# United States Patent

[11] 3,627,172


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[54] INCLINED SHELF PRODUCT VENDING MACHINE
10 Claims, 9 Drawing Figs.


[52] U.S. Cl. ..... 221/129, 221/236, 221/251, 221/262
[51] Int. Cl. ..... B65g 59/00
[50] Field of Search ..... 221/115, 129, 130, 191, 192, 193, 236, 251, 258, 261, 262, 92



[56] References Cited
UNITED STATES PATENTS

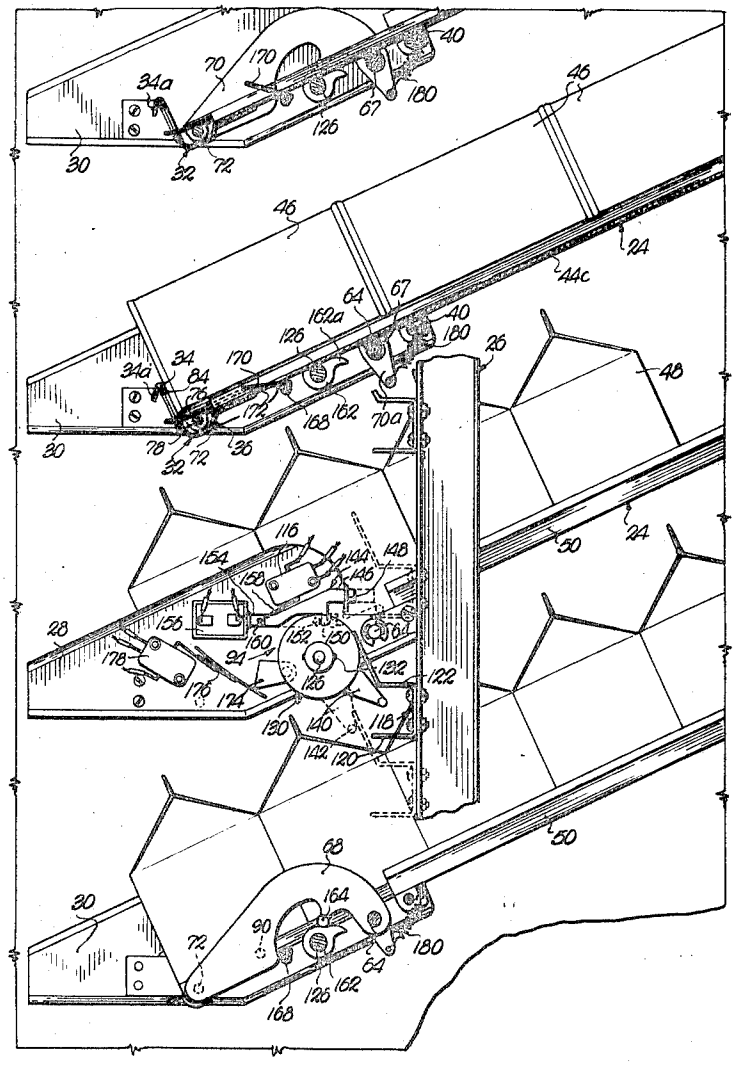
| | | | |
|---|---|---|---|
| 2,528,341 | 10/1950 | Creely | 221/298 X |
| 2,698,699 | 1/1955 | Skillman | 221/258 X |
| 2,868,344 | 1/1959 | Shields | 221/258 X |
| 2,965,262 | 12/1960 | Du Bois | 221/115 |
| 3,055,544 | 9/1962 | Krakauer et al. | 221/193 X |
| 3,174,646 | 3/1965 | Johnson | 221/130 X |



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ABSTRACT: An inclined shelf article dispensing machine having a stack of vertically spaced article support structures each provided with a series of side-by-side inclined article supports adapted to receive articles in a line thereon which are restrained against gravitational discharge by a blocking wall at the lower end of the structure. Selectively operable mechanism is provided for lifting a lowermost product on a support of a selected structure through a displacement for gravitational discharge over the blocking wall engaged thereby. Clutch and cam means are provided in association with each structure for effecting discharge of articles from the supports thereof in a repeated pattern upon successive operations of corresponding clutch means by the operating mechanism. Articles of diverse sizes may be dispensed from the supports without alteration of the operating mechanism.

Patented Dec. 14, 1971 3,627,172

4 Sheets-Sheet 1

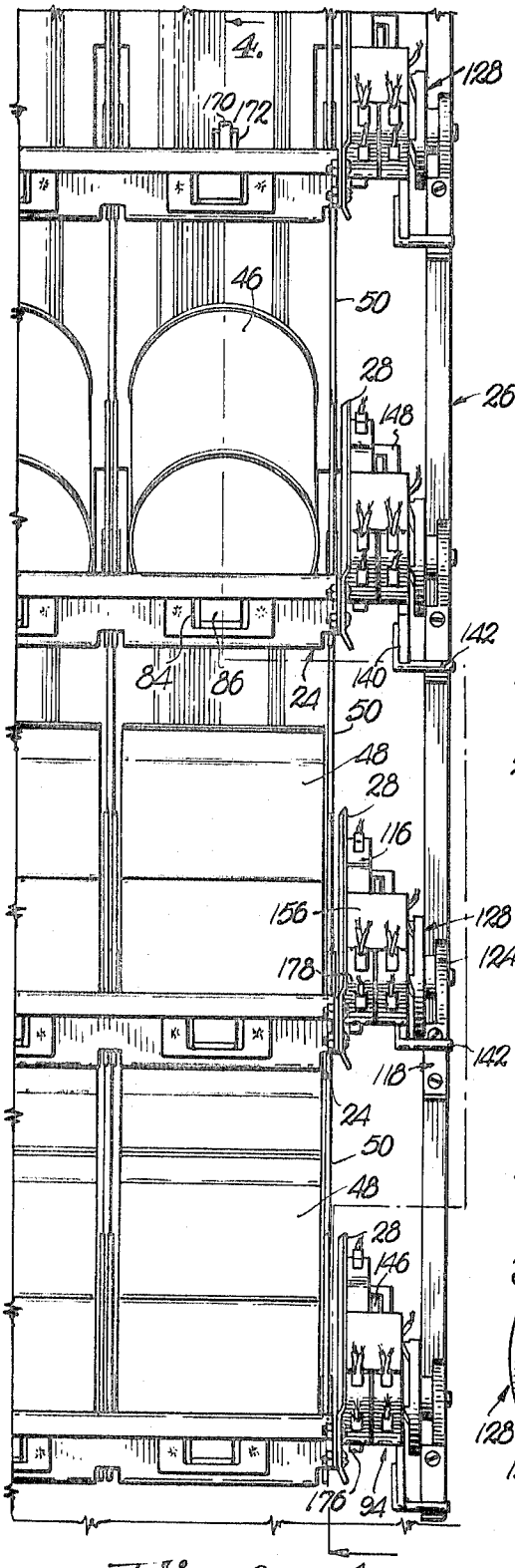



Fig. 2.

