

Sept. 13, 1960

A. W. HOLSTEIN ET AL
VENDING MACHINE

2,952,384

Filed Dec. 28, 1956

7 Sheets-Sheet 1

FIG. 1.

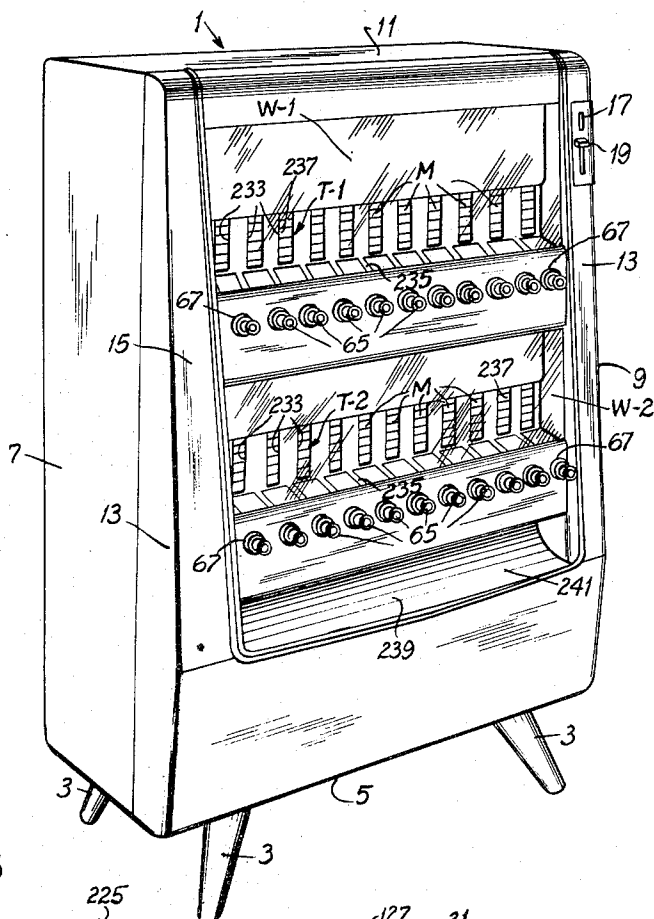
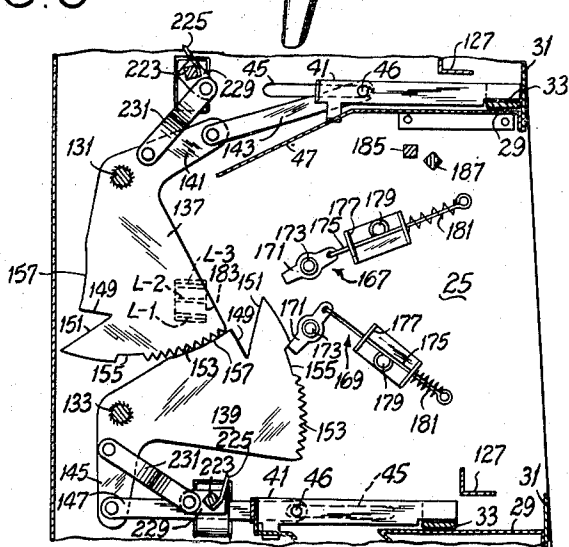


FIG. 8

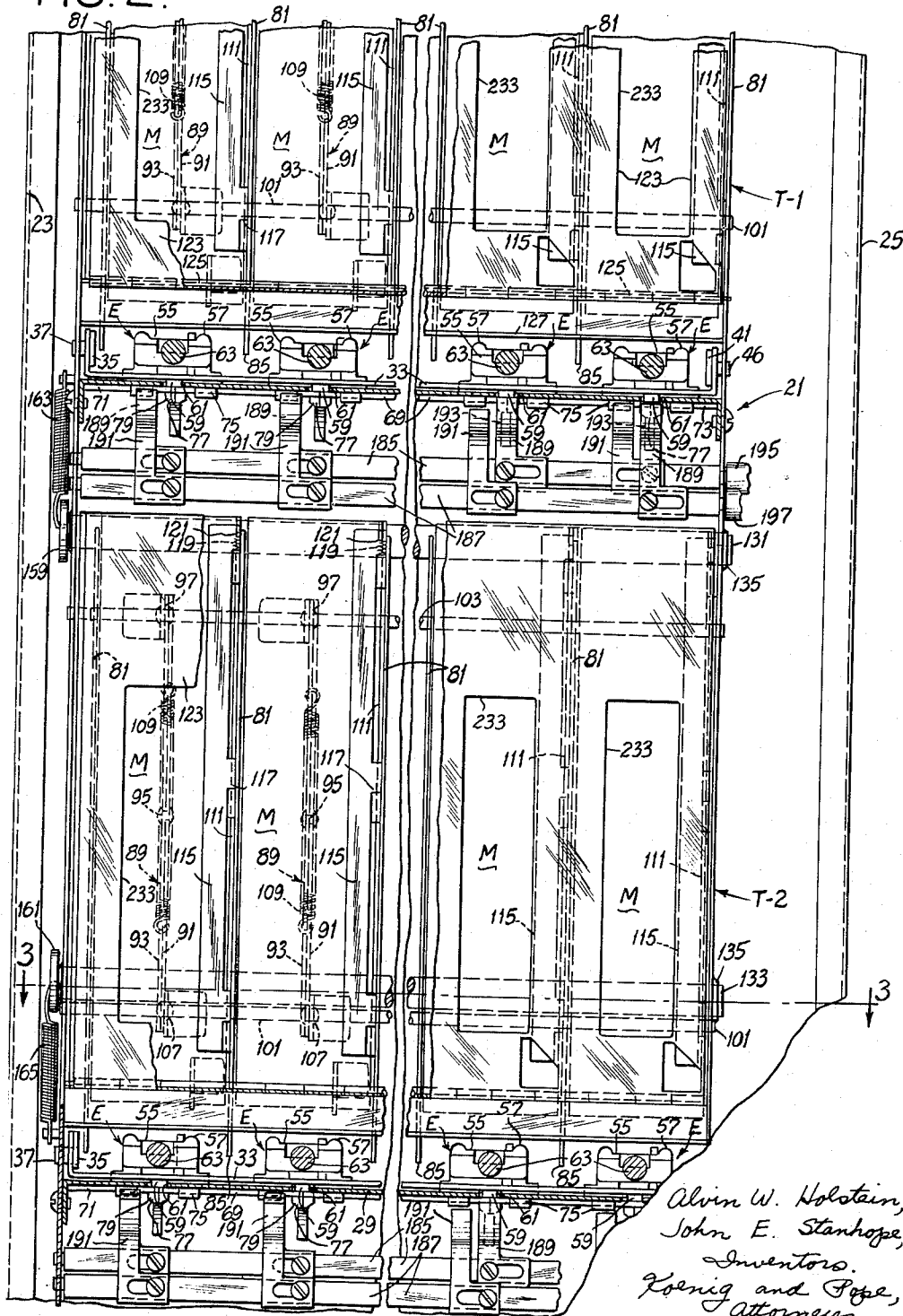


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FIG. 2.



