March 4, 1941. S. W. WILLIAMSON 2,233,690

ESCAPEMENT MECHANISM FOR PACKAGE DISPENSING MACHINES

Original Filed Dec. 17, 1936 4 Sheets-Sheet 1

FIG. 1.

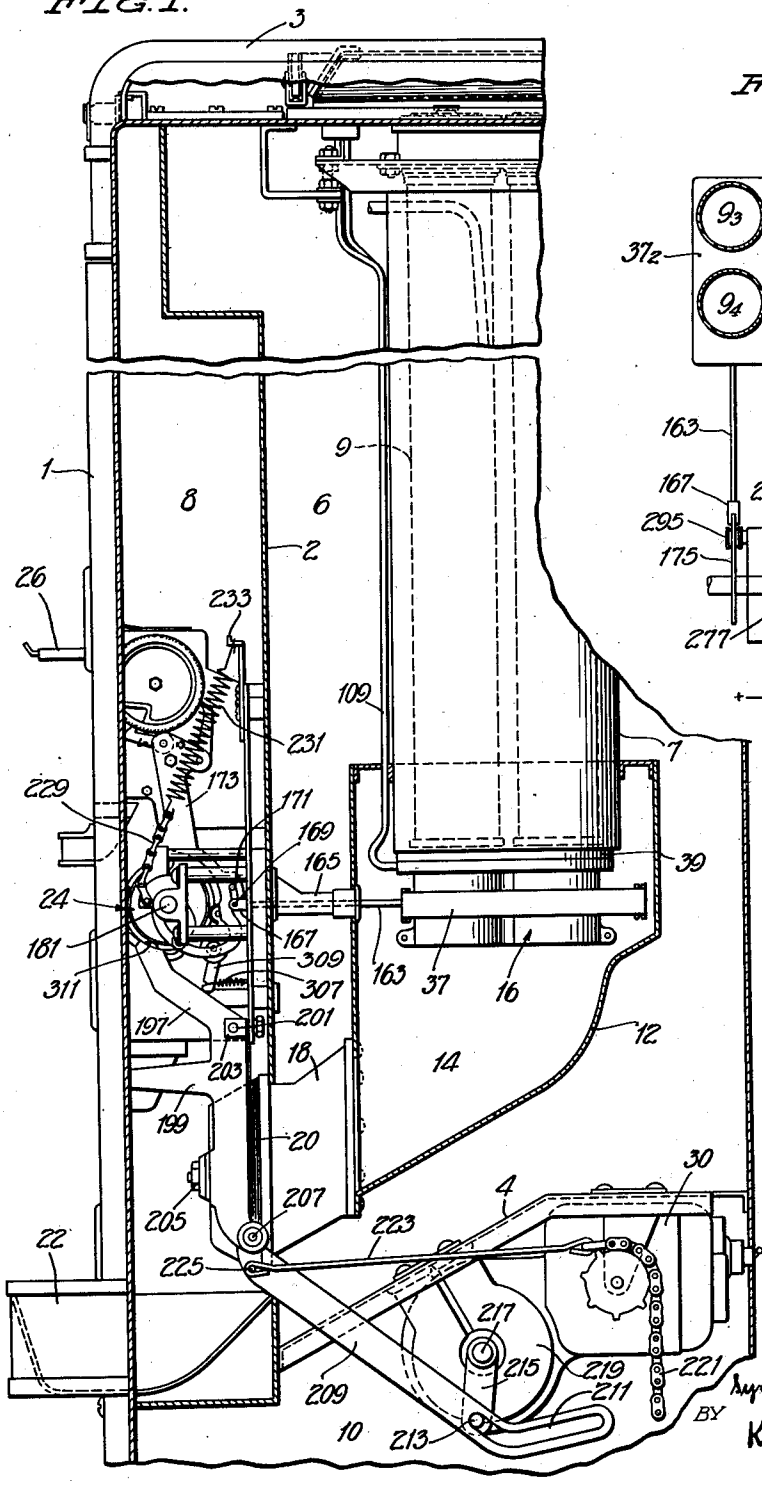

FIG. 9.

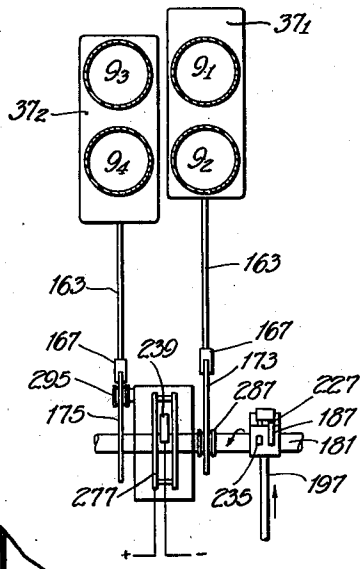

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FIG. 2.