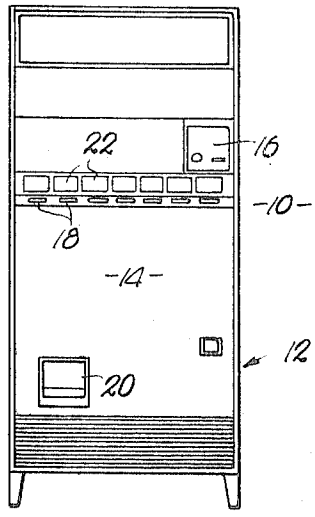



Fig. 1.

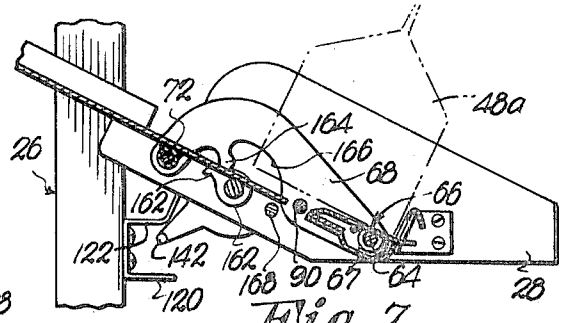



Fig. 7.

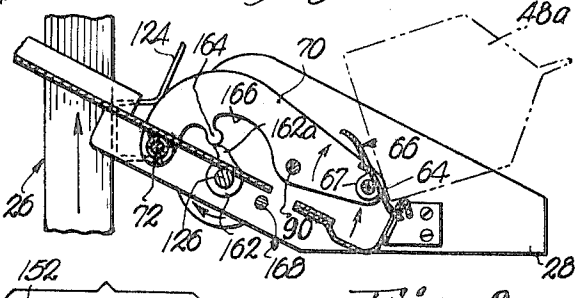



Fig. 8.

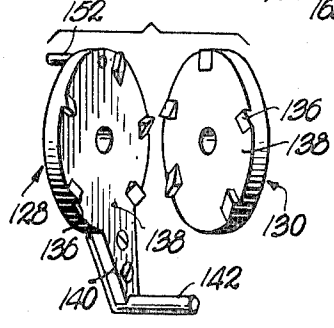



Fig. 9.

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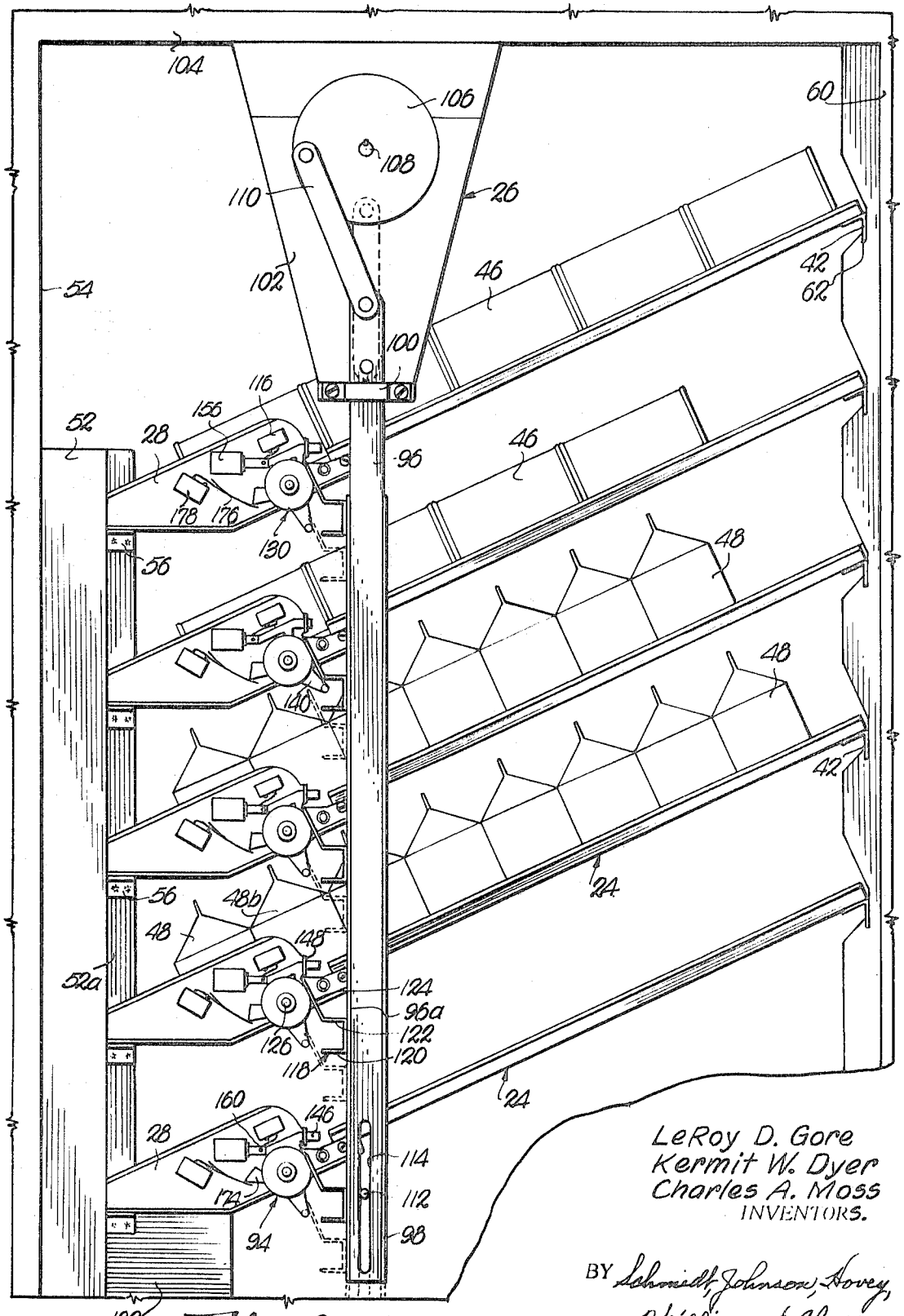



Fig. 3.

