April 23, 1957 R. W. WILSON ET AL 2,789,726

DISPENSING MACHINE

Filed June 16, 1953 5 Sheets-Sheet 1

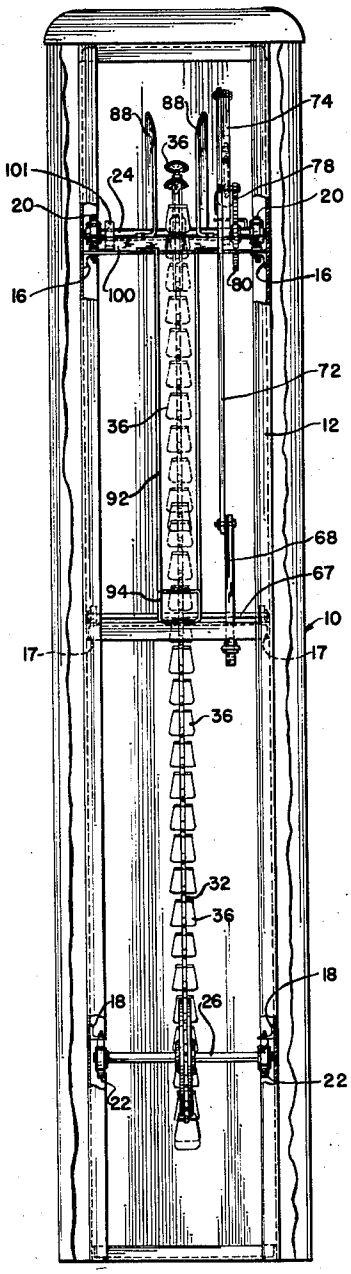


FIG-1

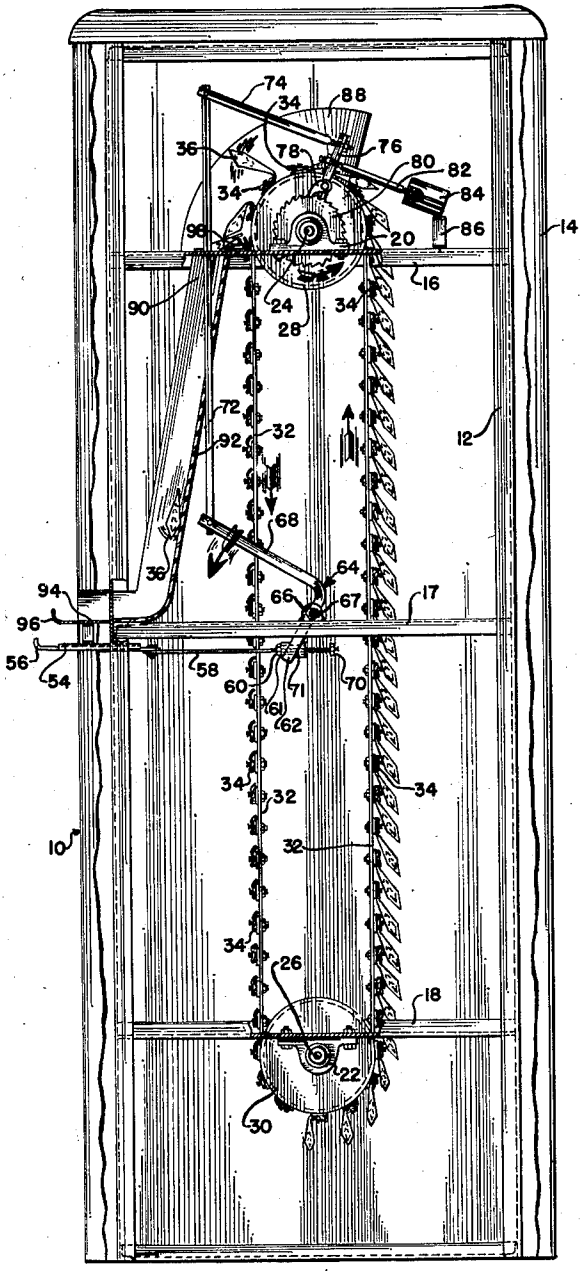


FIG-2

INVENTOR.
RUSSELL W. WILSON
RUSSELL J. MILLER
PAUL P. LONG

BY

ATTORNEY

April 23, 1957 R. W. WILSON ET AL 2,789,726

DISPENSING MACHINE

Filed June 16, 1953 5 Sheets-Sheet 2

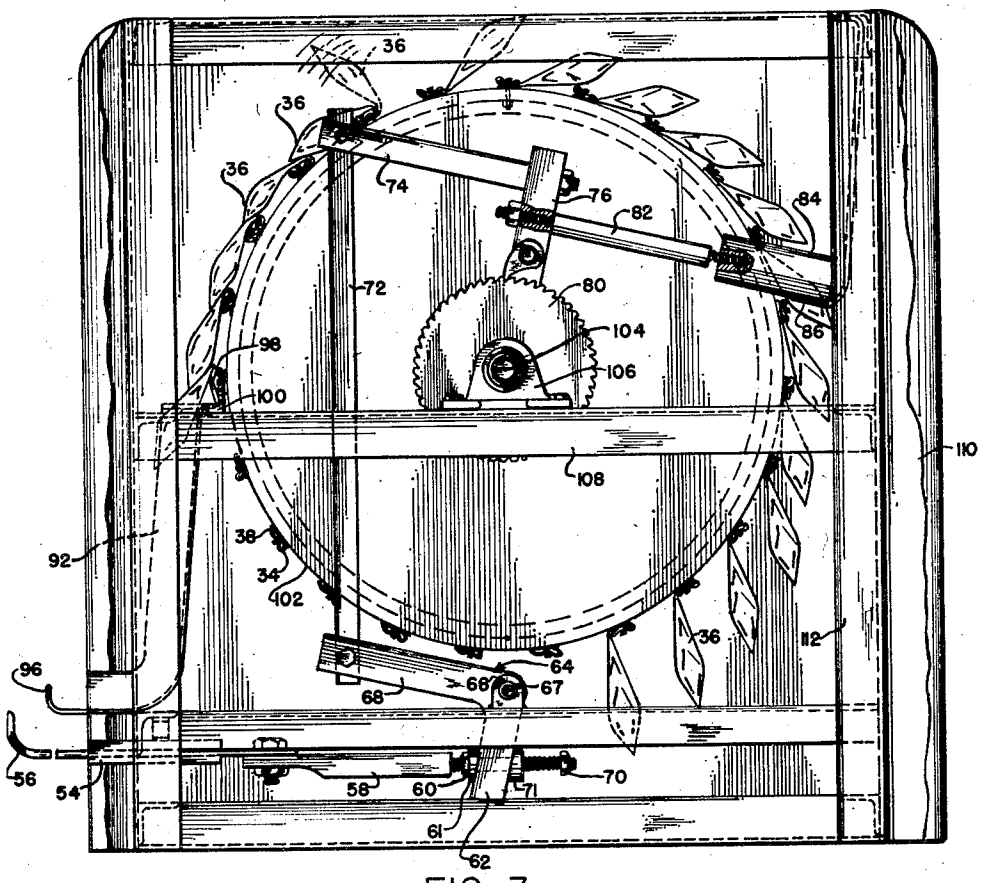


FIG-3

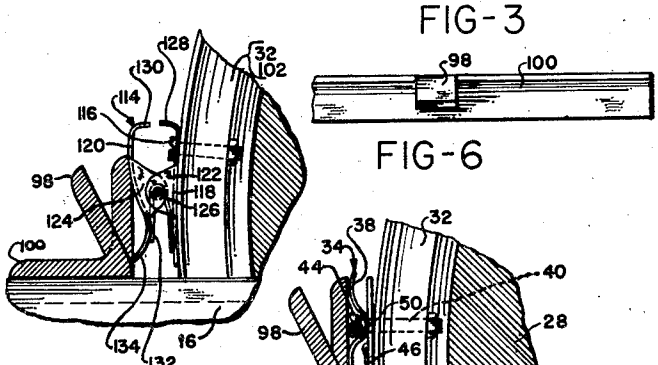


FIG-7

FIG-6

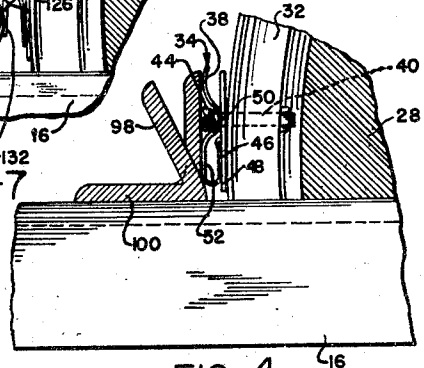


FIG-4

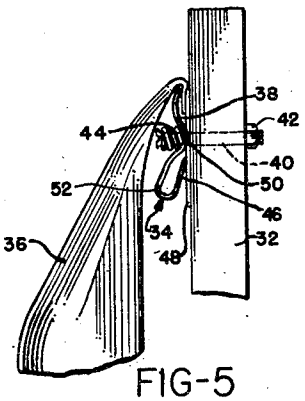


FIG-5

INVENTOR.
RUSSELL W. WILSON
RUSSELL J. MILLER
BY PAUL P. LONG

ATTORNEY

April 23, 1957 R. W. WILSON ET AL 2,789,726

DISPENSING MACHINE

Filed June 16, 1953 5 Sheets-Sheet 3

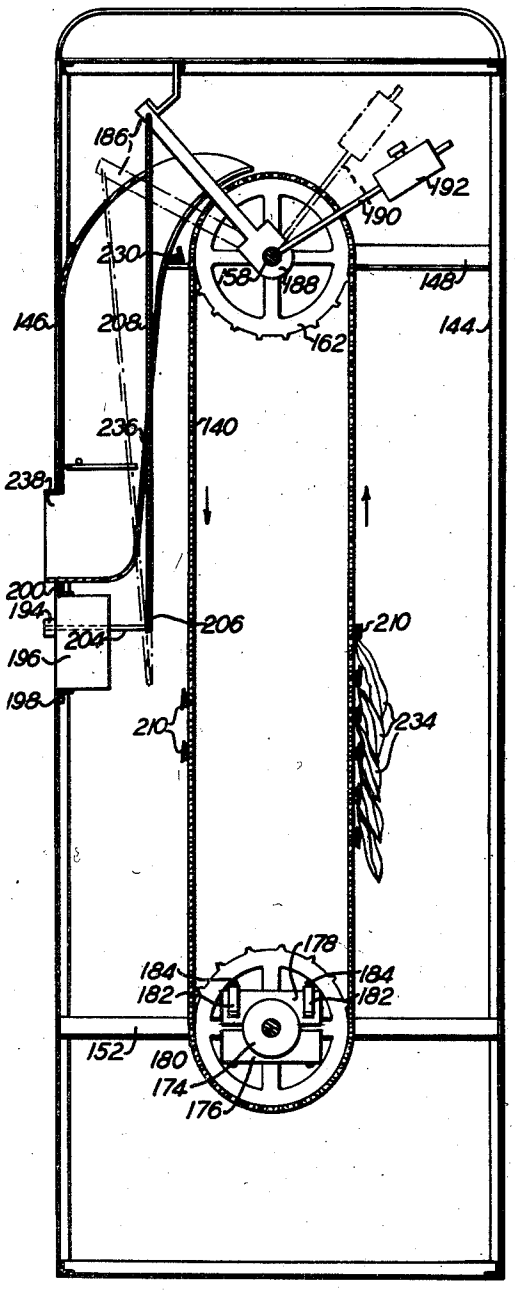


Fig. 8

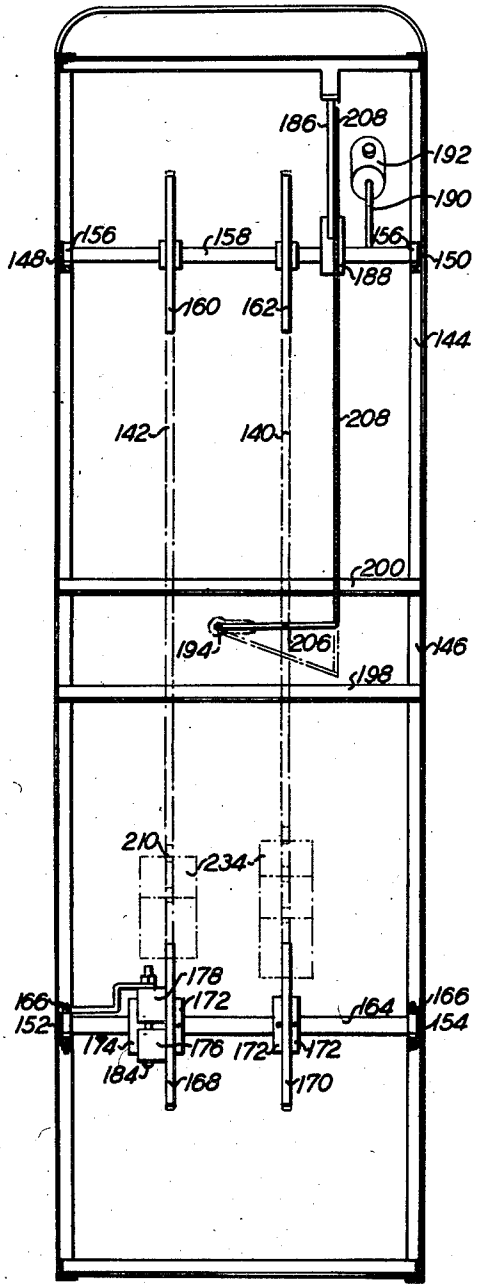


Fig. 9

INVENTORS
RUSSELL W. WILSON
RUSSELL J. MILLER
PAUL P. LONG

BY

ATTORNEY

April 23, 1957 R. W. WILSON ET AL 2,789,726

DISPENSING MACHINE

Filed June 16, 1953 5 Sheets-Sheet 4

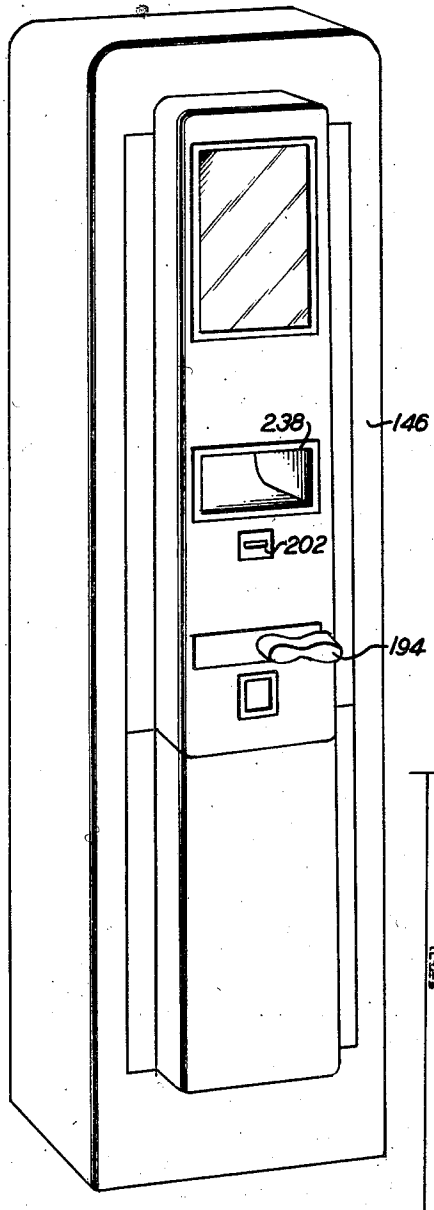


Fig. 10

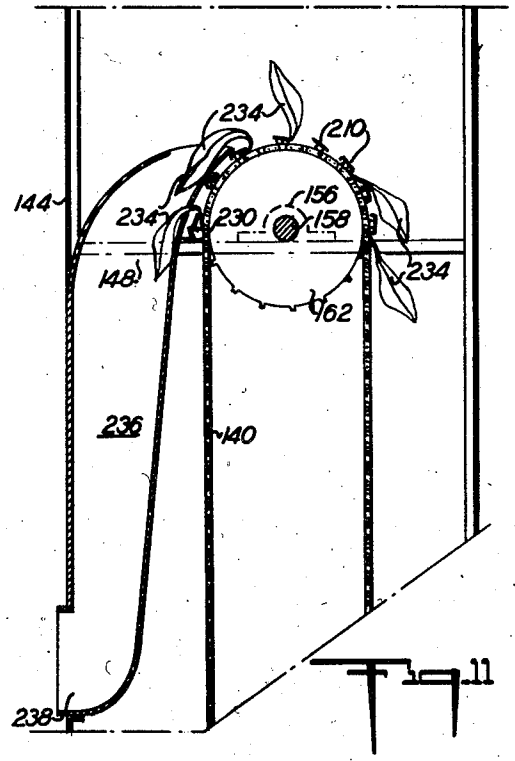


Fig. 11

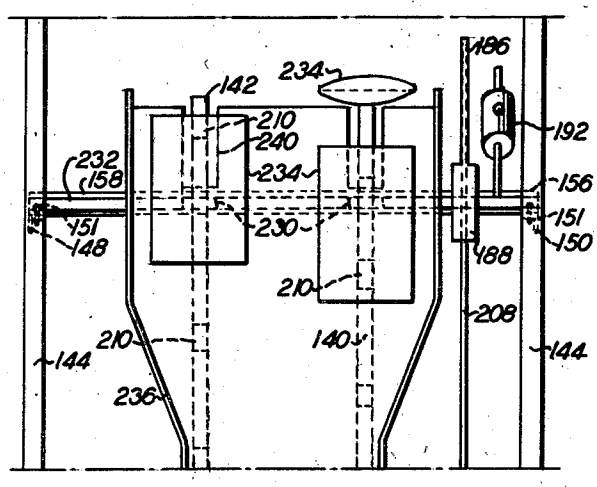


Fig. 12

INVENTORS

RUSSELL W. WILSON

RUSSELL J. MILLER

PAUL P. LONG

BY

ATTORNEY

April 23, 1957 R. W. WILSON ET AL 2,789,726

DISPENSING MACHINE

Filed June 16, 1953 5 Sheets-Sheet 5

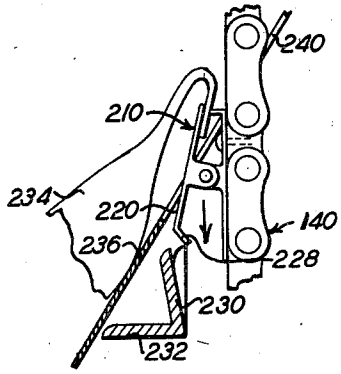


FIG. 13

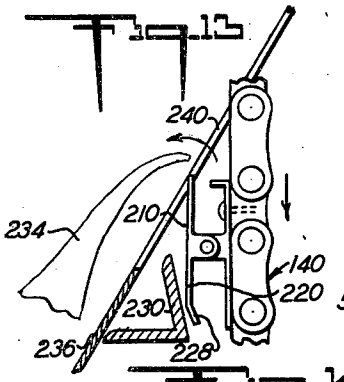


FIG. 14

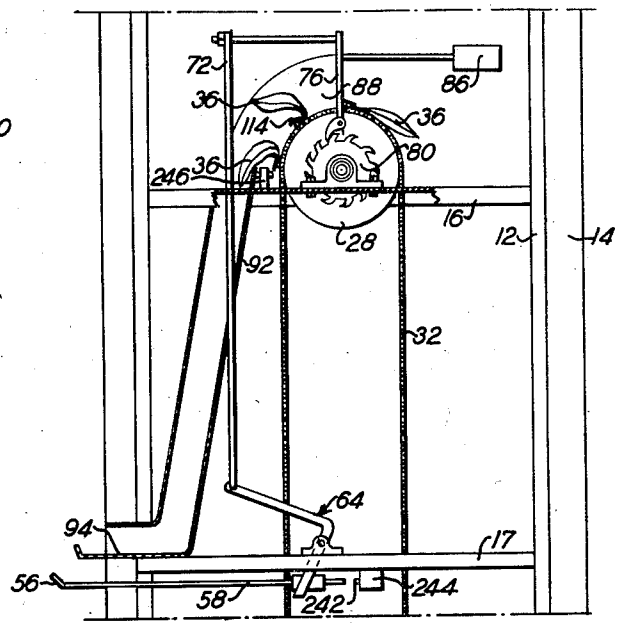


FIG. 16

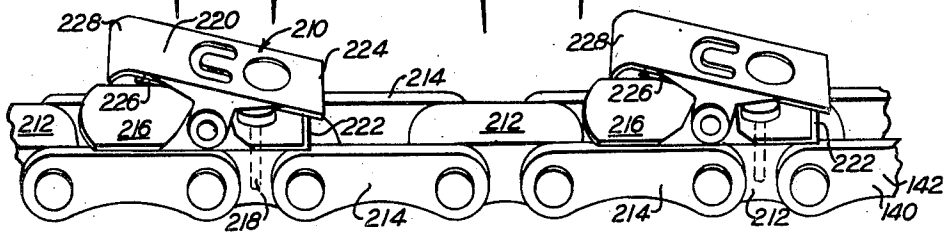


FIG. 15

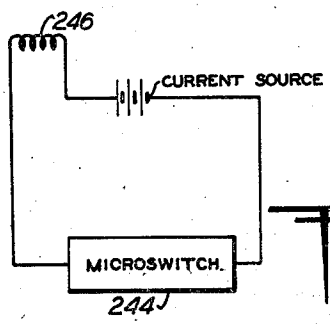


FIG. 18

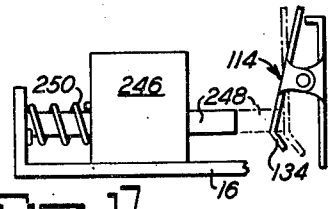


FIG. 17

INVENTORS
RUSSELL W. WILSON
RUSSELL J. MILLER
PAUL P. LONG

BY

ATTORNEY

United States Patent Office 2,789,726 Patented Apr. 23, 1957

2,789,726

DISPENSING MACHINE

Russell W. Wilson, York, Russell J. Miller, Seven Valleys, and Paul P. Long, York, Pa., assignors to El-Ge Vending Company, York, Pa., a corporation of Pennsylvania

Application June 16, 1953, Serial No. 362,058

11 Claims. (Cl. 221—84)

This application is a continuation-in-part of pending application Serial No. 281,712, filed April 11, 1952, and now abandoned.