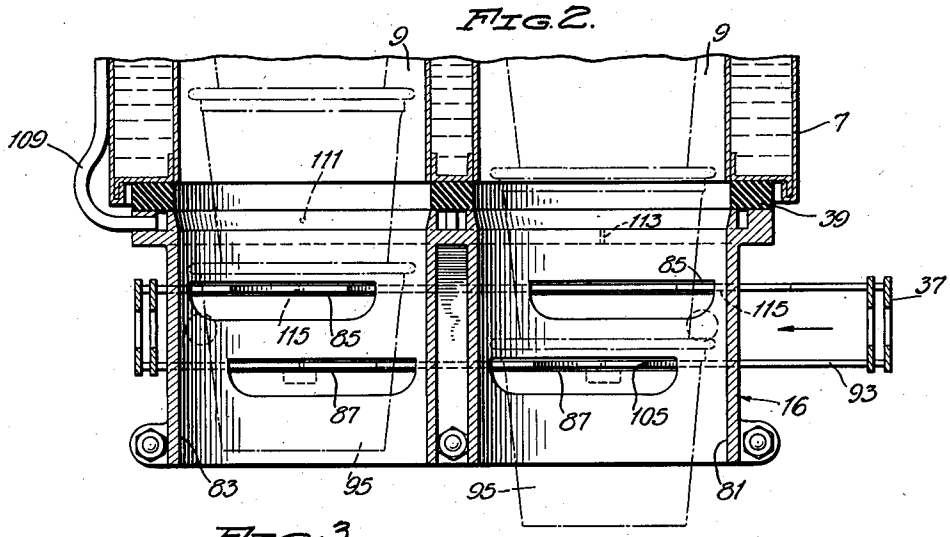


FIG. 3.

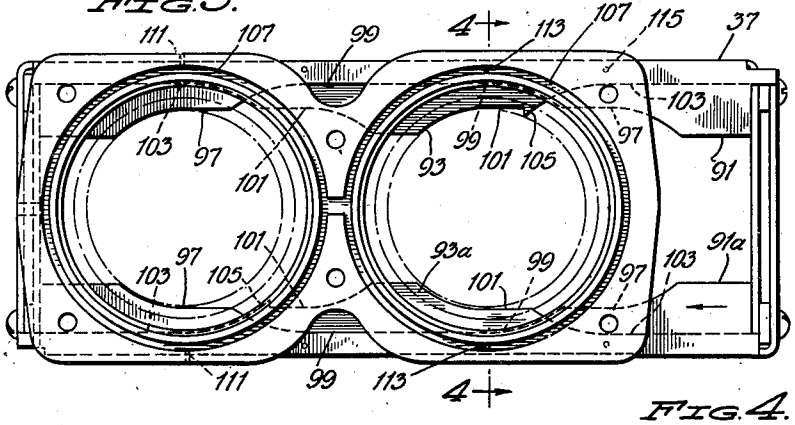


FIG. 4.

FIG. 5.

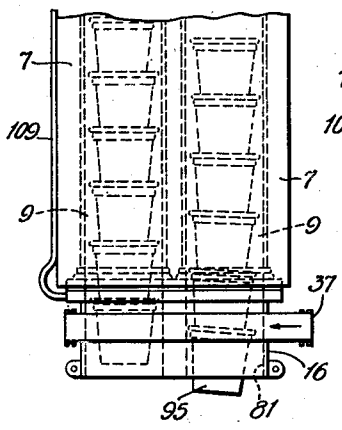
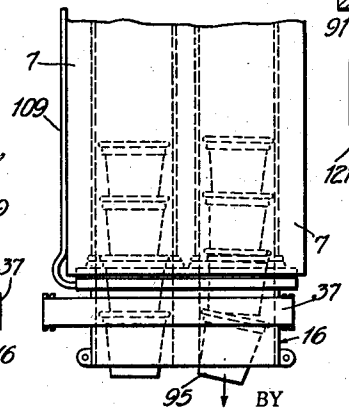


FIG. 6.



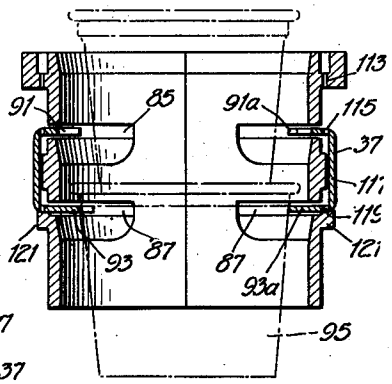


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FIG. 8.

