United States Patent [19]

Bookout

[11] **3,883,038**

[45] **May 13, 1975**

[54] **CAN AND BOTTLE VENDOR**

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[73] Assignee: **Rock-Ola Manufacturing Corporation,** Chicago, Ill.

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[21] Appl. No.: **414,752**

[52] **U.S. Cl.** **221/67;** 221/112; 221/242; 221/238

[51] **Int. Cl.** **B65g 59/00**

[58] **Field of Search** 221/92, 103, 110, 112, 221/114, 115, 118, 131, 67, 124, 238, 272, 221/273, 241, 242

[56] **References Cited**

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3,107,812	10/1963	Payne et al.	221/67
3,145,066	8/1964	O'Neal	221/242
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3,796,345	3/1974	Fessler	221/67
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Primary Examiner—Robert B. Reeves
Assistant Examiner—H. Grant Skaggs
Attorney, Agent, or Firm—McCaleb, Lucas & Brugman

[57] **ABSTRACT**

Article storage and dispensing means for a coin-operated automatic vending machine in which vertical gravity feed magazines have adjustable interior compartments to accommodate a plurality of cylindrical articles, such as cans or bottles, of varying diameters and lengths and a motorized cyclically operated dispensing mechanism associated with each magazine for receiving one or more articles therefrom holding the same in escrow until delivery, one at a time, to the customer.

12 Claims, 21 Drawing Figures

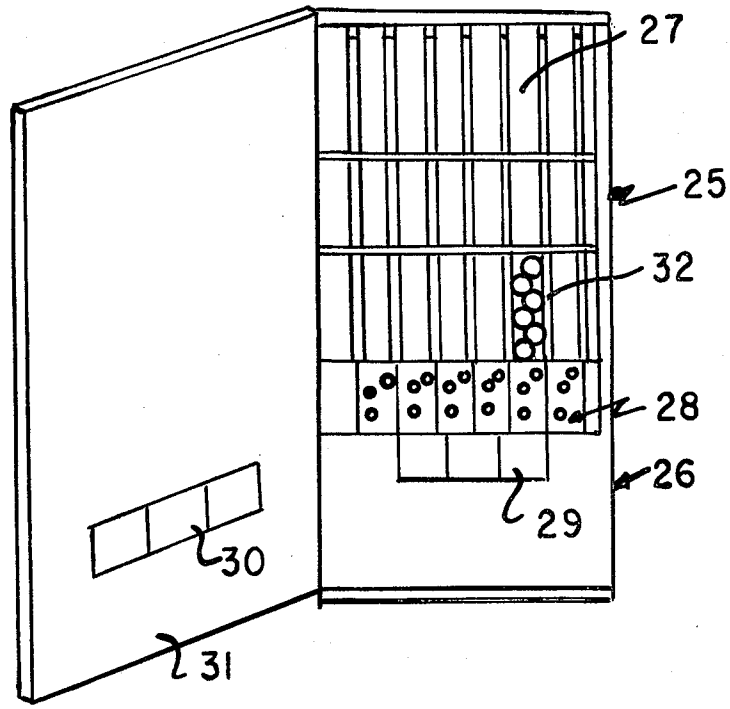


FIG. 1

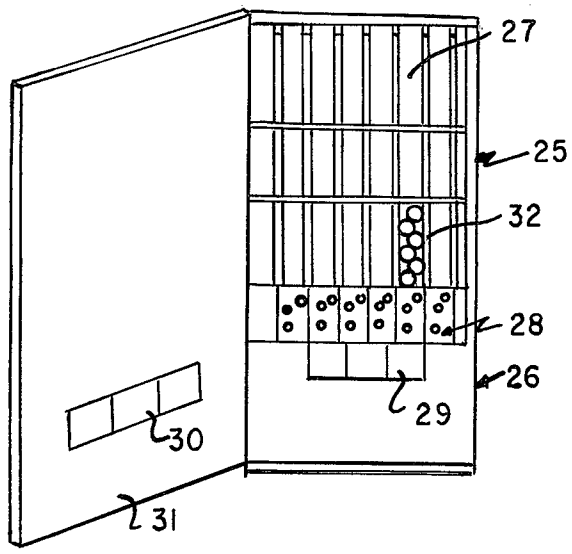


FIG. 2

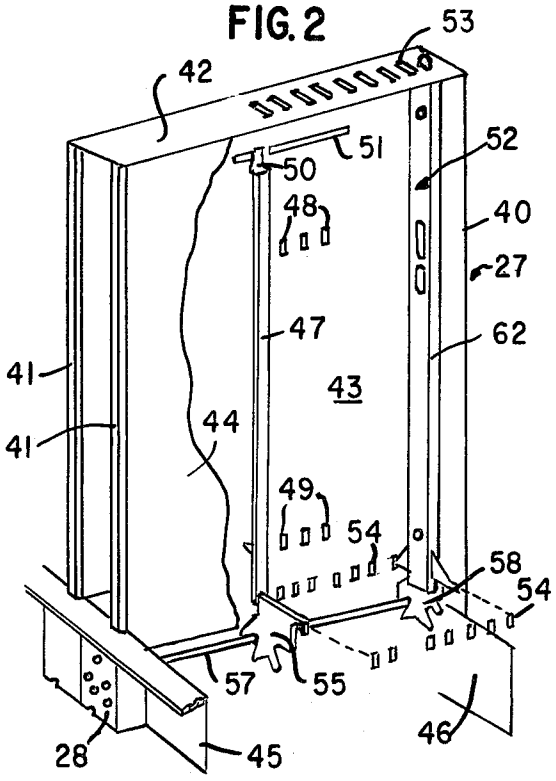


FIG. 4

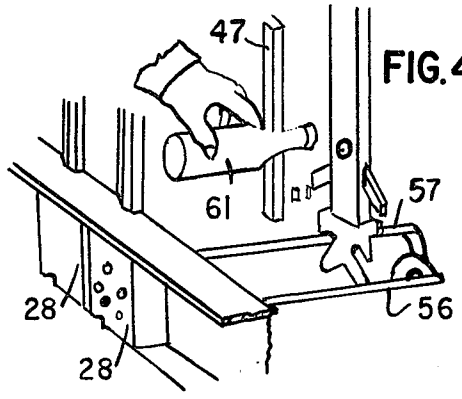


FIG. 3

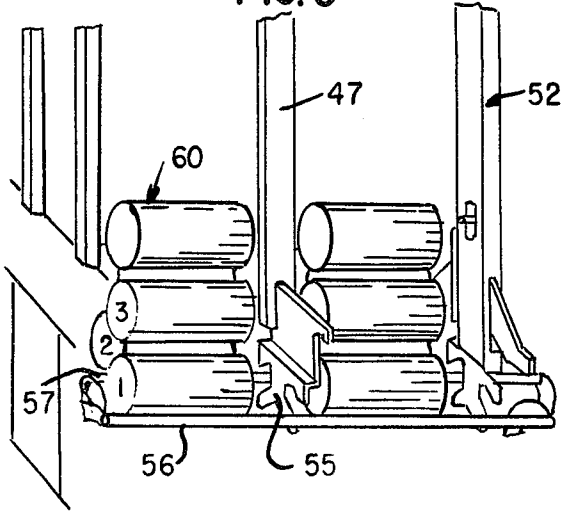


FIG. 5

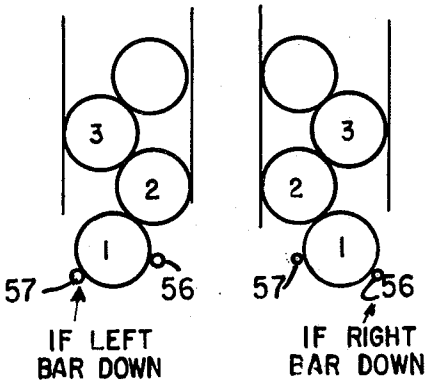


FIG. 6

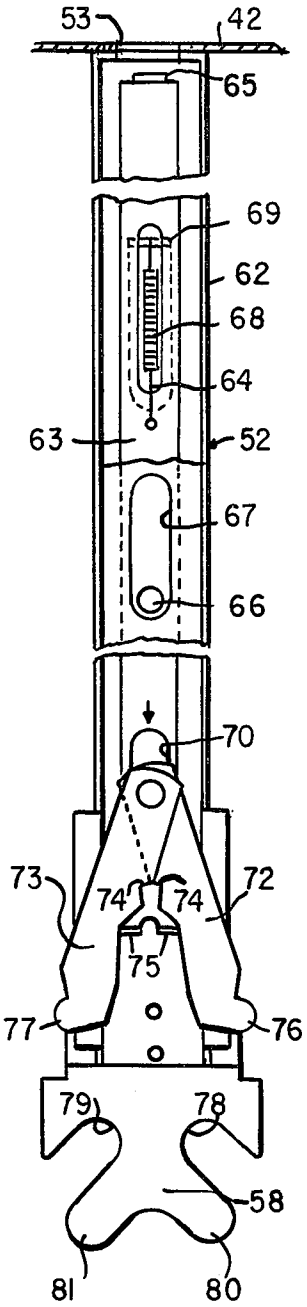
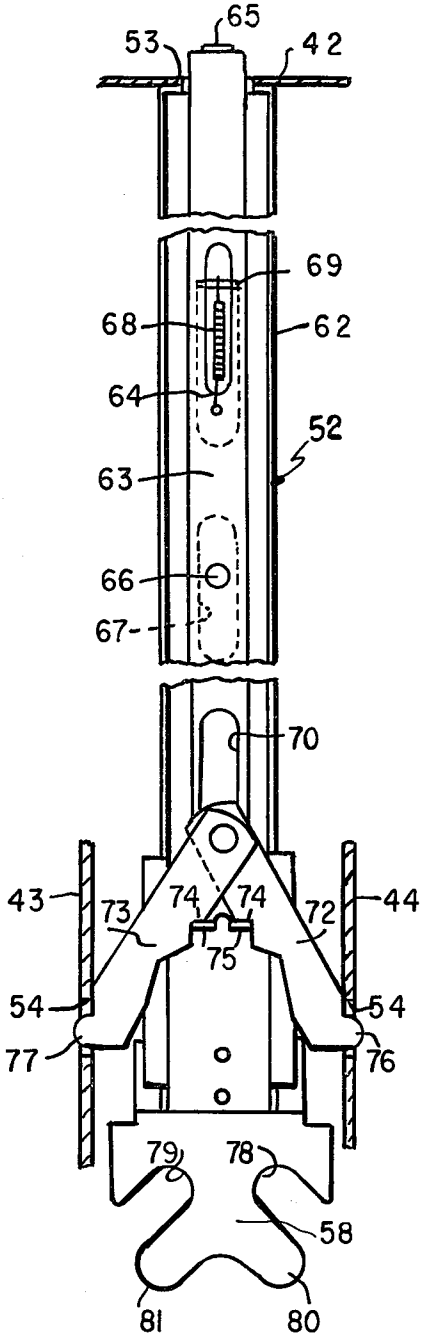

