

[54] **VENDING MACHINE**
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[52] U.S. Cl. **221/85, 221/218**
 [51] Int. Cl. **G07f 11/00**
 [58] Field of Search 198/180, 179;
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[57] ABSTRACT

A vending machine for vending packaged products having a product compartment, a plurality of delivery arms located in the product compartment, each including a movable endless chain having a plurality of pairs of package retention elements, the elements of each pair coacting to releasably retain an individual package to be vended.

6 Claims, 5 Drawing Figures

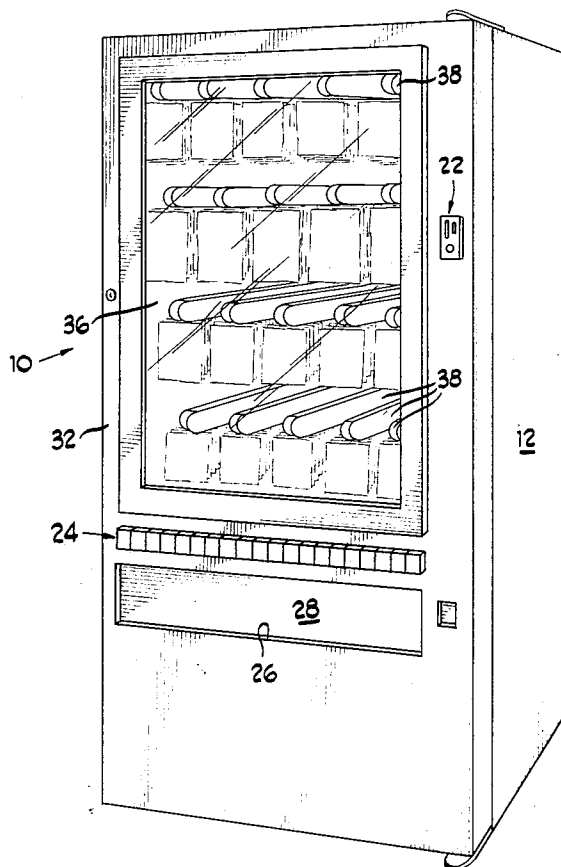


Fig 1

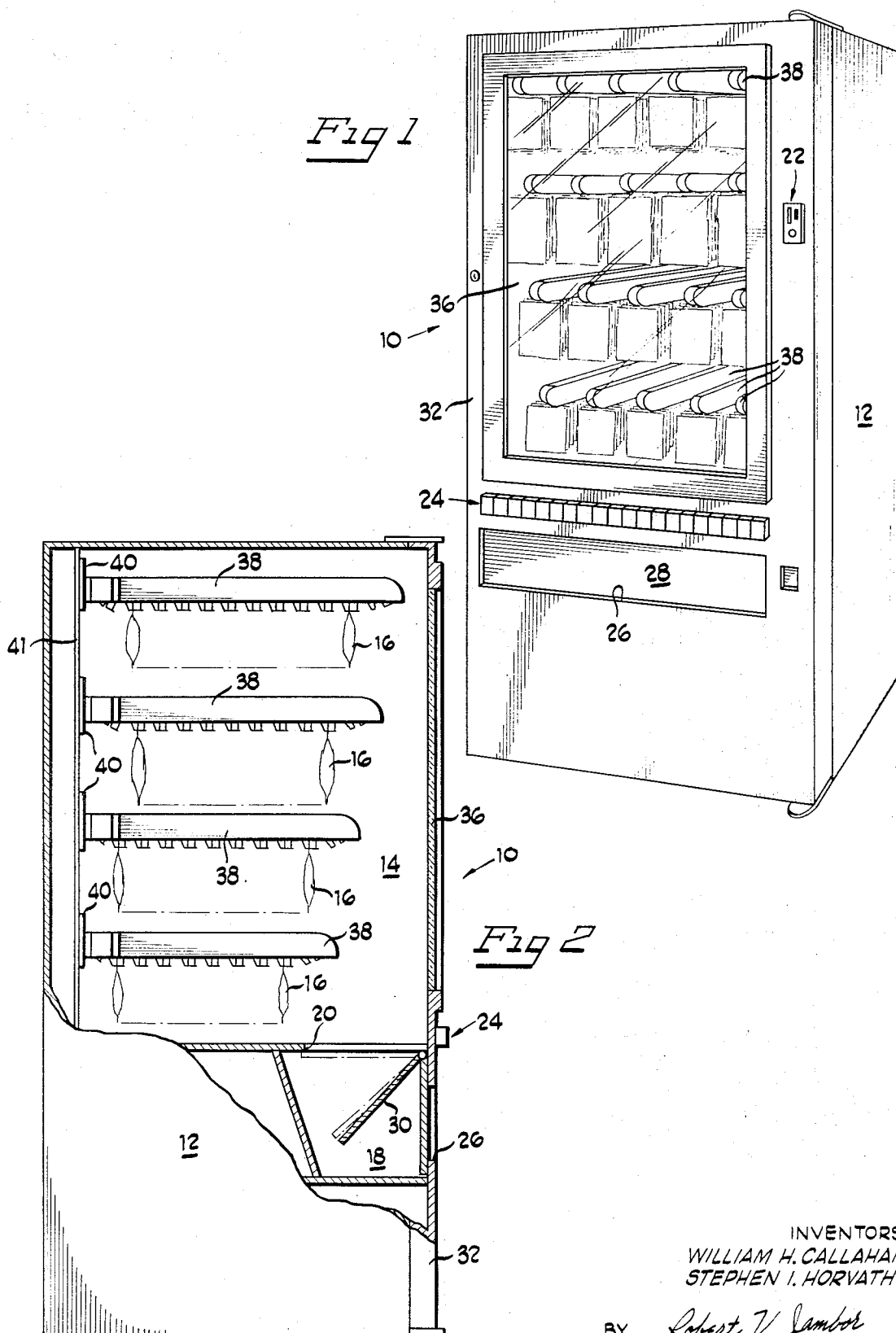
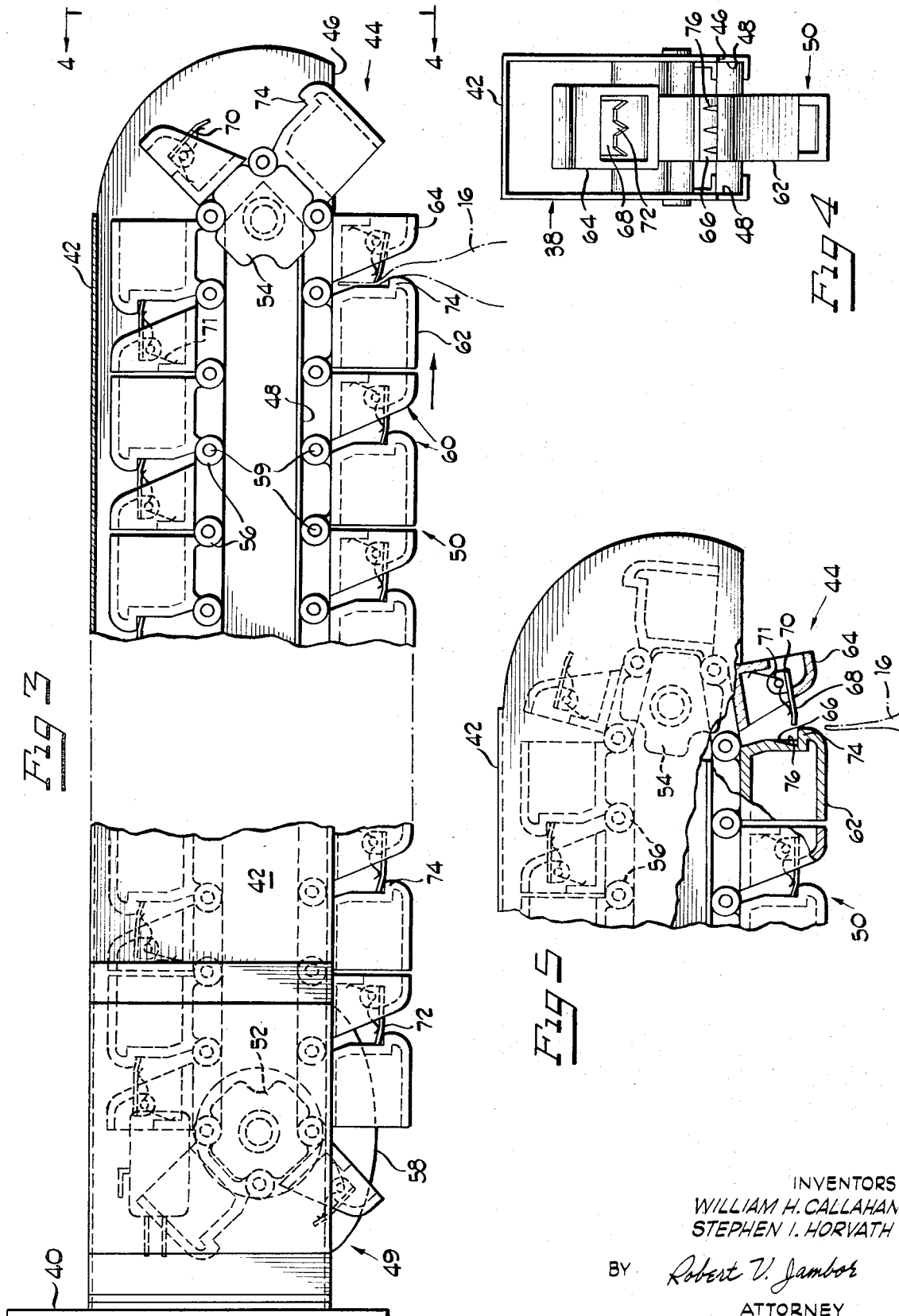