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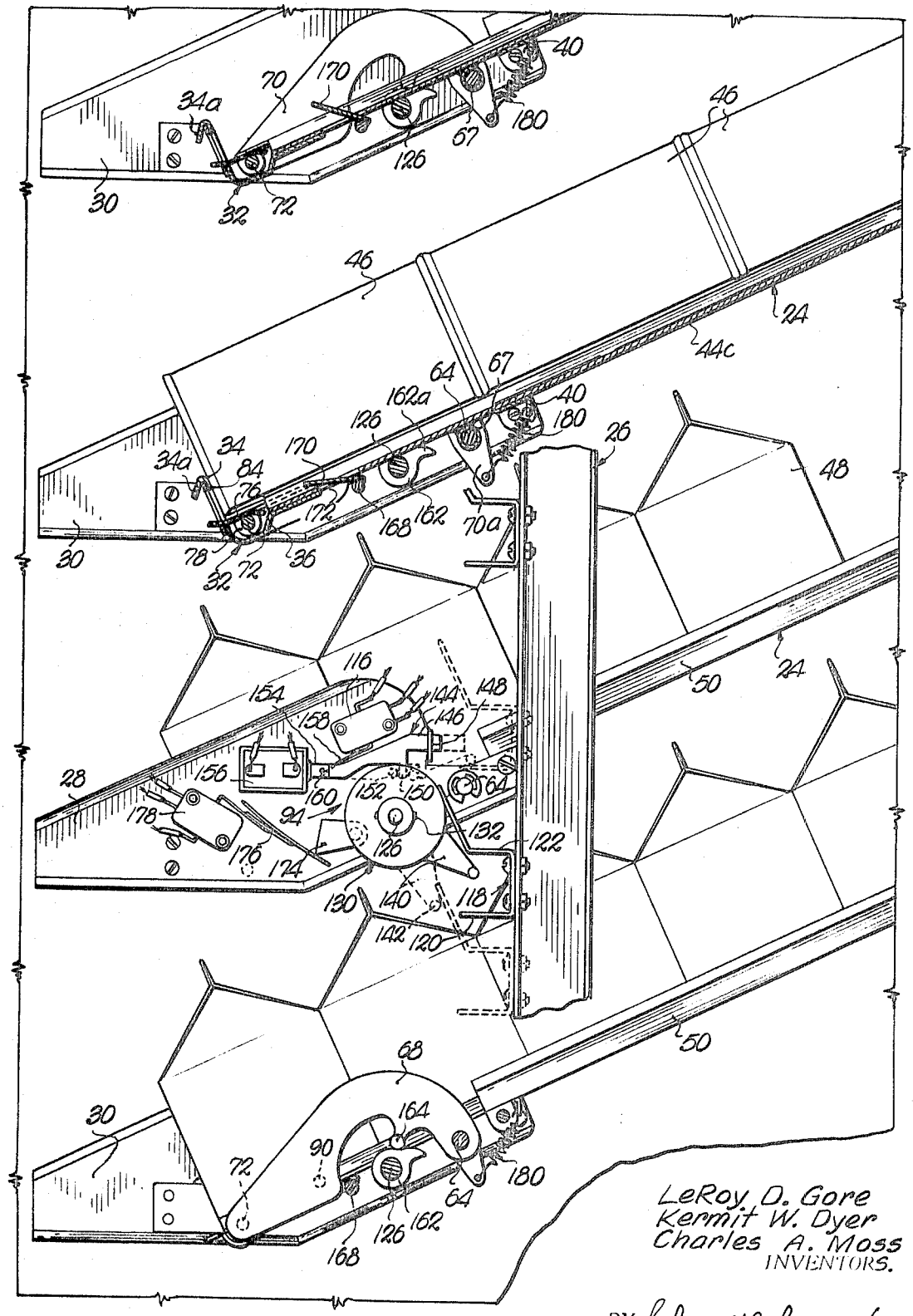



Fig. 4.

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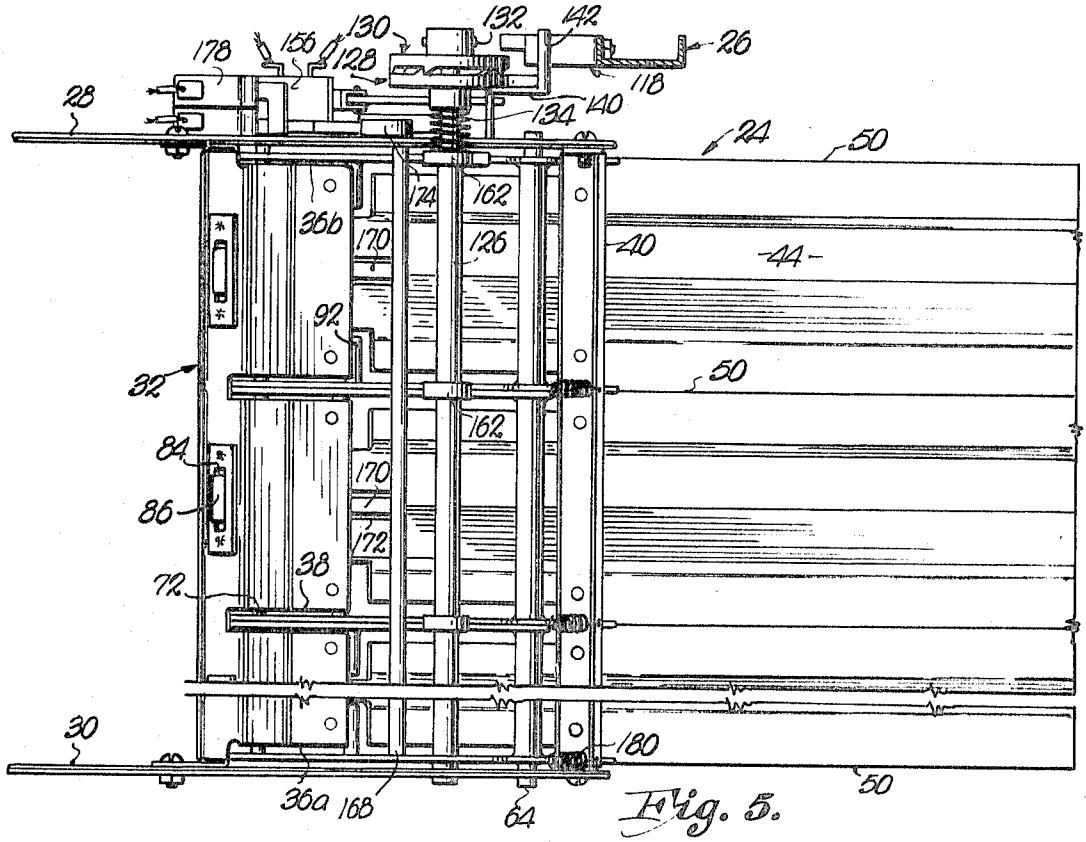



Fig. 5.

