

[54] **PRODUCT DISPENSING APPARATUS**

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[22] Filed: **Mar. 17, 1972**

[21] Appl. No.: **235,489**

[52] U.S. Cl. .... **221/129**

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

[58] Field of Search ..... 221/129, 274, 272, 221/273

[56] **References Cited**

**UNITED STATES PATENTS**

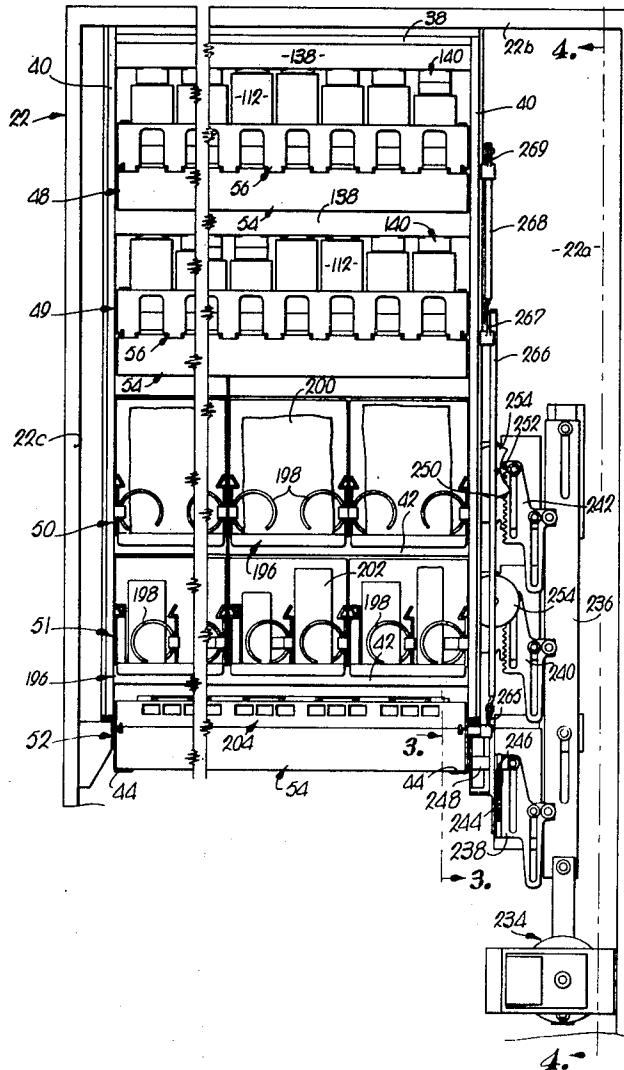
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Primary Examiner—Stanley H. Tollberg  
Attorney—Schmidt, Johnson, Hovey & Williams

[57] **ABSTRACT**

A general merchandising machine adapted to handle a variety of products has horizontal product dispensing modules provided with removable product trays and a series of selectively operable ejector mechanisms below each tray for forcing a selected, next-to-vend product at an ejecting station above the corresponding mechanism and out of its product row in the tray for gravitation to a vending station. A spring-loaded product pusher for each product row exerts constant pressure on the products in the row to present a new product to the ejecting station after each ejection of the next-to-vend product, and a latch for each pusher is designed to hold the latter away from the ejecting station during loading of the withdrawn tray and to release the pusher as the tray is reinserted into the machine. An auxiliary flipper on certain of the trays assures that the selected product is completely ejected from its tray.

**24 Claims, 17 Drawing Figures**



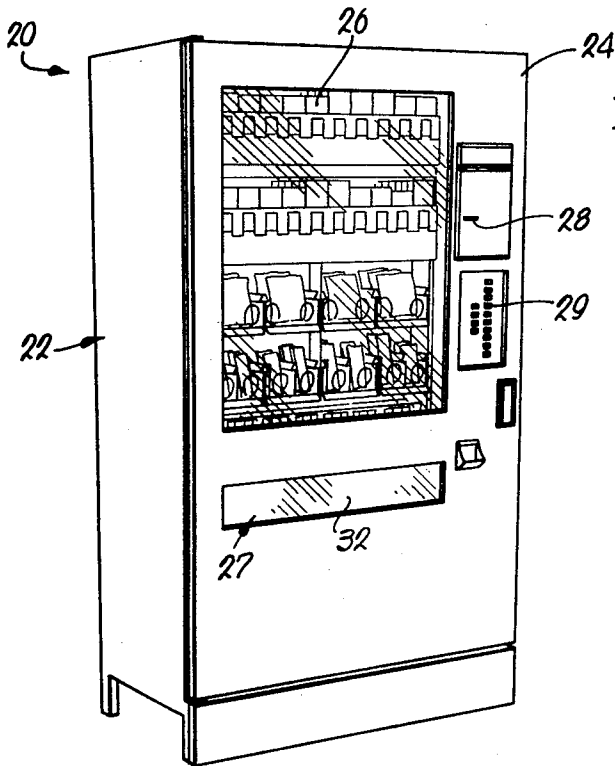


Fig. 1.

Fig. 14.

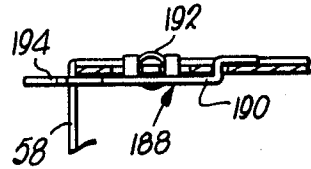


Fig. 12.

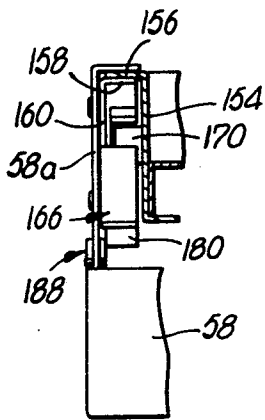
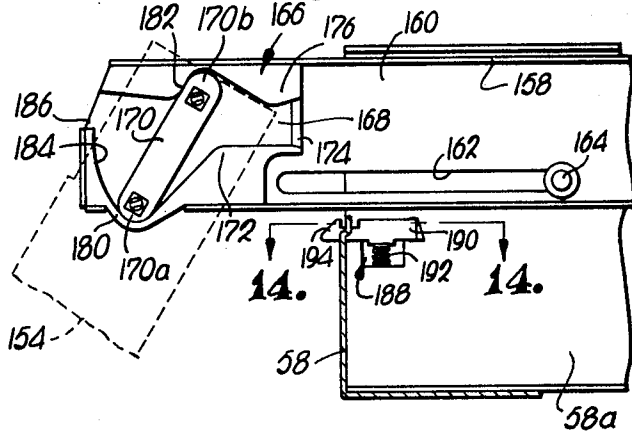


Fig. 11.

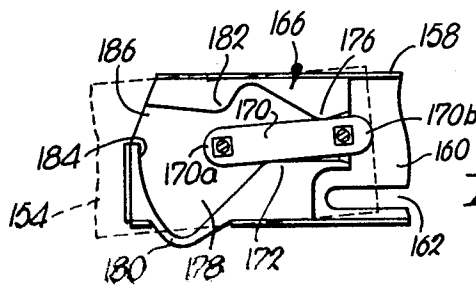


Fig. 13.

Fig. 2.