Fig 2

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VENDING MACHINE

BACKGROUND OF THE INVENTION

This invention relates to coin operated vending machines for vending of packaged products. More particularly, it relates to a vending machine for packaged products having product compartments in which the products are releasably retained upon a plurality of delivery arms.

One important factor in successful vending of products through coin operated machines is that of attraction of prospective purchasers to the product. This is especially true in the case of snack products, such as potato chips, nuts, pretzels, candy or the like, which are usually purchased on impulse or to compliment the purchase of a beverage. It is, therefore, important to make the customer aware of the availability of the product. If successful, sales of such products can be significantly increased.

Initially, snack products were vended through pastry or candy bar vending machines. However, these methods failed to adequately inform the purchaser of the availability of the product and sales volumes were disappointing.

More recently, attempts have been made to provide vending machines which take advantage of sales appeal of visual display of the products. It is well recognized that an effective machine of this type would not only solve the problem of vending snack foods, but would find wide application in the vending of pre-packaged consumable articles not normally sold through this media. For example, hardware items such as nuts, bolts, screws, nails and the like, could readily be vended in this manner. Similarly, toilet articles such as combs, razors, toothbrushes and the like, could also be effectively distributed.

The early attempts at designing a vending machine to suit this need did accomplish the objective of attractive display of the packaged products to increase consumer appeal. This was done through utilization of a product compartment completely visible from the exterior of the machine in which the products were retained upon a plurality of delivery arms. In this way, the entire compartment of the machine was visible to the purchaser to take full advantage of the impulse reaction.

However, the vending machines heretofore developed for this purpose have been both conceptually and technologically deficient. Each has included inherent design disadvantages which rendered it unsatisfactory as the ultimate solution to the problem.

