Oct. 15, 1963 F. W. TAYLOR 3,107,030

APPARATUS FOR DISPENSING ARTICLES ALTERNATELY FROM TWO ADJACENT COLUMNS

Original Filed April 25, 1958 3 Sheets-Sheet 1

FIG. 1.

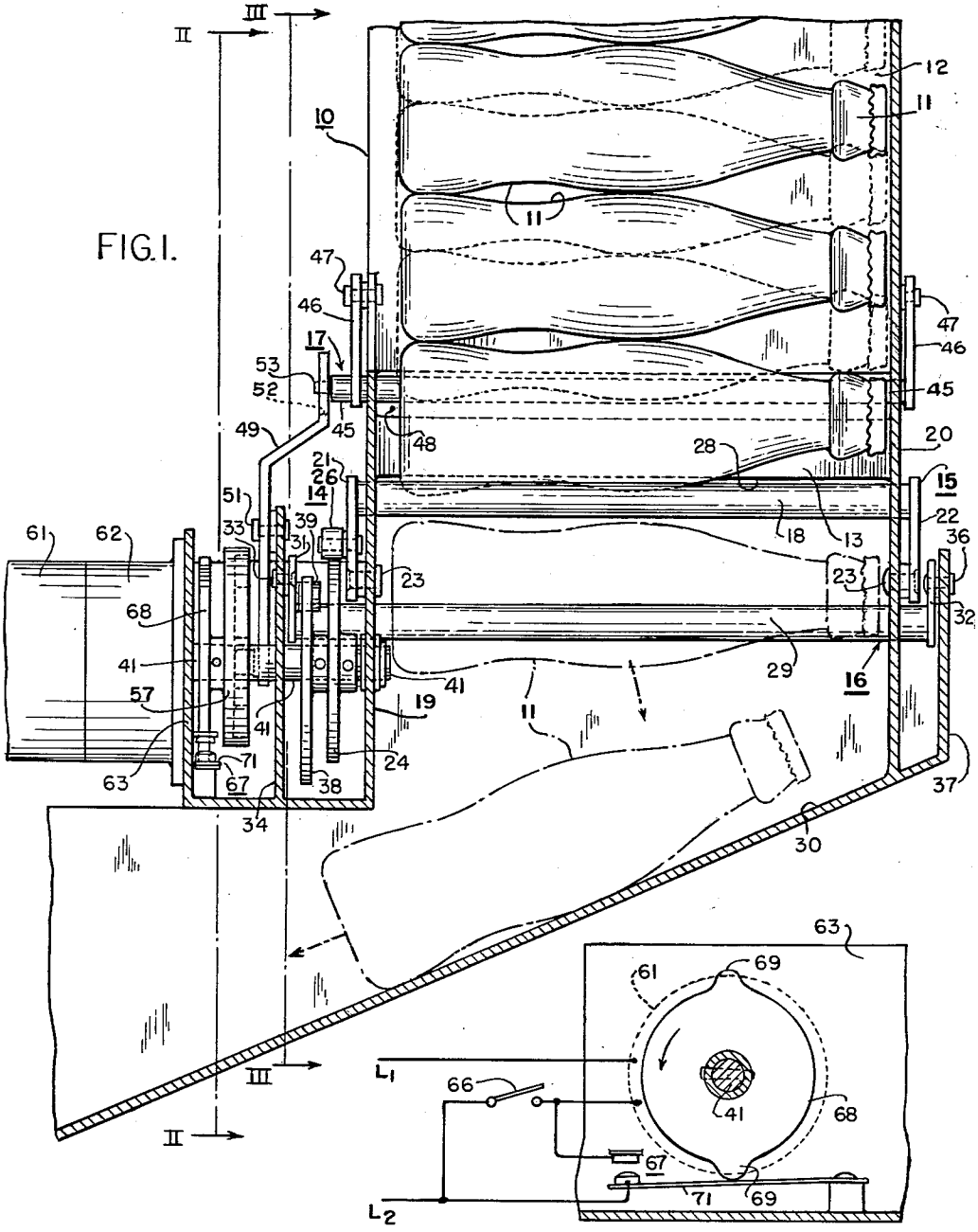


FIG. 8.