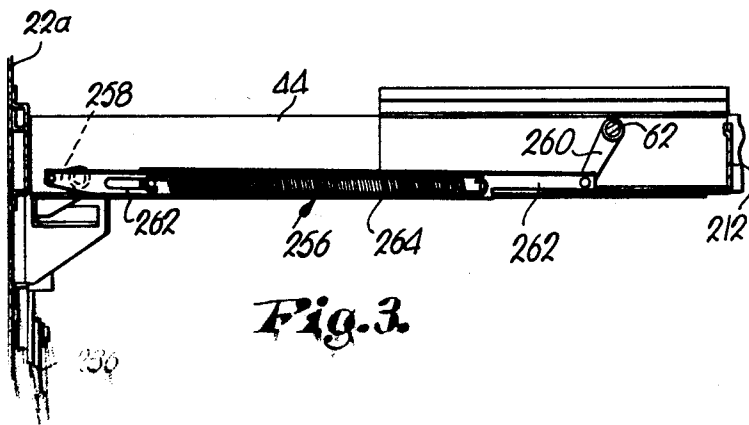
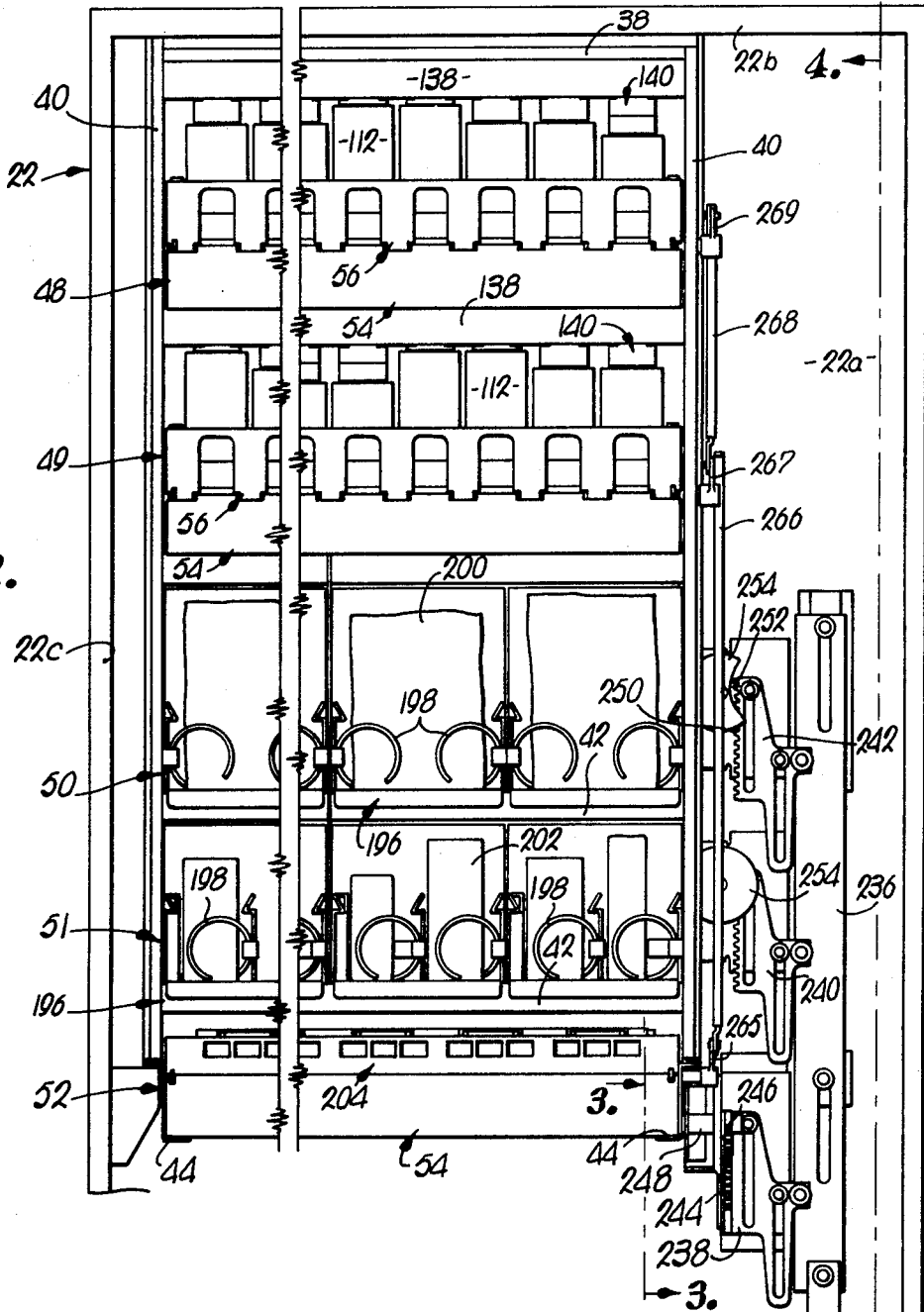


Fig. 3.

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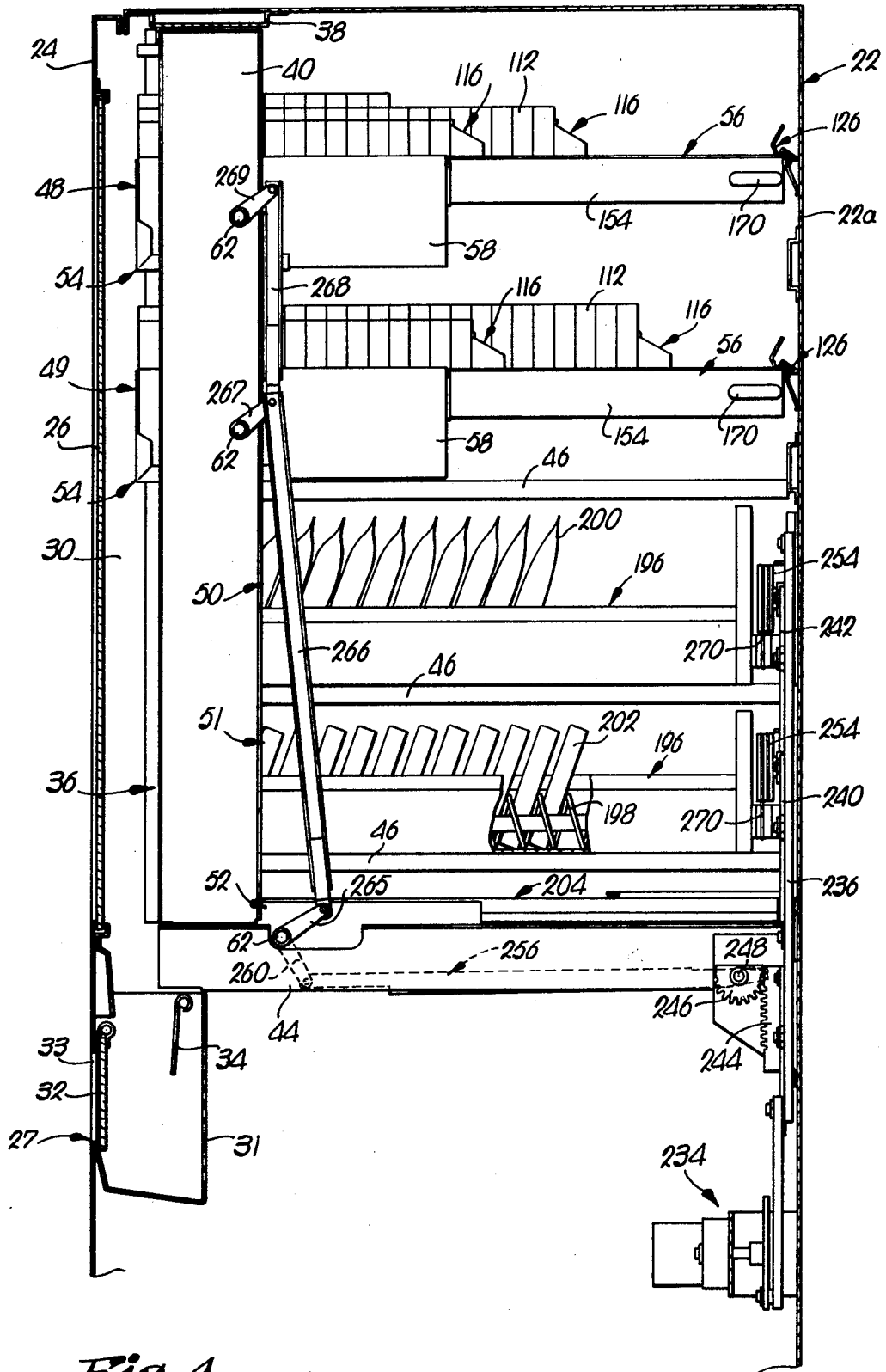


Fig. 4.

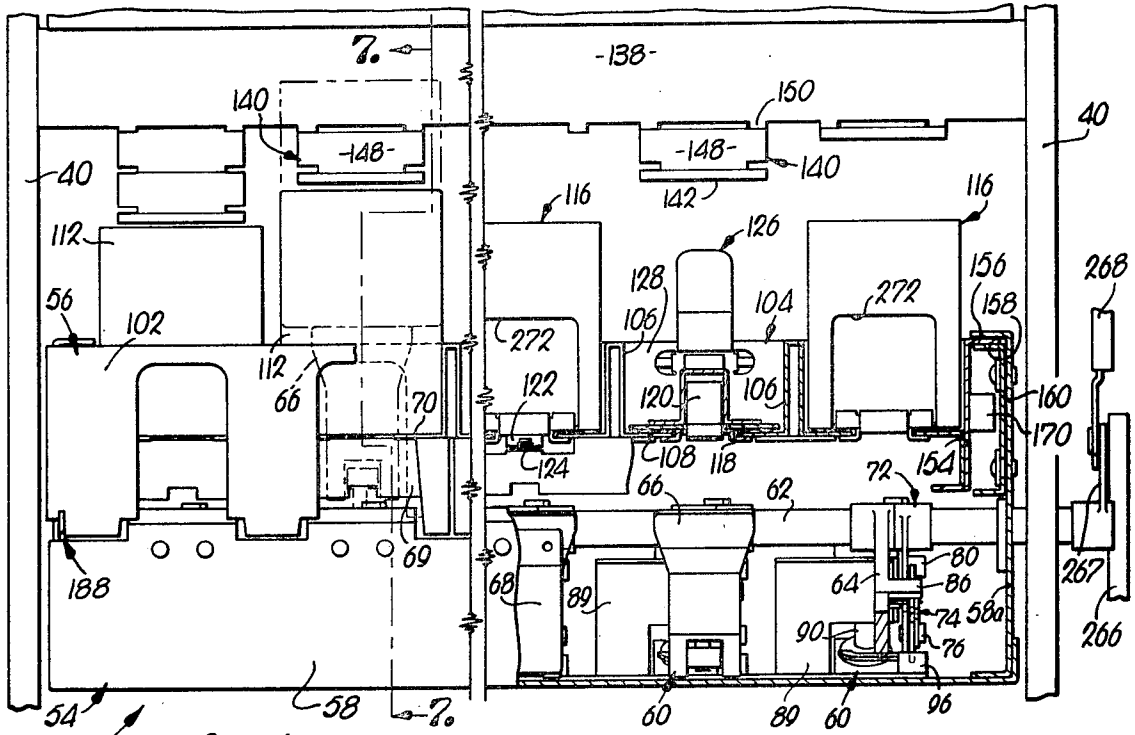


Fig. 5.