One of the earliest developments in this field was a machine which utilized delivery arms in the form of horizontally disposed rotatable spiral shafts. The packaged products were suspended upon each shaft in spaced relation along the spiral. Energization of the machine by deposit of proper coinage caused one shaft to rotate for a predetermined period. This advanced the packaged product toward the open delivery end. During each cycle the package nearest the open delivery end of the shaft rotated, would drop off, and fall to a vending area accessible to the purchaser.

Utilization of this form of machine was possible only if the packages vended were previously provided with an aperture to receive the spiral shaft. The procedures necessary to provide such an aperture were both time-consuming and cumbersome. Further, if the packages were not of sufficient strength, they could be easily dis-

lodged from the spiral shaft resulting in loss of the article without revenue.

In addition, the package loading arrangement was not inherently a "first in, first out, system". Articles first placed in the machine were not necessarily those first delivered to the consumer. It was necessary to remove the packages remaining in the machine when loading and to then place them nearest the open delivery ends of the spiral shafts. First in, first out loading therefore depended upon the conscious effort of the individual loading the machine. Thus, a strong possibility existed for the later vending of stale goods, an undesirable sales factor.

Other attempts to develop a satisfactory machine that optimized packaged product vending have included delivery arms having endless chains supported upon a pair of sprockets and provided with a plurality of retention hooks. Activation of the machine would cause the chain of one delivery arm to move, advancing the hooks toward the delivery end of the arm. The hook nearest the end would travel about the sprocket and move from a generally vertical retention position to a generally horizontal delivery position, allowing the package to fall from the hook.

This system also required pre-operation to be performed upon the bags or packages vended. Also, this arrangement was particularly susceptible to vandalism. Vigorous shaking of the machine would result in dislodgement of the packages from the hooks and would cause them to fall to the vending area accessible from the exterior of the machine. Attempts at rectifying this particular failing have proven to be cumbersome, and have detracted significantly from the efficient operation of the hook arrangement.

Accordingly, it is the principal object of the present invention to provide an improved form of vending machine for packaged products which optimizes the visual appeal of the product to be vended. It is a further object to provide such a machine which inherently provides for a first in, first out, distribution of the packaged product, and which is capable of vending packages which do not require special pre-loading preparation.

SUMMARY OF THE INVENTION

Very generally, the present invention is directed to a vending machine for packaged products having a product compartment, and a plurality of product delivery arms disposed in the compartment. Each arm includes a movable endless chain having a plurality of pairs of package retention elements which coact to releasably retain an individual package to be vended. Movement of a chain upon activation of the machine causes one pair of the package retention elements to advance and release the retained package for delivery to the consumer.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a vending machine embodying the principles of the present invention.

FIG. 2 is a side elevational view, partly in section, of the vending machine of FIG. 1.

FIG. 3 is a fragmentary sectional view on a slightly enlarged scale of a delivery arm of the vending machine of FIGS. 1 and 2.

FIG. 4 is an end view of the delivery arm of FIG. 3.

FIG. 5 is a fragmentary view, partially in section, of the delivery arm of FIG. 2, showing the apparatus in a slightly different position of operation.

DETAILED DESCRIPTION

Referring now to the drawings, there is illustrated a vending machine generally designated 10, which is illustrative of the principles of the present invention.

As best seen in FIGS. 1 and 2, the vending machine 10 includes a housing 12 defining a large product compartment 14 in which packaged products 16 are retained for delivery to purchasers. The housing further includes a vending compartment 18 disposed immediately below the product compartment and accessible from the exterior of the machine.

The machine 10 is electrically operated and includes a coin receiving mechanism 22 and a selector switch arrangement 24. Deposit of proper coinage and activation of the selector switch operates through well known electrical circuitry to effect delivery of a packaged product to the purchaser.

The vending compartment 18 is in communication with the product compartment 14 through an opening 20. Vended packages drop through this opening into the vending compartment.

