

March 23, 1937.

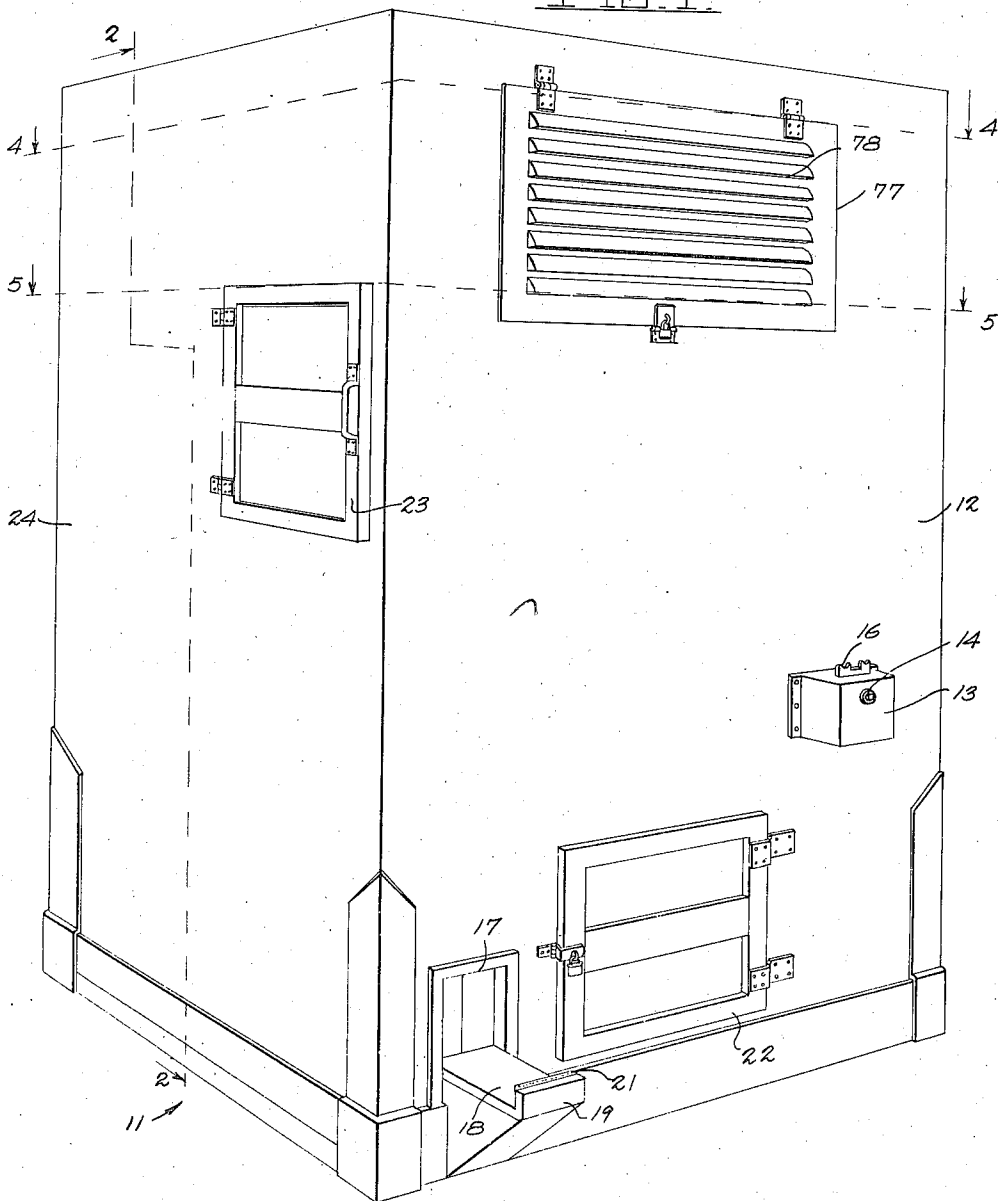
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2,074,351

ICE VENDING MACHINE

Original Filed April 10, 1931 6 Sheets-Sheet 1

FIG. 1.



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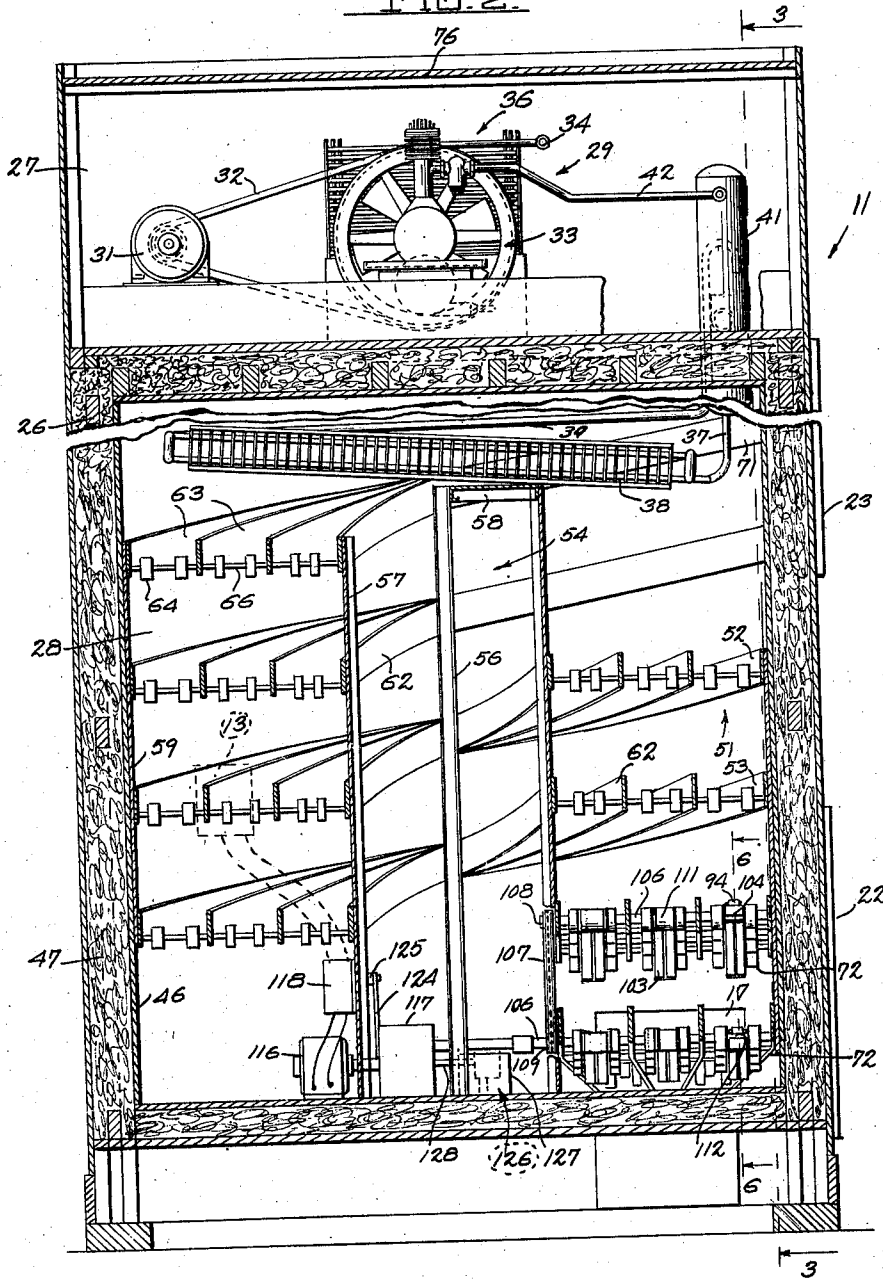
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ICE VENDING MACHINE

