United States Patent [19]

Payne

[11] **3,904,076**

[45] **Sept. 9, 1975**

[54] **ADAPTABLE DISPENSING APPARATUS WITH UNIQUE ESCROW BAR AND ASSOCIATED LATCH MECHANISM**

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[73] Assignee: **Cavalier Corporation,** Chattanooga, Tenn.

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[21] Appl. No.: **497,713**

[52] **U.S. Cl.** **221/67;** 221/116

[51] **Int. Cl.²** **G07F 11/08**

[58] **Field of Search** 221/67, 116, 117, 118, 221/293

[56] **References Cited**

UNITED STATES PATENTS

3,224,631	12/1965	Payne	221/67
3,300,084	1/1967	Payne	221/67

Primary Examiner—Robert B. Reeves
Assistant Examiner—Thomas E. Kocovsky
Attorney, Agent, or Firm—Cameron, Kerkam, Sutton, Stowell & Stowell

[57] **ABSTRACT**

Apparatus for dispensing articles such as cans and/or bottles is disclosed as comprising a reservoir or bin for receiving at least two staggered stacks, each stack including at least two columns of the articles with adjacent articles of the staggered stacks aligned substantially axially of each other. A releasable, article support member is disposed beneath each column of the staggered stacks to support two articles thereon and capable of moving from a first article supporting position to a second article releasing position. An escrow bar is disposed to receive one of the released articles from the actuated article support member and is operable to move from its first article retaining position to a second article releasing position whereby the second article is released. The escrow bar is responsive to the release of an article by one of the first and second support members to permit upon a second cycle or operation of the dispensing apparatus with the escrow bar retaining an article, the escrow member to be disposed to its second article releasing position to release the second retained article. The dispensing apparatus of this invention is capable of being adapted for dispensing either two stacks of articles such as cans or a single stack of articles such as bottles, in that the escrow bar is readily removed and the dispensing mechanism is operated to release a single bottle at a time without further adaptation thereof.

14 Claims, 9 Drawing Figures

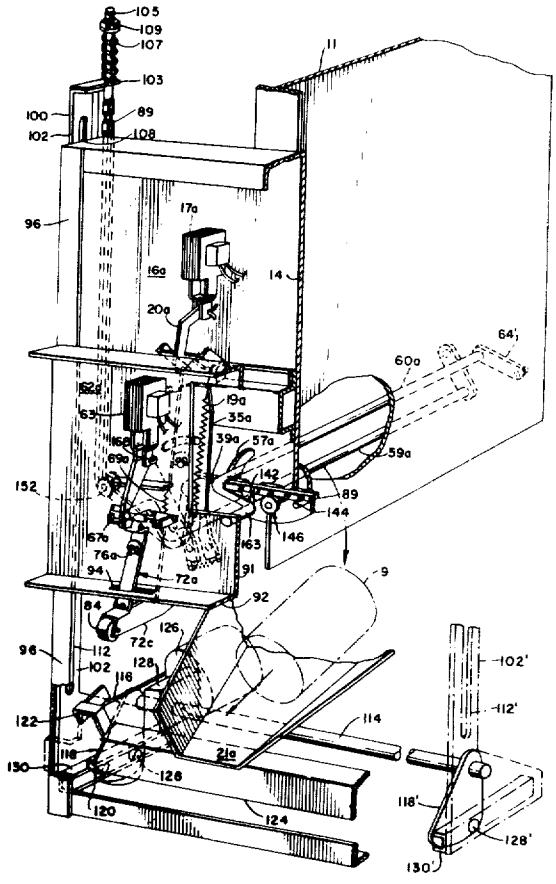


FIG. 1.

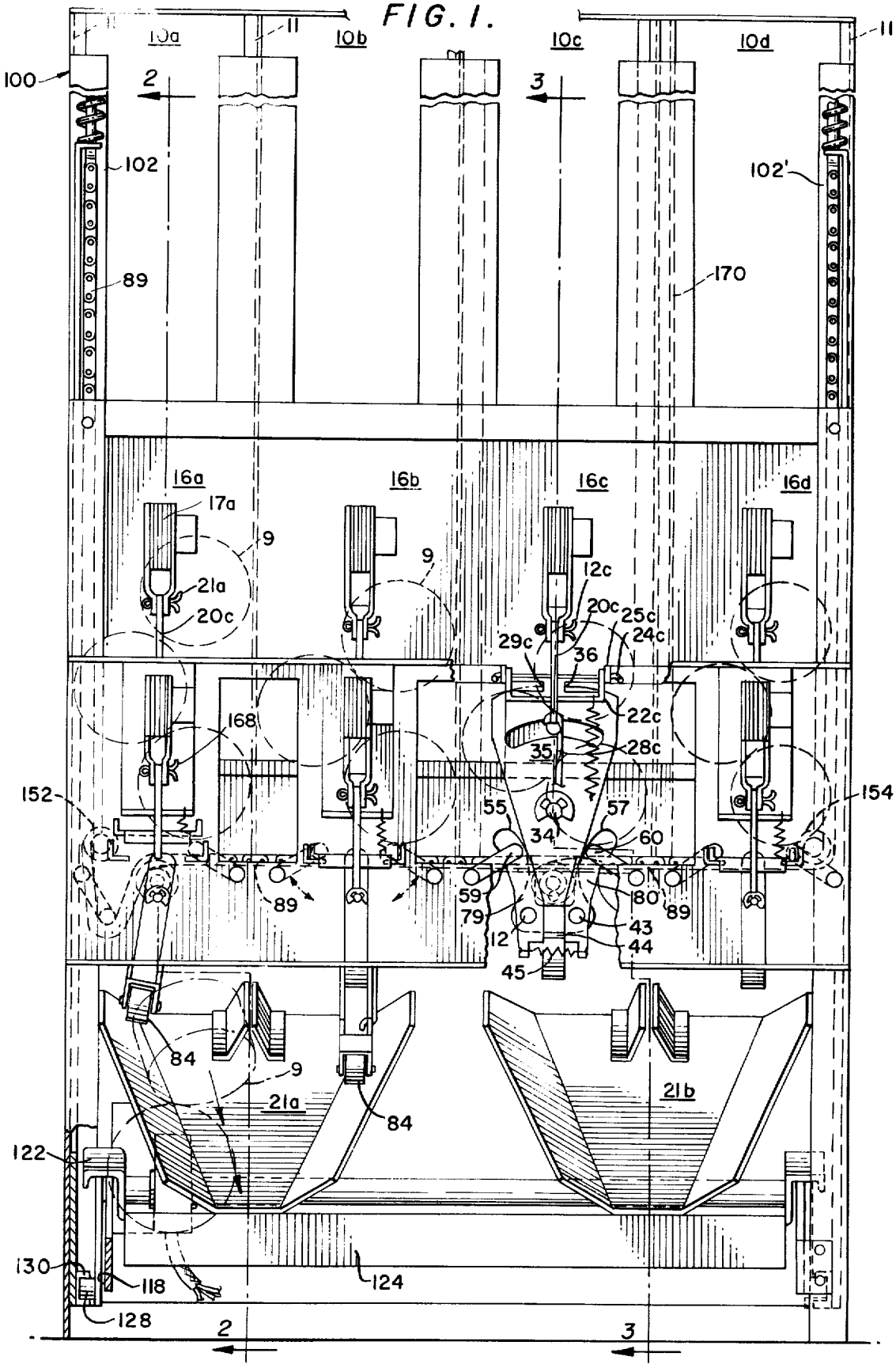

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FIG. 2.

