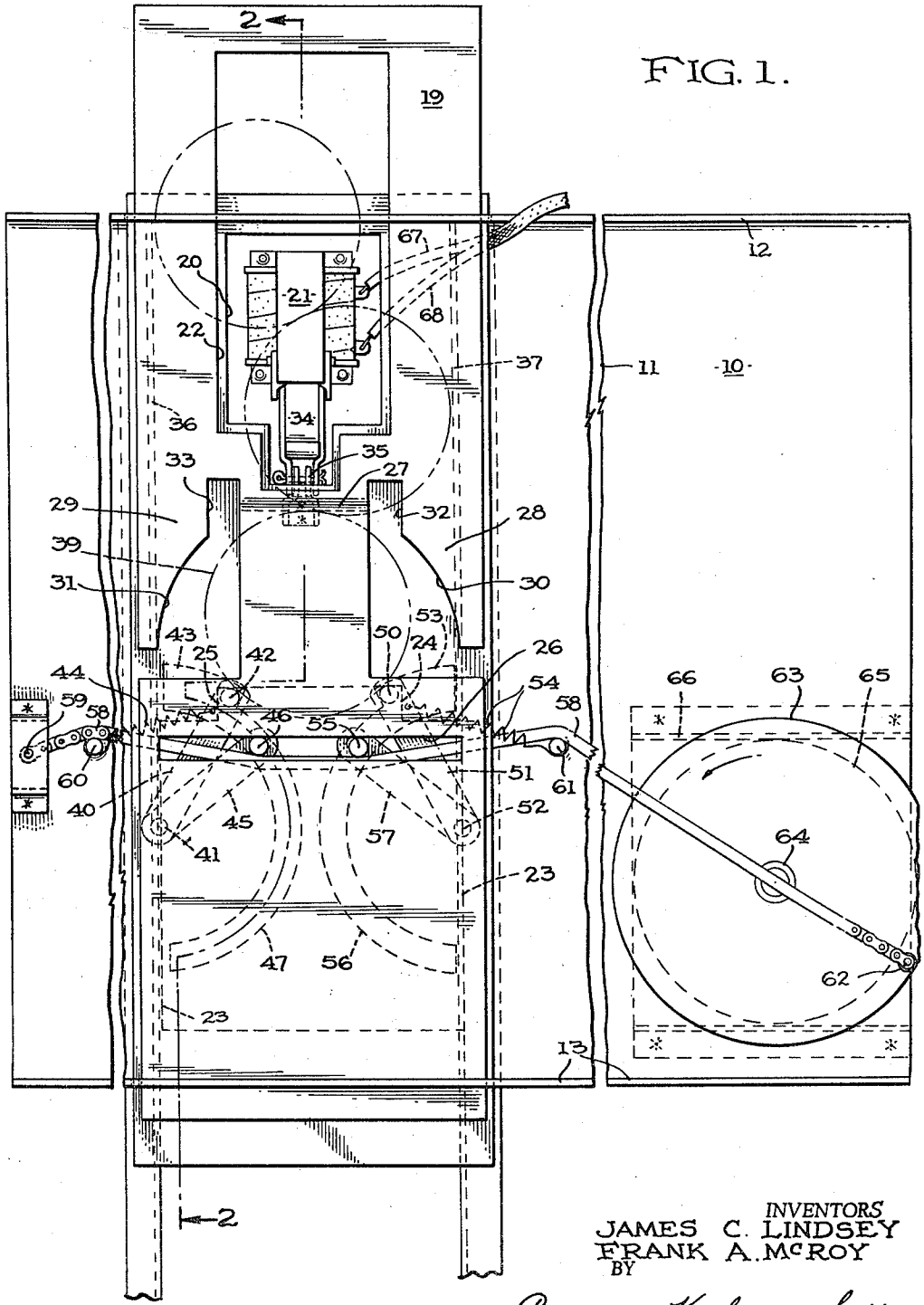
March 30, 1965 J. C. LINDSEY ETAL 3,175,728

CAM PLATE DISPENSING MECHANISM

Filed Jan. 29, 1963 5 Sheets-Sheet 1

FIG. 1.



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CAM PLATE DISPENSING MECHANISM

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FIG. 2.