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6 Sheets-Sheet 2

FIG. 2



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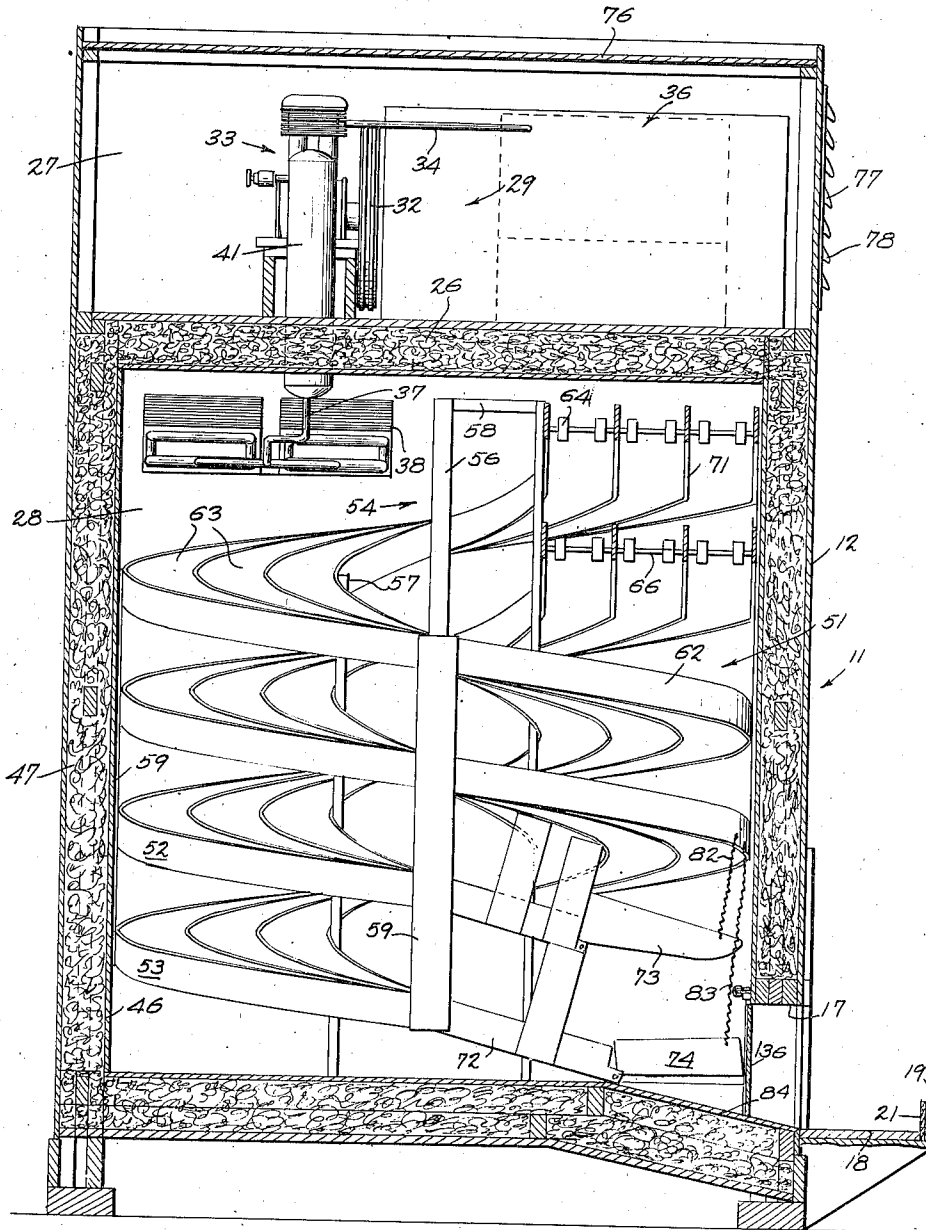
2,074,351

ICE VENDING MACHINE

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6 Sheets-Sheet 3

FIG. 3.



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ICE VENDING MACHINE

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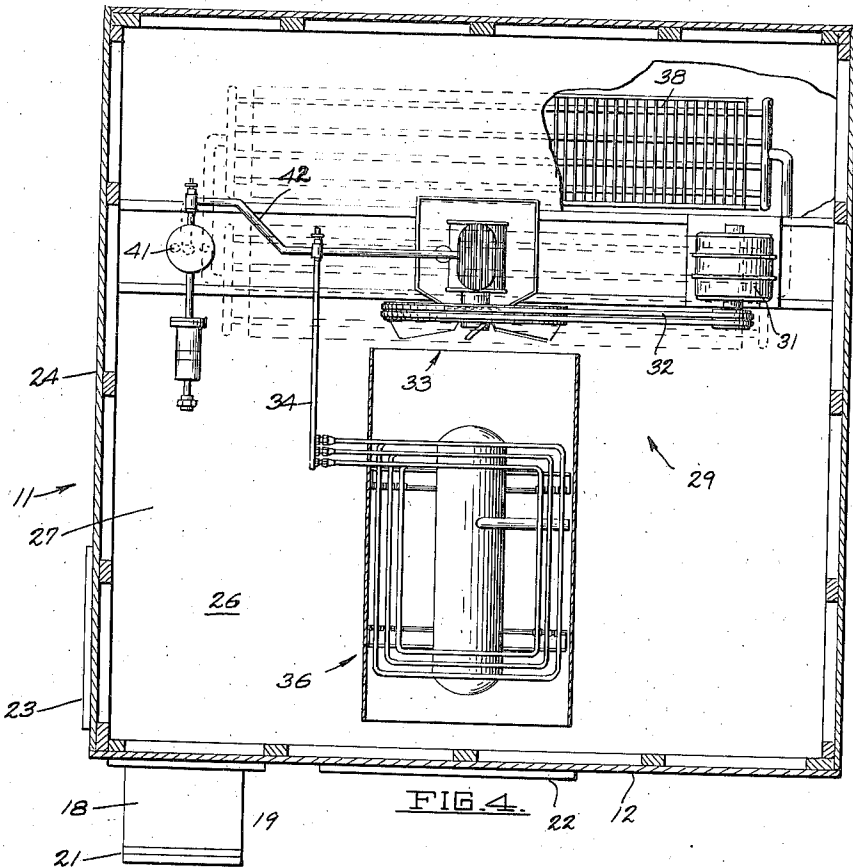


FIG. 4.

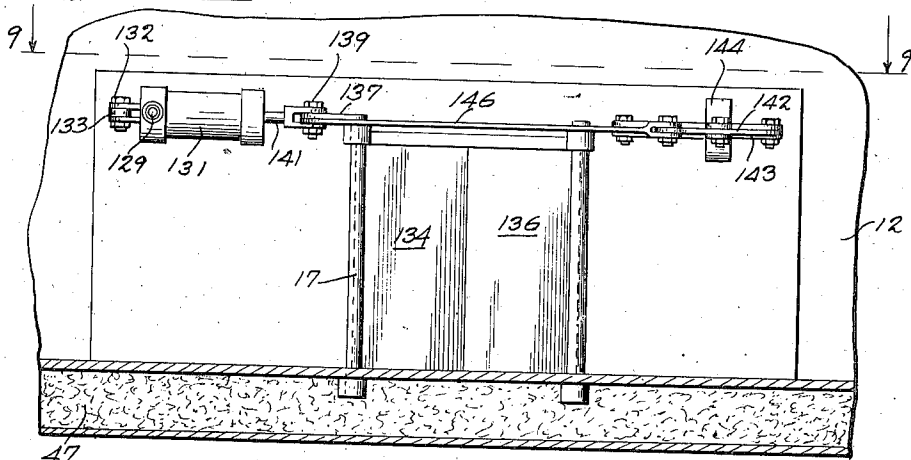


FIG. 5.

