

July 12, 1966

L. M. EZZELL
VENDING MACHINE

3,260,406

Filed Sept. 30, 1964

6 Sheets-Sheet 1

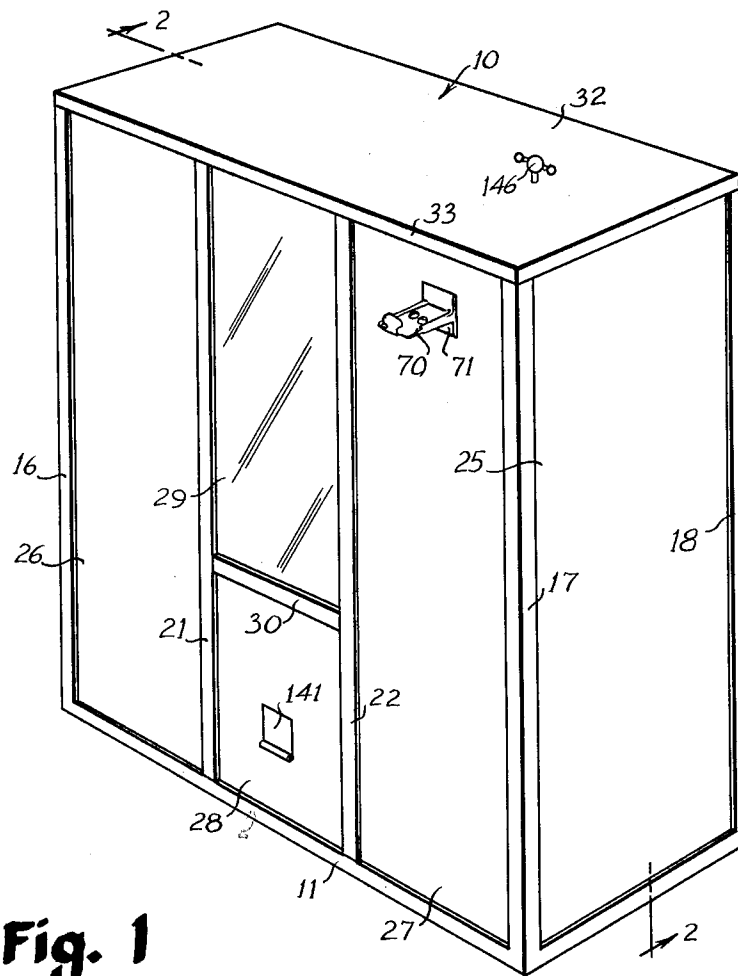


Fig. 1

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3,260,406

6 Sheets-Sheet 2

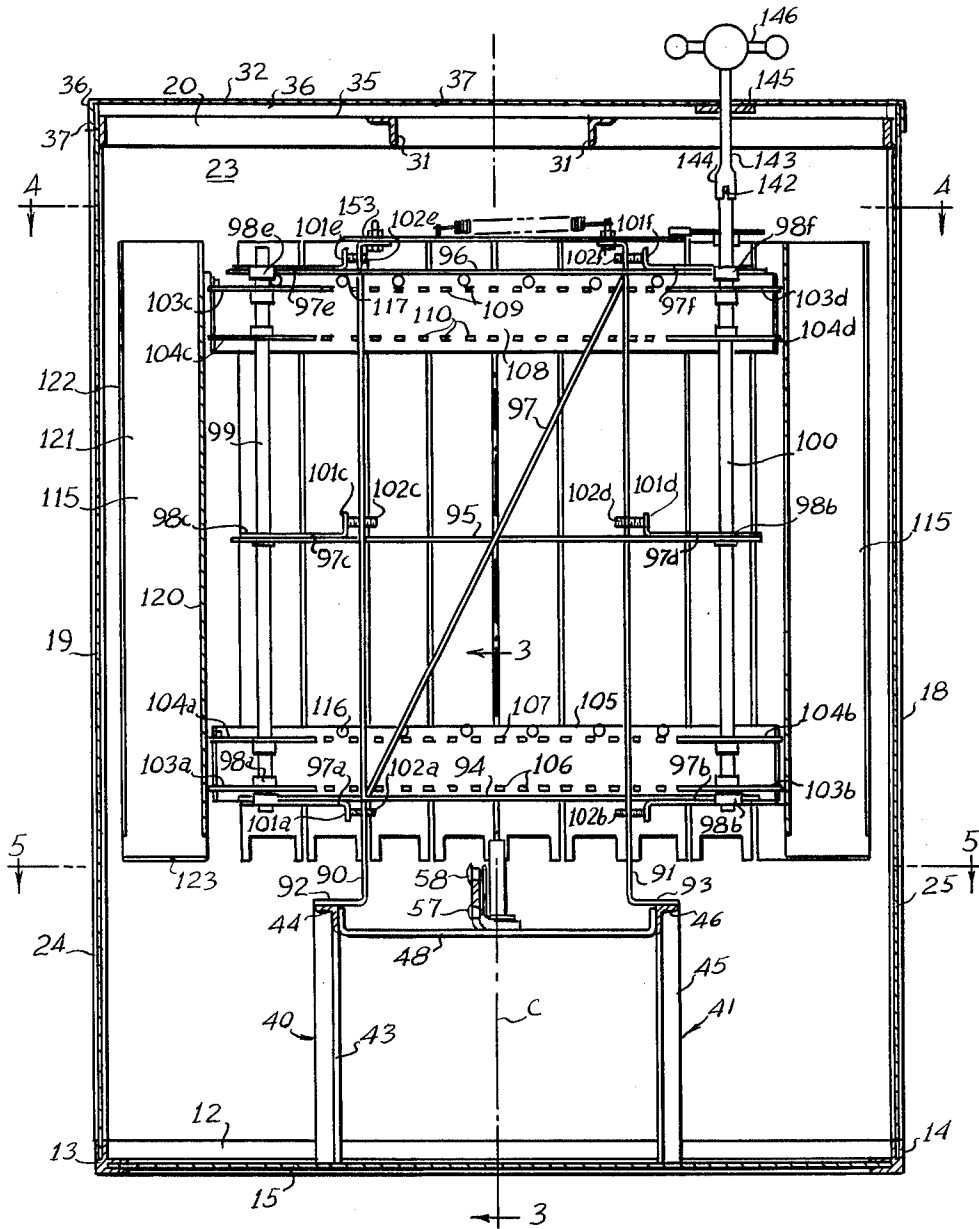


Fig. 2

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6 Sheets-Sheet 3

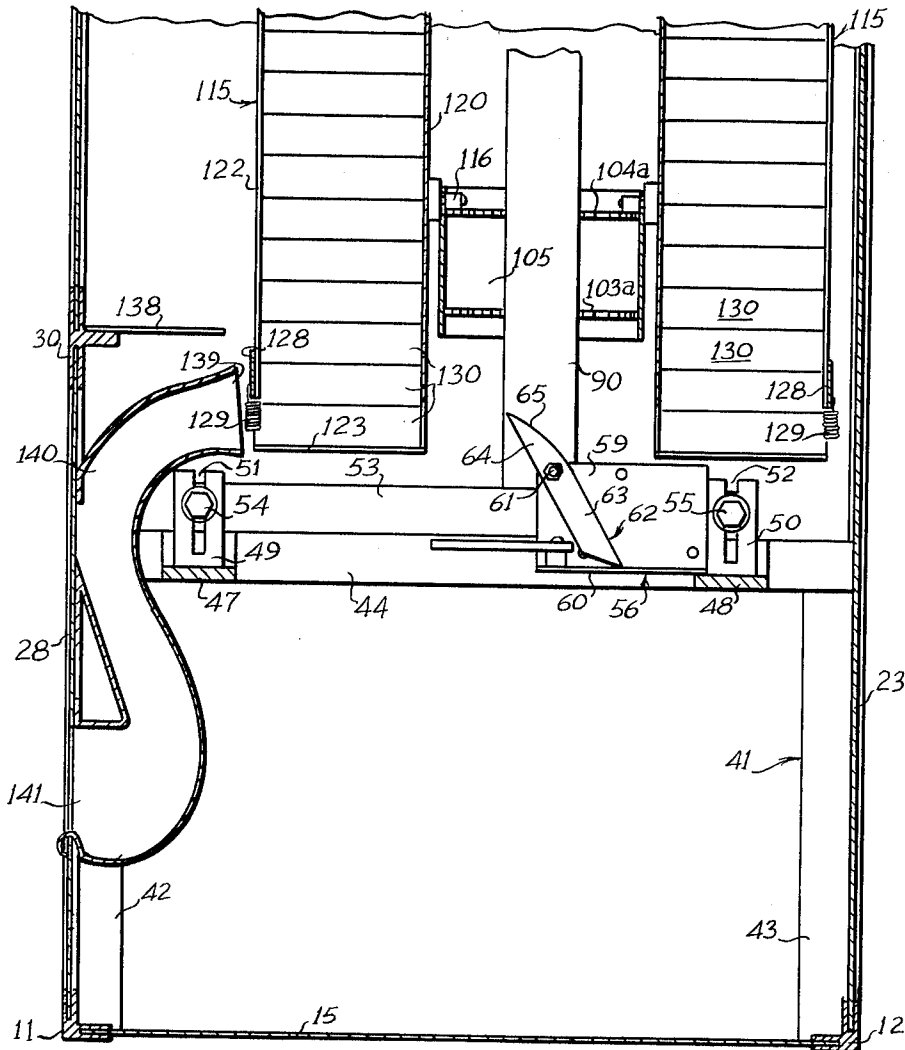


Fig. 3