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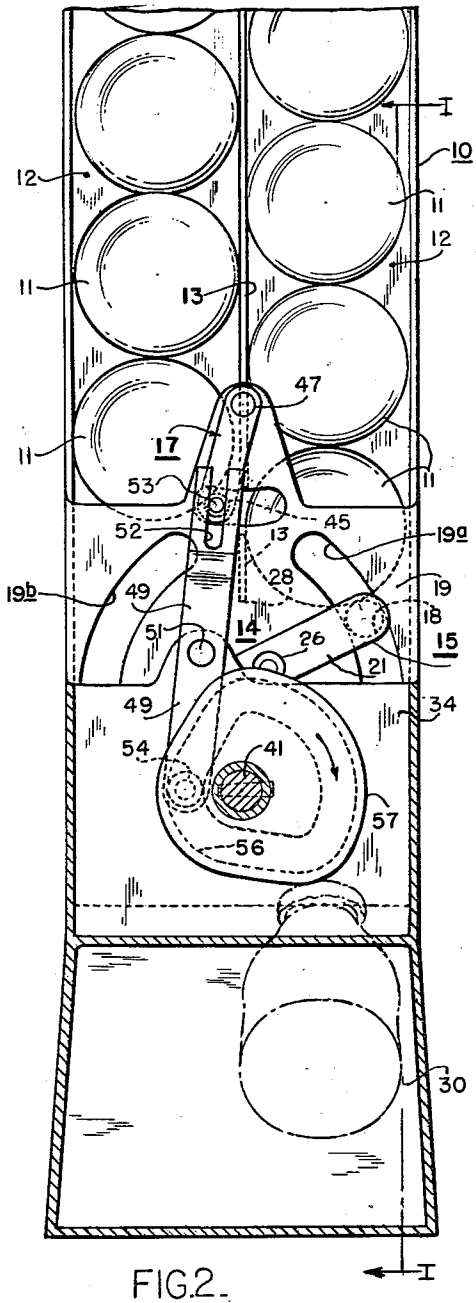


FIG.2.

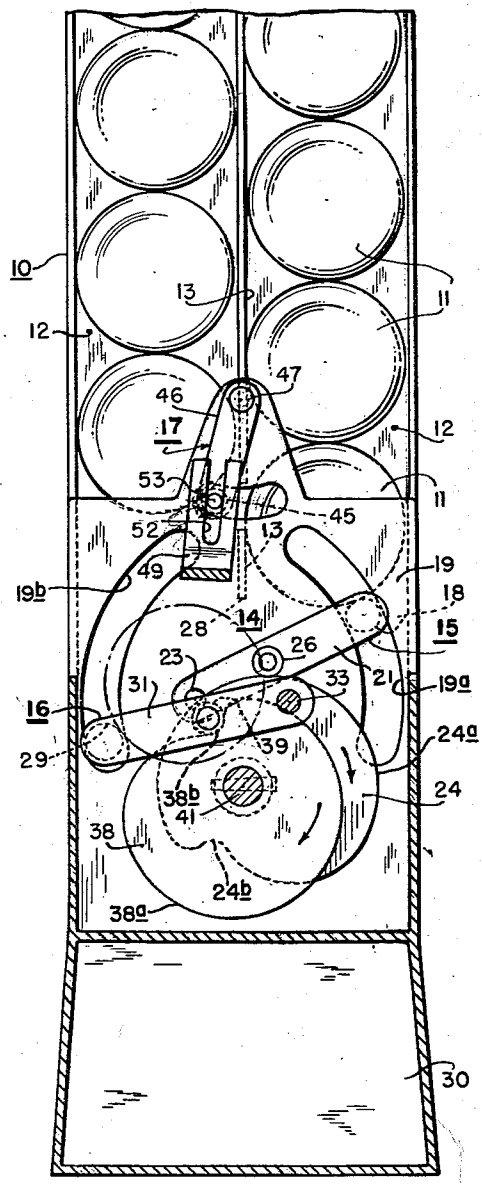


FIG.3.

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APPARATUS FOR DISPENSING ARTICLES ALTERNATELY FROM TWO ADJACENT COLUMNS

Original Filed April 25, 1958 3 Sheets-Sheet 3

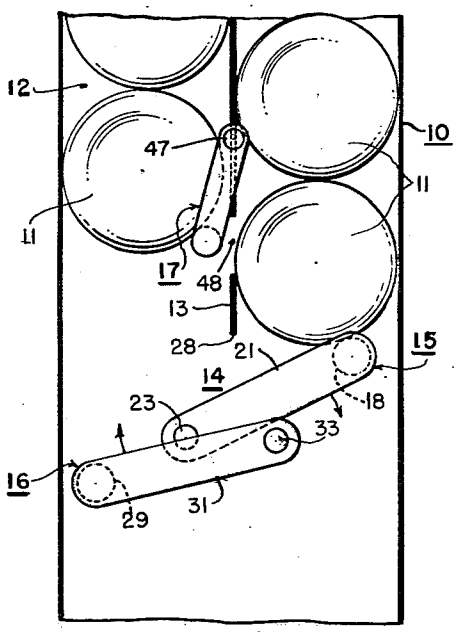


FIG.4.