Fig. 10.

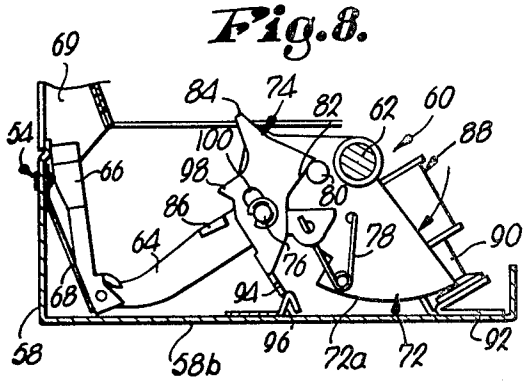


Fig. 8.

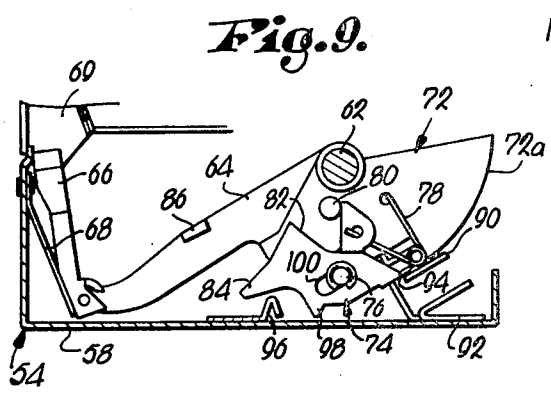


Fig. 9.

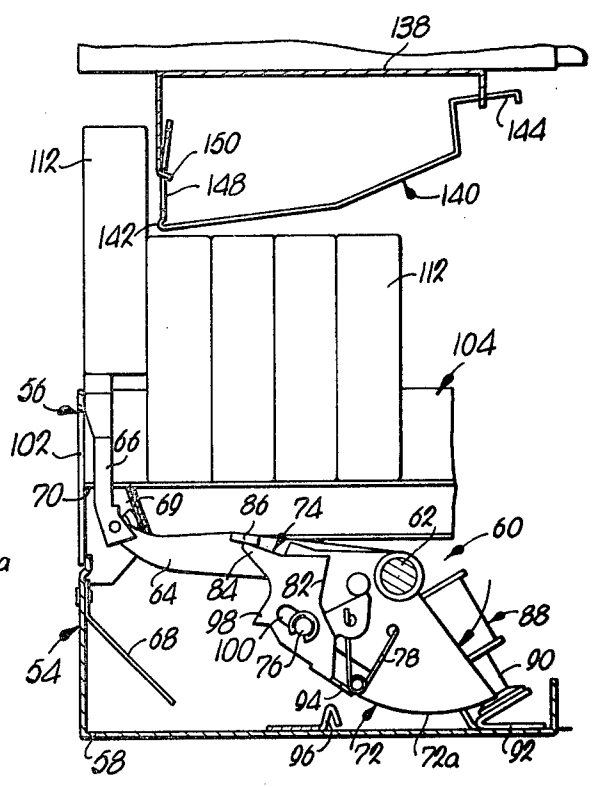


Fig. 6.