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6 Sheets-Sheet 4

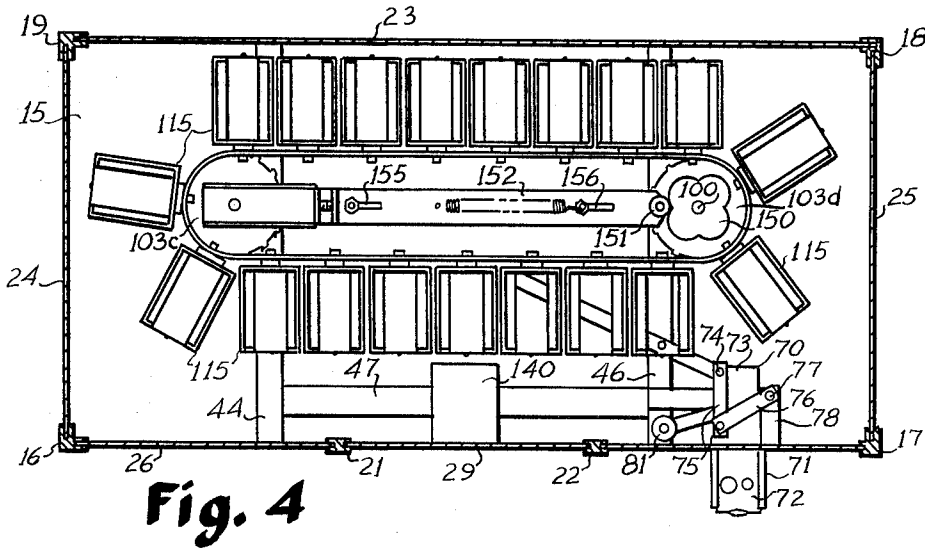


Fig. 4

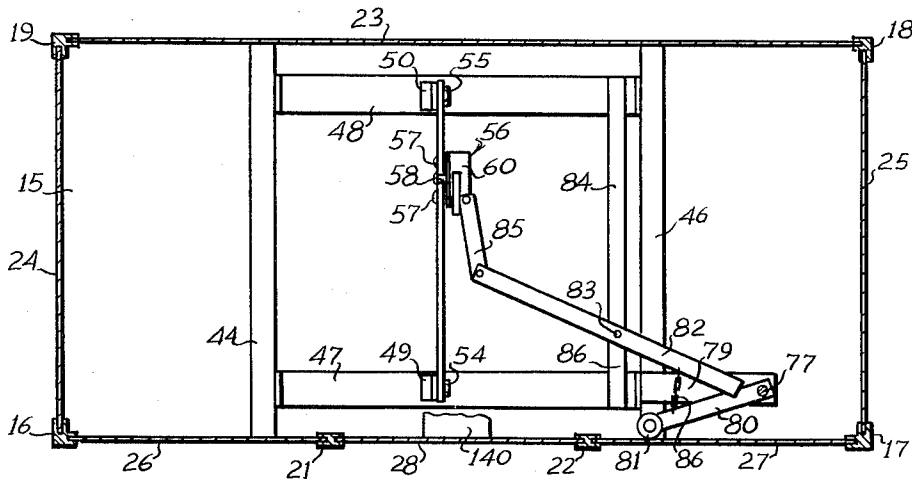


Fig. 5

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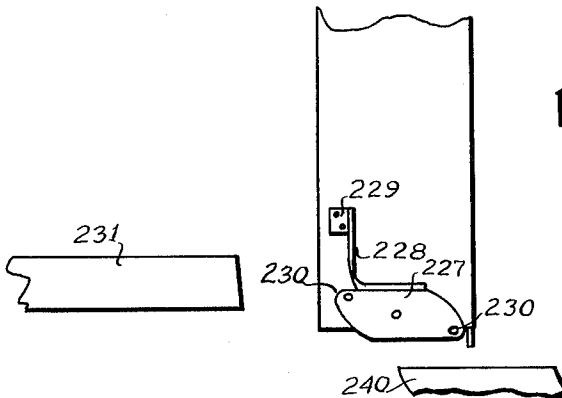
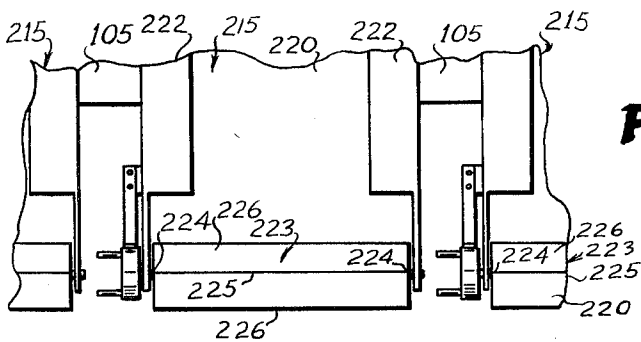
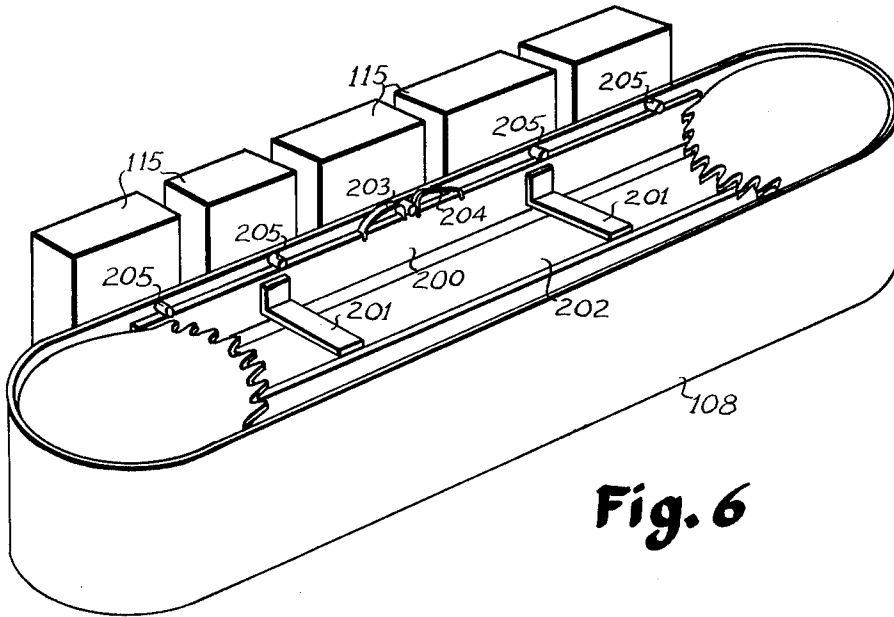
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6 Sheets-Sheet 5



