May 30, 1967 R. E. GRINDINGER ET AL 3,322,303

RELEASE MECHANISM FOR VENDING MACHINES

Filed July 22, 1966 2 Sheets-Sheet 1

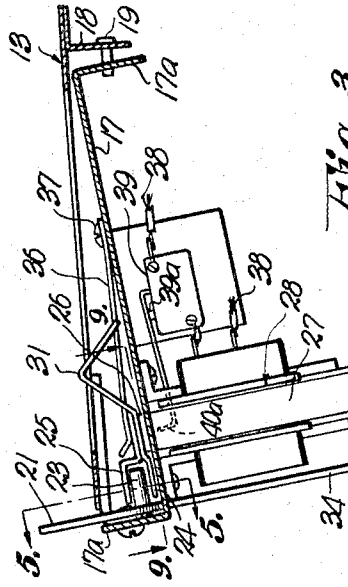


Fig. 3.

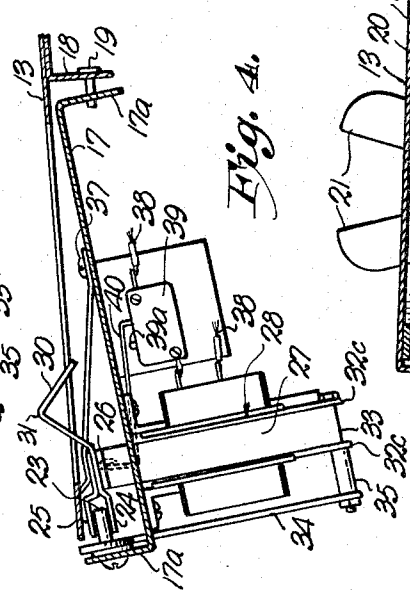


Fig. 4.

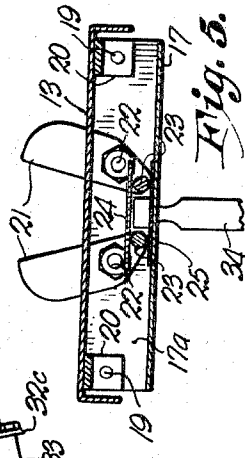


Fig. 5.

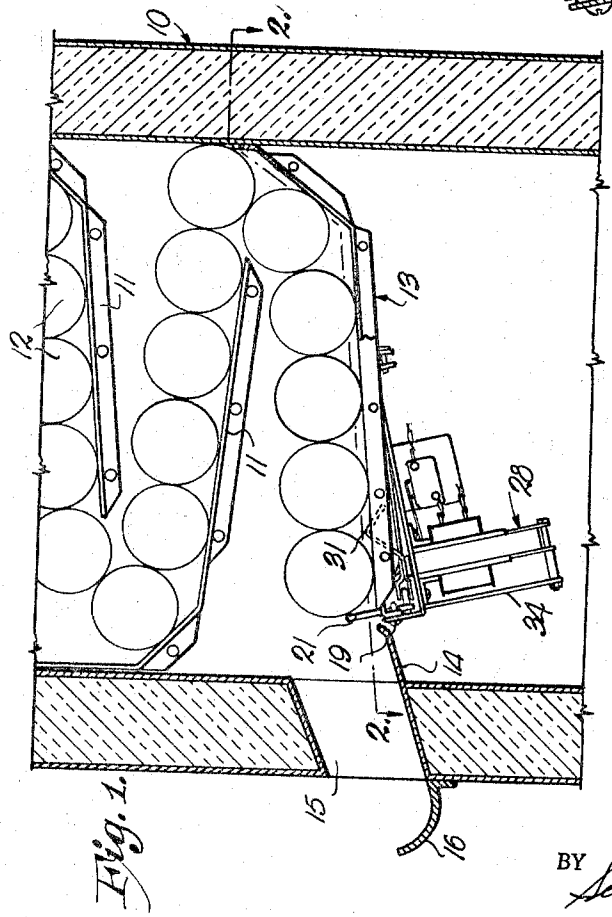


Fig. 1.

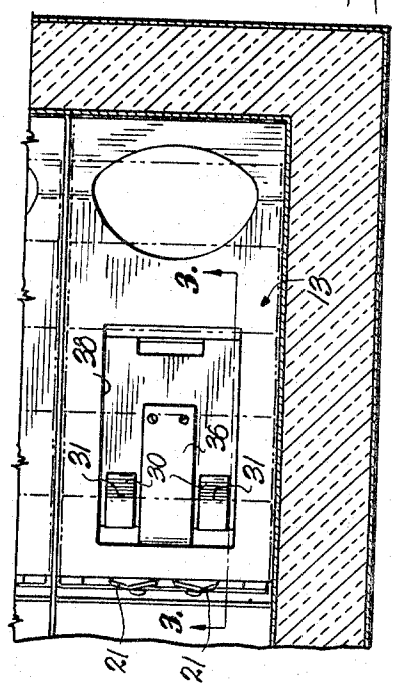


Fig. 2.