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FIG. 7


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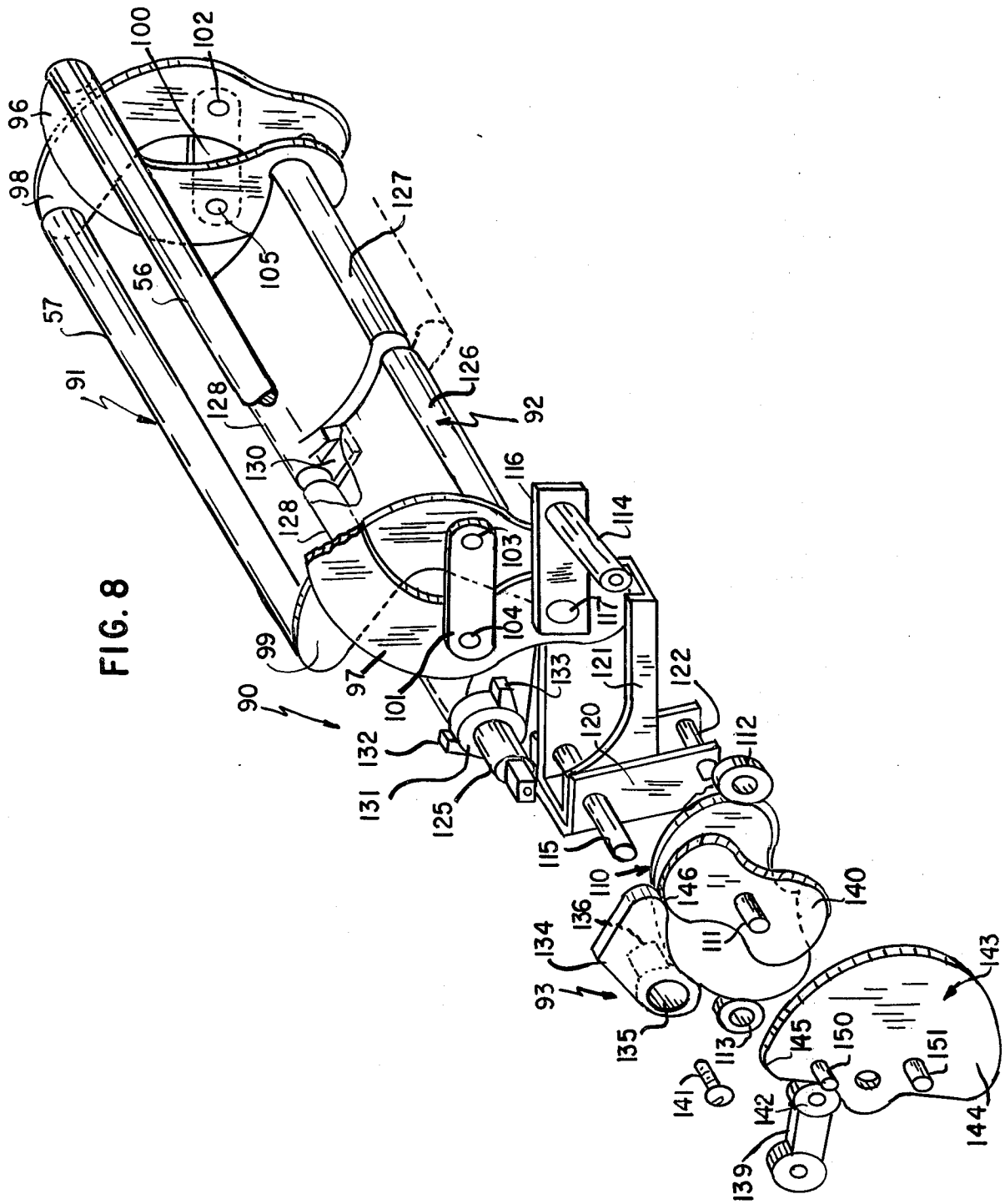