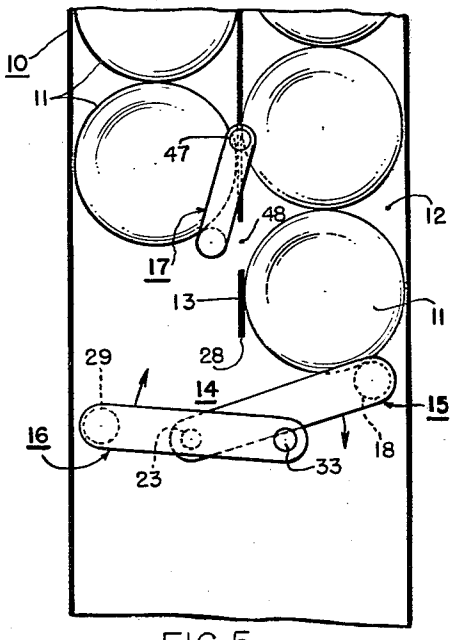


FIG.5.

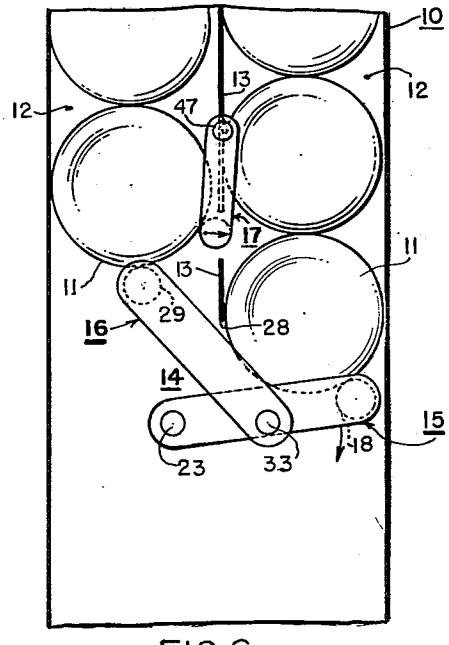


FIG.6.

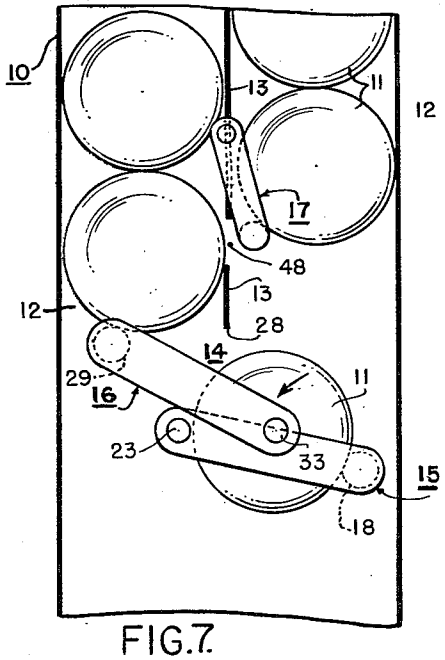


FIG.7.

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3,107,030

APPARATUS FOR DISPENSING ARTICLES ALTERNATELY FROM TWO ADJACENT COLUMNS

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Continuation of application Ser. No. 731,020, Apr. 25, 1958. This application Sept. 28, 1961, Ser. No. 142,453

5 Claims. (Cl. 221—116)

This invention relates to dispensing apparatus and more particularly to an improved mechanism for dispensing elongated articles of generally circular cross-section, such as bottles or cans, from storage compartments or magazines.

The invention is particularly applicable to releasing mechanisms for use in soft drink bottle vending machines that are adapted to deliver a single bottle upon insertion of a coin into the machine. Bottle vending machines generally contain a refrigerated store of bottles that are disposed in stacked rows, or columns, within a compartmented magazine. This invention provides an improved mechanism for individually releasing, or dispensing, stored bottles from the lower end of the columns, or rows, of bottles.

Briefly, the preferred embodiment of the invention herein disclosed comprises a mechanism or system of oscillatable members disposed at the lower ends of two side-by-side article columns or article-containing compartments, which mechanism, when activated either manually or by means of an electric motor or the like, alternately delivers a single article from each of the columns or compartments. The mechanism includes a lowering and releasing member disposed beneath each article column and having an article-engaging surface which moves up and down beneath that column. These members alternately lower the columns of articles and, when moved to their lowermost positions, permit the release of an article from the column lowered thereby. The mechanism also includes a holding member disposed above and between the two releasing members and which functions to support and hold back all but the lowermost article in the column from which the lowermost article is being released. In accordance with the invention, the movements of the two releasing members and the holding member are related in such a manner that the weight of the article columns is gently transferred from the holding member to the releasing members and vice versa. This is accomplished by delaying removal of the holding member from beneath an article column until the releasing member for that column is raised to engage the lowermost one of the articles supported by said holding member, whereby the column does not drop or fall onto the releasing member when support by the holding member is withdrawn. Similarly, the holding member is moved into the other column between the lowermost and next-to-lowermost articles just as the next-to-lowermost article in the column is lowered into position to be engaged by the holding member.