The vending compartment 18 is also open to the exterior of the machine through an opening 26. An access door 28 pivotally supported upon housing 12 normally closes the opening 26.

A vended product delivered to the compartment 18 is retrieved by the purchaser by opening the door 28 and reaching into the vending compartment. The door 28 includes a closure plate 30 which moves with the door 28. Opening of the door causes closure of opening 20 which normally communicates with the product compartment 14. In this manner, pilferage of the product compartment by access through the vending compartment is prevented.

The machine 10 is provided with a hinged access door 32 which is normally locked and which defines the front panel of the machine. This door provides access to the product compartment for loading of the packaged articles and other maintenance needs.

The door 34 includes a transparent panel 36 formed of glass or other suitable material. This panel provides full view of the product compartment 14 from the exterior of the machine. In this manner, the products 16 to be vended are displayed to the purchaser to take full advantage of visual appeal.

The products 16 are retained within the product compartment 14 upon a plurality of generally parallel, horizontally disposed delivery arms 38 which extend toward the clear panel 36. The packages to be vended hang downwardly from the arms generally transversely of the arms and are presented for full view through the clear panel.

The arms 38 include flanges 40 which are secured to the portion of the housing 12 defining a rear wall 41 of the product compartment 14. The flanges 40 may be provided with slotted mounting holes to allow vertical adjustment of the spacing between arms to accommodate differences in sizes of the packaged products.

Each of the arms 38 includes a rigid channel 42 which forms the main structural element of the arm. The channel 42 extends from the flanges 40 toward the panel 36 terminating in an open delivery end 44. It defines a pair of generally horizontal stripping surfaces 46

adjacent the end 44. The interior of each channel includes a pair of spaced apart facing guide tracks 48 best seen in FIG. 4, extending longitudinally of the channel along its lowermost edge.

In accordance with the present invention, each of the delivery arms 38 includes a package retention and delivery mechanism generally designated 50. The mechanisms 50 are effective to releasably retain the packaged products 16 on display to prospective customers, and are operable to vend a given article upon operation of the machine.

The mechanism 50 of each delivery arm 38 includes a drive sprocket 52, a guide sprocket 54, and an endless drive chain 56 extending about the sprockets. The drive sprockets 52 are rotatably supported by the channels 42 adjacent the flange 40, and the guide sprockets 54 are rotatably supported by the channels 42 adjacent the open delivery ends 44. The chain 56 of each package retention and delivery mechanism 50 thus defines two horizontally disposed lengths which extend between the sprockets 52 and 54. The lowermost length of each chain is disposed within the guide track 48 of the associated delivery arm 38.

An electric drive motor 58 is operatively associated with each delivery arm 38. The motors 58 are each secured to a channel 42 adjacent the flange 40, and are connected in driving association with the associated drive sprocket 52.

The electrical circuitry of the machine is adapted for energization of any one of the motors upon insertion of proper coinage into the mechanism 22. The particular motor energized is determined by selection of one of the selector switches of the selector switch arrangement 24. Energization of one of the motors is effective to rotate the associated drive sprocket 52 for a predetermined period or cycle. The sprocket is rotated in a direction to cause the longitudinally extending portion of the chain 56 disposed in the guide track 48 to advance a predetermined distance toward the open delivery end 44 of the delivery arm 38 as indicated by the arrow in FIG. 3. This causes the chain to travel about the guide sprocket 54.

As best seen in FIG. 3, the chain of each retention and delivery mechanism 50 includes a plurality of rigid links connected by pins 59 to define pluralities of pairs of retention elements 60. The elements of each pair of retention elements 60 are formed by adjacent links of the chain 56. Each pair includes an anvil member 62 and a wedge member 64.