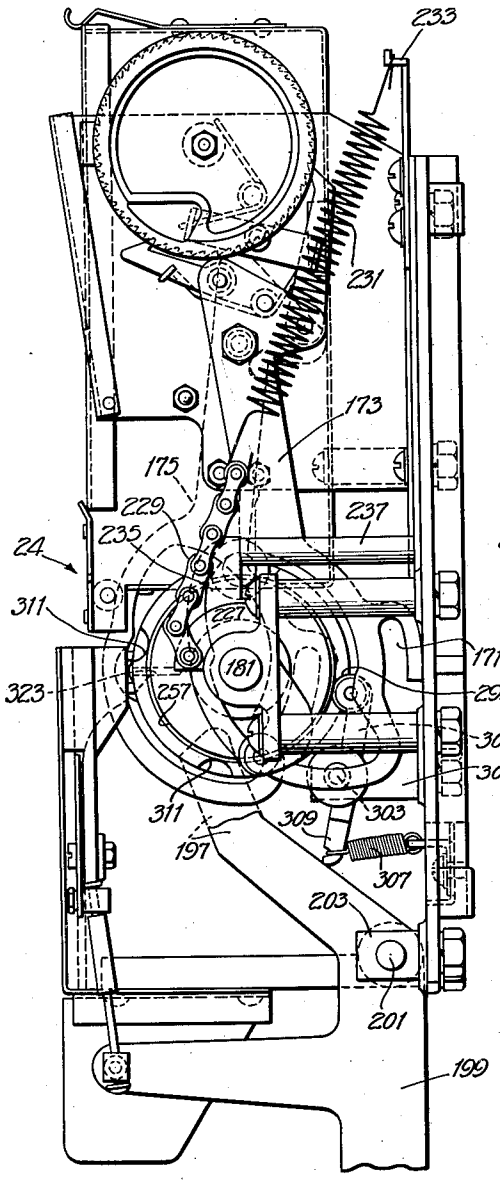
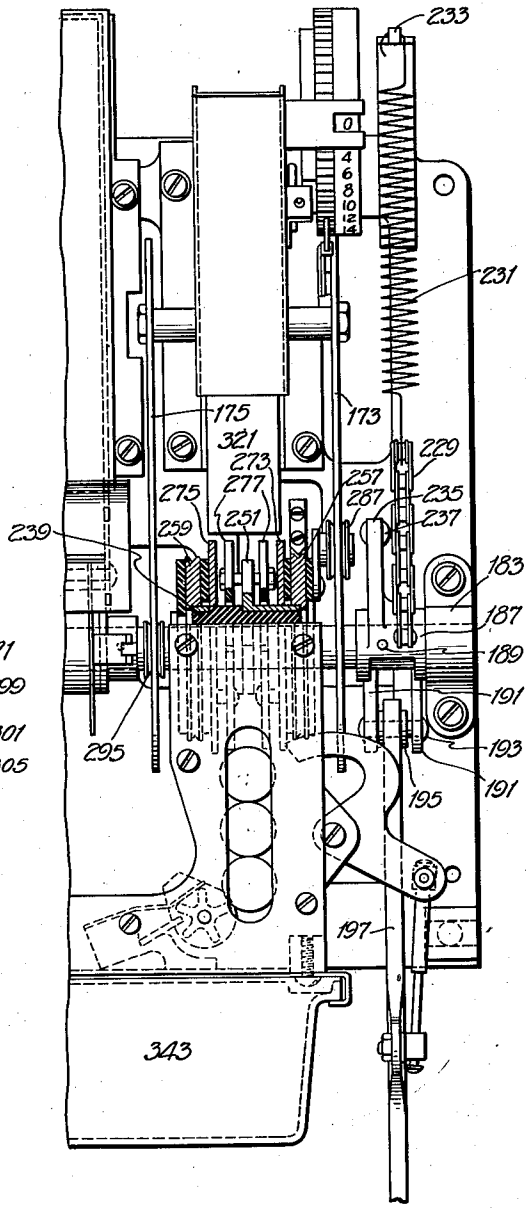


FIG. 7.