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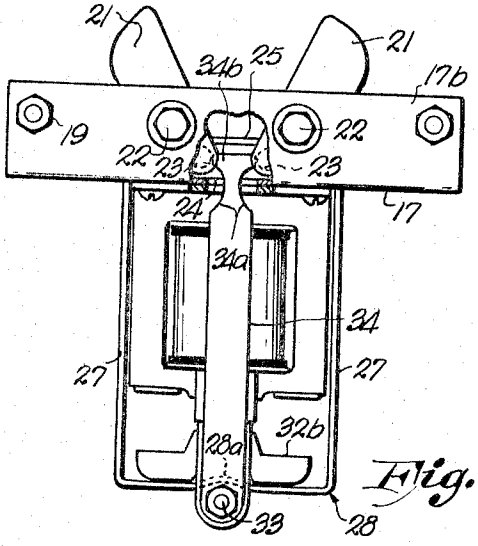


Fig. 6.

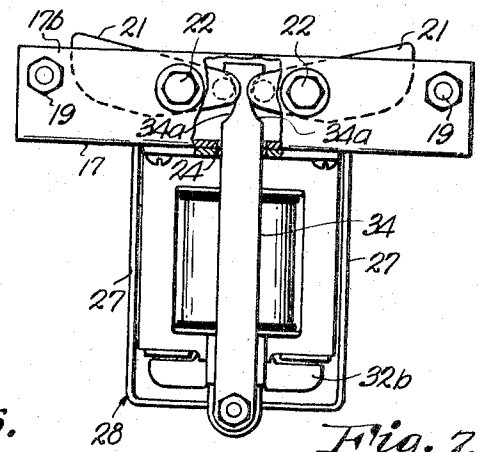


Fig. 7.

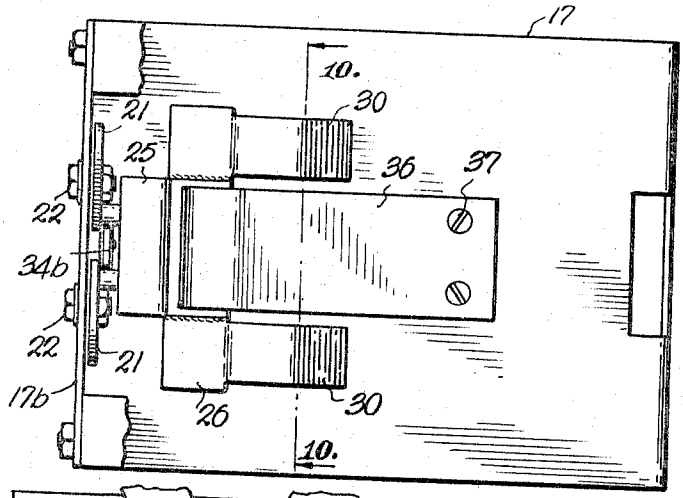


Fig. 8.

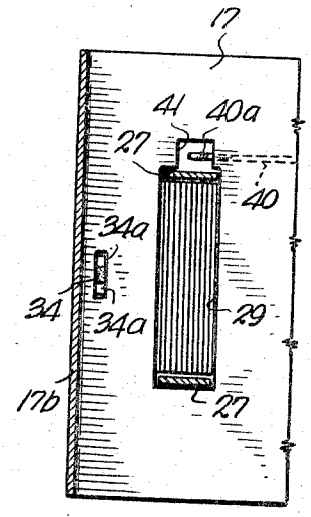


Fig. 9.

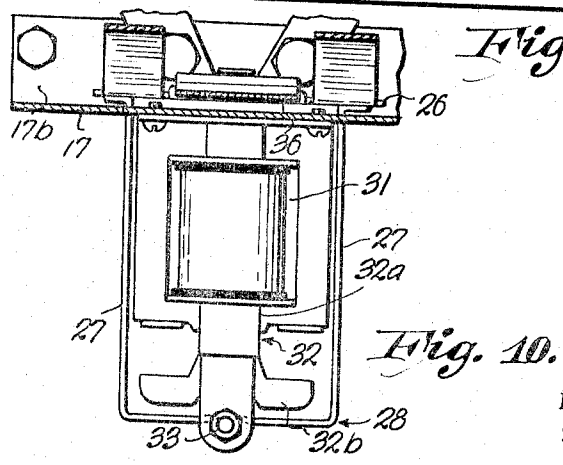


Fig. 10.