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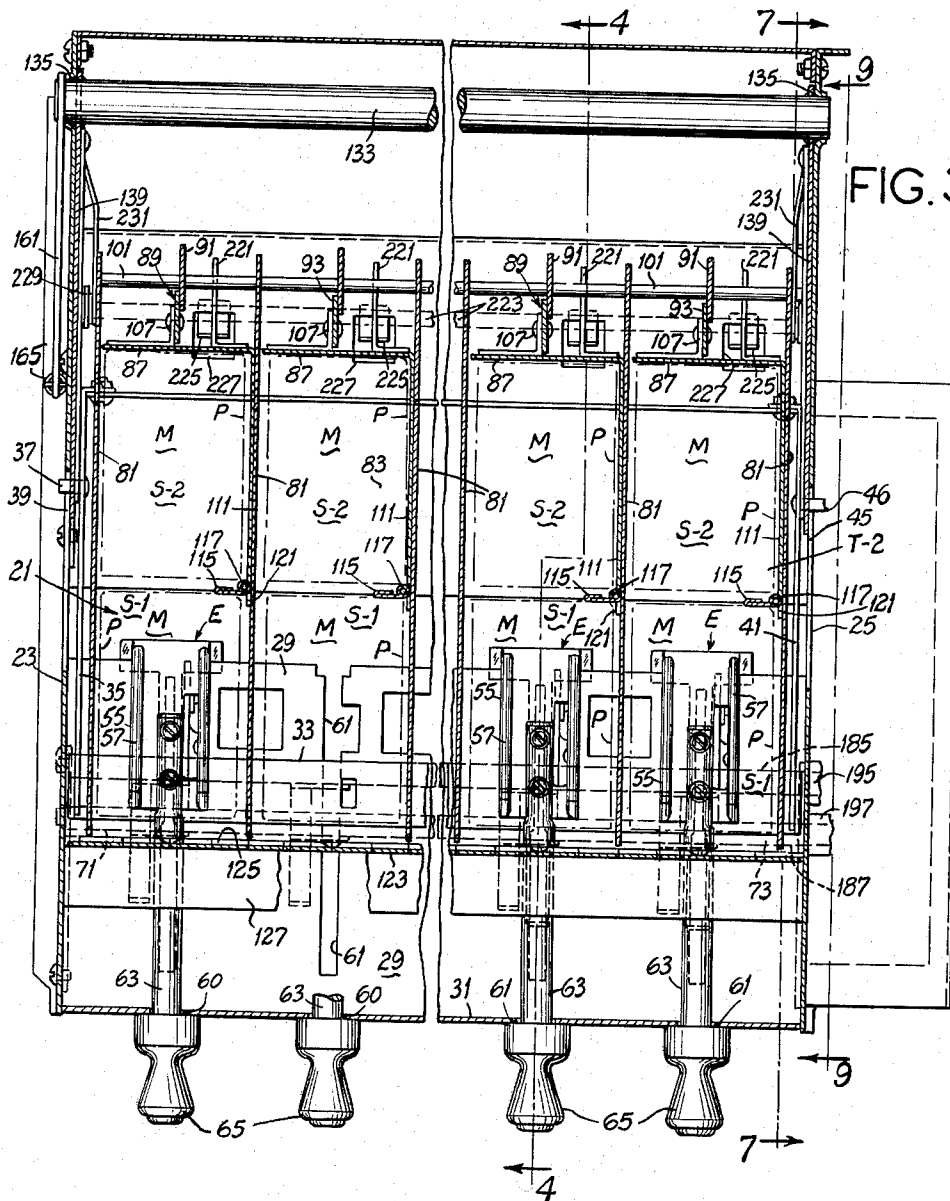


FIG. 3.

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FIG. 4.

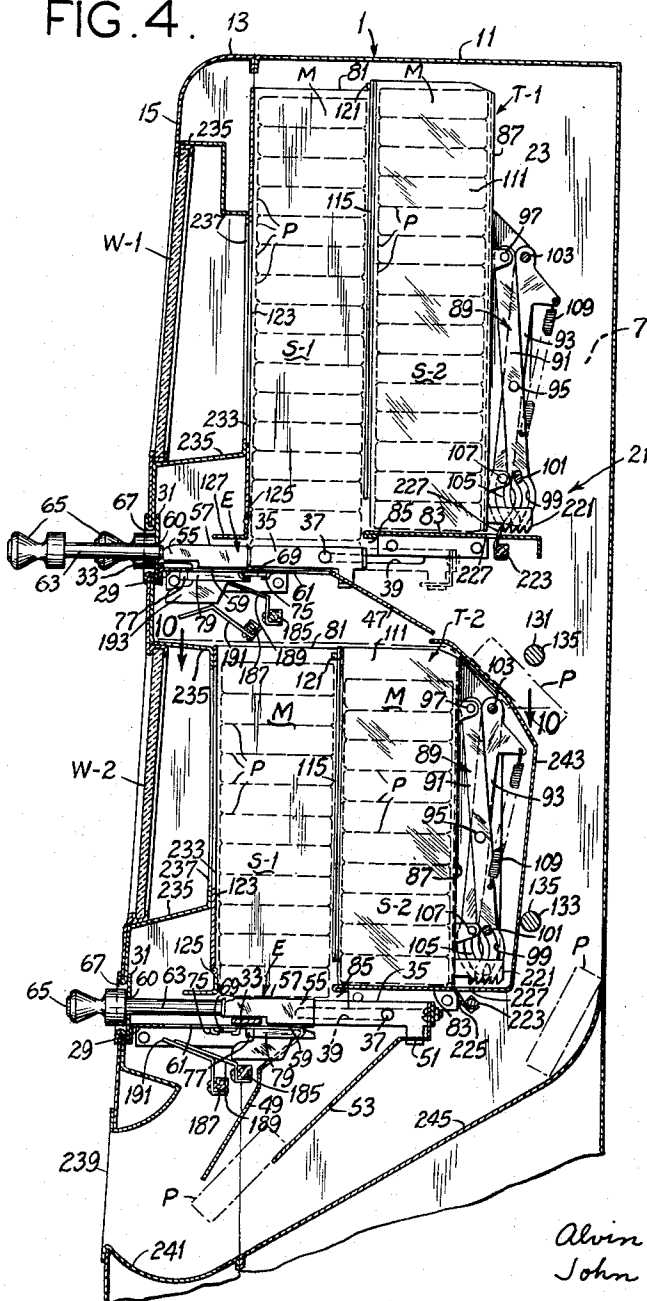
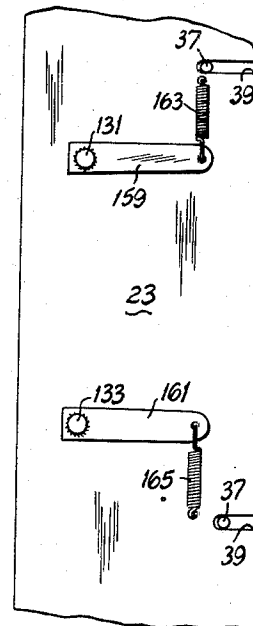


FIG. 5.