When the links of the chain 56 are disposed within the guide tracks 48, the associated pairs of retention elements underlying the guide track are in the retention position. In this position, the elements of each pair coact, as shown in FIG. 3, to releasably retain a package to be vended. Advancement of the links about the guide sprocket 54 upon energization of the drive motor 58 is effective to terminate the coaction as shown in FIG. 5, and the package is delivered to the vending compartment 18.

Anvil member 62 defines a clamping or retention surface 66 extending transversely of the longitudinal axis of the delivery arm. The wedge member 64 of each pair of elements 60 defines a clamping or locking surface 68 disposed in opposing facing relation to the clamping or retention surface 66 of the associated element 62. These clamping surfaces are positionable in closely spaced facing relation to releasably wedge or clamp the

package to be vended. This occurs when the pairs of elements 60 are in the retention position underlying guide tracks 48.

Advancement of the chain 56 in a direction toward the open delivery end 44 of the delivery arm causes the wedge member 64 to pivot the locking surface 68 away from the clamping surface 66 to release the clamping action of the pair 60 and vend the packaged article.

It should be noted that the clamping action provided by the retention pairs 60 to releasably retain the article to be vended is effective to grasp or clamp packaged material without requiring pre-operations to be performed upon the package. The expense of pre-loading operations is eliminated and loading of the packaged product is simplified.

In the illustrated embodiment, the locking surface 68 of each pair of elements 60 is defined by pivotally supported member 70 urged in a direction toward the surface 66 of the associated anvil member 62 by a spring 71. In the retention position, that is when the links of the chain 56 forming the pairs of elements 60 are slidably supported within the guide track 48, the pivotally supported member 70 is biased against the clamping surface 66 of the associated anvil member 62. The member 70 is pivoted in a manner such that when the pairs of elements 60 are in the retention position, the member 70 is urged toward clamping surface 64 by gravity. The spring member 71 compliments this action to increase the clamping effectiveness.

To increase the locking capabilities of the pairs of elements, each pivotally supported member 70 is formed to define a plurality of prongs 72, shown in FIG. 4, and the anvil members 62 are formed to define a step 74 and a plurality of notches 76, shown in FIGS. 4 and 5, aligned with the prongs 72. The prongs 72 engage the packages 16 and urge the packages against the steps 74 and into the notches 76. The prongs may actually pierce the package to provide positive retention. This arrangement renders the retention members effective to retain the product packages upon the arm even without the assistance provided by spring 70. Also pilferage is prevented since the packages cannot be dislodged by shaking the machine.

It is contemplated that a variety of forms of pairs of retention elements 60 may be provided which would adequately effect clamping or wedging engagement of packages to be vended. For example, the surfaces 66 and 68 could be formed such that they are extremely closely spaced when the pairs of elements 60 are in the retention position underlying the guide tracks 48. The mere compression of the package material between the surfaces would then provide the retention force. Additionally, to improve the effectiveness of closely spaced surfaces 66 and 68, the surfaces could be knurled, tooth-shaped or serpentine. Each arrangement would provide the necessary coaction between the elements 62 and 64 of each pair of elements releasably retaining the packaged product in position upon the delivery arms 38.

As previously pointed out, the pairs of retention elements 60 forming the links of the chain 56 which are disposed within the guide tracks 48 are positioned for coaction and consequent retention of the packages 16. In the illustrated embodiment, the pivotally supported members 70 provide an additional advantage in allowing simple loading of each pair of elements operable even when the pairs of elements are in this retention

position. The packages to be retained are simply urged upwardly between the anvil member 62 and the pivotally supported member 70 defining the locking surface 68. The spring 71 is displaced sufficiently to accommodate entry of the package between the retention surface 66 and the locking surface 68. The spring 71 then urges the pivotally supported member toward clamping surface 66 of anvil member 62. The clamping action provided by coaction of the retention surface 66 and the locking surface 68 retains the package 16. The coaction between the prongs 72 formed upon pivotally supported member 70 and the step 74 and notches 76 formed upon anvil member 62 firmly lock the packages in place until the pairs of elements 60 are advanced to the delivery end of the arm 38.