It is an object of this invention to effect dispensing of the articles in such a manner as to minimize the dropping, bumping, or jarring of the article columns, so as to reduce the likelihood of the articles being damaged or broken.

Other objects, features and advantages of the invention will appear from the following detailed description of the invention, of which the accompanying drawings form a part and wherein:

FIG. 1 is a fragmentary vertical sectional view taken from a side of a bottle dispenser embodying this invention;

FIG. 2 is a vertical sectional view from the front of the dispenser, taken as indicated by the line II—II in FIG. 1;

FIG. 3 is a view similar to FIG. 2, but taken as indicated by the line III—III in FIG. 1;

FIGS. 4 through 7 are a series of schematic illustrations showing successive positions of the dispensing mechanism in releasing a bottle from the right-hand storage compartment of the dispenser; and

FIG. 8 is a schematic illustration of the electrical control circuit for the dispenser.

The invention is embodied in dispensing apparatus employing a magazine 10 for storing two columns of vertically stacked bottles 11 in side-by-side compartments 12 which are separated by a partition 13, as best shown in FIGS. 2 and 3. Each compartment 12 is open at the front to permit the bottles 11 to be placed in the magazine. The compartments 12 are also open at their lower ends to permit bottles to be released therefrom by a dispensing mechanism which is disposed at the lower ends of the compartments and identified, generally, in the drawings by the numeral 14.

Release of the bottles 11 from the lower ends of the compartments 12 is governed by movements of three principal elements of the dispensing mechanism 14. These elements are: two lowering and releasing members 15 and 16; and a holding member 17. The two releasing members 15 and 16 and the holding member 17 undergo a series of related oscillating movements to release individual bottles 11 alternately from the compartments 12.

The two lowering and relasing members 15 and 16 are similar in construction and each is adapted to respectively control the release of bottles from one of the two columns.

Referring to FIGS. 1 and 3, the right-hand releasing member 15 includes a support bar 18 which extends from front to rear beneath the right-hand compartment 12 and projects through openings provided therefor in the front wall 19 and the rear wall 20 of the bottle storage magazine. The bar 18 is cylindrical and has a smooth exterior surface for engagement with the bottles 11, i.e., bar 18 provides an article engaging surface for releasing member 15. The support bar 18 is supported at its ends by front and rear arms 21 and 22, which are pivotally mounted for movement about a common axis by means of pins 23 projecting from the front and rear walls 19 and 20 of the magazine (see FIG. 1). The pivot pins 23 are disposed to the left of the plane of the partition 13, as shown in FIG. 3, to permit the arms 21 and 22, when oscillated about the axis of the pins, to carry the support bar 18 through an arcuate path of movement which is illustrated by the shape of an opening 19*a* in the magazine front wall 19 through which the support bar 18 passes. A similar opening (not shown) is provided in the magazine rear wall 20. This oscillating movement of the support bar 18 is produced by rotation of a cam 24 disposed just forward of the magazine front wall 19 in a position to engage a follower 26 therefor which is rotatably carried by the front arm 21 of the releasing member 15.

It will be noted that the support bar 18 of the releasing member 15 is movable from an upper or raised position in which it is disposed slightly to the left of the middle of the right-hand compartment 12, downwardly in an arcuate path of travel to a lowered position in which the bar 18 is disposed close to the right-hand wall of the magazine. The partition 13 is purposely terminated a distance above the lowermost position of the support bar 18 which is sufficient to permit a bottle resting on the support bar 18 to move through the space between these two members and be released from the magazine. It can

be appreciated that, in moving from an uppermost position to a lowermost position, the right-hand releasing member **15** is capable of lowering the column of bottles **11** in the right-hand compartment **12** sufficiently to enable the lowermost bottle **11** of the column to move sideways and to the left (as viewed in FIG. 3) between the support bar **18** and the lower edge **28** of the partition **13**. Bottles released by the member **15** fall onto a sloping chute **30** disposed beneath the magazine and slide forwardly thereon.