This invention relates to improvements in dispensing machines and more particularly to dispensing machines of the vending type which hold articles of merchandise and discharge the same upon manipulation of an actuating mechanism. In the preferred embodiment of the machine, the actuating mechainsm is coin controlled, said coin controlling mechanism per se being of conventional type however and not comprising part of the invention except as it comprises part of the actuating mechanism.

Many types of vending machines have been developed previously, particularly for dispensing articles of uniform size such as rolls or bars of candy, pieces or packages of gum, packages of cigarettes, and numerous other types of articles which are of regular and uniform geometric shape. Such machines frequently have hoppers or pockets for either receiving or holding and advancing the packages or articles to a discharge station and the regular shape of the package or article lends itself to the machine utilizing said shape conveniently in designing the machine and effecting its operation.

A very different and more complex problem is involved in developing a dispensing machine for holding and discharging packages of somewhat irregular shape such as bags or bag-like packages and particularly those which contain fragile material such, for example, as potato chips. The irregular shapes of packages such as bags do not readily lend the same to being stored in a hopper and discharged one at a time from the hopper for example. If a jostling mechanism is used to agitate the packages so as to insure feeding of them from a hopper, the contents of the bags, if fragile, will be damaged and thus detract from the salability of the product. Potato chips are decidedly in this category. Similar products such as curled wafers of various kinds, cookies, crackers, fruit, and thin or fragile candy products on the market today are likewise in this category.

It is an object of the present invention to provide a dispensing machine operable to hold irregularly shaped packages of merchandise and especially bag or bag-like packages containing fragile merchandise such as potato chips in a manner wherein they will not be injured while stored and feeding of packages or bags of such merchandise to a discharge station is assured, whereby one of said packages or bags is discharged to a customer each time the actuating mechanism is manipulated.