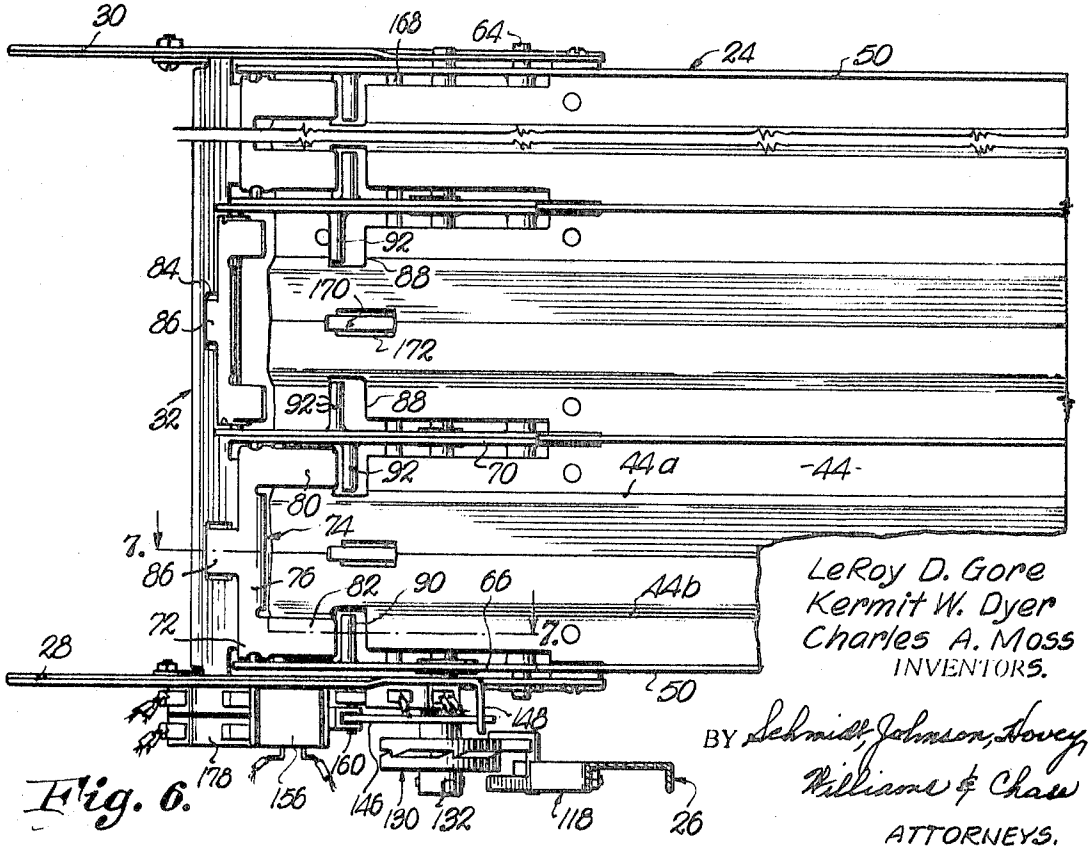



Fig. 6.

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# INCLINED SHELF PRODUCT VENDING MACHINE

This invention relates to product dispensing equipment and especially to an inclined shelf article dispensing machine capable of selectively delivering articles of diverse sizes without alteration of the operating mechanism so that the customer may obtain one of a number of different articles from the same machine and which may be sold at different prices if desired.

Inclined shelf product dispensing machines have been long used in the vending field because of their relatively low cost in relation to product selectivity and maintenance free operation over extended periods of time. Since the force of gravity is used to effect discharge of selected products from the supports therefor as well as to replenish the dispensing stations, it is only necessary to provide discharge or release mechanism at the lower end of each product support shelf for controlling delivery of articles to the customer. The most successful of these inclined shelf machines however have required the customer to grasp the desired article for removal after proper monetary deposit has been made in the machine. It is desirable though to provide a machine which does not require the customer to use force to remove an article from a discharge station and which is operable to direct the selected article into a delivery chute where the customer need only reach into the delivery area and pick up the article directed thereto. However, the function of delivery of a selected article into a chute for customer removal thereof must be coupled with retention of low cost and maintenance free operation which have been characteristics of past, highly successful slant shelf machines.

In addition, the operating mechanism should be of a configuration permitting dispensing of products of various sizes from the supports therefor without modification of the equipment being required when an article of a different size is selected for dispensing from a particular article support. Direct delivery of a selected article to the customer and dispensing of articles of various sizes however must not interfere with or reduce the overall capacity of the machine per unit volume of cabinet space occupied thereby and all at minimum overall cost.

It is therefore the primary object of the present invention to provide an inclined shelf product dispensing machine which overcomes the disadvantages noted above but retains the attributes of predecessor inclined shelf machines with respect to low cost, freedom from maintenance problems, and product selectively as well as capacity in conjunction with the capability of vending products of varying sizes without modification of the article discharge mechanism.

A further important object of the invention is to provide an inclined shelf product dispensing machine as described having a stack of vertically spaced article support structures each provided with a series of inclined article supports adapted to receive articles in a line thereon so that the degree of article selectivity by the customer may at least be as great as the number of vertically spaced support structures provided in a particular vending machine cabinet. In addition, an important object of the invention is to provide an inclined shelf product dispensing machine wherein each of the product support structures is made up of a series of side-by-side article dispensing supports with novel clutch mechanism common to each series of the horizontally aligned article supports for effecting discharge of articles from the supports of a respective structure in a repeated pattern upon successive operations of the clutch mechanism so that first-in first-out dispensing of articles from a respective product support structure is assured while at the same time providing a desirable large product capacity for each product selection.