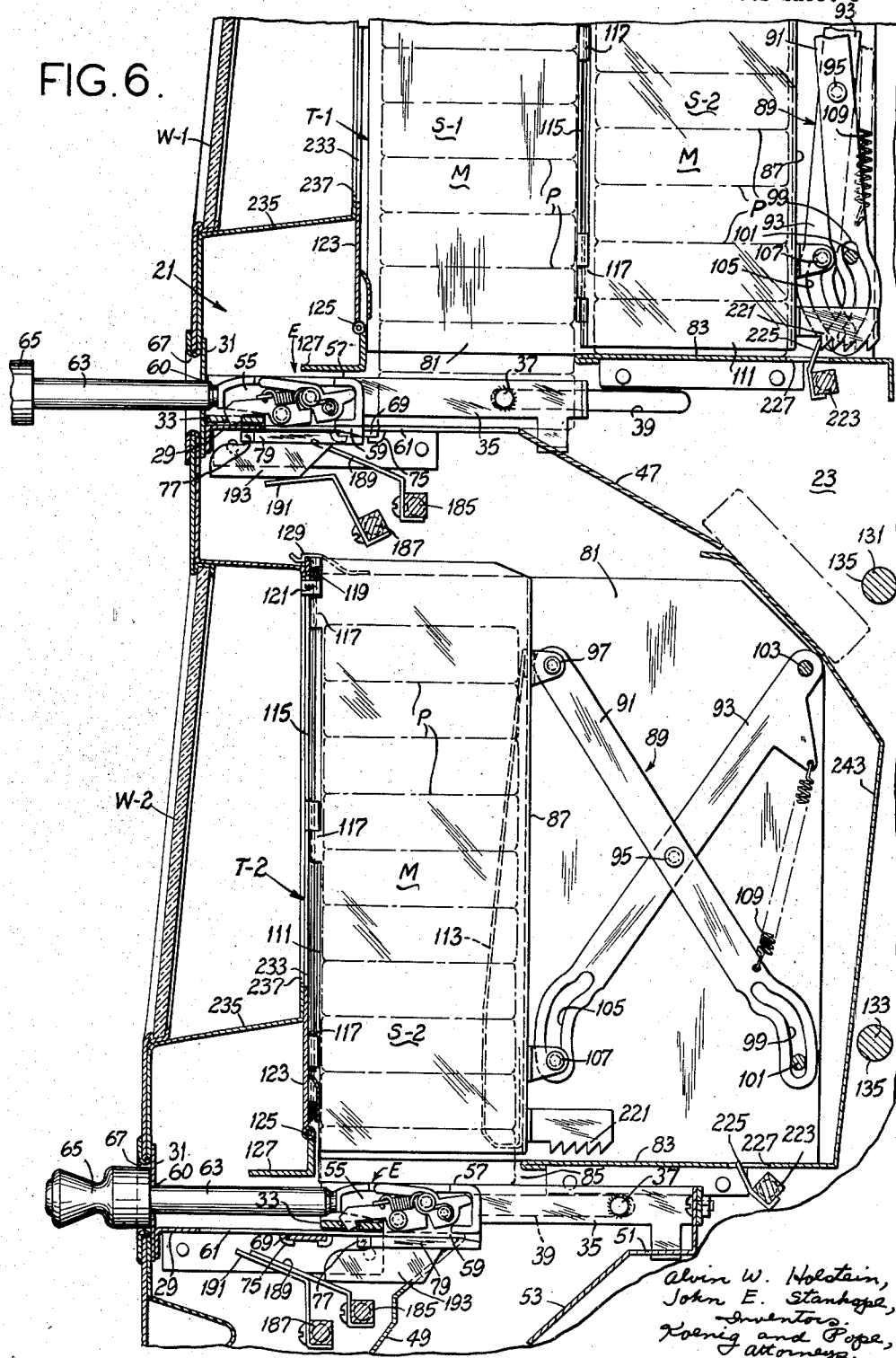
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FIG. 6.



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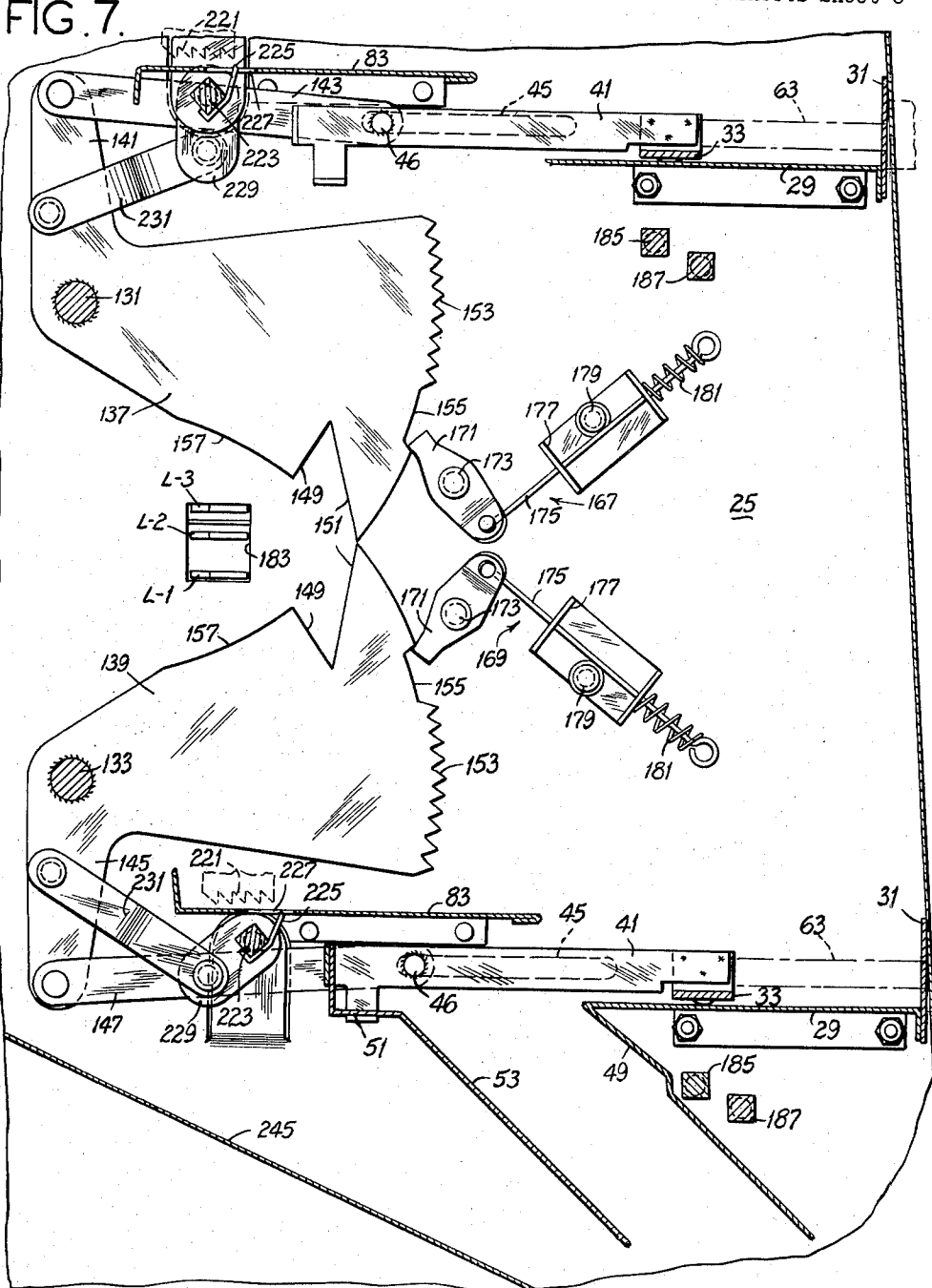
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FIG. 7.



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VENDING MACHINE

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Filed Dec. 28, 1956, Ser. No. 631,247

18 Claims. (Cl. 221-104)

This invention relates to vending machines, and more particularly to cigarette vending machines.