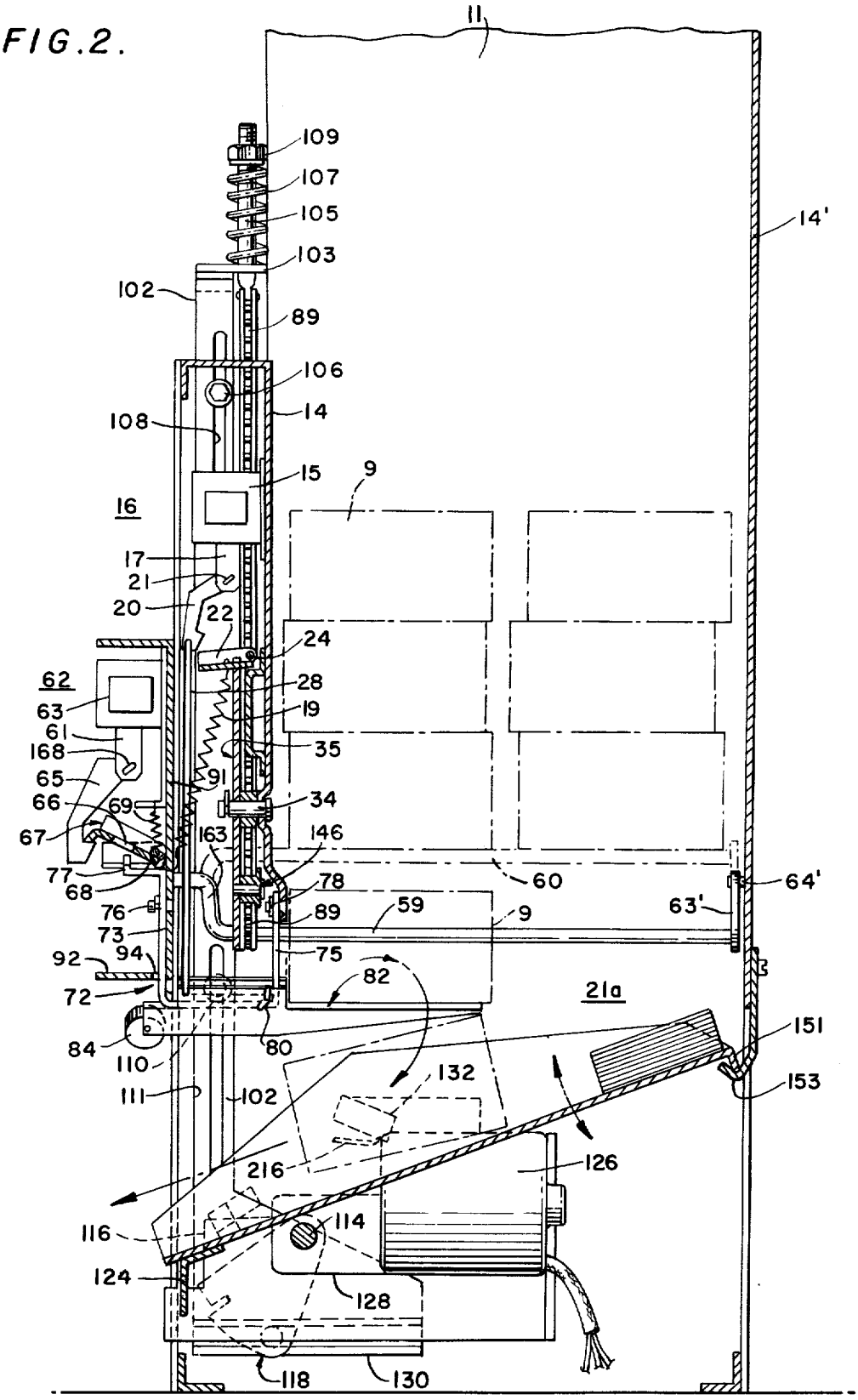

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FIG. 3.

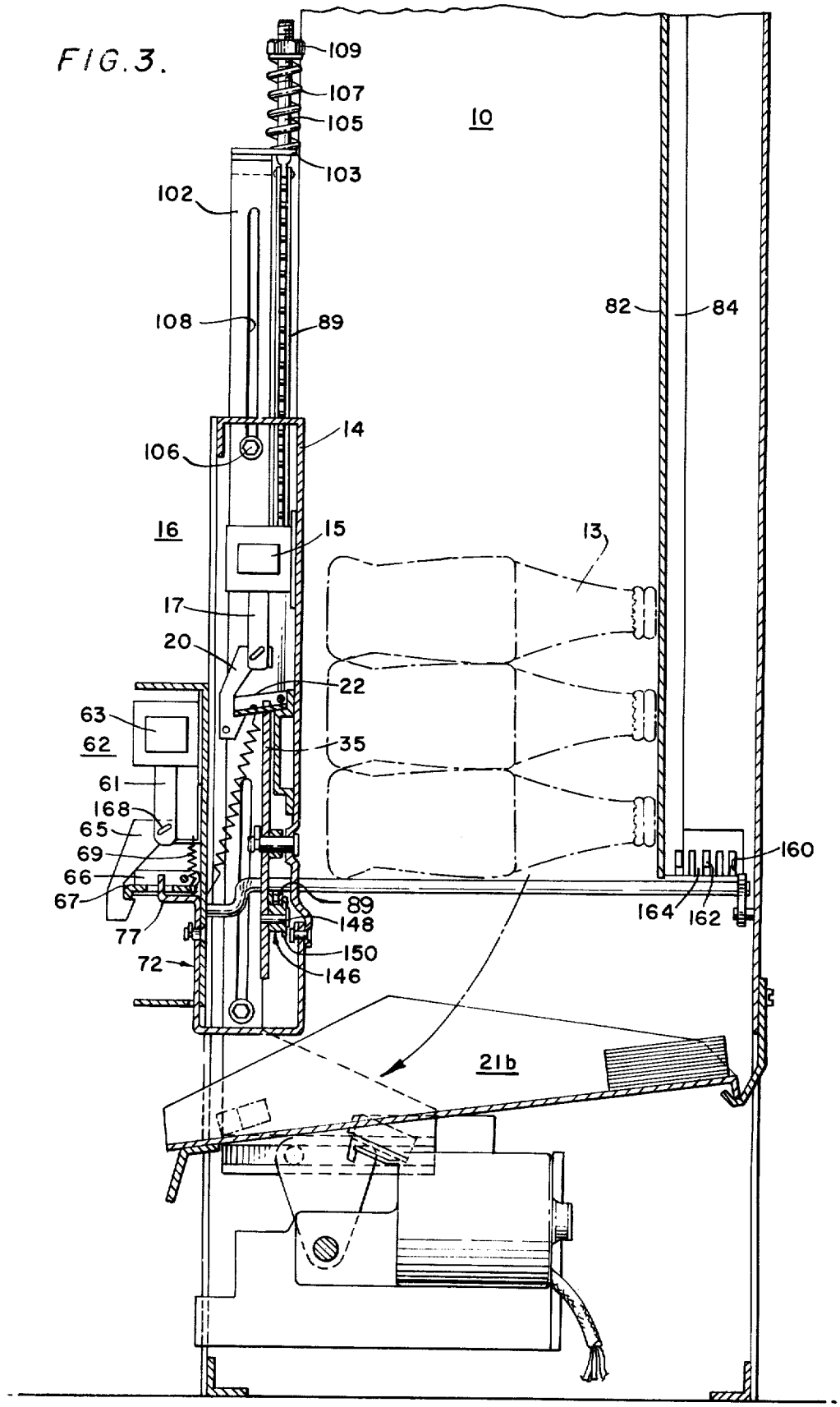

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FIG. 4.

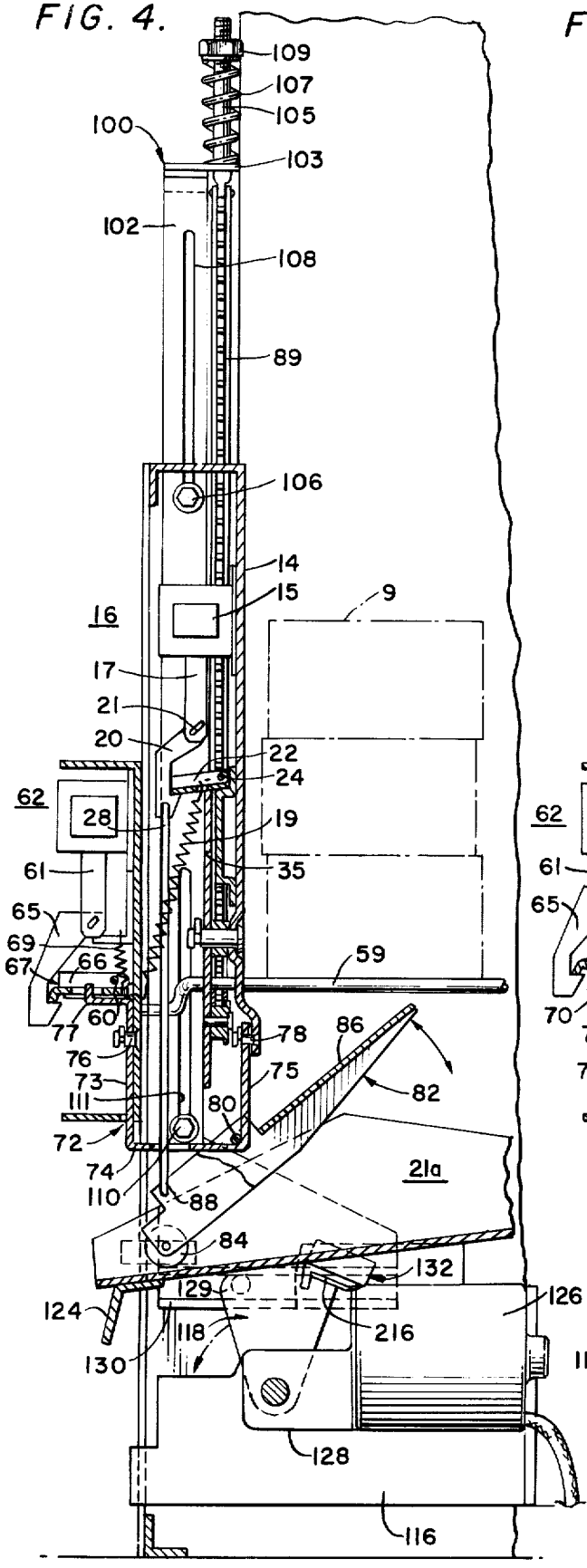
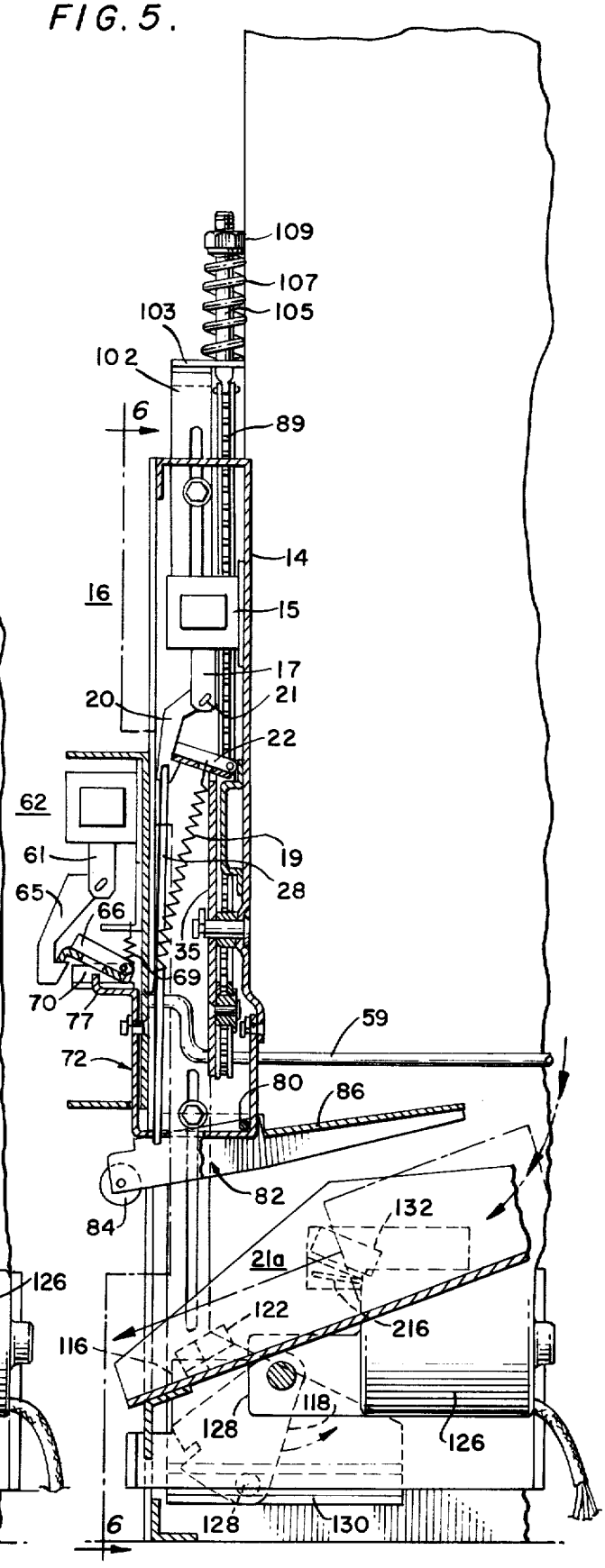