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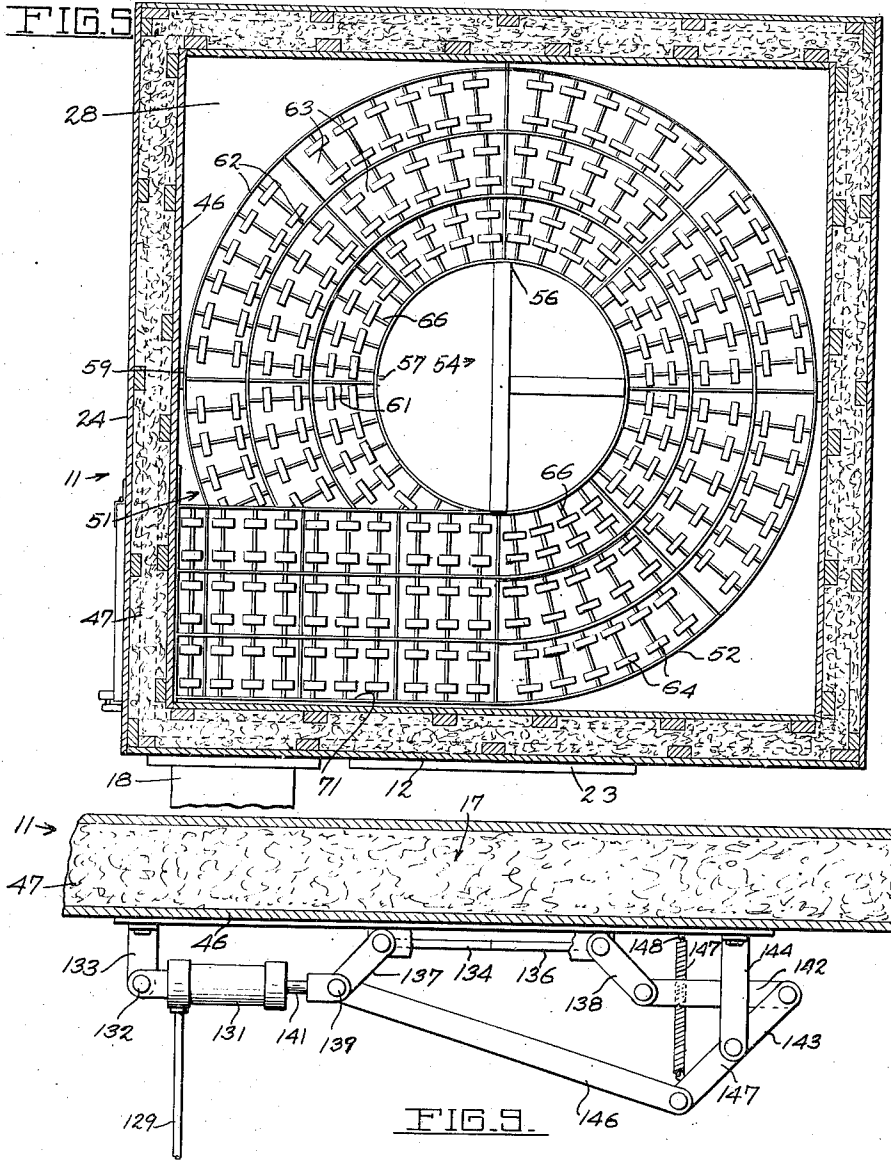
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ICE VENDING MACHINE

Original Filed April 10, 1931

6 Sheets-Sheet 5



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ICE VENDING MACHINE

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6 Sheets-Sheet 6

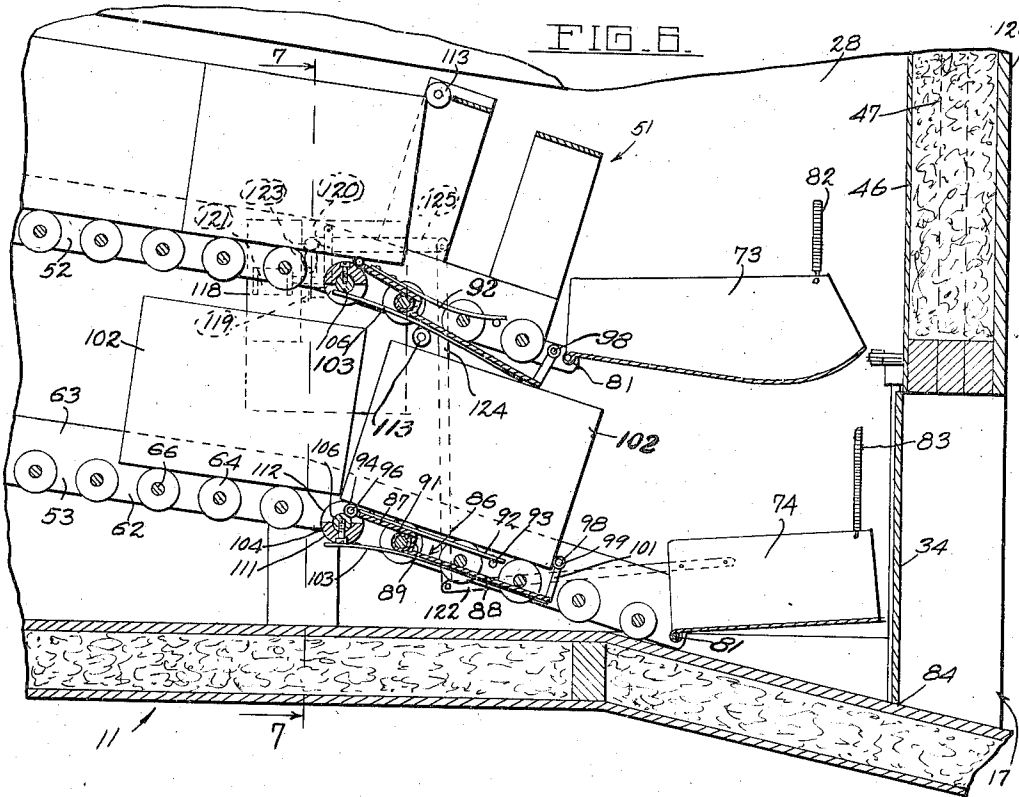
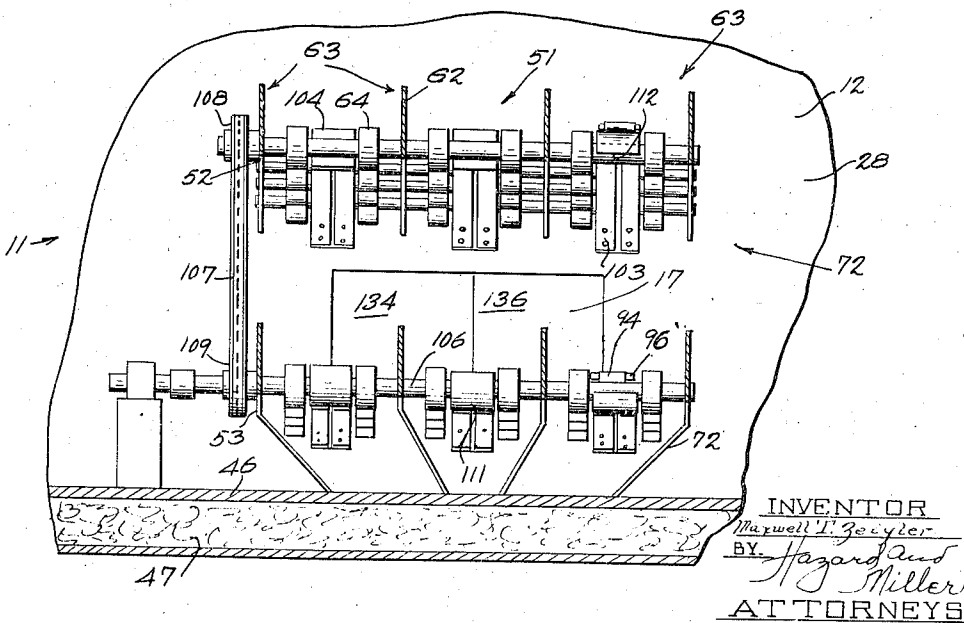


