June 16, 1942. C. GABRIELSEN 2,286,905

VENDING MACHINE

Filed Aug. 3, 1940 4 Sheets-Sheet 1

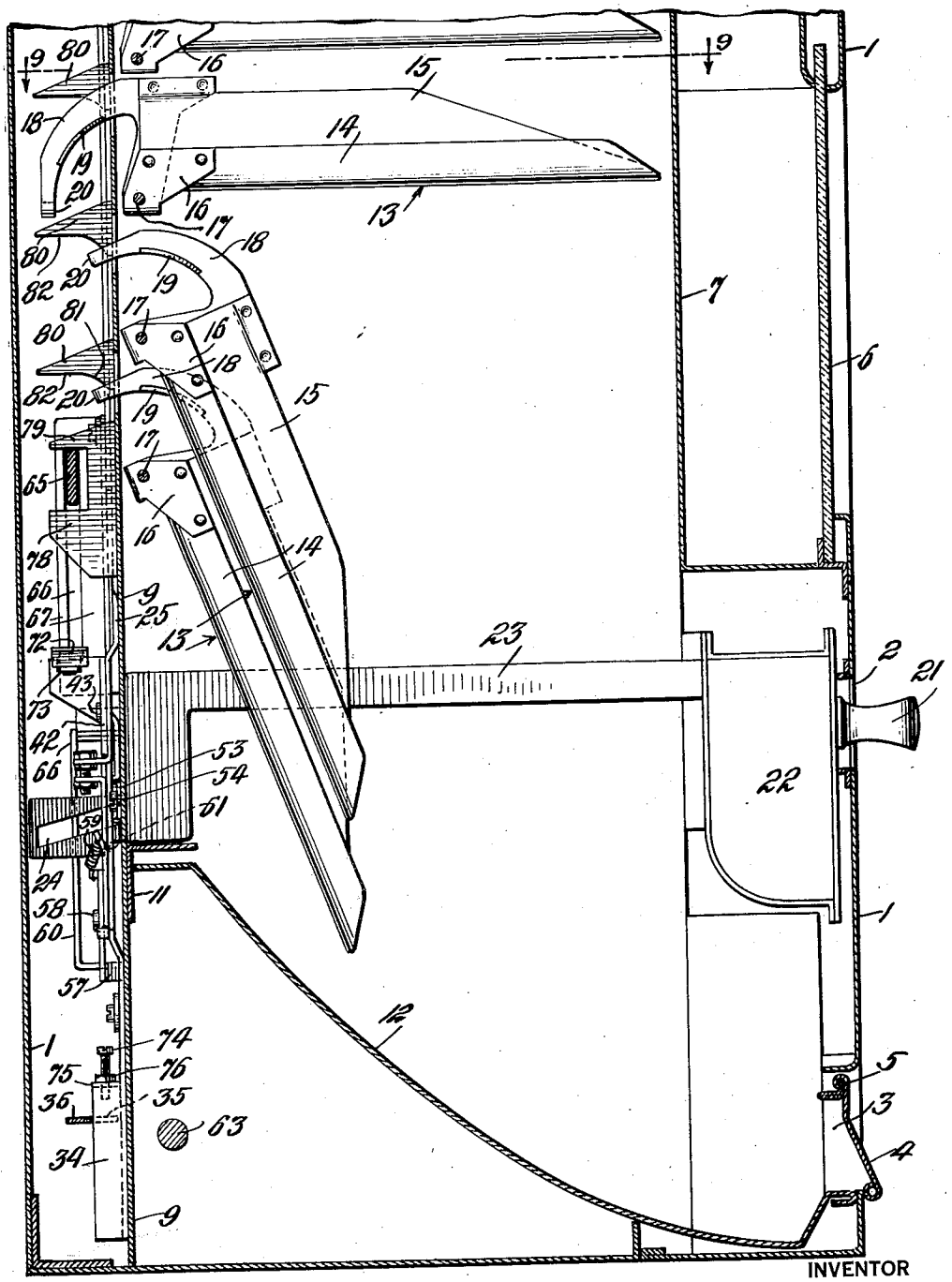

Fig. 1.