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FIG. 8

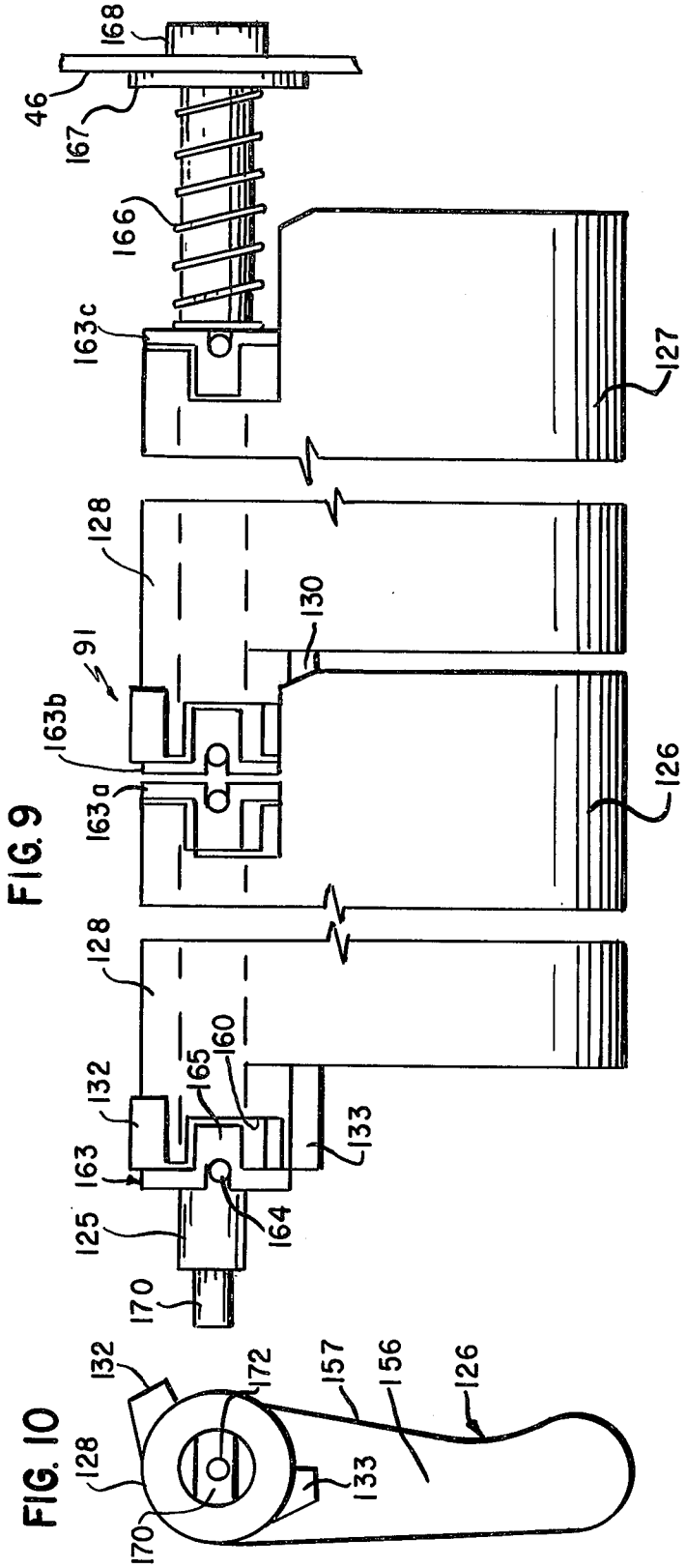


FIG. 9

FIG. 10

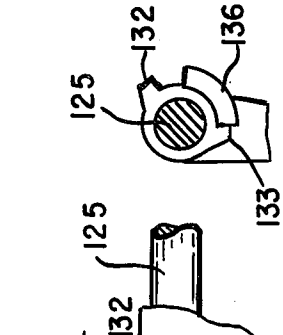


FIG. 13

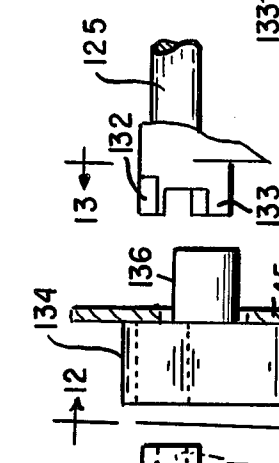


FIG. 11

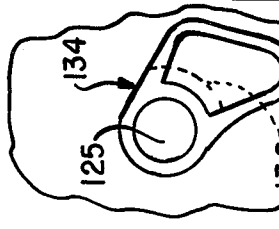


FIG. 12

FIG. 14

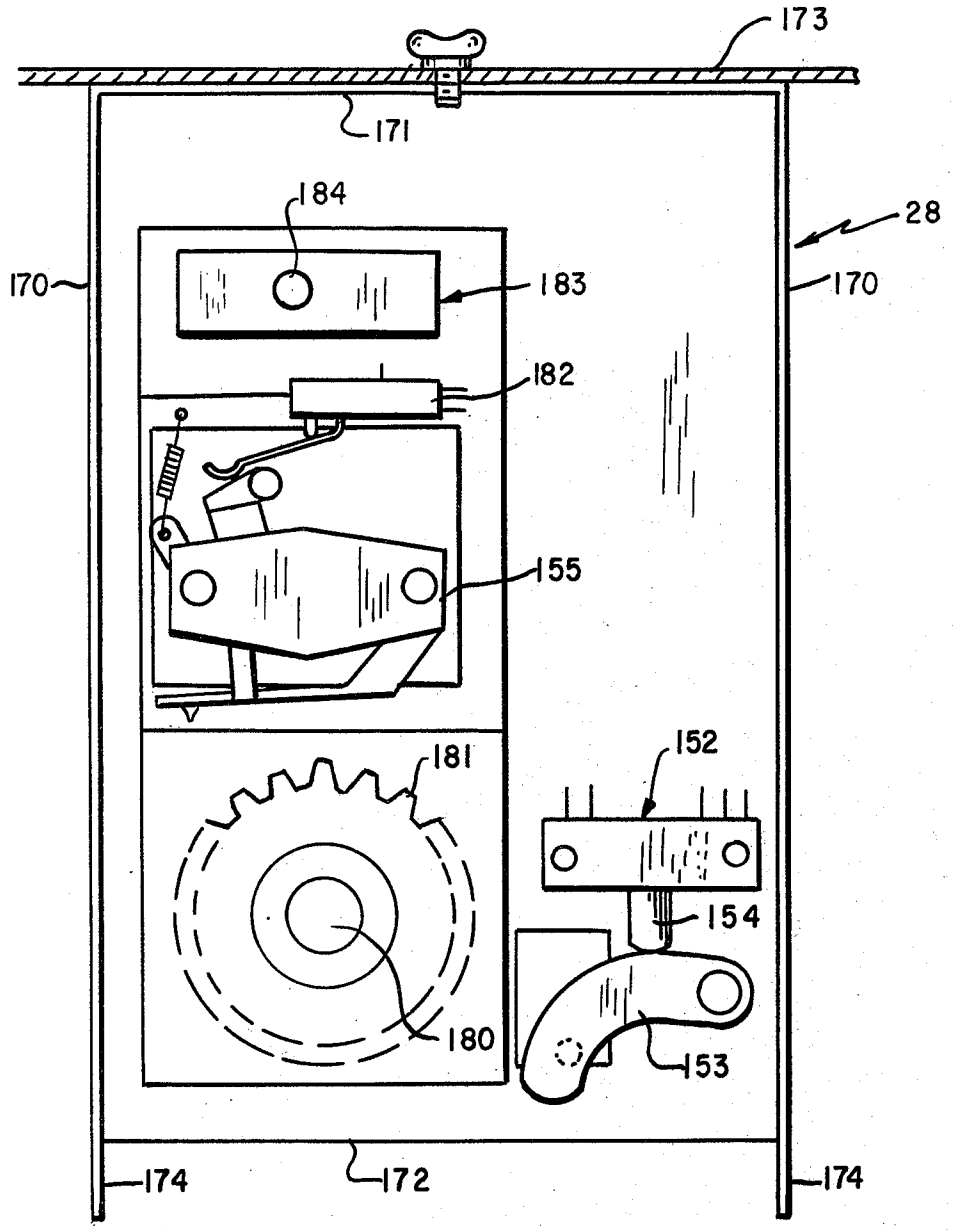

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FIG.15

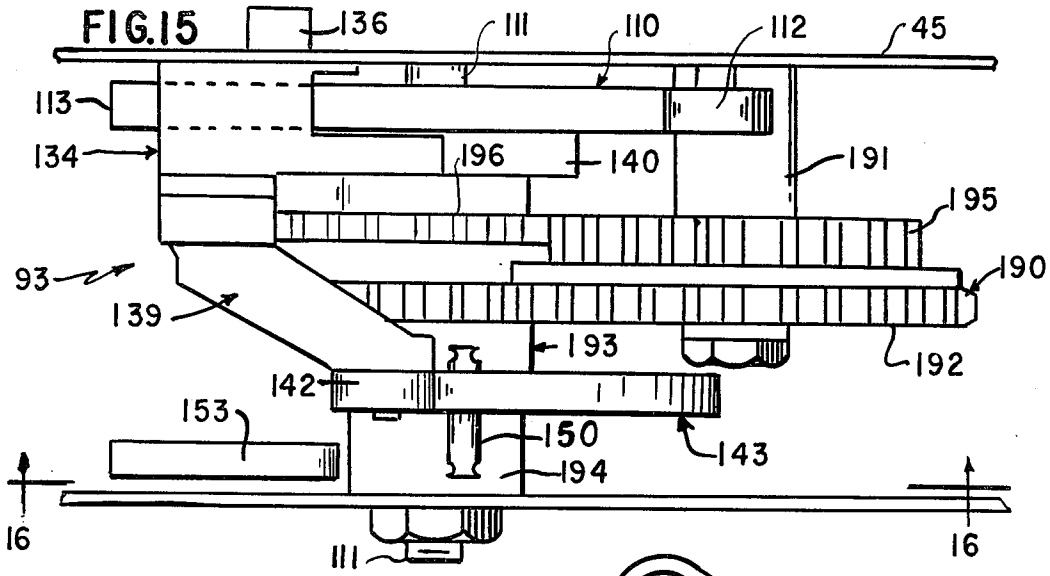


FIG.16

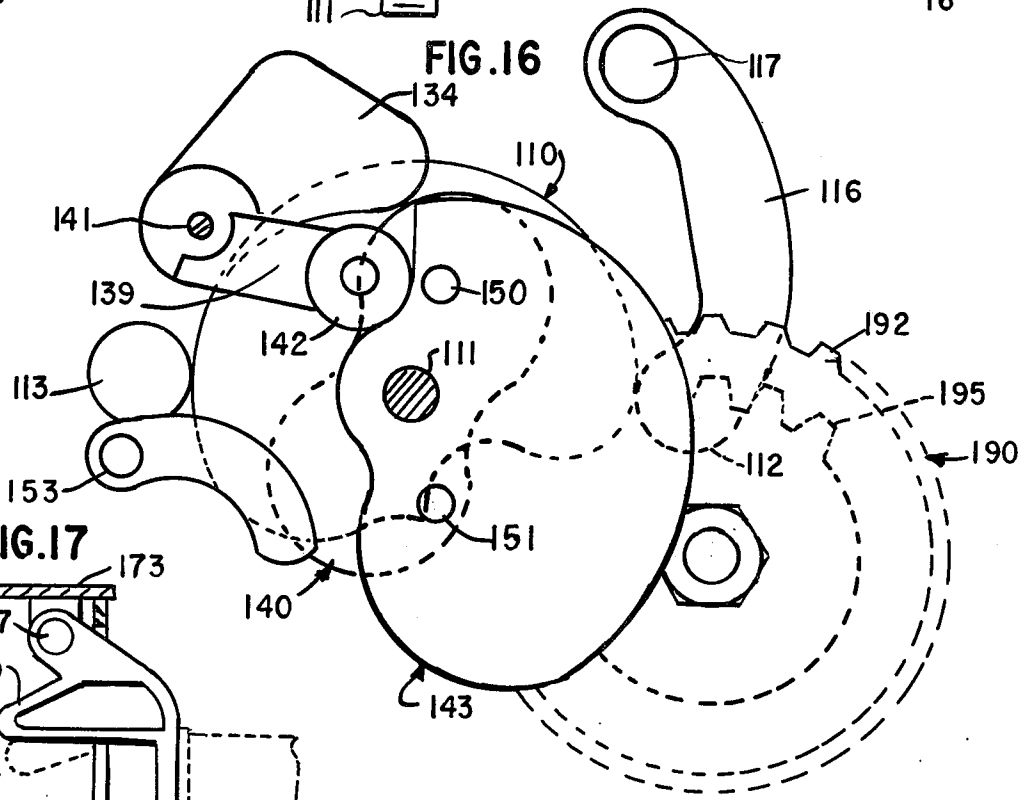
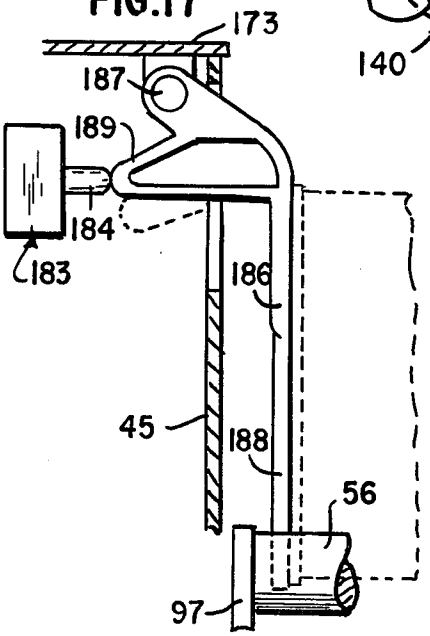