FIG. 7



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UNITED STATES PATENT OFFICE

2,074,351

ICE VENDING MACHINE

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Application April 10, 1931, Serial No. 529,105
Renewed February 20, 1934

24 Claims. (Cl. 312—35)

This invention relates to vending machines, and has for an object the provision of a machine adapted to deliver a block of ice of known weight when the machine is actuated by depositing a coin or coins of predetermined value within a suitable mechanism accessible exteriorly of the machine.

A further object is to provide a machine in which are combined means for storing and vending the blocks of ice, and also a refrigerating mechanism whereby the compartment within which the blocks of ice are stored, is maintained at a suitable temperature, so as to prevent melting of the ice.

Another object is to provide a novel design of storing and conveying mechanism whereupon a relatively large number of blocks of ice may be stored within a minimum of space, and in such a manner that they advance by gravity along the conveying mechanism and toward the delivery opening each time a block of ice is vended.

A more detailed object in this connection is the provision of a storage and conveying mechanism in the form of a plurality of coaxially arranged and intertwined helical guideways, each of which is adapted to receive a plurality of blocks of ice, and which are provided with means for delivering the blocks from any of the guideways to a common delivery opening in the housing of the vending machine.

A further object is the provision of a novel escapement device adapted to release one block of ice at a time, without permitting the other blocks in the associated guideway to move therepast.

A further object is to provide means for compensating for the greater steepness in pitch of each of the several guideways as compared with the pitch of the next adjacent guideway on the outside thereof, this compensating means being for the purpose of preventing the blocks of ice from moving downwards upon their respective guideways at a speed which is apt to result in breakage of the block of ice when it is brought to a sudden stop by coming in contact either with a block of ice at the bottom of the guideway or with the escapement device.

A still further object is the provision of an automatic closure for the delivery opening, which is adapted to be opened each time the vending machine is actuated, thereby permitting discharge of a block of ice, after which the closure is again moved to closed position, thereby preventing warm air from entering the refrigerated storage compartment.

This invention possesses other objects and ad-

vantageous features, some of which, with those enumerated, will be set forth in the following description of the invention's particular embodiment which is illustrated in the drawings accompanying and forming a part of the specification.

Referring to the drawings:

Fig. 1 is a perspective view of a vending machine constructed in accordance with the principles of the present invention.

Fig. 2 is a compound vertical medial transverse sectional view taken upon the lines 2—2 of Fig. 1, with the direction of view as indicated.

Fig. 3 is a transverse sectional view taken upon the line 3—3 of Fig. 2, with the direction of view as indicated.

Fig. 4 is a horizontal sectional view taken upon the line 4—4 of Fig. 1, with the direction of view as indicated.

Fig. 5 is another horizontal sectional view, this view being taken upon the line 5—5 of Fig. 1, with the direction of view as indicated.

Fig. 6 is an enlarged view in vertical section of the lower ends of the several spiral guideways, the delivery opening in the housing, and the means whereby blocks of ice are conducted from any of the guideways to the common delivery opening. The plane of section is taken upon the line 6—6 of Fig. 2, with the direction of view as indicated.

Fig. 7 is a vertical sectional view taken transversely through the several guideways upon the line 7—7 of Fig. 6, with the direction of view as indicated.

Fig. 8 is an inside elevation of a closure associated with the delivery opening and the actuating means therefor.

Fig. 9 is a top plan view of the closure and operating means of Fig. 8. This view may be considered as a sectional view taken upon the line 9—9 of Fig. 8, with the direction of view as indicated.

As illustrated upon Fig. 1, the vending machine of the present invention comprises a housing, indicated in its entirety at 11, upon the front wall 12 of which a coin box 13 is easily accessible. This coin box is adapted to receive one or more coins of a given value, and is provided preferably with a push button 14, which may be pressed after the proper coins have been deposited in the coin slots 16, to cause actuation of the vending machine within the housing 11. Inasmuch as the details of construction of the coin box 13 constitute no portion of the present invention, its inner operative parts need not be shown nor described in detail.

At the bottom, and adjacent one corner, of the front wall 12, a delivery opening 17 is formed, and a platform 18 is positioned in front of the opening 17 in such a manner that when a block of ice is discharged through the opening 17, it comes to rest upon the platform 18, whence it may be removed by the purchaser. Preferably, the forward edge of the platform 18 is provided with a stop 19 having a cushion 21 of any suitable nature on its inner face, thereby preventing possibility of damage to a block of ice when it engages the stop 19.

Access to the interior of the housing 11 may be had through a door 22 in the front wall 12 adjacent the delivery opening 17, and also through another door 23 in a side wall 24 of the housing proximal to the delivery opening 17, the door 23 being adjacent the top of the housing 11.

The interior of the housing 11 is divided by a horizontal partition 26 into upper and lower compartments 27 and 28, respectively. The former of these is adapted to receive any suitable type of refrigerating mechanism, indicated in its entirety at 29, whereas the compartment 28 serves as the storage compartment within which a relatively large number of blocks of ice are kept in readiness for vending.

Whereas any suitable type of refrigerating mechanism 29 may be employed, it is illustrated as including an electric motor 31 operatively connected as by a belt 32 to a compressing pump 33. The discharge line 34 of the pump 33 leads to a condenser 36 of any suitable design, and from the condenser 36 a pipe 37 leads through the partition 26 to an evaporator or cooling coil 38, which is disposed within the storage compartment 28. From the other end of the cooling coil 38 a line 39 leads to a trap 41, from the upper end of which another line 42 leads back to the intake valve of the pump 33. Thus, it may be seen that when the condenser 36, evaporator 38, trap 41, and the connecting conduits are filled with a suitable refrigerant such as ammonia, and when the pump 33 is driven by the electric motor 31, liquid ammonia will be driven into the coil 38 and caused to evaporate therein, thus extracting heat from the compartment 28, after which the gaseous ammonia flows back to the pump 33 by way of the trap 41. In this manner the temperature within the storage compartment 28 is maintained below a predetermined maximum, preferably between 25 and 28 degrees Fahrenheit, it being understood that a thermostat (not shown) may be employed in conjunction with the refrigerating mechanism 29, so as automatically to maintain the temperature within the compartment 28 at the desired point.

The efficiency of the entire refrigerating mechanism is increased by providing an inner shell 46 for the storage compartment 28, thus providing a space 47 between the outer walls of the housing 11 and the shell 46, within which any suitable heat insulative material may be provided, or which may merely be left empty, thus providing a dead air space whereby flow of heat to the interior of the storage compartment 28 is materially lessened.