The left-hand releasing member **16**, although similar in both operation and construction to the right-hand releasing member **15**, has a relatively longer support bar **29** which is carried by front and rear arms **31** and **32** and provides an article engaging surface for releasing member **16**. Support bar **29** extends through an arcuate shaped opening **19***b* in the magazine wall **19** and a similar opening (not shown) in magazine rear wall **20**. The arms **31** and **32** are spaced apart a greater distance than the distance between the front and rear arms **21** and **22** of the right-hand releasing member **15** to provide clearance between the elements of the right and left-hand releasing members, so that they may be moved independently of one another. The front arm **31** of the left-hand releasing member **16** is pivotally attached by means of a pin **33** to an upstanding partition **34** disposed forwardly of and in a plane parallel to the magazine front wall **19**. The rear arm **32** is pivotally supported by a pin **36** on another partition **37** spaced rearwardly from the rear wall **20** of the magazine. The pins **33** and **36** are axially aligned in such a manner that the arms **31** and **32** of the releasing member **16** pivot about a common axis. As in the case of the right-hand releasing member **15**, the pivot pins **33** and **36** are located to permit the supporting bar **29** of the left-hand releasing member **16** to travel in an arcuate path, up and down beneath the bottle column in the left-hand compartment **12**. The left-hand releasing member **16**, therefore, is capable of lowering the bottles in the left-hand compartment **12** and releasing the lowermost bottle by lowering it beyond the lower edge **28** of the partition **13**. The member **16** is driven through its front arm **31** by a cam **38** which engages a roller follower **39** mounted on the front arm.

The cams **24** and **38** which actuate the releasing arms **15** and **16** are both secured to a single drive shaft **41** for rotation therewith. These cams are angularly offset with respect to one another, that is, their respective high points, **24***a* and **38***a*, and their respective low points, **24***b* and **38***b*, are angularly displaced from each other, so that the support bars **18** and **29** of the releasing members **15** and **16** are alternately raised and lowered. This relationship between the cams **24** and **38** causes the releasing members **15** and **16** to release bottles alternately from the two compartments **12**.

When either of the releasing members **15** and **16** is in its lowermost position, all of the bottles in the compartment above that releasing member would fall through the open lower end of the compartment were the column of bottles above the lowermost bottle not supported by some other means. This supporting function is performed by the holding member **17** which is disposed above the releasing members **15** and **16**. The holding member **17** comprises a support bar **45** which extends from front to rear through the magazine and is carried at its front and rear ends by pivotally mounted arms **46**. The surface of bar **45** also may be termed an article surface engaging surface. The arms **46** pivot about pins **47** carried by the front wall **19** and the rear wall **20** of the magazine. The pivotal axis provided by the pins **47** lies in the plane of the partition **13** which separates the bottle storage compartment **12**, and the partition **13** has a horizontal slot **48** provided therein which enables the holding bar **45** of member **17** to oscillate or swing transversely from one bottle storage compartment **12** to the other. The holding member **17** can, therefore, be moved from a position in

which it blocks downward movement of the column of bottles in the left-hand compartment **12** (this position is shown in FIGS. 1 through 3) to a position in which it supports and blocks downward movement of the column of bottles in the right-hand compartment **12**.

The support bars **18** and **29** of the releasing members **15** and **16** and the support bar **45** of the holding member **17** constitute article engaging members or elements, and the exterior surfaces of these bars may be referred to as article engaging surfaces.

Movements of the holding member **17** are correlated to movements of the two releasing members **15** and **16** so that the holding bar **45** is moved out of one compartment **12** only after the releasing member for that compartment has been elevated sufficiently to undertake the support of the column of bottles in that compartment without the column being dropped violently from the holding member onto the releasing member. The movements of the holding member **17** are also related to downward movements of the releasing members **15** and **16** in such a manner that the holding member **17** does not enter the adjacent compartment **12** until the releasing member for that compartment has lowered the lowermost bottle of that bottle column beyond the holding bar **45**, so that the holding member **17** engages and supports the rest of the bottle column through the next bottle above that bottle which is being released by a releasing member. Movements of the holding member **17** are effected through a cam and lever linkage system including a rocker arm **49** which is pivotally mounted at **51**, intermediate its ends, on the support partition **34** at the front of the magazine. The upper end of the rocker arm **49** has a slot **52** therein for receiving a drive pin **53** projecting forward from the axis of the holding member bar **45**. The opposite and lower end of the rocker arm **49** carries a roller follower **54** which rides in a cam groove **56** formed in the rear face of a holding member cam **57**. This drive and linkage is illustrated in FIGS. 1 and 2. The cam **57** is secured to the drive shaft **41** for rotation therewith and is adapted to cause movement of the holding member **17** from a position in which it holds the bottles in one compartment **12** to a position in which it holds the bottles in the other compartment **12**, and back, each time the shaft **41** is rotated through 360 degrees. The use of a cam groove **56**, rather than a peripheral surface cam, assures positive movement of the holding member **17** and prevents accidental movement of the holding member **17** under the weight of the bottles in the two compartments **12** by confining the cam follower **54** to a preselected position for each position of the shaft **41** and cam **57**. The cams **24**, **38** and **57** which cause movement of the several elements of the dispensing mechanism **16**, being all secured to the same shaft **41**, turn simultaneously as the shaft **41** is rotated by a motor **61** and gear reduction unit **62** disposed at the front of the magazine and supported by another partition **63**, spaced forwardly of the magazine front wall **19**.