Among the several objects of the invention may be noted the provision of dispensing apparatus for a vending machine, and more particularly a cigarette vending machine, which is adapted to carry a relatively large number of different brands of cigarettes, and a relatively large number of packs of each different brand, and which despite its high capacity is relatively compact in size; the provision of dispensing apparatus of the class described wherein two tiers of magazines are provided, each magazine having an ejector, packs ejected from magazines in the upper tier dropping out to purchasers behind the magazines of the lower tier, and wherein the magazines, while being adapted to hold a relatively large number of packs, are relatively low in height so that the apparatus may be housed in a cabinet of relatively low height without having the packs delivered to purchasers at an unduly low level; the provision of dispensing apparatus of the class described in which each magazine is of a special construction adapted to hold a substantially vertical primary stack of packs and a substantially vertical reserve stack of packs behind the primary stack and which has means for pushing the reserve stack bodily forward to dispensing position when the primary stack is depleted in such manner that the reserve stack remains substantially vertical, as is desirable for display purposes; the provision of dispensing apparatus of this class in which each magazine is of such construction that it may be easily loaded with packs for both the reserve stack and the primary stack from the front of the apparatus; the provision of dispensing apparatus of the class described in which there is a special interlocking means between the two tiers which acts, upon operation of any ejector of one tier, to lock out of operation the ejectors of all the magazines of the other tier; the provision of dispensing apparatus of the class described which includes means whereby both tiers of magazines may be controlled by a single coin control mechanism, provision also being made for carrying packs of different prices in different magazines; and the provision of dispensing apparatus of the class described which is relatively economical to manufacture and reliable in operation. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

Fig. 1 is a view in perspective of a cigarette vending machine comprising a cabinet containing dispensing apparatus of this invention;

Fig. 2 is a front elevation of the dispensing apparatus per se, as it appears when a front door of the cabinet is removed, with parts of the dispensing apparatus broken away and shown in section;

Fig. 3 is a horizontal section taken on line 3-3 of Fig. 2;

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Fig. 4 is a vertical section taken on line 4-4 of Fig. 3, on a smaller scale than Fig. 3, and illustrating an ejector of one magazine of the upper tier pulled out, also illustrating certain reserve stacks in retracted position;

Fig. 5 is a fragmentary left side elevation of Fig. 3, on the scale of Fig. 4;

Fig. 6 is an enlargement of a portion of Fig. 4, with certain parts further broken away and shown in section, and showing the reserve stack in one of the magazines of the lower tier as having been pushed forward to dispensing position;

Fig. 7 is a vertical section taken on line 7-7 of Fig. 3;

Fig. 8 (Sheet 1) is a view which corresponds to Fig. 7, but on a smaller scale than Fig. 7, and showing a moved position of parts;

Fig. 9 is a view in side elevation taken on line 9-9 of Fig. 3;

Fig. 10 is an enlarged view taken on line 10-10 of Fig. 4, and showing a moved position of parts; and,

Fig. 11 is a section taken on line 11-11 of Fig. 10.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to the drawings, there is indicated at 1 in Fig. 1 a cigarette vending machine cabinet standing on legs 3. The cabinet has a bottom 5, left and right side walls 7 and 9 (left and right being as viewed from the front of the cabinet), a top wall 11, and a front door 13. The door 13 is entirely removable from the cabinet, any suitable means (not shown) being provided for holding it in place and locking it against unauthorized removal. The door has an inclined front panel 15. Shown at the upper right of the door are the usual coin slot 17 and coin return knob 19.

Housed in the cabinet is a dispensing apparatus of this invention designated in its entirety by the reference character 21. This dispensing apparatus comprises a frame including left and right side walls 23 and 25 which are mounted on the cabinet bottom 5. Located between the side walls 23 and 25 are upper and lower tiers T-1 and T-2, respectively, of magazines M.

Each tier may include eleven magazines, for example, making a total of twenty-two magazines for twenty-two different brands of cigarettes. Tiers T-1 and T-2 are substantially identical and a description of one will suffice for both. Each tier includes a forward horizontal shelf 29 which extends between the side walls 23 and 25. Fixed to the front of this shelf 29 is an upstanding vertical plate 31. On the shelf is a draw bar 33 which extends from one side wall to the other. This draw bar 33 is slidable on the shelf 29 transversely with respect to the length of the bar and in forward and rearward direction as regards the entire dispensing apparatus. Extending rearward from the left end of the draw bar is a horizontal arm 35 carrying a stud 37 slidable in a horizontal slot 39 in the left side wall 23. Extending rearward from the right end of the draw bar is a horizontal arm 41 carrying a stud 46 slidable in a horizontal slot 45 in the right side wall 25.

The shelf 29 of the upper tier T-1 has a rearward apron 47 sloping downward toward the rear of the apparatus. The shelf 29 of the lower tier T-2 has a downwardly extending rearward apron 49 inclined toward the front of the apparatus. Otherwise these shelves are the same. Extending between the arms 35 and 41 of the draw bar 33 for the lower tier T-2 is an apron 51 having a downwardly extending forwardly inclined portion 53. The magazines M of the upper tier, as shown in Fig. 4, are higher than the magazine M of the lower tier, but otherwise the magazines of the two tiers are substantially identical.

Each magazine of each tier has an ejector E. Each of these is similar to the ejectors shown in the copending coassigned Ridings et al. application Serial No. 530,333, filed August 24, 1955, issued as Patent No. 2,823,782, February 18, 1958. Each comprises a head 55 having a top flange 57 and a vertical web 59 which extends down through a slot 61 in the shelf 29. The forward ends of the webs 59 of heads 55 of each tier engage the rearward edge of the draw bar 33 for that tier. A rod 63 extends forward from each head 55 through an opening 60 in the vertical front plate 31. Each rod 63 has a knob 65 fixed on its outer end. The front door of the cabinet has openings such as indicated at 67 for the knobs. These openings are of larger diameter than the knobs so that the front door of the cabinet may be taken off over the knobs. Thus, there is an upper row of ejectors E including knobs 65, one for each magazine M of the upper tier, and a lower row of ejectors E including knobs 65, one for each magazine M of the lower tier.

The draw bar 33 of either tier is adapted to be moved forward from the retracted rearward position shown for the lower tier in Figs. 4, 6 and 8 and for both tiers in Fig. 7 toward the front of the apparatus (toward the vertical plate 31) by pulling out any one of the ejector rods 63 for the respective tier. Each tier is provided with lock-out means to prevent pulling out more than one rod 63 of the tier at a time. This is shown to comprise a series of interlock tumblers 69 mounted to be slidable laterally of the apparatus under the shelf 29 between end stops 71 and 73. The tumblers are guided by ears 75 struck from the shelf 29. Each of the heads 55 has a nose 77 at the forward end of a horizontal flange 79 at the bottom of the web 59. Flange 79 is below shelf 29. The arrangement is such that when any one rod 63 of a tier is pulled out, the respective nose 77 spreads the entire series of tumblers of the tier apart to lock all the other rods 63 of the tier against being pulled out. The construction of the tumblers is similar to that shown in U.S. Patent 2,377,413, and since the details thereof do not form a part of this invention, will not be further described.

As to each tier, the magazines M are formed by vertical partition plates 81 which extend in front-to-rear vertical planes above the shelf 29 and over a horizontal shelf 83 extending between the side walls 23 and 25 immediately rearward of and above the shelf 29. Each of the partition plates 81 (except the two outermost plates at the sides of the apparatus) is common to and constitutes the side wall for each of the two adjacent magazines so that there is no space between the magazines (see Fig. 3). The partition plates 81 are secured on the rearward shelf 83. The bottom edges of the partition plates 81 are stepped as indicated at 85, the bottom edges of the forward portions of the plates being somewhat above the shelf 29 to provide clearance for the draw bar 33. As to each magazine, when the ejector head 55 therefor is in its rearward retracted position, it is adapted to support a primary stack S-1 of cigarette packs P in a substantially vertical dispensing position toward the front of the magazine (see the lower tier magazine shown in Fig. 4). Shelf 83 is adapted to support a reserve stack S-2 of packs P in a retracted substantially vertical position rearward of the primary stack S-1 (see the magazines shown in Fig. 4 and the upper tier magazine shown in Fig. 6). The shelf 83 is located above the shelf 29 a distance somewhat greater than the thickness of a pack P, and located above the ejector heads 55 on shelf 29 a distance less than the thickness of a pack P, being preferably located a distance above these heads a distance corresponding to about one-half the thickness of a pack P.