A combination storage and conveying mechanism 51 is disposed within the storage compartment 28. This mechanism 51 is in the form of a multiple helical conveyor or chute comprising a plurality of (preferably two) decks 52 and 53. These helical decks are disposed coaxially, and are intertwined, so that the respective whorls of each deck are disposed in vertically spaced rela-

tionship. The term "spiral" is not used in a mathematical sense but to indicate decks or guideways winding downwardly from the top about a vertical axis.

The storage and conveying device 51 is erected upon a suitable framework 54, which comprises a central column 56, inner vertical supports 57, preferably angle irons, and retained at equal radial distances about the column 56 by means of radiating braces 58. Opposite each of the inner supports 57 an outer vertical spacing strip 59 is retained by means of stay bolts 61, which serve as supports for sets of parallel helical strips 62. The number of sets of strips determines the number of decks to be employed, the present modification being illustrated as employing two decks 52 and 53, as described hereinabove. The strips 62 of each deck divide that deck into a plurality of guideways or chutes 63, there being three such guideways in each of the decks 52 and 53 of the present modification. The bottom of each guideway 63 is defined by a large number of rollers 64 which are journaled upon radially extending rods 66, the ends of which are anchored in the strips 62 defining the associated guideway. Thus, it may be seen that a block of ice which is placed upon the rollers 64 adjacent the upper end of any of the guideways 63 will move by gravity downwards over the rollers 64, moving in a spiral path, as determined by the spiral strips 62 which define that guideway, toward the lower end of the conveyor 51.

The guideways 63 of each of the decks 52, 53 straighten out at their upper ends, as indicated at 71, and thus extend tangentially to a position adjacent the upper door 23, thereby facilitating the loading of the conveyor with blocks of ice. However, the tangential portions of the guideways maintain the pitch of the remainder of the conveyor, so that whenever a block of ice is placed upon the upper end of any one of the guideways, it will immediately move by its own weight downwards into the spiral portion and toward the lower end.

Similarly, the lower ends 72 of the guideways 63 extend tangentially toward the delivery opening 17, preferably with slightly increased pitch, as best indicated upon Fig. 3. However, instead of extending all the way to the delivery opening 17, they terminate at a distance therefrom, so as to leave room for the discharge pans 73 and 74, whereby blocks of ice from any one of the guideways 63 are conducted to the delivery opening 17 which is common to all the guideways.

Preferably the entire structure of the conveying and storage mechanism 51 is an integral unit, inasmuch as I find it more convenient to construct this portion of the device separately from the housing, and subsequently to lower the spiral conveyor 51 into the partially assembled housing, after which the partition 26, refrigerating mechanism 29, and roof 76 are installed. Access to the interior of the upper compartment 27, within which the refrigerating mechanism 29 is installed, may be had through a door 77 in the front wall 12, and preferably this door is provided with a grating 78 whereby the compartment 27 is ventilated.

Inasmuch as the present modification of the storage and conveying mechanism 51 is intended for use in the dispensation of blocks of ice, each of which is of a given weight and dimensions, and in view of the fact that such material is apt to fracture if permitted to travel down the guideways 63 at too great a speed and to be brought

suddenly to rest by striking a block at the bottom of the chute or by coming into contact with the escapement mechanism, I have designed the conveyor 51 so as to limit the speed at which the blocks of ice will be permitted to travel down the chute in any of the guideways 63. This is accomplished in the present modification by so proportioning the conveyor 51 that the distance between the tops of the rollers 64 of one guideway 63 and the bottoms of the rollers of the guideway immediately thereabove, this distance being measured in a line perpendicular to the planes of the guideways, is only slightly greater than the vertical dimension of each of the blocks to be handled. Moreover, the rollers 64 of each of the guideways 63 are arranged upon their respective rods 66 in pairs, and the rollers of each pair are arranged for rotation about an axis extending transversely of the associated guideway, but instead of being disposed at the extreme lateral edges of the guideway, they are spaced inwards a material distance therefrom toward the center of the guideway. Hence, in rolling down over the rollers 64, a block of ice is not supported at its extreme outermost edges. Instead, the area of the base of each block which rests upon supports is diminished materially in width, thereby making it easier for each block to tip over. This tendency to tip over is caused by the centrifugal force which is developed when the block moves in the circular or spiral path defined by each of the guideways 63. As will readily be observed, the innermost guideway 63 is considerably steeper than the outermost guideway. This is apparent from an inspection of Fig. 2, and also when it is realized that all the guideways 63 of each deck 51, 52 have their upper ends at the same elevation, and likewise their lower ends at the same elevation. However, inasmuch as the whorls of the innermost guideway 63 are of considerably less diameter than those of the outermost guideway, it follows that the innermost guideway is of considerably lesser length than the outermost. Consequently, the innermost guideway will be of considerably steeper pitch than the outermost, because it is of considerably lesser length, although the difference in elevation between its upper end and lower end is the same as that of the outermost guideway. Hence, the tendency would be for the blocks of ice moving downwards on the innermost guideway to travel at a considerably greater rate of speed, unless means were provided for compensating for this greater tendency. However, this difficulty is very easily taken care of by proper adjustment of the rollers 64, and so spacing them that when the speed of a block of ice in moving downwards thereupon exceeds a predetermined maximum, the centrifugal force developed thereby will produce a tendency for the block to tip. This will cause the inner, upper edge of the block to be raised, bringing it into engagement with the rollers 64 of the guideways 63 immediately above that upon which the block is moving. The faster the block moves, the more firmly will it press its upper surface against these rollers, with the result that the braking tendency whereby the downward speed of the block is controlled, is directed proportional to the speed at which the block is moving.

Inasmuch as there is a single delivery opening 17 through which all of the guideways 63 are adapted to discharge their respective blocks of ice, I have provided the two discharge pans 73 and 74, pivotally mounted at the lower ends of the two decks 52 and 53, respectively. Each of

these pivotally mounted discharge pans 73, 74 is in the form of an apron, the upper edge of which is pivoted to the lower end of the associated guideway by a transversely extending rod 81 (see Fig. 6). The lower end of each of the discharge pans 73, 74 is normally held in elevated position by a spring 82, 83, respectively, these springs being so proportioned, however, that when a block of ice imposes its weight upon either of the discharge pans 73, 74, that pan will be pivoted downwards about the axis of its pivoting rod 81, until that pan is disposed in inclined position, extending from the lower end of the associated deck 52, 53 to an inclined platform 84 which leads outwards through the delivery opening 17 to the platform 18. It will be observed that the upper pan 73, when in elevated position, is withdrawn out of the way of blocks of ice which are moving off the lower deck 53. However, when it is moved to operative position by the weight of a block of ice thereupon, the lower end of the upper pan 73 is disposed within the lower pan 74, providing an inclined surface down which a block of ice may slide into the lower pan 74, and thence, by way of the inclined platform 84, to the receiving platform 18, without dropping with sufficient velocity to fracture the block of ice. Inasmuch as each of the pivoted pans 73, 74 serves a plurality of guideways 63 of the associated deck 52, 53, respectively, the upper end of each pan 73, 74 is wide enough to receive a block of ice from any one of the associated guideways. However, each of these pans tapers to such an extent that its lower end guides a block of ice from any of the guideways 63 of the associated deck into and through the delivery opening 17.