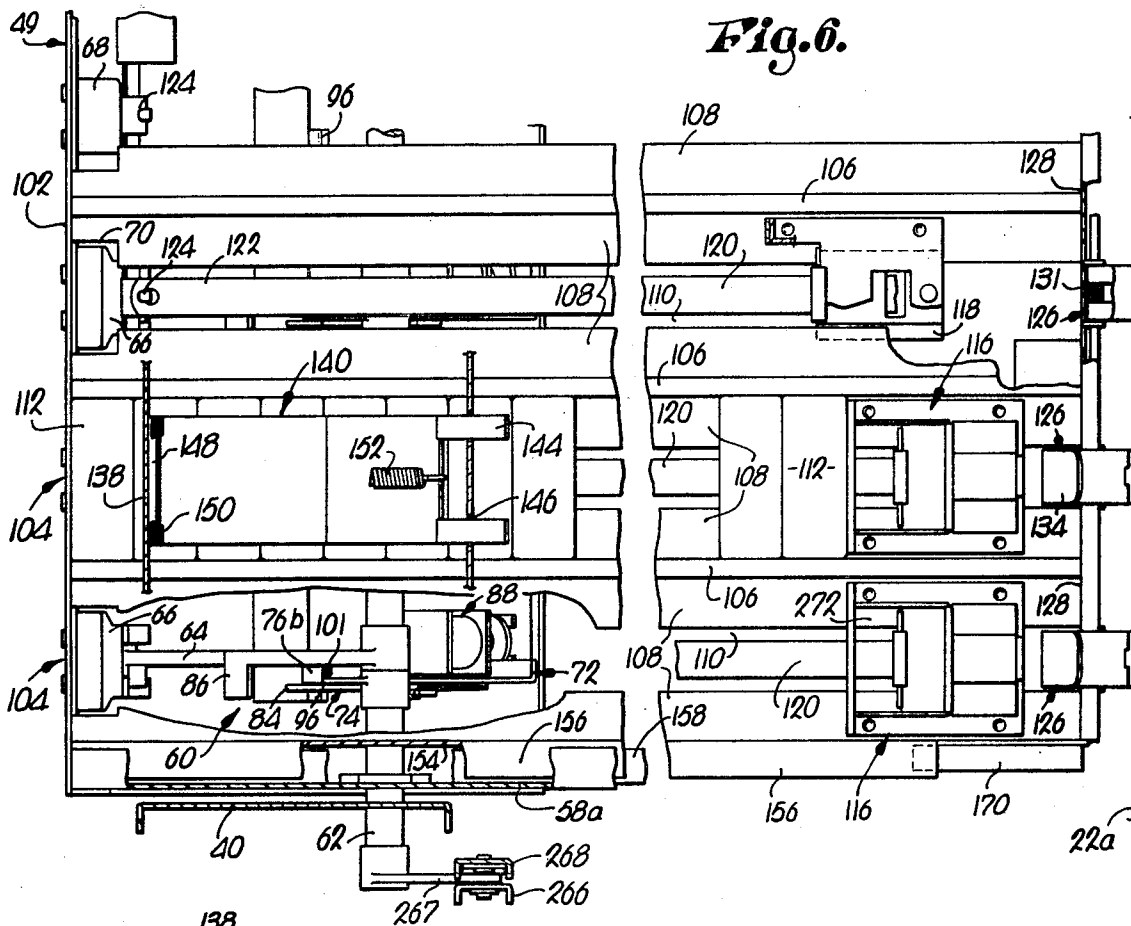
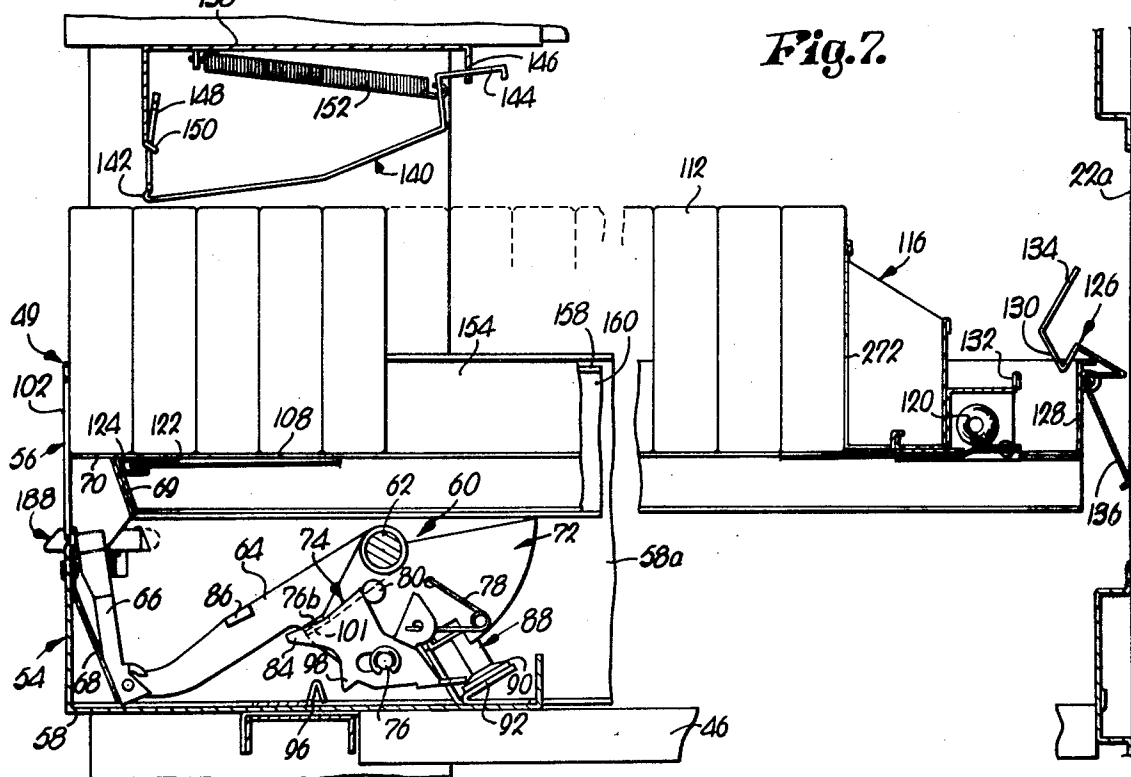
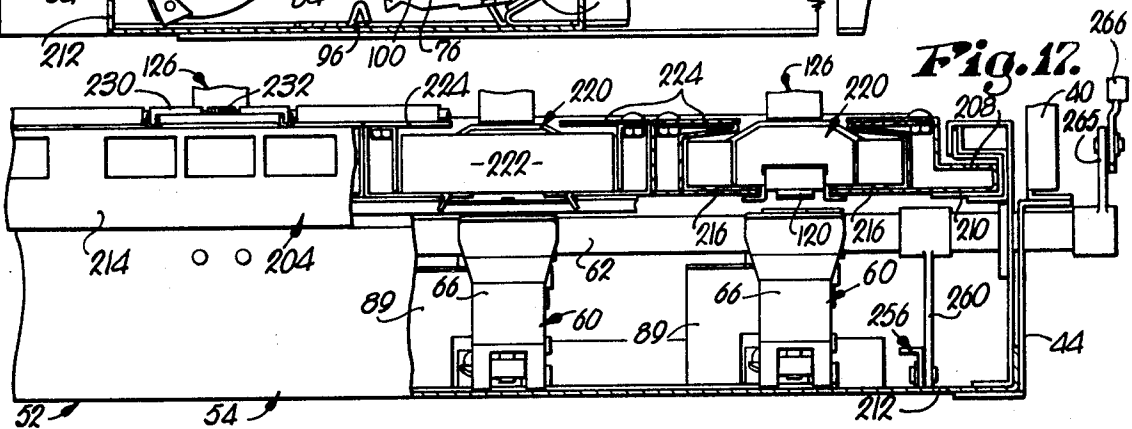
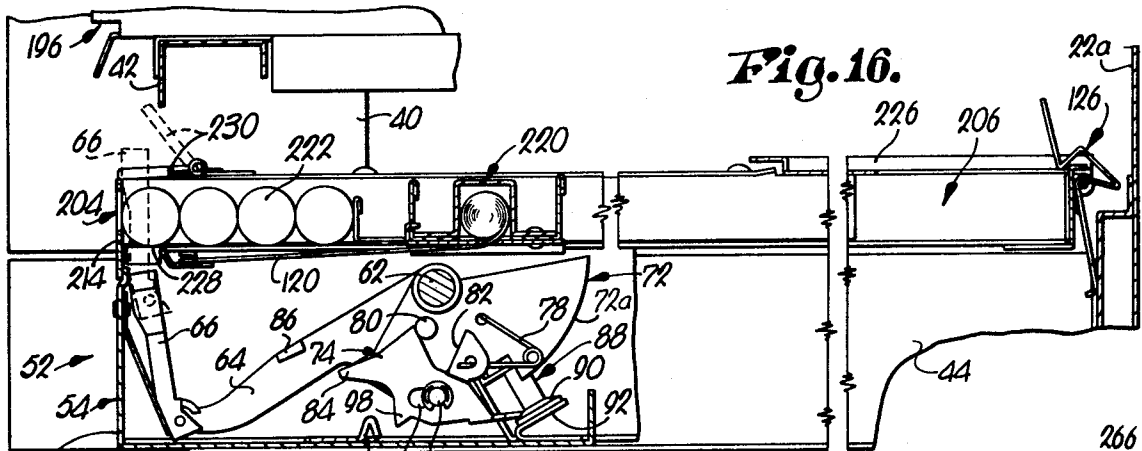
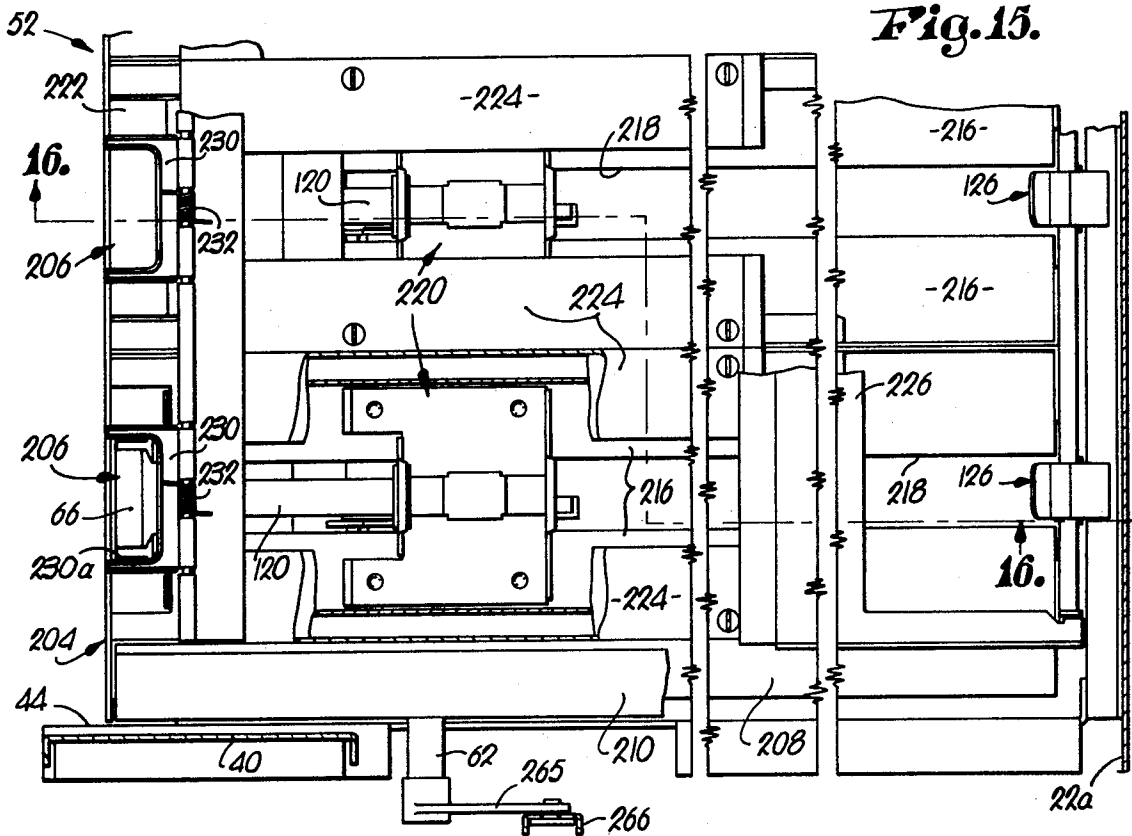


Fig. 7.





**PRODUCT DISPENSING APPARATUS**

This invention relates to product dispensing apparatus and, more particularly, to a general merchandising machine which is capable of vending a large variety of products in assorted sizes and packaging forms including, for example, bag-pack snack items such as potato chips, cheese curls, popcorn and the like; flat-pack items such as gum or cigarettes in either crush-proof or soft containers; and roll-pack items such as mints and candies.

General merchandising machines of the type in which a prospective customer is permitted to view all of a variety of next-to-vend product choices through a window in the front of the machine have steadily increased in popularity in recent years. Such machines have become popular, not only with customers because they are permitted to view the full range of available selections and to watch their product selection being dispensed, but also with owners and operators of the machines because of the inherent economies of using a single machine to handle diverging customer product preferences. It may be appreciated, however, that a machine capable of reliably handling such a wide variety of products necessarily presents a number of problems for the machine manufacturer from engineering and cost standpoints. The conventional approach of attempting to dispense various types of products by means of identical or similar types of mechanisms in a given machine has been found to possess many disadvantages.

For example, bag-pack items present special problems, in that, the products contained within such packages, such as popcorn, potato chips, and the like, are subject to being easily broken, which detracts from their customer appeal and saleability. Moreover, items in bags are not readily stackable one on top of the other or amenable to being pushed along in rows. Thus, to handle bag-pack items, various forms of rotatable helix conveyors have often been utilized, in which individual bags are carried by separate convolutions of a helix mechanism to maintain the bags in spaced relationship with one another while advancing the same in succession toward a dispensing point. On the other hand, while helix conveyor systems may also be used for flat-pack items such as gum and cigarettes or for roll-pack items such as mints and other candies, helix systems do not make as efficient use of available space where roll or flat-pack items are concerned as placing such items in abutting relationship with one another for dispensing purposes in either horizontal rows or vertical stacks because of their regular configurations and absence of the type of damage problems associated with bag-pack items.

Accordingly, in view of the above considerations, it is a goal of the present invention to provide an attractive, highly reliable and efficient general merchandising machine of the type in which a customer is permitted to view all of the next-to-vend product choices which is capable of dispensing not only bag-pack items, but flat-pack and roll-pack products as well, in a manner which makes optimum use of available cabinet space within the machine.