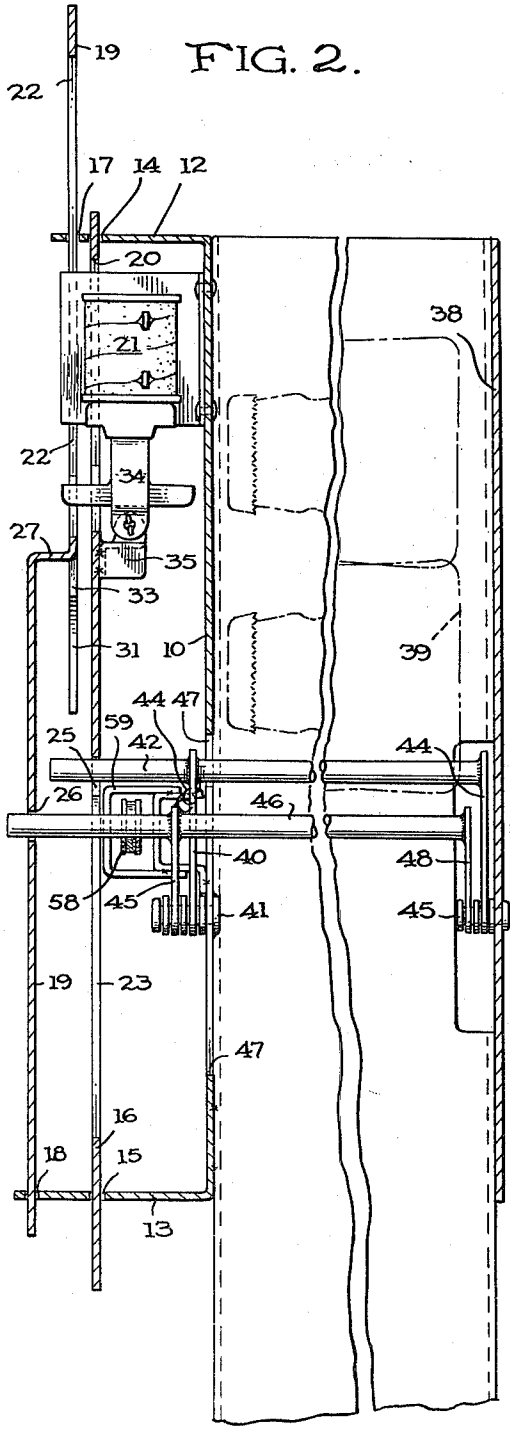
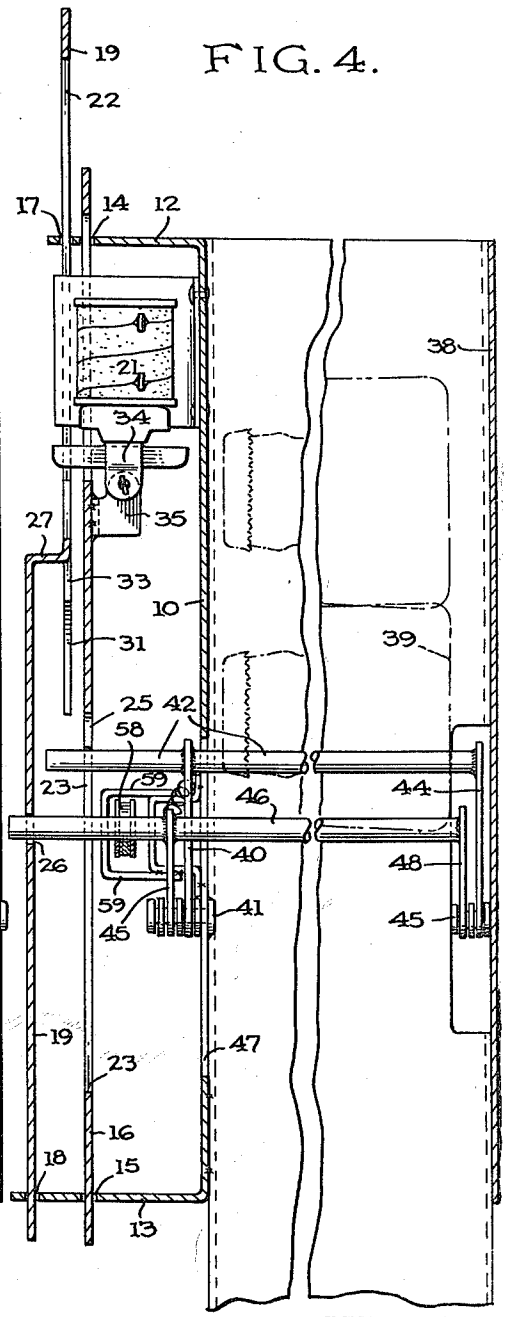


FIG. 4.



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CAM PLATE DISPENSING MECHANISM

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FIG. 5.