Energization of the motor **61** is controlled through an electrical circuit illustrated in a simplified manner in FIG. 8. The function of this control circuit is to permit initial energization of the motor **61** to initiate the release of a bottle **11** from one of the compartments **12**, continue energization of the motor **61** until one of the releasing members **15** and **16** reaches its lowermost position and the release of a bottle is effected, and to automatically deenergize the motor **61** at that time. As mentioned previously, the releasing members **15** and **16** and the holding member **17** are driven through a sequence of movements which effects the release of a bottle from each of the two compartments **12** during one complete revolution of the shaft **41**. Consequently, in a dispenser adapted to deliver bottles singly, the electrical control circuit permits the shaft **41** to be driven through but one-half of a complete revolution following initial energization of the motor **61**.

Electrical current is supplied to the motor 61 through a pair of conductors identified as L1 and L2 which represent an electrical supply line. Conductor L1 is connected directly to the motor 61. Conductor L2 is connected to the other side of the motor 61 but has a pair of switches 66 and 67 therein which are in parallel with one another. Switch 66 is adapted, when closed, to establish a circuit through the motor 61 to effect initial energization of the motor. The switch 66 can be manually closed or, if this invention is employed in a coin operated vending machine, the switch 66 can be a part of the coin control mechanism. In the latter case, the switch 66 is closed in response to the insertion of a legitimate coin into the machine. Switch 66 need be closed only temporarily since, shortly after the motor 61 begins to run, switch 67 is closed to establish a holding circuit to the motor 61, which circuit is broken only when the motor 61 is operated sufficiently to drive the dispensing mechanism 14 through a bottle releasing operation. The switch 67 is actuated by means of a cam 68 which is mounted on and driven by the same shaft 41 which drives the dispensing mechanism cams 24, 38 and 57. The cam 68 has two diametrically disposed lobes 69 on the periphery thereof which engage an actuating arm 71 forming a part of the switch 67. As can be seen in FIG. 8, the arrangement is such that each cam lobe 69 is adapted to move actuating arm 71 in the direction to open switch 67 when that lobe 69 is driven into contact with the switch actuating arm 71. Shortly after the motor 61 is energized by switch 66, switch 67 closes and maintains an electrical circuit to the motor 61 until the next cam lobe 69 is moved to a position in which it opens switch 67. Preferably, the cam 68 is mounted on shaft 41 in an angular position relationship to the cams 24, 38 and 57 of the dispensing mechanism 14 to effect deenergization of the motor 61 when or shortly after each one of the releasing members 15 and 16 is moved to its lowermost or bottle releasing position.

Operation

FIGS. 4 through 7 illustrate movements of the dispensing mechanism 14 for releasing one bottle 11 from the right-hand compartment 12. FIG. 4 shows the releasing members 15 and 16 and the holding member 17 in their respective positions at the beginning of the dispensing operation, the same positions which these elements occupy in FIGS. 1 through 3. Following energization of the motor 61, the right-hand releasing member 15 swings downwardly, lowering all of the bottles 11 in the right-hand compartment 12. The bottles in the left-hand compartment are held stationary by the holding member 17, which occupies a position in the path of movement of the bottles in this compartment. Concurrently with the lowering of the right-hand releasing member 15, the left-hand releasing member 16 commences to move upwardly as shown in FIG. 5 and eventually reaches its uppermost position as shown in FIG. 6. In this position the supporting bar 29 of member 16 engages the lowermost bottle of the left-hand column to provide support for this column when the holding member 17 is moved from beneath that column. The configurations of cams 24 and 38 (FIGS. 1 and 3) are such that member 16 is raised more rapidly than member 15 is lowered and member 16 reaches its uppermost position before the member 15 reaches its lowermost position. The member 16 dwells in its uppermost position while the holding member 17 is moved from beneath the column of bottles in the left-hand compartment 12 so that the weight of these botles is genly transferred from the holding member 17 to the member 16. At this point, the right-hand releasing member 15 has lowered the right-hand bottle column to the position where the lowermost bottle in the right-hand compartment 12 is below the holding member 17, so that the holding member can move into the space between the lowermost bottle and the next lowermost bottle and hold back, or support, all of the bottles in the right-hand compartment with the exception of the lowermost bottle. The surface of cam 24 is preferably provided with a short, constant radius section to permit the member 15 to dwell in the position shown in FIG. 6 until member 17 can move over to engage the next-to-lowermost bottle. Continued energization of the drive motor 61 permits the right-hand releasing member 15 to move to its lowermost position, as shown in FIG. 7, and the bottle 11 carried thereby is freed to pass between the lower edge 28 of partition 13 and the support bar 18 of the releasing member and fall onto the discharge chute 30, shown in FIG. 1. The final movement of member 15 can be comparatively rapid so as to jog the lowermost bottle and insure its release; the remainder of the right-hand bottle column being unaffected by this latter movement of the member 15 because the column is supported by the holding member 17.