FIG.17



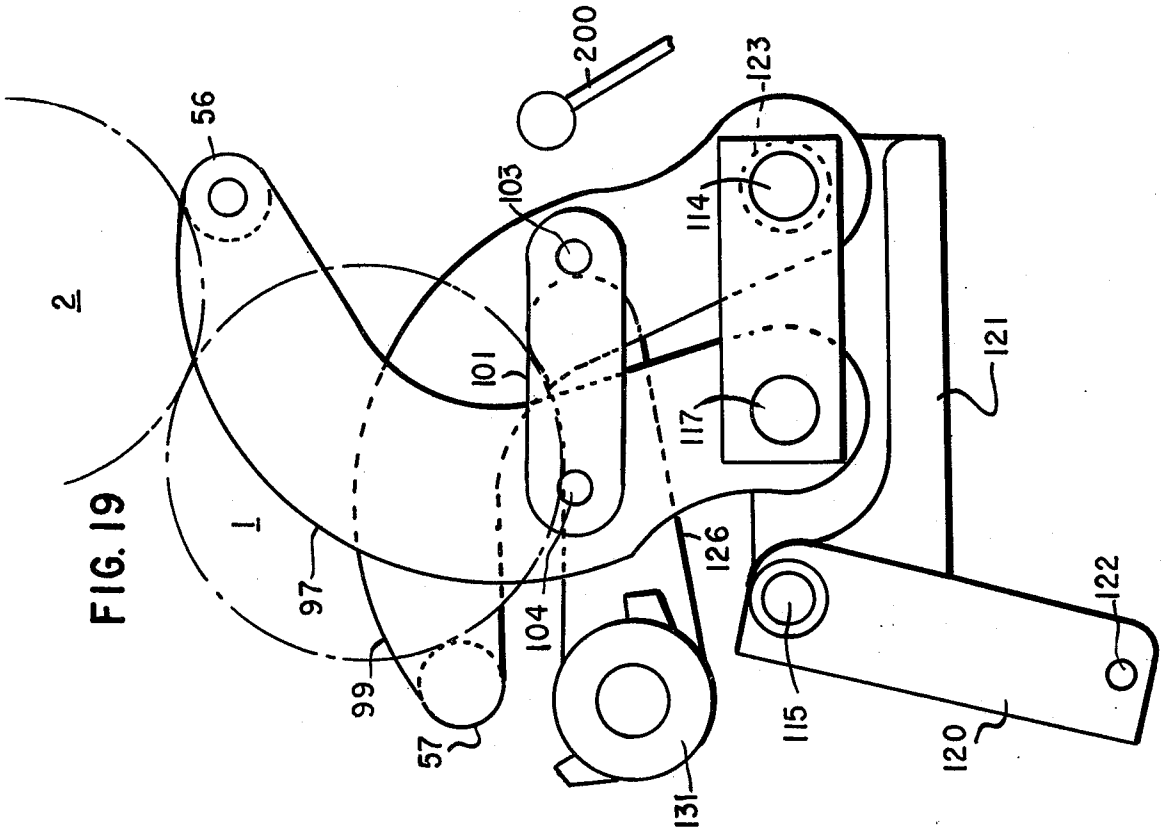

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FIG. 19

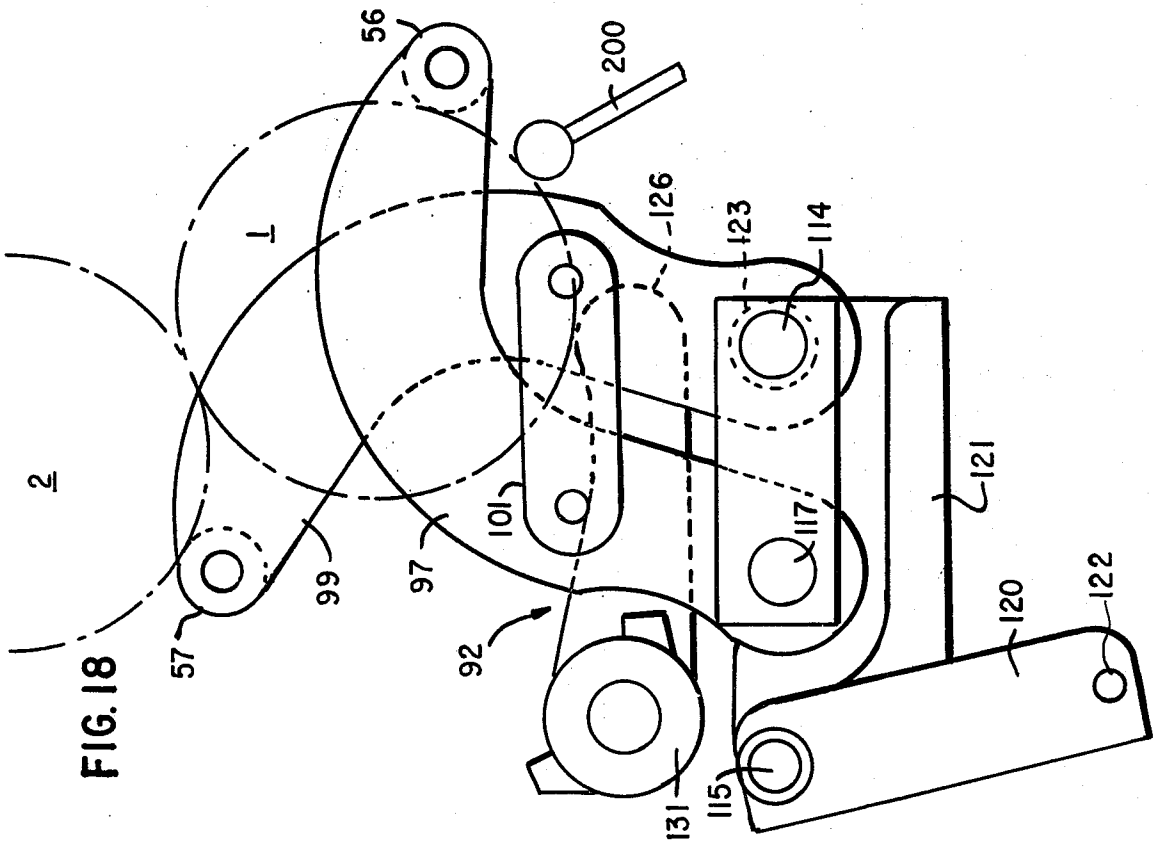

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FIG. 18

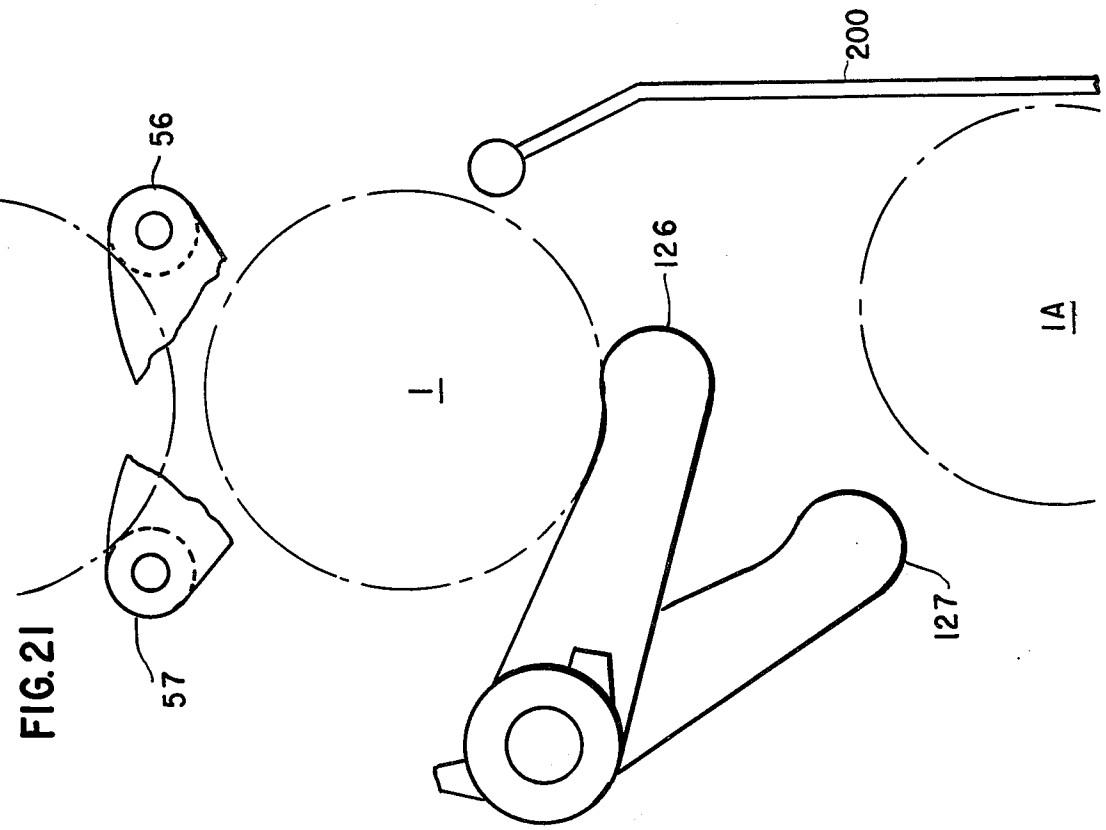

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FIG.21

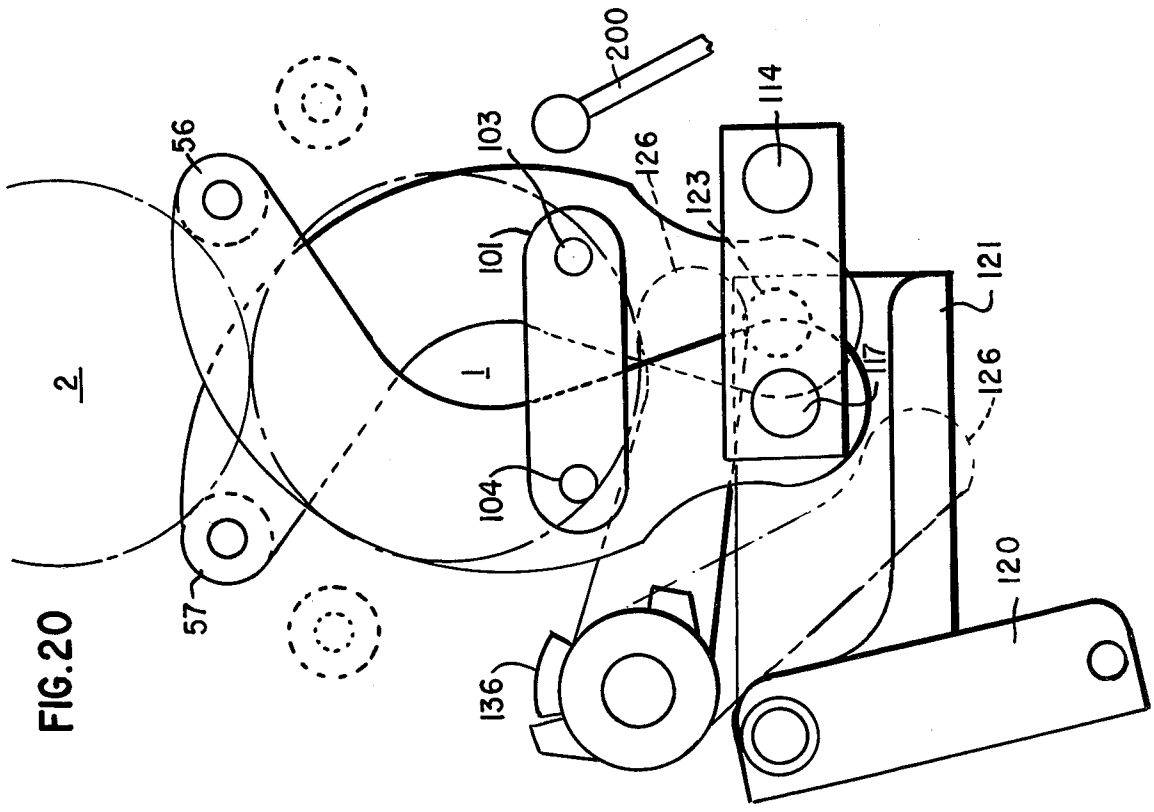

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FIG.20

CAN AND BOTTLE VENDOR

BACKGROUND OF THE INVENTION

In general this invention relates to dispensing of cylindrical articles in an automatic coin controlled vending machine and is particularly adapted to dispensing of canned and bottled articles or commodities.

While the automatic vending of cylindrical commodities has been carried out for some time in the art, in general past known mechanisms have been designed primarily to dispense articles of more or less uniform diameter and length. In addition, it has been the general practice to design vending machines to dispense either canned commodities or bottled commodities and very little attempt has been made to accommodate both types of articles in the same vending machine. In those instances where an attempt has been made to accommodate variations in diameter or length of the articles, the same have been addressed to either diameter problems, as related to cans, or length problems, as related to bottles. In the current market, a variety of canned commodities are being dispensed by automatic vending equipment. Depending on the contents of cans, the same may vary in diameter approximately three-quarters of an inch, and in length approximately one-half inch. As for articles merchandised in bottles, it has been found that the length of the bottles may vary approximately 5 inches and the diameters thereof, approximately three-quarters of an inch. Because of these size variations, it has become desirable to present means for accommodating a rather wide range of diameter and length dimensions for the canned and bottled commodities, without the necessity of designing specific magazines and dispensing mechanisms for handling each size and diameter encountered. It also has become desirable to provide a vending machine in which both canned and bottled commodities may be stored and dispensed interchangeably.

In considering the foregoing problem of providing a more or less universal vending machine for cylindrical articles, particularly cans and bottles, it is readily apparent that if one and the same magazine is to be designed for accommodating either cans or bottles as selected, such must include a certain degree of adjustability. A similar observation is true with respect to the mechanism for dispensing the articles from the storage magazines.

Adjustable compartmentalizing means have been suggested in the past, as for example, in the U.S. Pat. No. 3,145,066 issued Aug. 18, 1964, which teaches the features of an adjustable storage compartment to accommodate cylindrical articles of differing diameters. However, the teachings of that patent are relatively complicated and require numerous adjustments to achieve changes in compartment size.

Considering the dispensing mechanism to be employed with both cans and bottles, the problem becomes even more complex inasmuch as previously such items have not been interchangeably handled by the same dispensing mechanism unless articles either in cans or bottles were of substantially identical size. There have been some exceptions to this observation in the accommodation of cylindrical articles of varying length, particularly in bottle vending. However, past efforts to accommodate different diameter articles have usually produced limited success, principally because of jamming of the dispensing mechanism when attempting to accommodate any sizable diameter range, unless the dispensing mechanism is made adjustable to the particular diameter of the article being controlled thereby.

One of the more successful dispensing devices for bottle vending, for instance, is taught in my prior U.S. Pat. No. 3,146,907 issued Sept. 1, 1964 or a modified version thereof set out in U.S. Pat. No. 3,203,588 issued Aug. 31, 1965. Within limits both of the mechanisms taught in these two patents are capable of accommodating a small range of diameter variation in the articles being handled. However, in each instance serious drawbacks were encountered when attempting to vend articles varying in diameter as much as one-half inch for example, because of the inability of such mechanisms to deplete a full magazine or, that is, to dispense all the articles from a magazine. This is especially true of the last two or three articles in the magazine. The mechanism of U.S. Pat. No. 3,203,588, for instance, has a marked tendency to accept more than one article through the upper vending gates, as therein taught, and therefore jams when the supply of stacked articles is nearly depleted or, that is, the stack contains only one or two articles.

The present invention is directed to a solution of the above indicated difficulty of accommodating the vending of cans and/or bottles which vary both in length and diameter by one and the same magazine and dispensing mechanism.

BRIEF SUMMARY OF THE INVENTION

In brief, the present invention is directed to an improved magazine and dispensing mechanism adapted to dispense cans and/or bottles varying in diameter and length and is specifically directed to improvements in the type of dispensing mechanism taught in the aforenoted U.S. Pat. Nos. 3,146,907 and 3,203,588 whereby vertically stored cylindrical articles may be dispensed one by one in an accurate and positive manner without jamming the dispensing mechanism, particularly in the dispensing of the last one or two articles of the stacked commodities.

It is an important object of this invention to provide an improved storage magazine and dispensing means for vending cans and bottles having variations in diameter and in length.

It is another important object of this invention to provide an improved dispensing mechanism, particularly capable of receiving different sized cylindrical articles from an overdisposed storage magazine and releasing the same one by one without malfunctioning.

Another important object of this invention is to provide improved magazine for use in automatic vending machines and which is adapted to selectively accommodate both cylindrical cans and bottles.

A still further important object of this invention is to provide an improved storage and dispensing mechanism for cylindrical articles which is especially adapted for automatic vending machines and is economical in manufacture and maintenance, and exhibits improved operational quality.