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6 Sheets-Sheet 6

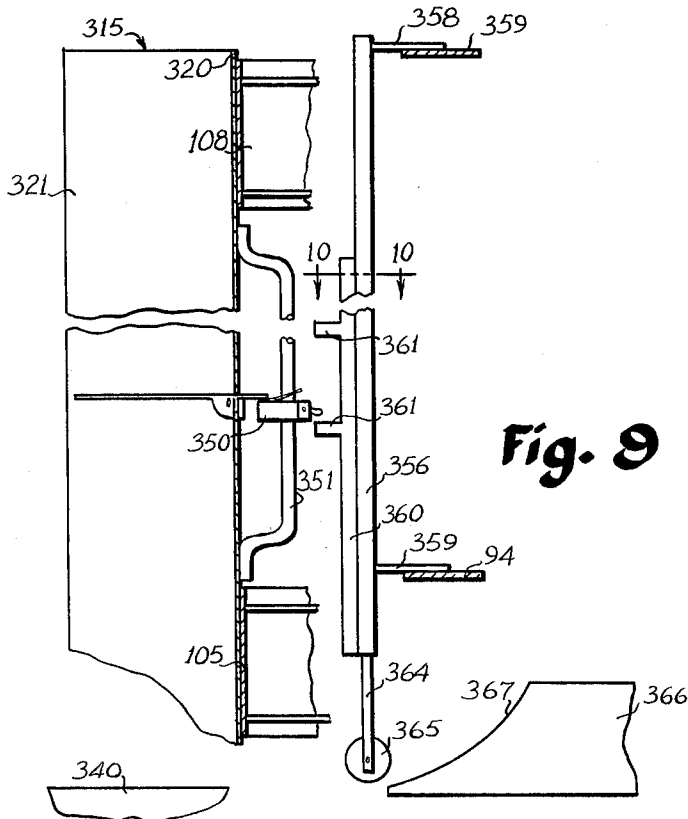


Fig. 9

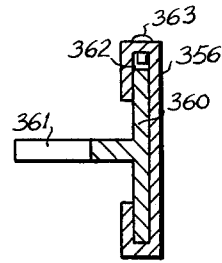


Fig. 10

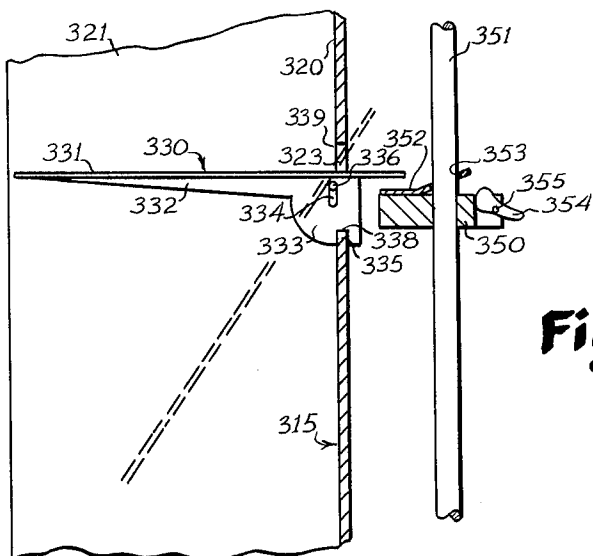


Fig. 11

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VENDING MACHINE

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Filed Sept. 30, 1964, Ser. No. 400,404
18 Claims. (Cl. 221-122)

This invention relates to dispensing machines and is more particularly concerned with a coin-operated vending machine for dispensing articles one at a time in response to receiving prescribed coins in the machine.

In the past, cigarette vending machines have been used extensively. Also, machines for vending candy, crackers, wafers, and various other packaged articles have been extensively used. Generally speaking, a cigarette vending machine cannot be used for vending other items, while candy vending machines are not normally used for vending cigarettes. Furthermore, these prior art vending machines have usually been complicated and expensive, requiring machined and cast parts. Such machines are usually serviced by a service organization and are not normally reloaded by the operator of a business establishment in which the machine is located.

The vending machine industry has long needed a practical, inexpensive cigarette vending machine which is so simple in construction and operation that a person having ordinary mechanical skill, such as service station operator, could observe and understand the operation of the machine sufficiently to repair the machine in most instances. It is my belief that I have devised such a machine.

Briefly described, the vending machine of the present invention is a simple, inexpensive machine which requires few moving parts and is made substantially from stamped metal and fabricated parts. It is quite easy to load and is convertible from a machine for vending cigarettes to a machine for vending other items, such as candy, peanuts, crackers and the like.

The mechanism of the present vending machine includes continuous flexible metal belts which carry a plurality of magazines disposed in juxtaposition for receiving stacks of different brands of cigarettes (or other like articles). By the rotation of a knob located exteriorly of the housing of the machine, any one of the magazines may be aligned with a discharge mechanism which is adapted to discharge the cigarettes (or other articles) one at a time, from the selected magazine. The machine also includes a housing in which the panels thereof are removable so that the exterior appearance of the vending machine may be altered to place various advertisements on the front and sides of the machine.

The vending machine of the present invention also includes modified magazines so as to render the machine suitable for vending other articles.

Accordingly, it is the object of the present invention to provide a vending machine which is inexpensive to manufacture, durable in structure and efficient in operation.

Another object of the present invention is to provide a vending machine which may be readily and easily altered to vend selectively cigarettes, candy, peanuts, cookies, crackers, and other relatively small articles.

Another object of the present invention is to provide a vending machine in which a person may selectively position an article to be dispensed and view the dispensing of the article.

Another object of the present invention is to provide a vending machine which may be readily and easily repaired and which has few moving parts, the parts being stamped and standard items which are readily available.

Another object of the present invention is to provide a vending machine which may be loaded by an unskilled laborer.

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Another object of the present invention is to provide a vending machine which has a long, useful life.

Other objects, features and advantages of the present invention will become apparent from the following description when taken in conjunction with the accompanying drawings, wherein like characters of reference designate corresponding parts throughout the several views and in which:

FIG. 1 is a perspective view of a vending machine constructed in accordance with the present invention.

FIG. 2 is a vertical sectional view taken substantially along line 2-2 in FIG. 1.

FIG. 3 is a vertical sectional view taken substantially along line 3-3 in FIG. 2.

FIG. 4 is a cross-sectional view taken substantially along line 4-4 in FIG. 2.

FIG. 5 is a cross-sectional view taken substantially along line 5-5 in FIG. 2, parts of the machine being removed for clarity.

FIG. 6 is a perspective view of a portion of the machine of the present invention and showing a modified form of mechanism for selectively positioning magazines at a proper position for the discharge of one item therefrom.

FIG. 7 is an enlarged fragmentary front elevational view of a modified form of the present invention showing a modified form of magazine and discharge mechanism of the vending machine suitable for the discharge of items such as packaged peanuts.

FIG. 8 is a fragmentary view of one side of one of the magazines illustrated in FIG. 7 and showing the operative mechanisms for actuating the discharge mechanism and the chute therefor.

FIG. 9 is an enlarged fragmentary vertical sectional view of still another form of magazine and discharge mechanism for the vending machine, the magazine being suitable for discharging items one at a time from trays carried by the magazine.

FIG. 10 is a cross-sectional view taken substantially along line 10-10 in FIG. 9.

FIG. 11 is an enlarged view of a detail showing the operation of a portion of the mechanism illustrated in FIG. 9.

Referring now in detail to the embodiment chosen for the purpose of illustrating the present invention, it being understood that in its broader aspects the present invention is not limited to the exact details herein depicted, numeral 10 denotes generally a rectangular box-shaped housing or casing which is formed from sheet metal panels and a window panel carried by extruded aluminum channel bars. In more detail, the housing 10 includes a base frame having a pair of parallel transversely extending base bars 11 and 12, the ends of which are joined by a pair of parallel, longitudinally extending base bars 13 and 14. A flat bottom 15 formed of sheet steel extends between the bars 11 and 12 the bars 13 and 14 are riveted or otherwise secured in place.