Another important object of the present invention is to provide a general merchandising machine of the type described which meets the desired requisites through use of a novel flat-pack or roll-pack dispensing module provided with a tray having a series of side-by-side sec-

tions adapted for receiving respective rows of items and dispensing mechanism for the items including a driven shaft common to all of the sections and an ejector for each section selectively operable by structure on the shaft to push the lead item in a selected row out of its section for delivery to a dispensing station.

An additional important object of the instant invention is the provision of a dispensing module as aforesaid for flat-pack or roll-pack items in which the tray and dispensing mechanism thereof are mechanically independent of one another such that the tray may be readily withdrawn from the cabinet to a loading position and returned to its normal position within the cabinet without restriction by the dispensing mechanism.

Another important object of the invention is to provide special means for holding a tray which has been withdrawn to its loading position in an inclined disposition such that loading of the tray may be greatly facilitated without the need for completely removing the tray from the machine.

A further equally important object of the invention is to provide a spring-loaded pusher for continuously urging a row of items on the tray toward the ejecting station of the tray and, in combination with the pusher, a spring-loaded latch at the rear of the tray for releasably holding the pusher in its most distant position with respect to the ejection station such that the tray may be loaded without tension on the row of items. In this connection, it is an important object to provide a latch of the aforesaid capability which is adapted to be tripped by the rear wall of the cabinet to release the pusher for operation when the tray is returned to its normal position fully within the cabinet after loading of the tray.

A still further important object of the present invention is to provide both rotatable helix conveyor modules for bag-pack items and the like and ejector mechanism modules as above described for flat-pack and roll-pack items within the same general merchandising machine, yet a common power source and common power transmitting means for both types of modules.

Other important objects and details of the present invention will be made apparent or be explained in greater detail in the description and drawings which follow, wherein:

FIG. 1 is a front perspective view of a general merchandising machine constructed in accordance with the concepts of the present invention;

FIG. 2 is an enlarged, fragmentary front elevational view of the machine with the front door thereof removed to reveal the product levels within the machine and attendant drive means for the various levels;

FIG. 3 is a fragmentary, cross-sectional view taken along line 3—3 of FIG. 2 illustrating driving linkage for ejector mechanism of the lowermost product level of the machine;

FIG. 4 is a fragmentary, cross-sectional view of the machine taken substantially along line 4—4 of FIG. 2 with the front cabinet door of the machine broken away;

FIG. 5 is an enlarged, fragmentary front elevational view of a flat-pack dispensing module with parts broken away to various depths to reveal details of construction;

FIG. 6 is an enlarged, fragmentary top plan view of a flat-pack dispensing module with parts broken away for clarity;



FIG. 7 is a fragmentary, vertical cross-sectional view of a flat-pack dispensing module taken along line 7-7 of FIG. 5 showing ejector mechanism in standby condition;

FIGS. 8-10 are fragmentary, detail views of flat-pack ejector mechanism in vertical cross-section and in various stages of operation;

FIG. 11 is an enlarged, fragmentary front elevational view of one corner of a flat-pack dispensing module illustrating components of the module which permit sliding withdrawal of the product tray of the module and tilting of the tray for loading purposes;

FIGS. 12 and 13 are fragmentary, side elevational views of the components detailed in FIG. 11 illustrating the relationship of the components to one another when the product tray is inclined and held near a horizontal position respectively;

FIG. 14 is an enlarged, fragmentary elevational view of a front latch assembly for the removable product tray taken along line 14-14 of FIG. 12;

FIG. 15 is a fragmentary top plan view of a roll-pack dispensing module with parts of the product tray thereof broken away to reveal details of construction;

FIG. 16 is a fragmentary, vertical cross-sectional view of the roll-pack dispensing module of FIG. 15 taken along line 16-16 of FIG. 15; and

FIG. 17 is a fragmentary front elevational view of the roll-pack dispensing module with parts broken away at various depths to reveal components of the module.

Referring initially to FIG. 1, a general merchandising machine constructed in accordance with the principles of the present invention is designated broadly by the numeral 20 and has a cabinet 22 provided with a front door 24 hinged for swinging about an upright axis between opened and closed positions. A large, rectangular product display window 26 in door 24 permits a customer standing in front of machine 20 to view the product selection levels behind window 26 from which a selected product may be released to a vending station 27 below window 26 upon the insertion of proper coinage into coin slot 28 and actuation of the appropriate product selector button 29. As shown in FIG. 4, the front extremities of the product levels are spaced rearwardly from window 26 to define a path 30 for gravitation of a selected product into a bin 31 behind a swingable panel 32 and an access opening 33 in door 24 defining station 27. A swingable anti-theft door 34 is connected by linkage (not shown) to panel 32 for closing path 30 when panel 32 is opened.

As shown best in FIGS. 2 and 4, the product levels within cabinet 22 are contained within an open framework 36 including a front frame section consisting of a horizontal top member 38 and two vertical side members 40. Framework 36 further includes a member 42 for each of the second and third levels from the bottom extending horizontally between side members 40; a pair of laterally spaced-apart, fore-and-aft extending, Z-shaped side rails 44 for the lowermost level secured at their front ends to respective side members 40 and at their rear ends to the back wall 22a of cabinet 22; and a number of fore-and-aft extending, centered, guide and support members 46 (FIG. 4) for each of said second and third levels which are tied at opposite ends to members 42 and back wall 22a. Also supported by framework 36, but not shown in the drawings because it forms no part of the present invention, is coin-control apparatus in association with push buttons 29

which precludes dispensing any product until appropriate coinage has been deposited in coin slot 28. Generally, the coinage-control apparatus will include mechanism for returning change to the customer if his deposit exceeds the price of the item selected, as well as mechanism for performing authenticity checks on the deposited coinage.

The machine 20 chosen for purposes of illustration has, for example, three different types of product dispensing modules supported by framework 36. The top two levels contain identical dispensing modules 48 and 49 for flat-pack items such as cigarettes, the next two levels contain helix conveyor dispensing modules 50 and 51 for bag-pack items such as potato chips and generally elongated items such as candy bars, while the lowermost level contains a dispensing module 52 which is similar to modules 48 and 49 but is especially adapted for roll-pack candies and mints. Because modules 48 and 49 are identical to one another, only module 49 will be described in detail with the understanding that identical components in module 48 are denoted by identical numbers.

Reference to FIGS. 5-10 in addition to FIGS. 2, 3 and 4 will be helpful in gaining a full understanding of module 49 which includes two major portions, a stationary dispensing mechanism portion 54 and a product tray portion 56 carried above portion 54 for supporting rows of products to be dispensed by mechanism within portion 54. Portion 54 includes a pan 58 carried at opposite ends by respective upright side members 40 of framework 36 which contains a plurality of side-by-side ejector mechanisms 60 extending in a row (FIG. 5) between the upright, C-shaped ends 58a of pan 58. Ends 58a journal a driven shaft 62 common to all of the ejector mechanisms 60 for supplying driving power to the mechanisms 60.

Each mechanism 60 includes an ejecting arm 64 (FIGS. 7-10) which is supported for free rotation about shaft 62 at one end and has an ejector foot 66 pivotally connected to the opposite end thereof which rides on a ramp-like guidance spring 68 at the forwardmost end of pan 58. A tapered, formed element 69 above foot 66 guides the latter for periodic projection into and through an aperture 70 (FIGS. 7 and 10) forming an ejecting station in tray section 56 when arm 64 is swung from its standby position of FIGS. 7, 8 and 9 to its operation position of FIG. 10. Arm 64 is operated through the combined efforts of a crescent-shaped member 72 keyed to shaft 62 beside arm 64 for rotation with shaft 62 and an irregularly shaped pawl member 74 which is pivoted to crescent 72 at 76 for movement between a non-actuated position shown in FIGS. 7 and 8 and an actuated position shown in FIGS. 9 and 10. An over-center torsion spring 78 yieldably maintains pawl 74 in either of its alternate positions against a stop 80 which projects outwardly from the surface of crescent 72 into a reentrant notch 82 in pawl 74. A forwardly projecting nose 84 on pawl 74 is disposed to clear a lifting tab 86 on arm 64 when pawl 74 is in its non-actuated position and crescent 72 is rotated in a clockwise direction by shaft 62, while nose 84 is disposed to engage and lift arm 64 through tab 86 when pawl 74 is in its actuated position and crescent 72 is rotated.

An actuator device in the nature of a solenoid 88 is carried by an L-shaped bracket 89 (FIG. 5) on pan 58 and has a reciprocable, flanged armature 90 which is

normally extended as shown in FIGS. 7, 8 and 10 against a rest 92 on pan 58, but which, upon energization of solenoid 88, retracts to its operated position of FIG. 9 to engage an arcuate, inwardly extending lever arm 94 on pawl 74 to effect shifting of the latter from its non-actuated to its actuated position. As the crescent 72 is then rotated in a clockwise direction upon similar rotation of shaft 62, the outermost edge 72a of crescent 72 acts as a cam to return armature 90 to its extended position against rest 92.