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United States Patent Office 3,322,303 Patented May 30, 1967

3,322,303

RELEASE MECHANISM FOR VENDING MACHINES

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Filed July 22, 1966, Ser. No. 567,150
5 Claims. (Cl. 221—298)

This invention relates generally to vending machines and deals more particularly with means for obtaining controlled release of individual cans stored in tiers in a vending machine. While the embodiment hereinafter shown and described is particularly adaptable to the vending of canned goods, the invention is applicable as well to other sorts of packaged products which can be delivered by gravity from a storage section or magazine to a discharge area.

One of the main objects of the invention is to provide a gate mechanism for intermittent controlled release of the successive endmost cans in a tier of cans through the action of an electromagnet or other actuating mechanism which is pulsed in response to the deposit of a coin or other signal by a customer. A particular feature of the invention resides in the provision of a highly effective gate mechanism in which a gate of substantial height relative to the can diameter is obtained while requiring only a very short displacement stroke of the armature of an electromagnet.

Another object of the invention is to provide an intermittently operated gate mechanism in which means are provided for intercepting and holding the tier of cans or other objects while the endmost can is being released and which permits, upon return of the gate, another can to move into position for release.

A further object of the invention is to provide a gate mechanism in which the gate members are locked in the can restraining condition and remain so locked until the actuating mechanism is operated to dispense a can. For this purpose the gate mechanism includes a locking bar which is moved from the gate locking position responsive to the operation of the actuating mechanism and which is returned to the locking position when the gate mechanism resumes the normal can intercepting condition.

Other objects of the invention together with the features of novelty appurtenant thereto will appear in the course of the following description.

In the accompanying drawings, which form a part of the specification and are to be read in conjunction therewith, and in which like reference numerals indicate like parts in the various views;

FIG. 1 is a sectional view taken generally on a vertical plane through the intermediate portion of a vending machine having cans stored in a zig-zag tier and showing the can release mechanism in side elevation.

FIG. 2 is a fragmentary sectional view taken generally along the line 2—2 of FIG. 1 in the direction of the arrows;

FIG. 3 is an enlarged side elevational view of the gate mechanism per se showing its relationship to the lower end of the bottom slant shelf of the tier or magazine;

FIG. 4 is a view similar to FIG. 3 but illustrating the gate mechanism in the can release position;

FIG. 5 is a fragmentary sectional view taken along line 5—5 of FIG. 3 in the direction of the arrows;

FIG. 6 is an elevational view taken generally from the left-hand side of FIG. 3 with parts broken away for the purposes of illustration;

FIG. 7 is a front elevational view taken generally from

the left-hand side of FIG. 4, parts again being broken away for purposes of illustration;

FIG. 8 is a top plan view looking down upon the device as viewed in FIG. 3;

FIG. 9 is a fragmentary sectional view taken generally along the line 9—9 of FIG. 3 in the direction of the arrows; and

FIG. 10 is a sectional view taken along line 10—10 of FIG. 8 in the direction of the arrows.

Referring to the drawings, reference numeral 10 indicates generally the insulated side walls of a typical vending machine cabinet. Located in the interior of the machine is a series of slant shelves 11 which cooperate to form a zig-zag passageway on which cans 12 are supported in series. The bottom shelf of the tier is indicated generally at 13. This shelf terminates at its outer end closely adjacent a chute 14 which passes through a discharge opening 15 in the cabinet wall at the lower end of which is a can receiving trough 16. It will be understood that the showing of the basic vending machine is largely schematic and that other components may be used without affecting the can release mechanism now to be described.

Located beneath the base shelf 13 is a generally Z-shaped plate 17. The rearward end flange 17*a* of plate 17 is secured to a depending flange 18 supported from the underside of the plate 13, the connection being by means of a bolt or pin 19. The upturned outer or front flange 17*b* of member 17 is secured by bolts 19 to angle members 20 (see FIG. 5) which have depending legs and are secured to the plate 13 by welding or otherwise.

Located substantially centrally and symmetrically on the front flange 17*b* are a pair of pivotal gate members 21. Each gate member is pivoted to the flange 17*b* by a bolt 22. These gate members have distal end portions which, when in the can restraining position, project well above the plane of the top of the bottom shelf 13.