Each magazine M includes means for moving the reserve stack S-2 into dispensing position when the primary stack S-1 is depleted. More particularly, this means is adapted to push the reserve stack bodily forward in

horizontal direction with the reserve stack remaining substantially vertical. As shown best in Figs. 3, 4 and 6, this means comprises a substantially vertical pusher plate 87 extending transversely between the two partition plates 81 which constitute the side walls of the magazine M for engaging the rear of the reserve stack. This pusher plate is biased forward and maintained substantially vertical by a spring-biased lazy tongs generally designated 89. These lazy tongs comprise a pair of crossed levers 91 and 93 pivotally connected where they cross at 95. Lever 91 is pivotally connected at one end (constituting its upper end) to the rear of the pusher plate as indicated at 97. At its lower end it has a slot 99 receiving a transverse rod 101 extending between the partitions 81. Lever 93 is pivoted at one end (constituting its upper end) on a transverse rod 103 extending between the partitions 81. At its lower end it has a slot 105 receiving a pin 107 carried by the pusher plate 87. A spring 109 is connected between the levers 91 and 93 which tends to lengthen the lazy tongs and thus biases the pusher plate forward. It may be desirable to design the lazy tongs so that the pusher plate 87, when in retracted position, is slightly angled rearward from its bottom to its top to avoid the possibility of wedging the uppermost packs in the primary stack which would prevent them from dropping.

A side plate 111 (which may be formed integrally with the pusher plate 87) extends forward from the pusher plate at one side (the right side) of the magazine M. This side plate extends forward from the pusher plate a distance slightly greater than the length of a pack P, and, in particular, a distance slightly greater than the length of a king-size pack. Such king-size packs are shown in the drawings. If a magazine is to hold regular size packs, a filler piece such as indicated in dotted lines at 113 in Fig. 6 is provided on the front of the pusher plate, this filler piece being such that the distance from it to the forward edge of the side plate 111 is slightly greater than the length of a regular size pack.

A flap 115 is pivoted by hinge means such as indicated at 117 on a vertical axis at the forward edge of the side plate 111. This flap is swingable between an inwardly extending transverse position (see Fig. 3), wherein it acts as a partition for separating the primary stack S-1 and the reverse stack S-2, and a forwardly extending position at one side of the magazine (see Fig. 10) for front loading of the magazine, as will be made clear. It is biased to swing outward to the stated forwardly extending loading position by a spring 119. It has a finger 121 engageable with the adjacent partition 81 for holding it in its transverse stack-separating position against the bias of the spring 119. The bottom edge of the flap 115 is spaced above the shelf 83 a distance somewhat greater than the thickness of a pack P.

Each tier of magazines is provided with a door 123 pivoted as indicated at 125 at its lower edge on a cross-bar 127 extending between the side walls 23 and 25. Latch means such as indicated at 129 is provided for latching this door in vertical position closing the open fronts of the magazines. As to each magazine, the finger 121 engages the adjacent partition 81 and holds the flap 115 in its stack-separating position when the pusher plate 87 is in its retracted position shown in Fig. 3, but is released when the pusher plate has moved forward to the position shown in Fig. 10 and the door 123 is opened to release the flap 115 to swing outward to loading position under the bias of spring 119.

A rockshaft 131 extends between the side walls 23 and 25 toward the rear of the apparatus generally at the elevation at the top of the lower tier T-1. A similar rockshaft 133 extends between the side walls 23 and 25 directly below the shaft 131 and at an elevation somewhat above the rearward shelf 83 of the lower tier T-2. These rockshafts are journaled at their ends in openings in the side walls 23 and 25 such as indicated at 135.

Fixed on the upper shaft 131 on the inside of the right side wall 25 is a first lever 137 which constitutes a first member of an interlock between the tiers for locking out of operation all the ejectors E of one tier upon operation of any ejector E of the other tier. Fixed on the lower shaft 133 is a lever 139 which is identical to the lever 137 except that it is reversed in position. Levers 137 and 139 are coplanar. Each is sector-shaped. The upper lever 137 has an integral upwardly extending crank arm 141. A link 143 connects the stud 46 of the upper tier to the crank arm 141. The lower lever 139 has an integral downwardly extending crank arm 145. A link 147 connects the stud 46 of the lower tier to the arm 145.

Each of the levers 137 and 139 is formed with a notch 149, one side 151 of this notch constituting a shoulder for engagement with one or more of a series of coin-controlled latches L-1, L-2, and L-3. The arcuate end of each sector-shaped lever 137 and 139 is formed with a series of ratchet teeth 153 and a notch 155. When the draw bars 33 of both tiers are in the rearward retracted position illustrated in Fig. 7, the levers 137 and 139 occupy the retracted position shown in Fig. 7 wherein their shoulders 151 are spaced from the latches L-1, L-2 and L-3. The shafts 131 and 133 are spaced from one another a distance less than twice the radius of the levers 137 and 139, the arrangement being such that when the upper lever 137 swings clockwise away from its retracted position shown in Fig. 7, it blocks the lower lever 139 from being swung counterclockwise away from its retracted Fig. 7 position, and conversely, when the lower lever 139 swings counterclockwise away from its retracted position, it blocks the upper lever 137 from being swung clockwise away from its retracted position. The upper lever 137 is swung clockwise away from its retracted position when any ejector E of the upper tier is pulled out to move the upper draw bar 33 forward. The lower lever 139 is swung counterclockwise away from its retracted position whenever any ejector E of the lower tier is pulled out to move the lower draw bar 33 forward. The opposed side edges of levers 137 and 139 may be cut away to arcuate shape as indicated at 157 for clearance purposes.

Means is provided for biasing the upper shaft 131 to rock counterclockwise and for biasing the lower shaft 133 to rock clockwise, as viewed in Fig. 7. As shown in Fig. 5, this means comprises arms 159 and 161 fixed on the left ends of shafts 131 and 133, respectively, outside the left side wall 23, and springs 163 and 165 connected between the left side wall and arms 159 and 161, respectively. Spring 163 thus biases the upper interlock lever 137 and the upper draw bar 33 to the retracted position shown in Fig. 7, determined by the engagement of the upper knobs 65 with the upper plate 31. Spring 165 thus biases the lower interlock lever 139 and the lower draw bar 33 to the retracted position illustrated in Fig. 7, determined by the engagement of the lower knobs 65 with the lower plate 31.

A latching means 167 is provided for the upper interlock lever 137, and a latching means 169 is provided for the lower interlock lever 139. Each of these latching means is identical, comprising a pawl 171 pivoted on the inside of the side wall 25 by means of a stud 173 and engageable with the arcuate end of the respective lever 137 or 139. The pawl is biased toward the centered position such as is illustrated for the upper pawl in Fig. 8 by an overcentering spring mechanism including a rod 175 slidable in a U-shaped bracket 177 pivoted on the inside of the side wall 25 by means of a stud 179. A spring 181 biases the rod to move outward away from the pawl. When lever 137 or lever 139 is in its retracted position (see Fig. 7), the tip of the respective pawl 171 is received in the notch 155 and the pawl is cocked at an angle to the rod 175. When the lever 137 or 139, as the case may be, swings away from its

retracted position, the series of ratchet teeth 153 on the lever engages the respective pawl, and the pawl is swung to an oppositely angled position to lock into the ratchet teeth and prevent the lever from swinging back to retracted position unless the lever is swung far enough for the series of ratchet teeth to disengage completely from the pawl (see the position of the upper lever 137 and the pawl therefor in Fig. 8). This arrangement compels full-stroke operation of any ejector E once it has been pulled out far enough for the respective pawl 171 to latch on to the respective ratchet teeth. However, any ejector E may be pulled out a short distance before the respective pawl engages the respective ratchet teeth.