It is another object of the invention to provide a dispensing machine which is relatively simple, inexpensive, durable and foolproof for holding individual packages or bags of merchandise in a manner so that they will not be crushed while stored in the machine and said bags sequentially are fed upon operation of the manipulating mechanism to a discharge chute.

It is another object of the invention to provide a dispensing machine which may easily be serviced and provides a maximum amount of space for storing the merchandise to be dispensed.

It is a further object of the invention to provide a simple and readily operable clip mechanism on movable carrier means, every clip being arranged to hold one or more packages or bags of merchandise, as desired, and upon said clips sequentially arriving at a discharge station, the clips are automatically operated to release the clipped merchandise for discharge to a customer, said releasing means being arranged to prevent damage to the contents of the package or bag.

Still another object of the invention is to provide several embodiments of dispensing mechanism using similar basic principles, said embodiments respectively being adapted to either relatively large or relatively small numbers of packages or bags of merchandise, as may be desired.

A still further object of the invention is to provide as a sub-structure of the main invention clips for holding a package or bag of merchandise on a movable member, said clips being simple in design and inexpensive to manufacture and also being readily adapted to being manipulated by a cam mechanism as relative motion takes place between the clips and cam.

Details of the foregoing objects and of the invention as well as other objects thereof are set forth in the following specification and illustrated in the accompanying drawings forming a part thereof.

In the drawings:

Fig. 1 is a front view of one embodiment of dispensing machine having principles of the present invention incorporated therein, part of the casing of said machine being broken away to show details of the mechanism within the casing.

Fig. 2 is a side view of the machine illustrated in Fig. 1, part of the casing in this figure also being broken away to illustrate details of the invention and certain elements of the machine likewise being in section for the same purpose.

Fig. 3 is a side elevation of another embodiment of dispensing machine having incorporated therein the principles of the present invention, part of the casing of said machine being broken away so as better to illustrate details thereof.