An upwardly projecting stationary reset projection 96 on pan 58 is disposed in the path of travel of a corner 98 on pawl 74 when the latter is in its actuated position. An elongated slot 100 in pawl 74 which receives pivot 76 permits corner 98 to ride over projection 96 against the bias of spring 78 when crescent 72 is rotated in a clockwise direction toward arm 64, while engagement of projection 96 with corner 98 during return rotation of crescent 72 in a counterclockwise direction from arm 64 causes pawl 74 to be reset in its non-actuated position. As shown only in FIGS. 6 and 7, a second tab 101 on arm 64 is disposed for engagement by a return lug 72b on crescent 72 during such counterclockwise rotation of the latter for pulling arm 64 back from its operated condition of FIG. 10 to its standby condition of FIGS. 7, 8 and 9.

Tray 56 (FIGS. 5, 6 and 7) has an upright, windowed wall or abutment 102 at its front end and is provided with a plurality of elongated, side-by-side, fore-and-aft extending product-receiving station sections 104 separated from one another by short, upright partitions 106. Partitions 106 have lowermost, laterally extending feet 108 which define the bottoms of sections 104, the opposed feet 108 of adjacent partitions 106 being spaced from one another to present a continuous slot 110 extending from aperture 70 to the rear of each section 104. Each section 104 is adapted to receive a row of upstanding flat-pack items such as cigarette packs 112 of varying commercial sizes, and each is provided with a spring-loaded pusher 116 which is slidable longitudinally therein to maintain constant forward tension on the row of cigarette packs 112.

Each pusher 116 is guided in its sliding movement by a pair of L-shaped retaining wings 118 (FIG. 5) which project from the bottom of pusher 116 through slot 110 for sliding engagement with respective feet 108 of adjacent partitions 106. A normally coiled band spring 120 (FIG. 7) is spindled on the rear of each pusher 116 with its free end 122 hooked to an anchor 124 on ejector foot guide 69 at the front of the corresponding section 106 such that spring 120 supplies yieldable biasing force to its pusher 116 as spring 120 seeks to recoil from an extended condition. Each section 104 is also provided with a spring-loaded, releasable latch 126 swingably mounted on the rear wall 128 of tray 56 having a projecting corner which defines a catch 130 (FIG. 7) normally biased by a torsion spring 131 (FIG. 6) into a position for latching engagement with an upright lip 132 on the corresponding pusher 116 to retain the latter in its rearmost position against the bias of spring 120. A thumb lever 134 at one end of latch 126 facilitates manual setting or releasing of the latter, while an arm 136 at the opposite end thereof is adapted for engagement with back wall 22a of cabinet 22 for automatic release of latch 126 in a manner which will hereinafter be described.

An inverted, generally U-shaped channel 138 (FIGS. 7 and 10) spans the side frame members 40 above the forward part of tray 56 and supports a series of generally C-shaped, vertically adjustable hold-down components 140 for cigarette packs 112 in sections 104, there being one component 140 for each section 104. Each component 140 is in the nature of a forwardly inclined ramp with its lowermost corner 142 aligned with the second pack 112 from the front of the row of insuring that such item does not vend along with the first pack 112 in the row when the latter is ejected from section 104. The rear leg 144 of each component 140 is longitudinally shiftable through an opening 146 in the downwardly projecting rear flange of channel 138 and fulcrums within opening 146 when component 140 is vertically adjusted to dispose corner 142 at the desired level by removing and replacing the notched upright front leg 148 of component 140 within mating lugs 150 on the downwardly extending front flange of channel 138. A coil spring 152 yieldably biases notched leg 148 into its interlocked condition with lugs 150.

Tray 56 may be withdrawn from cabinet 22 to facilitate loading by virtue of the fact that tray 56 and the dispensing mechanism portion 54 are mechanically independent from one another. The sides 154 of tray 56 (FIGS. 5 and 11) are each essentially Z-shaped in cross-sectional configuration presenting an uppermost outturned flange 156 extending longitudinally fore-and-aft of tray 56 which is slidably carried by the upper inturned leg 158 of a short track 160 on the corresponding sidewall 58a of pan 58. Thus, tray 56 may be withdrawn from its position fully within cabinet 22 as shown in FIG. 4 to a loading position when door 24 is opened in which tray 56 is substantially fully extended from cabinet 22.

As best shown with reference to FIGS. 11, 12 and 13, each track 160 is itself extensible to a certain degree by virtue of an elongated slot 162 in track 160 receiving a mounting pin 164 on sidewall 58a, thus giving an additional amount of extensibility to tray 56 sufficient to allow the latter to be inclined at its forwardmost position as shown in FIG. 12, to further facilitate loading of sections 104. Each track 160 is provided with a special block 166 at its forward end having an irregularly-shaped, generally horizontal channel 168 therein for receiving an elongated element 170 on the corresponding side 154 of tray 56 to guide the latter when the rear extremity of flange 156 has passed beyond the forward extremity of leg 158 and to support tray 56 in its inclined loading disposition. A ledge 172 supports element 170 from beneath the latter as it enters mouth 174 of channel 168 as shown in FIG. 13, while an overhead abutment 176 prevents inclination of element 170 until tray 56 is extended to such an extent that element 170 enters the inclined region 178 immediately ahead of overhead abutment 176 and ledge 172. When element 170 is in region 178 as shown in FIG. 12, the forward end 170a of element 170 rests within a depression 180, while the rear end 170b of element 170 rests against an overhead shoulder 182 which prevents further counterclockwise swinging of element 170. An upright arcuate wall portion 184 across region 178 from ledge 172 serves as a stop to limit forward travel of element 170 when the latter is essentially horizontal on ledge 172, although tray 56 may be entirely removed from tracks 160 by slightly elevating the front end of tray 56 to align each element 170 with its correspond-

ing slightly inclined exit opening 186 disposed above wall portion 184, and thereafter pulling tray 56 until elements 170 clear their respective openings 186.

Because of the spring force exerted by the pusher latches 126 at the rear of tray 56 which are held in their released positions by cabinet wall 22a when tray 56 is in its normal position within cabinet 22, tray 56 tends to spring slightly outwardly from framework 36 unless restrained. Accordingly, a releasable latch assembly 188 (FIGS. 5, 11, 12 and 14) is provided at each of the two front corners of tray 56 for releasably retaining the latter fully within cabinet 22. Each assembly 188 includes a generally horizontally extending latch 190 (FIGS. 12 and 14) which is loosely carried by sidewall 58a for yieldable movement by a coil spring 192 beneath latch 190 into position in which a hook 194 at the outermost end of latch 190 latchingly engages the lower edge of front wall 102 of tray 56. Each assembly 188 may be manually released by depressing hook 194 until the latter clears wall 102.

The helix conveyor dispensing modules 50 and 51 (FIGS. 2 and 4) are substantially identical to one another in that each has a member of separately removable trays 196, with each tray 196 employing helix conveyors 198 to advance items toward the front of tray 196 for subsequent discharge over the open front end thereof for gravitation through path 30 into bin 31. Module 50 differs from module 51 in that two oppositely rotating conveyors 198 are operated in unison for each single row of items such as bags 200 of potato chips or the like, while the conveyors 198 of module 51 are individually operable, each being utilized to convey a single row of individual items such as candy bar packages 202. Details of construction of each dispensing tray 196 which conveyors 198 and their attendant mechanisms for selectively operating the same are fully disclosed in U.S. Pat. No. 3,653,540, issued Apr. 4, 1972 and entitled "Dispensing Machine Having Multiple Dual Helix Conveyors". Accordingly, such patent is incorporated herein by reference where needed for a complete and clear understanding of the structure and operation of modules 50 and 51.

Briefly, the mechanism for selectively operating the conveyors 198 includes a rotatable clutch member for each set of conveyors 198 (using module 50 as an example) provided with a shiftable actuator thereon, while a selection solenoid is operably associated with each actuator for shifting the latter from a standby to an operated position. In the operated position, each actuator is located to engage gear structure on an associated tray 196 for rotating the conveyors 198 thereof in opposite directions in response to rotation of the respective clutch member. All of the clutch members are rotated in unison through an operating arc and then returned by cables trained therearound.

The dispensing module 52 shown in detail in FIGS. 15, 16 and 17 is substantially identical to modules 48 and 49, with slight modifications which adapt module 52 especially for dispensing gum, mints and other candies packaged in rolls or small, flat packages. Accordingly, only those specific modifications of module 52 will be described in detail, with components identical to those in modules 48 and 49 being denoted by like numerals. The dispensing mechanism portion 54 of module 52 including ejector mechanisms 60 is unchanged from modules 48 and 49, although tray 204 having product receiving sections 206 is much shall-

lower than trays 56. Tray 204 has formed sides 208 (FIG. 17) which are slidably received within corresponding U-shaped guides 210 on the pan 212 for ejector mechanisms 60, although no provision is made for inclining tray 204 when the latter is fully extended from cabinet 22 because of its low position in cabinet 22. A windowed front wall or abutment 214 is common to all of the sections 206, and each of the latter is provided with a bottom 216 having a longitudinal slot 218 therein for a spring-loaded pusher 220. Each pusher 220 utilizes a coiled band spring 120 for maintaining constant forwardly directed pressure on the row of items received within the corresponding section 206 such as roll packs 222 shown in FIGS. 16 and 17. A pair of fore-and-aft extending covers 224 project inwardly from opposite sides of each section 206 for partially enclosing the same to prevent the roll packs 222 from popping out under the pressure of pusher 220, and a loading door 226 common to all of the sections 206 is hinged at the rear of tray 204 to facilitate loading of the latter in the area not occupied by covers 224. Spring-loaded latches 126 at the rear of each section 206 respectively releasably retain the corresponding pushers 220 in their rearmost positions during loading of tray 204.