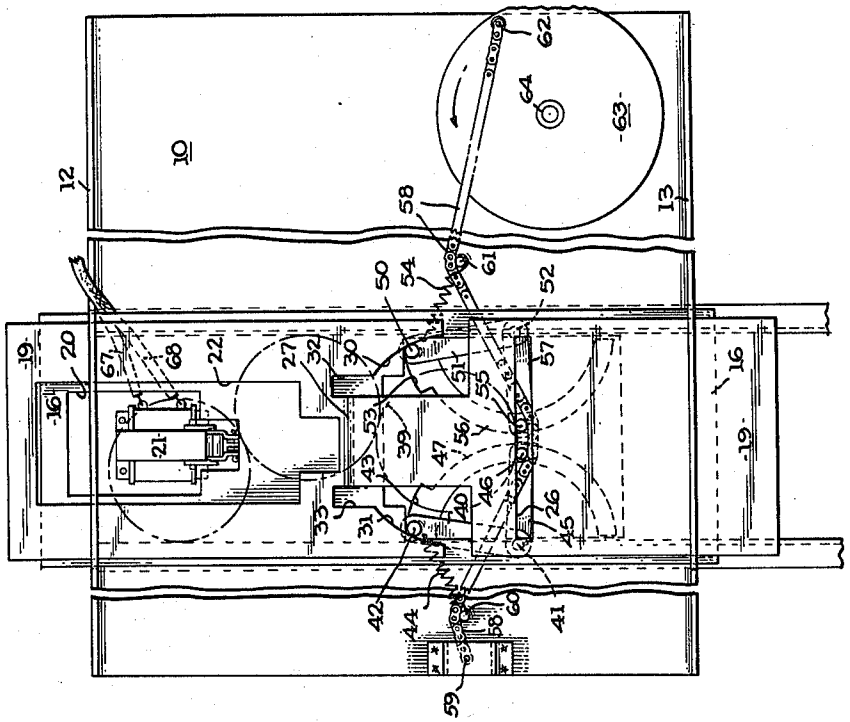
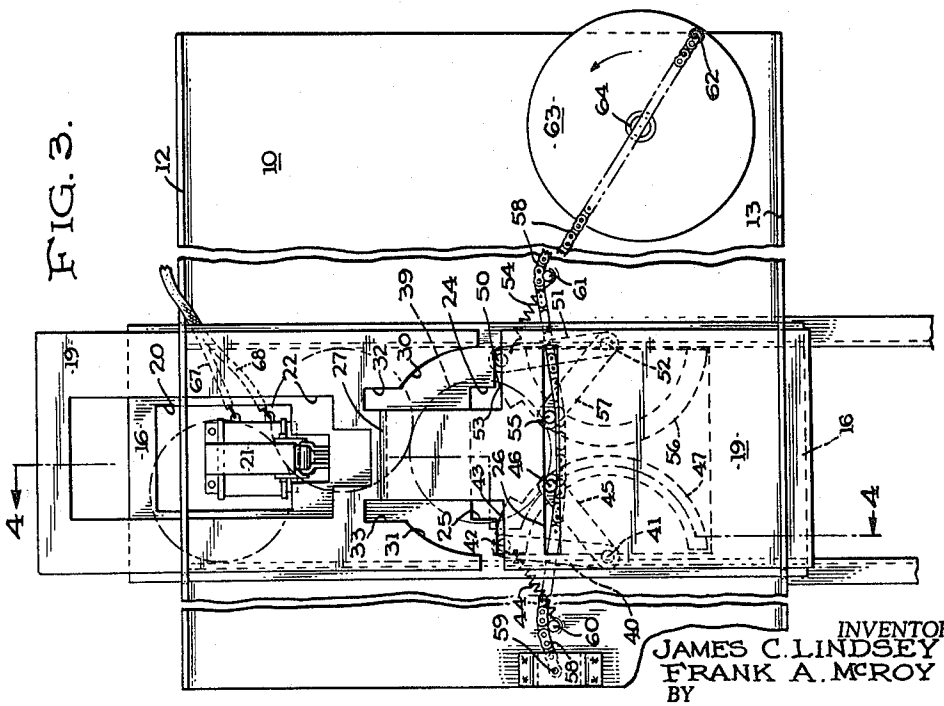


FIG. 3.



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CAM PLATE DISPENSING MECHANISM

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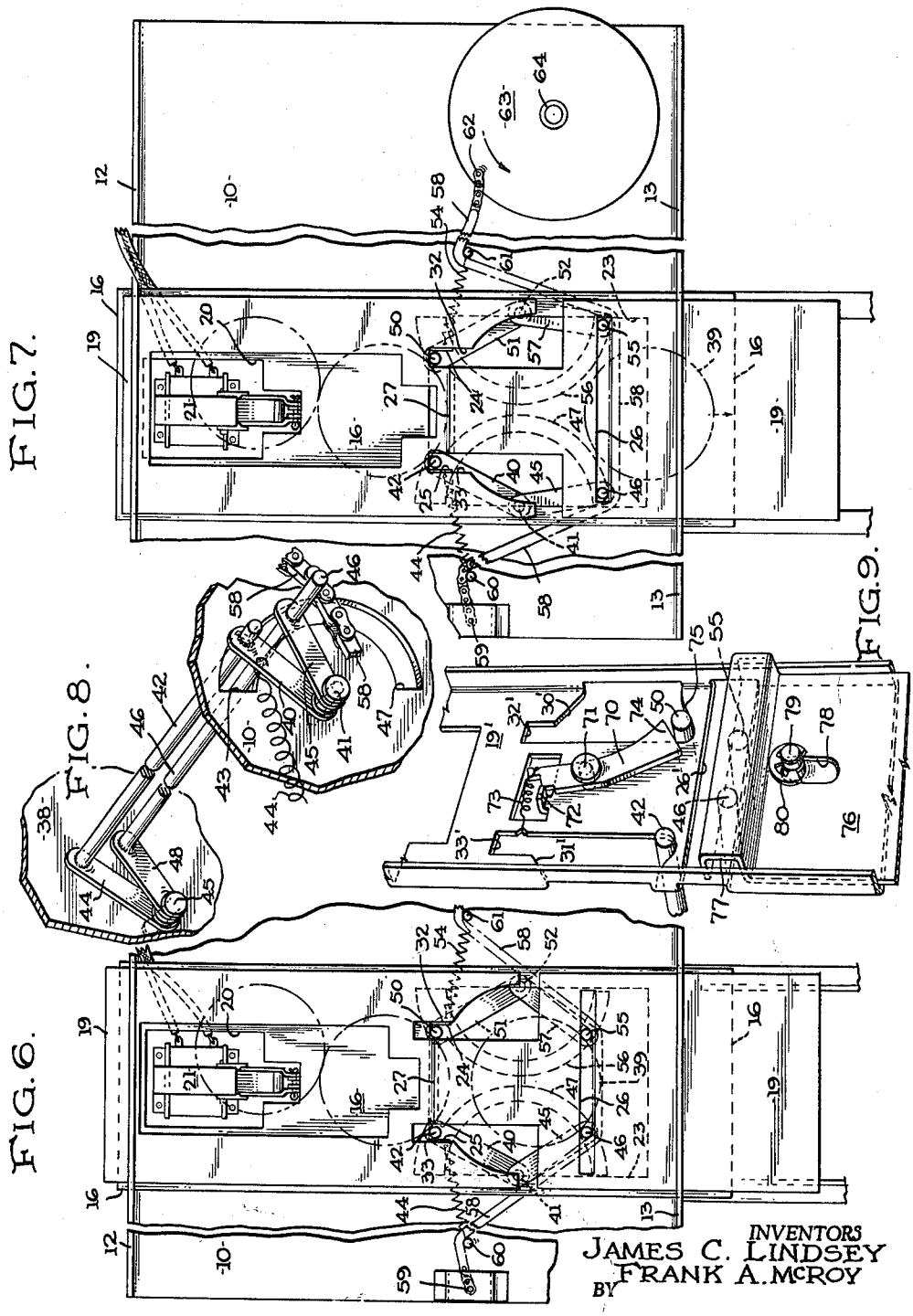