Another important object of the invention is to provide an inclined shelf product dispensing machine wherein initial cost and maintenance are minimized by virtue of the fact that dispensing of articles from any one of a number of vertically spaced article support structures and in predetermined sequence from the supports of a respective structure is accomplished through use of a single drive motor which may be of relatively small size and which is operably coupled to a



selected horizontally aligned row of article supports through unique clutch mechanism which effects successive discharge of the lowermost articles of respective supports across the horizontal extent thereof in a predetermined sequence so that the articles first to be loaded in the machine are those which are first dispensed at all times.

A further important object of the invention is to provide an inclined shelf product dispensing machine wherein the operating mechanism is simplified by the utilization of a power driven actuator movable along an essentially linear, reciprocable path of travel relative to the product support structures and wherein selectively actuatable means comprised of a series of customer operated switches and respective solenoids is provided in association with the operating clutches of each support structure for effecting selective coupling of a respective clutch to the reciprocable actuator by the simple expedient of moving an operating drive element of the clutch into the path of travel of the actuator bar.

A still further important object of the invention is to provide an inclined shelf product dispensing machine wherein the individual product support structures adapted to be disposed in stacked, vertically spaced relationship are all of identical construction thus substantially decreasing the overall cost of the assembly.

Other important objects and advantages of the present invention will be explained in greater detail or become apparent as the following description progresses, having reference to the accompanying drawings, wherein:

FIG. 1 is a front elevational view on a reduced scale of article-vending mechanism embodying the concepts of the present invention and illustrating one type of cabinet enclosure having a number of article selection buttons, coin receiving mechanism, and an article discharge chute at the lower left-hand corner of the enclosure door;

FIG. 2 is a fragmentary side elevational view of the inclined shelf product dispensing mechanism mounted within the enclosure of FIG. 1, with the showing in this figure being on an enlarged scale for clarity;

FIG. 3 is a fragmentary front elevational view of the left side of the mechanism illustrated in FIG. 2 and on essentially the same scale as that figure but also showing the common actuator bar for the dispensing structures as well as the eccentric mechanism for operating the same;

FIG. 4 is a fragmentary vertical cross-sectional view taken substantially on the irregular line 4—4 of FIG. 2 and looking in the direction of the arrow with one of the clutch assemblies shown in actuated position for operation by the actuator bar;

FIG. 5 is a fragmentary bottom view of one of the article-dispensing support structures with the article lifting units for each article support being illustrated in their normal standby position;

FIG. 6 is a fragmentary plan view of the article-dispensing support structure illustrated in FIG. 5 but in this instance showing one of the lifting units in an operated position and the article flipper associated therewith in substantially its extreme actuated disposition;

FIG. 7 is a fragmentary vertical cross-sectional view on the line 7—7 of FIG. 6 and illustrating the relationship of the components immediately prior to lifting of the lowermost article on the respective support and with the operating clutch mechanism therefor in disposition for operation by the common actuator bar;

FIG. 8 is a cross-sectional view similar to FIG. 7 but showing the lifting components in their relative dispositions at the time of discharge of the lowermost article from a support therefrom as the actuator bar is moved upwardly to raise the article-lifting assembly; and

FIG. 9 is an exploded perspective view on an enlarged scale of the operating plate components of the clutch mechanism provided in association with each of the article-dispensing support structures.

A vending machine embodying the preferred concepts of the present invention is broadly designated by the numeral 10

in FIG. 1 and includes a cabinet 12 having a swingable front door 14 which is lockable and serves as a support for coin control mechanism rearwardly of the coinage panel 16 and a series of switch actuating product selection buttons 18. Products selected by the customer are received through the product discharge chute structure 20. Changeable article identification labels are received in the holders 22 above respective buttons 18.

The interior of cabinet 12 houses a series of vertically spaced, inclined shelf dispensing units 24 of substantially identical construction and selectively operable by actuating mechanism broadly designated 26. Since all of the dispensing units 24 are of identical construction, only one of the same will be described in detail. It is to be understood though that the units 24 comprise a series of vertically spaced article-supporting structures with each being made up of a series of side-by-side article supports having individual article-dispensing mechanisms associated therewith.

Each of the units 24 includes a pair of essentially trapezoidal shaped main mounting plates 28 and 30 which are interconnected by a generally L-shaped article-blocking member broadly designated 32 extending between plates 28 and 30 generally intermediate the ends thereof as illustrated in FIG. 4. Member 32 includes an inclined, upwardly directed front wall portion 34 having an out-turned lip section 34*a* on the upper end thereof, as well as a generally J-shaped, rearwardly extending bottom wall section 36. For purpose to be detailed hereinafter, the bottom wall section 36 is provided with a series of horizontally spaced, parallel notches 38 therein which extend forwardly to the front wall portion 34. In addition, the outer end margins 36*a* and 36*b* of bottom wall section 36 terminate in spaced relationship from corresponding mounting plates 28 and 30 to present clearance therebetween of a width at least about equal to the transverse dimension of each of the notches 38. The rearmost ends of plates 28 and 30 are joined by crosspiece 40 of generally V-shaped cross-sectional configuration to present a downturned lip section as best shown in FIGS. 4 and 5.

Blocking member 32 and crosspiece 40 interconnecting mounting plates 28 and 30 cooperate with a transversely L-shaped crossmember 42 at the uppermost end of each dispensing unit 24 to support a series of transversely W-shaped panels 44 which are cooperable to present individual supports for receiving articles to be dispensed in a line thereon. The panels 44 are of irregular transverse cross-sectional configuration in order to permit use of minimum thickness sheet material without sacrifice to the strength thereof, particularly in a longitudinal direction, and also serve to present spaced elongated inverted V-shaped sections 44*a* and 44*b* which offer minimum resistance to gravitational movement of articles therealong while at the same time presenting a central wide spread vee groove section 44*c* for receiving cylindrical articles 46 such as cans or the like as shown in FIG. 3. Other typical products as shown in FIG. 3 are half-pint milk cartons 48 which readily slide along the ways presented by vee sections 44*a* and 44*b*. The outer margins of panels 44 are all bent upwardly to present flanges 50 cooperable to delineate respective article guide ways across the width of corresponding dispensing units 24. A flange 50 is provided in alignment with each of the notches 38 in blocking member 32 as well as with end mounting plates 28 and 30. Assuming for example that dispensing units 24 are adapted for delivery of half-pint milk cartons such as those designated by the numeral 48, the distance between adjacent flanges 50 is only slightly greater than the normal transverse dimension of cartons 48. The diameter of cylindrical articles 46 which may be dispensed from each unit 24 is thereby necessarily limited to the effective width of a product support presented by an individual panel 44 and its integral, upright flanges 50.