Extending up from the corners of the rectangular base frame, formed by the bars 11, 12, 13 and 14, are the corner bars 16, 17, 18 and 19, which terminate in a horizontal plane, the inner sides of the upper end portions of the corner bars 16, 17, 18 and 19 being secured to the corners of a continuous rectangular flat metal strap or upper frame 20. The base bars 10, 11, 12 and 13, as well as the end bars 16, 17, 18 and 19, are angle irons, the flanges of which have outwardly opening slots or channels therein throughout their lengths for receiving the sheet metal panels hereinafter described.

A pair of upstanding parallel front bars 21 and 22 is secured at intermediate positions on opposite sides of the longitudinal center lines of the front of the housing 10. These front bars 21 and 22 are parallel to the corner bars 16, 17, 18 and 19 and are each H-shaped in cross-section

so as to provide outwardly opening slots or channels for the receipt of the panels. The inner surfaces of the upper end portions of the front bars 21 and 22 are secured to the upper frame 20.

The housing 10 also includes a rectangular back panel 23, a pair of side panels 24 and 25, a pair of front wing panels 26 and 27, a front central panel 28 and a transparent front panel 29. The back panel 23 is secured in place between the upright corner bars 18 and 19 and is carried by the base bar 12 along its bottom portion. Rivets or the like (not shown) secure the back panel 23 in place.

It will be remembered that the bars 11, 13 and 14 have upwardly opening channels and these channels are disposed in the same plane with cooperating channels in the corner bars 16, 17, 18 and 19. Therefore, since the upper frame 20 is inwardly of the plane of the respective channels, the side panels 24 and 25 may freely be received by their edges in the channels 16 and 19 and 17 and 18, respectively, while the bottoms of the panels 24 and 25 are respectively received in the channels of the bars 13 and 14. It will be understood, of course, that these panels 24 and 25 may be removed and replaced readily by lifting the same upwardly.

In the same manner the panels 26 and 27 are received respectively between the bars 16 and 21 and 22 and 17 with the lower edges of the panels 26 and 27 being received in the channel in bar 11. These front panels 26 and 27 may also be removed by lifting the same upwardly; however, because of the coin actuating mechanism, panel 27 is not so readily removable and requires that certain mechanism be disconnected before the panel can be removed. The front central panel 28 is a small panel and is received between the upright bars 21 and 22, the edges of panel 28 riding in the channels of these upright bars 21 and 22 and the lower edge of the panel 28 being received in the channel in bar 11.

A removable H-shaped horizontally disposed divider bar 30 is disposed on the upper edge of the panel 28, its lower slot or channel receiving the upper edge of the panel 28. The upper channel of the bar 30, therefore, is disposed in alignment with the inner channels of the upright bars 21 and 22. The transparent rectangular window or panel 29, which is formed of either transparent plastic or glass, is received by the opposed channels of uprights 21 and 22, and the bottom edge of this panel 29 is received in the upper channel of the cross-bar 30. This panel 29 is readily removable upon being lifted upwardly and the panel 28 is also readily removable upon the removal of the divider bar 30 and upon being lifted upwardly.

Suitable reinforcing ribs 31, seen in FIG. 2, are provided for the upper frame 20.

The top for the housing 10 includes a flat rectangular top panel 32 provided with downwardly extending flanges 33, 34, 35 and 36 which overlie the upper end portions of the upright bars 16, 17, 18, 19, 21 and 22 and thereby prevent the removal of the panels 24, 25, 26, 27, 28 and 29 unless the top is opened. A piano hinge 37 is secured along the inner surface of back panel 23 adjacent the upper edge thereof and is also secured in the inner edge of the back flange 36. A suitable lock (not shown) is provided for locking the top in a closed position.

As best seen in FIGS. 2 and 3, the lower central portion of the housing 10 receives therein a supporting frame which carries the entire dispensing assembly hereinafter to be described and is carried by bottom 15. The supporting frame includes a pair of parallel inverted U-shaped frame elements, denoted generally by the numerals 40 and 41. These U-shaped frame elements 40 and 41 are formed, as seen in FIG. 2, of angle irons. The frame 40 includes a pair of upstanding legs 42 and 43 which are respectively disposed inwardly adjacent the front wing panel 26 and the back panel 23. A horizontally disposed

support bar 44 connects the upper ends of the legs 42 and 43. In like manner, the frame element 41 includes a pair of legs, such as leg 45, which are disposed parallel to the legs 42 and 43 and adjacent panels 27 and 23, respectively. The upper ends of these legs, such as leg 45, are connected by a support bar 46. Extending between the support bars 44 and 46 are a pair of parallel, transversely extending, support straps 47 and 48.

Discharge assembly

Extending up from the central portions of the support straps 47 and 48 are a pair of upstanding longitudinally aligned brackets 49 and 50 which are slightly off the centerline C and are respectively provided with upwardly opening slots 51 and 52. A slide bar 53 parallel to the centerline C and slightly to one side thereof is carried by bolts 54 and 55 projecting through the slots 51 and 52 and threadedly engaging the bar 53. By loosening of the bolts 54 and 55, the slide bar 53 may be raised or lowered, as desired; however, it usually remains parallel to bottom 15.

For reciprocation on the slide bar 53 is an L-shaped traveller block 56, the vertical flange 59 of which is provided, as seen in FIGS. 2 and 5, with a pair of lower rollers 57 and an upper roller 58. The upper roller 58 rides along the upper edge of the slide bar 53 while the roller 57 rides along the lower edge of bar 53. Thus, flange 29 is positioned on one side of the slide bar 53 and the block 56 may be moved forwardly and rearwardly between the brackets 49 and 50. The block 56 is preferably formed from a section of angle iron and includes, in addition to the vertical flange 59 which is spaced from and parallel to the slide bar 53, a horizontally disposed flange 60 extending away from the slide bar 53 across centerline C.

A pivot pin 61 protrudes sidewise from the forward corner portion of the vertical flange 59 over the flange 60 and pivotally carries a forwardly inclined ejector finger 62 which functions as a means for discharging the articles in the magazines. The ejector finger 62 is on the centerline C and is provided with a longer and heavier inner lower arm 63 and a shorter and lighter outer upper arm 64, the arm 63 being longer than the distance from the pivot pin 61 to the flange 60. Thus, the lower inner end of the arm 63 normally rests upon the flange 60 as the ejector finger 62 protrudes upwardly and forwardly therefrom. The rear edge of the outer arm 64 is provided with a curved upper edge 65. The flange 60 limits movement of the ejector finger 62 in a clockwise direction, as viewed in FIG. 3, but permits ready pivotable movement of the ejector finger 62 in a counterclockwise direction through a limited arc.

In the present embodiment the housing 10 is provided with a conventional "slug rejector" denoted generally by numeral 70. It will be understood by those skilled in the art that any other type of coin actuating mechanism, either electric or manual, may be substituted for the slug rejector 70 herein disclosed. This slug rejector 70 is entirely conventional and includes the usual guide block 71 which is mounted on the panel 27. The guide block 71 slidably carries a coin delivery plate 72 which protrudes through the panel 27, the inner end of the coin delivery plate 72 being provided with a sidewise extending actuator bar 73, seen in FIG. 4. The outer end of the actuator bar 73 is provided with an upstanding pin 74 which pivotally carries a forwardly extending link 75, the forward end of which is pivotably connected to a transversely extending lever arm 76. The free end of the lever arm 76 is secured to the upper end portion of an actuator shaft or rod 77 which, in turn, is journaled by an upper bracket 78 protruding inwardly from the panel 27. The lower portion of shaft 77 is journaled by a lower bracket 79 which protrudes sidewise from the support bar 46.