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FIG. 5.


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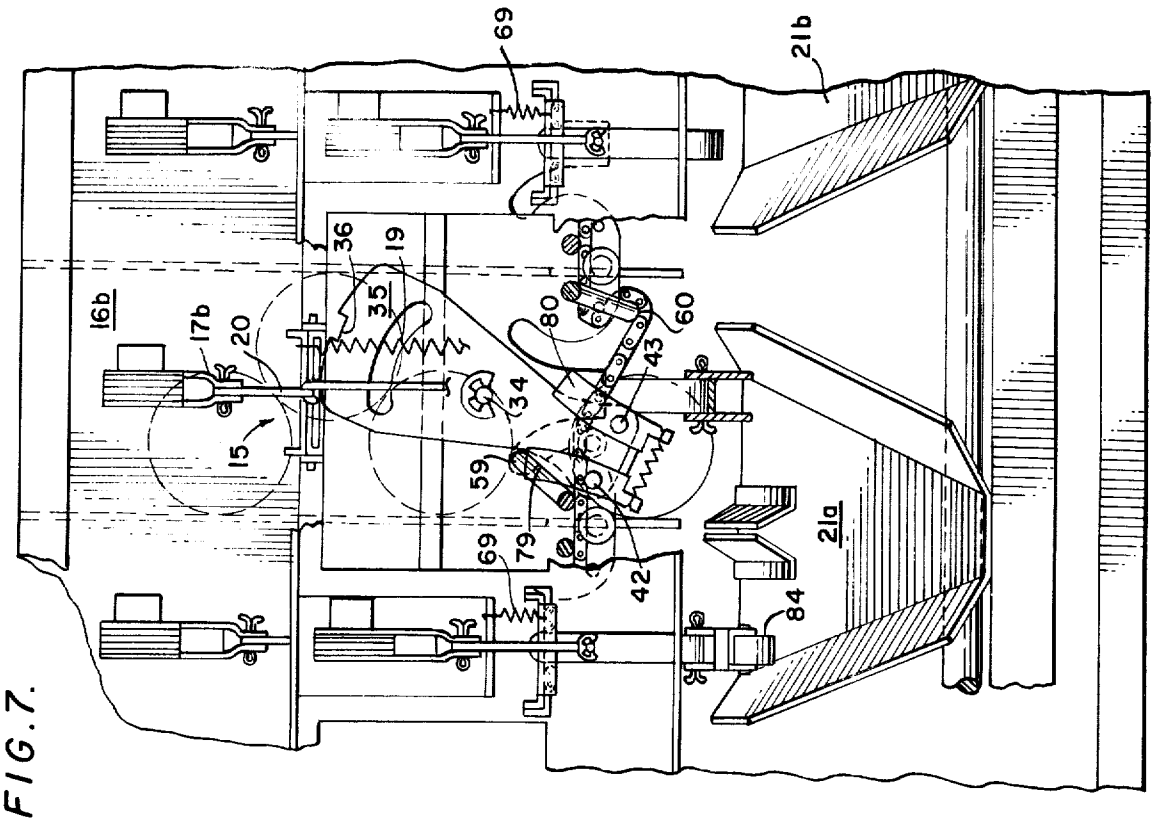

69
21b
16b
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FIG. 7.

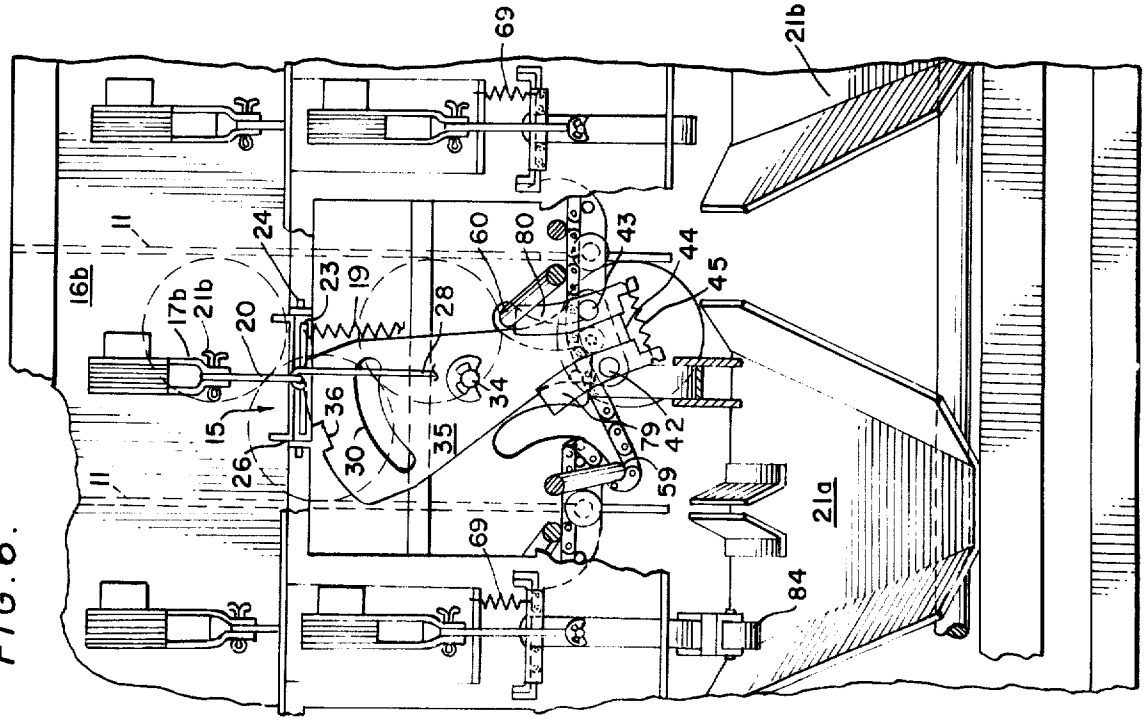

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FIG. 6.

FIG. 8.