FIG. 6.

FIG. 7.

FIG. 8.

FIG. 9.

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CAM PLATE DISPENSING MECHANISM

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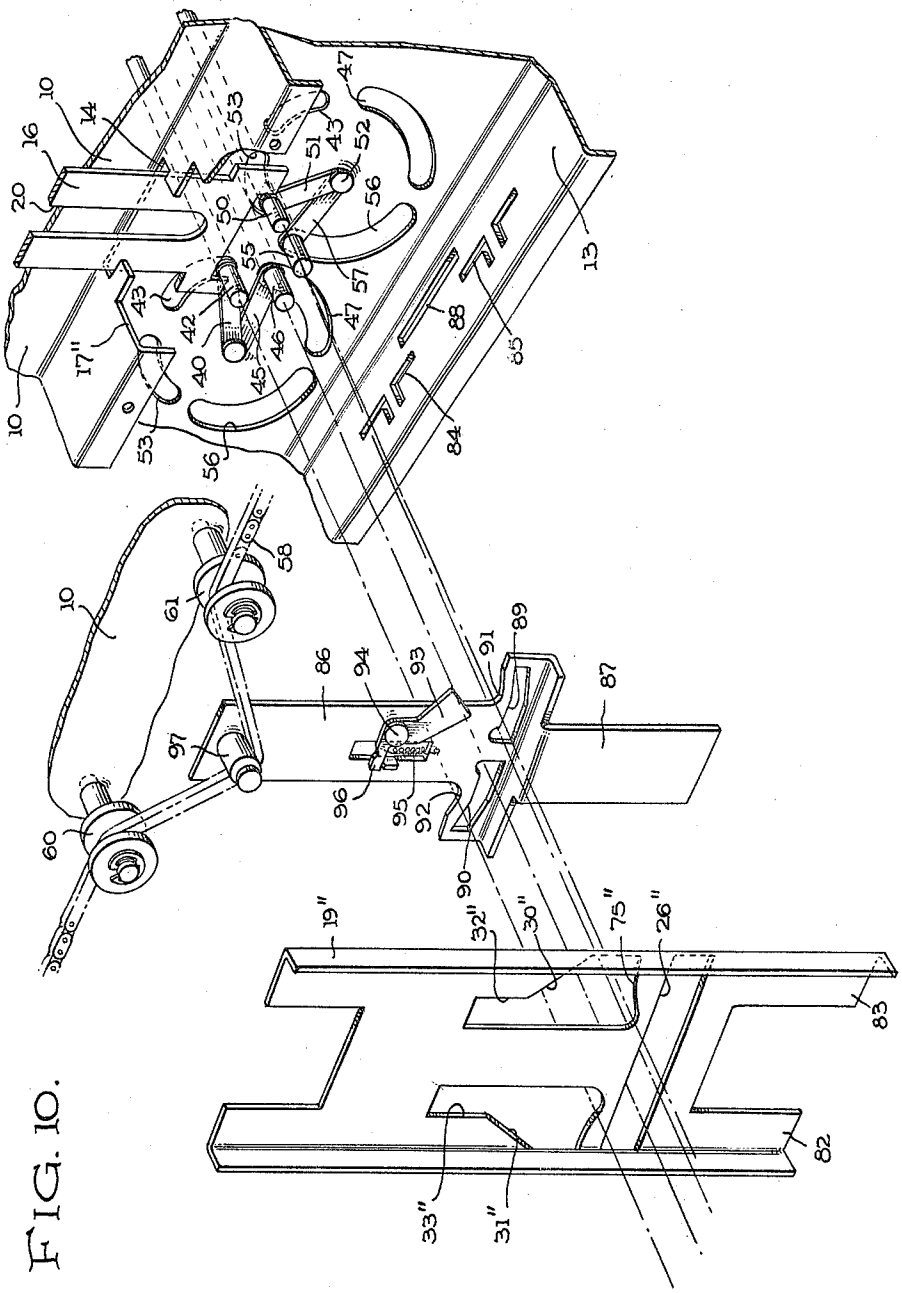


FIG. 10.

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United States Patent Office 3,175,728 Patented Mar. 30, 1965

3,175,728

CAM PLATE DISPENSING MECHANISM

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Filed Jan. 29, 1963, Ser. No. 254,680
13 Claims. (Cl. 221—15)

This invention relates to mechanisms for dispensing articles one at a time from a vertical stack of articles.