Transversely Z-shaped upright supports 52 adjacent the inner upright left-hand wall 54 have an indented segment 52*a* supporting L-shaped brackets 56 which removably carry the outermost ends of mounting plates 28 and 30 of respective units 24. The rear crossmember 42 of each unit 24 are hooked in irregularly shaped, upright support members 58 carried by the inner right-hand wall 60 of the cabinet 12. As best shown in FIG. 3, the brackets 56 and the recesses 62 for respectively crossmembers 42 of units 24 are located in relative positions to cause the panels 44 to be inclined downwardly from wall 60 at an angle of about 25° toward the wall 54 in generally parallel, vertically spaced relationship. Thus, articles 46 or 48 carried by respective panels 44 tend to gravitate toward blocking members 32 which prevent gravitational discharge of the articles from corresponding supports therefor.

An elongated cross-shaft 64 (FIGS. 4–8) extending between and carried by mounting plates 28 and 30 immediately forward of crosspiece 40, pivotally mounts a lifting assembly 66 for each of the panels 44. Each assembly 66 comprises a sleeve 67 rotatably mounted on shaft 64 between adjacent notches 38, or main mounting plate 28 or 30 and an adjacent notch 38 as the case may be, and serving as a pivotal support for a pair of forwardly extending, generally J-shaped arms 68 and 70 which extend downwardly toward blocking member 32 within corresponding notches 38 and are interconnected at the forwardmost extremities thereof by crossmember 72.

A generally Y-shaped flipper 74 is pivotally mounted on each of the crossmembers 72 with the main planar section 76 thereof directly overlying a corresponding crossmember 72 and having opposed downturned ears 78 on opposite ends thereof rotatably receiving opposite end portions of crossmember 72.

The legs 80 and 82 of each flipper 74 overlie the lowermost end of a respective panel 44 adjacent arms 68 and 70 respectively on opposite sides of the sections 44*a* and 44*b* as best shown in FIG. 6. The upright front wall portion 34 of blocking member 32 is provided with a series of openings 84 therein aligned with the central part of corresponding panels 44 for receiving the base leg 86 of each flipper 74 as shown in FIGS. 5–8 inclusive. Openings 84 are of dimensions to permit an increment of travel of crossmember 72 supporting flipper 74 before engagement of the base leg 86 with the upper margin of front wall portion 34 defining a corresponding opening 84 whereupon continued movement of the respective crossmember 72 effects swinging of the flipper 74 as the base leg 86 is restrained against further upward movement.

Each of the panels 44 is also provided with a pair of transversely extending, oppositely opening notches 88 therein intermediate the ends of arms 68 and 70 for clearing respective retainer pins 90 and 92 on arms 68 and 70 respectively. The pins 90 and 92 are below the level of the upper portions of sections 44*a* and 44*b* when in their retracted dispositions as shown in FIGS. 4 and 7 so that the pins do not impede sliding movement of an article 48 toward blocking member 32 in the case of milk cartons or the like, whereas pins 90 and 92 are of sufficient length that they do not interfere with downward sliding movement of cylindrical articles such as cans 46 which are contained within V-shaped trough section 44*c* of each panel 44.

Clutch mechanism broadly designated 94 is provided for selectively operating the lifting assemblies 66 of each unit 24 in a predetermined sequence upon successive operations of actuating mechanism 26 and successive coupling of a corresponding unit 24 to the upright reciprocable actuator bar 96 of mechanism 26. The bar 96 is of channel-shaped configuration throughout its length except for the upper part thereof as shown in FIG. 3. The upper end of bar 96 is slidably received within retainer 100 carried at the lower end of mounting structure 102 suspended from the upper wall 104 of cabinet 12. An eccentric plate 106 driven by gear motor shaft 108 has a connecting rod 110 pivotally secured to the periphery thereof and joined to the upper end of bar 96 for reciprocating the latter in response to rotation of plate 106. A retainer pin 112 carried by structure on the lower wall of cabinet 12 is received within an elongated slot 114 in the bottom portion of bar 96 to restrict reciprocation thereof to a linear path of travel. Although not illustrated in the drawings, it is to be understood

that the gear motor driving shaft 108 is secured to the rear face of mounting structure 102 and is operable during each cycle controlled by motor start switch 116 on a corresponding mounting plate 28 of each dispensing unit 24 to reciprocate the bar 96 as plate 106 is rotated through an arc of 360°.

The out-turned leg 96*a* of bar 96 proximal to clutch mechanisms 94 is provided with a U-shaped member 118 thereon for each dispensing unit 24 with the extensions 120 and 122 of each member 118 being located in parallel, vertically spaced relationship while a projection 124 is provided on the outer end of the upper extension 122 of each member 118 and at an angle relative thereto for movement with bar 96. As shown in FIGS. 3 and 4, each of the projections 124 extends upwardly as well as outwardly from the outer end of a corresponding extension 122 into overlying relationship to a respective clutch mechanism 94.

Each of the clutch mechanisms 94 includes an elongated cross-shaft 126 pivotally carried by the mounting plates 28 and 30 forwardly of shaft 64 and projecting outwardly from mounting plate 28 for receiving clutch plates 128 and 130 thereon. The outermost clutch plate 130 is connected to shaft 126 by a cross pin 132, while the inner clutch plate 128 is freely rotatable on shaft 126 but biased toward plate 130 by a coil spring 134 (FIG. 5) interposed between mounting plate 28 and clutch plate 130. The plates 128 and 130 cooperate to present a one-way clutch by virtue of the provision of facing, mutually cooperable, integral, generally triangular teeth 136 on the opposed, facing surfaces 138 thereof. The teeth 136 are configured to interengage and couple plates 128 and 130 when plate 128 is rotated in a counterclockwise direction viewing FIG. 4, but to slide over one another and permit relative rotation between plate 128 and 130 as plate 128 moves away from plate 130 against the action of coil spring 134 when plate 128 is rotated in a clockwise direction as viewed in FIG. 4.

An integral extension 140 on plate 128 normally projecting toward actuator bar 26 at a position of about 5:00 o'clock in the standby location thereof as illustrated in FIG. 4, carries a transversely extending drive element 142 thereon which is located to be received within a respective member 118 on actuator bar 96 when drive extension 140 is rotated to a position of about 4:00 o'clock as viewed in FIGS. 3 and 4.