The linkage arrangement is such that, upon inward movement of the coin delivery plate 72, as viewed in

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FIG. 4, the shaft 77 will be rotated through a limited arc in a clockwise direction and as the coin delivery plate 72 is returned to its original position, the shaft 77 is returned to its original position. In FIG. 5 it will be seen that the rotation of shaft 77 is a clockwise direction will cause rotation in a rearwardly direction of an actuator lever 80 carried at the lower end portion of the shaft 77, immediately above the bracket 79. The actuator lever 80 is provided at its outer end with a camming roller 81 which is in the same plane with the outer arm of a power transfer lever 82 pivotally carried by a central portion by a pivot pin 83, the pivot pin 83 being carried by a strap 84 extending between the support straps 47 and 48. The inner end of the lever 82 is pivotally connected to a link arm 85 which, in turn, is pivotally connected to the horizontally extending flange 60 of traveler block 56. Thus, upon rotation of the shaft 77, the roller 81 will be brought into engagement with the outer arm of the lever 82 and will urge the outer arm of lever 82 rearwardly so as to cause counterclockwise rotation of the lever 82. The rotation is sufficient for the link arm 85 to move the traveler block 56 forwardly toward the bracket 49 through its full distance of travel.

When the coin has been received by the machine, the linkage to the shaft 77 is such that the shaft 77 will be rotated back to its original position as the delivery plate 72 is returned by spring action to its original position, thereby returning the roller 81 to the position illustrated in FIG. 5. A loose chain 86, extending between the lever 82, causes the outer arm of the lever 82 to follow the lever 81 and therefore the lever 82 is also returned to its original position as illustrated in FIG. 5. The return of lever 82 returns the traveler block 56 to its original position. This operation completes a cycle of the machine by which an article or item can be dispensed from one of the magazines 115, as will be more fully explained hereinafter.

Carried by the supporting frame in the central portion of the housing 10 is an upstanding transversely extending magazine carrying frame which includes a pair of upstanding parallel stanchions 90 and 91 which are formed from flat sheet metal strap material, the stanchions 90 and 91 being bent outwardly at their lower ends to provide the bases 92 and 93, respectively. The bases 92 and 93 are secured, respectively, to the central portions of the support bars 44 and 46. A plurality of parallel, vertically spaced, horizontally disposed low, middle and upper ribs 94, 95 and 96 extend between the upstanding stanchions 90 and 91, while a diagonally extending brace 97 extends between a corner formed by the junction of the stanchion 90 and the rib 94 and the junction formed by the stanchion 91 and the upper rib 96. The stanchions 90 and 91, however, extend above the rib 96.

The ribs 95, 95 and 96 extend transversely outwardly beyond the stanchions 90 and 91 in both directions and are provided at their end portions with sleeves 97a, 97b, 97c, 97d, 97e and 97f. The sleeves 97a, 97b, 97c, 97d, 97e, and 97f are slidably received by the end portions of the ribs 94, 95 and 96 so that they may be moved inwardly and outwardly, as desired. The outer end portions of these sleeves are provided with bearings 98a, 98b, 98c, 98d, 98e and 98f. The bearings 98a, 98c and 98e are generally in vertical alignment and receive for rotation a vertically disposed idler shaft 99. The bearings 98b, 98d and 98f are generally in vertical alignment and receive for rotation a vertically disposed indexing shaft 100. The inner end portions of the sleeves 97a, 97b, 97c, 97d, 97e and 97f are respectively provided with upstanding bearing tabs 101a, 101b, 101c, 101d, 101e and 101f against which respectively abut set screws 102a, 102b, 102c, 102d, 102e and 102f, the set screws 102a, 102c and 102e threadedly protruding through the stanchion 90 and the set screws 102b, 102d and 102f threaded protruding through the

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stanchion 91. Each of the set screws 102a, 102b, 102c, 102d, 102e and 102f engages a complimentary tab 101a, 101b, 101c, 101d, 101e, 101f, so that, upon rotation of a set screw, the corresponding tab will be urged outwardly or permitted to be moved inwardly. Therefore, the distance between the shafts 99 and 100 may be adjusted, as desired. Furthermore, the position of the shafts 99 or 100 may be altered slightly with respect to the vertical.

Fixed to the idler shaft 99, immediately above the bearing 98a, are a pair of lower sprockets 103a and 104a. The shaft 100 is provided with similar sprockets 103b and 104b, immediately above the bearing 98b. Immediately below the bearing 98e, the shaft 99 is provided with a pair of spaced sprockets 103c and 104c. The shaft 100, immediately below the bracket 98f, is provided with a pair of similar sprockets 103d and 104d.

A continuous flexible metal lower belt 105, provided with a row of lower spaced holes 106 and a row of upper spaced holes 107, is passed around the sprockets 103a, 104a and the sprockets 103b and 104b so that the teeth of the sprockets 103a and 103b protrude into appropriate holes 106 in the lower row of holes while the teeth of the sprockets 104a and 104b protrude through the appropriate holes 107 in the upper row of holes. Thus is provided a lower flexible metal belt 105 which functions as a conveyor and is capable of movement along its path of travel upon rotation of the shaft 100. A similar upper belt 108, aligned vertically with belt 105 and provided with an upper row of holes 109 and a lower row of holes 110, is disposed around the sprockets 103c and 104c and 103d, 104d. It is now seen that I have provided continuous steel belts 105 and 108 having transverse straight front flights and transverse straight rear flights, parallel to each other. Since the sprockets 103b, 104b, 103d and 104d are carried by the same shaft 100, these sprockets will drive the belts 105 and 108 in synchronization or unison with each other for conveying, i.e., indexing the magazine 115.

The belts 105 and 108 are provided along their outer surfaces with vertically disposed, juxtaposed, article carrying, tubular magazines 115, best seen in FIGS. 2 and 4. Vertically aligned single bolts 116, passing through the belts 105 and 108 into the central portions of back 120 of each magazine 115 secure that magazine 115 in place. Spacer elements 118 between the belt 108 and the magazine 115 and between the belt 105 and the magazine 115 space the magazine 115 outwardly of the belts so that the belts do not interfere with the movement of the magazines 115 in a rotary path, upon simultaneous movement of the belts 105 and 108 by the rotation of the indexing shaft 100.

Each of the magazines 115 is a stamped sheet metal member formed as a channel so as to provide the flat rectangular back 120, to the edges of which are integrally connected a pair of parallel, outwardly extending sides 121. The outer edges of the sides 121 are provided with inwardly turned flanges 122 which protrude toward each other but do not connect and, therefore, provide an open ended slot therebetween. The lower ends of the sides 121 protrude below the lower ends of the flanges 122 and the back 120 and are provided with horizontal, parallel, article carrying, inwardly directed, opposed lower flanges 123 provided with an open slot therebetween. Extending from a cross strap 128 on the lower ends of flanges 123 is a resilient, coiled spring 129 which yieldably arrests movement of the articles out of the magazine 115.

The magazines 115 terminate below the lower belt 105 in a common horizontal plane such that the lower end of the back 120 of each magazine 115 terminates above the plane of travel of the outer arm 64 of the ejector finger 62, while the flanges 123 of each magazine 115 terminate below the tip of the outer arm 64. In its rearmost position, the traveler block 56 supports the ejector finger 62 in a position transversely midway between the shafts 99 and 100 and rearwardly of the

front flight of magazines 115; however, upon outward movement of the transfer block 56, the leading edge or tip of the outer arm 64 is moved along a prescribed path to a position adjacent the path of travel of the flanges 122 of the magazines 115 in the forward flight of magazines 115.

Each of the magazines 115 carries a plurality of articles 130 stacked one on top of the other therewithin. The lowermost article 130 is carried by its edges on the flanges 123 and is of such height that its upper surface is below the lower edges of the flanges 122 and the back 120. Therefore, assuming that a selected magazine 115 has been indexed by belts 105, 108 to a position along the centerline in the front flight so that the slot between flanges 123 thereof is aligned with the ejector finger 62, the forward movement of the finger 62 in its path of reciprocation will cause the outer arm 65 to engage forwardly and discharge the lowermost article 130 out beneath the front flanges 122 and off of the flanges 123. Thereafter, the next lowermost article 130 will drop, by gravity, onto the flanges 123 so as to take the place of the dispensed article 130. Upon rearward movement of the carriage 56, the curved back edge 65 of the ejector finger 62 will pass along the lower surface of the article 130, then positioned on the flanges 23, and, therefore, be pivoted in a counterclockwise direction until the carrier 56 has moved the ejector finger 62 rearwardly a sufficient distance to clear the lowermost article 130 in the selected magazine 115. It is, therefore, seen that any one of the lowermost articles 130 in any one of the stacks of articles 130 in any one of the magazines 115 may be selectively positioned so that it may be discharged forwardly from the magazine 115.