The latches L-1, L-2 and L-3 correspond to the latches L-1, L-2 and L-3 shown in the copending application of Alvin W. Holstein et al. Serial No. 589,918, filed June 7, 1956. When any one of these latches is in its locking position projecting through an opening 183 in the side wall 25, all of the ejectors E are locked against being pulled out any more than a small distance corresponding to the small angle through which lever 137 or lever 139, as the case may be, may rotate before its shoulder 151 engages a latch L-1, L-2 or L-3. This limited movement of either lever 137 or 139 is not sufficient for the respective ratchet teeth to latch on to the respective pawl 171. In order that any ejector E may be completely pulled out for full-stroke operation, it is necessary that all three of the latches L-1, L-2 and L-3 be retracted out of the path of the levers 137 or 139.

Each tier of magazines is shown as having rear and front price shafts 185 and 187 corresponding to the rear and front price shafts 155 and 157 shown in said copending application Serial No. 589,918. As in said application Serial No. 589,918, these shafts carry price arms 189 and 191, respectively, corresponding to the arms 169 and 171 shown in said application adapted to be located for engagement by ribs 193 on the heads 55. They also carry arms 195 and 197, respectively (see Fig. 9) on the outside of the right side wall 25 (corresponding to arms 159 and 161 shown in Serial No. 589,918). The arm 195 for the upper tier is linked to the arm 195 for the lower tier by a link 199 having lost motion connections such as indicated at 201 with each arm 195, so that the lower arm 195 may rotate to pull down the link 199 without moving the upper arm 195, and, conversely, the upper arm 195 may rotate to move the link 199 down without moving the lower arm 195. Similarly, the upper and lower arms 197 are connected by a link 203 having lost motion connections such as indicated at 205 with each of the arms 197. Link 199 operates a lever 207 which corresponds to the lever 135 shown in said copending application Serial No. 589,918, and link 203 operates a lever 209 which corresponds to the lever 149 shown in said copending application. Springs such as indicated at 211 and 213 bias the levers 207 and 209 in clockwise direction as viewed in Fig. 9, and tend to maintain the links 199 and 203 raised. A wire 215 corresponding to the wire 199 shown in said copending application has end portions hooked around studs 217 and 219 on the levers 207 and 209 in such manner that when lever 209 is swung counterclockwise, the wire pulls up the lever 207, but when lever 207 is swung counterclockwise, the lever 209 is not operated. From here on the action is the same as that disclosed in the stated copending application Serial No. 589,918, and reference may be made to said application for a complete disclosure of the coin-controlled mechanism for operating the latches L-1, L-2 and L-3.

Each magazine M is provided with means for moving its pusher plate 87 rearward whenever its ejector E is operated in order to relieve the bias or pressure of the reserve stack S-2 on the primary stack S-1 so that the primary stack may drop freely downward. This means includes a ratchet 221 projecting rearward from the

pusher plate 87 of the magazine. Each tier of magazines has a rockshaft 223 extending transversely between the side walls 23 and 25 under the rearward shelf 83. Each shaft 223 carries a series of pawls 225 which extend through openings 227 in the respective shelf 83 for engagement with the ratchets 221. Each shaft 223 has a crank arm 229 fixed thereon on the inside of the right side wall 25. The arm 229 for the upper shaft 223 is connected by a link 231 to the arm 141 and the arm 229 for the lower shaft 223 is connected by a similar link 231 to the arm 145. The arrangement is such that when any ejector E of the upper tier is pulled out, the upper rockshaft 223 is rotated counterclockwise as viewed in Fig. 7 (clockwise as viewed in Figs. 4 and 6), and the pawls 225 thereon engage the ratchets 221 of the pusher plates 87 of the upper tier to move them rearward against the bias of the respective springs 109. Similarly, when any ejector E of the lower tier is pulled out, the lower rockshaft 223 is rotated counterclockwise as viewed in Fig. 7 and the pawls 225 thereon engage the ratchets 221 of the pusher plates 87 of the lower tier to move them rearward against the bias of the respective springs 109. The ratchets 221 are of such length as to allow for loading any magazine with either king size or regular size packs P.

Each of the doors 123 for the upper and lower tiers T-1 and T-2 is provided with a series of window openings 233, one for each magazine M. The cabinet door 13 has upper and lower windows W-1 and W-2 for viewing of the packs in the magazines through openings 233. The door 13 is also shown as provided behind windows W-1 and W-2 with casings 235 having window openings 237 which register with openings 233. The door 13 has an access opening 239 below the lower row of knobs 65. Behind opening 239 is a trough 241 for receiving packs ejected from the magazines. Extending around the lower tier T-2 is a guide plate 243 for guiding packs discharged from the upper tier around the rear of the lower tier. Below the lower tier T-2 is a guide plate 245 down which packs slide to the trough 241.

Operation is as follows:

As to any magazine M, as long as there are two or more packs P in the primary stack S-1 resting on the ejector head 55, and as long as door 123 in front of the magazine is closed, the pusher plate 87 is held back in rearward retracted position by engagement of the flap 115 with the rear of the primary stack, the latter being pushed forward against the door 123 (see Figs. 3 and 4 and the upper magazine in Fig. 6). When there is only one pack left in the primary stack resting on the ejector head 55, the pusher plate 87 is held back in retracted position by engagement of the lowermost pack of the reserve stack S-2 with this one pack left in the primary stack.

To obtain a pack P from a magazine M of either tier T-1 or T-2, a customer inserts the appropriate amount in coin in the coin slot 17, then pulls out the knob 65 for this magazine and returns the knob to its rearward retracted position. Assuming that the magazine has two or more packs in the primary stack S-1 and a full reserve stack S-2, on pulling out the knob 65 the ejector head 55 is drawn out from under the primary stack and the entire primary stack drops down on to the forward shelf 29. Then, when the knob 65 and head 55 return to retracted position, the head pushes the lowermost pack of the primary stack rearward off the shelf 29 under the rearward shelf 83. In the case of dispensing from a magazine of the upper tier, the ejected pack slides down the plate 243 around the rear of the lower tier to the plate 245 and then slides down the latter plate to the trough 241. In the case of dispensing from a magazine of the lower tier, the ejected pack slides forward down the flange 53 to the trough. When the knob is pulled out, the pusher plate 87 is

moved rearward by the action of the respective pawl 225 on the respective ratchet 221, to release the pressure on the primary stack so that it may drop freely downward onto the shelf 29.

On pulling out any knob 65 of the upper tier, all the other knobs of the upper tier are locked out of operation by the action of the tumblers 69 of the upper tier, and all the knobs of the lower tier are locked out of operation by the movement of the upper interlock lever 137 away from its retracted position of Fig. 7 to the position shown in Fig. 8. On pulling out any knob of the lower tier, all the other knobs of the lower tier are locked out of operation by the action of the tumblers 69 of the lower tier, and all the knobs of the upper tier are locked out of operation by the movement of the lower interlock lever 139 away from its retracted position of Fig. 7. It will be understood by reference to the above-noted copending application Serial No. 589,918, that pulling out of the knob of any magazine farther than the limited distance permitted by latches L-1, L-2 and L-3 is precluded unless an amount in coin corresponding to the price for the brand in that magazine has been inserted, and that, assuming that the proper amount has been inserted, all three latches L-1, L-2 and L-3 will be retracted out of the paths of interlock levers 137 and 139.

When the last pack of the primary stack S-1 in a magazine drops down onto the shelf 29, the pusher plate 87 (under the bias of spring 109) pushes the entire reserve stack S-2 in the magazine bodily forward into vertical dispensing position, flap 115 remaining in its transverse position and coming into engagement with the door 123. Dispensing may then proceed from the reserve stack until it is exhausted. With the flap 115 engaging the door 123, there is no pressure on the stack to impede its dropping downward, and it makes no difference that the ratchet 221 has moved forward beyond the range of the pawl 225.