Having thus described the present invention, the above and further objects, features and advantages thereof will be apparent to those familiar with this art from the following detailed description of a preferred embodiment thereof, illustrated in the accompanying

drawings so as to enable those familiar with the art to understand and practice this invention.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective showing of a combination can and bottle vendor according to this invention showing the arrangement of multiple storage magazines therein;

FIG. 2 is a partial perspective view schematically demonstrating the features of one magazine;

FIG. 3 is a partial perspective view similar to FIG. 2 illustrating the adaptation of a magazine for multiple stack vending;

FIG. 4 is a partial perspective showing similar to FIG. 2 illustrating the adaptation of the magazine to single stack vending;

FIG. 5 is a schematic diagram illustrating the loading pattern employed in the magazine of FIG. 2;

FIG. 6 is a front elevational view of mechanical rear guide assembly employed in establishing the length of the magazine's interior compartments;

FIG. 7 is another front elevational view of the assembly shown in FIG. 6 and illustrating its latching condition;

FIG. 8 is a diagrammatic view showing the operating and vending gate elements of the dispensing mechanisms with parts arranged in schematic perspective to facilitate illustration;

FIG. 9 is a foreshortened elevational view of the lower vending gate system employed in the mechanism of FIG. 8;

FIG. 10 is an end elevational view thereof;

FIG. 11 is an exploded view in side elevation for demonstrating the driving connection between the lower vending gate and operating means associated therewith;

FIG. 12 is an end elevational view looking substantially from vantage line 12—12 of FIG. 11;

FIG. 13 is a cross-sectional view with parts in elevation taken substantially from vantage line 13—13 of FIG. 11 and looking in the direction of the arrows thereon;

FIG. 14 is a partial elevational view of a drive motor unit for actuating the mechanism of FIG. 8;

FIG. 15 is a top plan view of the cam and drive gear means driven by the motor unit of FIG. 14;

FIG. 16 is an elevational view of the drive gear and cam means of FIG. 15 as viewed substantially from vantage line 16—16 of that Figure;

FIG. 17 is a diagrammatic showing in side elevation of a sold out lever and switch means associated with the drive means of FIG. 14;

FIG. 18 is a diagrammatic showing in end elevation of the upper and lower vend gates in loading position;

FIG. 19 is a diagrammatic view, similar to FIG. 18, illustrating a second loading position of the upper and lower vend gates;

FIG. 20 is a diagrammatic showing of the vend gate mechanism illustrated in FIGS. 18 and 19 illustrating the escrow and discharge positions of lower vend gate operation; and

FIG. 21 is a diagrammatic illustration of the vend gates showing the operating positions thereof during discharge of a commodity from escrow position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to the details of the present invention in the exemplary embodiment illustrated, FIG. 1 shows a typical vending machine 25 for accommodating can, bottle or similar cylindrical article vending. As illustrated, such comprises a cabinet 26 having a hollow interior for accommodating a plurality of vertical storage magazine means 27 from which cylindrical articles are released by vending mechanisms driven by individual motor units 28 for delivery to a discharge chute 29 available to the customer via door openings 30 in a front closing door 31 of the cabinet 26. It will be recognized that each of the plurality of magazine means 27 accommodates a staggered or serpentine stack 32 of cylindrical items as indicated generally in FIG. 1. Selector means, not shown, are provided on the front face of the door panel 31, accessible to the customer for an operation of the coin controlled vending mechanisms, and which may comprise, for example, a selector system of the order set out in my prior U.S. Pat. No. 3,628,643 issued Dec. 21, 1971. It will be understood by those familiar with the art that a vending machine of the order indicated is adapted for dispensing of items in response to customer deposit of a predetermined coin value. In the particular case illustrated, a can or bottle vending machine is indicated and its operation is designed to dispense one canned or bottled commodity per predetermined coin deposit upon customer selection.

With particular reference to FIGS. 2, the features of magazine means 27 are there set forth. As shown, each magazine comprises a vertical or upright cubical having a back wall 40, opposed by a pair of guide rails 41, 41 at open front wall therefor, a top wall 42 and parallel side walls 43 and 44, all interjoined to provide a rigid enclosure. Each magazine is supported in the cabinet 26 on horizontal front and back support structures or walls 45 and 46, respectively; the former supporting individual motor drive units 28, one associated with each of the magazine means 27.

Internally the magazine means 27 support pair of elongated side guide rails 47, one being shown in FIG. 2, and selectively located in a plurality of slotted openings 48 and 49 formed through the two side walls 43 and 44 in registering opposition; each of the side guide rails having hooks which project through selected pairs of the slotted openings 48, 49. A spring latch device 50 is provided at the upper end thereof to engage with an elongated slotted opening 51, removably locking the rails in position. A rear guide assembly 52 is also provided and such is adjustably movable front to back within the magazine compartment to regulate the length of the internal compartmentation thereof, as will appear presently. Detailed construction of guide 52 will be described hereinafter in association with FIGS. 6 and 7 of the drawings. For the present, suffice it to say that the guide 52 may be located in any one of a plurality of selected positions within the compartment by virtue of a plurality of latch openings 53 formed in the magazine top wall 42 and bottom latch openings 54 formed in the two side walls 43 and 44 in registering opposition as schematically indicated in FIG. 2. A column divider or separator plate 55 is associated with the two side guides 47 for the purpose of positively separating the internal space of the magazine at the vending mechanisms into two vertical compartments for vending multiple stacked articles in the manner illustrated in FIG. 3. In that respect the column divider 55 insertably interfits with slotted lower ends of the side guides 47 in operation and is formed in a fashion to interfit

with or embrace upper vend gate bars 56 and 57 but with suitable clearance to permit their operating movements. In a similar manner, the lower end of the rear guide 52 is equipped with a separator plate 58, which serves to define the longitudinal back limit of the interior compartmentation for the magazine when the same is conditioned for either multiple or single stack operation, as will appear presently.

It will be understood that by selective positioning of the intermediate guide rails 47 and its bottom guide plate 55 at desired locations, dictated by the latch openings 48, 49 associated therewith, the interior space of the magazine compartment may be divided longitudinally into sub-compartments for accommodating different length items such as canned articles 60 (see FIG. 3). With this arrangement two columns of canned articles may be provided for, with the back column thereof lying between the intermediate guide rails 47 and the back guide assembly 52 which, as will appear presently, is adapted to be located at desired positions from front to back of the magazine as determined by the locations of openings 53 in the top wall 42 and corresponding side openings of 54, 54 in the two side walls 43 and 44. While canned goods or articles 60 are illustrated in FIG. 3, it is to be understood that the double compartmenting condition is also available for vending short bottles or, that is, bottles having a length approximating that of a canned item, which length obviously cannot exceed more than one-half the front to back dimension of the magazine compartment.

In the event that bottles such as article 61 illustrated in FIG. 4 are to be vended which have a length exceeding double spacing permitted by medial location of the guide rail 47 (see FIG. 3) then the magazine is adapted to accept a single column of goods, such as bottles, in the manner illustrated in FIG. 4. This is accomplished by repositioning the back guide assembly 52 forwardly of its FIGS. 2 and 3 positions, somewhere intermediate of the front to back dimension of the magazine and in close proximity to the cap end of the bottles, usually with approximately one-eighth inch clearance. The intermediate guide rails 47 are preferably disposed adjacent the necked down portion of the bottles so as to engage the exterior thereof between the open front wall of the magazine and the rear guide assembly 52 in the manner indicated in FIG. 4. With either arrangement, that is, either with a double or single stacking of articles, the same are vertically arranged in a serpentine fashion in the manner diagrammed in FIG. 5 of the drawings, with the bottommost article numbered 1 in such diagrams resting on the two upper vend gate bars 56 and 57 in the initial loading condition. As noted in the diagram of FIG. 5, the serpentine coursing of the articles varies depending on which of the vend gate bars 56 or 57 is in a lowered position, so as to effect either a left or righthand serpentine alignment.

In order to better understand the workings of the rear guide mechanism 52, reference is now made to FIGS. 6 and 7 of the drawings wherein details of part organization and operation are illustrated. As there shown, mechanism 52 comprises an elongated metal housing 62 generally rectangular in cross-sectional configuration and formed by two intermating half shells of generally U-shaped cross-section to enclose an interior elongated slide bar 63 (see FIG. 2). Rivets or the like are utilized for interlocking the two half shells of the housing 62 with the slide bar having an elongated opening 64 intermediate a projecting upper tongue end 65 thereof and a finger opening 66 available to the operator by suitable voids or openings 67 in the walls of the housing 62. A spring means 68 extends between the slide bar and an inwardly turned shoulder 69 formed on one of the shell elements of housing 62, opposite the upper end of opening 64 in the slide bar. Downward movement of the slide bar within the housing 62 effectively tensions the spring 68 and causes the latter to resiliently urge the slide bar to move upwardly upon release to project the tongue portion 65 thereof beyond the upper wall 42 of the magazine housing for entering and engaging one of the locating slots 53 therein.

Adjacent the lower end of the slide bar is a slotted opening 70 through which extends a connecting pin 71 intertying a pair of scissor length link arms 72 and 73 which pivot thereabout. Arms 72 and 73 are underengaged, at a shoulder 74 therein, by an outwardly extending finger portion 75 formed at the lower end of the slide bar 63. The pin means 71 extends through the opposing side walls of the housing 62 as well as through the upper ends of the two links 72 and 73 whereby the latter pivotally scissor about the pin 71 moving downwardly or toward one another when the shoulders 74 thereon are disengaged from the slide bar finger as illustrated in FIG. 6. Conversely, the arms move outwardly away from one another, when the slide bar moves upwardly, upon release by the operator and returning movement imposed by the spring means 68. In this latter regard it will be understood and recognized that the walls of the housing 62 are suitably slotted or cut away to permit the passage outwardly therethrough of the other ends of the arms 72 and 73 and more particularly to permit latching finger portions 76 and 77, at the outer ends thereof, to interengage selected slotted openings 54, 54 in the magazine's side wall 43 and 44.

Mounted beneath the scissor arms 72 and 73 above described, and located at the lower or terminal end of the housing 62 is the rear guide plate 58, which is configured with two elongated openings 78 and 79 formed angularly inwardly of the opposite lateral edges or margins thereof and immediately above a pair of divergent finger portions 80 and 81, symmetrically configured about the central axis of plate 58, much in the nature of an inverted Y formation. The slotted openings 78, 79 are adapted to straddle the two upper vend bars 56 and 57 while the finger portions 80 and 81 thereof depend beneath such bars in the normal operating positioning for the plate 58, as illustrated in FIGS. 2, 3 and 4 of the drawings. This effectively interlocks the guide plate 58 with the vend gate bars 56 and 57 with the slotted opening 78 and 79 serving to guide the assembly 52 during its adjusting movements from front to back of the magazine compartment.

From the above description of the guide means 52, it will be readily understood that the same comprises a simple latching mechanism whereby the finger portion 65 at the upper end thereof and the scissors arm 72 and 73 adjacent the lower end thereof are automatically retracted or extended to correspondingly engage aligned sets of slot openings 53 and 54 to positively lock the guide assembly 52 at desired positions from front to back of the magazine.