As seen in FIG. 3, an S-shaped, open ended, tubular discharge chute 140 having an upper receiving mouth 139, positioned in horizontal alignment in front of the selected magazine and slightly forward of the path of the ejector finger 62, is carried by the front panel 28. This S-shaped magazine 140 has a lower discharge or access opening 141 which protrudes through an opening in the panel 28. Thus, upon the discharge of an article 130 from a selected magazine 115, the article 130 passes into mouth 139 and thence through chute 140 to come to rest at the access opening 141 and is available to the customer.

Above the mouth 139, the divider bar 30 is provided with a shield 138 which protrudes inwardly to shield from view the mouth 139 so as to discourage a person from tampering with the mechanism.

The shaft 100 protrudes above the upper end of the magazines 115 and is provided with a radially received rotatable pin 142 which protrudes outwardly of the upper end portion of the shaft 100 on both sides. A rotatable shaft 143 provided with a bifurcated collar 144 at its lower end is aligned axially with the shaft 100 so that the collar 144 is removably received over the end of shaft 100 and pin 142 is received in the slots of the bifurcated collar 144. The shaft 143 protrudes loosely through a bearing 145 carried by the top panel 32, the upper end of the shaft 143 being provided with a rotate handle 146 outwardly of the panel 32. Thus, upon rotation of the handle 146, the shaft 100 will be rotated for positioning a selected magazine 115 in a discharge position in front of finger 62.

Upon the pivoting of the top about its piano hinge 37, the bifurcated collar 144 will readily be removed from the shaft 100 so that the person servicing the machine may install articles 130 in the various magazines. As the top is returned to its closed position, the handle 146 may be manipulated sufficiently to again align the collar 144 with the shaft 100 so that the collar 144 may be received on the upper end portion of the shaft 100.

Above the bearing 98f and below the upper end of the shaft 100 is a cam wheel 150, best seen in FIG. 4. The function of this camming wheel 150 is to assure proper

alignment of a selected magazine 115 with the ejector finger 62 when the magazine has been indexed to a discharge position. This cam wheel 150 has recessed portions approximately every 90 degrees thereabout. A cam follower 151 in the form of a roller is adapted to ride along the periphery of the cam 150 and is carried by one end of a slide bar 152, the slide bar 152 being mounted for limited movement on a pair of opposed inwardly turned flanges 153 and 154 on the upper ends of the stanchions 90 and 91, respectively. The slide bar 152 is provided with aligned elongated slots 155 which receive bolts 156, the bolts 156 protruding upwardly from the flanges 153 and 154. Thus, the slide bar may move laterally to the extent permitted by the slots 155.

A coiled spring 160 secured by one end to the central portion of slide bar 152 and secured by its other end to the upstanding end of one of the bolts 156 biases or resiliently urges the bar 152 toward the camming wheel 150 so as to maintain cam follower 151 in contact with the periphery of the camming wheel 150. The arrangement of the camming wheel 150 and the sprockets 103b, 104b, 103d, 104d with respect to the belts 105 and 108 is such that the rotation of shaft 100 through 90 degrees will advance the belts 105 and 108 through the distance from the centerline of one magazine 115 to the centerline of an adjacent magazine 115. The valleys or recesses in the camming wheel 150 are such that when the cam follower 151 is positioned in one recess or valley, the centerline of one magazine 115 is aligned with the centerline C and the ejector finger 62 and with the centerline of the tubular discharge chute 140. Therefore, the cam assembly centering mechanism hereinabove described causes an operator to align a selected magazine 115 properly with the discharge finger 62 and the chute 140 before actuating the machine.

As an alternate for the cam assembly centering mechanism or for operation in conjunction therewith, I have provided a spring detent centering mechanism such as illustrated in FIG. 6. This alternate centering mechanism includes a flat guide bar 200 disposed inwardly adjacent and parallel to the front or rear flight of belt 105 or 108. In the present embodiment, the guide bar 200 is disposed inwardly adjacent the front flight of the upper belt 108, being supported by L-shaped brackets 201 secured to a crossbar 202 carried by the flanges 153, 154 of stanchions 90 and 91. If both types of centering mechanisms are employed, the bolts 156 and slide bar 152 could be mounted on top of brackets 201.

The central upper edge portion of guide bar 200 carries a pair of spaced arcuate leaf springs 203 and 204, the ends of which are received in slots in the guide bar 200. Thus, the central portions of the leaf springs 203, 204 stand above the upper edge of the guide bar 200, curving upward and then downwardly from one end to the other.

Along the centerline of the magazine 115, the belt 108 is provided with a plurality of evenly spaced inwardly projecting stub shafts 205, corresponding in number and spacing to the number and spacing of the magazines 115. The stub shafts 205 are disposed in a horizontal plane at a height to ride on the upper edge of guide bar 200 and depress the leaf springs 203 and 204 when passing thereover. The space between the leaf springs 203 and 204 is sufficient to receive one of the stub shafts 205. Therefore, the leaf springs 203, 204 form resilient detents which position properly the magazines 115 when a stub shaft 205 is between the leaf springs 203 and 204.

In FIGS. 7 through 11 are illustrated various magazine and chute modifications of the present invention. In FIGS. 7 and 8, it will be seen that a modified form of magazines 115, namely, magazines 215, may be employed in place of the magazines 115. The magazines 215 are particularly for the purpose of supporting in stacked relationship, long narrow articles (not shown) which are relatively flexible and, therefore, do not lend themselves well to being discharged by finger 62. Bags of peanuts

are a good example of the type of articles for which the magazine 215 is adapted to receive and dispose.

Referring to FIG. 7, it will be seen that the magazine 215 is quite similar to magazine 115, having an open front tubular member, rectangular cross-section and having a vertical slot through its length along its front portion. In other words, the magazine 215 is a channel member having a flat back 220, a pair of parallel sides 221 and inwardly turned opposed front flanges 22. The front flanges 222 terminate above the lower end of the magazine to facilitate discharge of an article.

The dispensing mechanism includes a rotatable discharge plate 223 disposed transversely at the lower end of the magazine 215, and provided with oppositely extending trunnions 224 which are journaled by the sides 221. The discharge plate 223 is essentially balanced on the trunnions 224 and is L-shaped in cross-section, having a flat rectangular article carrying base 225 and flanges 226 at its side edges which respectively extend in the direction of intended rotation of base 225.

The trunnions 224 are aligned, being midway between and parallel to flanges 226 and protrude from the ends of base 225. Thus the trunnions 224 establish a transverse axis of rotation for the discharge plate 223. The plate 223, of course, is slightly smaller than the inside cross sectional dimensions of the magazine 215.

On the outer end of one of the trunnions 224, outwardly of the chute 215, is a parallelogram shaped, flat metal positioning plate 227, having curved corners. The end of trunnion 224 is secured to the central portion of plate 227. Above the positioning plate 227 is an L-shaped leaf spring 228, secured by its upper end, via bracket 229, to a side 221. The lower arm of spring 228 extends horizontally over the trunnion 224 and rides against the perimeter of the positioning plate 227 so that the plate 227 tends to come to rest when either of the two bases thereof are contiguous with that arm of spring 228. Thus, there is a tendency to arrest the rotation of the discharge plate 223, only when it is horizontal.

For rotating the discharge plate 223 through 180 degrees upon each cycle of the machine, the positioning plate 227 is provided with a pair of diagonally spaced rotate pins 230 which protrude sidewise from the plate 227 at the extreme corners of the plate 227. Rearwardly of the path of travel of the magazines 215 is a forwardly extending ejector bar 231 which is carried by the travel block 56 in place of the finger 62. The travel block 56 simply holds the bar 231 aligned with the upper pin 230 of any one of magazines 215 which is positioned in the discharge position, whereby upon forward movement of the travel block 56, the end of the bar 231 will pass along one side 221 of magazine 215 and urge the pin 230 forwardly for a sufficient distance that the spring 228 urges the positioning plate 227 the remainder of its 180 degrees rotary travel.