Fig. 4 is an enlarged, fragmentary, sectional view of cam releasing mechanism employed to operate clips on the merchandise holding means so as to release the merchandise from said clips, said view illustrating one of the clips being moved to open position in said figure.

Fig. 5 is a fragmentary enlarged side elevation of one of the clips holding a bag of merchandise to a supporting member in accordance with the present invention.

Fig. 6 is a top plan detail view of the releasing cam employed in both specifically illustrated embodiments of the invention.

Fig. 7 is a side elevation, partly in section, showing another embodiment of clip engageable by the releasing cam.

Fig. 8 is a sectional side elevation of a dispensing machine similar to that shown in Figs. 1 and 2 but in which the actuating mechanism is somewhat different in detail, this embodiment also illustrating a plurality of endless chains mounted on sprocket gears for purposes of supporting clips by which merchandise is releasably secured to said chains.

Fig. 9 is a sectional front elevation of the dispensing machine illustrated in Fig. 8, the front cover of the cabinet being removed in this view to show the details.

Fig. 10 is a perspective exterior view of the dispensing machine illustrated in Figs. 8 and 9.

Fig. 11 is a fragmentary sectional side elevation of the dispensing machine shown in Figs. 8 through 10 and illus-

trating the package handling and releasing function of the machine.

Fig. 12 is a fragmentary front elevation of the machine shown in Figs. 8 through 11, the front panel of the casing being removed in this view.

Fig. 13 is a fragmentary side elevation partly in section, illustrating on a larger scale than in the previous figures, one of the package securing clamps immediately prior to releasing a package from the supporting and feeding chain.

Fig. 14 is a view similar to Fig. 13 but illustrating the package securing clamp cammed into open position to release a package.

Fig. 15 is a perspective view illustrating a section of the chain and package securing clamps carried thereby in the embodiment shown in Figs. 8 through 14.

Fig. 16 is a fragmentary sectional side elevation of another embodiment of dispensing machine utilizing a solenoid clip releasing means.

Fig. 17 is a fragmentary enlarged side elevation of the solenoid releasing means illustrated in Fig. 16.

Fig. 18 is a diagrammatic illustration of the circuit included in the embodiment of the invention illustrated in Figs. 16 and 17.

Referring especially to Figs. 1 and 2, one embodiment of dispensing machine **10** employing the principles of the present invention is illustrated therein. This embodiment is of a type adapted to hold a relatively large number of packages or bags of merchandise. Suitable supporting structure for the mechanism is afforded by a frame **12** enclosed by a casing **14**. The casing **14** may have a suitable door provided in either one side, the front, or the back to permit access to the interior of the machine for servicing such as loading the machine with merchandise. Such door is not actually shown in the drawings but it may be located at any convenient position and be of any desirable size. The frame **12** includes pairs of spaced cross-members **16** and **18** to which bearings **20** and **22** are fixed. Either the top or bottom bearings and preferably the bottom bearings **22** are of the adjustable type in the preferred embodiment of the invention for purposes to be described.

Shafts **24** and **26** are pivotally supported at the ends thereof respectively in bearings **20** and **22**. Fixed to each shaft intermediately of the ends thereof are pulleys **28** and **30**, preferably of the V-type. Extending around and between said pulleys, as shown in Figs. 1 and 2, is an endless flexible member such as a belt **32** which is also preferably of the V-type. A composite rubber and fabric belt is well suited for the purpose but any other suitable material may be employed. Said belt may suitably be tensioned by the adjustable bearings **20** or **22** or, if desired, the lower cross-members **18** may be adjustably mounted relative to the frame **12** to effect such tensioning.

Secured to the belt **32** is a plurality of preferably evenly spaced clips **34**, one embodiment of which is shown in Figs. 4 and 5. The specific type of clip shown herein is well adapted for the purpose of securing a portion of a bag or other type package **36** containing merchandise to the belt **32**. It will be understood of course that the present invention is not limited to the exact shape of clip **34**, however, since other shapes may conceivably be operable to achieve the desired purposes of the clip illustrated herein within the spirit of the invention. Clip **34** comprises a curved clamping finger **38** arranged at one end of the clip and constructed so as to form an effective clamping of the top, for example, of a bag of fragile merchandise such as potato chips **36** between said finger and the outer surface of the belt **32**. Intermediately of their ends, the clips **34** are apertured to receive securing means such as a bolt **40** which extends either into or through the belt **32** to secure each clip **34** to the belt. The end of the bolt opposite the headed end may either receive a nut **42** or be peened, against a washer or otherwise, so as to attach the clip **34** to the belt. Preferably, elastic means such as a coiled spring **44** surrounds the headed end of the bolt **40** so as resiliently to urge or bias the clip **34** against the outer surface of the belt **32** as clearly shown especially in Fig. 5.

The end of the clip **34** opposite the finger **38** is bent upon itself to provide a biasing leaf **46**, the free end of which is engageable with either the outer surface of the belt **32** or, preferably, a metal bearing plate or washer **48** which is secured between the clip **34** and the belt **32** by the bolt **40**. In the specific construction shown in Figs. 5 and 6, the clip **34** is preferably formed from resilient material such as spring steel, brass, or the like, whereby the leaf **46** cooperates with the spring **40** to bias or urge the finger **38** against the outer surface of the belt **32** and thereby effectively but releasably clamp one end or other portion of a bag **36** to the belt **32**. That is, the end of the leaf **46** bears against the plate **48**, thereby urging said end of the clip away from the belt and the finger **38** into engagement with the belt, spring **44** also aiding in such urging. The intermediate portion **50** of the clip is preferably curved as shown in Figs. 5 and 6 and acts as a fulcrum for the clip.

Bags **36** or other packages of either regular or irregular shape and containing merchandise may readily have ends or other portions thereof clamped to the belt **32** by manually pressing the bite portion **52** of the clip toward the belt, thereby pivoting the clip about its fulcrum **50** and moving the finger **38** away from the outer surface of the belt. The end of the bag, for example, is then inserted in the space between the belt and finger and, upon releasing the bite portion **52**, the package or bag is securely attached to the belt against the outer surface thereof. As the belt is loaded through the loading door, it is gradually fed around the pulleys until substantially the entire belt is loaded. This arrangement affords a means for storing a relatively large number of bags within a compact space wherein the bags are suspended pendant-like in overlapping manner resembling shingles and the merchandise within the packages or bags, especially if fragile such as potato chips, is not damaged as it would be for example if the bags were merely stored on top of each other in a hopper. Due also to the clip ararngement described above, and the space within the cabinet between the belt and the front and rear walls of the cabinet, bags of a relatively wide range of sizes may be accommodated. It will be understood of course that the machine should be loaded at any one time with bags or packages of the same size. However, the machine lends itself to being loaded, for example, at any one time, with bags of either five or ten cent size, or any other price size within reason, whereby the machine can be operated preferably by using a single coin of the required denomination.

The actuating or feeding mechanism for the belt will now be described. The preferred embodiment of the invention contemplates the use of a conventional coin controlled unit **54** having a slide type, manually operable plunger **56** which projects forwardly from the front of the cabinet or casing **14**. Upon inserting a coin, within the opening provided therefor in unit **54**, the plunger **56** is pushed inwardly to cause inward movement of a bar **58** interconnected to the slide. Bar **58** has an abutment such as a nut **60** threadably mounted thereon which is engageable with a boss **61** on relatively short leg **62** of a lever comprising, in the specific construction shown herein, a bell crank **64** which is pivotally supported at **66** by a shaft **67** extending between and supported by the cross-member **17**. The relatively short leg **62** of the bell crank is connected at its bend or angle with a relatively long leg **68**.

Bar **58** also carries a second abutment such as nut **70** which is fixed thereto and arranged to abut boss **71**, there being a space between the abutments **60** and **70** and the portion of the bar **58** between the abutments passes freely through a suitable opening in the end of the shorter leg **62** of the bell crank and bosses **61** and **71** to afford a

certain amount of lost motion. This lost motion is preferably provided so that when anyone tampers with the plunger **56** without using a coin, the portion of the bar **58** between the abutments **60** and **70** merely idly moves relative to the short leg **62** of the bell crank and no feeding of the belt **32** is possible. It is only when a coin is inserted in the unit **54** and the plunger is moved only a relatively short distance, frequently of the order of 1" or so, past the amount of the free play or lost motion movement that the abutment **60** is moved into engagement with the short leg **62** of the bell crank so as to move it counterclockwise as viewed in Fig. 2 and thereby move the outer end of the long leg **68** in the direction of the arrow shown in Fig. 2. The movement of the long leg **68** by short leg **62** comprises a motion multiplying function, whereby a relatively small movement of the end of short leg **62** will provide a relatively longer or greater movement of the outer end of the long leg **68**. Also, the bell crank **64** serves to translate motion in one direction to motion in another direction at an angle to the first direction, thus permitting compactness in this machine.