It should be noted that the left-hand bottle column is transferred smoothly and gently from the holding member 17 to the releasing member 16 by virtue of the fact that the holding member 17 is not withdrawn from beneath this bottle column until the member 16 is raised to its uppermost position to engage the lowermost bottle in the left-hand column. Furthermore, the related movements of the holding members 17 and 15 insure that the right-hand column of bottles is gently stopped and supported by the holding member 17 during the descent of the releasing member 15. At no point during the dispensing sequence, therefore, are the bottle columns permitted to drop or fall abruptly and the likelihood of the bottles being damaged or broken or their contents disturbed is minimized.

During the next operating period of the dispensing mechanism, a bottle 11 will be released from the left-hand compartment 12 as the elements of the dispensing mechanism undergo a related sequence of movements similar to that described above with respect to the releasing of a bottle from the right-hand compartment.

From the foregoing it will be apparent this invention enables bottles, or other articles, to be handled in an improved manner in a two-compartment dispenser adapted to release articles alternately from the lower ends of the compartments. The mechanism shown and described is both positive and reliable in operation and, therefore, well suited for use in unattended coin controlled article vendors.

While the invention has been described with reference to a magazine having but two storage compartments, it can be appreciated that the invention can be employed in dispensing apparatus wherein additional pairs of compartments are arranged alongside of, or near, the two-compartment magazine described above. In such an application, a separate dispensing mechanism 14 would be provided for each pair of compartments, although all of the mechanisms could, if desired, be driven from a single drive motor and the movements of the releasing mechanisms correlated to sequentially release bottles from the several storage compartments.

Thus, while the invention has been described in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

This application is a continuation of application Serial No. 731,020, filed April 25, 1958, now abandoned.

What is claimed is:

1. In a machine for dispensing elongated articles of generally circular cross section,

a magazine for storing at least two columns of stacked articles, said magazine being open at its lower end to permit articles to be delivered therefrom,

and mechanism positioned at the lower end of said magazine for releasing individual articles alternately from said columns,

said mechanism including three article engaging members, two of said article engaging members being

disposed respectively beneath said columns,
means for alternately raising and lowering said two article engaging members,
each of said two article engaging members being adapted when raised to prevent the delivery of an article from the article column above that member and when lowered to permit the delivery of an article from the article column above that member,
said last-named means effecting raising and lowering of said two article engaging members in alternating sequence to release articles alternately from said columns,
the third of said article engaging members being supported for movement from a position beneath one of said columns to a position beneath the other of said columns, said third article engaging member being movable with respect to said other members,
and drive means interconnecting said third member with said first two members for alternately moving said third member from its position beneath one of said columns to its position beneath the other of said columns in predetermined relation to movements of said first two members, said drive means delaying removal of said third member from beneath one article column until the one of said first two members which is beneath said one column is raised to engage the lowermost article supported by said third member, the construction and arrangement being such that the weight of the articles in said one column is transferred gently to said one member from said third member.

2. In a machine for dispensing articles of generally circular cross section,
a magazine for storing at least two side-by-side columns of stacked articles, said magazine being open at its lower end to permit articles to be delivered therefrom,
and mechanism positioned at the lower end of said magazine for releasing individual articles alternately from said columns,
said mechanism including a holding member supported for movement between a position beneath one of said columns and a position beneath the other of said columns,
said mechanism further including a lowering and releasing member disposed beneath each of said columns, each of said lowering and releasing members being movable upwardly to a position to engage the lowermost article supported by said holding member,
the construction and arrangement of the magazine and the lowering and releasing members being such that each lowering and releasing member is adapted when raised to prevent the delivery of an article from the article column above that member and when lowered sufficiently to permit the delivery of an article from said article column,
and means for driving said holding member and said lowering and releasing members in predetermined relation to dispense articles alternately from said columns, said driving means in dispensing an article from either one of said columns being operable,
to lower the lowering and releasing member for the one column from its uppermost position to release the lowermost article in said one column,
to raise the lowering and releasing member for the other column to its uppermost position to engage the lowermost article in said other column, and
to retain the holding member in engagement with the lowermost article in said other column until the lowering and releasing member for said other column is substantially in engagement with said lowermost article and then to move the holding member to said one column into engagement with the next to the lowermost article therein before the lowering and releasing member for said one column releases said lowermost article.