The forwardmost of the roll packs 222 in each section 206 is aligned with a corresponding aperture 228 in the bottom 216 of its section 206 for ejection by the under-lying ejector foot 66, and a spring-loaded, generally C-shaped flipper 230 is hinged above the open end of each section 206 for assuring that an ejected pack 222 is thrown completely clear of tray 204 into passage 30 as a torsion spring 232 of flipper 230 seeks to return the latter to its normal covering relationship with its section 206.

All of the dispensing modules 48-52 are driven by a common power unit 234 within cabinet 22 which operates a common bar 236 reciprocally carried for vertical travel by the rear cabinet wall 22a. Three power transmitting elements 238, 240 and 242 are mounted at vertically spaced intervals on bar 236 for reciprocation therewith, the lowermost element 238 having a forwardly facing rack 244 which drives a pinion 246 on a laterally extending stub shaft 248, while the elements 240 and 242 are each provided with laterally facing racks 250 which drive meshing pinions 252 associated with pulleys 254.

The rotative motion applied to stub shaft 248 by bar 236 is brought to the front of machine 20 by virtue of structure illustrated in detail in FIG. 3. Such structure includes a fore-and-aft extending driving linkage 256 connected at its rear end through a crank 258 to shaft 248 and at the forward end to driven shaft 62 of module 52 through a crank 260. Linkage 256 consists of a pair of relatively extensible members 262 which are held at their maximum extension by virtue of a spring 264, thereby affording stress release should ejecting mechanisms 60 in any way become jammed. Modules 48 and 49 are driven from shaft 62 of module 52 for rotation in unison therewith via a pair of driving links 266 and 268 and associated cranks 265, 267 and 269 extending along the outside of a side frame member 40.

The pulleys 254 for modules 50 and 51 are in turn entwined by respective cables 270 (FIG. 4) which operably couple the driven pulleys 254 with their respective clutching mechanisms for conveyors 198 as described in the incorporated patent. Accordingly, when power

unit 234 is energized, all of the dispensing mechanism shafts 62 of modules 48, 49 and 52, as well as the clutching members for modules 50 and 51, are rotated in unison as a result of the common power transmitting bar 236.

### OPERATION

In preparing machine 20 for use, the serviceman may withdraw a tray 56 or a tray 204 by simply releasing the appropriate set of front latches 188 and sliding the tray 56 or 204 outwardly from cabinet 22. In the case of a cigarette tray 56, the elements 170 on opposite sides thereof prevent accidental complete withdrawal of tray 56 from cabinet 22 by engaging the forward walls 184 of their respective supporting blocks 166, whereupon the tray 56 may be swung to its inclined disposition to facilitate loading of sections 104.

Before loading each cigarette section 104, the pusher 116 thereof should be returned to its rearmost position for retention by the latch 126, whereupon the area ahead of each pusher 116 may be completely filled. Thereafter, the loaded tray 56 should be raised to an essentially horizontal condition to properly orient elements 170 and then may be replaced fully within cabinet 22. As the replaced tray 56 approaches cabinet wall 22a, all of the latches 126 are tripped as arms 136 thereof engage cabinet wall 22a, thereby releasing pushers 116 to maintain forward bias on the rows of products 112 in sections 104. If needed, vertical adjustment may be made of the hold-down components 140 at this time.

The mint tray 204 is prevented from accidental complete withdrawal by mutually cooperable structure (not shown) on the sides of pan 212, slide 210, and tray 204, although tray 204 may be most easily loaded by purposely completely removing the same. Once removed, the sections 206 are loaded by first moving all of the pushers 220 to their rearmost positions for retention by the releasable latches 126, whereupon the common door 226 is raised to permit access to sections 206 for completely filling the latter forwardly of pushers 220. As with trays 56, latches 126 on tray 204 are automatically tripped when tray 204 is reinserted completely within cabinet 22 such that the pushers 220 are released to bias the items 222 toward their ejecting positions. Trays 196 of modules 50 and 51 are easily loaded by withdrawing the same and placing the bags 200 or packages 202 between convolutions of the helical conveyors 198.

When a selection is made by a customer depositing the proper coinage in slot 28 and depressing the appropriate selection button 29, control circuitry, not shown but conventional in this art, energizes a selection solenoid corresponding to the customer's selection to begin the dispensing process. If the product selected is on one of the helical conveyor trays 196, then the proper dual or single conveyors 198 are actuated to dispense the product in accordance with the manner of operation described fully in the incorporated patent. If the selected product is in one of the ejector mechanism modules 48, 49 or 52, the sequence of operation is as follows, using module 49 as an example. Prior to energization, solenoid 88 and ejector mechanism 60 assume the positions of FIG. 7. However, as the selected solenoid 88 is energized, the flange on the lower end of armature 90 engages operating lever 94 on pawl 74 to shift the latter from its FIG. 7 position to its FIG. 9 position.

Power unit 234 is then energized to shift bar 236 vertically from its lowermost position of FIGS. 2 and 4 causing all of the common shafts 62 to rotate in unison in a clockwise direction viewing FIG. 4, such that all of the mechanisms 60, except for the selected mechanism 60, are shifted into the position illustrated in FIG. 8 in which nose 84 of pawl 74 clears tab 86 of ejector arm 64. On the other hand, the selected mechanism 60 has shifted to the position shown in FIG. 10 as nose 84 of the actuated pawl 74 engaged tab 86 to lift arm 64, thereby causing ejector foot 66 to extend upwardly into and through the overlying aperture 70 to push the next-to-vend product (cigarette pack 112) up and out of section 104 for gravitation through passage 30 into bin 31. During this initial clockwise rotation, the outer arcuate edge 72a of crescent 72 cams armature 90 to its normal extended position. Note that as soon as next-to-vend pack 112 clears wall 214 during upward travel thereof, the remaining packs in the row instantaneously push the next-to-vend pack from foot 66 out over wall 214 and advance against the protruding foot 66. As unit 234 then lowers bar 236, all shafts 62 are rotated in a counterclockwise direction in unison toward their normal positions, forcing the arm 64 and the operated ejector foot 66 to be pulled downwardly out of the grip of the packs and wall 214 to their initial positions and resetting the actuated pawl 74 as the latter engages its reset projection 96.

As soon as the foot 66 has been completely withdrawn from in front of the packs, the row is advanced a slight extent by the corresponding pusher 116 to bring the next pack in the row fully into position at the ejecting station above aperture 70. When the final item in the row has been ejected through repeated selections, the pusher 116 for that section 104 will engage front wall 102 and, should any further selections inadvertently be made from the depleted row, the clearance opening 272 in such pusher 116 allows the corresponding ejector foot 66 to complete its full upward stroke without jamming the ejector mechanism therefor. Note in this respect that the clearance openings 230a in each of the flippers 230 for tray 204 perform this same function when one of the pushers 220 reaches front wall 214.

The ejector mechanisms 60 of the mint and candy module 52 operate in precisely the same manner as those of module 49, although the total distance which an arm 64 of module 52 moves is less than its counterpart in module 49 because of the relative shallowness of tray 204. Additionally, the flippers 230 on tray 204 each function to assure that a pack 222 ejected by a corresponding mechanism 60 does not become lodged between the top of tray 204 and the overhead structural member 42 by flipping pack 222 directly into delivery path 30 as pack 222 emerges from tray 204.

From the foregoing it should be readily apparent that modules 48, 49 and 52 are capable of vending products on a high-volume, space-saving basis such that available cabinet space is utilized in a most efficient manner. Manifestly, this allows a large assortment of brands and sizes of cigarettes plus a great variety of types and flavors of candies and mints to be stocked such that these items may be combined with additional snack items within a single merchandising machine to serve the same purpose which previously required a number of individual machines to fulfill.