With the foregoing described arrangement, a suitable system is provided for conveniently adjusting the column depth in either multiple or single stack operation

of a magazine of the order herein illustrated. If double depth column or stack operation is required, such as when vending canned goods **60** as illustrated in the FIG. **3**, the rear guide means **52** is suitably located adjacent the back wall **40** of the magazine and latched in position. This is conveniently accomplished by first aligning the bottom latching arms with the appropriate pair of openings **54, 54** and holding the same in upright position at which point the depressed latch bar is released and the spring means **68** causes upward movement thereof, throwing the latch arms **72, 73** laterally outwardly to engage the openings **54** while simultaneously forcing tongue portion **65** to enter an appropriate opening **53** in the top wall of the magazine. If perchance the upper tongue portion does not immediately enter a slotted opening **53**, corresponding to the openings **54** selected, movement of the assembly **52** forwardly or rearwardly as necessary will release the tongue portion from the inside of wall **42** and automatically permit it to enter the selected opening **53.**

Once the rear guide assembly **52** is in position, the column divider plate **55** is located in the appropriate set of opposed openings **54**, such as the forwardmost set of openings in the walls **43, 44.** The side guide rails **47** are next positioned over the plate **55** and locked into slots **48** and **49**, with the spring latch **50** at the upper end thereof engaging the slotted openings **51** to properly locate and latch the bars **47** in position. With this arrangement the internal compartmentation of the magazine is effectively divided into two like columns, each of a size or depth to accommodate the selected length of the canned or bottled commodities, as the case may be, to be dispensed therefrom.

In the event the cylindrical articles, such as 16 oz. bottled beverages, are of a length exceeding one-half the depth of the magazine compartment, the alternate arrangement indicated in FIG. **4** of the drawings is resorted to. In carrying out this adjustment, the rails **47** and plate **55** are removed and rear guide assembly **52** is moved forwardly from its rearmost position, as illustrated in FIG. **2**, to approximately one-eighth inch away from cap ends of three bottles staggered stacked in the bottom of the magazine so as to rest on the vend gate bars **56** and **57** which are positioned with one of the bars down in the manner illustrated in FIG. **5** of the drawings. The upper end of the rear guide assembly **52** is then properly positioned by using a bottle as a gauge intermediate the vertical limits of the column or magazine interior to thus position the upper end of assembly **52.** Once the same is aligned with the bottles in the lower end of the compartment and the gauge bottle as described, the latching mechanism thereof is released to lock in appropriate openings in the top and side walls of the magazine as previously described. Thereafter the two side guide rails **47** are positioned in the manner illustrated in FIG. **3**, so as to align in contacting and guiding the relationship with the necks of the bottles. After the side rails are aligned they are appropriately latched into position in the selected openings **48, 49** to insure their guiding function on opposite sides of the bottle stack. It will be understood, of course, that the intermediate column divider plate **55** previously removed is not employed in the single column condition. The single stack operation can be carried out with either bottles or cans depending on the lengths of the item involved. In the particular embodiment illustrated and the described perameters, previously indicated, this would occur in vending articles greater than 5 inches in length.

Depending on the diameter of the articles being vended, the staggered or serpentine stacking thereof will accommodate more or less numbers of items, but in any event will accommodate a fairly flexible range of diameter sizes due to the spacing of the side walls **43,** 44.

Turning now to the features of the improved vending mechanism according to this invention, initial reference is made to FIG. **8** of the drawings where the same is schematically diagrammed. As there shown, the vending mechanism indicated generally by numeral **90** comprises an upper vend gate assembly **91,** a lower gate assembly **92,** and a drive assembly **93** therefor.

Specifically the upper vend gate assembly **91** may be termed as "clam shell" because of its operating activity, as will appear hereinafter, and in essence comprises a pair of elongated cylindrical gate rods **56** and **57** each welded at opposite ends to a pair of generally crescent shaped crank arms; arms **96** and **97** being affixed to opposite ends of gate rod **56** and arms **98** and **99** to opposite ends of gate rod **57.** The two rod and arm assemblies are internested, **96** being disposed inwardly of arm **98** and arm **99** inwardly of arm **97.** Adjacent arms **96,** 98 and **97, 99** are intertied by a pivot cross link **100** and **101,** respectively, which cross links are suitably offset to maintain the internested relationship between the arm and rod pairs. In addition, the centers of pivotal connection between link **100** and the opposing pair of arms **96** and **98** for example, and between link **101** and the arm pair **96, 97,** indicated at **102, 103, 104** and **105** are fixed to the parallel spaced horizontally extending supporting walls **45** and **46** of the cabinet so as to constitute axes of rotation for the arm sets **96, 97** and **98,** 99.

Rocking activity of the upper vend gate rods **56** and **57** about their pivot centers is effected by a cam means **110** rotatably driven about a central axis **111** therefor. Cam **110** is peripherally engaged by follower rollers **112, 113** respectively affixed to the outer ends of rods **114, 115.** It will be noted that rod **114** is located transversely of the outer end of a crank arm **116** pivotally joined by pivot connection **117** to the lower end of arm **97,** below the latter's pivot axis or pin **104.** Thus as the roller **112** follows the contour of cam means **110,** crank arm **116** serves to oscillate the right hand vend gate assembly, comprising arms **96, 97** and rod **56** about the rotational axis therefor as defined by the related pivot centers **104, 105.**

In a similar fashion the secondary cam following roller **113** associated with rod **115** causes rotational movements of the cam **110** to oscillate a pivotal bell crank comprising links **120** and **121** rotatably on rod **115** and pivotally supported on a fixed pivot center **122.** The outer end of link **121** in turn is pivotally joined by pin **123** to the lower end of the arm **99** associated with the left hand upper vend gate assembly, comprising rod **57** and arms **98** and **99.** Consequently, rod **57** responds in an oscillating arcuate fashion to the cranking activity of the link assembly **120, 121,** in accordance with the movement of the cam means **110** and follower **113.**

As a result of the foregoing described arrangement, the two vend gate rods **56** and **57** alternately oscillate along arcuate paths toward and away from one another as indicated in FIG. **20,** moving to and out of their respective positions shown in FIGS. **19** and **18.** Due to

the shape of the cam means **110** by which such rods **56** and **57** are responsively moved, oscillating activity thereof is in the alternative, that is, one rod moves arcuately downward and returns to its upward position before the other rod travels. Thus the action is likened to the opening and closing movements of a "clam shell."

In addition to the upper vend gate assembly **91** above described, vending mechanism **90** includes the lower vend gate assembly **92** which comprises a support shaft **125** extending horizontally between the support walls or frame members **45, 46** of the vending machine and in spaced parallelism to the centers of rotation for the rod and arm assemblies of the upper vend gate assembly **91,** above described.

Mounted on the shaft **125** are a pair of identical gate members, namely front gate **126** and rear gate **127,** each of which has a cylindrical hub portion **128** along one inner margin thereof and through which the supporting shaft **125** extends. The two gates **126** and **127** are rotatably mounted on the shaft **125** and are free to move relative thereto within limits. More specifically, each of the gates has a lost motion connection with shaft **125** and is permitted to rotate partially with respect thereto, such lost motion connection comprising a collar with suitable projections for interlocking engagement as will be described in greater detail in conjunction with FIGS. **9–13.** In turn, gate **126** has a lost motion connection with gate **127,** comprising a projection **130** on gate **127** which is adapted to underengage the front gate **126** for purposes which will appear presently.

The forward end of the hub portion **128** for front gate **126** is formed with a collar portion **131** having projecting ears **132** and **133** and comprising part of a lost motion connection system between the front gate and an actuator link **134** therefor which is rotatably mounted about shaft **125** for movement thereabout; the shaft being receptive in opening **135** in link **134.** On the rearward face of the actuator link **134** (as viewed in FIG. **9**) is a projection finger of semi-circular formation indicated at **136** (see FIG. **11**) which is adapted to interfit between ears **132** and **133** projecting from the hub of the front gate **126.** So it will be recognized that gate **126** is free to move relative to the actuator portion **136** depending on the arcuate extent of the projection **136** and its interfitting spacing with the abutment projections **132** and **133.**

The actuator **134** responds to rotating activity of a double lobe cam member **140** affixed to the supporting axle or shaft **111,** common to cam **110.** Cam **140** moves with cam **110,** but activates the actuator **134** in a different predetermined phase relationship with respect to the activity of the upper vend gates which also respond to rotation of the cam **110.**

In addition to actuator **134,** shaft **125** is also coupled to a follower arm **139** fixed to rotate with the shaft **125** as by interfitting tongue extension on shaft **125** and fastening bolt or screw means **141.** Arm **139** carries a rotatable cam follower **142** at its outer end for engaging the periphery of a third cam means **143** also mounted for movement on axle **111,** common to the cams **140** and **110.** In response to the movement of roller **142** about the periphery of **143,** shaft **125** is periodically rotated or oscillated to raise and lower the two vend gates **126** and **127** in cyclical fashion. More specifically, as the roller **142** traverses the lobe **144** of cam **143** in the position thereof shown in FIG. **8,** the lower vend gates **126, 127** are held in an article receiving position. As the follower **142** approaches the cam node portion **145,** however, the lower gates **126** and **127** are slightly lowered to an "escrow" position as indicated in the upper positioning thereof shown in FIGS. **20** and **21,** for example. When roller **142** passes node **145** there is a quick drop of the arm **139** with a partial or limited rotation of the shaft **125,** sufficient to release the rear vend gate **127** from its interengaging lost motion connection with the shaft **125.** This activity permits the gravitational lowering or quick dropping of the back gate **127** to a discharge or release position as indicated in dotted lines in FIG. **8.** In this respect it will be understood that the rear gate **127** moves relative to the front gate **126** which at this stage of the operation is held in its raised condition by virtue of interfering engagement between the projection **136** on the actuator **134** and the projection **132** associated with the hub of the front gate, as previously described. It will be noted that the actuator **134** responds to the configuration of its actuating cam **140** and this particular circumstance of holding gate **126** occurs in the condition of actuator **134** as shown in FIG. **8** with the outer end thereof engaging a node **146** of the cam **140,** thereby to position projecting finger **136** to lock the front gate in its up position.

Continued rotation of cam **140** gradually lowers the front gate by permitting clockwise following movement of arm **134** into the indented mid section of cam **140** adjacent node **146,** causing front gate **126** to fall into alignment with the previously lowered gate **127** at which stage both gates reside in a discharge position, as indicated by the dotted line showing for the lower vend gate **126** in FIG. **20,** for example. Continued rotation of cam **143** causes the lost motion connection between shaft **125** and the rear gate **127** to reengage or pick up the rear gate. By virtue of the underengaging ledge or portion **130** at the rear gate, the front gate **126** is picked up by the rear gate to raise the two gates simultaneously as the follower roller **142** moves onto the lobe surface **144** of cam **143.**

It will be noted that during the aforedescribed activity of cam **143,** the intermediate cam **140** serves to oscillate the follower **134** in accordance with its peripheral configuration, raising and lowering the latter to position its projection finger portion **136** toward or away from the projections **133** and **134** of the front gage. While it is not felt necessary to describe the exact movements of the follower **134** and its response to the cam **140,** suffice it to say that the function of the follower **134** is to position its finger **136** in an interfering condition with the projection **133** on the front gage **126** thereby periodically to hold the same in a raised or escrowed position as previously noted. Thereafter gate **126** is lowered to its discharge position when the follower **134** enters one of the depressed nodes in the periphery of cam **140.** Thus activity produces the sequential cycling of the front and rear gates **126** and **127** from "escrow" to "discharge" positions, first the rear gate and then the front gate, as illustrated respectively in FIGS. **20** and **21.**

Importantly, it is to be noted that the cam **143** carries with it two projecting pins **150** and **151,** one of which is slidably movable relative to the cam **143** whereas to be alternately or selectively positioned in projecting or non-projecting positions. The purpose of these two pins is to effect operation of motor control switch **152** hav-

ing a pivotal depending actuator **153** (FIG. **14**). When either of the pins **150** or **151** underengages the actuator **153**, it raises the latter to cause a depression of the switch plunger **154** discontinuing further rotation of the cam **143** and deactivating a drive motor **155**. The provision of the sliding pin **151**, for example, is to accommodate either single or double column vending operation for the magazine. Thus, for example, if two columns of canned items are stacked in the magazine **27**, pin means **151** is placed in an extended or projecting position in the manner illustrated in FIG. **8**, to interrupt the drive motor and thus the cycling of the cam means **143**, **140** and **110** halfway through a full rotational cycle therefor. Thus, a single can or cylindrical item is delivered via the lower vend gate **127** during the first half cycle of rotation for the cam **143** and a second can from the front lower vend gate **126** during the second half cycle of rotation for the cam **143**. This obviously permits the double stack vending operation.