Selective energization of one of the delivery mechanisms 50 associated with one of the delivery arms 38 is effective to cause advancement of the chain 56 a predetermined distance. This causes the pair of retention members 60 nearest the open delivery end 44 of the delivery arm to travel about the guide sprocket 54. This movement, as best seen in FIG. 5, results in separation of the retention surface 66 and locking surface 68, allowing the package 16 to fall to the vending compartment 14.

In some cases, the packages 16 may adhere to prongs 72 and fail to fall to the delivery compartment 18 upon separation of the elements 60. Continued rotation of the elements 60 about the sprocket 54 causes the package to contact stripping surfaces 46 formed upon the delivery arms 38. This provides for positive separation of the package from the retention elements 60.

It should be noted that energization of a retention and delivery mechanism 50 causes advancement of all of the links disposed within the guide tracks 48 toward the open delivery end 44 of the delivery arms 38. Simultaneously, emptied retention element pairs return to the guide tracks 48 adjacent the flange 40. Thus, products placed into the machine continually advance toward the delivery ends 44 of the delivery arms 38, and a first-in, first-out vending is inherently provided.

As can be seen, an improved form of packaged product vending machine has been provided which optimizes visual display of the products to be vended, inherently provides a first-in, first-out system of vending, and requires no pre-loading operations to be performed upon the packages to be vended.

Various features of the invention have been particularly shown and described. It must be understood, however, that various modifications may be made without departing from the scope of the invention as defined by the appended claims.

What is claimed is:

1. In a vending machine for vending packaged products having at least one delivery arm for retaining and dispensing packages, said delivery arm comprising:
 - a. an elongated member carried by said vending machine and having at least two laterally spaced rollers mounted thereon;
 - b. an endless chain mounted on said rollers and adapted to be rotated for vending packaged products;
 - c. said chain defining a plurality of pairs of retention elements, each having adjacent clamping surfaces for releasably retaining a package to be vended and being operable to release said package upon rotation of the chain about one of said rollers; and

d. one of said elements of each pair of retention elements including a pivotally supported member defining said clamping surface and biasing means urging said member in a direction toward the adjacent clamping surface of the other element.

2. An apparatus therefor as claimed in claim 1 wherein said elongated members therefore includes an elongated channel defining a drive end and a delivery end, said endless chain is rotatably supported by said channel intermediate said ends with a portion of said pairs of retention elements underlying said channel, each of said pairs of elements underlying said channels are disposed to coact to releasably retain a package to be vended, and wherein said mechanism is operable to advance said portion of said chain including said pairs of elements underlying said channel toward said delivery end to terminate said coaction.

3. An apparatus therefor as claimed in claim 2 wherein said channel further defines a pair of opposed facing guide tracks extending longitudinally thereof and wherein said portion of said chain including said pairs of retention elements underlying said channel are slidably supported within said guide tracks.

4. An apparatus therefor as claimed in claim 2 wherein said channel defines at least one stripping sur-

face adjacent said delivery end engageable with said package to be vended upon advancement of said chain toward said delivery end.

5. An apparatus therefor as claimed in claim 1 wherein the elements of each said pairs of elements are formed upon adjacent links of said chain.

6. In a vending machine for vending packaged products, an improved dispensing unit comprising:

a. an elongated member rotatably mounting an endless chain;

b. said endless chain having means for defining opposing pairs of retention elements with coating surfaces for releasably retaining a packaged product and adapted to terminate said coaction to effect dispensing of said packaged product;

c. one of said surfaces being formed by a resiliently biased member carried by an associated retention element and urged against the coating surface of the other element; and

d. said surface formed by said biased member forming an outwardly opening angle with the other surface for guiding said packages into said retention elements and for facilitating the reloading of the dispensing units with packages to be dispensed.

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