More particularly this invention relates to mechanisms for dispensing one article at a time from a vertical stack of articles in which upon deposit of a coin an electrically actuated solenoid moves a lock plate to release a pair of support rods which move to permit the article to rest upon lowering rods. The downward motion of the lowering rods is controlled by a regulator mechanism. The lowering rods in their downward movement are followed by a cam plate which returns the support rods to their initial position beneath the next article in the stack of articles before the first article is dispensed. The cam plate includes slots for locking the support rods in place beneath the next article in the stack to prevent "jack-potting" of the machine should the lowering rods fail to return to their upper position.

Heretofore, various mechanisms have been proposed for dispensing one article at a time from a vertical stack of articles, such articles being bottles, cans, cartons, and the like, hereinafter referred to for convenience as bottles. In most of these prior devices the bottle after dispensing is permitted to fall by gravity to position accessible to the user of the mechanism. Considerable damage to the bottles has been experienced by reason of this free gravity fall.

The present dispensing mechanism not only dispenses but one bottle at a time from a vertical stack of bottles while preventing removal of more than one bottle at a time from the mechanism but also controls the downward movement of the released bottle so that the same is delivered to position accessible to the user of the mechanism with minimum free fall and without damage to the bottle.

It is therefore an object of the present invention to provide a novel cam mechanism for dispensing a single bottle at a time from a vertical stack of bottles in which a lock plate is moved when the mechanism is actuated, as by the deposit of a coin, to release bottle support rods which move to permit the bottle to rest upon bottle lowering rods. Downward movement of the lowering rods is controlled by a regulator mechanism so that the bottle moves to dispensing position at a controlled rate, the downward movement of the lowering rods being followed by a cam plate to cam the bottle support rods to position beneath the next bottle in the stack and to lock the bottle support rods under this next bottle until the lock plate returns to locking position thus preventing "jack-potting" of the mechanism.

Another object of the present invention is to provide such a cam plate dispensing mechanism in which the downward movement of the lowering rods is controlled by a flexible inextensible element which is normally tensioned beneath the lowering rods but is progressively released during the dispensing cycle to permit the lowering rods to move to dispensing position. The element is then retensioned to return the lowering rods to their upper stand-by position.

Another object of the present invention is to provide such a cam plate dispensing mechanism which is positive and certain in its operation; which is reasonably inexpensive to manufacture and to maintain; and which is suitable for use with each of a plurality of vertical side by side stacks of bottles in a dispenser, the control mechanism for the lowering rods then being common to all of the mechanisms.

Other and further objects of the present invention will appear from the following description of an illustrative embodiment thereof.

The present invention is capable of various mechanical embodiments a preferred embodiment being shown in the accompanying drawings and is described hereinafter to illustrate the invention. This illustrative and preferred embodiment should not be construed as defining or limiting the invention.

In the accompanying drawings, in which like reference characters indicate like parts, FIG. 1 is a front view of an illustrative and preferred embodiment of the cam plate dispensing mechanism of the present invention together with a regulator for the movement of the lowering rods, one stack only of bottles being shown, it being understood that a plurality of stacks of bottles may be arranged in side by side relationship with a dispensing mechanism for each stack;

FIG. 2 is a side view in section of the embodiment of FIG. 1 on the line 2—2 thereof;

FIG. 3 is a view similar to that of FIG. 1 with the latch plate lifted and the support rods withdrawn;

FIG. 4 is a view in section of the embodiment of FIG. 3 on the line 4—4 thereof;

FIG. 5 is a view similar to that of FIG. 1 with the latch plate lifted; the support rods withdrawn; and the cam plate and lowering rods moved partially downward and showing the position of the regulator during this portion of the cycle of operation;

FIG. 6 is a view similar to that of FIG. 1 with the cam plate in position to move the support rods back to their initial position and to lock them there; with the lowering rods approaching bottle dispensing position with the regulator controlling the downward movement of the lowering rods and the cam plate;

FIG. 7 is a view similar to that of FIG. 1 showing the mechanism in bottle dispensing position;

FIG. 8 is a perspective view of a detail of the embodiment of FIG. 1 showing the relationship of one set of support and lowering rods;

FIGS. 9 is a partial view of a modified cam plate having a latch and lowering bar leveler to compensate for bottles of varying diameters; and

FIG. 10 is an expanded view of a modified construction having a separate lock plate, lowering rod leveling plate and cam plate with a support rod latch on the leveling plate.

Referring now to the several figures, the mechanism is provided with a face plate or front wall 10 of suitable length to accommodate as many stacks of bottles as may be desired, one such stack of bottles only being shown but it being understood that the break at 11 indicates the inclusion of a plurality of side by side stacks of bottles. Front wall 10 is provided with upper forwardly extending flange 12 and lower forwardly extending flange 13, these flanges being suitably slotted at 14 and 15, respectively, to slideably receive lock plate 16. Flanges 12 and 13 are also slotted at 17 and 18, respectively, to receive cam plate 19. Lock plate 16 is cut away at 20 to clear solenoid 21 which is mounted on front wall 10. Cam plate 19 is cut away at 22 to receive solenoid 21 so that both cam plate 19 and lock plate 16 can reciprocate vertically in their respective slots in flanges 12 and 13. Lock plate 16 is also cut away at 23 and is provided with spaced shoulders 24 and 25 for purposes which will hereinafter be described. Cam plate 19 is slotted at 26 as will be more fully described hereinafter and is offset at 27 to provide downwardly extending portions 28 and 29.