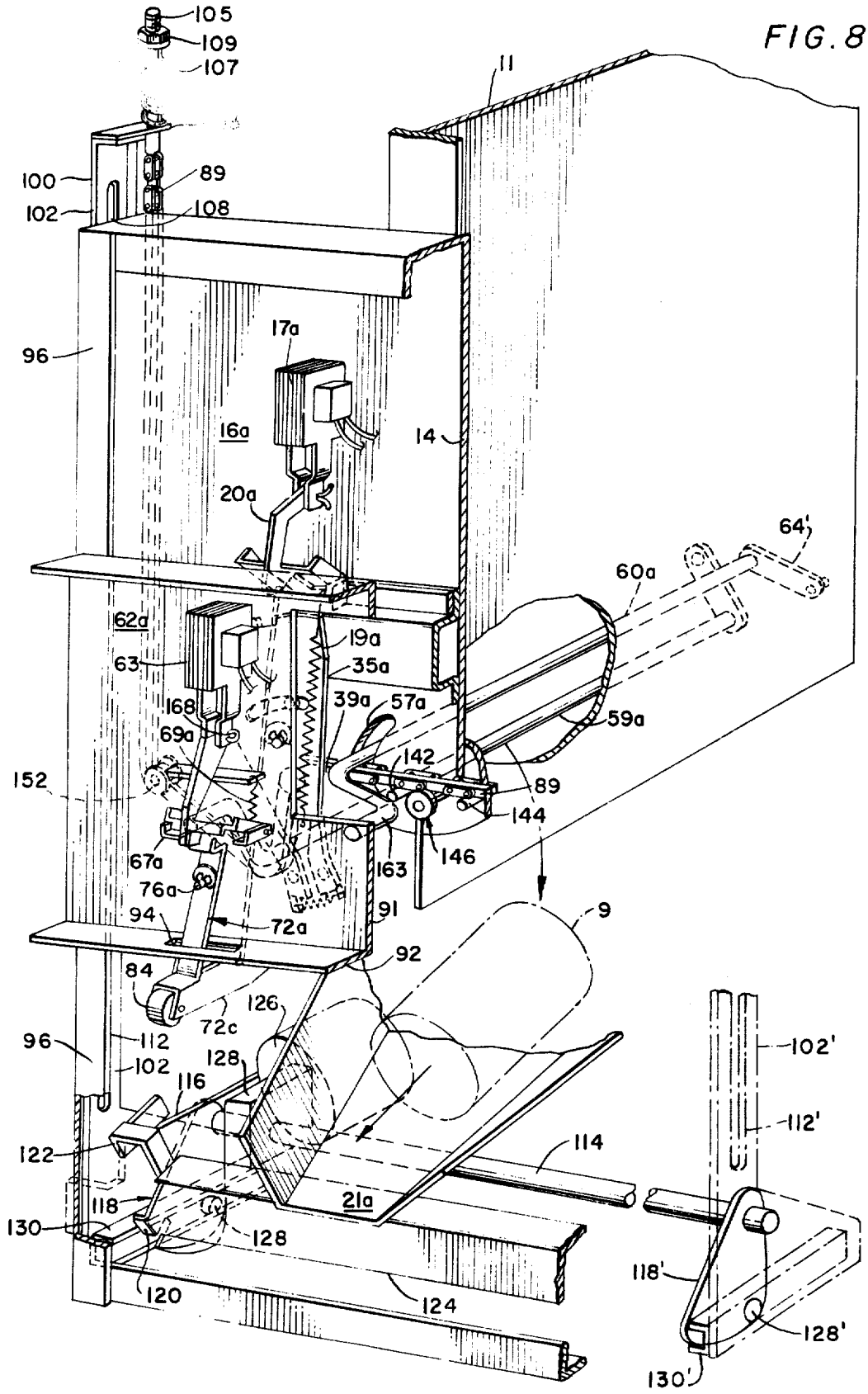
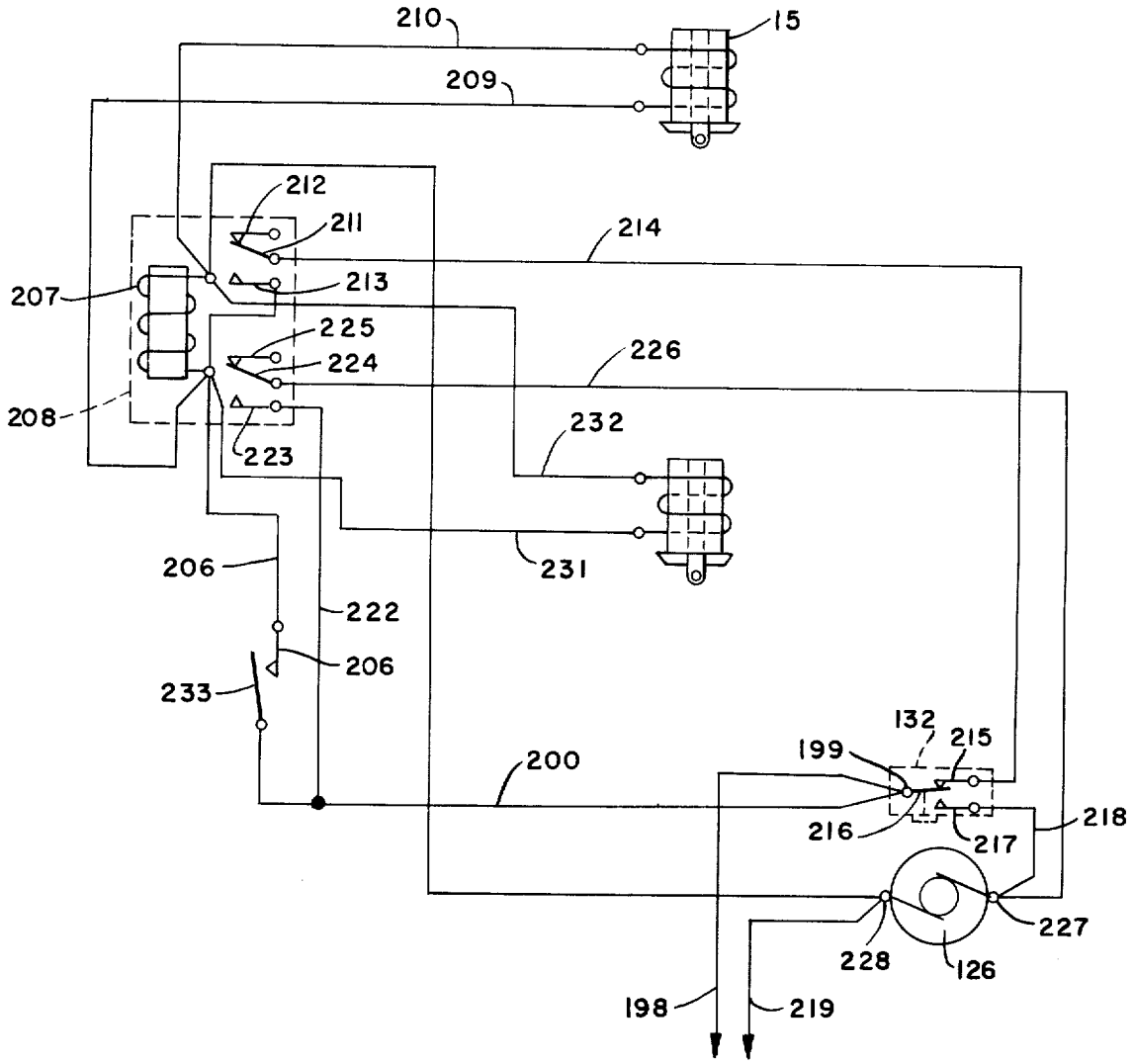

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67a
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76a
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72a
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112'
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FIG. 9.


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ADAPTABLE DISPENSING APPARATUS WITH UNIQUE ESCROW BAR AND ASSOCIATED LATCH MECHANISM

CROSS-REFERENCE TO RELATES APPLICATION

Reference is made to commonly-assigned, copending application Ser. No. **495,492** entitled, "Adaptable Article Dispensing Apparatus With Cam Actuating Member", filed concurrently herewith in the name of James C. Lindsey.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to dispensing apparatus for dispensing a single article at a time in sequence from a plurality of articles arranged in a front-to-back staggered stack of the type generally disclosed in my U.S. Pat. No. **3,224,631,** issued Dec. **31, 1965.**

Even more particularly, this invention relates to a mechanism for dispensing a single article at a time in sequence from front-to-back staggered stack of articles in which the releasing and dispensing mechanisms are actuated by the weight of the articles in the staggered stacks of articles and release of the releasing and dispensing mechanisms for dispensing a single article at a time from the staggered stack of articles is actuated by electrically energized means.

Even more particularly still, this invention relates to a dispensing mechanism for dispensing in sequence and one-at-a-time an article such as a single can or bottle from front-to-back staggered stacks of articles, cans or bottles, hereinafter referred to for convenience as cans, in which the weight of the cans in the stacks actuates the releasing and dispensing mechanisms. The mechanism is released for the dispensing of a single can at a time by electrically energized means which may be energized from any suitable source and controlled by any suitable switch mechanism which switch mechanism may preferably be actuated by the deposit of a coin.

Even more particularly, this invention relates to a dispensing mechanism in which two staggered stacks of cans are arranged in front-to-back relationship with a releasing mechanism common to both stacks for releasing a can from each stack when the releasing mechanism is energized with one can then being immediately dispensed and the other can being retained until the mechanism is again energized, as by the deposit of a second coin, whereupon the other can is released and dispensed.

2. Description of the Prior Art

At the present time, articles such as cans of popular beverages are usually stored for selective sale in refrigerated cabinets with coin release mechanisms for dispensing one can at a time. In these cabinets, the cans may be disposed on sloping shelves arranged one shelf above the other or the cans may be arranged in vertical staggered stacks in side-by-side bins. In the first type of dispenser in which the cans are arranged on sloping shelves, the lowermost can on each shelf may move by gravity to a position where it can be withdrawn manually by the purchaser after a coin has been deposited to release a locking mechanism allowing withdrawal of one can at a time.

In the second type of apparatus, in which the cans are arranged vertically in columns in staggered stacks in side-by-side bins, various devices have been used for

releasing one can at a time on the deposit of a suitable coin. Usually this release mechanism is driven by an electric motor and moves from beneath one can in the selected column in the selected staggered stack to a position beneath the next can to prevent more than one can from being dispensed at a time.

The first type of dispenser has advantages of relatively simple construction and the merchandise is visible for selection by the purchaser. A variety of types of beverage can be sold in this machine depending only on the number of sloping shelves provided. This multiplicity of variety is disadvantageous to the supplier who may place the machine on location since the machine can then be used for vending products other than those of the supplier.

In the second type of dispenser in which the cans are arranged in staggered stacks, it has been found that the practical size of the cooler, doors and the like of the apparatus limits the number of double column staggered stacks side-by-side in the cabinet. The number of selections are therefore limited in a machine of maximum size. This is advantageous to the supplier since it limits the number of beverages that can be sold other than those of the supplier. A further advantage is that more cans can be stored in the staggered stack type dispenser than in the shelf type machine. Even greater capacity is obtained when the staggered stacks are arranged in front-to-back relationship. However, in the staggered stack machine, the delivery mechanism is usually motor-driven; it is expensive; and there is always the possibility of a mechanical jam of the mechanism in the automatic, positive drive of the dispensing mechanism for the cans.