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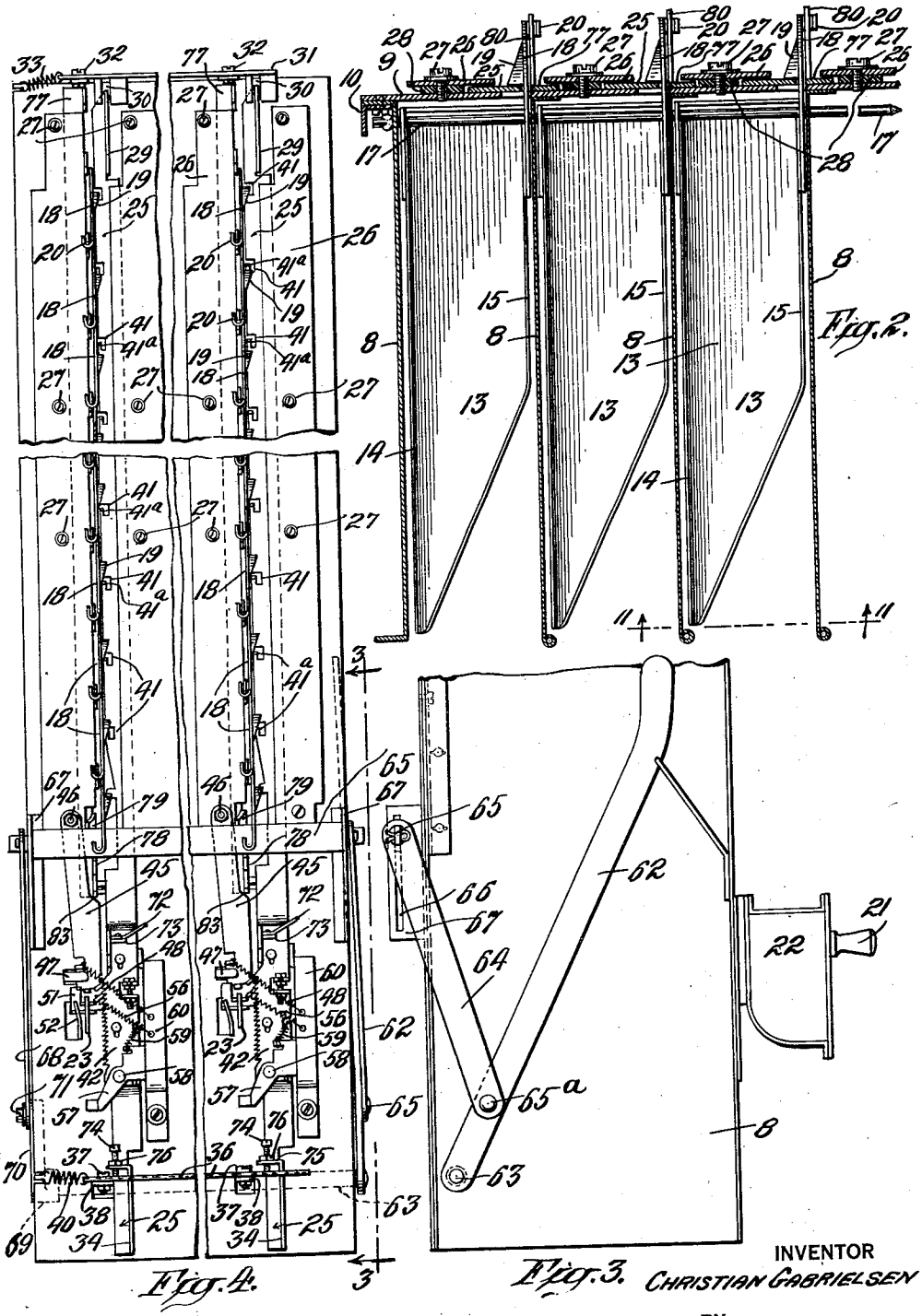

Fig. 4.

Fig. 3.

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VENDING MACHINE

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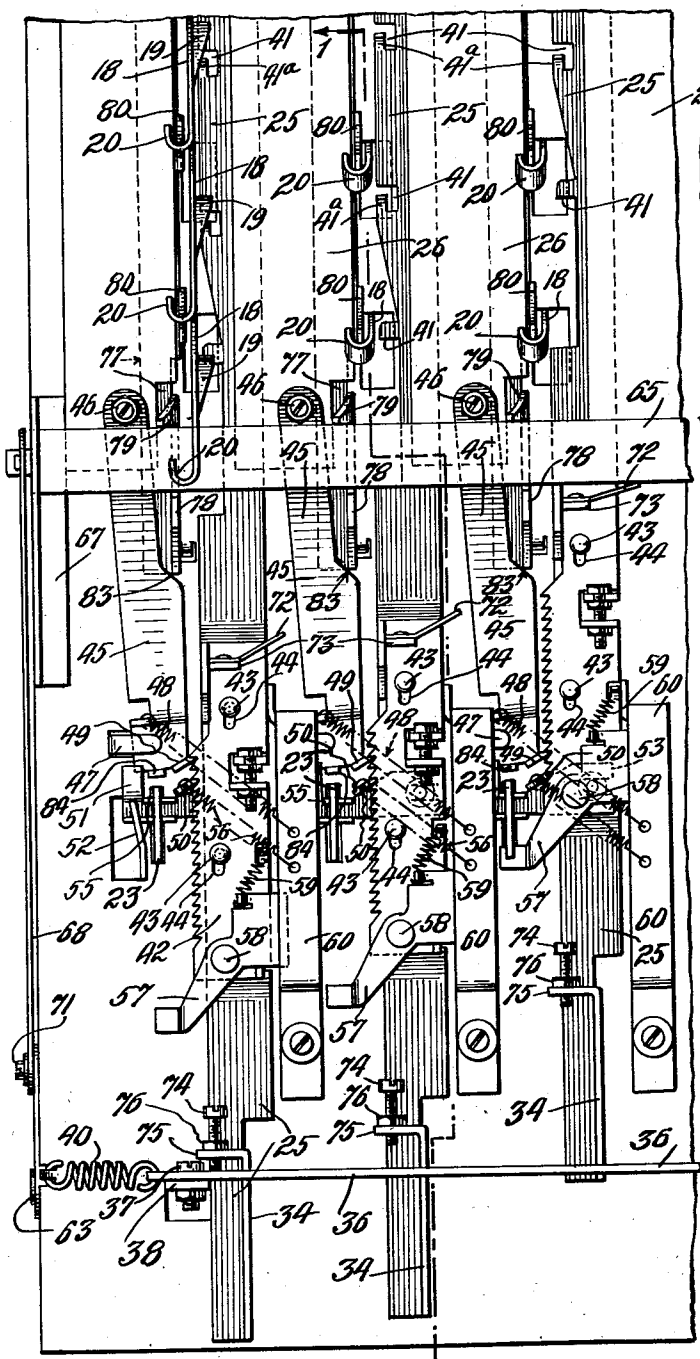

Fig. 5.

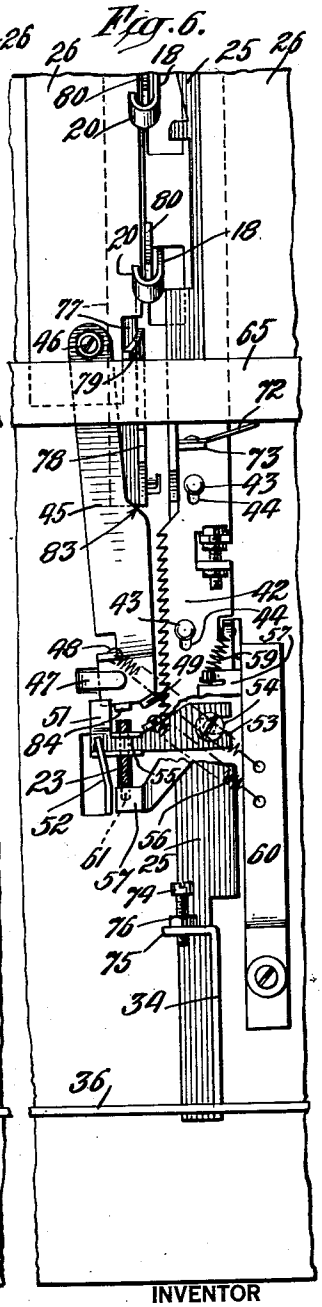

Fig. 6.

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VENDING MACHINE

Filed Aug. 3, 1940 4 Sheets-Sheet 4

Fig. 7.

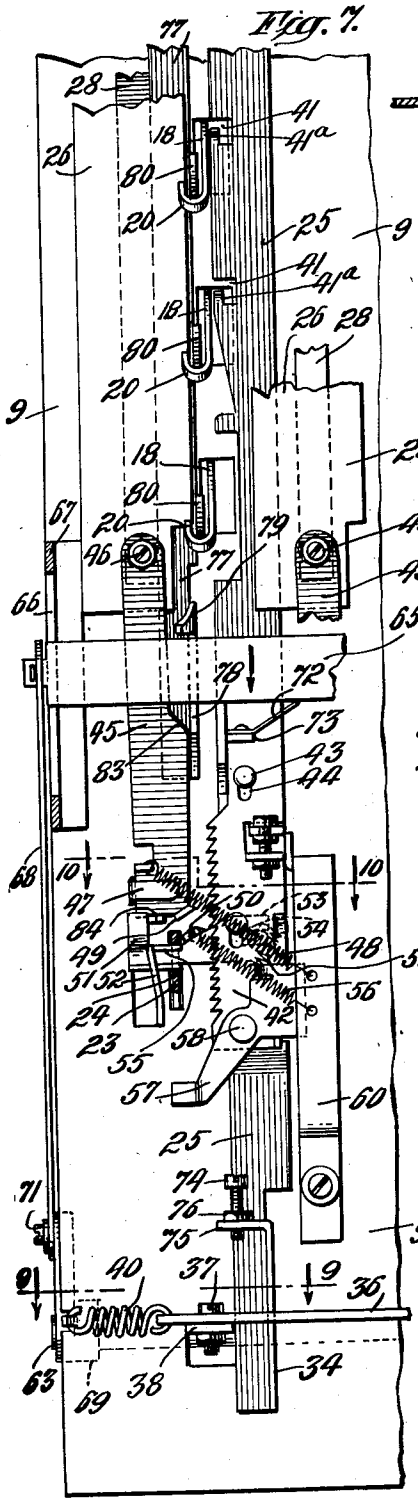
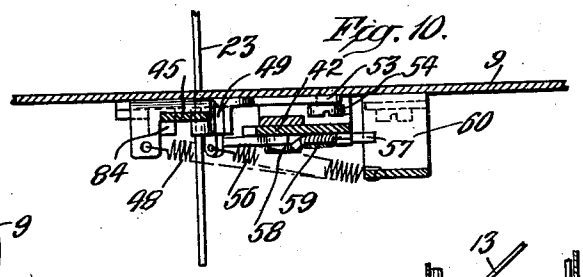


Fig. 10.



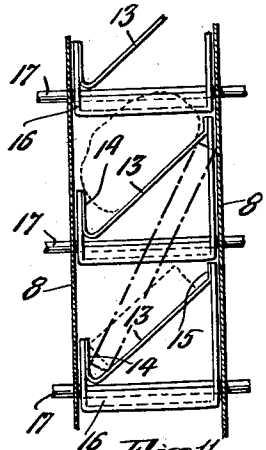
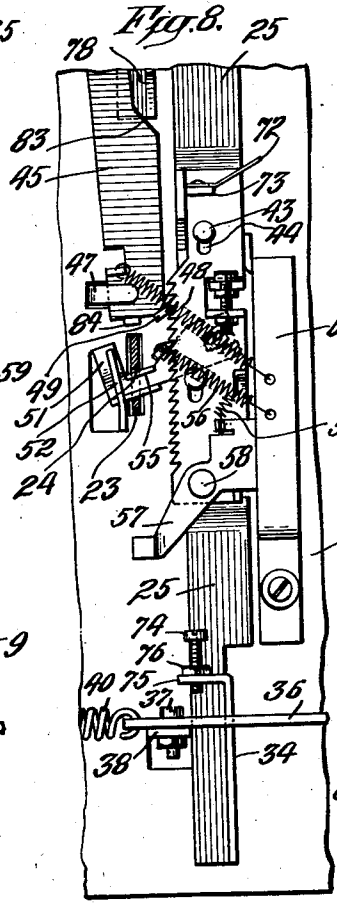


Fig. 11.

Fig. 8.



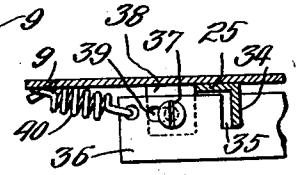


Fig. 9.

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Patented June 16, 1942

2,286,905

UNITED STATES PATENT OFFICE

2,286,905

VENDING MACHINE

Christian Gabrielsen, Belleville, N. J., assignor to Rowe Manufacturing Co., Inc., New York, N. Y., a corporation of New York

Application August 3, 1940, Serial No. 350,806

6 Claims. (Cl. 312—94)

This invention relates to improvements in vending machines, and more particularly in vending machines of the class in which the articles to be vended are stored upon shelves one above the other and delivered by progressively tilting or tripping the shelves.

The principal objects of the invention are to provide an improved form of tiltable shelf for a vending machine and to provide improved mounting, tripping and resetting arrangements for the shelves.

The present application is directed primarily to those features concerned with the dispensing mechanism, features having primarily to do with the shelf form, mounting and arrangement being claimed in my copending application Serial No. 401,469, filed July 8, 1941, for improvements in Vending machines, and which is a division of the present application.

With these and other objects which will appear in the following full description in mind, the invention consists in the combinations and arrangements of parts and details of construction which will now first be described in connection with the accompanying drawings, and then pointed out more particularly in the appended claims.

In the drawings—

Figure 1 is a fragmentary vertical cross section taken on the line 1—1 of Figure 5, and showing the invention as embodied in a preferred form in a machine for vending packages, such as packages of candy, cigarettes and the like, which may be of widely varying size and shape.

Figure 2 is a horizontal section of the machine of Figure 1 and showing the shelves in three adjacent columns of the machine.

Figure 3 is a side elevation of the lower part of the machine, on a reduced scale, and showing, in particular, the resetting lever arrangement.

Figure 4 is a rear view upon the same scale as Figure 3, partly broken away, and showing the tripping and resetting mechanism.

Figure 5 is a rear view on an enlarged scale of a portion of the machine and showing three adjacent columns with the mechanisms in different positions occupied during different stages of the operation of the machine.

Figure 6 is a view similar to Figure 5 showing only the right hand column thereof and with certain parts broken away and removed to exhibit the construction more clearly.

Figure 7 is a view similar to Figure 5 but showing only the left hand column, with the parts in position to illustrate still another condition of operation and with certain parts broken away to reveal the construction more clearly.

Figure 8 is a view of a portion of Figure 7 with the parts in a different position.

Figure 9 is a horizontal section taken on the line 9—9 of Figure 7.

Figure 10 is a horizontal section taken on the line 10—10 of Figure 7; and

Figure 11 is a front view of a portion of one of the columns of the machine showing the arrangement of the shelves one above the other and the manner in which articles are placed therein.

Referring now to Figure 1, the machine of the invention as illustrated is enclosed within a casing 1 forming a generally enclosed space provided with an aperture 2 for accommodating the delivery handles of the vending machine, and an aperture 3 for furnishing access to the articles delivered. The latter aperture is shown as normally closed by a flap 4 carried on a hinge along its upper edge 5 so as to prevent any articles from being projected out of the machine during delivery, but permitting access by lifting the flap. A glass panel 6 is also provided, permitting the display of packages in front of the appropriate columns or the display of other suitable indications of the contents of the machine. The front of the exterior casing may be hinged in any of the usual ways so as to provide access to the interior for loading and servicing the machine and advantageously carries a partition or plate 7 adapted to close off the otherwise open fronts of the storage columns later described, while the machine is in use.

The vending machine unit within the casing includes a number of vertical compartments arranged adjacent to one another in a row and within which columns of superposed tiltable shelves or trays are provided for the purpose of storing and delivering the merchandise. These columns (Figures 2 and 3) are defined by a number of vertical partitions or plates 8 attached to a rear plate 9 which runs across the machine, as by means of angles 10 at the rear of the partitions 8 which are welded to plate 9. The plate 9 is pierced with apertures, as best shown in Figures 1, 4 and 5, to permit the passage therethrough of mechanism later described, and may be reinforced as by means of angle 11 running crosswise of the machine. The lower part of the machine is provided with an inclined surface 12 (Figure 1) to receive articles being delivered and conduct them to the front of the machine so

that access may be had to them through aperture 3.

Each of the tiltable shelves 13 for carrying and delivering the articles is formed principally of a body portion made of sheet metal and bent into a dihedral angle having a vertical side or flange 14 and slanted side or flange 15, forming a structure which is V-shaped in cross section. The sides 14 and 15 are in turn cut away at their forward edges so as to slope toward their forward meeting point as shown. To the rear of each tray is affixed a stirrup 16 having holes pierced through it to accommodate a shaft 17 upon which the shelf is thus pivotally mounted in the machine. Shafts 17, as best shown in Figures 1, 2 and 11, pass through aligned apertures in the partitions 8, each shaft 17 thus serving as a pivotal mounting for a horizontal row of a number of trays positioned at the same level in the machine but within different columns. As appears best in Figure 1, the stirrup 16 extends below and in back of the tray body 13 so that the tray is tiltable on an axis situated somewhat below it and close to the plate 9 at the rear of the column. Stirrup 16 also carries a curved arm 18 which extends backwardly through an aperture in plate 9 and is provided with a triangular or wing-shaped abutment 19 adapted to cooperate with the holding and tripping mechanism later described, and which is also provided with a terminal hook 20 adapted to stop the trays in dropped position (lowermost pair of trays in Figure 1) and to cooperate with the resetting mechanism later described.

As will be understood, a machine constructed according to the invention will comprise any desired number of similar columns arranged side by side and each containing any desired number of trays 13 positioned one above the other as described. When the machine is loaded all trays will be set in the position of the top tray in Figure 1 and the articles to be delivered placed therein by inserting them from the front. All articles in any single column will normally be of the same description. In Figure 11, however, there is illustrated within a single column (in broken lines) the manner in which rectangular and irregular packages may be carried on shelves 13 and it is found in practice that with the construction of the invention, even bulky and irregular packages which require in effect to be jammed between the shelf and the one immediately above it, can be satisfactorily stored and delivered. This feature is due to the tray construction and mounting. The pivoting of the shelves at the back makes it possible to provide a relatively large space for accommodating an article during delivery, as appears from Figure 1. As indicated in that figure by the showing of the two lower shelves, the shelves, as progressively tripped, nest together leaving approximately half of the depth of the column open to permit an article to fall from the next higher shelf when it in turn is tripped. The catching of articles during delivery is further prevented by the slanting of the forward edges of the shelves, as previously described. By mounting the tray on the shafts 17 positioned with relation thereto as previously described, the invention makes it possible to store a package substantially filling or completely filling the space between a tray and the one immediately above it without danger of failure to deliver the package. This follows from the fact that such an article will extend no further back than the lower part of the stirrup 16 of the tray immediately above it and when it is in such position, its rearward portion is to the front of the pivot 17 so that the dropping of the tray 13 moves all parts of the package away from the tray above, thus preventing jamming.

By employing V-shaped shelves or shelves slanted crosswise of their tilting axes, the invention makes it possible to store relatively large articles without any undue increase in the width of the machine. In machines of conventional construction, the storage compartment defined by any shelf and the one immediately above it is substantially square or rectangular as viewed from the front, and this entails a very considerable waste space in accommodating articles of a variety of different shapes. With trays shaped and mounted according to the invention, the space defined by a given tray and the one immediately above it has the form of a parallelogram which makes it possible to store a much greater variety of articles of different sizes and shapes within a given space than with constructions heretofore employed, and also assists in the delivery of such articles since they will all, regardless of their shapes, tend to slide down the slanted side 15 of a tray into the corner between it and the vertical side 14. It is also to be noted that with the V-type of construction a very light tray of adequate strength is provided due to the angle between the sides 15 and 14 and due to the fact that articles are supported principally by the portion of the tray adjacent this angle.

The delivery of articles is effected by the purchaser by withdrawing and returning a plunger 21 positioned in front of the desired column in the usual way. The plunger 21 will be mounted on a plunger housing 22 which may contain any of the usual locking devices for controlling the operation of the various plungers and connecting the same to a coin control. This mechanism forms no part of the present invention. Running through the container unit from front to rear is an operating link 23 for each plunger 21, the rearward end of which extends through an aperture in plate 9 and is provided with a cam slot 24 for actuating the delivery mechanism.

The delivery mechanism comprises primarily a slide bar 25 (Figures 4 to 8) slidably mounted between plate 9 and a plate 26 spaced therefrom to accommodate slide 25 and fastened to plate 9 as by means of screws 27 (Fig. 4) which pass through spacing bar 28 (Figure 7). The various slides 25 are held in alignment crosswise of the machine by means of angles 29 at their upper ends which pass through guides 30 carried on a member 31 slidably mounted by means of slots on studs 32 attached to the top of the machine and urged to the left (Figure 4) by a spring 33. Slides 25 are similarly held in alignment at their lower ends by angles 34 passing through guides 35 carried on a member 36, which in turn is slidably carried on studs 37 attached to brackets 38 on plate 9, by means of slots 39, and is biased to the left by a spring 40. Slide 25 is positioned adjacent the abutments 19 previously referred to of the associated column of shelves 13 so that when these abutments are to the rear of the edge of slide 25 they serve to hold the shelves 13 in loaded position. To effect delivery by tripping or permitting the shelves 13 to drop, the edge of slide 25 is provided with a number of evenly spaced cut outs 41, one for each tray in the column, and forming openings adapted to accommodate abutments 19. The edge of member 25

accordingly is made up of a number of evenly spaced portions adapted to engage abutments 19, defining and separated by evenly spaced openings 41, adapted to release the abutments. For holding the parts in alignment, tongues 41—*a* bent slightly to the rear (Figure 7) may be provided at the lower edges of the cut outs 41, to abut against arms 18. The shafts 17 being spaced at equal intervals apart, and the trays 13 similarly constructed, the abutments 19 are evenly spaced apart when their trays are in raised position. The successive dropping of the trays is provided for by making the constant interval at which cut outs 41 are spaced somewhat shorter than the interval at which the abutments 19 are spaced. An interval difference of about ⅛ inch will ordinarily be found satisfactory.