Portion 28 is provided with cam surface 30 and portion 29 is provided with cam surface 31. Slot extends cam surface 30 and slot 33 extends cam surface 31, all for purposes more fully described hereinafter.

Solenoid 21 is provided with armature 34 which is connected at 35 to lock plate 16.

Suitable partitions 36 and 37 are mounted between front wall 10 and back wall 38 to provide a bin for the bottles in vertical stack, the bottles being generally indicated at 39. An arm 40 is pivotally mounted at 41 on the front of wall 10 and support rod 42 passes through and is secured to an end thereof. Rod 42 extends through an arcuate groove 43 in wall 10 to rear wall 38 where it is secured to arm 44 which is pivoted to wall 38 at 45. Arm 42 can therefore swing from its position as shown in FIG. 1 in counterclockwise movement to the position shown in FIGS. 3 and 4. A suitable spring 44 is secured to rod 42 to move the same, when released, in counterclockwise rotation.

An arm 45 is also mounted on pivot 41 and receives and holds lowering rod 46. Rod 46 passes through wall 10 and is arranged for downward clockwise rotary movement in arcuate slot 47 therein. Rod 46 extends to back wall 38 and is secured to arm 48 which in turn is mounted on pivot 45. Lowering rod 46 is extended to pass through and for engagement in slot 26.

A second support rod 50 is mounted opposite support rod 42. An arm 51 supports rod 50 and is pivoted to front wall 10 at 52. Rod 50 extends through front wall 10 in slot 53 and a spring 54 connected to rod 50 urges rod 50 to be released in clockwise rotation as seen in FIG. 1. Rod 50 extends to rear wall 38 where it is provided with an arm similar to arm 44 which arm is in turn pivoted to back wall 38.

A second lowering rod 55 is mounted opposite lowering rod 46 and extends through slot 26 and through arcuate slot 56 in wall 10. Rod 55 is supported by arm 57 which is pivotally mounted on pivot 52. Rod 55 extends to rear wall 38 where it is supported by an arm similar to arm 48 which in turn is pivotally mounted on rear wall 38.

A flexible non-extensible element such as chain 58 is secured to front wall 10 at 59 and passes over spaced pins or rollers 60 to 61 and is secured at its other end 62 to arm or disc 63. Disc 63 is mounted on shaft 64 of electric motor 65 and motor 65 is suitably mounted on or behind front wall 10 as by bracket 66. In the stand-by position of the apparatus as shown in FIG. 1 element 58 is under tension and passes beneath and supports lowering rods 46 and 55 and extends between front wall 10 and lock plate 16. Lowering rods 46 and 55 are therefore retained in upper position by element or chain 58 and in turn hold cam plate 19 in upper position as seen in FIG. 1.

As indicated above, the present mechanism is particularly suitable for coin actuation whereby upon the deposit of a suitable coin a single bottle is dispensed from the selected stack of bottles. Any suitable and well known type of coin receiving mechanism can be employed which upon deposit of the coin closes an electric circuit through wires 67 and 68 to solenoid 21 and at the same time energizes electric motor 65 solenoid 21 being deenergized after approximately 5° rotation of motor 65. Electric motor 65, upon energization, makes but one complete revolution of plate 63 in counterclockwise rotation as seen in FIG. 1 from the position shown in FIG. 1 tensioning element 58 through bottle dispensing position shown in FIG. 7 and return to the position of FIG. 1 with element 58 again under tension.

7JimmyHoward45139DayPatsMarch8

Assuming now that the embodiment of the present invention as shown in the drawings is in stand-by position as seen in FIG. 1 with support rods 42 and 50 locked in position by shoulders 24 and 25 of lock plate 16 and with lowering rods 46 and 55 engaged in slot 26 and raised to their upper position by element 58. When a coin is deposited solenoid 21 is energized raising armature 34 which, in turn, raises lock plate 16. Shoulders 24 and 25 of lock plate 16 then disengage from rods 50 and 42, respectively, so that springs 54 and 44, respectively, move rods 50 and 42 away from each other and beneath the shoulders of lock plate 16. Movement of rods 50 and 42 apart permits bottle 39 to move downwardly onto lowering rods 46 and 55. Lock plate 16 cannot return to its lower locking position since it is resting upon rods 42 and 50. This portion of the cycle of the mechanism is seen in FIGS. 3 and 4, it being particularly noted in FIG. 3 that plate 16 rests on rods 42 and 50.