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ESCAPEMENT MECHANISM FOR PACKAGE DISPENSING MACHINES

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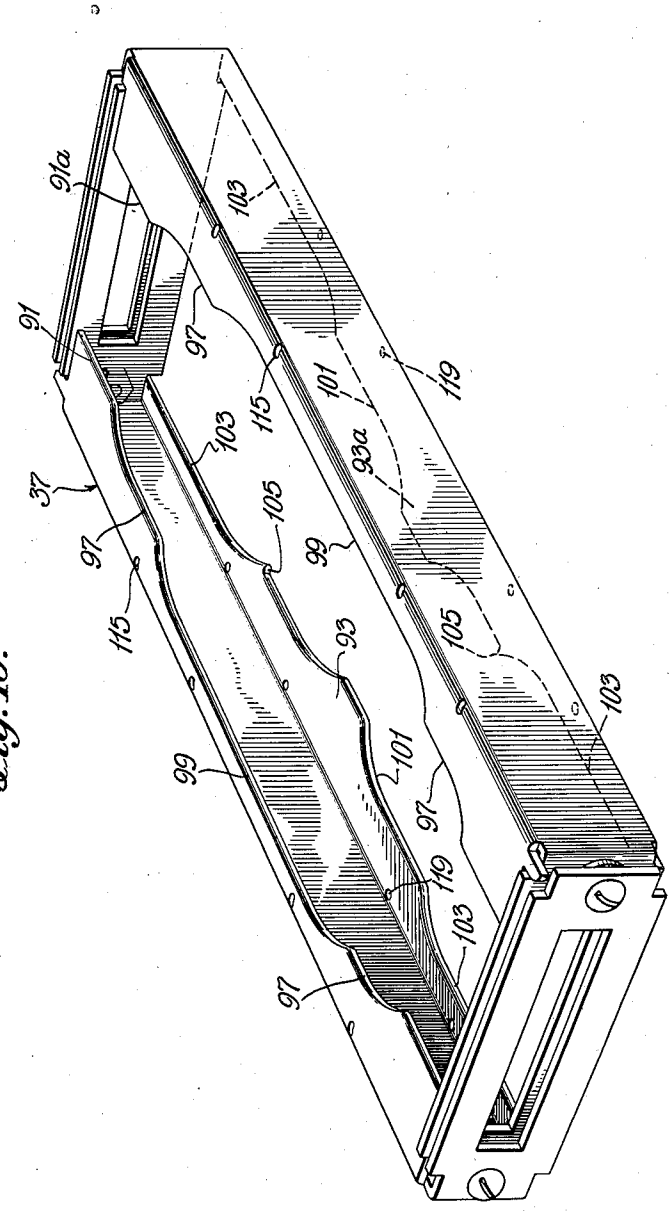

Fig. 10.

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Patented Mar. 4, 1941 2,233,690

UNITED STATES PATENT OFFICE

2,233,690

ESCAPEMENT MECHANISM FOR PACKAGE DISPENSING MACHINES

Sydney W. Williamson, Jamaica, N. Y.

Original application December 17, 1936, Serial No. 116,294. Divided and this application February 5, 1938, Serial No. 188,827

8 Claims. (Cl. 312—44)

This invention relates to machines for dispensing packages of frozen goods, which must be stored in the machine at a temperature below the freezing point of water. The present application is a division of my copending application, Serial No. 116,294, filed December 17, 1936.

In this kind of machine difficulties are caused by the adhesion of packages in the package storage compartment to each other and to the walls of the compartment, as a result of the freezing of moisture, ice cream, or other substances which might act as an adhesive at low temperatures. It is the principal object of the invention claimed in the present application to free the packages from adhesion at the time they are to be delivered. The freeing of the packages is accomplished by agitating or joggling the package about to be delivered, without substantially removing it from its position. This special freeing motion is distinct from the feed and delivery motion of the package and is derived from a force positively applied to the package in a direction transverse to its feeding and delivery movements.

An incidental object of the invention is to provide means for the lubrication of the package escapement mechanism.

Another object of the invention is to provide a package escapement mechanism which will engage the lowermost package of a column of packages in a storage compartment in such a way as to sustain the entire load of the column of packages, without reliance upon a relatively fragile projecting portion of the package, such as a rim.

The invention is illustrated in the drawings by a machine of the type disclosed in my Patent No. 2,078,984, entitled Package dispensing apparatus. For details not particularly described in the present specification reference is made to the said patent and to my copending application, Serial No. 116,294, of which this is a division.

In the drawings

Fig. 1 is a vertical section of a package dispensing machine suitable for vending packages of ice cream, for example;

Fig. 2 is a vertical section of the lower end of the package storage chamber and package escapement device;

Fig. 3 is a plan view of the package escapement device;

Fig. 4 is a vertical section on the line 4—4 of Fig. 3;

Figs. 5 and 6 are two diagrammatic views of the package storage chamber and escapement device, with the escapement device in two different positions;

Fig. 7 is a front elevation of one of the control mechanisms of a vending machine embodying the invention;

Fig. 8 is a side elevation of the mechanism shown in Fig. 7;

Fig. 9 is a diagrammatic plan view, with parts in section, of the escapement device and its check controlled operating mechanism, designed for control by a single check; and

Fig. 10 is a perspective view of a slide forming part of the escapement mechanism.

Referring first to Fig. 1, the illustrative package dispensing cabinet there shown has an outer housing comprising a main casing 1 covered by a lid 3. The casing is divided by partitions 2 and 4 into three principal compartments, namely, a storage compartment 6, a control mechanism compartment 8, and a compressor and motor compartment 10. Within the storage compartment 6 is a refrigerating medium container 7, here shown as a brine tank, formed with package storage compartments 9. To the bottom of the brine tank 7 is fixed a casing 12 enclosing a package dispensing chamber 14. At the bottom of the brine tank is an escapement device 16 for controlling the delivery of packages from the package storage compartments 9 to the dispensing chamber 14. At the bottom of the package dispensing chamber is a tubular chute 18 normally closed by a door 20. The chute 18 delivers the packages into a tray 22, from which they can be removed by the customer. The compartment 8 contains an operating mechanism indicated generally by the reference character 24, which actuates the escapement device. The operating mechanism, in this particular machine, is controlled by checks or coins inserted in a coin slot 26. In the compartment 10 there is a motor 30 for opening the door 20, operating through a driving gear to be described. This compartment also contains the compressor, which is not shown in the drawings. The space in compartment 6 between the outer casing 1 and the brine tank 7, and between the partition 2 and the brine tank is to be packed with insulation.

In dispensing from a cabinet packages, or package units, of frozen commodities, such as ice cream, one of the difficulties encountered is that the packages may stick together, or may freeze to the walls of the package storage compartment. If this occurs, when the package is released by the escapement device it may fail to be delivered because it has not yet been freed from the following package or from the surrounding walls of the package storage compartment. In a machine of the kind described above, the package should be released instantly upon operation of the escapement device, for if its delivery is delayed the door may close before it has escaped into the trough from which it can be reached by the customer. Any mechanism which is used to release the package should be of the utmost simplicity, for complicated mechanisms will not work with regularity under the frigid

conditions prevailing in the package dispensing chamber.

I have found that it is possible to free the packages from adhesion as they are being delivered, or about to be delivered, by applying to them a force transverse to the direction of delivery. Such transverse force may be applied radially, tangentially, or in any other transverse direction, and may be either rotary about any axis, or directly displacing, or any combination of these. The resulting agitation or joggling of the package, which occurs without substantially removing the package from its position, is referred to herein as a transverse motion, because it is transverse to the feed and delivery motion of the packages. One effective scheme for applying this package freeing force is shown by way of example in Figs. 2 to 6. The escapement device 16 mounted on the bottom of the refrigerating tank 7, with interposed insulation 39, is in the form of a block with two cylindrical bores 81, 83, aligned respectively with the two tubular package storage compartments 9. The opposite sides of the escapement block 16 are slotted at 85 and 87. Embracing the block 16 is a slide 37 having an upper pair of flanges 91, 91*a*, and a lower pair of flanges 93, 93*a*. These flanges project into the slots 85 and 87 for a distance such that in certain positions portions of the flanges partially obstruct the bores 81 and 83. The slide has a reciprocating motion and feeds out one of the packages 95 on each stroke. The mechanism for reciprocating this slide will be described later. The packages shown by way of example are circular in section and have a larger diameter at the top than at the bottom. The top has a rim, flange, or beading, of greater diameter than the body wall of the package.

The configuration of the flanges of the slide is shown in Fig. 3. The left half and the right half are identical, except that the portions of the flanges of these two halves are reversed in position. Each half of the upper pair of flanges has portions 97 which are spaced apart by a distance greater than the smallest diameter of the package but smaller than the greatest diameter thereof, and portions 99 which are spaced apart by a distance greater than the largest diameter of the packages. Preferably the distance between the closer portions of the flanges of the slide is such that these flanges engage the tapered walls of the package, where they are supported by the frozen commodity and by the top of the package. Projecting flanges of the packages sometimes become bent and cannot be relied upon to support the packages in all cases. When the slide is in its right-hand position, the portions 97 of the left half of the slide are aligned with the bore 83, while the portions 99 of the right half of the slide are aligned with the bore 81. Thus in the bore 83 downward movement of the packages is limited by engagement of the walls or flange of the bottom package with the flange portions 97, while in the bore 81 the upper pair of flanges offer no obstruction to the downward feed of the packages. Similarly the lower pair of flanges have portions 101 which are spaced apart by a distance greater than the smallest diameter of the package but smaller than the greatest diameter thereof, and portions 103 which are spaced apart by a distance greater than the largest diameter of the packages. On the lower flanges, however, the positions of the narrower portions of the flanges and the wider portions are reversed with respect to the corresponding portions of the upper pair of flanges. That is to say, when the slide is in its right-hand position, as shown in Figs. 2 and 3, the wider portions 103 of the left half of the lower pair of flanges are aligned with the bore 83, while the narrower portions 101 of the right half of the lower pair of flanges are aligned with bore 81. Thus in the bore 81 it is the lower pair of flanges which obstruct the feed of the packages and the bottom package in this bore therefrom assumes the position shown in Fig. 2. When the slide moves to its left position the package in bore 81 is released by flange portions 101 and the column of packages drops until the second package from the bottom shown in Fig. 2 rests upon flange portions 97 of the upper pair of flanges. Meanwhile, the flange portions 97 of the left half of the upper pair of flanges have released the bottom package in bore 83 and the column of packages in this bore has descended until stopped by engagement of the sides or flange of the bottom package with the flange portions 101 of the left half of the bottom pair of flanges. On the next stroke to the right the same series of events occurs again, but with the operations transposed in the two bores.

In accordance with the present invention I have, as above stated, provided means for applying a transverse freeing force to the package about to be delivered. As shown in the example illustrated, this means takes the form of two hooks or spurs 105 located on the bottom flanges, one for each of the bores. These hooks are positioned at the juncture between the portions 101 and 103 of the bottom flanges and are designed to engage the side of the package as the slide moves, imparting to it a transverse motion, the nature of which will depend upon the condition of adhesion of the particular package. Figs. 5 and 6 illustrate one possible motion of the package. As the slide begins to move to the left and the hook 105 in bore 81 engages the bottom package, the latter is pulled over until its top flange abuts against the side of the bore, as shown in Fig. 5. Thereupon further movement of the slide causes the package to tilt around the contacting portion of its upper flange as a fulcrum, as shown in Fig. 6, thus releasing the package from adhesion with the surrounding wall or an adjacent package. The package may also be given a rotary motion about a vertical axis, due to the tangential direction of the force applied to it. In many cases its motion will be a composite of displacing and rotary components. Since the bottom package is supported in readiness for delivery by the flange portions 101, and since the hook 105 projects inward from the adjacent flange portion 101, the motion of the slide 37 moves the hook along a path which traverses the side wall of the bottom cup. Consequently the hook becomes embedded in the side wall of the cup and thereby fixed to the cup at one point, in a manner permitting the cup to pivot on the hook in any direction. Therefore, I call this hook a pivot element. In any case, it is freed of adhesion to the next package or to the side of the bore through which it is delivered, should any such adhesion exist.

It will be noted that in the form of the invention shown in Figs. 2 to 6 the bottom package is released from adhesion while it is still supporting the column of packages above it. This arrangement makes for great simplicity of the escapement device.

The matter of oiling the escapement device is of considerable importance. Since the escape-

ment device is in an inaccessible place, it is difficult for the service man to oil it directly by means of an oil can. For this reason I have provided an oiling system which enables the oiling to be carried out easily while the system is comparatively warm at the time of defrosting the cabinet. Around the top of the block 16 is a figure eight oil groove 107 supplied with oil by a tube 109. This oil groove is provided with ports 111 and 113, through which the oil leaks out down the side of the block and flows on to the top flanges 91, 91a of the slide 37. These flanges are also provided with ports 115 through which the oil leaks down the inside of slide 37, lubricating bosses 117, which guide the slide laterally. Finally, the oil reaches the bottom flanges 93, 93a and leaks through ports 119 onto the upper face of bearing lugs 121, on which the bottom of the slide rests. At the time of defrosting, the service man squirts enough oil into the tops of oil tubes 109, which are accessible through the hole in the top of the casing 1. The oil flows down onto the bearing surface and any excess can be wiped off by reaching through the package discharge chute 18. When the cabinet freezes up again, further flow of oil ceases and the oil remains on the lubricating surfaces.

The machine as shown in my copending application, Serial No. 116,294, is designed with eight package storage compartments. The four right-hand package storage compartments are diagrammatically represented in Fig. 9 of the present application, being identified as 9_1, 9_2, 9_3, 9_4. The escapement devices of these four compartments are operated by a single control mechanism designed to feed from the four compartments in sequence, in the order 9_1, 9_4, 9_2, 9_3. The compartments 9_1 and 9_2 are controlled by one slide 37_1 and the compartments 9_3 and 9_4 by a second common slide 37_2. These slides move alternately and discharge a package at each stroke. When the slide for compartments 9_1 and 9_2 moves forward a package is delivered from compartment 9_1 and when it is moved rearward a package is delivered from compartment 9_2; similarly with the slide for compartments 9_3 and 9_4. Each slide has attached to it a rod 163 (Fig. 1) which projects forward through a bush 165 into the control mechanism compartment 8. The front end of the rod 163 is forked at 167 and provided with a cross pin 169, which engages in a slot 171 of a cam lever 173. There is one cam lever for each slide, the one for the slide controlling compartments 9_3, 9_4 being numbered 175. The cam levers 173 and 175 are moved alternately, by a mechanism now to be described, each moving just one stroke at a time.

A main operating shaft 181 is rockably mounted in bearings, one of which is shown at 183, and has a hub 187 fixed to it by a pin 189. The hub 187 has a downwardly projecting forked arm 191 across the end of which is a pin 193 supporting a roller 195. Against this roller bears the end of an arm 197 (Figs. 1 and 8) projecting upward from door operating bracket 199. The bracket 199 is pivoted at 201 upon a stationary bearing 203 and is attached at 205 to the door 20 which closes the delivery chute 18. At the lower end, bracket 199 is connected by a pin 207 with a thrust bar 209, the lower end of which has an angular slot 211 in which engages a pin 213 of a crank 215. The crank is mounted upon a shaft 217 driven through speed reducing gearing inside of casing 219 by motor 30. The door 20 is normally held tightly closed by a weight (not shown) suspended from the end of chain 221 connected by link 223 with a pin 225 on thrust bar 209. The hub 187 has a segmental flange 227 to which is attached a chain 229. To the opposite end of chain 229 is hooked one end of a spring 231, the other end of which is hooked over a stationary peg 233. The hub 187 is also provided with a rigid arm 235, the rear face of which abuts against the front end of a stationary abutment 237, when the hub is held in normal position by the pull of spring 231. Motor 30 is started by a control mechanism to be described presently, and drives the crank 215 through one complete revolution, then stops. During this revolution the crank pin 213 thrusts bar 209 forward, swinging door 20 open and throwing back arm 197. The arm 197 bears against roller 195 and swings hub 187 through exactly one quarter revolution. The motion of one quarter revolution imparted to shaft 181 by hub 187 is used to swing the cam levers 173, 175, through a coupling mechanism which will now be briefly described, and the full details of which are disclosed in my copending application, Serial No. 116,294.

The coupling mechaism comprises a driving member fixed upon the rock shaft 181 and a driven member revolubly mounted on the driving member and adapted to be coupled thereto, the driven member being provided with means for alternately actuating the cam levers 173 and 175. The driving and driven members are connected mechanically and electrically by a coin deposited in slide 26 for each operation of the machine. As shown in Fig. 7, the driving member comprises a bushing 239 rigidly fastened to shaft 181 and provided with a radially extending driving arm 251. The driven member is composed of a group of rigidly connected rings, namely, an outer pair of guiding rings 257 and 259, which have a gliding fit on the shoulders of driving member 239; a pair of coupling rings 277 located on opposite sides of the driving arm 251; and an intermediate pair of rings 273 and 275. The ring 273 has notches 311 placed so as to divide the periphery of the ring into four quadrants. A lever 301 pivoted at 303 on a stationary support 305 carries at its upper end a roller 299 which travels on the ring 273 and engages successively in the notches 311 to position the driven member exactly. The lever 301 is urged counterclockwise by a spring 307 connected to its lower end 309.

Mounted on the two outer rings 257 and 259 are two rollers 287 and 295 which engage, respectively, the cam levers 173 and 175. The rollers are placed ninety degrees apart and the cams are so shaped that while one roller is travelling, during a quarter revolution of the shaft 181, along a portion of its cam lever which is eccentric to the axis of shaft 181, thereby moving said cam lever, the other roller is travelling along a concentric portion of its cam lever, so that the latter remains idle.

The inner rings 274 are each provided with four slots 323, the slots of the two rings registering with each other and being so positioned at ninety degree intervals around the periphery of the rings, that when the roller 299 is engaged with a notch 311 a pair of slots 323 is directly below the foot of a coin chute 321 (Fig. 7), which conveys the coins from coin slide 26. In the position of rest of shaft 181 the upper part of the front edge of driving arm 251 is just behind the slots 323 which are in receiving position; this

front edge inclines forward and downward, intersecting the plane of the slots, so as to be engaged by the bottom edge of the coin as the latter drops into the slots. The driving arm 251 and the rings 277 are insulated from each other and are connected in the motor circuit (Fig. 9) in such a way that it requires only the metallic connection of the arm 251 and rings 277 by a coin to complete the motor circuit and start the motor. In the ninety degree angular movement of shaft 181 which follows, the coin mechanically couples the driving arm 251 to the rings 277 and thus the entire driven member is given a quarter revolution. During the second half revolution of crank 215 the shaft 181 is rocked back by spring 231 and driving arm 251 is brought behind the next pair of slots 323 in rings 277. The used coin is pushed out in the course of this backward movement, by means of a cam (not shown) on the driving member 239.

I claim:

1. In a machine for dispensing packages at a temperature below the freezing point of water, a refrigerated package storage compartment, an escapement mechanism movably mounted below said compartment, said escapement mechanism having a package arresting member and a package discharge orifice alignable with the stored packages, means for actuating said escapement mechanism to align said package discharge orifice with a package to control the feed and delivery of packages in a substantially continuous path, and means included in the escapement mechanism for imparting to a package preparatory to delivery a rotary motion in a plane perpendicular to the feeding and delivery path to free said package from adhesion to a surface with which it is in contact.

2. An escapement device for dispensing from a storage chamber frozen packages having a larger cross section at one end than the other, comprising a slide having opposing flanges to control the delivery of the packages, said slide being movable transversely to the direction of feed of the packages to bring different portions of said flanges opposite the packages to be delivered, one portion of said flanges being spaced apart by a distance intermediate between the larger and smaller diameters of the packages, the other portion being wider apart than the greatest diameter of the packages, one of said flanges having a hook projecting toward the package substantially at the juncture of the two portions of said flange and adapted to engage a lateral face of the package as the slide moves, and means operating in conjunction with said flanges for intercepting the packages behind the one to be delivered before the more widely spaced portion of said flanges comes opposite the package to be delivered.

3. An escapement device for dispensing from a storage chamber frozen packages having a larger cross section at one end than the other, comprising a tubular block having opposite sides slotted transversely to the axis of the block, a slide having upper and lower flanges on each side of said block slidably engaging in said slots, said upper pair of flanges having a portion wide enough apart to pass only the smaller part of the packages, and a portion wide enough apart to pass the entire package, said lower flange having similar portions reversed in position with respect to those of the upper flange, one of said lower flanges having a hook thereon to engage each package as the slide moves to free it from adhesion to a surface in contact therewith.

4. In an apparatus for storing frozen packages of circular cross section and dispensing them one by one; a refrigerated vertical tube adapted to store a stack of the packages; and escapement mechanism at the bottom of said tube movable transversely to the axis of the tube to release the packages, said escapement mechanism including an element adapted to engage a side wall of the bottom package and movable almost tangentially to said side wall to turn said package about a vertical axis.

5. In an apparatus for storing and dispensing frozen packages of circular cross section having a larger cross section at one end than at the other; a refrigerated upright chamber adapted to store a stack of the packages end to end with the larger end up; and escapement mechanism at the bottom of said chamber movable horizontally to release the packages one by one, said escapement mechanism including a projecting prong adapted to become embedded in a side wall of the bottom package below the larger end thereof and to tilt the bottom package with respect to the package above it.

6. An escapement device for dispensing from a storage chamber frozen packages having a larger cross section at one end than the other, comprising a tubular block having opposite sides slotted transversely to the axis of the block, a slide having flanges on each side of said block engaging in said slots, said block having an oil groove surrounding the same at the top, said groove having drain holes therein to allow oil from said groove to run down onto said slide, the flanges of said slide having holes therein to allow the oil to run onto the slotted surfaces of said block.

7. In a machine for dispensing packages of frozen commodities, refrigerated means defining an upright storage chamber adapted to hold a column of the packages and having an inner cross section somewhat larger than the outer cross section of the packages, escapement means at the bottom of said chamber adapted to support the column of packages by the bottom package and to arrest the bottom package in a definite position, and a pointed device movable in conjunction with said escapement means in a path which causes it to fix itself to a single point on said bottom package, thereby to wrench said package free from adhering surfaces.

8. In a machine for storing and dispensing frozen packages, refrigerated means defining an elongated storage chamber adapted to receive a series of the packages placed end to end, an escapement device at one end of said chamber movable transversely to the long axis of said chamber and having means for controlling the one by one exit of the packages from said chamber, and means on said escapement device positioned so as to traverse a portion of a side wall of the package to be delivered, whereby said last means will become embedded in the wall of said package and impart thereto a movement in addition to its delivery movement to free it from any surface to which it may be frozen.

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