To reload a magazine, the respective door 123 is swung down to open up the front of the magazine. Assuming that the reserve stack for this magazine has previously been pushed forward to dispensing position, opening the door 123 frees the flap 115 so that it swings open (see Fig. 10). Then, packs may be inserted straight in from the front of the magazine to replenish the reserve stack. Next, the flap 115 is moved to its transverse position to act as a pusher, and additional packs inserted from the front to make up a primary stack, the reserve stack being pushed back to retracted position by the act of inserting the additional packs and pushing them against the flap. Once the reserve stack has been pushed back, it drops down behind a pack which remains on the ejector head 55 in view of the spacing of the bottom edge of the flap above the ejector head, and this holds the reserve stack in retracted position.

As above described, each magazine in each tier includes means for holding a reserve stack and means for moving the reserve stack into dispensing position when the primary stack is depleted. This provides for maximum capacity for all brands. It will be understood, however, that the reserve stack feature may be omitted as to certain of the magazines in one tier, or in both tiers, or even as to all the magazines in one tier, these magazines then being utilized for slower-selling brands. In any case, however, at least some of the magazines in at least one tier will have the reverse stack feature.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. Dispensing apparatus comprising an upper tier of magazines and a lower tier of magazines, each magazine having an ejector operable by a purchaser for ejecting an item from the magazine, each tier including means operable upon operation of any ejector therein for locking out of operation all the other ejectors of the tier, and an interlock between tiers for locking out of operation all the ejectors of either one of the tiers upon operation of any ejector of the other tier, said interlock comprising a first pivoted lever swingable away from a retracted position in response to operation of any ejector of the upper tier, a second pivoted lever coplanar with the first lever and pivoted on an axis parallel to the pivoted axis of the first lever and swingable away from a retracted position in response to operation of any ejector of the lower tier, the first lever, when swung away from its retracted position, blocking the second lever against swinging away from its retracted position, and the second lever, when swung away from retracted position, blocking the first lever against swinging away from its retracted position.

2. In a dispensing apparatus, a magazine having side walls and being openable at the front for loading, a first shelf for supporting a primary stack of items to be dispensed in a substantially vertical dispensing position between the side walls toward the front of the magazine, a second shelf for supporting a reserve stack of packages in a substantially vertical retracted position between the side walls rearward of the primary stack, the second shelf being located above the first a distance greater than the vertical dimension of an item as stacked so that the lowermost item of the primary stack may be pushed rearward off the forward shelf under the rearward shelf, means for pushing the reserve stack forward into dispensing position above the forward shelf when the primary stack is depleted with the reserve stack remaining substantially vertical comprising a pusher plate extending transversely between the magazine side walls for engaging the rear of the reserve stack and a spring-biased lazy tongs located between the side walls in the rear of the plate, said lazy tongs comprising a pair of crossed pivotally connected levers having connections with the side walls and the pusher plate, and a spring connected between the levers, a side plate extending forward from the pusher plate at one side of the magazine, and a flap pivoted on a vertical axis at the forward edge of the side plate and adapted to occupy an inwardly extending transverse position for separating the primary stack and the reserve stack, means biasing said flap to swing outward, and means for holding said flap in its stack-separating position against said outward bias when the pusher plate is in a rearward position and adapted to release the flap to swing outward when the pusher plate has moved forward and the magazine is opened.

3. Dispensing apparatus comprising an upper tier of magazines and a lower tier of magazines, each tier comprising a first shelf extending transversely of the apparatus and vertical partition plates in front-to-rear vertical planes above the first shelf, each first shelf constituting a bottom for all the magazines in the respective tier, and the partition plates constituting side walls for the magazines in the respective tier, each of the partition plates except the two outermost plates at the sides of the apparatus being common to and constituting the side wall for each of the two adjacent magazines, so that there is no space between the magazines, each magazine being adapted to hold a primary stack of items to be dispensed in a forward dispensing position on the respective first shelf, each magazine having a second shelf located rearward of the first shelf and located above the latter a distance greater than the vertical dimension of an item as stacked so that the lowermost item of the primary stack may be pushed off the first shelf under said rearward shelf, the partition plates extending above the second

shelf, each magazine being adapted to hold a reserve stack of items to be dispensed in a rearward retracted position on the second shelf, a pusher in each magazine for engaging the rearward ends of items in the reserve stack and pushing the entire reserve stack forward into dispensing position above the first shelf when the primary stack is depleted, means mounting said pusher for forward and rearward movement with said pusher positioned generally vertically whereby upon forward movement of the pusher it pushes the reserve stack bodily forward with said reserve stack remaining substantially vertical, said pusher mounting means being located in the rear of said pusher, spring means located in the rear of said pusher biasing said pusher and said reserve stack in forward direction, said pusher and said reserve stack being held back in rearward retracted position until the primary stack is depleted, whereupon the spring means acts to push the pusher and reserve stack forward, each magazine having an ejector for ejecting the lowermost item of the stack in dispensing position, the ejector for each of said magazines ejecting the lowermost item of the respective primary stack rearward off the first shelf, and means operable upon operation of any ejector for locking out of operation all the other ejectors.

4. Dispensing apparatus as set forth in claim 3 wherein each said pusher comprises a plate extending transversely between the respective magazine partition plates, a side plate extending forward from said pusher plate at one side of the magazine, and a flap pivoted on a vertical axis at the forward edge of said side plate and adapted to occupy an inwardly extending transverse position for separating the primary stack and the reserve stack and a forwardly extending position at one side of the magazine to enable loading of the magazine from the front.

5. Dispensing apparatus as set forth in claim 4 wherein the pusher and reserve stack in each magazine are held back in retracted position by engagement of the flap with the primary stack, and further comprising means operable upon operation of the ejector for any magazine to move the respective pusher rearward to move the flap rearward away from the primary stack.

6. In a dispensing apparatus, a magazine having side walls, a first shelf located at the bottom and toward the front of the magazine, an ejector slidable over said first shelf between a rearward and a forward position, said ejector when in rearward position being adapted to support a primary stack of items in a substantially vertical dispensing position toward the front of the magazine, said stack dropping down onto said first shelf when the ejector is moved forward from under the stack, and said ejector on returning to its rearward position pushing the lowermost item of the stack on said first shelf rearward off said first shelf, a second shelf for supporting a reserve stack of items in a substantially vertical retracted position between the side walls rearward of the primary stack, said second shelf being located above the first shelf a distance greater than the vertical dimension of an item as stacked so that the lowermost item of the stack on said first shelf may be pushed off said first shelf under the second shelf, a pusher located between said side walls engageable with the rearward ends of the items in the reserve stack and adapted to push the entire reserve stack forward into dispensing position when the primary stack is depleted, means located in the rear of the pusher mounting the pusher for forward and rearward movement with the pusher positioned generally vertically whereby upon forward movement of the pusher it pushes the reserve stack bodily forward with said reserve stack remaining substantially vertical, spring means located in the rear of said pusher for biasing said pusher and reserve stack forward, said pusher and reserve stack being held back in retracted position until the primary stack is depleted, whereupon the spring means acts to push the pusher and reserve stack forward.