Starting with the parts in the position of the left hand column of Figure 5, from which no articles have as yet been delivered, it will be observed that all abutments 19 are held back by the slide 25 and that each abutment is progressively further away from its associated cut out 41 than the next lower one, by the amount of the interval difference referred to. Accordingly, raising bar 25 one step will free the lowermost tray, raising it a second step will free the second tray, and so on. The middle column in Figure 5 shows the position of the parts when slide member 25 has been raised a few steps, and the right hand column shows the position when it has been raised fully so as to trip all shelves in the column.

The successive step by step movement of the slide 25 is communicated to it through a rack 42 having downwardly facing saw teeth spaced apart by the desired interval difference and adjustably mounted on the slide 25 by means of screws 43 passing through slots 44.

The step by step raising of the bar 25 is effected through a pawl and detent mechanism by the associated plunger link 23. As best shown in Figures 1 and 5 to 8 inclusive, a detent arm 45 pivoted to plate 9 at 46 and held against plate 9 by tongue 47 at its lower end is provided. This detent arm 45 is biased or urged toward the rack 42 by a spring 48 and carries a detent tooth 49 which normally holds the rack 42 against downward movement. The upward movement of rack 42 is caused by a pawl 50 carried on a slide 51, the central portion of which passes through slot 24 in link 23 previously referred to, and which is held against plate 9 by means of a guide tongue 52 at one end. The other end of member 51 passes under an offset portion of slide 25 and is provided with fork 53 within which is positioned a pin 54 mounted on plate 9. The structure of member 51 is completed by an angle 55, at its left end, which serves to free the rack 42 for resetting, as later described. Member 51 is urged downwardly and toward the rack 42 by spring 56 attached to the pawl 50. Upon forward movement of link 23 the cam slot 24 forces the central portion of member 51 which passes therethrough to move downwardly as shown in Figure 8. Fork 53 around pin 54 and spring 56 convert this downward movement into a pivotal movement in which the pawl 50 is carried over the adjacent lower tooth of the rack and snaps into the notch below this tooth upon passing over the same. Return of the link 23 to the position of Figure 1 raises the member 51, pivoting the same about pin 54 and through pawl 50 lifts the rack 42 and slide 25 to which it is attached through one tooth interval or by one step. At each operation of the associated plunger, the slide 25 is thus raised by one step bringing an aperture 41 into registry with the abutment 19 of the next undischarged shelf of the column.

When a slide 25 has been raised so as to discharge all shelves 13 associated therewith, further operation of the slide is prevented by means of an arm 57 pivotally mounted on rack 42 at 58, and which is biased to the position shown by spring 59 and held against rack 42 by means of a plate 60 which is fastened to the plate 9. This plate also serves in this case for attachment of the springs 48 and 56 previously referred to. When the rack has moved upward to its furthest designed extent of movement, the end of arm 57 passes in front of a rearwardly facing abutment 61 formed on link 23 (Figures 1 and 6) just to the rear of plate 9, thus preventing further operation of the associated plunger.

The resetting of discharged shelves for reloading of the machine is accomplished by pushing a hand lever 62 (Figure 3) which is mounted on one end of a shaft 63, rearwardly and returning this lever to the position of Figure 3. This serves, through a link 64 swingingly connected to lever 62 at 65^a, to depress resetting bar 65. This bar passes through guide slots 66 in brackets 67 attached to plate 9 at the sides of the machine and is pivotally connected to the upper end of the link 64 at one end and to another link 68 at the other. The shaft 63 attached to lever 62 runs across the machine and is attached at 69 to an arm 70 to which is pivotally connected at 71 the lower end of link 68 so that both ends of resetting bar 65 are moved together upon operation of lever 62. Bar 65, when moved downwards from the position of Figure 5 through that of Figure 7, resets slides 25 and their operating mechanism by means of springs 72 carried on brackets 73 upon the racks 42 attached to slides 25. The downward movement of the parts in this resetting operation is gauged by means of adjustable stop screws 74 which pass through horizontal portions 75 formed on angles 34 at the lower ends of slides 25 and are fixed in position relative thereto by nuts 76. The lower ends of these stop screws 74 engage the member 36 previously referred to so that any extra movement of bar 65 is taken up in merely flexing springs 72.