Heretofore, it has been proposed to dispense from stacks of articles or cans less than two diameters of the articles or cans in width, with a mechanism for holding the lowermost can in the stack first on one side of the stack and then on the other side of the stack. A mechanism of this type is disclosed in the above-identified U.S. Pat. No. **3,224,631,** which discloses apparatus for dispensing articles from one side or column of the staggered stack and then from the other column of the staggered stack, as referred to above. In particular, first and second support members are provided under each column of the staggered stacks, each of which is movable from an article supporting position to an article releasing position as controlled by a pivotably mounted latch or rock plate. When a coin is deposited within the dispensing apparatus or an initiating switch in a control circuit is momentarily closed, an energizing signal or current is applied to a first lock mechanism associated with the pivotably mounted latch, whereby the latch is permitted to rotate from a first, rest position to either of a second or third position. In the second position, the pivotably mounted latch member serves to retain the first support member in its article supporting position, while at the same time releasing the second support member to its article releasing position, whereby at least two articles from the aligned, staggered stacks thereof are released. One of the two released articles is dispensed for the use of the operator, while the other article is retained by an escrow bar that is held during this first cycle of operation, in its article retaining position.

The movement of the released support member is controlled, as taught in the above-identified patent, by a non-extensible member such as a chain, whose ten-

sion is released, whereby the disengaged support member is slowly moved to its article releasing position under the weight of the stacked articles. The chain tensioning mechanism comprises, in the above-identified patent, a motor-driven disk to which the chain is connected. As the disk continues to rotate, the chain tension is again increased and the support member is moved from its second article releasing position back to its article supporting position and the rotatable latch member is disposed to its first, rest position, at which time the rotatably mounted latch member is again latched by the first lock mechanism. When the disk has rotated through a complete revolution, a de-energizing circuit switch is actuated, whereby the control circuit de-energizes the motor.

When the next coin is inserted or the initiating switch thrown, a second cycle commences, wherein the motor-driven disk rotates through a second complete revolution. During the second cycle, a second lock mechanism is actuated whereby the escrow bar is released, permitting it to be moved to its second article releasing position, whereby the article initially released during the first cycle but retained by the escrow bar, is now released. Illustratively, the first and second lock mechanisms comprise solenoid mechanisms that are sequentially energized during the first and second cycles by the aforementioned control circuit.

In the above-identified patent, the mechanism is adapted to release articles such as cans from at least two staggered stacks thereof, corresponding cans in the adjacent stacks being substantially axially aligned of each other. In the present invention, the dispensing apparatus is adapted to vend different types of articles, such as bottles, that may be disposed in a single stack, as well as other articles such as cans, that may be stacked double from front to back. Such adaptation makes the dispensing apparatus more versatile and permits the refrigerated area to be used more efficiently than presently available dispensing apparatus. Further, the conversion or adaptation from articles of one size to another, i.e. cans to bottles, is relatively simple and may be carried out by a technician at the location of the dispensing apparatus. In addition, the control or energizing circuit is simplified with respect to that of the above-referenced patent, in that the switch mechanism for ensuring the sequential energization of the first and second solenoids during the respective first and second cycles of operation, may be eliminated. Further, the dispensing mechanism of this invention is capable of dispensing articles such as bottles disposed in a single stack with the same basic mechanism and circuitry as used to dispense articles such as cans from two stacks thereof, but with the removal of the escrow bar, the energizing circuitry and the remainder of the mechanism being the same for both modes of operation.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide an article dispensing apparatus that is capable of easy conversion between dispensing articles of a first size to articles of a second, different size.

It is a further object of this invention to provide new and improved article dispensing apparatus capable of operating in a first mode to dispense articles, e.g. cans, one-at-a-time from staggered stacks thereof in front-to-back relation and in a second mode of operation, in which articles of greater axial dimensions, e.g. bottles, are dispensed one-at-a-time from a single staggered stack thereof.

It is a still further object of this invention to provide a new and improved article dispensing apparatus incorporating a simplified energizing circuit capable of energizing the dispensing mechanism for dispensing articles from either a single or two stacks thereof in substantially the same manner.

These and other objects are accomplished in accordance with the teachings of this invention by providing article dispensing apparatus comprising a reservoir or bin capable of receiving at least two staggered stacks of articles wherein adjacent articles in these stacks are aligned substantially axially of each other and each stack including at least two columns of the articles with adjacent articles in the columns of a stack staggered with respect to each other; an article support member for each column of the first and second stacks of articles movable from a first article supporting position beneath its respective column to a second article releasing position whereby an article from one column of each of the stacks is released; an escrow bar disposed to receive one of the two articles released from the actuated article support member and movable from a first article retaining position to a second article releasing position; a latch plate or means pivotably mounted to move from a first rest position wherein it engages and holds the two article support members in their first article supporting positions, to a second position wherein the latch plate engages and holds one of the article support members in its article supporting position and releases the other article support member to permit it to move to its article releasing position, and to a third position wherein the latch plate engages and holds the other article support member in its article supporting position and releases the one article support member to permit it to move to its second article releasing position; first and second lock means for respectively locking the latch plate in its first position and the escrow bar in its first article retaining position, and wherein the escrow bar is responsive to the release of an article by one of the support members to render the first lock means unreleasable, so that the first lock means retains the pivotably mounted plate in its first rest position to hold the support members in their article supporting positions. Thus, during the first cycle of operation, the first lock means releases the pivotably mounted latch means whereby one of the support arms is moved to its second article releasing position to release two articles. One of the articles descends onto the escrow bar and is retained thereby. During the second cycle of operation, the escrow bar actuated under the weight of the article retained thereby, serves to render the first lock means nonreleasable. Thus, only the second lock means is released during the second cycle, whereby the escrow bar is permitted to move under the weight of its retained article to its second article releasing position to dispense the retained article.

In an illustrative embodiment of this invention, the escrow bar takes the form of a pivotably mounted member and is coupled by a linkage to the first lock mechanism. The pivotably mounted escrow bar is movable from a first position to a second position under the weight of the article as it is released from one of the support members. When the escrow bar is in its second position, the first lock means through the linkage is disposed to a nonreleasable position so that during the

second cycle of operation, the first lock means retains the pivotably mounted latch plate in its first rest position and therefore the article support members in their first article supporting positions.

In a further aspect of this invention, a non-extensible member is suspended by a frame to engage each of the support members. The frame is movable slowly by a motor-driven disk, from a first position wherein the non-extensible member is tensioned to hold the first and second support members in their first article supporting positions, to a second position wherein the tension placed upon the non-extensible member is released and one of the article support members is permitted to slowly fall under the weight of the articles associated therewith toward its second article releasing position. As the frame returns to its first position, the article support member is disposed to its first position and the pivotably mounted latch member is disposed to its first position wherein it is locked by the first lock means. The non-extensible member, illustratively in the form of a chain, is further suspended about a surface of the pivotably mounted latch plate, whereby the latch plate is moved to either of its second or third positions as the frame moves to its second position, without a "whiplash action" of the latch plate.

In a still further feature of this invention, the disk-driven motor further serves to move a support frame cyclically between first and second positions. The support frame carries at least one tray for receiving the articles dispensing from the above-described dispensing apparatus. When the support frame is in its first position, the tray is aligned with an exit opening from the mechanism to permit the released article to be dispensed therefrom, whereas when the support frame is moved to its second rest position, the tray and support frame serve to block the exit opening and to prevent unauthorized entrance into the dispensing apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the present invention will become more apparent by referring to the following detailed description and accompanying drawings, in which like reference characters indicate like parts:

FIG. 1 is a front view of an embodiment of the present invention showing a plurality of bins for receiving the articles to be dispensed by a corresponding plurality of dispensing mechanisms;

FIG. 2 is a side, partially-sectioned view of one dispensing mechanism as shown in FIG. 1, as taken along line 2—2 thereof;

FIG. 3 is a side view, partially in section, of the dispensing mechanism of FIG. 1 taken along line 3—3 thereof, particularly illustrating the manner in which the dispensing mechanism may be adapted to receive a single stack of articles, e.g. bottles, to be dispensed therefrom;

FIGS. 4 and 5 are side views, partially in section, of the dispensing mechanism of FIG. 1 taken along line 2—2 thereof, particularly illustrating the cyclical operation of the dispensing apparatus and in particular the operation of its escrow bar;

FIGS. 6 and 7 are partial, front views of the dispensing mechanism as shown in FIG. 1, particularly illustrating the operation of the pivotably mounted latch plate;

FIG. 8 is a perspective view, partially broken away, of the dispensing apparatus of FIG. 1; and

FIG. 9 is a schematic diagram of the circuit for energizing one of the dispensing mechanisms as shown in the embodiment of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings and in particular to FIGS. 1, 2 and 8, there is shown an article dispensing apparatus in accordance with the teachings of this invention, as comprising a plurality of bins or reservoirs 10*a*, 10*b*, 10*c* and 10*d* for receiving staggered stacks of articles, such as bottles and/or cans. As illustratively shown in these figures, the bins 10 are dimensioned along their width and axial length to receive first and second staggered stacks of cans 9, corresponding cans 9 of each stack being axially aligned from the front to the back of its bin 10. As more clearly shown in FIG. 1, each stack is considered to include first and second columns of articles with each column of a stack supported by an article support member 59 or 60. In a further embodiment of this invention, as will be explained with respect to FIG. 3, the dispensing apparatus of this invention is adapted to be modified readily to accept a single stack of articles such as bottles 13. As particularly shown in FIG. 2, each bin or reservoir 10 is formed of side walls 11, and front and rear walls 14 and 14'. The side walls 11 of the bins 10 are spaced apart less than twice the diameter of the articles to be dispensed so that the articles will lie between the walls in the staggered stacks. The front and rear walls 14 and 14' are speced to accommodate the axial lengths of the cans 9 to be dispensed from the first and second staggered stacks.