An escapement mechanism is provided adjacent the lower end of each guideway 63, so as to permit a single block of ice to be released from the guideway each time the dispensing mechanism is actuated; and subsequent to the release of a block the remaining blocks of ice in the associated guideway are permitted to move downwards a distance equal to the length of the released block, thereby positioning the next block of that guideway in position for subsequent release. This escapement mechanism comprises a plate 86, the two ends 87 and 88 of which are offset, but disposed in substantially parallel planes and joined by a transversely extending portion 89. The plate 86 is disposed with its upper end 87 above the plane of the rods 66 upon which the rollers 64 are journaled, whereas the lower end 88 of the plate 86 is disposed below the plane of the rods 66, as clearly shown upon Fig. 6. The plate is mounted for rocking movement by means of a pair of spaced brackets 91 extending downwards from the under surface of the upper offset end 87, and pivotally mounted upon one of the rods 66. A leaf spring 92 is riveted or otherwise permanently attached to the upper end 87 of the plate 86, and extends past the transversely extending portion 89, so that the lower end of the spring 92 bears against a rod or pin 93, the parts being so proportioned and arranged that the spring 92 is continually urging the plate 86 in rocking motion in a counterclockwise direction, as viewed upon Fig. 6, i. e., to lower the upper end 87 and to raise the lower end 88. The upper end 87 is provided with an abutment in the form of a roller 94 which is journaled upon a pin 96 which extends transversely of the upper end 87 of the plate 86, this pin being carried by extensions of the plate 86. The lower end 88

is also provided with an abutment in the form of a roller 98, which also is journaled upon a pin 99 extending transversely of the plate. However, this pin 99 is carried by vertical extensions 101 of the lower end 88 which extend between the rods 66 so as to dispose the abutment roller 98 above the plane of the upper surfaces of the rollers 64 when in position to engage a block 102 of ice and prevent it from moving off the associated guideway 63. Another leaf spring 103 is riveted or otherwise attached to the lower end 88 of the plate 86, and extends past the transverse portion 89, so as to dispose the upper end of the spring 103 adjacent the upper abutment roller 94. Between the upper end of the spring 103 and the abutment roller 94 of each plate 86, a cam 104 is disposed, this cam 104 being affixed to a shaft 106 which extends transversely of the associated guideway 63. In order to facilitate the movement of blocks 102 in moving past the cam 104 when the upper abutment 94 is retracted, a pair of the rollers 64 is journaled upon the shaft 106, so that in reality the shaft 106 serves also as one of the rods 66 for the support of this pair of rollers. However, the shaft 106 extends across all the guideways 63 of the associated deck 52, 53, with the result that all the cams 104 of that deck are operated by a single shaft 106. Moreover, the two shafts 106 of the two decks are connected by means of a chain 107, which engages sprockets 108 and 109 on the upper and lower shafts 106, respectively, with the result that all the cams 104 are moved simultaneously, thereby predetermining the sequence of operation of the several guideways 63.

In the present modification, the operating mechanism is designed to rotate all the cams 106 through one-sixth ($\frac{1}{6}$) of a complete revolution upon each actuation thereof, and each cam 106 is in the form of a semi-cylinder, i. e., it is provided with a cylindrical surface 111 which extends throughout 180° , and a relieved portion 112 which extends throughout the remaining 180° of the cam. The parts are so proportioned and arranged that when the high portion 111 of a cam is upwards, it bears against the upper roller 94, rocking the plate 86 in a clockwise direction, as viewed upon Fig. 6, and against the action of the springs 92 and 103, thus raising the upper abutment roller 94 and lowering the lower abutment roller 98. This will permit the extreme lowermost block 102 of ice to move past the escapement device and through the delivery opening 17. As this occurs, however, the upper abutment roller 96 will come into contact with the lower surface of the next block 102 of ice on that same guideway, holding the block 102 elevated so that its upper forward corner will come into contact with a roller 113 which is positioned at a suitable distance above the bed of the associated guideway, as clearly shown upon Fig. 6. Hence, this block 102 and all the other blocks of the associated guideway, are not permitted to move downwards to again fill the space emptied when the lowermost block 102 is released, until the cam 104 is again rotated far enough to swing the plate 86 into that position in which the upper abutment roller 94 is retracted and the lower abutment roller 98 is disposed in the path of the next block 102. Therefore, when the blocks of ice do again feed downwards to fill the space emptied by the released block, they will be brought to rest by the engagement of the lowermost block with the roller 98, which will retain them against release until the releasing mechanism is again actuated.

The actuating means for the cam shafts 106 is preferably an electric motor 116 coupled to the lowermost shaft 106 through a speed reduction gear mechanism, indicated in its entirety at 117. The motor 116 receives energy through a control switch 118. Inasmuch as the details of construction of this control switch form no portion of the present invention, it will not be necessary to describe it, beyond explaining that it includes a fixed contact 119 adapted to complete the motor circuit when engaged by a movable contact 120. A solenoid 121 is adapted to be energized by a circuit which is not illustrated, when the proper coins are dropped into the coin control box 13 and the button 14 is depressed, whereupon the solenoid 121 attracts the contact 120 and moves it into engagement with the contact 119, completing the circuit to the motor 116, and also an auxiliary holding circuit which keeps the solenoid 121 energized until the contacts 119 and 120 are separated. An arm 122, rigid with the lower pivoted pan 74, is connected to a cam 123 by a link 124 and pivotally mounted lever 125, in such a manner that when the pan 74 is depressed, the cam pushes the contact 120 away from the contact 119, deenergizing both the motor 116 and the solenoid 121. Inasmuch as the upper pan 73 conducts cakes of ice from the upper deck into the lower pan 74, the switch contacts 119 and 120 will be separated whenever a block of ice is delivered through the opening 17; but should it happen that one of the guideways 63 becomes clogged in any way, an operator of the machine will be sure to receive a block of ice, because the motor 116 will be kept energized until a block slides and depresses the pan 74.

Also coupled to the gear reduction 117 is a pump 126, preferably enclosed within a suitable casing 127 and operated by a shaft 128 whenever the motor 116 is energized. A discharge conduit 129 from the pump 126 is preferably a length of flexible tubing, and leads to a cylinder 131 which is pivotally mounted by means of a pivot pin 132 upon a bracket 133 which is secured to the inside of the shell 46 adjacent the delivery opening 17. A pair of doors 134 and 136 are mounted for pivotal movement about vertical axes adjacent the opposite sides of the opening 17, and rigid with each of the doors 134 and 136 are operating cranks 137 and 138, respectively. The crank 137 is pivoted by a pin 139 directly to the rod 141 which is adapted to be pushed outwards from the cylinder 131 when fluid under pressure is supplied thereto, the parts being so proportioned and arranged that when this motion of the rod 141 occurs the door 134 is swung outwards to open the delivery opening 17. The other door 136 is also swung outwards simultaneously, inasmuch as it is also connected to the rod 141 by means of a link 142, one end of which is pivoted to the crank 138, and the other end of which is pivoted to a lever 143 pivotally mounted upon a bracket 144. This lever is connected by a push rod 146 to the pin 139, so that when the rod 141 is pushed to the right, as viewed upon Fig. 9, the lever 143 is swung in counterclockwise motion, pushing the link 142 and thus causing the door 136 also to open. When the pump 126 is stopped the parts are returned to that position in which the doors 134 and 136 are closed, by means of a spring 147 under tension between the lever 143 and an eye or staple 148 secured to the inner surface of the shell 46.

Operation

Blocks 102 of ice to be vended are placed within the machine by way of the door 23, which when open gives access to the upper ends of the guideways 63 of both decks 52 and 53 of the conveyor 51. As stated hereinabove, these blocks of ice are of a given weight and dimensions, all the blocks preferably being of the same size and shape. As the blocks are placed upon the upper ends of the guideways and released, they will move downwards of their own weight until they come into contact with either the escapement mechanism at the bottom of the guideway or with a block of ice already positioned upon that guideway. As explained previously, the transverse spacing of the rollers 64 is such that the speed of each block of ice in moving downwards is limited so that it will not be brought to rest with sufficient impact to fracture the block of ice. After the desired number of blocks of ice have been placed upon the delivery and storage mechanism 51, the door 23 should be closed so as to prevent the influx of heat to the storage chamber.