Pivotally connected to the outer end of the long leg **68** is one end of a link **72**, the other end of the link being pivotally connected to one end of an arm **74**. Arm **74** is fixed at its other end to a second or ratchet arm **76**, the opposite end of which is rotatably supported by shaft **24**. Intermediately of the ends of second arm **76**, a pawl **78** is pivotally mounted which is engageable with the teeth of a ratchet wheel **80** that is fixed to shaft **24**. Pawl **78** is spring pressed into the notches between the teeth of the ratchet wheel **80** in accordance with conventional practice.

A counterweight arm **82** is also fixed to second or ratchet arm **76**, the weight **84** being adjustable on arm **82** and is also engageable with a stop **86**, supported by one of the cross-members **16** so as to limit movement of the pawl **78** and second arm **76** in clockwise direction as viewed in Fig. 2. The stop **86** may be adjustable in height to vary the travel of the pawl arm to correspond with the spacing of the clips **34**, whereby one or more bags or packages may be advanced by said actuating mechanism upon each actuation thereof, as desired. From the foregoing and especially by referring to Fig. 2, it will be seen that inward movement of the plunger **56**, when made following for example the insertion of a coin into the control unit **54**, will cause rotation of the bell crank **64** in counterclockwise direction relative to Fig. 2 and thereby effect downward movement of link **72** so as to impart sufficient movement to the ratchet wheel **80** that the belt **32** is advanced by the pawl **78** a distance substantially equal to the space between a successive pair of clips **34** or even multiples thereof as where more than one bag or package is to be discharged as described hereinafter.

Plunger **56** is preferably moved inward rather quickly and such movement, due to the motion multiplying effect of bell crank **64** explained above, will cause more rapid movement of the pulley **28** and correspondingly of the belt **32**. Such rapid movement of the belt, through the effect of centrifugal force imparted to the bag **36** moving around the upper portion of pulley **28** at the time as shown in Fig. 2, will cause said bag to flip from a position where it hangs in one direction relative to the clip to a position where the bag is hanging in the opposite direction.

Inasmuch as the clips **34** are preferably made of relatively narrow material of the order of ¼" to ⅜" for example, there might be some possibility of the bags or packages **36** becoming slightly disarranged to their normal path of movement during such movement. Accordingly, to insure that the bags will be properly positioned while moving around the upper pulley **28** particularly, a pair of spaced guide shields **88** are provided, these guide shields being of any suitable material such as metal and preferably flared at their entrance end particularly so as to insure that the bags or packages will be flipped over into alignment with the entrance end **90** of a discharge chute **92**. As will be seen from Fig. 2, the guide shields **88** are arcuate and extend through an arc of at least 90°.

The discharge chute **92** is fixed at its upper end to the cross-members **16** and extends slopingly downward and outward toward the front of the casing as shown in Fig. 2, terminating in a discharge end **94** and communicating with a suitable exit opening in the casing **14**. Preferably, a safety lip **96** is provided to prevent the discharged bag or package of merchandise from falling upon the floor. Gravity causes a package or bag of merchandise to travel down the chute **92** after it is released from the belt **32**.

Simple and effective means are provided for causing release of the bags or packages of merchandise from the belt **32** as they approach the entrance end of the discharge chute **92**. One form of said releasing or discharging means comprises a fixed cam **98** which may simply be formed by utilizing a piece of angle iron **100** extending between and fixed at its ends to two of the side cross-members **16**. Intermediately of the ends of the angle iron **100**, the vertical flange is cut at two spaced positions to provide the cam **98** which is merely the portion of said flange between said cuts bent at an acute angle to the remainder of said flange, as shown in Figs. 4 and 6, to comprise clip actuating means. During the movement of the belt **32** relative to the cam **98**, the bite portion **52** of the clip **34** slidably engages the face of cam **98** and automatically causes the bite portion to be compressed as shown in Fig. 6, thereby causing the clamping finger **38** of the clip to be moved away from the outer surface of belt **32** and the clamped end of the bag or package **36** is thus released from the belt **32**, being discharged into the chute **92**.

This releasing operation takes place while the belt is being moved as a result of inward movement of the plunger **56** and movement of the plunger **56** is sufficient to cause the advancement of one or more bags or packages of merchandise to the cam **98**, as desired, whereupon the same are released from the belt **32** and move to the exit end **94** of the discharge chute. The clip **34** which has been actuated as aforesaid to release the bag or article of merchandise continues to move past the cam **94** and is restored to its normal position as indicated in Fig. 5 but of course no bag of merchandise will be clamped thereby until the machine is reloaded.

After merchandise has been released and discharged as aforesaid, the plunger **56** will be disengaged by the customer and the counterweight **84** will cause the feeding mechanism linkage and arms to be moved in reverse direction to that in which they moved while advancing the belt **32** to the cam **98**. To prevent reverse movement of the belt and pulleys during such return, a one way clutch or brake **101** engages shaft **24** so as to permit it to rotate in feeding direction only. The mechanism will then be in position for another coin to be inserted and the above described cycle may be repeated to effect the discharge of another bag or package from the machine.

The present invention also lends itself to being applied to another embodiment of machine illustrated in Fig. 3 wherein a cylindrical drum **102**, formed from suitable material such as wood or metal, is fixed to a shaft **104** supported at its ends in spaced bearings **106**. Said bearings are supported on cross-members being supported by a frame **112**. In this embodiment, an operating plunger **56** is associated with a coin controlled unit **54** as in the above described embodiment shown in Figs. 1 and 2. Similarly, bar **58** is slidably movable by plunger **56** to effect counterclockwise movement of bell crank **64** for purposes of actuating link **72**. Mechanism similar to that shown in Figs. 1 and 2 causes stepwise movement of the ratchet wheel **80** so as correspondingly to cause sequential advancement of merchandise clipped by the fingers **38**

of the clips **34** and the outer surface of the drum **102** and cause them to drop into discharge chute **92** so that they may be removed from the discharge end of the chute **92** by the customer.

The principal difference between the embodiments shown in Figs. 1 and 2 and Fig. 3 is that the embodiment shown in Figs. 1 and 2 is adapted to contain a relatively larger number of bags or packages of merchandise than the machine embodied in Fig. 3 since the latter utilizes a drum and the former utilizes a belt of greater length than the periphery of the drum for holding bags or packages of merchandise. Obviously, the diameter of the drum **102** may be varied and thereby permit the same to hold smaller or larger numbers of bags or packages, depending too upon the size of the bags or packages. In the embodiment shown in Fig. 1, the belt **32** may be made as long as feasibly possible, depending particularly upon the height of the casing **14** and the space in which the casing is to be accommodated within a room for example.

When the dispensing machine is used for purposes of holding and dispensing bags or packages of perishable merchandise, it is usually best practice not to arrange the machine to hold too great a supply, so that the supply is soon exhausted and frequent replenishing of the machine with fresh merchandise is required. Further, suitable signal means may be utilized to indicate the supply is exhausted and permit return of a coin or prevent insertion of a coin.

Aside from the capacity aspect of the several embodiments of the invention, the operating mechanism is generally the same and the manipulation thereof is likewise similar. Thus, it is possible to provide substantially similar operating mechanism for either type of embodiment with the exception perhaps of the length of the links **72**. Further, the embodiment shown in Fig. 3 readily lends itself to being placed upon a counter, whereas the embodiment shown in Figs. 1 and 2 is best suited for being supported upon a floor surface. One additional embodiment not illustrated herein also comprises a relatively rigid elongated rod-like carrying or supporting member having clips spaced thereon and advanced by ratchet teeth thereon operable, for example, by a pawl attached to the free end of long leg **68** of bell crank **64**, all within the spirit of the present invention.

It will also be understood that the shafts for supporting either the pulleys **28** and **30** as well as the drum **102** in the several embodiments may be supported by bearings affixed directly to the side panels of the casing **14** or **110** and the other shafts in the operating mechanism may likewise be supported directly by the side panels of the casings if desired. By such arrangement, the cost of manufacturing the machines may be somewhat lessened as compared with the arrangement specifically shown in Figs. 1 through 3.

To aid in retaining the mechandise within the machine in as fresh, crisp, and salable condition as possible, particularly in regard to foodstuffs such as potato chips, popcorn, various forms of fried or other types of puffed snack products, wafers of many kinds, cookies, crackers, candy and the like, it is desirable to prevent the occurrence of undue humidity or undesirable odors within the cabinet casing **14**. To reduce humidity to a minimum, any convenient type of moisture absorbing substance, of which silica gel is one convenient form, may be placed preferably within a central location within the casing in a suitable container, not shown.

The movement of the packages of merchandise will serve to keep the atmosphere within the casing somewhat agitated, thus rendering the moisture absorbing substance efficient. The use of a heating element, not shown, such as electric resistance means or a lamp bulb will warm the casing interior and aid in the absorption of moisture by the aforementioned substance as well as otherwise evaporating and dissipating moisture. Undesirable odors may be absorbed for example by placing a holder containing activated carbon, not shown, within the casing **14**.