As shown generally in FIG. 1, each bin 10*a*, 10*b*, 10*c* and 10*d* has an associated dispensing mechanism comprising the first and second support members 59 and 60, one for each column of the staggered stacks of articles, rotatable as shown by the arrows in FIG. 1 from a first, article supporting position directly beneath and supporting the articles in its column of the staggered stacks, to a second, article releasing position, wherein at least one article from the corresponding stacks of that column is released into one of the trays 21*a* and 21*b*. It is understood that the elements of corresponding dispensing mechanisms are identified with the letters *a*, *b*, *c* and *d* throughout these drawings. Further, each dispensing mechanism includes a latch plate 35 pivotably mounted upon a stud 34 fixedly secured to the front wall 14, as shown in FIG. 2. The latch plate 35 includes first and second tumbler plates 79 and 80, each pivotably mounted upon the plate 35 by pins 42 and 43, respectively. A spring 45 is coupled between the bottom ends of the tumbler plates 79 and 80 to bias them together against a rest stop 44. The latch plate 35 is pivotably mounted to rotate from its first, rest position wherein the tumbler plates 79 and 80 respectively engage and hold the support arms 59 and 60 in their first article supporting position, to either of a second article releasing position as shown in FIG. 6, wherein the tumbler plate 80 engages and holds the support arm 60 in its first article supporting position and releases the second support arm 59 to rotate to its second article releasing position, and to a third position as shown in FIG. 7, wherein the tumbler plate 79 engages and holds the support member 59 in its first article support-

ing position and releases the first article support member **60** to its second article releasing position.

As shown most clearly in FIGS. **1** and **8**, a front end portion of each of the article support members **59** and **60** is disposed within a corresponding opening of a front mounting plate **91** to be rotatably mounted thereby. A portion **163** of the support members **59** and **60** extends radially inward to form a radial arm about which its support member rotates. The support members **59** and **60** extend through arcuate openings **55** and **57**, respectively, of the front wall **14** to extend across the lower portion of its bin **10** to selectively block the passage of the articles. The other or back end of the article support members **59** and **60** is fixedly secured to an arm **63'** which is rotatably mounted by a pin **64'** affixed upon the back wall **14'**. Upon release of articles from the staggered stacks by one of the support members **59** or **60**, one of the articles falls into one of the trays **21** or **22**, whereas the other article falls onto and is retained by a pivotably mounted escrow bar **82**.

As shown in FIGS. **1**, **2** and **8**, each dispensing mechanism includes a first locking mechanism or means generally designated by the numeral **16**, for locking the pivotably mounted latch plate **35** in its first rest position, and a second lock means generally designated by the numeral **62**, for locking the escrow bar **82** in its first article supporting position. The first locking mechanism **16** comprises, as best shown in FIG. **2**, a solenoid **15** with an actuatable plunger **17**, to which is secured a finger arm **20** by a cotter pin **21**. The solenoid **15** is mounted upon the front face of the wall **14**, and the finger **20** is so configured as to engage a member **22** that is pivotably mounted by a pin **24** upon a bracket **25** (see FIG. **1**) affixed to the front wall **14**. As best seen in FIG. **2**, the rotatable member **22** is biased by a spring **19** in a downward, counterclockwise direction whereby a narrowed portion **29** (see FIG. **1**) thereof is disposed within a slot **36** of the plate **35** and the rotatably mounted latch plate **35** is maintained or locked in its first rest position, as shown in FIG. **1**. When the solenoid **15** is energized, as will be explained in detail later, its plunger **17** is withdrawn, rotating the member **22** upward and away from the plate **35**, whereby the latch plate **35** is free to move to either of its second or third positions, as shown in FIGS. **6** and **7**, respectively.

As shown in FIGS. **1**, **2** and **8**, the second locking mechanism **62** includes a solenoid **63** mounted upon the front mounting plate **91**; the solenoid **63** comprises a plunger **61** to which is attached a finger arm **65** as by a cotter pin **168**. The finger arm **65** is so configured as to engage a member **66** pivotably mounted by a pin **68** from a bracket affixed to the front mounting wall **91**. The rotatably mounted member **67** is biased by a spring **69** in a downward, counterclockwise direction, as shown in FIG. **2**, to a position wherein an opening **66** within the member **67** engages and retains a finger **77** of a bracket **72** that supports the escrow bar **82**. Upon energization of the solenoid **63**, the plunger **61** and its attached finger **65** are raised upward, engaging and withdrawing the pivotably mounted member **66** from the finger **77** of the escrow bar support assembly **73**. As will be explained, the escrow bar **82** is now permitted to rotate to its article releasing position.

As most clearly shown in FIGS. **2** and **8**, the escrow bar **82** is pivotably mounted by an assembly **72** to rotate from a first, substantially verticle position, wherein the escrow bar **82** retains and supports an article thereon, to a second, article releasing position as shown in FIG. **8**, whereby the article retained by the escrow bar **82** is released to fall into its associated tray **21a**. The support assembly **72** is pivotably mounted to swing, when released by the second locking mechanism **62**, to rotate as shown by the arrow in FIG. **8**, to its second article releasing position. As shown in FIG. **2**, the support assembly **72** includes a pair of radially extending arms **73** and **75** whose end portions are rotatably mounted as by studs **76** and **78**, respectively. The studs **76** and **78** are fixedly secured to the front mounting wall **91** and the front wall **14** of the bin **11**, respectively. The arm **73** includes the finger **73** for engaging the opening **66**, whereby the mounting assembly **72** and the escrow bar **82** are held in their first position. The escrow bar **82** is pivotably mounted with respect to the support assembly **72** by a cotter pin **80** that is capable of being easily removed, as will be explained in detail later. Upon the front end of the escrow bar **82** remote from its article supporting portion, a weight **84** is suspended, whereby in the absence of an article thereon, the escrow bar **82** is rotated in a counterclockwise direction as shown in FIG. **4**. The escrow bar **82** is coupled by a link **28** to the finger arm **20** of the first locking mechanism **16**. In particular, the bottom end of the link **28** is inserted through an opening **88** of the escrow bar **82**, whereas the topmost end is disposed within an opening within the finger arm **20**. As a result, when the escrow bar **82** is free of an article, it rotates to a first position under the influence of the weight **84**, whereby the link **28** pulls the finger arm **20** down into engagement with the rotatably mounted member **22**; in this position, the finger **20** engages the member **22** upon energization of the solenoid **15**, removing it from locking engagement with the latch plate **35**. Upon release of an article from one of the support members **59** and **60**, an article **9** in the front stack falls onto and is retained by the escrow bar **82**. The weight of the released article **9** rotates the escrow bar **82** is a clockwise direction, as shown in FIG. **2**, to its second position; in this position, the link **28** is forced upward disposing the finger arm **20** out of engagement with the rotatably mounted member **22**. Thus, when an article is retained by the escrow bar **82**, the finger **22** is disposed from engagement with the member **22** and the first lock mechanism **16** is inoperative to release the rotatably mounted latch plate **35**.

Upon release of one of the support members **59** or **60** by the rotatably mounted latch plate **35**, as explained above, the released support member rotates downwardly under the weight of its column of articles to release articles in each of the stacks supported thereby. It is desirable to control the movement of the released support arm rather than permit it merely to fall under the weight of the articles. To this end, tension is placed upon and released from a non-extensible member **89** taking the form of a chain suspended to receive either of the article support members **59** or **60** as it is released by the rotatably mounted latch plate **35** and then rotates downward under the weight of its supported articles. The non-extensible member **89** is supported upon a frame generally identified by the numeral **100**, as shown in FIG. **1**; in particular, the support frame **100** includes a pair of leg members **102** and **102'**, from the ends of which the non-extensible member **89** is secured by a flange portion **103** extending therefrom. As shown particularly in FIG. **8**, the last link of the non-extensible

member **89** is secured to a bolt **105**, which in turn is disposed through an opening within the flange **103**. A spring **107** is disposed about the bolt **105** and is secured thereto by a nut **109** threadably secured to the end of the bolt **105**. In this manner, an article may become jammed with respect to the support members **59** and **60**, and yet the dispensing mechanism and in particular the operation of the frame **100** may continue due to the biasing action of the spring **107**. It is understood that a similar spring may be inserted between the end of the non-extensible member **89** and the end of the other leg **102'**.

As shown in FIGS. **1** and **8**, the non-extensible member **89** extends from the flange **103** downwardly along the length of the corresponding arm **102**. A pair of rollers **152** and **154** are mounted upon the front wall **14** to suspend the non-extensible member **89** horizontally and beneath each of the article support members **59** and **60**. As shown in FIG. **8**, a suspension assembly is disposed between the support arms of each bin **10** to suspend the non-extensible member **89** is tension against the lower portion of the article support members **59** and **60**. In particular, a roller **146** is disposed centrally of two adjacent bins and is rotatably mounted upon a pin **148** affixed to the front wall **14**. The roller **146** includes a flange **150** (see FIG. **3**) for retaining the non-extensible member **89** in association with the roller **146**. On either side of roller **146**, there are disposed posts **142** and **144**, likewise affixed to the front wall **14**, to assist in aligning the non-extensible member **89** with respect to the article support members **59** and **60**.