The thermostat (not shown) whereby the operation of the refrigerating mechanism 29 is controlled, should be set so as to maintain the temperature within the compartment 28 several degrees below the freezing point. Hence, the ice stored therein is kept at a sufficiently low temperature to permit its being transported a considerable distance by a purchaser, after the block of ice is removed from the compartment 28, without excessive melting. It should be explained that toward this same end I have found it desirable to wrap each of the blocks of ice with a suitable heavy kraft paper, which serves as an efficient heat insulative wrapping, which also is conducive to the elimination of excessive melting during transportation of a block of ice after its removal from the vending machine.

A person desiring to purchase a block of ice should deposit the suitable coins in the coin slots 16, and then press the button 14, causing energization of the motor 116, which will be energized long enough to cause the cam shafts 106 to turn through 60°, after which the switch mechanism 118 will be actuated to break the circuit leading to the motor 116. The first result of energization of the motor will be opening the delivery doors 134 and 136. Shortly thereafter the upper abutment roller 94 of one of the escapement plates 86 will be engaged and raised by the high portion 111 of one of the cams 104, thus causing the lower abutment roller 98 of that escapement mechanism to be withdrawn from the path of the block 102, which has up until this time been engaged thereby. This permits the block 102 to move downwards past the roller 98, over the associated pan 73 or 74, as the case might be, and through the opening 17, onto the platform 18, from which the purchaser may easily remove the block. The next block 102 of that guideway will be engaged by the elevated upper roller 94, and thus held against being released, thereby insuring that the purchaser will receive a single block of ice.

As soon as the de-energization of the motor 116 occurs, the pressure generated by the pump 126 will be relieved, whereupon the spring 147 will cause the doors 134 and 136 to close.

Simultaneously with the release of the escapement mechanism associated with one of the guideways 63, the cam 104 of another guideway

will be moved in such a manner that the upper abutment roller 94 drops off the high portion 111 of that cam, thus permitting the roller 94 to be lowered. This action is relatively fast, inasmuch as the lower spring 103 is engaged by the high portion 111 of the cam 104 when the upper roller 94 drops off the high portion, with the result that the spring 103 then cooperates with the spring 92 to snap the escapement plate 86 back into that position in which it is illustrated at the bottom of Fig. 6. This insures that the lower abutment roller 98 will be disposed in the path of the block 102 before it has a chance to move downwards from that position in which it has been retained by the upper abutment roller 94. Hence, each time a block of ice 102 is released from one of the guideways 63, the blocks in another of the guideways are permitted to move downwards a distance equal to the length of the block of ice which previously had been dispensed from that guideway, placing the lowermost block in position for subsequent dispensation. Inasmuch as the several cams 111 are set 60° apart, only a single block of ice is released each time the machine is actuated.

It is to be understood that the details of the invention as herein disclosed, are subject to alteration within the spirit or scope of the appended claims.

I claim:

1. A conveying mechanism comprising a plurality of spaced parallel strips arranged spirally to define spiral guideways therebetween, rollers journaled between said strips in position to support articles upon the guideways and to conduct said articles downwards thereupon, and means for limiting the speed of said articles in moving downwards upon said rollers, the limiting means of the several guideways being individually variable to compensate for the steeper pitch of each guideway as compared with that of the adjacent guideway on the outside thereof.

2. A conveying mechanism comprising a plurality of spaced parallel strips arranged spirally to define spiral guideways therebetween, rollers journaled between said strips in position to support articles upon the guideways and to conduct said articles downwards thereupon, the whorls of each guideway being spaced one above the other and said articles being slightly less in height than the distance between the rollers of adjacent whorls, said rollers being arranged in pairs and the rollers of each pair being journaled for rotation about an axis extending transversely of the associated guideway, and means holding the outermost roller of each of said pairs at a predetermined distance inwards from the strip defining the outer edge of the associated guideway, whereby each article is tipped by centrifugal force when its speed in moving downwards upon the guideway exceeds a predetermined maximum.

3. In a vending machine, an inclined chute adapted to receive a plurality of articles to be vended, and escapement means adjacent the lower end of said chute for releasing one of said articles at a time, said escapement means comprising a plate mounted for rocking movement about an axis extending transversely of said chute, upper and lower abutments carried by said plate and engageable with one of said articles, an abutment above said plate and slightly in advance of said upper abutment on the plate, spring means urging said plate into that position in which said lower abutment lies within

the path of articles in moving off said chute, and a cam cooperative with said plate and adapted to rock the plate into that position in which said lower abutment is withdrawn from said path, said upper abutment being adapted to engage the bottom of the next of said articles on said chute when said lower abutment is withdrawn and press said next article upwards into engagement with said abutment above the plate.

4. In a vending machine, an inclined chute adapted to receive a plurality of articles to be vended, and escapement means adjacent the lower end of said chute for releasing one of said articles at a time, said escapement means comprising a plate mounted for rocking movement about an axis extending transversely of said chute, upper and lower abutments carried by said plate and engageable with one of said articles, an abutment above said plate and slightly in advance of said upper abutment on the plate, spring means urging said plate into that position in which said lower abutment lies within the path of articles in moving off said chute, a cam cooperative with said plate and adapted to rock the plate into that position in which said lower abutment is withdrawn from said path, said upper abutment being adapted to engage the bottom of the next of said articles on said chute when said lower abutment is withdrawn and press said next article upwards into engagement with said abutment above the plate, and a spring engageable by said cam as the cam releases said plate and adapted to snap the lower abutment back to engaging position.

5. In a vending machine, a housing, a plurality of superposed decks, each deck having a plurality of inclined chutes therein, a single delivery opening in the housing adjacent the lower end of the lowermost deck, and separate escapement means for each of said chutes co-operatively connected to release articles from said chutes one at a time and in predetermined sequence through the delivery opening.

6. In a vending machine, a housing, a plurality of inclined chutes therein, a single delivery opening in the housing adjacent the lower end of said chutes, separate escapement means for each of said chutes co-operatively connected to release articles one at a time for movement through the delivery opening, said escapement means comprising a rocking member for each of the chutes and provided with means for alternately retaining and releasing the article for delivery through the delivery opening, means for operating said rocking members in predetermined sequence, said operating means including rotating cam shafts provided with cams for operating the rocking member, and means for rotating the shafts in unison.

7. In a vending machine, a housing, a plurality of superposed decks therein provided with a plurality of inclined chutes, a single delivery opening in the housing adjacent the lower end of the lower deck, separate escapement means for each of said chutes co-operatively connected to release articles from said chutes one at a time for movement through the delivery opening in predetermined sequence, an upper and a lower discharge pan for the upper and the lower deck respectively, said upper pan being tiltable by the weight of the article passing over it to transfer the article to the lower pan and the lower pan being adapted to convey the article through the delivery opening, and means operatively connected with said lower pan to stop

the operation of the escapement means for the chutes when an article passes over the lower pan.

8. In a vending machine, a housing, a plurality of inclined chutes therein, a single delivery opening in the housing adjacent the lower end of said chutes, separate escapement means for each of said chutes co-operatively connected to release articles from said chutes one at a time for movement through the delivery opening in predetermined sequence, said escapement means comprising a rocking member for each of the chutes having means for alternately retaining and releasing the article for delivery through the delivery opening, a stationary abutment above the rocking member and co-operating therewith in retaining the article, and means for operating said rocking members in predetermined sequence.