3. In a machine for dispensing elongated articles of generally circular cross section,
a magazine,
a partition having a lower edge and dividing said magazine into two side-by-side compartments each of which is adapted to contain a column of stacked articles, said articles being disposed within said compartments with their axes arranged more nearly horizontally than vertically,
a releasing member disposed at the lower end of each of said compartments, each of said releasing members having an article engaging surface thereon extending beneath the column of articles in the compartment above that releasing member,
means supporting each of said releasing members for movement in a manner that permits the article engaging surface of each member to move from an elevated position above said lower edge of said partition to another position which is sufficiently below said lower edge of the partition to permit an article to pass between the article engaging surface and the partition,
means for moving said releasing members to alternately raise and lower their respective article engaging surfaces to alternately effect delivery of articles from said two compartments,
a holding member disposed near the lower end of said magazine,
means supporting said holding member for movement from a position in one of said compartments in which it supports a column of articles in said one compartment to a position in the other of said compartments in which it supports a column of articles in said other compartment, said holding member being movable with respect to said releasing members, and
means for driving said holding member in predetermined relation to movements of said releasing members, said last-named drive means positioning said holding member between the lowermost and the next-to-lowermost articles in that article column from which an article is being delivered to prevent the delivery of more than one article at a time from said compartments.

4. In a machine for dispensing elongated articles of generally circular cross-section,
a magazine,
a partition having a lower edge and dividing said magazine into two side-by-side compartments each of which is adapted to contain a column of stacked articles, said articles being disposed within said compartments with their axes arranged more nearly horizontally than vertically,
a releasing member disposed at the lower end of each of said compartments, each of said releasing members having an article engaging surface thereon extending beneath the column of articles in the compartment above that releasing member,
means supporting each of said releasing members for movement in a manner that permits the article engaging surface of each member to move from an elevated position above said lower edge of said partition to another position which is sufficiently below said lower edge of the partition to permit an article to pass between the article engaging surface and the partition,
means for moving said releasing members to alternately raise and lower their respective article engaging surfaces to alternately effect delivery of articles from said two compartments,
a holding member disposed near the lower end of said magazine,
means supporting said holding member for movement from a position in one of said compartments in

which it supports a column of articles in said one compartment to a position in the other of said compartments in which is supports a column of articles in said other compartment, said holding member being movable with respect to said releasing members, and

means for driving said holding member in predetermined relation to movement of said releasing members, said last-named drive means delaying movement of said holding member out of a compartment until the releasing member for the article column in that compartment is raised to its said elevated position and engages the lowermost article supported by said holding member, the construction and arrangement being such that the weight of articles in that column is transferred gently to said releasing member from said holding member.

5. In a machine for dispensing articles of generally circular cross section,

a magazine for storing at least two side-by-side columns of stacked articles, said magazine being open at its lower end to permit articles to be delivered therefrom,

and mechanism positioned at the lower end of said magazine for releasing individual articles alternately from said columns,

said mechanism including a holding member supported for movement between a position beneath one of said columns and a position beneath the other of said columns,

said mechanism further including a lowering and releasing member disposed adjacent the lower end of each of said columns, each of said lowering and releasing members being movable upwardly to a position beneath and substantially in engagement with the lowermost article supported by said holding member,

the construction and arrangement of the magazine and the lowering and releasing members being such that each lowering and releasing member is adapted when raised to prevent the delivery of an article from the article column above that member and when lowered sufficiently to permit the delivery of an article from said article column,

and means for driving said holding member and said lowering and releasing members in predetermined relation to dispense articles alternately from said columns, said driving means in dispensing an article from either one of said columns being operable,

to lower the lowering and releasing member for the one column from its uppermost position to release the lowermost article in said one column,

to raise the lowering and releasing member for the other column to its uppermost position to engage the lowermost article in said other column, and

to retain the holding member in engagement with the lowermost article in said other column until the lowering and releasing member for said other column is substantially in engagement with said lowermost article and then to move the holding member to said one column into engagement with the next to the lowermost article therein before the lowering and releasing member for said one column releases said lowermost article, each lowering and releasing member being movable relative to said holding member during at least a portion of each of said lowering and raising movements.

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