Means for rotating the clutch plate 128 from its standby position at about 5:00 o'clock to the 4:00 o'clock actuated position thereof includes an irregularly shaped actuator 144 overlying clutch plates 128 and 130 and includes an extension 146 slidably received within retainer 148 projecting from mounting plate 28 while the depending hook portion 150 of the actuator 144 is located to engage coupling pin 152 extending outwardly from the rear face of clutch plate 128. The end of actuator 144 remote from hook portion 150 is joined to the armature 154 of selection solenoid 156 controlled by respective pushbutton 18 on the front door 14 of machine 10. Motor switch 116 has a contact actuator 158 thereon located to be operated by a pin 160 which pivotally joins actuator 144 to armature 154.

Shaft 126 has a series of cams 162 thereon located within the space between mounting plate 28 and the adjacent panel 44, as well as within each of the notches 38 for engaging the depending cam ear 164 within the C-shaped opening 166 of each arm 68 of lifting assemblies 66. Assuming that five panels 44 are provided for the dispensing unit 24, five sets of teeth 136 are provided on clutch plates 128 and 130, and five cams 162 are positioned along the length of shaft 126 in disposition such that the actuating lugs 162*a* thereof are located at relative arcs of 72° from one another to sequentially operate the five lifting assemblies 66 across the width of the dispensing unit 24. Extensions 70*a* of arms 70 of each lifting assembly 66 which project below shaft 64 as illustrated in FIG. 4, serve as means for securing respective tension springs 180 which are joined to crosspieces 40 so that the members 72 of each assembly 66 are biased downwardly to force the flipper leg 86 into engagement with the lower edges of openings 84 to thereby retain flipper legs 80 and 82 in engagement with the upper face of corresponding panels 44.

Another rotatable shaft 168 extends between mounting plates 28 and 30 forwardly of shaft 126 and carries an extension 170 for each panel 44 which extends through a clearance slot 172 therefor in the corresponding panel to provide a product soldout control since member 174 secured to shaft 168 outboard of mounting plate 28 is located to engage the contact actuator 176 of soldout switch 178 on mounting plate 28. Products ejected from respective dispensing units 24 fall over the upper margins of respective blocking members 32 and fall downwardly between mounting plates 28 and 30 onto an inclined delivery plate 182 which leads into chute structures 20 on front door 14.

In operation, the front door 14 is opened and articles such as cans 46 and cartons 48 are loaded on the shelves presented by dispensing units 24. The angle of inclination of panels 44, which is preferably about 25° assures gravitational delivery of the articles to ejection positions. The cartons 48 ride on the sections or ridges 44*a* and 44*b* of panels 44 while items such as cans 46 slide along V-shaped grooves 44*c* between the ridges. Viewing FIG. 4, assuming that the customer pushes a button 18 associated with the second from the bottom dispensing unit 24, the associated solenoid 156 is momentarily energized which pulls the armature 154 as illustrated, shifting actuator 144 to the left, whereby the corresponding clutch plate 128 is rotated from its normal 5:00 o'clock disposition into a location as illustrated in FIG. 4 where the drive element 142 is between extensions 120 and 122 of adjacent member 118 on actuator bar 96. The clutch plate 128 is free to rotate through this limited arc relative to clutch plate 130 since the interengageable teeth of respective plates are separated by 20° to 30° in standby. As the actuator 144 moves to the left viewing FIG. 4, pin 160 contacts switch actuator 158 of motor start switch 116, thereby effecting energization of the drive motor carried by structure 102. In this case, the drive motor is permitted to become energized by virtue of the fact that at least one article is available on the panels 44 of the selected dispensing unit 24 as sensed by the extensions 170 of the soldout structure which retains the contacts of soldout switch 178 in a closed condition. During upward movement of the actuator bar 96 by rotation of plate 106 through an arc of 180°, the extension 120 below the shifted drive element 142 contacts the latter to rotate plate 128 in a counterclockwise direction viewing FIG. 4, whereby plate 130 is rotated therewith because of interengagement of the mutually cooperable opposing teeth 136 whereby shaft 126 is also rotated in a clockwise direction to rotate the cams 162 through an arc of 72°. As shown in FIGS. 7 and 8, the lug 162*a* of the cam 162 proximal to the cam ear 164 of one of the assemblies 48*engages the cam ear and moves the legs 68 and 70 of the associated assembly 66 upwardly whereby the flipper 74 carried by crossmember 72 is lifted to elevate the end carton 48a* from its normal position as illustrated in FIG. 7. After the carton 48*a* has been raised to a position where the bottom thereof is about halfway up front wall portion 34, engagement of the base leg 86 of flipper 74 with the top of the opening 84 causes the flipper to be rotated relative to the lifting arms to positively eject carton 48*a* from the support therefor as in FIG. 8 and assure delivery of the same into the chute structure leading to product discharge structure 20. Springs 180 return the actuated assembly 66 to the initial disposition thereof after cam 162 clears the associated cam ear 164. During ejection of the carton 48*a*, the next lowermost carton 48*b* is restrained by the retainer pins 92 from moving into a position where it would interfere with return of the assembly 66 to its normal location. Since flipper 74 does not extend rearwardly further than the length of the shortest article to be dispensed from units 24, there is no possibility of dispensing the next to lowermost article with the lowermost article. The flipper 74 ejects articles such as the cartons shown in FIGS. 7 and 8 by causing them to somersault over the blocking member 32 whereas it lifts the forwardmost portion of longer articles such as cans above the blocking member 32 for clearance to slide thereover.

During return motion of actuator bar **96** to its initial standby position, the projection **124** of the member **118** which has operated the associated clutch mechanism **94**, engages drive element **142** to return the same to the 5:00 o'clock standby position thereof as illustrated in FIGS. **3** and **4** so that product selection may be made from any of the units **24** during the next cycle of the vend motor. Return of the actuator **144** to the initial position of the same by pin **152** returns the contacts of the motor control switch **116** to normal, but another motor switch in the vend circuit has previously taken over the operation of the motor to accomplish a full 360° of rotation of shaft **108**.

In the particular machine illustrated there are five supports **44** in side-by-side relationship making up one of the structures **24**. Therefore, the cams **162** are located so that they are 72° apart in sequential order from one support panel **44** to the next so that articles are vended repetitiously and successively across the width of each unit **24**. In this manner, true first-in, first-out delivery of products is assured since fresh products are always loaded behind the products remaining on the supports at the time of servicing and old products are always dispensed before the last loaded products. In addition, exhaustion of products from a particular shelf unit **24** is assured before the soldout mechanism will preclude energization of the selection solenoid **116** for the respective dispensing unit **24**. A particular feature of the invention is the provision of cyclic vending of individual products in a repeated pattern (1–2–3–4–5–1–2–3, etc.) from multiple chutes of a given shelf using a single input from a common drive system. Projections **124** on drive members **118** of actuator bar **96** positively return each actuated clutch plate **128** to the standby position thereof and through engagement of pin **152** thereon with the depending hook portion of actuator **144**, the armature **154** of the respective solenoid **156** is also positively returned to its standby position, thus eliminating any problems from residual magnetism in respective selection solenoids **156**.