9. Package dispensing apparatus including a plurality of substantially parallel conveyors and each adapted for conveying blocks of ice one behind the other in single file, a gate associated at the discharge end of each conveyor for holding the blocks of ice thereon at each operation thereof and permitting the delivery of the advancing blocks of ice on such conveyor, means for operating each gate and returning it to normal position, which means are associated side by side in a row, a single shaft with a plurality of arms thereon in staggered position to engage and operate successively said gate operating means for the plurality of conveyors, whereby the advancing block of ice will be delivered from all the conveyors in succession, and means for stopping said rotating series of arms after each gate has been operated.

10. Package dispensing apparatus including a plurality of substantially parallel conveyors and each adapted for conveying blocks of ice one behind the other in single file, a gate associated at the discharge end of each conveyor for holding the blocks of ice thereon at each operation thereof and permitting the delivery of the advancing block of ice on such conveyor, means for operating each gate and returning it to normal position, which means are associated side by side in a row, a single shaft with a plurality of arms thereon in staggered position to engage and operate successively said gate operating means for the plurality of conveyors, whereby the advancing block of ice will be delivered from all the conveyors in succession, means for stopping said rotating series of arms after each gate has been operated, a delivery door for the blocks of ice released from said conveyors, and a motor means for starting each operation of said gate operating means and at the same time opening the delivery door.

11. Package dispensing apparatus including a plurality of substantially parallel conveyors and each adapted for conveying blocks of ice one behind the other in single file, a gate associated at the discharge end of each conveyor for holding a block of ice thereon and at each operation thereof and permitting the delivery of the advancing block of ice on such conveyor, means for operating each gate and returning it to normal position, which means are associated side by side in a row, a single shaft with a plurality of arms thereon in staggered position to engage and operate successively said gate operating means for the plurality of conveyors, whereby the advancing block of ice will be delivered from all the conveyors in succession, means for stopping said

rotating series of arms after each gate has been operated, the arms on the shaft for causing the operation of said gate extending substantially equidistant from each other circumferentially.

5 12. A vending machine comprising means providing a housing, a plurality of inclined conveyors adapted to have articles stored thereon one behind the other in the housing, there being a door opening in the housing through which 10 articles released from all of the conveyors may pass, escapement means for releasing articles from the conveyors one at a time to pass through the door opening, means for operating the escapement means for the conveyors in succession, and 15 means operable by the passage of an article from a conveyor through the door opening for causing the escapement means to cease operating whereby should one conveyor become exhausted or clogged the escapement operating means will be 20 caused to continue to operate until an article is released from another conveyor and delivered to the door opening.

13. A vending machine comprising means providing a housing, a plurality of inclined conveyors 25 adapted to have articles stored thereon one behind the other in the housing, there being a door opening in the housing through which articles released from all of the conveyors may pass, escapement means for releasing articles from the conveyors 30 one at a time to pass through the door opening, a door for the opening, means for opening the door and operating the escapement means to release an article from the conveyor to be passed through the door opening, and means operable by the passage of an article from a conveyor through 35 the door opening for causing the door to subsequently close.

14. A vending machine comprising means providing a housing, a plurality of inclined conveyors adapted to have articles stored thereon one 40 behind the other in the housing, there being a door opening in the housing through which articles released from all of the conveyors may pass, escapement means for releasing articles from the conveyors one at a time to pass through the door 45 opening, a door for the opening, means for opening the door and operating the escapement means of the conveyors in succession, and means operable by the passage of an article from a conveyor through the door opening for causing the 50 escapement operating means to cease operating and the door to close whereby should one conveyor become exhausted or clogged the escapement operating means will be caused to continue 55 to operate and the door will be held open until an article is released from another conveyor and delivered through the door opening.

15. In a dispensing mechanism, a housing having an egress opening, a chute in the housing in 60 which a plurality of articles to be dispensed are adapted to be stored, motor driven means for releasing articles one at a time from the chute to be passed through the opening, a door normally closing the opening but openable by other motor driven means, and means engageable by an 65 article passing from the chute through the opening for causing the second motor driven means to stop and allow the door to close.

16. In a dispensing mechanism, a housing having an egress opening common to a plurality of 70 chutes, a plurality of inclined chutes in the housing upon which a plurality of articles to be dispensed are adapted to be stored, motor driven escapement means for releasing articles one at 75 a time from the chutes to be passed through the

opening, and means engageable by an article passing from a chute through the opening for causing the motor driven means to stop.

17. In a dispensing mechanism, a housing having an egress opening, a plurality of inclined 5 chutes in the housing upon which a plurality of articles to be dispensed are adapted to be stored, escapement means for each chute, motor driven means for operating the escapement means of 10 the chutes to release articles from the chutes one at a time to be passed through the opening, and means engageable by an article passing from a chute through the opening for stopping the motor driven means.

18. In a dispensing mechanism, a housing having an egress opening, a plurality of inclined 15 chutes in the housing upon which a plurality of articles to be dispensed are adapted to be stored, escapement means for each chute, motor driven means for operating the escapement means of 20 the chutes consecutively to release articles from the chutes one at a time to be passed through the opening, and means engageable by an article passing from a chute through the opening for stopping the motor driven means.

19. In a dispensing mechanism, a housing having an egress opening, a door normally closing 25 the opening, a plurality of inclined chutes in the housing upon which a plurality of articles to be dispensed are adapted to be stored, motor driven means for releasing articles one at a time from 30 the chutes to be passed through the opening and for opening the door, and means engageable by an article passing from a chute through the opening for causing the motor driven means to stop 35 and allow the door to close.

20. In a dispensing mechanism, a housing having an egress opening, a door normally closing 40 the opening, a plurality of inclined chutes in the housing upon which a plurality of articles to be dispensed are adapted to be stored, escapement means for each chute, motor driven means for opening the door and for operating the escapement means of the chutes to release articles from 45 the chutes one at a time to be passed through the opening, and means engageable by an article passing from a chute through the opening for stopping the motor driven means and allowing the door to close.

21. In a dispensing mechanism, a housing having an egress opening, a door normally closing 50 the opening, a plurality of inclined chutes in the housing upon which a plurality of articles to be dispensed are adapted to be stored, escapement means for each chute, motor driven means for opening the door and for operating the escapement means of the chutes consecutively to release 55 articles from the chutes one at a time to be passed through the opening, and means engageable by an article passing from a chute through the opening for stopping the motor driven means, and allowing the door to close.

22. In a dispensing mechanism, a housing having an egress opening, a plurality of chutes in 65 the housing in which articles to be dispensed may be stored, motor driven means for releasing articles from the chutes consecutively one at a time from each chute to be passed through the opening, means for closing the circuit of the motor, 70 and means operable upon the discharge of an article for opening the circuit of the motor to allow the motor to stop.

23. In a dispensing mechanism, a housing having an egress opening, a chute in the housing 75 in which articles to be dispensed may be stored,

a door normally closing the opening, means for releasing articles one at a time from the chute, motor driven means for opening the door, means for closing the circuit of the motor, and means 5 operable upon the discharge of an article for opening the circuit of the motor to allow the motor to stop and the door to close.

24. In a dispensing mechanism, a housing having an egress opening, a plurality of chutes in 10 the housing in which articles to be dispensed

may be stored, means for releasing articles from the chutes consecutively and one at a time from each chute to be passed through the opening, a door normally closed to the opening, motor driven means for opening the door, means for 5 closing the circuit of the motor, and means operable upon the discharge of the article for opening the circuit of the motor to allow the motor to stop and the door to close.

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