When solenoid 21 is energized, motor 65 is also energized and commences rotation of disc 63, solenoid 21 being deenergized after approximately 5° rotation of motor 65. Since element 58 extends beneath lowering rods 46 and 55, lowering rods 46 and 55 can move downwardly under the weight of bottle 39 only as slack is provided for element 58. As lowering rods 46 and 55 descend they are maintained in parallel relationship by slot 26 in cam plate 19. By reason of engagement of rods 46 and 55 in slot 26, cam plate 19 follows rods 46 and 55 downwardly. Movement of cam plate 19 downwardly brings cam surfaces 30 and 31 into engagement with support rods 50 and 42, respectively. This stage of the cycle of operation of the present mechanism is seen in FIG. 5 where rods 50 and 42 have been engaged by the cam surfaces 30 and 31, respectively, for movement toward their initial positions. Further downward movement of cam plate 19 as more slack is provided element 58 moves rods 50 and 42 to their initial positions and beneath the next bottle 39 in the stack. As rods 50 and 42 move from beneath the shoulders on lock plate 16, lock plate 16 falls so that shoulders 24 and 25 engage behind rods 50 and 42, respectively, to lock them in position and prevent release of the next bottle 39. This stage of the cycle of the mechanism is shown in FIG. 6 where it will be noted that slots 32 and 33 in cam plate 19 also receive rods 50 and 42, respectively, to lock them in position to prevent "jack-potting" of the machine should lock plate 16 fail to return to locking position. It should also be noted from FIG. 6 that lowering rods 46 and 55 are now moving apart in slot 26 preparatory to dispensing bottle 39 resting thereon.

Further rotation of disc 63 providing additional slack for element 58 permits rods 46 and 55 to move further apart in slot 26 by reason of the weight of bottle 39 thereon thus moving cam plate 19 to its lowermost position as seen in FIG. 7. When rods 46 and 55 approach the ends of slot 26 bottle 39 resting on rods 46 and 55 passes between them and moves to dispensing position. At this time in the cycle of operation of the mechanism disc 63 has performed approximately one-half a revolution.

Continuing rotation of disc 63 now retrieves the slack provided to element 58, and element 58 engaging beneath rods 46 and 55, lift them upwardly and move them toward each other in slot 26. At the same time, cam plate 19 is raised with the upward movement of rods 46 and 55. Cam plate 19 continues in upward movement until slots 32 and 33 are raised above support rods 42 and 50 so that rods 42 and 50 are locked in position only by shoulders 24 and 25, respectively, of lock plate 16. Further upward movement of cam plate 19 moves cam surfaces 30 and 31 above rods 50 and 42, respectively, until disc 63 reaches its position of maximum tension upon element 58 at which point energization of motor 65 terminates. The mechanism is now in stand-by position and ready for the next cycle of operation.

The amount of slack provided element 58 by rotation of disc 63 is just sufficient for downward movement of one pair of lowering rods 46 and 55. When a plurality of stacks of bottles are provided in the dispenser, each

stack having a cam plate mechanism as above described, but one element 58, disc 63 and motor 65 are required.

Another embodiment of the cam plate is shown in FIG. 9. In this embodiment cam plate 19' has cam surfaces 30' and 31' with notches 32' and 33' for the purposes above described. A latch 70 is pivoted at 71 to plate 19' and is drawn against stop 72 by spring 73 so that end 74 thereof overlies cut away portion 75 through which support rod 50 extends when cam plate 19' is in raised and stand-by position. End 74 is normally above rod 50 when rod 50 is locked in its stand-by position as seen in FIG. 1, preventing cam plate 19' from moving downward when another dispensing mechanism is energized and member 58, which is common to all of the dispensing mechanisms, is released to regulate dispensing of the selected mechanism. Latches 70 are used on cam plates 19' when a plurality of dispensing mechanisms are used in side by side relationship so that member 58 will not require excessive slack for regulation of dispensing of the selected mechanism.

Plate 19' is cut away at 75 so that rod 50 can move outwardly from beneath surface 74 when latch plate 16 is raised. Latch 70 cannot interfere with the normal dispensing actuation of the mechanism.

Cam plate 19' is provided with a slot 26' which is wider than slot 26 but functions in the same general way as slot 26. The additional width for slot 26' is provided to compensate for variations in the diameters of the bottles being dispensed.

The play provided by the extra width of slot 26' permits bottles of larger diameter to be dispensed without jamming the mechanism. However, rods 46 and 55 must be maintained in their parallel relationship to keep the lowermost bottle centered until support rods 50 and 42 are relocked. Leveler plate 76 is provided for this purpose. Plate 76 is provided with groove 77 in which the ends of rods 46 and 55 are received for sliding movement. Plate 76 is slotted at 78 and stud 79, which is secured to cam plate 19', passes through slot 78. A suitable keeper 80 holds leveler plate 76 for sliding movement with respect to cam plate 19', groove 77 overlying slot 26'. Rods 46 and 55 are therefore given the necessary play in slot 26' but are maintained in parallel by groove 77.

In the embodiment of FIG. 10 the support rods 42 and 50, the lowering rods 46 and 55 and lock plate 16 are arranged as above described for FIGS. 1–9. A cam plate 19'' is employed similar to cam plate 19' of FIG. 9 having cam surfaces 31'' and 30'' with locking slots 32'' and 33'' for the purposes above described for cam surfaces 30 and 31 and slots 32 and 33. Cam plate 19'' is also provided with a slot 26'' of extra width similar to slot 26' of FIG. 9 and for the same purpose. Cam plate 19'' is provided with extensions or legs 82 and 83 which slide in slots 84 and 85 in flange 13, the upper end of cam plate 19'' sliding in slot 17'' in flange 12.

