so that the three staggered stacks move downward to the position shown in FIG. 6, and it is to be noted that bar 9L still remains responsible for holding up the three staggered stacks (except for can C3). Can C3 moves down to the point where its central horizontal plane is below the level of lower edge portion 15R of the right side wall 3R. The distance from bar 9R is then greater than the can diameter, and can C3 rolls to the right off bar 9R as illustrated in FIG. 6 under edge portion 15R and drops out of the column laterally.

On the fourth vend cycle, pinion 47 is driven clockwise through a single revolution to rotate gear 43L and cam 41L counterclockwise and gear 43R and cam 41R clockwise through a fourth 60° interval. This results in lowering of bar 9L one step from its home position of FIG. 6 to its first dispensing position at the level shown in FIG. 7. This lowers all three staggered stacks S1–S3, and cans C4–C6 (the bottom cans of the left-hand series of cans in stacks S1–S3) move down to the point where their central horizontal plane is below the level of lower edge portion 11L of the left side wall 3L, but still above the level of lower edge portion 13L of this side wall. The distance from bar 9L to edge portion 11L is then greater than the can diameter, and can C4 rolls to the left off bar 9L as illustrated in FIG. 7 under edge portion 11L and drops out of the column laterally. However, cans C5 and C6, as well as all the other cans in the column, are retained. Cans C5 and C6 separate from the adjacent cans, bearing on bar 9L, and the bottom cans of the right-hand series of cans in the three staggered stacks come down to bear on bar 9R (which remains in its elevated position), as shown in FIG. 7, and bar 9R is thus responsible for holding up the three staggered stacks (except for cans C5 and C6).

On the fifth vend cycle, pinion 47 is driven clockwise through a single revolution to rotate gear 43L and cam 41L counterclockwise and gear 43R and cam 41R clockwise through a fifth 60° interval. This results in lowering of bar 9L a second step to its second dispensing position at the level shown in FIG. 8. It also results in lowering of bar 9R to its intermediate position of FIG. 8 so that the three staggered stacks move downward to the position shown in FIG. 8, and it is to be noted that bar 9R remains responsible for holding up the three staggered stacks (except for cans C5 and C6). Cans C5 and C6 move down to the point where their central horizontal plane is below the level of lower edge portion 13L of the left side wall 3L, but still above the level of lower edge portion 15L of this side wall. The distance from bar 9L to edge portion 13L is then greater than the can diameter, and can C5 rolls to the left off bar 9L as illustrated in FIG. 8 under edge portion 13L and drops out of the column laterally. However, can C6 and all the other cans in the column are retained.

On the sixth vend cycle, pinion 47 is driven clockwise through a single revolution to rotate gear 43L and cam 41L counterclockwise and gear 43R and cam 41R clockwise through a sixth 60° interval. This results in lowering of bar 9L a third step to its third dispensing position at the level shown in FIG. 9, followed by quick upward return of the bar 9L to its elevated position as shown in phantom in FIG. 9. It also results in lowering of bar 9R to its home position so that the three staggered stacks move downward to the position shown in FIG. 9, and it is to be noted that bar 9R still remains responsible for holding up the three staggered stacks (except for can C6). Can C6 moves down to the point where its central horizontal plane is below the level of lower edge portion 15L of the left side wall 3L. The distance from bar 9L is then greater than the can diameter, and can C6 rolls to the left off bar 9L as illustrated in FIG. 9 under edge portion 15L and drops out of the column laterally. This completes the sequence, and, as is apparent, all parts have returned to the position occupied at the start of the sequence.

It should be noted that although three staggered stacks of cans have been described and illustrated, the invention may be utilized with a greater or lesser number of staggered stacks by providing a corresponding number of vertically spaced horizontal side wall edge portions and modifying the dispensing cams to provide the required number of vertical moves for the can support bars. It should also be noted that the present dispensing apparatus may be utilized in vendors for dispensing articles other than beverage cans, and certain features thereof, e.g., the stepped lower edge side wall feature in conjunction with the means for lowering the bottom articles in steps, may be utilized for dispensing from single stacks as distinguished from staggered stacks.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

What is claimed is:

1. Apparatus for dispensing cylindrical articles such as cans comprising a column having side walls spaced apart a distance greater than the diameter of one of said articles but less than twice said diameter and having a front-to-rear dimension such as to provide for stacking of a plurality of staggered stacks in the column between the side walls one behind another, each of said staggered stacks comprising a first vertical series of said articles at one side of said column and a second vertical series of said articles at the other side of the column, with the articles in all the staggered stacks extending endwise in front-to-rear direction in the column, the first vertical series of articles of all the staggered stacks being generally coplanar at one side of the column and the second vertical series of articles of all the staggered stacks being generally coplanar at the other side of the column, a movable support at one side of the column for the first vertical series of articles of all the staggered stacks, a movable support at the other side of the column for the second vertical series of articles of all the staggered stacks, and means for effecting movement of the supports to dispense articles in a sequence involving successive dispensing one after another of the bottom articles of the first vertical series of the staggered stacks followed by successive dispensing one after another of the bottom articles of the second vertical series of the staggered stacks.