Each gate member 21 also has a lower distal end portion which carries a rearwardly extending pin 23, the pin being located on the opposite side of the pivot axis from the main upwardly extending portion of the gate member. It will be noted that the pins 23 are also inset toward one another with respect to their respective pivot axes. These pins are slidably captured in a space between an upper camming member 24 and lower camming member 25, both of which are secured centrally to a horizontal member 26 (see FIGS. 3, 4, 8 and 10) extending transversely above plate 17. The member 26 bridges between and is secured to the outwardly bent upper ends of the spaced upstanding legs 27 of a U-shaped member 28 which extends downwardly below plate 17 at the forward end thereof. The legs 27 of U-shaped member 28 slidably extend through an opening 29 in plate 17 (see FIG. 9). The cross member 26 has formed integral therewith a pair of spaced rearwardly extending upwardly projecting V-shaped elements 30, more about which will be said later.

Located between legs 27 of U-shaped member 28 is an electromagnet assembly having the coil assembly 31, which is supported from the underside of plate 17, and a vertically reciprocable armature 32 which includes a stem 32*a* within the core and a T-head 32*b* at the lower end of the stem from which depends a pair of parallel ears 32*c*. A bolt 33 extends through these ears and projects forwardly to connect with the lower end of an upstanding bar-like member 34 which, as will be seen from later description, provides a locking bar for controlling the operation of the gate members 21. The locking bar is apertured to receive the bolt and a spacer 35 is sleeved over the bolt to maintain the locking bar at the desired spacing from the armature.

The unit is so designed that the upstanding, or can intercepting, position for the gate member coincides with

the deenergized condition for the electromagnet. In this condition, the armature 32 is in its lowermost position and the same is true of the member 28. The lower limit position for the cross bar 28 is determined by engagement of the outturned flanges at the upper end of legs 27 with the top surface of plate 17 adjacent the ends of the opening 29 earlier described. The bar 26 is secured to the flanges on the upper ends of the legs by welding or any other suitable fastening medium.

The lower limit position for the armature is determined by engagement of the lower surface of head 32*b* with the bight portion of U-shaped member 28.

The upper end of the locking bar 34 is formed with a pair of symmetrically arranged incut notches 34*a* which cooperate to define a neck and a T-like upper head portion 35*b* on the upper end of the locking bar. As can be seen best in FIG. 6, when the armature 32 is in its lowermost position, the T-head 35*b* is interposed between the pins on the gate members 21. Accordingly, it is not possible for the gate members 21 to pivot away from one another. Therefore, the gate members are locked in the raised position of FIG. 6 until such time as the locking bar 34 is moved upwardly far enough to align the notches 34*a* with the pins.

As can be again best seen in FIGS. 3 and 6, the bolt 33 has a portion underlying the bight of the U-shaped member 28 at the center thereof. The bolt is spaced somewhat below a central indented portion 28*a* in the bight. Accordingly, upon energization of the solenoid, the initial upward displacement of the armature is not accompanied by upward displacement of the U-shaped member 28. Instead, the armature will rise with an accompanying upward movement of the bolt until such time as the bolt strikes the under side of the indentation 28*a*. During this time interval, the locking bar is also displaced upwardly to bring the notches 34*a* into registry with the pins 23 on the gate members. Continued upward displacement then results in upward movement of the U-shaped member 28 and the cross member 26 connected to the upper ends of its arms. Since the members 24, 25 which lie above and below pins 23 are connected with the cross member 26 they will also rise and will operate to cam the pins 23 inwardly and upwardly, thus to pivot the upper gate portions outwardly and downwardly. FIG. 10 shows the armature at the intermediate point when the locking bar has been raised just enough to bring the bolt 33 into engagement with the bight of the U-shaped member 28, thereby to apply an upward force thereon.

The armature of the electromagnet and the associated gate actuating assembly comprising the cross member 26 and U-shaped member 28 are biased toward the down position by means of a leaf spring 36 which is fixed at its rearward end by screws 37 to the top side of plate 17 and which has its forward free end engaging the top of the offset rear portion of camming member 25 secured to the top of the cross member 26.

The electric current is supplied to the electromagnet through leads 38 and a microswitch 39 which is connected in series with the electromagnet. The switch has an upwardly biased plunger 39*a* which is controlled by a feeler arm 40 extending forwardly from the switch and having an upturned end or tip 40*a* which bears against the underside of cross member 26, access being achieved through an opening 41 formed in the member 17 (see FIG. 9). When the gate members 21 are up and the member 26 thus in its corresponding down position, the feeler 40 is depressed, thus depressing plunger 39*a*. In this condition, the circuit to the solenoid is closed. When the electromagnet is energized, as is usually done through deposit of a coin in a proper coin mechanism, the cross member 26 will be displaced upwardly as earlier described, thus permitting arm 40 to rise and freeing the plunger 39*a* so as to change the condition of the microswitch to "off." When the switch is moved to the off condition, the electromagnet is deenergized and the spring 36 returns the armature and the U-shaped member 28 to the lowered position or condition.