In the event a single column or stack mode is utilized in the magazine means **27**, such as a single column of bottles for example (see FIG. **4**), then the pin means **151** is depressed to a non-interfering position with the switch actuator arm **153**, permitting the full rotational cycle of cam **143** and the other related mechanisms per vend selection. In this condition both the lower gates **126** and **127** must be in a "discharge" position in order to release a single bottle even though during such procedure the rear vend gate **127** gravitationally moves to its discharge position first and independently of the front gate **126**. It will be recognized that discharge position of the rear gate, however, does not effect the ultimate discharge of the bottle or elongated article held in the forward part of the magazine on the front gate **126** for single column vending operation.

Turning now to more specific details of the lower vend gate system **92**, reference is made to FIGS. **9** through **13** of the drawings. As there illustrated, each of the vend gates **126** and **127**, of like construction, comprises a hub portion **128**, as previously noted, receptive of the shaft **125**. An elongated body portion **156** projects from one side of the hub portion preferably having a concave face **157** to retain a cylindrical item engaged thereby. Face **157** is normally positioned upwardly in operation in the manner illustrated in FIG. **8**. It will be noted that the end of hub portions **128** for the lower vend gates are formed with cut-away slotted portions **160** and **162** to provide a female jaw connection cooperating with male jaw collars **163** placed over shaft **125** and pinned thereto as by pin means **164**. Diametrically opposed projecting portions **165** on the male jaw member are substantially less in arcuate extent than the recesses **160** and **162** on the gate hub portions, so as to provide the referred to lost motion connection therebetween. It is to be particularly noted that there are four male jaw members **163** provided in the assembly of the two gates **126** and **127** on shaft **125** indicated at **163**, **163***a*, **163***b* and **163***c* located on the opposite ends of the hub portions for the two gate members. A resilient spring means **166** is mounted on the shaft **125** between the jaw member **163***c* and a washer **167** engaged with the rear support wall **46** of the cabinet support system, the shaft **125** being locked in place by nut means **168**. It is to be noted that portion **130** on the rear gate member which interengages the front gate member **126** as previously explained, is formed in accordance with the configuration of portion **134** on the front gate **126**, as best illustrated in FIGS. **9** and **10** of the drawings.

With reference now to composite FIG. **11**, it will be noted that the actuator arm **134** which is mounted rotatably on shaft **125**, has its rearward projection finger **136** extending over or past the outer end of the hub portion **128** of gate member **126** as to lie interferingly with the projections **132** and **133** thereon. It is this periodic interengagement between the finger **136** and the lugs **132** and **133** that regulates the lost motion movement of the front gate **126** in response to the activity of the actuator **134** and its cam **140**, as previously described. This relationship is further illustrated in FIG. **13**.

It also is to be noted that the forward or outer end of shaft **125** is formed with a key projection **170** which fits into a slotted hub socket portion **171** formed in the mounting hub portion of the crank arm **140**. Projection **170** further is provided with a central threaded opening **172** for connection with the holding screw **141**, for tying the crank **140** to the shaft **125** for simultaneous movements. Thus, it will be understood that partial rotational movement of the shaft **125** takes place directly with movements of the crank arm **140**, whereas movement of the actuator **134** about shaft **125** and thus the relative movement between the projecting finger portion **136** of the actuator **134** and the interfering lugs **132** and **133** of the front gate **126**, appears in timed sequence as determined by the peripheral contour of cam member **140**. With this arrangement therefore the desired sequential relative movement between the front and rear gates **126** and **127** of the lower vend gate assembly is effected through the initial movement of the rear gate **127** to a discharge position followed by the subsequent movement of the front gate to such position to complete the delivery sequence.

Turning now to the specific features of the drive means or assembly **93**, reference is made to FIGS. **14** through **17** of the drawings illustrating the related mechanisms for actuating the several cams **110**, **140** and **143**. As shown best in FIG. **14**, a drive motor unit **28**, adapted to actuate the mechanism hereinbefore described and illustrated in FIG. **8**, comprises a unitary housing having parallel side walls **170**, **170** interjoined by a planar top wall **171** and a front wall **172**. Motor unit **28** is adapted to be removably interlocked with the horizontal front support wall structure **45** of the cabinet support system and in particular is located beneath a horizontal outwardly projecting flange portion **173** of such support wall **45** (see FIGS. **14** and **17**). More specifically, the two side walls **170**, **170** of the drive motor unit housing have extending hook portion **174** at their lower ends, which interengage with suitable openings (not shown) formed in an upwardly extending, vertical frontal flange portion **175** (FIG. **15**) of the support wall structure **45**. A wing nut means **176** also is used to extend through the upper flange wall **173** for threaded connection with an opening therefor in the top wall **171** of the motor housing (see FIG. **14**).

Mounted within the motor housing is the electric drive motor **155** having an associated reduction gear CONTROL CIRCUIT. driving an output shaft **180** having a drive gear **181** affixed thereto. A hold in switch **182** and a sold out switch **183** with operating plunger **184** are mounted adjacent the motor unit **155** for operationally controlling the same in conjunction with the motor cam switch **152** operated by plunger **154** and the

arm 153 as previously noted. The particulars of the control circuitry for the motor 155 are set forth more fully in my copending application Ser. No. 414,753 filed Nov. 12, 1973 now U.S. Pat. No. 3,848,718 and entitled VENDING MACHINE CIRCUIT. Briefly, however, the sold out switch 183 controls energization and deenergization of the motor in response to the presence and absence of articles in vend position within the magazine (see FIG. 17). The motor cam switches 152 control the periodic cycling of the motor 155 in accordance with the engagement of actuator arm 153 by one or both of the pins 150, 151 associated with cam means 143, as previously described.

The "hold in" switch 182 operatively provides a hold circuit and deenergizes an appropriate selection switch available to the customer on article selection at the start of a vend cycle.

As will best be noted from FIG. 17, the sold out switch 183 is designed to be activated by a sold out lever 186 pivotally suspended on a shaft 187 beneath the horizontal flange portion 173 of the support structure 45. The lever 186 comprises an elongated finger portion 188 adapted to be engaged by a cylindrical article, such as a can located in the front portion of the magazine compartment on lower vend gate 126. A secondary arm 189 of lever 186 is adapted to engage the plunger 184 of switch means 183. As long as cans are present in the vending column, plunger 184 is depressed, preventing the sold out switch from deactivating the control circuitry for the motor 155 associated therewith. On the other hand, if there are no cans or articles present in the vending magazine, lever 186 swings into the forward end of the magazine, releasing the plunger 184 and permitting switch 183 to deactivate the vending motor, as described in my aforenoted copending application, Ser. No. 414,753, now U.S. Pat. No. 3,848,718.

In general, it may be noted that energization of the motor means 155 takes place in response to the deposit of a predetermined coin value by a customer followed by the selection of an item to be vended from a particular magazine through closing actuation of appropriate selection switch mechanism (not shown herein). Additionally, the presence or absence of articles to be vended within a particular magazine associated with a particular motor unit 28 is a precondition of its energization and operation of the vending mechanism 90 related thereto.

With specific reference to FIGS. 15 and 16 of the drawings, it will be appreciated that the drive means 93 therein illustrated includes the several cam means 110, 140, 143 and their associated followers, etc., as previously described. Such assembled items are suitably housed and supported between the horizontal front support wall 45 of the cabinet support structure and the vertically extending flange portion 175 related thereto. In addition, a compound idler gear 190 is mounted for rotation about stub shaft 191 fixed to the wall 45 and projecting forwardly thereof for engagement by the drive gear 181 rotatably driven by the drive motor 155. The compound gear 190 has a major diameter portion 192 engaged with a spur gear portion 193 formed integrally with the hub 194 of cam means 143; the same being supported on shaft means 111 which extends between the back wall 45 and the flange portion 175 therein shown. A smaller diameter secondary gear portion 195 of the idler gear 190 also engages a spur gear portion 196 formed integrally with the compound cam members 110 and 140 for rotation with the latter on shaft 111. Thus in response to rotational movement of the idler gear 190, the cam means 143, 140 and 110 are simultaneously rotated by the drive gear chain to operatively actuate the vending mechanism in the manner previously set forth.

It will be understood that the individual motor drive units 28 associated with each of the vending mechanisms embody the concept of modular unitization. As such, each unit 28 is intentionally made to be quickly removed or installed to facilitate maintenance and repair. For example, in the event there is a failure of a drive motor or any of the several switches associated therewith, the entire unit 28 may be readily removed from the machine and replaced with a new unit to minimize breakdown time.

It also will be noted that the actuating lever or arm 153 associated with the motor cam switch assembly 152 is in a path of interfering engagement with the pins 150, 151 on the cam means 143. Thus in response to rotational cycling of such cam means, the lever arm 153 is periodically raised to depress the adjacent plunger 154 and operate cam switch 152 to deactivate the motor. As previously noted, if both pins 150, 151 are in their extended position, that is, project forwardly of cam means 143 to interfere with the lever arm 153, double column vending of the vending mechanism 90 takes place. On the other hand, if one of the pins, for example 151, is depressed to a non-interfering position with actuator 153, then single column vending of the machine takes place.

Having described the several elements and mechanisms which go to make up the improved storage and dispensing means of this invention, reference is now made to FIGS. 18 through 21 of the drawings for a better understanding of the operational sequencing of the upper and lower vend gate means 91 and 92.

Turning now to FIGS. 18 through 21 of the drawings, the operational sequencing of loading, escrow holding and discharging cylindrical articles from the vending mechanism 90, will now be described in relationship to the illustrations set forth therein.

In FIG. 18 one of the two alternate loading conditions is set forth, namely, that in which bar 56 of the upper vend gate assembly 91 is in a lowered position permitting the passage of cylindrical article or can number 1 between the two vend gate bars 56 and 57. It is to be noted that such passage travel of the cylindrical article 1 is limited by the presence of the lower vend gate assembly 92 and, more particularly, the positioning of the front and back vend gate 126 and 127 thereof in a substantially horizontal raised condition. This interrupts the downward movement of can 1 and prevents following movement of can 2 past vend gate bar 57. Regarding the position of can 2 as illustrated in FIG. 18, it will be noted that the same is held in tangential engagement with the underdisposed can 1 and the left hand vend gate bar 57.

FIG. 19 shows the second loading condition which corresponds to that diagrammed in FIG. 18, except that in this instance the left hand upper vend gate bar 57 is in a lowered position. Again, can number 2 in this loading condition has tangential engagement with the can number 1 and the uppermost vend gate bar (56 in this case) while the article number 1 rests on the concave upper surface 157 of the lower vend gate assembly 92.

In both conditions of loading illustrated in FIGS. **18** and **19**, it will be understood that depending on the single or double column arrangement for the magazine interior, as heretofore described, either a single cylindrical item will pass between the vend gates **56** and **57** or a pair thereof in tandem relationship will so pass. In either event, however, it is to be noted that the following can, or cans, as the case may be, namely can number **2**, is retained outwardly of the uppermost vend gate bar or rod **56** or **57**, as the case may be, by the intermediate at rest positioning of the previously fed or dropped article or can number **1**.