2. Apparatus as set forth in claim 1 wherein the supports are mounted for upward and downward movement in the column, and said means for effecting movement of the supports is operable alternately to lower the supports in steps successively to bring the bottom articles on

one support to a position for discharge from the column and then successively to bring the bottom articles on the other support to a position for discharge from the column.

3. Apparatus as set forth in claim 2 wherein each of the side walls has a stepped formation providing a plurality of vertically spaced generally horizontal edge portions under which the bottom articles of the respective series may exit laterally from the column on lowering of the respective support to different levels, said means for effecting movement of the supports being operable to effect downward movement of one support in steps for lowering the bottom articles of the respective series successively to said different levels while the other support holds up the remaining articles, followed by raising of said one support, and then to effect downward movement of the other support for lowering the bottom articles of the respective series successively to said different levels, while said one support holds up the remaining articles, followed by raising of said other support for repetition of the sequence.

4. Apparatus as set forth in claim 3 wherein the stepped formation of each side wall is at its lower edge.

5. Apparatus as set forth in claim 4 wherein each support comprises a bar extending through the column adjacent its bottom parallel to the side walls.

6. Apparatus as set forth in claim 5 wherein means is provided for supporting each bar at its ends, and the means for effecting movement of the bars comprises first cam mechanism operable on the supporting means for one bar and a second cam mechanism operable on the supporting means for the other bar.

7. Apparatus as set forth in claim 6 wherein each cam mechanism includes a rotary cam and a follower connected to the respective bar supporting means, the followers being gravity-biased into engagement with the cams by the weight of the bars and the articles.

8. Apparatus for dispensing cans comprising a column having right and left side walls adapted to hold three staggered stacks of cans one behind another, each stack comprising a right-hand vertical series of cans engaging the right side wall and a left-hand vertical series of cans engaging the left side wall, a right-hand bar extending through the column adjacent its bottom parallel to the side walls adapted to support the right-hand series of the three stacks, and a left-hand bar extending through the column adjacent its bottom parallel to the side walls adapted to support the left-hand series of the three stacks, said bars being mounted for vertical movement, the right side wall having first, second and third steps at its lower edge under which the bottom cans of the three right-hand series may be successively discharged on lowering of the right-hand bar from a home position successively to first, second and third dispensing levels, the left side wall having first, second and third steps at its lower edge under which the bottom cans of the three left-hand series may be successively discharged on lowering of the left-hand bar from a home position successively to first, second and third dispensing levels, and means for effecting movement

of the bars in a sequence involving lowering of the right-hand bar successively from its home position to its first, second and third dispensing levels followed by raising of the right-hand bar, and lowering of the left-hand bar successively from its home position to its first, second and third dispensing levels, followed by raising of the left-hand bar.

9. Apparatus as set forth in claim 8 wherein the means for effecting movement of the bars is operable to raise each bar immediately after it has been lowered to its third dispensing level to an elevated position above its home position and thereafter to lower each bar to its home position.

10. Apparatus as set forth in claim 9 wherein the means for effecting movement of the bars comprises a first cam operable on the right-hand bar and a second cam operable on the left-hand bar, and means for rotating the cams through one-sixth of a revolution on each dispensing cycle.

11. Article dispensing apparatus comprising a column for holding a plurality of stacks of articles one behind another, a support for the stacks mounted for upward and downward movement relative to the column, said column having a side wall having a stepped formation providing a plurality of vertically spaced generally horizontal edge portions under which the bottom articles of the respective stacks may exit laterally from the column on lowering of said support to different levels, and means operable to effect downward movement of said support in steps for lowering the bottom articles of the stacks successively to said different levels while holding up the remaining articles.

12. Apparatus as set forth in claim 11 wherein the stepped formation is at the lower edge of said side wall.

13. Apparatus as set forth in claim 12 wherein said support comprises a bar extending through the column adjacent its bottom parallel to said side wall.

14. Apparatus as set forth in claim 13 wherein means is provided for supporting said bar at its ends, and said means for moving the bar comprises cam mechanism operable on said bar supporting means.

15. Apparatus as set forth in claim 14 wherein said cam mechanism includes a rotary cam and a follower connected to said bar supporting means, the follower being gravity-biased into engagement with the cam by the weight of the bar and the articles.

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WALTER SOBIN, *Primary Examiner.*

U.S. Cl. X.R.

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