As seen in FIG. **2**, the arm **102** of the support frame **100** is suspended to a side wall **11** by a pair of studs **106** and **110** disposed respectively within slots **108** and **111** of the arm **102** to permit the rectilinear motion of the arm **102** and therefore the frame **100** from a bottommost, first position, as shown in FIG. **5**, to an uppermost, second position as shown in FIG. **4**. As shown in FIGS. **4**, **5** and **8**, the frame **100** is driven rectilinearly by a motor **126** coupled through a suitable gearing mechanism **128** to a shaft **114**; in turn, the shaft **114** is fixedly secured to each of a pair of disks **118** and **118'**. As will be explained in detail later, as the motor **126** is energized, the disks **118** and **118'** are rotated whereby the frame **100** is driven between its first and second positions to alternately increase and decrease the tension applied to the non-extensible member **89**. More specifically, the disks **118** and **118'** include, respectively, rollers **128** and **128'** for engaging channels **130** and **130'** respectively affixed to the corresponding arms **102** and **102'**. Thus, as the disks **118** and **118'** are rotatably driven, the channels **130** and **130'** and therefore the arms **102** and **102'** move in a rectilinear fashion.

As seen most clearly in FIGS. **8** and **1**, the trays **21** and **22** are associated with the frame **100** so that the front end of each tray **21***a* and **21***b* moves up and down so as to be aligned with an exit opening (not shown) through which the article is to be dispensed. In particular, each tray **21***a* and **21***b* is affixed at its leading edge to a support flange **124**. A limiting, U-shaped member **122** is secured at each end of the flange **124**. As shown in FIG. **8**, when the disks **118** and **118'** are rotated to their lowest positions, the trays **21***a* and **21***b* are aligned with the exit opening to permit dispensing of an article **9** therethrough and the limiting member **122** engages the upper edge of a plate **116** affixed to a flange **96** of the dispensing apparatus housing to thereby define the tray's exit position, even though the frame **100** continues to move to a still lower position. As shown most clearly in FIG. **1**, as the disk **118** rotates, it engages the limiting member **122**, directing it upward along with the flange **124** whereby the leading edge of the trays **21***a* and **21***b* is likewise moved up. As seen in FIG. **2**, the rear edge **151** of the tray **21***a* sits within a retaining portion of a J-shaped member **153** affixed to the rear wall **14'**, whereby the tray may be rotated thereabout.

Referring now to the diagram of the circuit shown in FIG. **9**, it will be seen that the wire **198** leads from a suitable source of electric power to one side **199** of a timer or limit switch **132**. As shown in FIG. **2** and **8**, the timer switch **132** is disposed to be engaged by a flange **120** attached to the disk **118** and serving as a switch-actuating surface that is cyclically rotated into engagement with and closing a switch arm **216** of the switch **132**. Wire **200** leads from side **199** to switch element or arm **233**. Switch element **233** is normally set to be disengaged from contact or side **205**. In turn, contact **205** is connected by wire **206** to solenoid **207** of relay **208** and is extended by a wire **209** to solenoid **15**. The other side of solenoid **15** is connected by a wire **210** to the other side of solenoid **207** and by wires **222** and **219** to the source of electric power.

Coil **207** actuates two switch elements **211** and **224** which normally engage contacts **212** and **225**, respectively. Switch element **211** is connected by wire **214** to contact **215** of switch **132**. Contact **217** of switch **132** is connected by wire **218** to connection **227** of motor **126**. The other connection **228** of motor **126** is connected by wire **219** to the source of electric power. Switch **224** is connected by wire **226** to the motor connection **227** and, when actuated, engages contact **223** which is connected by wire **222** to motor connection **228**.

Solenoid **63** of the second locking mechanism is coupled in parallel by wires **232** and **231** to the contacts of the coil **207**. Assuming the several switches of FIG. **9** to be in the positions as shown, the deposit of a coin in the mechanism (not shown) to obtain an article, e.g. a can or a bottle of beverage or other goods, will move switch element **233** into engagement with contact **205** to permit electric current to flow through wires **198** and **200**, the coil **207** of the relay **208** and conductors **222** and **219**, whereby the circuit for the coil **207** is completed to the source of electric energy, thereby energizing the coil **207**. As a result, the solenoid coil **15** of the first lock mechanism **16** is energized to raise the rotatable member **22** and relay **208** is energized, moving switch element **211** into engagement with contact **213** and moving switch element **224** into engagement with contact **223**. Current then flows through wires **198** and **200**, switch element **233**, wires **225** to motor connection **227** to initiate the energization of motor **126**, the motor circuit being completed through motor connection **228** and wire **219**. At the same time, relay **208** is energized through wire **198**, switch element **216**, contact **215**, wire **214** switch element **211**, contact **213** and wire **234**, the circuit being completed through wires **220** and **219**.

Motor **126** then begins to rotate shaft **114** and disks **118** and **118'** coupled thereto, whereby the selective release of an article is accomplished, as will be explained in detail. As the disk **118** continues to rotate, its flange **120** disengages contact arm **216**, moving it into engagement with contact **217**. The motor circuit

for energizing motor **126** is now energized through wire **198**, switch element **216**, contact **217**, wire **228**, connection **227**, connection **228** and wire **229**. The motor **126** will now rotate the disks **118** and **118'** through one complete revolution, at which time the flange **120** moves the switch arm **216** back into engagement with contact **215**. At this point, the motor energizing circuitry is opened, de-energizing motor **126**; further, relay **208** is de-energized, returning its contacts to their normal position.

The operation of the dispensing mechanism as shown in FIGS. **1** to **8** will now be explained with regard to dispensing articles such as cans arranged in two stacks from front to back of the bin **10** as shown in FIG. **2**, one-at-a-time in a two-cycle mode of operation. Initially, a coin is deposited into a suitable mechanism, whereby the switch element **233** is closed to contact **205** to energize the relay **208** whereby its associated contacts are closed and also to energize the motor **126**. At the same time, the solenoids **15** and **63** of the first and second lock mechanisms **16** and **62** are energized. Thus, the solenoid **15** retracts the plunger **17** and the finger arm **20**, whereby the rotatable member **22** is moved upward against the bias of spring **19**. As a result, the pivotably mounted latch plate **35** is released whereby it may pivot to either of its second or third positions. As illustratively shown in FIGS. **2**, **4** and **8**, the lowermost articles in the staggered stacks received within the bin **10**a are disposed upon the article support member **59**, whereby upon release, the member **59** is rotated down under the weight of its articles to release articles from the first and second stacks thereof. As shown in FIG. **5**, an article from the rearwardmost stack falls into the tray **21***a* and is dispensed through the exit opening. The motor **126** drives the disks **118** and **118'** toward their lowermost positions whereby the tray **21***a* is permitted to rotate downwardly to that position as shown in FIG. **5**, whereat it is disposed in alignment with the exit opening to permit the article to be dispensed therethrough. While the rearwardmost article is being dispensed, the article from the forwardmost stack thereof falls onto the escrow bar **82** which is rotated from its position as shown in FIG. **4** to that position as shown in FIG. **2**, wherein it supports and retains an article. It is noted that both of the solenoids **15** and **63** are energized at essentially the same time. However, at the beginning of the first cycle of operation, no article is retained by the escrow bar **82** and even though the second locking mechanism **62** releases the escrow **82**, it remains unaffected thereby, as shown in FIG. **5**.

Initially, the disk **118** is disposed in its uppermost position as shown in FIG. **4**, and as the motor **125** begins to rotate the disk **118** in a counterclockwise direction, the roller **128** engages the channel **130** disposing it downward along with the frame **100** associated therewith. In its initial uppermost position, the frame **100** applies a maximum tension to the non-extensible member **89**, whereby it is disposed in tension against the lower surfaces of the article support members **59** and **60**. Thus, as the first lock mechanism releases the latch plate **35** and one of the article support members **59** or **60** is released, the tension applied by the frame **100** to the non-extensible member **89** is released and the selected article support member **59** or **60** is permitted to rotate downwardly under the weight of the articles in its column, following the movement of the non-extensible member **89** as the frame **100** likewise moves downwardly.

As the control circuit is initially energized by the closure of the switch element **233**, the motor is rotated to an extent whereby the contact element **216** is released as shown in FIG. **5** and therefore the motor **126** is energized. The motor **126** will continue to be energized, rotating the disks **118** and **118'** until the disk **118** brings the flange **120** into contact with the contact element **216**, thereby disposing it against contact **215** whereby the motor **126** is de-energized, thus completing the first cycle of operation. At this point, a single article has been dispensed from the rearwardmost stack and a second article is retained by the escrow bar **82**, to be dispensed during the second cycle of operation, now to be described.

To commence the second cycle of operation, a further coin is deposited in the dispensing apparatus whereby the coin-operated vend switch is operated to throw contact element **233** against contact **205**, to energize motor **126** as explained above and to energize the solenoid coils **15** and **63** at substantially the same time. At the beginning of the second cycle, an article, e.g. a can **9**, is resting upon the escrow bar **82**, disposing it to the position as shown in FIG. **2**. In this position, the link **28** is directed upwardly to dispose the finger arm **20** of the first lock mechanism **16** out of engagement with the rotating member **22**. As a result, when the solenoid **15** is energized, the plunger **17** retracts, pulling the finger arm **20** with it; however, the finger arm **20** does not engage the rotating member **22**, the pivotably mounted latch plate **35** remains locked in its first rest position, and neither of the article support members **59** nor **60** is released. As shown in FIG. **2**, the solenoid **63** is energized, pulling its plunger **61** and coupled finger arm **65** upward, thus rotating the rotatable member **66** upward to release the finger **77** of the escrow bar support assembly **72**. As shown in FIG. **8**, the assembly **72** and the escrow bar **82** rotate to one side under the weight of the article, thereby releasing it into the tray **21***a*. As illustrated in FIGS. **2** and **8**, the motor **126** rotates the disks **118** and **118'** to their lowermost positions, whereby the frame **100** is lowered until the limiting member **122** comes to rest upon the plate **116** to orientate the flange frame **124** and the corresponding tray **21***a* with respect to the exit opening. Thus, the article **9** drops into the tray **21***a* to be dispensed through the aligned exit opening. The motor **126** continues to be energized until the flange **120** engages the contact arm **216** to de-energize the motor. At the end of either cycle as shown in FIG. **4**, the disk **118** is disposed to its uppermost position, whereby the trays **21***a* and **21***b* are misaligned with respect to the exit opening so that one may not reach through the exit opening to extract one of the articles. As seen in FIG. **4**, the flange **124** serves to at least partially block the exit opening.