Upon rotation through 180 degrees, the base 225 and the rear upwardly extending flange 226 urge the lowermost article forwardly and downwardly out of magazine 215, as the flange 226 prevents the next lowermost article in that stack from being discharged. The stack of articles (not shown), however, shifts downwardly when the flange 226 clears the magazine 215, whereby a new lowermost article rests upon the base 22, in position for discharge when the cycle is repeated.

Below the magazine 215 in a position to receive the discharged article and convey the same to a position for access by a customer is a conventional tubular discharge chute 240 which is substituted for chute 140. Chute 240 is carried by a panel 328, the panel 328 being substituted for the panel 28 and channels the article to a position for access by a purchaser.

In FIGS. 9, 10 and 11 is another modified form of magazine having a suitable mechanism for discharging soft items, such as chocolate candies in packages or the like. These items or articles do not lend themselves readily

to stacking since the chocolate tends to melt in hot weather and the weight of such articles will deform the lowermost articles. The mechanism illustrated in FIGS. 9, 10 and 11 includes a plurality of vertically spaced, pivotally mounted cantilever type trays 330 carried by the back 320 of each magazine 315. It will be understood that the magazines, such as magazine 315, are substituted as shown in FIG. 9 for the magazines 115 on belts 105 and 108.

Each magazine 315 includes a pair of parallel sides 321 extending from the edges of back 320 and may or may not include inwardly turned flanges, such as flanges 122. The magazine 315, however, has an open bottom for the free fall of the articles into a delivery chute 340, similar to the delivery chute 240.

Between the upper edge of belt 105 and the lower edge of belt 108, the back 320 of each magazine 315 is provided with a plurality of horizontally disposed, vertically spaced, vertically aligned slots 323 through which the rear end portions of the trays 330 respectively project.

Each tray 330 includes a flat rectangular base 331 and opposed parallel, downwardly turned side flanges 332 depending from the side edges of base 331. The lower edge of each flange 332 diverges inwardly from the front edge of the base 331, as seen in FIG. 11, and then curves abruptly downwardly and inwardly in an arcuate path to provide a slide surface 333 which is the arc of a quadrant of a circle, the center of which terminates of an elongated slot 334 disposed perpendicular to base 331.

Inwardly of the slide surface 333, as viewed in FIG. 1, the flange 332 is provided with a notch 335 slightly larger than the thickness of the back 320. The width of the tray adjacent notch 335 is at a maximum but is less than the width of the slot 323. Therefore, the tray 330 may be freely inserted in the slot 323 so that the notches, such as notch 335, receive therein an edge 338 of back 320 defining the lower portion of slot 323.

When the tray is disposed horizontally, a pin 336 passed through appropriate holes in sides 321 passes adjacent the front surface of back 320 across the central portion of slot 323, being received through slots such as slot 334. The length of slot 334 exceeds the depth of notch 335 and the pin 336 is so disposed that the pin 336 is in the upper portion of the slot 334 when notch 335 is received on the lower edge defining slot 323. Therefore, when the tray 331 is lifted so that the pin 336 is disposed in the lower portion of slot 334, the notch 335 is freed from its engagement, whereby tray 330 pivots, from an article supporting position, as shown in full lines in FIG. 11, to its article release position, as shown in broken lines in FIG. 11.

It is to be understood that the rear end portion of the tray 330, when the tray is carried on pin 336, protrudes inwardly beyond the back 320 and that the distance from the inner end of the tray 330 to the pin 336, regardless of its position with respect to the slots, such as slot 334, exceeds the distance from the pin to the upper edge 339 defining slot 323. Furthermore, since the tray in its article supporting position is supported in cantilever fashion, and the forward portion of the tray 330 is substantially greater in area and heavier than the rear portion, there is a tendency of the tray 330 to pivot by gravity to its broken line position in FIG. 11. When, however, the tray 330 is in its article supporting position, i.e., horizontal, as shown in FIG. 11, the rear portion of the platform protrudes rearwardly sufficiently that it may be engaged for lifting and subsequent pivoting of the tray 330, as aforesaid.

For sequentially engaging the plurality of trays 330 so as to drop the lowermost tray and then the next lowermost tray, etc., upon repeated cycling of the machine, I have provided a lug or traveler 350 for each magazine 315, the lug 350 being slidably carried on the straight central portion of a traveler rod 351. The central position of the rod 351 is disposed parallel to and rearwardly of the back 320 while the upper and lower ends of the rod 351 are

bent toward and secured to the back 320, the lower end being secured to back 320 above belt 105 and the upper end being secured to back 320 below the belt 108. Therefore, the rod 351 is carried at all times by its magazine 315 and does not interfere with the indexing of the magazines 315.

The lug or traveler 350 has a spring keeper 352 secured to its upper surface, the purpose of which is to prevent the lug 350 from sliding downwardly while permitting the lug 350 to be moved upwardly on rod 351. Depression of the spring keeper 352 permits the lug 350 to be returned to its original position at the lower end of the rod 351. The spring keeper 352 is formed from a rectangular sheet of spring steel drilled to provide a hole 353 adjacent one end thereof, the hole 353 being slightly larger than rod 351. The keeper 352 is bent at its central portion and the portion without the hole is fixed to the upper surface of lug 350 whereby the remaining portion of the spring keeper 352 diverges upwardly and rearwardly from the lug so that hole 353 is angularly disposed, receiving rod 351. Therefore, the upper edge defining hole 353 tends to cut into the rod 350 and prevent the downward movement of the lug 350 when the spring keeper 352 is depressed.

Each rod 351 passes outwardly adjacent the inner ends of all trays 320 on its associated magazine 315 and lug 350 extends forwardly so as to engage from the bottom, lift and permit tilting of all trays 320 as the lug 350 passes thereby in an upward direction.

Rearwardly of the rod 351, the lug 350 is bifurcated and receives a gravity bias lever 354, seen best in FIG. 11. Lever 354 is pivoted about a pivot pin 355 and its inner weighted arm engages the lug above the pin 355 whereby the outer arm protrudes inwardly and is free to be pivoted downwardly, but not upwardly.

In the central portion of the machine, aligned with the discharge chute 340, forwardly of the stanchions 90 and 91 but rearwardly of the front flight of belts 105, 108, is a vertically disposed tubular rod 356, which is rectangular in cross-section and has an axial slot throughout its length. Brackets 357 and 358 secure the rod 356 to the rib 94 and a top rib 357 similar to rib 202. Thus the hollow rod 356 is fixed in a vertical position behind the front flight of magazines 315.

Slidably carried within rod 356 is a T-shaped, lug lifter 359, the shank of which protrudes forwardly through the slot in rod 356 and is provided with a plurality of spaced, forwardly extending lifter fingers 361 which protrude into the path of travel of the rear arm of lever 354. The space between the upper surfaces of adjacent lifter fingers 361 is approximately equal to the space between the adjacent trays 330. A slot 362, seen in FIG. 10, which is longer than the distance between the fingers 362 is provided in one edge of the lug lifter so that a set screw 363 threadedly received by the rod 356 protrudes into the slot. Thus, the slot 362 and set screw 363 limit the vertical movement of the lug lifter 360.

Depending from the lower end of lug lifter 360 is an actuator arm 364, the lower end of which carries a roller cam follower 365. Aligned with the cam follower 365 and carried by the traveler block 56, in place of and substituted for the finger 62, is a straight camming bar 366 having a concaved, inwardly and upwardly inclined camming surface 367. The thickness of camming bar 366 exceeds the distance between trays 330; therefore, upon each cycle of the machine when the camming bar 366 is moved forwardly and then rearwardly on the traveler block 56, the follower 365 is lifted by the camming surface 367 through a distance slightly in excess of the distance between the upper surfaces of fingers 361 and then returned to its normal position.

Normally, the lug lifter 360 is in the position shown in FIG. 9 so that one finger 361 is slightly below lever 354 of the magazine 315 which has been indexed to a discharge position. The lug 350 of that magazine 315 is

slightly below the rear portion of the lowermost, horizontally disposed tray 330 of that magazine 315, as shown in FIG. 9. Since the lug 350 can only travel upwardly (except when being reset, the finger 361, next below lug 350, engages lever 354 and lifts the lug 350 past one of the trays 330 as the follower 365 is lifted, thereby lifting that tray 330 and permitting it to tilt to its discharge position. When the lug lifter 360 is lowered, the next finger 361, above the finger 361 which lifted the lug 350, passes by the lever 354, simply rotating the lever 354 without moving the lug 350. Therefore, the lug 350 is positioned to trip the next lowermost tray 330 upon the next cycle.