The present invention also contemplates the use of another embodiment of clip illustrated in Fig. 7. The clip **114** shown therein in detail may be fastened to the support such as belt **32** or drum **102** by a bolt **116** passing through an aperture in one finger or leg **118** of the clip and the belt or drum, as shown, so as rigidly to clamp said leg thereto. It will be understood that a plurality of such clips will similarly be fastened in spaced relationship to the belt **32** or drum **102** as in the embodiments shown in Figs. 1 through 3. The clip **114** also comprises a clamping finger or leg **120** which is pivotally connected to leg **118** by pairs of ears **122** and **124** bent substantially perpendicularly respectively to the legs **118** and **120** intermediately of the ends thereof, said ears being apertured to receive a headed pin **126** passing therethrough and comprising a pivot pintle for the leg **120** particularly.

Since finger or leg **118** of each clip is rigidly secured to the support such as belt **32** or drum **102**, the clamping leg **120** of each clip is the only one which is movable relative to the supporting member and, in effect, the leg **118** and gripping end **130** thereof might be considered part of the support such as belt **32** or drum **102**. The gripping ends **128** and **130** of the legs preferably are bent inwardly toward each other and are serrated so as more firmly to engage a portion of a package of merchandise clipped therebetween. Said gripping ends are constantly urged toward each other by a spring **132** bent or coiled around pin **126** in such manner that the ends thereof extend along the inner surfaces of legs **118** and **120** as shown in Fig. 7, thereby constantly urging the tail **134** of clamping leg **120** away from the corresponding end of rigidly clamped leg **118**.

A portion of a package of merchandise such as the folded end of a bag may be clamped between the gripping ends **128** and **130** of the legs by manually pressing the tail **134** toward the supporting member **32**, **102** or straight bar type, thereby separating the gripping end **128** from end **130**. Upon releasing the tail **134**, the end **128** is moved toward end **130** by spring **132** and the package is thereby firmly clamped between said ends.

Automatic release of the packages held by clips **114** is effected, as in the embodiment of the clip shown in Figs. 1 through 5, by the tails **134** of the movable leg **120** of each clip being moved succesively past cam **98**, as shown in Fig. 7, as a result of movement of the supporting member by the actuating mechanism therefor. The tails are depressed by the cam, thereby moving gripping end **130** of claimping leg **120** away from gripping end **128** of leg **118** and the thus released package falls by gravity from the clip and down the discharge chute **92**. Basically, therefore, the function of clips **114** is very similar to clips **34**, the same being alternatives.

It will further be understood that a single cabinet or casing **14** or **110** may contain either a plurality of belts **32** mounted side by side on sets of pulleys therefor or circular parallel rows of clips mounted on either a single wide drum **102** or respectively on a plurality of adjacent drums. If desired, the plurality of belts or rows of clips on a drum or drums may have the clips staggered, for example, in adjacent rows, and the cams **98** provided for each row thereby alternately will release packages from the several rows of clips and discharge them into either a common discharge chute or separate chutes, as desired. In such an arrangement only a single actuating mechanism is required to actuate all the rows of clips. However, obviously, separate actuating mechanisms may be provided for each row of clips, if preferred.

In addition to the several embodiments of dispensing machines illustrated in Figs. 1 through 7 and described hereinabove as well as in application Serial No. 281,712, the principles of the present invention may be utilized

in the embodiment of a dispensing machine illustrated in Figs. 8 through 15. In the latter embodiment, a plurality of endless chains **140** and **142** are specifically shown and are arranged side by side as best illustrated in Figs. 9 and 12. A fragmentary portion of one of said chains is illustrated in detail in Fig. 15, wherein it will be seen that the specific illustration comprises, for convenience, a conventional bicycle chain.

The frame **144** supports the components of the mechanism and is enclosed by a suitable casing **146**. A plurality of cross-members **148** and **150** comprise part of the upper portion of the frame **144** and parallel, lower cross-members **152** and **154** also comprise part of the frame. The upper cross-members **148** and **150** respectively support bearings **156** and the opposite ends of upper shaft **158** are rotatably supported therein. Fixed to shaft **158**, in spaced relationship to each other, is a pair of sprocket gears **160** and **162**. The chains **140** and **142** pass around said sprocket gears as clearly shown in Figs. 8, 9 and 11.

The opposite ends of a lower shaft **164** preferably are fixed respectively to the lower cross-members **152** and **154** by any suitable means such as bolts **66**. A pair of lower sprocket gears **168** and **170** are mounted on shaft **164** for free rotation. Suitably spaced sprocket positioning collars **172** are fixed to shaft **164**. Sprocket gear **168** also has a brake drum **174** welded or otherwise secured thereto, said brake drum extending through a complementary opening formed in a pair of brake members **176** and **178**. The brake members **176** and **178** are preferably formed from wood and are slightly spaced apart, the same preferably having the brake drum receiving opening lined with frictional material **180** such as conventional automobile brake lining. Secured to cross-member **152** is a pair of brackets **182**, the inner end of each bracket being secured to brake member **178** by a pair of bolts **184** which extend through said brackets and both brake members **176** and **178**. These bolts not only maintain the brake members positioned relative to the brackets but the nuts on one end of each bolt are adjustable to afford the desired amount of friction between the brake members and brake drum **174**. Said friction is sufficient to permit rotation of the sprocket gear **168** in feeding direction by the actuating mechanism, to be described, but also prevents overrun or backlash movement of the sprocket gear **168**. Inasmuch as sprocket gear **168** is connected by chain **142** to upper sprocket **160**, and sprocket gears **160** and **162** are both fixed to shaft **158**, it follows that prevention of overtravel or backlash movement of the sprocket gear **168** will likewise be prevented in the chains **140** and **142**.

Movement of the chains **140** and **142** in feeding direction is achieved by means of arm **186** which is connected at one end **188** to upper shaft **158**. Said end **188** is enlarged and encloses conventional ratchet mechanism, such as in a ratchet wrench, which is operable in such manner that when the outer end of arm **186** moves in the direction of the arrow shown in Fig. 8, the shaft **158** will be moved correspondingly. Also secured to and projecting radially from upper shaft **158** is a counterweight arm **190**. An adjustable counterweight **192** is mounted on the outer end of arm **190** and may be maintained in any desired position by a suitable set screw. The purpose of the arm **190** and weight **192** is to return the arm **186** to starting position following a complete feeding movement thereof. The ratchet nature of end **188** of arm **186** will permit readily such return movement of said arm **186** while shaft **158** remains stationary.

In this embodiment of dispensing machine, a pivotally supported actuating handle **194** is mounted on the exterior of the casing **146**. Said handle is connected to a shaft projecting from a coin-controlled mechanism **196** which may be of any suitable commercial type, the exact nature thereof not comprising part of the present invention. Mechanism **196** is supported between a pair of cross-bars **198** and **200** which extend between two of the vertical members of frame **144**. A coin slot **202**, shown in Fig. 10, is formed in mechanism **196** and it will be understood that when a suitable coin is introduced into said mechanism, the handle **194** will be connected to a shaft **204** which projects into the casing **146** from the mechanism **196**. Connected at one end to shaft **204** is a radially extending arm **206** which is best shown in Fig. 9. Extending between the outer end of arm **204** and arm **186** is any suitable connecting means such as a chain **208**, the opposite ends of which may be affixed to said arms by suitable wire loops or otherwise. It thus will be seen that when handle **194** is moved in the direction of the arrow shown in Fig. 9, arm **206** will pull the outer end of ratchet arm **186** downward and thereby effect a feeding movement of the chains **140** and **142**. Movement of arm **186** in feeding direction may be arrested, if desired, by engagement with cross-bar **232**, to be described hereinafter, or by an adjustable stop supported thereby. At the completion of such feeding movement, and upon handle **194** being released by the operator, the counterweight **192** will raise arms **186** and **206** to the starting or full-line position thereof shown in Figs. 8 and 9.

Each of the chains **140** and **142** has a plurality of package or article clamping clips **210** secured thereto in spaced relationship to each other longitudinally of said chains. In the specific illustration shown in Fig. 15, each chain comprises a series of blocks **212** which are connected to each other by pairs of links **214**. In supporting bags of potato chips, for example, on said chains, it has been found that clips secured to alternate blocks **212** afford an adequate spacing of the clips **210**. However, it will be understood that said spacing of the clips may be varied to suit the particular bags or packages of articles or merchandise to be supported by said clips upon said chains.