Referring now to FIG. **3**, there is shown the manner in which the dispensing apparatus of this invention may be readily modified on location by a serviceman with readily available tools so that articles such as bottles **13** may be singly dispensed from the same essential mechanism that dispensed cans **9**, as explained above. First, a rear spacing wall **82** is disposed within the bin **10** at a position slightly in excess of the axial length of the bottles **13**. In an illustrative embodiment, the rear spacing wall includes a flange **84** having a plurality of fingers **164** adapted to be aligned with corresponding

openings **160** within the side walls **11** of the bin **10**. When the rear spacing wall **82** has been spaced the correct axial distance from the front wall **14**, a suitable keying member **162** is disposed within one of the openings **160** so as to engage adjacent fingers **164** to retain the rear spacing wall **82** at its correct position. As shown in FIG. **1**, it may be necessary to insert side spacing walls **170** to narrow the bin width so that the bottles **13** are staggered. Further, as shown in FIG. **3**, the escrow bar **82** is removed by withdrawing the cotter pin **80** best shown in FIG. **2**; further, the link **28** may be readily removed from the finger arm **20** of the first locking mechanism **16**. A serviceman may readily perform these operations at the on-site locations of the dispensing apparatus in a relatively short period of time and without special tools. In the operation of the modified embodiment as shown in FIG. **3**, a coin is deposited to close the contact element **233** to initiate rotation of the motor **126** and to simultaneously energize the solenoids **15** and **63**. Since the escrow bar **82** has been removed, the solenoid **63** of the second locking mechanism will be energized but without any effect upon the dispensing operation. Rather, the solenoid **15** is energized to lift the rotatable member **22** to release the pivotably mounted latch plate **35**, and in turn to release one of the article support members **59** or **60**, whereby one bottle **13** from the corresponding column of the single staggered stack thereof, is released. As shown in FIG. **3**, there is no escrow bar **82** to retain the released article and it falls directly into the tray **21***b*. The operation of the dispensing apparatus of the subject invention as shown in FIG. **3** is a single-cycle operation from single staggered stacks of similar articles. The motor **126** will continue to rotate the disks until the timer switch **132** is actuated to de-energize the motor **126**, thus completing the dispensing cycle.

Thus, there has been shown a dispensing mechanism that is readily capable of being adapted to dispense various types and sizes of articles. For example, in one mode of operation, the dispensing apparatus of this invention may be disposed to dispense cans from at least two staggered stacks thereof in a double-cycle mode of operation, wherein two cans are first released by an actuated support member, one article of which is dispensed to the customer, while a second article is retained by an escrow bar, to be released during a second cycle of operation. In a second mode of operation, the escrow bar is readily removed to permit a single cycle of operation, in which articles such as bottles are released singly.

The conversion of the dispensing apparatus from its first to its second mode of operation is simple in contrast to that required for the complex mechanisms of the prior art. The conversion contemplated by this invention may be carried out on location with simple tools in a relatively short period of time.

Further, the non-extensible member for controlling the movement of the released support member allows one of a plurality of dispensing apparatus to malfunction, e.g. an article jam therein, by providing springs associated with the ends of the non-extensible member (chain) whereby additional slack is provided by the springs to permit the support arm of the operating dispensing mechanism to swing down, i.e., the springs attached to the ends of the non-extensible member being compressed to allow its article support member to rotate downwardly. Further, the trays for receiving the dispensed articles are coupled to the support frame to be moved from a first position wherein the bin is aligned to dispense articles through an exit opening, to a second position whereby the exit opening is blocked to prevent unauthorized entry into the dispensing apparatus.

Numerous changes may be made in the above-described apparatus and the different embodiments of the invention may be made without departing from the spirit thereof; therefore, it is intended that all matter contained in the foregoing description and in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. Apparatus for storing and successively dispensing articles from first and second staggered stacks, each stack including at least two columns of the articles with adjacent articles in the columns of a stack staggered with respect to each other and adjacent articles in the first and second staggered stacks aligned substantially axially of each other, said apparatus comprising:

a. an article support member disposed to support each of the two columns of the first and second stacks of articles, each of said article support members disposable from a first article supporting position beneath its respective column of the first and second stacks, to a second article releasing position whereby an article from one column of each of the first and second stacks is released;

b. an actuatable escrow means disposed to receive one of the two articles released by one of said first and second article support members and movable from a first article retaining position to a second article releasing position;

c. latch means pivotably mounted to be moved from a first, rest position, wherein said latch means engages and holds said first and second article support members in their first article supporting positions, to a second position wherein said latch means engages and holds said first article support member in its first article supporting position and releases said second article support member to permit it to move to its article releasing position under the weight of the articles, and to a third position wherein said latch means engages and holds said second article support member in its article supporting position and releases said first article support member to permit it to move to its second article releasing position;

d. first releasable lock means for normally retaining said pivotably mounted latch means in its first rest position;

e. second releasable lock means for normally retaining said escrow means in its first article retaining position; and

f. said escrow means responsive to the release of an article by one of said first and second support members to render nonreleasable said first lock means whereby said first lock means retains said pivotably mounted latch means in its first rest position.

2. Dispensing apparatus as claimed in claim **1**, wherein there is included first actuating means for releasing said first lock means, whereby said pivotably mounted latch means is permitted to be disposed to either of its first or second positions, second actuating means actuatable for releasing said escrow means to be

moved to its second article releasing position, and control means for first releasing substantially simultaneously said first and second lock means, whereby one of said first and second support members is disposed to its articles releasing position to release articles from its corresponding columns of the two stacks so that one of the articles is released and the other article is retained by said escrow means which is disposed in its second position, and for releasing a second time said first and second lock means whereby said first lock means is defeated by said second lock means to retain said latch means in its first, rest position and said second lock means is released to permit the release of the other article by said escrow means.

3. Dispensing apparatus as claimed in claim 1, wherein there is further included a regulator disposed beneath and in an engaging manner with said first and second support members, and drive means for moving gradually said regulator to permit said first and second support members to follow the gradual movement of said regulator toward their second article releasing positions.

4. Dispensing apparatus as claimed in claim 3, wherein said regulator comprises a non-extensible flexible element extending beneath said first and second support members, said drive means including means for tensioning said non-extensible flexible element, an eccentric, an electric motor rotating said eccentric through one complete revolution, and an assembly for suspending said non-extensible member with respect to said first and second support members and engaged by said eccentric for reciprocal movement from a first position wherein said non-extensible flexible element is held taut against said first and second support members to a second position wherein the tension applied to said non-extensible flexible element is released.

5. Dispensing apparatus as claimed in claim 4, wherein said latch means comprises an engaging surface against which said non-extensible flexible element is tensioned for controlling the movement of said pivotably mounted latch means to either of its second or third positions and for retaining said latch means in either of its first or second positions for a period sufficient to permit the articles to be released by either of said first or second support members.

6. Dispensing apparatus as claimed in claim 1, wherein there is included reservoir means for receiving the stacks of the articles and said escrow means is disposed tranversely of said reservoir means for a length not greater than the axial length of the article to be dispensed.

7. Dispensing apparatus as claimed in claim 6, wherein there is included a spacing wall and means for adjustably disposing said spacing wall from an opposed wall of said bin a distance slightly in excess of that of the axial length of the article to be dispensed, whereby a single stack of the articles may be disposed within said bin.

8. Dispensing apparatus as claimed in claim 1, wherein said escrow means comprises a pivotably mounted bar, a link coupling said pivotably mounted bar and said first lock mechanism, and said pivotably mounted bar pivotable from a first position wherein said escrow bar is free of an article to a second position under the weight of an article released from one of said article support members wherein said link is disposed by said escrow bar to render unreleasable said first lock mechanism.

9. Dispensing apparatus as claimed in claim 8, wherein said escrow bar includes an article receiving portion and a weight for normally disposing said escrow bar in its first position.

10. Dispensing apparatus as claimed in claim 8, wherein said escrow bar is pivotably mounted by a readily removable pin to permit the ready removal of said escrow bar.

11. Dispensing apparatus as claimed in claim 4, wherein there is included means fixedly mounted with respect to said latch means for suspending said non-extensible flexible element so that when tension is applied thereto in the first position of said assembly, said non-extensible member is disposed to abut the lower surfaces of said first and second article support members.

12. Dispensing apparatus as claimed in claim 11, wherein said suspension means comprises a rotatably mounted roller having a flange for aligning said non-extensible member with respect to said first and second article and second article support members.

13. Dispensing apparatus as claimed in claim 4, wherein there is included a tray disposed to receive articles released by said first and second article support members and said escrow means, and support means for supporting said tray and engageable with said suspending assembly to be moved from a first position wherein said tray is aligned to dispense the released articles through an exit opening, to a second position wherein said tray is misaligned with respect to said exit opening.

14. Dispensing apparatus as claimed in claim 13, wherein said mounting member includes a limiting member engageable with a portion of the dispensing apparatus housing for limiting the movement of said support means as said suspending assembly moves towards its first position and thereby defining said first position of said support means.

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