It is now seen that the stepwise lifting of the lug 350 causes sequential tripping of the trays 330 from the bottom upwardly until all trays 330 have been pivoted downwardly. When each tray 330 is tripped, it permits the article carried thereby to fall into chute 340 and be positioned by the chute 340 for access by the customer.

Since lugs 350 are individual to each magazine 315, one magazine 315 may be empty of articles, another magazine 315 filled with articles, and still another partially filled, without affecting the fact that when a filled or partially filled magazine 315 is indexed into position over the discharge chute 340, the lug 350 will trip the lowermost horizontal tray 330 in that magazine 315 so as to dispense the article thereon. When reloading, however, it is important that each tray 330 be positioned horizontally only if it is to carry an article and that the tray 330 be loaded from the top downwardly, leaving all trays which are not loaded in this discharge position. Furthermore, the lug 350 of each magazine 315 should be positioned to be lifted into engagement with the lowermost loaded tray 330 and no lower.

If desired, magazine assemblies of magazines 215 and 315 may be interspersed indiscriminately on belts 105, 108, in which case the traveler block 62 is provided with both a bar 366 along the centerline C and a bar 231 to one side thereof and disposed forwardly of the bar 366. In this way, the lug lifter 360 is cycled harmlessly when a magazine 215 is in the discharge position and the bar 231 is cycled harmlessly when a magazine 315 is in the discharge position.

The machine thus described is quite inexpensive to manufacture and is easily converted for dispensing a variety of articles. The mechanism is so simple that substantially anyone can detect the reason for a malfunction. Most of the mechanism can be viewed through the window or panel 29, including the magazines thereof, and therefore the machine need not be opened in order to ascertain that a given magazine is empty or about to become empty. On the other hand, the safe guards are sufficient that no appreciable loss of merchandise through "cheating" of the machine should be encountered.

It will be obvious to those skilled in the art that many variations may be made in the embodiments chosen for the purpose of illustrating my invention without departing from the scope thereof as defined by the appended claims.

What is claimed as invention is:

1. A vending machine comprising a housing having a bottom and a window therein, a supporting frame mounted on said bottom, a main frame mounted on said supporting frame, a pair of vertically disposed shafts mounted on opposite sides of said main frame, means for rotating one of said shafts, sprockets on said shafts, a pair of vertically spaced aligned endless belts carried by said sprockets, a plurality of juxtaposed vertically disposed magazines removably mounted on said belts and extending outwardly therefrom to provide a front flight of magazines for passing across said machine and in front of said window, slide bar carried by said supporting frame between said shafts, a traveler block movably carried by said slide bar inwardly of said front flight of magazines for cyclic movement toward and away from said front flight, and a discharge member carried by said traveler block for the discharge of articles forwardly one at a

time from a selected magazine disposed in front of said discharge member.

2. The structure defined in claim 1 wherein said magazines each including at its lower end a pair of opposed flanges spaced from each other for supporting by its edges the lowermost article in a stack of articles in that magazine, and wherein said discharge member including an ejector finger pivotally mounted for rotation about a horizontal axis and gravity urged into a forwardly and upwardly extending position, said ejector finger being so positioned that its upper end portion passes between said flanges and, engages and discharges forwardly the lowermost article in the stack of articles in said selected magazine as said traveler block is moved forwardly, said finger being adapted to pivot and thereby pass below the lowermost article in said stack of articles when said traveler block is moved rearwardly for returning to its original position.

3. The structure defined in claim 1 wherein said magazines each includes a pair of parallel sides, a discharge plate rotatably carried by said sides for rotation about a transverse axis and pivot means for rotating said plate and wherein said discharge member includes a bar for engaging said pivot means for causing said pivot means to pivot said plate through approximately 108 degrees upon each reciprocation of said discharge member.

4. A vending machine for dispensing merchandise from a selected stack of a plurality of individual stacks of merchandise, including a movable endless flexible means, separately spaced independent supports on said endless flexible means for supporting separate independent stacks of merchandise, a dispensing station adjacent the path of travel of said endless flexible means, means at said station for dispensing an article of merchandise from a stack of merchandise at said station and means for moving said flexible means to present a selected stack of merchandise to said station.

5. The vending machine as set forth in claim 4 in which the flexible means includes an endless belt.

6. The vending machine as set forth in claim 4 in which the flexible means includes an endless metallic, transversely rigid belt.

7. The vending machine as set forth in claim 4 in which the independent supports are tubular magazines separately bolted to the flexible means in spaced relation.

8. The vending machine as set forth in claim 4 in which the independent supports are tubular magazines separately bolted to the flexible means in spaced relation with respect to each other and outwardly spaced from the flexible means.

9. The vending machine as set forth in claim 5 in which the independent supports are tubular magazines separately bolted to the endless belt in spaced relation.

10. The vending machine as set forth in claim 6 in which the independent supports are tubular magazines separately bolted to the endless metallic, transversely rigid belt in spaced relation with respect to each other and outwardly spaced from the belt.

11. A vending machine for dispensing merchandise from a selected stack of a plurality of individual stacks of merchandise, including a pair of vertically spaced coplanular flexible means, vertically mounted independent stack supporting means engaged between and supported in spaced relation by said flexible means, a dispensing station adjacent one of said endless flexible means, and means for simultaneously moving said flexible means to selectively

present one of said stack supporting means to said dispensing station.

12. The vending machine of claim 11 including dispensing means at said dispensing station, within the path of travel of said one of said flexible means, operable to discharge outwardly from said one of said flexible means, merchandise from a stack of merchandise at said dispensing station.

13. The vending machine of claim 11 in which both of said flexible means are endless metallic transversely rigid belts.

14. The vending machine of claim 11 in which the means for simultaneously moving said flexible means in a manually rotatable shaft including drive pulleys engageable with said flexible means.

15. The vending machine of claim 14 in which both of said flexible means are endless metallic transversely rigid belts.

16. The vending machine of claim 14 in which the means for simultaneously moving said flexible means is a manually rotatable shaft including drive pulleys engageable with said flexible means.

17. The vending machine of claim 16 in which the means for simultaneously moving said flexible means is a manually rotatable shaft including drive pulleys engageable with said flexible means.

18. A vending machine comprising a housing having a bottom and a window therein, a supporting frame mounted on said bottom, a main frame mounted on said supporting frame, a pair of vertically disposed shafts mounted on opposite sides of said main frame, means extending through said housing for rotating one of said shafts, sprockets on said shafts, a pair of vertically spaced aligned endless belts carried by said sprockets, a plurality of juxtaposed vertically disposed magazines carried on said belts and extending outwardly therefrom to provide a front flight of magazines for passing across said machine and in front of said window, a plurality of trays pivotally carried by each of said magazines and disposed one above the other, said trays being adapted to extend horizontally when in an article carrying position and extend generally downwardly in an article discharge position, detent means for each of said trays for holding the same in horizontal position, and lug means for sequentially engaging said detent means of a magazine when said magazine is in a discharge position to release successive ones of said trays when said lug means is actuated, a slide bar carried by said supporting frame between said shafts, and means operably connecting said slide bar with said lug means for actuating said lug means upon each cycle of said slide bar.

References Cited by the Examiner

UNITED STATES PATENTS

818,594	4/1906	Whitney	221—122 X
907,449	12/1908	Bock	221—277 X
1,038,236	9/1912	Tubergen	221—119 X
1,061,880	5/1913	Stewart	221—286 X
2,099,267	11/1937	Hackett	221—122 X
2,875,877	3/1959	Hoban	221—119 X
2,876,928	3/1959	Adams et al.	221—122
2,996,217	8/1961	Gabrielsen	221—90
3,002,602	10/1961	Gieben	221—122 X
3,104,028	9/1963	Brown	221—120

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