The clips **210** may be of any appropriate nature and in the embodiment presently being described, said clips are similar to those illustrated in Fig. 7 in the foregoing embodiments. The clips **210** preferably comprise a clamping leg **216** which is secured by a rivet or bolt **218** to one of the blocks **212** of the chain. Pivotally secured to leg **216** is a movable clamping leg **220** which is substantially parallel to the chain to which the clip **210** is secured. Clamping leg **216** of each clip preferably has a transversely extending end **222** which cooperates with the clamping end **224** of leg **220**. A spring **226** maintains the clamping ends **222** and **224** of the clips in clamping engagement with each other for purposes of clamping any suitable portion of a bag or package of merchandise such as an end, corner, or a label or tab affixed thereto. The other end **228** of each clamping leg **220** is preferably curved toward clamping leg **216** so as to form a suitable camming surface which is slidably engageable with releasing cam **230**. The latter releasing cam normally is fixed relative to the frame **144**, said cam **230** preferably comprising a section of one web of an angle arm bar **232** which extends between cross-members **148** and **150**, as in the embodiments shown in Figs. 1 through 7. The ends of bar **232** may be attached to cross-members **148** and **150** by bolts **151**. One of said bolts is preferably arranged so as easily to be disconnected and thereby permit swinging of the bar **232** and the releasing cams **230** from the operative position of said cams. If desired, a fixed pin on one of the cross-members may be substituted for one of said bolts **151**, in which event the end of bar **232** held by said pin may simply be lifted from said pin to permit pivotally moving said bar to inoperative position as aforesaid. Thus, when the machine is being loaded with the bags or packages **234**, it may be desirable to move the chains **140** and **142** freely, especially in feeding direction, without causing release of previously attached bags or packages from the clips. Further to facilitate

such movement of the chains, the feed chute **236** may be removed readily, if desired.

Exemplary bags **234** of merchandise, such as potato chips for example, are clamped at one end by clips **210** to each of the chains **140** and **142**. As best shown in Fig. 12, the clips on the respective chains **140** and **142** are mounted in staggered relationship to each other so that successive feeding movements of shaft **158** by arm **186** will alternately release clips on the chains **140** and **142**. Thus, while a plurality of chains are embodied in the dispensing mechanism shown in this embodiment, preferably only one bag or package is released upon each feeding movement of the shaft **158**. Movement of said shaft can be limited and varied by suitable fixed or adjustable stops engageable by arm **186**, for example.

It is to be understood too that the coin-controlled mechanism **196** may be of such type as to accommodate a variety of coins. In this event, if a basic coin such as a nickel is inserted in the slot **202**, only a single bag or package of merchandise will be released upon each actuation of the handle **194**. However, if for example, a dime is inserted in slot **202** or in another slot provided specifically to accommodate dimes, the mechanism **196** may be such that it will then afford greater movement of handle **196** and correspondingly greater movement of arm **186**, whereby two bags or packages will be released by a single movement of handle **194**. It will be seen from the foregoing that the present invention is capable of either a single or multiple discharge of packages or bags of merchandise in accordance with the value of coin inserted in the mechanism **196**.

Although a plurality of chains **140** and **142** are provided in the present embodiment of dispensing machine, only a single discharge chute **236** preferably is provided. The upper end of said chute, as shown in Fig. 12, is made sufficiently wide to accommodate the bags on both of the chains **140** and **142**. Said chute extends from the upper sprocket gears **160** and **162** to the discharge opening **238** in the casing **146**. Chute **236** may be supported by detachable engagement with bars **232** and **200**, and the upper end of the chute is also provided with a plurality of slots **240** which accommodate portions of the sprocket gears **160** and **162** as well as the chains **140** and **142** and the clips **210** thereon. Said slots are best illustrated in Figs. 8 and 12 through 14. Referring to Figs. 11 and 12 particularly, it will be seen that the slots **240** afford a stripping action which assures separation of the clipped ends of bags **234** from the clips **210** and the chain after the clips engage the cams **230** so as to open the same. This function is illustrated in its sequences in Figs. 13 and 14. In Fig. 13, the clip has not engaged the cam and the upper end of the bag **234** still is clamped but the bag is resting on chute **236** ready to be released. In Fig. 13, the cam has opened the clip to release the bag and the opened clip also has been moved through slot **240** in chute **236**, the edges of slot **240** incidently engaging the bag to insure the stripping thereof from the clip. In Fig. 14, it will be seen the bag **234** has been released from the clip and is sliding down chute **236**. If desired, a pilfer-proof means such as a pivoted blade, not shown, may be provided in chute **236** to prevent unauthorized access to the upper end of the chute. The lower, discharge end of the chute extends through discharge opening **238** in casing **146**. Preferably, the front panel of the casing comprises the loading door, whereby the chute **236** may be removed readily to load the machine.

As is best shown in Fig. 8, the elongated packages or bags such as **234**, for compactness, are preferably arranged in overlapping or shingle-like formation, said bags or packages hanging downward from the clips on the chains **140** and **142**, similarly to the arrangement shown in the embodiment illustrated in Fig. 2. The generally parallel arrangement of the clips to the movable chains also provides maximum compactness of the clamped bags or packages within the casing of the machine. When the actuating handle **194** is moved, following the insertion of a coin, the chains **140** and **142** will be moved in feeding direction rather briskly and such movement causes the bags or packages positioned adjacent the top of sprocket gears **160** and **162** to be flipped counterclockwise, as shown in Fig. 11, so as to change the position of the package or bag from hanging in one direction relative to the clips **114** to hanging in the opposite direction. Such flipping action of the bags or packages **234** effectively will dispose the same upon the upper end of discharge chute **236** without damage to the contents, particularly since the spacing of the bags preferably is such that when a bag is flipped, it will contact a previously flipped bag which will cushion the contact. Thus, when the bags or packages **234** successively are released by cam **230** from the clips **210**, the released packages or bags will slide down chute **236** so that they may readily be removed through opening **238** by the customer.

Further, while the present illustration shown in Fig. 12 particularly indicates a pair of chains for supporting merchandise and a single discharge chute to accommodate released bags or packages from either chain, it is to be understood that any reasonable number of chains or other similar supporting and conveying means for releasably holding bags or packages of merchandise may be used within a single casing in accordance with the principles of the present invention.

In the several embodiments of the invention described hereinabove, the merchandise supporting clips are opened to release the merchandise upon said clips engaging in sequence a fixed cam means. Other types of clip releasing means are possible in lieu of such cam. One example of another type of releasing means is illustrated in the embodiment of dispensing machine illustrated in Fig. 16. Said machine is similar to that illustrated in Figs. 1 and 2 insofar as the belt advancing mechanism is concerned. The specific releasing means to be described is not restricted by its nature however for use only with said specifically illustrated machine. The belt actuating mechanism illustrated in Fig. 16 corresponds to that shown in Fig. 2 and repetition of such description will not be made insofar as the novel clip releasing means is concerned.

Referring to Fig. 16, when the plunger **56** is moved inward to actuate the bell crank **64** for purposes of advancing pulley **28** and belt **32** supported thereby, the bags or packages **36** of merchandise positioned at the top of the pulley **28** will be flipped, as shown in Fig. 16, from hanging downward in one direction to hanging downward in the opposite direction relative to the clip and incidentally be disposed upon discharge chute **92**. Preferably during the last portion of the inward movement of the plunger **56**, the inner end of bar **58** will engage the actuating member **242** of a switch **244** that is connected in a circuit including a source of electric current and a solenoid **246** positioned beneath the entrance end of discharge chute **92**. The solenoid **246** has a plunger or armature **248** which is positioned to engage the tail end **134** of the movable clamping leg of clip **114**. Thus, when the bag or package **36** which next is to be released has been moved unto the discharge chute **92** as the result of inward movement of plunger **56**, the final portion of the movement of said plunger **56** will cause the switch **244** to either close or open the circuit, as the case may be, depending upon the circuit, to effect actuation of the solenoid **246** so that armature **248** thereof opens the clip **114** sufficiently to permit the bag or package **36** to be released from the clip, whereupon it will slide down discharge chute **92** to the discharge end **94** thereof. The cooperation of the solenoid **246** with clip **114** is illustrated in larger scale in Fig. 17, the closed position of the clip and normal position of the solenoid armature being shown in full lines. The open position of the clip, when engaged by the solenoid armature **248**,

is shown in dotted lines in said figure. Following the opening of the clip **114** by the solenoid armature **248**, and after the customer has released plunger **56** pursuant to the delivery of the bag or package **36** to the discharge opening **94**, the counterweight **86** will restore the ratchet feeding mechanism to its initial position. The plunger **56** incidentally also will be restored to its initial position and thereby move the inner end of bar **58** from engagement with switch member **242**. The solenoid **246** will thereby be restored to its normal position illustrated in full lines in Fig. 17. Plunger **248** may be retracted to said position by any conventional means such as a spring **250**. It will be understood, too, that the above-described solenoid-type clip actuating means may be substituted, if desired, for the cams **230** of the embodiment shown in Figs. 8 through 15.