Means operable by the bar 65 is also provided for resetting the trays 13 and comprises a slide 77 associated with each column of trays and located on the opposite side of the arms 18 attached thereto from the slides 25 previously referred to. This slide 77 is formed with a pair of abutments 78 and 79 between which passes the bar 65 so that each movement of the bar 65 by means of lever 62 serves to reciprocate slides 77. The slides 77 are held against plate 9 by means of plates 26 previously referred to in connection with slides 25 and each slide 77 is provided with an abutment 80 adapted to register with each of the hooks 20 of the shelves 13 on the associated column. The depressing of slides 77 by means of resetting bar 65 causes all abutments 80 of slides 77 to engage within hooks 20. The forward portions of the lower surfaces 81 of abutments 80 are slanted as shown in Figure 1, and upon engagement with the hooks 20 force the latter downwardly and rearwardly until they are in engagement with the substantially horizontal rearward lower surfaces 82 of the abut-

ments. Further movement brings all trays 13 into the horizontal loading position.

In resetting, the initial movement of bar 65 engages abutments 78, forcing the slides 77 downwardly. This downward movement is utilized to free the slides 25 by means of slanted cam surfaces 83 upon the detent arms 45 previously referred to. The lower ends of abutments 78 engage these cam surfaces 83, thus forcing the arms 45 away from racks 42 and bringing the teeth 49 out of registry with the racks 42. The arms 45 in turn are provided at their lower ends with angle abutments 84 which engage the portions 55 of members 51 thus moving the members 51 to the left and also freeing the racks 42 from the pawls 50. During this movement springs 72 are put under pressure by resetting bar 65 so that the bar 25 and attendant mechanism is snapped downward upon the freeing of rack 42 in the manner described. Bar 65, continuing to move downward, brings the wing shaped abutments 19 through the apertures in plate 9 past the bars 25. The inclination of the edges of these abutments, as shown, serves to cam or press bars 25 aside against the tension of springs 33 and 40, and upon the passage of the abutments 19, slides 25 are returned to their previous position by the springs so as to prevent passage of the abutments 19. Upon the return movement of rod 65 it engages abutments 79 on each slide 77, thus disengaging abutments 80 from hooks 20 and putting the machine in condition for loading and further operation.

What is claimed is:

1. In a vending machine, and in combination, a vertically aligned series of article supporting and delivering shelves, means for tiltably supporting said shelves, each said shelf including an abutment, a vertically slidable member including spaced edge portions for engaging said abutments to hold said shelves in untilted position and defining openings between said portions to permit passage of said abutments when in registry therewith, and means for moving said member step by step to bring said openings progressively into registry with said abutments.

2. A vending machine according to claim 1, in which the said means for tiltably supporting said shelves are positioned to space said abutments apart by a uniform interval, the said openings are spaced apart by a different uniform interval, and the said means for moving said member comprise means for moving the same in successive steps equal to the difference between said intervals.

3. A vending machine according to claim 1, comprising also means for yieldably urging said member toward said abutments, and cam means upon said shelves for engaging said portions during movement of said shelves from tilted to untilted position to move said member aside to permit passage of said abutments.

4. A vending machine according to claim 1, comprising also means for yieldably urging said member toward said abutments, cam means upon said shelves for engaging said portions during movement of said shelves from tilted to untilted position to move said member aside to permit passage of said abutments, and manually operable means for moving said shelves from tilted to untilted position for resetting the same and returning said member to an initial starting position.

5. A vending machine according to claim 1, in which the said means for moving the said member comprises a pawl and detent mechanism, and comprising also manually operable means for moving said shelves from tilted to untilted position for resetting the same and means operable by said manually operable means for disengaging said pawl and detent mechanism to permit movement of said member reversely to the direction of said step by step movement.

6. In a vending machine, and in combination, a plurality of parallel partitions defining a row of vertical columns for article storage, and a series of tiltable article supporting and delivering shelves mounted one above the other in each such column, the said shelves being slanted crosswise of said partitions so as to define therewith a row of adjacent columns of article receiving spaces of parallelogram cross section, means for pivotally mounting said shelves for tilting about horizontal axes adjacent their ends and extending crosswise of said partitions, abutments upon said shelves and extending beyond the edges of said partitions, a vertically slidable member adjacent the abutments of each said column and including spaced edge portions for engaging said abutments to hold said shelves in untilted position and defining openings between said portions to permit passage of said abutments when in registry therewith, and means for moving said member step by step to bring said openings progressively into registry with said abutments.

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