7. In a dispensing apparatus, a magazine having side walls and being adapted for front loading, a first shelf

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located at the bottom and toward the front of the magazine, an ejector slidable on said first shelf between a rearward and a forward position, said ejector when in rearward position being adapted to support a primary stack of items in a substantially vertical dispensing position toward the front of the magazine, said stack dropping down onto said first shelf when the ejector is moved forward from under the stack, and said ejector on returning to its rearward position pushing the lowermost item of the stack on said first shelf rearward off said first shelf, a second shelf for supporting a reserve stack of items in a substantially vertical retracted position between the side walls rearward of the primary stack, said second shelf being located above the first shelf a distance greater than the vertical dimension of an item as stacked so that the lowermost item of the stack on said first shelf may be pushed off said first shelf under the second shelf, pusher means located between the side walls including a rear pusher member engageable with the rear of the reserve stack and a front member engageable with the front of the reserve stack and being movable forward and rearward for pushing the reserve stack forward and rearward, means for biasing said pusher means and the reserve stack forward, said pusher means being held against forward movement by engagement of said front member with the primary stack until the primary stack is depleted, whereupon said biasing means moves said pusher means to a forward position thereby to push the reserve stack forward into dispensing position, said front member being carried by said pusher means for movement relative to said pusher means to a position allowing for insertion of items into the magazine from the front when the pusher means is in its said forward position, said front member comprising a flap pivoted on said pusher means for swinging movement on a generally vertical axis, said flap being swingable between an inwardly extending transverse position wherein it is engageable with the front of the reserve stack and a forwardly extending position at one side of the magazine allowing for the insertion of items into the magazine from the front when said pusher means is in its said forward position.

8. In a dispensing apparatus as set forth in claim 7, means for holding said flap in its said transverse position when said pusher means is rearward of its forward position and adapted to release the flap to swing to its forwardly extending position when said pusher means is moved to its forward position.

9. In a dispensing apparatus, a magazine having side walls and being adapted for front loading, a first shelf located at the bottom and toward the front of the magazine, an ejector slidable over said first shelf between a rearward and a forward position, said ejector when in rearward position being adapted to support a primary stack of items in a substantially vertical dispensing position toward the front of the magazine, said stack dropping down onto said first shelf when the ejector is moved forward from under the stack, and said ejector on returning to its rearward position pushing the lowermost item of the stack on said first shelf rearward off said first shelf, a second shelf for supporting a reserve stack of items in a substantially vertical retracted position between the side walls rearward of the primary stack, said second shelf being located above the first shelf a distance greater than the vertical dimension of an item as stacked so that the lowermost item of the stack on said first shelf may be pushed off said first shelf under the second shelf, pusher means located between the side walls including a rear pusher member engageable with the rear of the reserve stack and a front member engageable with the front of the reserve stack and being movable forward and rearward for pushing the reserve stack forward and rearward, means for biasing said pusher means and the reserve stack forward, said pusher means being held against forward movement by engagement of said front member with the primary stack until the pri-

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mary stack is depleted, whereupon said biasing means moves said pusher means to a forward position thereby to move the reserve stack forward into dispensing position, means operable upon forward movement of the ejector for moving the pusher means rearward to move said front member rearward away from the primary stack and to push back the reserve stack to allow the primary stack freely to drop down onto said first shelf, and said front member being carried by said pusher means for movement relative to said pusher means to a position allowing for insertion of items into the magazine from the front when the pusher means is in its said forward position, said pusher means comprising a pusher plate constituting said rear pusher member extending transversely between the side walls, a side plate extending forward from said pusher plate at one side of the magazine, and a flap constituting said front member pivoted on a generally vertical axis at the forward edge of said side plate, said flap being swingable between an inwardly extending transverse position wherein it is engageable with the front of the reserve stack and a forwardly extending position at one side of the magazine allowing for the insertion of items into the magazine from the front when said pusher means is in its said forward position.

10. In a dispensing apparatus as set forth in claim 9, means biasing said flap to swing outward from its said transverse position to its said forwardly extending position, and means for holding said flap in its said transverse position against the bias when said pusher means is rearward of its forward position and adapted to release the flap to swing to its forwardly extending position when said pusher means is moved to its forward position.

11. In a dispensing apparatus as set forth in claim 10, said flap-holding means comprising a finger on the flap engageable with the side wall at said one side of the magazine.

12. In a dispensing apparatus as set forth in claim 7, said second shelf being spaced above said first shelf a distance such that one of the items in the primary stack on the ejector extends above said second shelf, whereby, after stacking reserve items at the front of the magazine on said one item with the pusher means in its forward position, and pushing the reserve stack rearward, the reserve stack drops down onto said second shelf with the lowermost item thereof engaged behind said one pack to hold the pusher means against forward movement.

13. In a dispensing apparatus as set forth in claim 12, said one item in the primary stack being the lowermost item in the primary stack on the ejector.

14. In a dispensing apparatus, a magazine having side walls and being adapted for front loading, a first shelf located at the bottom and toward the front of the magazine, an ejector slidable on said first shelf between a rearward and a forward position, said ejector when in rearward position being adapted to support a primary stack of items in a substantially vertical dispensing position toward the front of the magazine, said stack dropping down onto said first shelf when the ejector is moved forward from under the stack, and said ejector on returning to its rearward position pushing the lowermost item of the stack on said first shelf rearward of said first shelf, a second shelf for supporting a reserve stack of items in a substantially vertical retracted position between the side walls rearward of the primary stack, said second shelf being located above the first shelf a distance greater than the vertical dimension of an item as stacked so that the lowermost item of the stack on said first shelf may be pushed off said first shelf under the second shelf, pusher means located between the side walls for pushing the reserve stack forward and rearward, said pusher means including a substantially vertical rear pusher member, engageable with the rear of the reserve stack and a sub-

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stantially vertical front member engageable with the front of the reserve stack, means located wholly between the side walls in the rear of said rear member mounting said pusher means for forward and rearward movement with said member remaining substantially vertical, spring means located wholly between said side walls in the rear of said pusher means for biasing said pushing means and the reserve stack forward, said pusher means being held against forward movement by engagement of said front member with the primary stack until the primary stack is depleted, whereupon said spring means moves said pusher means to a forward position thereby to move the reserve stack forward into dispensing position, means operable upon forward movement of the ejector for moving the pusher means rearward to move said front member rearward away from the primary stack and to push back the reserve stack to allow the primary stack freely to drop down onto said first shelf, and said front member being carried by said pusher means for movement relative to said pusher means to a position allowing for insertion of items into the magazine from the front when the pusher means is in its said forward position, said pusher means comprising a pusher plate constituting said rear pusher member extending transversely between the side walls, a side plate extending forward from said pusher plate at one side of the magazine, and a flap constituting said front member pivoted on a generally vertical axis at the forward edge of said side plate, said flap being swingable between an inwardly extending transverse position wherein it is engageable with the front of the reserve stack and a forwardly extending position at one side of the magazine allowing for the insertion of items into the magazine from the front when said pusher means is in its said forward position.

15. In a dispensing apparatus as set forth in claim 14, means biasing said flap to swing outward from its said transverse position to its said forwardly extending position,

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tion, and means for holding said flap in its said transverse position against the bias when said pusher means is rearward of its forward position and adapted to release the flap to swing to its forwardly extending position when said pusher means is moved to its forward position.

16. In a dispensing apparatus as set forth in claim 15, said flap-holding means comprising a finger on the flap engageable with the side wall at said one side of the magazine.

17. In a dispensing apparatus as set forth in claim 14, said second shelf being spaced above said first shelf a distance such that one of the items in the primary stack on the ejector extends above said second shelf, whereby, after stacking reserve items at the front of the magazine on said one item with the pusher means in its forward position, and pushing the reserve stack rearward, the reserve stack drops down onto said second shelf with the lowermost item thereof engaged behind said one pack to hold the pusher means against forward movement.

18. In a dispensing apparatus as set forth in claim 17, said one item in the primary stack being the lowermost item in the primary stack on the ejector.

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