From the foregoing, it will be seen that the present invention provides a plurality of embodiments of a dispensing machine wherein packages or bags of either irregular or regular shape may be supported within the machine without injury to the bags or packages and the contents thereof, regardless of whether said contents are fragile or otherwise. The packages or bags are moved by efficient and simple feeding mechanism to a discharge chute upon the insertion of a coin within the actuating mechanism. The supporting means for the packages or bags include clips each of which has movable clamping legs extending substantially parallel to the supporting means whereby the bags or packages may be held in compact relationship to each other in a safe manner due particularly to the arrangement of the clips relative to the supporting means. Such arrangement also affords maximum use of the available storage space within the casing of the machine.

A variety of supporting means are provided in the various embodiments, these consisting, for example, of belts, chains, rigid rods or drums to which the clips are secured. Several forms of clip releasing means are provided of simple and effective nature and the basic design included in said various embodiments provides for a flipping of the packages or bags from hanging in storage position onto the discharge chute. Such arrangement insures effective delivery of the packages or bags to said chute in a positive and orderly manner. After being positioned on said discharge chute, the clip releasing means function to permit sequential disconnection of the packages or bags from the clips and supporting means by relatively tamper-proof and simple mechanism.

The various embodiments of merchandise supporting means are readily loaded with bags or packages by the provision of suitable doors in the casings of the machines and ample space is provided within a relatively compact casing to permit the accommodation of a maximum movement of bags or packages within the dispensing machine. The feeding and actuating mechanism is also provided with means for preventing overtravel or backlash movement of the supporting and feeding means for the merchandise, whereby delivery of the correct number of bags or packages for a specified coin is insured. The actuating mechanism also is rugged and capable of withstanding a substantial amount of attempted misuse without injury to the machine.

While the invention has been shown and illustrated in its several preferred embodiments, and has included certain details, it should be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways falling within the scope of the invention as claimed.

We claim:

1. A vending machine for holding and discharging articles of merchandise having a flexible portion, said machine comprising in combination, a member movable through a fixed endless path having a portion circular in cross-section, said member being supported within said machine for rotation about horizontal axis means, a series of spaced clips supported and moved by said member, said clips being operable respectively to clamp said flexible portions of said articles to said member in spaced relationship to each other and said articles hanging pendant-like by gravity from the clamped portion thereof, cam means fixedly mounted adjacent the path of movement of said member and relative to which said member is movable, and actuating means for said member interconnected thereto and including a manually operated member and motion multiplying means operable to produce stepwise rapidly accelerated movements of said member and articles clamped thereto in feeding direction to effect successive engagement of said clips with said cam and actuate said clips sequentially to disengage said articles from said member, said articles prior to engaging said cam and when moving through the upper portion of the circular path thereof being subjected to centrifugal force resulting from said accelerated feeding movements and flipped thereby from hanging in one direction relative to said member to hanging in the opposite direction.

2. The vending machine of claim 1 further including a discharge chute having an entrance end positioned adjacent said cam and said articles when flipped as aforesaid being positioned to be received by said entrance end of said chute.

3. A vending machine for holding and discharging articles of merchandise having a flexible appendage portion, said machine comprising in combination, a pair of circular members rotatably supported for movement about horizontal axes in vertically spaced relationship to each other, said members being disposed substantially in a common vertical plane, an endless flexible member passing around said circular members, a series of spaced clips connected to and moved by said flexible member, said clips being operable respectively to clamp said flexible appendage portions of said articles to said member in spaced relationship to each other in such manner that said articles may hang by gravity from said clips, cam means fixedly mounted adjacent the path of movement of said flexible member and relative to which said member is movable, and ratchet-type actuating means for said member interconnected thereto and comprising ratchet operated manually actuated motion multiplying means operable to produce rapidly accelerated stepwise movements of said flexible member in feeding direction to cause the articles hanging in one direction from said clips as they approach the uppermost portion of movement around the top circular member to be flipped successively by centrifugal force to hang in the opposite direction from said clips prior to said clips reaching said cam means, said clips while holding said articles in the latter position successively engaging said cam to actuate said clips to disengage said articles from said member.

4. A vending machine for holding and discharging articles of merchandise having a flexible appendage portion, said machine comprising in combination, a pair of shafts horizontally mounted within said machine in vertically spaced relationship, a plurality of circular members mounted in spaced relationship on each shaft, endless flexible members each passing around two of said circular members respectively on said shafts, a series of spaced clips connected to each of said flexible members, said clips being operable respectively to clamp said flexible appendage portions of said articles to said members in spaced relationship to each other and in such manner that said articles may hang by gravity from said clips, the clips on said several flexible members being vertically staggered relative to each other, whereby said clips are not in horizontal alignment, cam means fixedly mounted adjacent the path of movement of said flexible members and relative to which said members are movable, actuating means interconnected to said flexible members and operable to produce quick stepwise movements thereof in feeding direction to cause the articles hanging in one

direction from said clips as they approach the uppermost portion of movement around the top circular members to be flipped successively by centrifugal force to hang in the opposite direction from said clips prior to said clips reaching said cam means, said clips while holding said articles in the latter position successively engaging said cam means and actuate said clips sequentially to disengage said articles from said members, a chute extending downwardly from said cam means to a discharge station and operable to receive articles released from said clips, and guide means adjacent the upper end of said chute and operable to direct said articles onto said chute when moving toward said cam means.

5. The vending machine set forth in claim 4 further including stripping means positioned adjacent the upper end of said discharge chute and means commonly supporting said entrance end of said chute and said cam means, said entrance end of said chute being sufficiently wide to accommodate the articles disengaged from all of said flexible members and the exit end leading to a single discharge opening.

6. The vending machine set forth in claim 3 further including a discharge chute having an entrance end positioned adjacent said cam means and provided with a slot receiving said flexible member and clips immediately prior to said cam means engaging said clips, the portions of said chute defining said slot serving to engage said articles of merchandise as each is released from its clip to prevent further movement thereof with said clip as said clip moves past said cam means, thus insuring delivery of said article to said chute means.

7. A vending machine for holding and discharging articles of merchandise comprising in combination, a casing having a loading opening in one wall thereof and an article delivery opening, said loading opening being closed by a movable door, a supporting member movable within said casing through a closed path, means interconnected to said member and operable to advance said member stepwise, a plurality of clips evenly spaced along and connected to said supporting member and each clip including an article clamping finger pivotally interconnected to said membr, one end thereof comprising a clip releasing end, means on each clip operable normally to urge the opposite end of said finger toward said member to engage said article in clamping relationship, a releasing cam supported by a fixed member within said casing adjacent said movable clip supporting member and the cam thereon being operable sequentially to engage the clip releasing end of each clip near the end of each stepwise movement of the supporting member to move the opposite gripping end of the clip away from said member and release the article held thereby, and an article delivery chute removably supported within said casing adjacent said loading opening and removable therethrough to render said supporting member accessible for loading, said chute communicating with and extending upward from said delivery opening to said cam, whereby said chute receives articles when released from said clips and delivers them by gravity to said delivery opening.

8. The vending machine set forth in claim 7 further characterized by said fixed cam supporting member comprising a bar extending benath the upper end portion of said chute and detachably engaging the same to support it operatively relative to said movable clip supporting member.

9. The vending machine set forth in claim 8 further characterized by said bar also being movable from its fixed position when loading said machine to render said movable clip supporting member accessible.

10. A vending machine for holding and discharging articles of merchandise comprising in combination, a supporting member movable through a closed path relative to an article delivery station, means operable to advance said member stepwise unidirectionally toward said station, a plurality of clips evenly spaced along and connected to said supporting members, each clip including pivotally connected legs, one leg of each clip being fixed directly and parallel to said supporting member and the trailing end thereof in the direction of movement of said member comprising a gripping end, one end of the pivotally supported leg comprising a gripping end cooperating with the gripping end of said one leg to clamp a flexible appendage of an article of merchandise to hang pendant-like therefrom and the opposite end of said pivotally supported leg comprising a clip releasing end, means on each clip operable normally to urge the gripping ends of the legs toward each other in article gripping relationship, the closed path of the supporting member being curved at least at the upper portion thereof and the articles hang downward in one direction from said clips when moving into said curved portion of said path but are shifted by gravity to hang downward in the opposite direction substantially at the end of said curved path, whereby said clamped flexible appendage is bent U-shaped around the clamping end of the outermost leg of each clip when the articles are in the latter position and effectively preventing accidental separation of said articles from said clips prior to discharge therefrom, and releasing means supported in a fixed position adjacent the end of said curved path of said supporting member and said delivery station and operable sequentially to engage the clip releasing end of the other leg of each clip near the end of each stepwise movement of the supporting member to move the gripping ends of the clip apart and release the article held thereby at the article delivery station.

11. The vending machine set forth in claim 10 further including stripping means positioned adjacent said delivery station and operable to engage the articles as released from the gripping ends of said clips and insure complete separation of the articles sequentially from said supporting member.

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