The legs **80** and **82** of flipper **74** of each assembly **66** are effective to positively eject articles such as the cartons illustrated from a respective support panel **44** even though another carton is not present thereabove to provide a force against the lowermost article in a direction to assure delivery thereof over blocking member **32**. Throughout the motion of the assemblies **66** however, retainer pins **92** preclude the next to lowermost articles from moving downwardly until after the assemblies **66** have returned to their initial positions. Foolproof operation is thus provided using only a single drive motor and identical dispensing units **24** controlled by respective selection solenoids **156**.

We claim:

**1.** In an article-dispensing machine:

a plurality of stacked, vertically spaced, elongated longitudinally inclined supports each adapted to receive a plurality of articles in a line thereon;

blocking means adjacent the lower extremity of each of the supports for preventing gravitational discharge of articles from respective supports;

a lifting unit at lower end of each of the supports mounted for swinging movement about an axis extending transversely of the corresponding support and each movable through a displacement to raise the lowermost article on a respective support to a level for passage over a corresponding blocking means immediately therebelow:

a power driven actuator mounted for movement along an upright path of travel relative to the supports;

a clutch assembly for operating each respective lifting unit, each of said clutch assemblies including a rotatable first plate operably connected to a respective lifting means and operable upon rotation thereof to shift a corresponding lifting means through article discharging displacement, a second plate rotatable relative to the first plate, and interengageable teeth means on the plates for intercoupling the latter only when the second plate is rotated in one direction relative to the first plate associated therewith, each of said assemblies being provided with a movable drive element operable upon movement thereof to rotate a corresponding second plate in said one direction; and

selectively actuatable means operably associated with each clutch assembly for permitting selective conditioning of a corresponding assembly to effect coupling thereof to the actuator during movement of the latter to effect discharge of the lowermost article from a selected support, said selectively actuatable means including mechanism operable upon actuation thereof to move a corresponding drive element into disposition to be moved by said actuator as the latter is shifted to effect discharge of the lowermost article from a selected article support.

**2.** A machine as set forth in claim **1**, wherein is provided selectively actuatable means for each support respectively and each provided with a pin on the second plate of an associated clutch means and a solenoid-operated member engageable with a corresponding pin to shift the latter and thereby rotate a corresponding second plate through an arc to bring the drive element thereon into disposition to be engaged and driven by the actuator during shifting thereof.

**3.** A machine as set forth in claim **2**, wherein said actuator includes an elongated bar, and an extension therefrom for each support and located to engage a corresponding driving element only when the latter is shifted into extension engaging disposition.

**4.** A machine as set forth in claim **3**, wherein is provided a projection from the bar for each support and located to engage and return an operated element to actuator clearing disposition as the actuator is returned to its initial position.

**5.** In an article-dispensing machine:

an elongated, longitudinally inclined support adapted to receive a plurality of articles in a line thereon;

blocking means adjacent the lower extremity of the support for preventing gravitational discharge of articles therefrom;

a lifting unit at the lower end of the support movable through a displacement to raise the lowermost article to a level for passage over said blocking means;

flipper means operably associated with the lifting unit and engageable with the lowermost article as it is raised by the lifting means for imparting a force against the underside thereof in the direction of delivery from the support to assure discharge of the lowermost article from the support; and

means mounting the flipper means on the lifting means for movement therewith, said flipper means being engageable with the blocking means and movable relative thereto and to the lifting means as the latter is raised.

**6.** In an article-dispensing machine:

an elongated, longitudinally inclined support adapted to receive a plurality of articles in a line thereon;

blocking means adjacent the lower extremity of the support for preventing gravitational discharge of articles therefrom;

a lifting unit at the lower end of the support movable through a displacement to raise the lowermost article to a level for passage over said blocking means; and

flipper means operably associated with the lifting unit and engageable with the lowermost article as it is raised by the lifting means for imparting a force against the underside thereof in the direction of delivery from the support to assure discharge of the lowermost article from the support,

said flipper means comprising a plate pivotally mounted on the lifting means, movable therewith and swingable about an axis extending transversely of the support,

said plate being provided with an extension thereon engageable with the blocking means for effecting pivoting of the plate in a direction to eject the lowermost article from the support as the lifting means raises the lowermost article.

**7.** In an article dispensing machine:

an elongated, longitudinally inclined support adapted to receive a plurality of articles in a line thereon;

blocking means adjacent the lower extremity of the support for preventing gravitational discharge of articles therefrom, said blocking means comprising an upright wall at least partially transversing the support adjacent the lower end thereof;

a lifting unit at the lower end of the support movable through a displacement to raise the lowermost article to a level for passage over said blocking means, said lifting unit being provided with a bar extending across the lower end of the support and movable through said displacement to raise the lowermost article toward discharge disposition; and

flipper means operably associated with the lifting unit and engageable with the lowermost article as it is raised by the lifting means for imparting a force against the underside thereof in the direction of delivery from the support to assure discharge of the lowermost article from the support, said flipper means including a plate pivotally mounted on the bar for swinging movement relative thereto, there being an extension on the plate along the margin thereof proximal to the blocking means, the latter being provided with an opening therein receiving said extension whereby upon raising of the lifting means and thereby upward movement of the plate, the extension thereon engages the blocking means to effect swinging of the plate relative to the lifting means.

8. A machine as set forth in claim 7, wherein said plate is of general Y-shaped configuration and is provided with a pair of legs in spaced relationship and normally located below the level of the support for said lowermost article to avoid impedance to movement of the next to lowermost article into the discharge position thereof.

9. A machine as set forth in claim 7, wherein is provided retaining means cooperable with the lifting device and said flipper means for preventing the next to lowermost article from engaging the flipper means and thereby preventing said lifting means and the flipper means from resuming their normal position.

10. A machine as set forth in claim 7, wherein is provided a power driven actuator mounted for movement relative to the support, and selectively operable means for joining the actuator to said unit to effect discharge of said lowermost article from the support by the lifting means and said flipper means during movement of the actuator while coupled to said lifting means.

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