Moreover, because the ejector mechanism modules 48 and 49 are driven from shaft 62 of the lowermost module 52, it may be appreciated that any additional number of such modules may be used within machine 20 in place of helix conveyor modules with the simple addition of crank and link to the linkage assembly 265-269. Similarly, fewer ejector mechanism modules may be provided in favor of more helix dispensing modules if it is anticipated that more potato chips and other snack items should be provided at the particular installation location than cigarettes. In this respect, it may be appreciated that the use of a common power transmitting bar 236 and single power source 134 for both ejector mechanism modules and helix conveyor modules facilitates such "tailoring" of the machine and renders the overall cost of the machine appreciably lower than would be the case wherein each type of dispensing mechanism was provided with its own power unit and its own power transmitting assembly.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

**1. In product dispensing apparatus:**

a cabinet having front and rear wall assemblies, said front wall assembly having an opening for access to a released product and being operable to permit loading of the cabinet;

frame means within said cabinet;

at least one product-supporting tray shiftably carried by said frame means for movement between a normal position in which the front extremity of the tray is spaced rearwardly from said front wall assembly when the latter is closed to present a delivery path for gravitation of a released product to said opening and a loading position in which said tray is extended forwardly from said cabinet when the front wall assembly is opened to facilitate loading of products on said tray,

said tray having a plurality of side-by-side, fore-and-aft extending sections for receiving rows of products, each section having a bottom for supporting the products, an abutment at its forward end, and an aperture in said bottom rearwardly adjacent said abutment;

a shaft rotatably mounted on said frame means for said tray common to all sections thereof;

power means in said cabinet;

means operably coupling said power means with said shaft for driving the latter;

ejector means for each section respectively and shiftably between a standby position in which the ejector means is disposed below the aperture and a product-ejecting position in which the ejector means projects into and through the aperture a sufficient extent to push a product at said aperture out of the corresponding section and over said abutment thereof into said delivery path;

operator means for each ejector means respectively mounted on said shaft for rotation therewith, each operator means being operably couplable with its corresponding ejector means to shift the latter from its standby to its ejecting position in response to actuation of said shaft; and

selectively operable actuating means for each operator means respectively for coupling the same to its ejector means.

**2. In dispensing apparatus as set forth in claim 1;**

shiftable product pusher means for each section respectively mounted therein for movement fore-and-aft of the section; and

yieldable biasing means coupled with each pusher means respectively for urging the latter toward said abutment.

**3. In dispensing apparatus as set forth in claim 2; and a releasable latch at the rear of each section respectively shiftably between a latching position in which the latch is operable to retain the pusher means of the section in its rearmost disposition for loading of the section and a releasing position in which the pusher means is released for movement toward the abutment.**

**4. In dispensing apparatus as set forth in claim 3, wherein said latch includes an operating component adapted for actuation by said rear wall assembly when the tray is in said normal position to hold the latch in said releasing position.**

**5. In dispensing apparatus as set forth in claim 4; second yieldable biasing means operably coupled with each latch respectively for biasing the same toward said latching position,**

said second biasing means yieldably urging the tray toward said loading position when the latch is held in said releasing position by said rear wall assembly; and

a second releasable latch for said tray operable to releasably interconnect the latter and said frame means for holding the tray in said normal position.

**6. In dispensing apparatus as set forth in claim 1; and mutually cooperable means on said frame means and on said tray respectively for supporting the latter in an inclined disposition when the tray is in said loading position,**

said cooperable means including an element on the tray adjacent the rear of the latter and structure on the frame means adjacent the front of the latter provided with a receiving channel for said element having an inclined region therein.

**7. In dispensing apparatus as set forth in claim 6, wherein said channel has an exit opening for the element disposed forwardly of said region for complete removal of the tray from said frame means.**

**8. In dispensing apparatus as set forth in claim 7, wherein is provided a stop in the channel for said element disposed below said opening forwardly of said region and normally in alignment with the element.**

**9. In dispensing apparatus as set forth in claim 1, wherein is provided a spring-loaded flipper for each of said sections respectively for aiding the corresponding ejector means in releasing a product into said delivery path.**

**10. In dispensing apparatus as set forth in claim 9, wherein each of said flippers is yieldably biased into a position in which the flipper covers the next-to-vend product rearwardly adjacent said abutment.**

**11. In dispensing apparatus as set forth in claim 1, wherein said operator means each includes a first member fixedly secured to said shaft and a second member shiftably secured to said first member for movement by the corresponding actuating means between a non-actuated position in which said second member clears the corresponding ejector means when the members are rotated with the shaft and an actuated position in which said second member is disposed for engagement**



with the corresponding ejector means during rotation of the shaft.

12. In dispensing apparatus as set forth in claim 11, wherein is provided yieldable means for each pair of members operably interconnecting the same in a manner to yieldably maintain said second member in either of its alternate positions.

13. In dispensing apparatus as set forth in claim 11, wherein each operating means is provided with means for returning said actuated second member from said actuated position to said non-actuated position after ejection of a product.

14. In dispensing apparatus as set forth in claim 13, wherein said power means and said coupling means are operable to drive said shaft through an arc first in one direction and then in the opposite direction during each cycle of operation of the power means, said return means including a stationary reset projection on said frame means disposed in the path of travel of said second member when the latter is in said actuated position for engaging and shifting the actuated second member during rotation of said shaft in said opposite direction.

15. In dispensing apparatus as set forth in claim 14, wherein each said second member is adapted for momentary partial displacement out of said actuated position to permit overriding of the corresponding reset projection when the shaft is rotated in said one direction.

16. In dispensing apparatus as set forth in claim 11, wherein each said actuating means includes a solenoid having a shiftable armature movable between an extended position and a retracted position for effecting said shifting of the corresponding second member from the non-actuated to the actuated position thereof, each said first member having a cam surface engageable with said armature when the latter is in the retracted position thereof for returning the same to its extended position upon rotation of said shaft.

17. In dispensing apparatus as set forth in claim 1, wherein is provided a vertically adjustable hold-down component for each of said sections respectively mounted on said frame means above said tray in disposition for retaining against ejection and next-to-forwardmost product in the corresponding product row when the forwardmost product in said row is ejected by said ejector means.

18. In dispensing apparatus as set forth in claim 1, wherein said coupling means includes driving linkage having a pair of relatively extensible members and yieldable means yieldably biasing said members to their fullest extension to provide stress relief if jamming should occur during product ejection.

19. In selectable product dispensing mechanism:

a driven shaft mounted for rotation about its longitudinal axis;

a series of spaced product ejector arms mounted on said shaft for individual rotation relative to the shaft between a standby and an operated position;

a series of first members for said arms fixedly mounted on the shaft adjacent respective arms for rotation in unison upon actuation of said shaft;

a series of second members for said arms each shiftable mounted on the corresponding said first member for movement between a non-actuated position in which said second member clears the corresponding arm during rotation of said shaft and an actuated position in which said second member is

disposed for engagement with the arm to shift the same to the operated position thereof during rotation of the shaft;

yieldable means for each pair of members operably interconnecting the same in a manner to yieldably maintain said second member in either of its alternate positions; and

a series of selectively operable actuators for said second members each operable to shift the corresponding second member from the non-actuated to the actuated position thereof to thereby permit selective dispensing of products disposed in the respective paths of travel of said ejector arms.

20. In dispensing apparatus as set forth in claim 19, wherein said shaft is rotatable first in one direction and then in the opposite direction during each cycle of operation, and wherein is provided return means for each second member respectively including a reset projection disposed in the path of travel of said second member when the latter is in said actuated position for engaging and shifting the actuated second member from its actuated to its non-actuated position during rotation of said shaft in said opposite direction.

21. In dispensing apparatus as set forth in claim 20, wherein each said second member is adapted for momentary partial displacement out of said actuated position to permit overriding of the corresponding reset projection when said shaft is rotated in said one direction.

22. In dispensing apparatus as set forth in claim 19, wherein each actuator includes a solenoid having a shiftable armature movable between an extended position and a retracted position for effecting said shifting of the corresponding second member from the non-actuated to the actuated position thereof, each of said first members having a cam surface engageable with said armature when the latter is in the retracted position thereof for returning the same to its extended position upon rotation of said shaft.

23. In a dispensing machine:

a cabinet;

a frame in said cabinet;

a plurality of individually functional product dispensing modules supported by said frame in spaced relationship with one another,

at least one of said modules including a first product support having a series of side-by-side pairs of rotatable, helical, product dispensing conveyors thereon,

the convolutions of adjacent conveyors in each pair winding in opposite directions relatively along their axes of rotation and defining an axially extending series of transverse product-receiving spaces whereby products received in said spaces are shifted along the first support for dispensing when the corresponding path of conveyors are operated;

first drivable mechanism for said conveyors including a first actuatable operator for each pair of conveyors respectively operably coupleable with the corresponding conveyors to rotate the same when said first mechanism is driven;

a first selectively operable actuator for each first operator adapted to couple the same with its corresponding conveyor,

at least one other of said modules including a second product support having a series of elongated, side-by-side, product-receiving sections,

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each of said sections having an abutment at one end, a bottom, and an aperture in said bottom adjacent the abutment;

a shiftable product dispensing ejector for each section respectively movable between a standby position in which the ejector is disposed below the aperture and an operated position in which the ejector projects into and through said aperture for pushing a product at said aperture out of the section and over said abutment to release the product;

second drivable mechanism for the ejectors including a second actuatable operator for each ejector respectively operably couplable therewith to shift the corresponding ejector from its standby to its operated position when said second mechanism is driven;

a second selectively operable actuator for each second operator adapted to couple the same with its corresponding ejector;

power means; and

shiftable drive means coupling said power means with said first and second mechanism for driving the same in unison with one another each time the power means is actuated such that a product may be dispensed having said helical conveyors or from a module having said ejectors by selecting and operating an appropriate one of said first and second actuators.

24. In dispensing apparatus as set forth in claim 23, wherein said first and second mechanisms include first and second rotatable shafts respectively and first and second pinions rotatable with said first and second shafts respectively, said drive means including a bar reciprocally carried by said cabinet and common to said shafts and first and second racks mounted on said bar for reciprocation therewith in meshing engagement with said first and second pinions respectively.

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