Following the feeding movement of the first can between the upper vend gate bars as above described and illustrated in FIGS. **18** and **19**, whichever one of the upper vend gate bars is in a lowered positon, i.e. condition of FIG. **18** or FIG. **19**, the same next returns to its uppermost position capturing the following article number **2** thereabove in the manner illustrated in FIG. **20**. Substantially simultaneously and in proper timed sequence to the returning movement of the previously lowered upper vend gate bar, the lower vend gate assembly **92** is lowered slightly to accommodate the diameter of the article number **1** thereupon as shown in FIG. **20**. This is the normal loaded condition of the vending mechanism at the initiation of a vending cycle, namely, wherein one or two cans rest on top of the lower vend gate assembly **92** in an "escrow" condition, ready for discharge during the next vending cycle.

With respect to the movement of the upper vend gate bars **56** and **57** during the infeed function as above noted, it is important to recognize that the movement of such bars **56** and **57** is arcuately outwardly of the escrow chamber provided between the upper and lower vend gate assemblies. Because of this geometrical relationship, there is little or no invasion of the designated space and capacity of the escrow chamber.

This feature accounts importantly to the ability of the vending mechanism of this invention to accommodate a fairly substantial range of article diameters, at the same time insuring that only one article at a time passes the upper vend gate systems when the machine is conditioned for single column vending or two items simultaneously when the machine is conditioned for double column vending.

With reference now to FIG. **20**, it will be assumed that the condition of operation illustrated is one wherein a single column vending condition for the magazine obtains. As such article number **1** is held in the escrow chamber while the following article is held outwardly of the upper vend gate bars **56** and **57** at the initiation of a vend cycle. Article selection by the customer initiates operation of the motor unit **28** to cycle the several cams of the drive assembly **93**, causing both of the lower vend gates **126** and **127** to assume the dotted line position as indicated in that Figure. This releases a single item past the outer end of lower vend gates and a guide wall **200** as therein indicated, permitting article **1** to gravitate downwardly into the discharge chute **29** for delivery to the customer. While this release of item **1** from the escrow chamber is occurring, the upper vend gate bars **56** and **57** remain in their uppermost closed position as illustrated in FIG. **20**, until return of the lower vend gate assembly to the FIG. **18** or **19** positions therefor. Thereafter repeat of the feeding cycle occurs.

Considering FIG. **21** to illustrate the condition of double column vending for the magazine, it will therefrom be appreciated that upon initiation of the vend cycle in this operating condition, the rear lower vend gate **127** is initially dropped to its discharge position, releasing article **1A**, formerly positioned thereon, but retaining article **1** on the upper side of the front lower vend gate **126** in an escrow condition awaiting initiation of the next succeeding vend cycle. Thereafter item number **1** is released from the front lower vend gate **126**, positioning both of the lower vend gates **126** and **127** in their article discharge or release condition, as illustrated in FIG. **20**, while still retaining the next set of articles (indicated at **2** in FIG. **21**) outwardly or above the upper vend gate bars **56** and **57**. The remaining part of the vending cycle, after release of the item number **1** from the front lower vend gate **126**, cycles one or the other of the vend gate bars **56** or **57** downwardly to infeed a pair of cylindrical articles onto the lower vend gate system in the manner illustrated in FIGS. **18** or **19**.

From the foregoing description, it is believed that it will be readily understood how the successive operation of the upper and lower vend gate systems cooperate to release articles one by one for discharge to the customer. It further will be recognized that movement of the upper vend gate bars **56** and **57** arcuately outwardly of the escrow chamber between the upper and lower vend gates, provides for minimum interference with the space alloted for the escrowing of the articles and accommodation of range of article diameters as intended. Further, it is to be noted that interfering positioning with one of the upper vend gate bars with the following cylindrical article during the infeed cycle, as shown in FIGS. **18** and **19**, in conjunction with the upper positioning of the lower vend gates **126** and **127**, effectively prevents any overdisposed article from following into the escrow chamber or otherwise lodging between the upper vend gate bars during the infeed operation. An important feature of the returning movement for the lowered upper vend gate bar to its uppermost position at the end of the infeed operation, is the fact that the same moves arcuately outwardly against the overdisposed cans or articles, thus further preventing such overdisposed articles from lodging between the vend gate bars **56** and **57** to jam the mechanism. Consequently, the vending mechanism of this invention is fully capable of one hundred percent discharge of the magazine columns without jamming contrary to prior mechanisms known in the art, such as that set out in U.S. Pat. No. 3,203,588.

While the present invention has hereinabove been described in association with a particular preferred embodiment thereof illustrated in the accompanying drawings, it is to be recognized that the same is susceptible to variation, change and substitution of equivalents without necessarily departing from the spirit and scope of the invention as hereinafter claimed.

I claim:

1. In an automatic vending machine for dispensing cylindrical articles, such as canned and bottled commodities, storage and dispensing means comprising: at least one vertical magazine means for storing articles within an open bottom compartment enclosed by parallel side walls, such compartment being openly accessible at frontal margins of said side walls for loading articles therein; means for dividing the interior of said

compartment into vertical columns of selected front to back dimension, at least one of which columns is receptive of a serpentine stack of articles to be dispensed; article dispensing means blocking the open bottom of said compartment and comprising an upper vend gate assembly having a pair of horizontal rod means paralleling said side walls for underengaging the lowermost article of a said stack thereover, means mounting each said rod means for oscillating movement along an arcuate path toward and away from the other thereof, separation of said rod means permitting passage of articles therebetween; a lower vend gate assembly mounted in parallel spaced relation to and beneath said upper assembly, with the space therebetween defining an article escrow chamber; said lower assembly comprising pivotal gate means movable about a horizontal axis toward and away from said rod means and a central vertical axis of said chamber and sequentially to and between a fully raised article receiving position, a substantially horizontal article holding position and a lowered discharge position; means for periodically oscillating each said rod means about the upper end of and noninterferingly with the interior of said chamber, means for periodically moving said gate means from said article receiving position to said article holding position when either one of said rod means moves through its oscillating cycle; said gate means and the moving said rod means cooperating to undersupport and positively guide and control movement of each lowermost article between said rod means and into said chamber for retention by said gate means at said holding position, and means for subsequently lowering said gate means to release articles from said chamber.

2. The combination of claim **1** wherein the raised positioning of said gate means and its movement to said article holding position dictates the passage of a single article between said rod means and into said chamber for each separating cycle of the latter.

3. The combination of claim **1** wherein said rod means comprises a pair of cylindrical rod members, each coupled to pivotal crank arms actuated by first rotatably driven cam means and operable to alternately oscillate each rod member about a horizontal axis arcuately about the upper end of said escrow chamber.

4. The combination of claim **1** wherein said means dividing said compartment into vertical columns comprises a pair of divider plates and adjustably positioned guide means whereby said compartment is divisible into at least two columns, each for accommodating a serpentine stack of articles, and said lower gate assembly comprises a pair of gate means, one opposite the lower end of each of said columns and cooperable with said rod means for dispensing articles from said stack thereover one at a time.

5. The combination of claims **4** and drive means selectively conditioned to effect lowering of one of said gate means for each operating cycle thereof.

6. In an automatic vending machine for dispensing cylindrical articles, storage and dispensing means comprising: at least one magazine means for storing articles in an open bottom compartment having parallel side walls, such compartment being openly accessible between frontal margins of said walls for loading articles therein; vertical guide means and cooperating divider means adjustably mounted on and extending transversely between said side walls for dividing said compartment into vertical columns of selected front to back dimension, at least one of which columns is available for stacking articles to be dispensed; article dispensing means blocking the open bottom of said compartment and comprising an upper vend gate assembly having a pair of horizontally extending rod means paralleling said side walls and spaced therefrom and from one another less than the smallest diameter of an article to be dispensed, means for alternately and periodically oscillating each said rod means arcuately toward and away from the other thereof to effect passage of articles therebetween, the limit of separating movement between said rod means determining the largest diameter of articles movable therebetween; a lower vend gate assembly mounted horizontally beneath said upper assembly, defining an article escrow chamber therewith and comprising pivotal gate means movable about a horizontal axis, arcuately toward and away from said rod means and a central vertical plane of said chamber, between raised, intermediate and lowered positions; and drive means sequentially operating said upper and lower gate assemblies, comprising means to move said gate means from said raised to said intermediate positions thereof while one of said rod means moves through its cycle of oscillating movement, the raised positioning of said gate means causing each article to be engaged and supported thereby as it enters said chamber for controlled movement therewith to said intermediate position whereby to insure the deposit of a single article in said chamber for each separating cycle of said rod means, and means operable subsequentially to move said gate means to said lowered position thereby to gravitationally discharge articles from said chamber.

7. The combination of claim **6** wherein said guide and divider means are positionable to provide two columns, each receptive of articles to be dispensed, and said lower vend gate assembly comprises a pair of gate members, one opposite the lower end of each said column with each being receptive of an article from its respective column at each separating cycle of said rod means.

8. The combination of claim **6** wherein said lower vend gate assembly comprises a pair of individual gate means, a horizontal shaft supporting said gate means, and lost motion connection means between said shaft and each of said gate means whereby said gate means move with and relative to said shaft; and said drive means includes means for periodically partially rotating said shaft to drive said gate means therewith and additional means for periodically preventing movement of one of said gate means with said shaft to thereby effect relative movement between said gate means.

9. The combination of claim **7,** wherein each of said gate means is lowered independently of the other to thereby discharge the articles thereon, one-by-one.

10. The combination of claim **9** wherein said drive means comprises a coin controlled motor, cam means driven thereby for sequentially driving said upper and lower vend gate assemblies, and means for selectively deactivating said motor when the first of said gate means is in its lowered discharge position whereby to preclude the discharge of more than one article for each coin controlled vending cycle.

11. In an automatic coin controlled vending machine for dispensing canned or bottled articles from vertical open bottom magazines in which articles are stored in serpentine stacks, improved dispensing means compris-

ing: an upper vend gate assembly mounted in blocking position over the open bottom of said magazine and comprising a pair of horizontal rod means positioned to underengage the bottommost article of a stack thereover, a lower vend gate assembly mounted horizontally beneath said upper assembly to define an article receiving escrow chamber therebetween, means effecting alternate periodic oscillating movement of each said rod means relative to the other along a path about the upper end of said chamber and non-interferingly with the interior thereof such that the resulting separation of said rod means permits the passage of a said bottommost article therebetween for entry into said chamber; said lower assembly comprising gate means pivotal about a horizontal axis for movement toward and away from said rod means and sequentially to and between a raised position adjacent said rod means whereat the same underengages and supports said bottommost article as it enters said chamber, an intermediate position to which it carries and at which the same holds said article in said chamber, and a lowered position whereat articles thereon are released from said chamber; and means sequentially operating said rod and gate means to effect movement of said gate means from said raised to said intermediate position for each cycle of oscillating movement of said rod means and subsequent movement thereof to said lowered position.

12. The invention of claim **11,** and means dividing said magazine into plural columns of selected front to back dimension, each receptive of a stack of articles, whereby the bottommost articles of the plural stacks are deposited in said chamber in response to each separation of said rod means, and wherein said gate means comprises individual gate members beneath each said column, and means effecting individual movement thereof to said lowered position thereby to discharge articles one-by-one from said chamber for each vending cycle.

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