As is best seen in FIGS. 2, 3 and 4, the shelf 13 is provided with a rectangular opening 38 having a width somewhat less than the length of the can to be moved thereover and of sufficient length to accommodate the inverted V-shaped members 31 which are carried by the cross member 26. When the armature of the electromagnet is in its lowermost position, the tips of the elements 31 are sufficiently below the center of gravity of the cans as to permit the cans to roll thereover by gravity. When the electromagnet is energized these elements 30 are raised so that they project well above the level of the shelf 13. The elements 30 are so located that they lie between the can which is engaged by the gate 21 and the next succeeding can. Accordingly, upon energization of the solenoid, elements 30 are brought upwardly and into engagement with the succeeding can so as to engage the succeeding can.

Briefly summarizing the operation of the invention, which has already been explained in large part in connection with the description that has preceded, the normal condition for the electromagnet is a deenergized condition. This is the condition which corresponds to the positions of the parts shown in FIGS. 1, 2, 3 and 6. The endmost can 12 is restrained from departure from shelf 13 by the upstanding portions of the gate members 21. Moreover, these gate portions cannot be separated by reaching in through the chute 15 since the locking bar 34 has the head portion 34*b* which is interposed between the pins 23 at the lower ends of the gate members.

Upon energization of the solenoid, the armature is drawn upwardly, carrying with it, during the initial increment of displacement, the locking bar 34. The bar is moved upwardly sufficiently to disengage the T-head 34*b* of the locking bar from between the pins 23. Thereafter, the U-shaped member 28 is engaged by bolt 33 and it, too, is impelled upwardly. The members 24, 25 operate to cam the pins 23 inwardly, thereby pivoting the upper portions of the gate members 21 outwardly and downwardly, whereby to smoothly release the endmost can and permit it to roll on into the chute 14 and into the discharge trough 16. A second can is prevented from rolling down the chute by the upward movement of the V-shaped members 30 into a position to intercept the next can.

When the armature reaches the uppermost limit of travel, the microswitch 39 opens the circuit to the solenoid, thus deenergizing the solenoid and permitting the leaf spring 36 to return the armature and its associated components to the down position. The camming members 24, 25, acting on pins 23, again pivot the gates back toward the raised position. As the V-shaped members 30 move back to the down position, the next can is permitted to roll into the space vacated by the preceding can where it is intercepted and restrained by the gate members 21. When the armature reaches the full down position, the head 34*b* of the locking bar is again interposed between the pins and the unit is ready for another operation cycle.

From the foregoing, it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described our invention, we claim:

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1. In a can vending machine, the combination of
a slant shelf for supporting a series of cans and having a lower discharge end over which cans can roll by gravity,
a pair of pivotal gate members positioned at said discharge end of said shelf with first distal portions normally extending above the level of the shelf to intercept a first can, the pivot axes for said gate members located below said discharge end,
operating means operable intermittently to pivotally displace said gate members in opposed directions whereby to move said first distal portions from the path of said can to a can release position and back to the can intercept position,
stop means connected with said operating means and operable to engage and hold the can behind said first can when said gate members are pivoted to said release position and to disengage therefrom upon return of said gate members to the can intercept position.

2. The combination as in claim 1, including
a displaceable locking member operatively associated with said gate members and normally locking same in said can intercept position and against said pivotal displacement, and
means interconnecting said locking member with said operating means and operable to effect displacement of said locking member from the normal locking condition to an unlocking condition prior to said pivotal displacement of said gate members.

3. The combination as in claim 2,
said gate members having second distal end portions,
said locking member including a portion normally disposed between said second distal portions and preventing said pivotal displacement of said gate members.

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4. The combination as in claim 1,
said operating means comprising
an electromagnet having a reciprocable armature,
camming members connected to and reciprocable with said armature, and
cam follower members connected respectively with said gate members and displaced by said camming members in directions to pivot said gate members in response to reciprocation of said armature.

5. The combination as in claim 4,
a displaceable locking member connected with said armature and operably associated with said gate members, said locking member normally positioned to prevent said pivotal displacement of said gate members from said can intercept position but operable upon initial displacement of said armature to release said gate members for pivotal displacement, and
means providing a lost motion connection between said camming members and armature whereby the camming members are not operatively displaced until said gate members have been released for pivotal displacement.

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