Lowering rod leveling plate 86 is provided with extension 87 for sliding engagement in slot 88 of flange 13, leveling plate 86 being positioned between lock plate 16 and cam plate 19'' and extending upward through slot 17'' of flange 12. Leveling slots 89 and 90 are provided in plate 86, slot 89 receiving rod 55 and slot 90 receiving rod 46. Surfaces 91 and 92 are also provided on leveling plate 86, surface 91 being disposed under rod 50 and surface 92 being disposed under rod 42 when leveling plate 86 is in raised position. A latch 93, similar to and for the same purposes as latch 70 described above, is pivotally mounted at 94 on leveling plate 86 and is urged by spring 95 against stop 96. The lower end of latch 93 is normally above rod 50 when rod 50 is locked in its stand-by position preventing leveling plate 86 and also cam plate 19'' from moving downward when other dispensing mechanism is energized and member 58, which is common to all the dispensing mechanisms is released.

Leveling plate 96 is provided with a pin or roller 97 under which member 58 is engaged, member 58 passing over spaced pins or rollers 60 and 61 carried by plate 10. This arrangement of rollers 60, 97 and 61 provides for smooth operation of the apparatus with reduced friction with less slack required for member 58 during a dispensing cycle.

Slots 89 and 90 maintain lowering rods 46 and 55 in parallel relationship to keep the lowermost bottle centered until support rods 50 and 42 are relocked while the extra width of slot 26'' permits bottles of larger diameter to be dispensed without jamming the mechanism.

It should now be apparent that the present invention in every way satisfies the objectives discussed above.

Changes in or modifications to the above-described illustrative embodiment of the present invention may now be suggested to those skilled in the art without departing from the present invention concept. Reference should therefore be had to the appended claims to determine the scope of this invention.

What is claimed is:

1. In a dispensing mechanism, a bin for articles in vertical stack, a pair of support rods movable mounted beneath the lowermost article in said bin, a pair of lowering rods beneath said support rods, a lock plate in restraining engagement with said support rods, means for moving said lock plate out of restraining engagement with said support rods for movement of said support rods, a cam plate for engaging said support rods engaged by said lowering rods and regulator means movable beneath and controlling the speed of movement of said lowering rods whereby when said support rods are released for movement by weight of the stack of articles thereon the article thereon is moved to and is supported by said lowering rods and said regulator means permits said lowering rods to be moved to article dispensing position by the weight of the articles on said lowering rods, said lowering rods moving said cam plate so that said cam surfaces move to position engaging and moving said support rods to supporting position beneath the next article in the stack when the next article moves to position adjacent said support rods during dispensing of the preceding article.

2. Mechanism as described in claim 1 including slots in said cam plate opening into said cam surfaces engaging and restraining said support rods in supporting position beneath the next article in the stack when said lowering rods are in article dispensing position.

3. Mechanism as described in claim 1 including a slot extending across said cam plate said lowering rods extending through said slot for said engagement with said cam plate.

4. Mechanism as described in claim 1 including resilient means for said support rods urging said support rods in article release movement.

5. Mechanism as described in claim 1 said means for moving said lock plate comprising a solenoid and an armature for said solenoid connected to said lock plate.

6. Mechanism as described in claim 1, said regulator means comprising a normally tensioned flexible inextensible element engaging beneath said lowering rods and motor means for relieving the tension on said element.

7. In a dispensing mechanism, a bin for articles in verticle stack, a pair of opposed spaced support rods mounted beneath the lowermost article in the stack in said bin for relative movement, resilient means urging said support rods apart, a lock plate engaging said support rods and restraining them against movement, means for disengaging said lock plate from said support rods freeing them for relative movement by the weight of the stack of articles thereon, a pair of opposed spaced lowering rods mounted in said bin beneath said support rods receiving the lowermost article in the stack from said support rods for downward movement to article dispensing position, a movable cam plate, means for coupling said lowering rods to said cam plate, cam surfaces on said cam plate for engaging said support rods when said cam plate

is moved by the weight of the stack of articles on said lowering rods for return of said support rods to article support position for the next article in the stack when said lowering rods are adjacent article dispensing position and regulator means engaging and controlling the speed of movement of said lowering rods.

8. Mechanism as described in claim 7, including slots in said cam plate opening into said cam surfaces engaging and locking said support rods in article support position when said lowering rods are adjacent article dispensing position.

9. Mechanism as described in claim 7, said coupling means including a slot extending across said cam plate, said lowering rods extending through said slot.

10. Mechanism as described in claim 7, said means for disengaging said lock plate comprising a solenoid and an armature for said solenoid connected to said lock plate, said regulator means comprising a normally tensioned flexible inextensible element engageable beneath said lowering rods and electric motor means for relieving the tension on said element.

11. Mechanism as described in claim 7, including a latch pivoted on said cam plate and spring means urging said latch to position overlying one of said support rods whereby said cam plate is held in position with respect

to said support rods until said support rods are disengaged by said lock plate.

12. Mechanism as described in claim 9, including a leveling plate mounted for movement on said cam plate and a groove in said leveling plate overlying said slot and receiving said lowering rods.

13. Mechanism as described in claim 7, including a leveling plate between said cam plate and said lock plate, a separate slot in said leveling plate for each of said lowering rods, a latch pivoted on said leveling plate, spring means urging said latch to position overlying one of said support rods, said regulator means comprising a normally tensioned flexible inextensible element engaging said leveling plate and electric motor means for relieving the tension on said element.

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LOUIS J. DEMBO, *Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,175,728

March 30, 1965

James C. Lindsey et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 69, strike out "7JimmyHoward45139DayPats-March8"; column 6, line 22, for "movable" read -- movably --.

Signed and sealed this 24th day of August 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents