Dec. 22, 1959 R. R. FRERK 2,918,195

DISPENSING MECHANISM FOR VENDING MACHINES AND THE LIKE

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FIG. 5

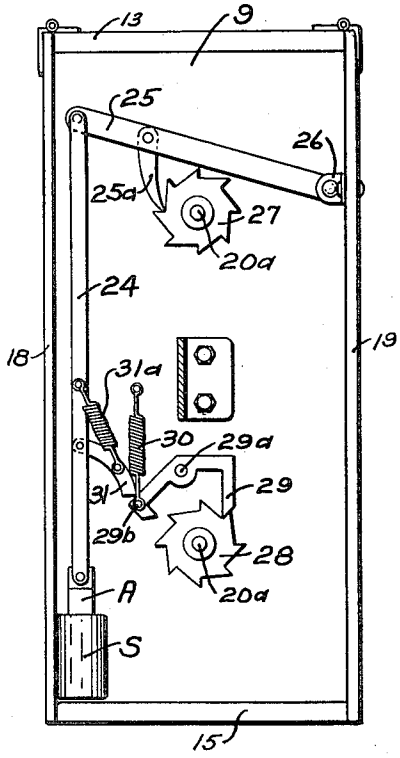


FIG. 1

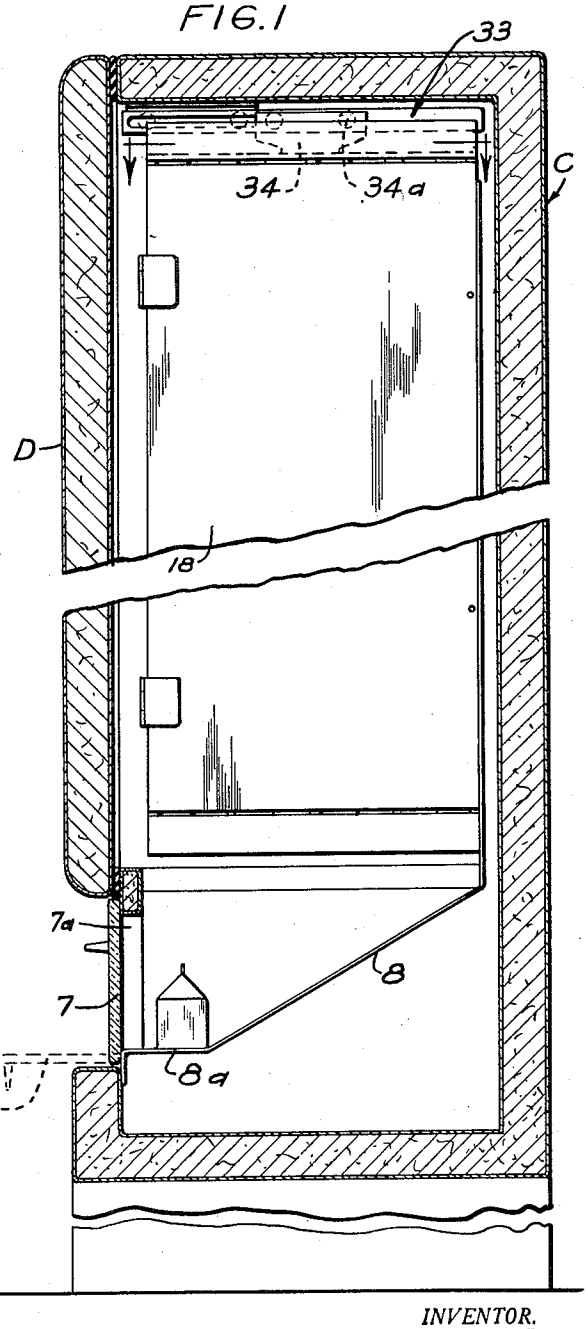
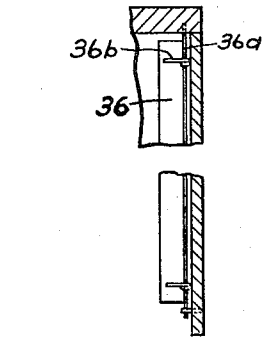


FIG. 6



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DISPENSING MECHANISM FOR VENDING MACHINES AND THE LIKE

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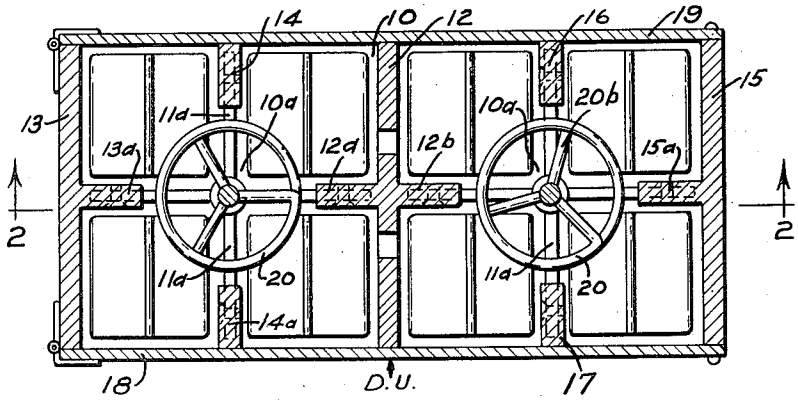


FIG. 3

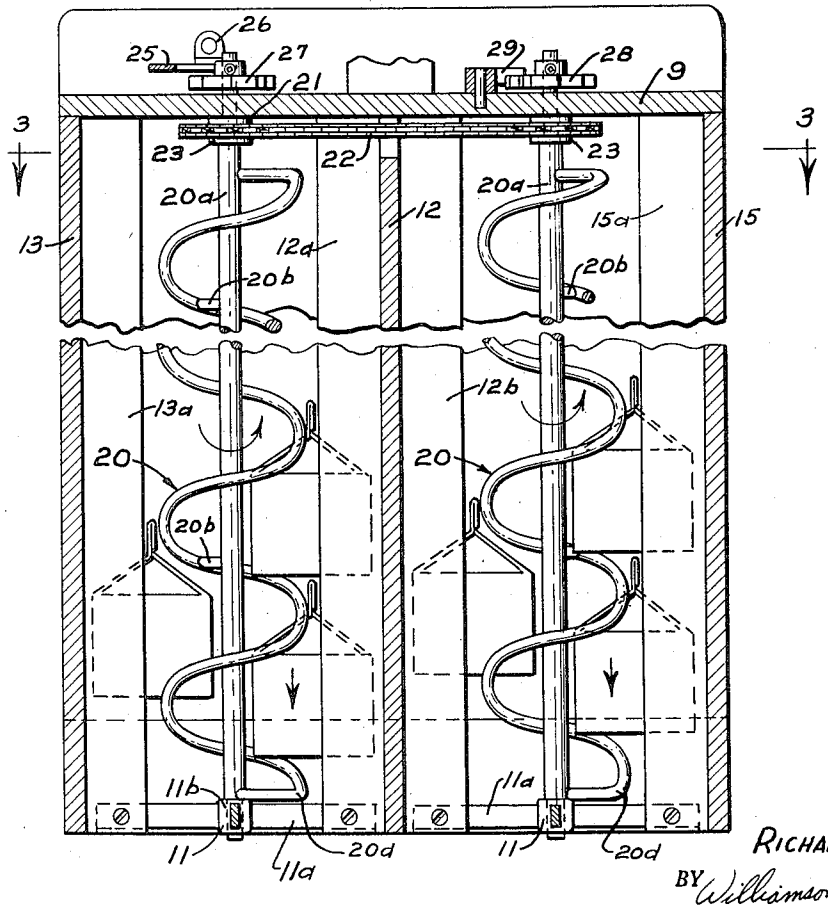


FIG. 2

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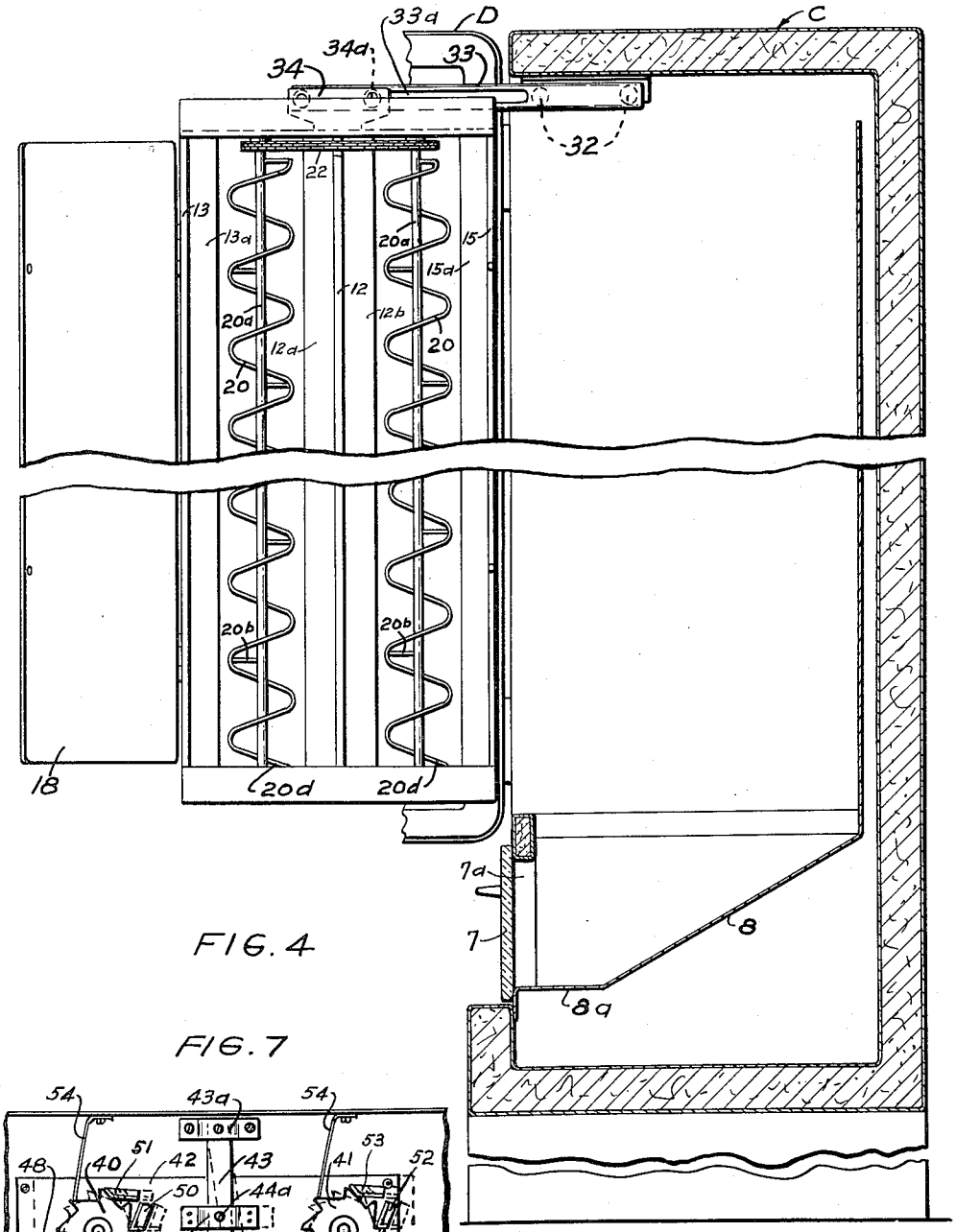


FIG. 4

FIG. 7

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2,918,195

DISPENSING MECHANISM FOR VENDING MACHINES AND THE LIKE

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Application November 14, 1955, Serial No. 546,621

3 Claims. (Cl. 221—75)

This invention relates to vending machines and analogous devices wherein it is desirable to discharge through coin-control or other stroke or similar operation, one article at a time from a multiplicity of other articles housed or contained in magazines or chambers.

Present day vending machines contain and often selectively discharge such foods as packaged confections, milk, bottled goods, fruit juices and the like. In most instances, such machines are owned by "operators" who install them at various locations, their operation being subject to coin control and usually an elaborate electrical system, including a multiplicity of relays, micro switches, stops or abutments which interact to selectively release a desired article from the holding compartments or magazines. To make such machines profitable and require less attention in making calls and extracting money from the machines, it has been desired to increase the capacities and sizes, and in so doing, to compact the articles as much as possible within the cabinet or storage facilities.

Most of the machines, electrically operated, often get out of order, requiring frequent servicing.

The machines now in use for the larger articles such as cans, milk cartons and the like are very complicated and employ a multiplicity of working parts, circuits and electrical components.

It is an object of my invention to provide an extremely simple dispensing mechanism for vending machines and the like comprising very few parts and actuated in an extremely simple manner, lending itself well to high capacity vending machines and to machines which will selectively dispense a number of different articles.

A further object is the provision of dispensing mechanism of the class described employing for each unit, a plurality of closely clustered article magazines, the articles of which may be very simply discharged one at a time through a common discharge and conveying element, the essential features of my invention being mechanical and the discharge and conveying element or elements being progressed for successive dispensing through a common stroke medium such as for example, a single solenoid.

Further objects are the provision of convenient and easy means for quickly loading a great multiplicity of articles into the magazine; the provision of inherent mechanism which is adapted to operate upon a variety of containers such as cans, cartons and packages varying considerably in size and shape together with magazines and controlled discharge mechanism which is substantially foolproof and will not get out of adjustment under normal working conditions.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is a vertical section taken just beyond one of the insulated side walls of the cabinet with the adjacent door of the magazine holder closed and showing an article just dispensed;

Fig. 2 is a vertical section through two of the magazine and dispensing units taken substantially on the line 2—2 of Fig. 3 and showing the combined discharge and conveying spiral rods in full, portions being broken away to shorten the length of the view;

Fig. 3 is a cross section taken on the line 3—3 of Fig. 2 showing the tops of the discharging and conveying helixes in plan;

Fig. 4 is a view similar to Fig. 1 showing the units extended and supported at the front of the cabinet for loading;

Fig. 5 is a plan view at the top of a double unit removed from the cabinet showing an exemplary simple type of stroke actuating mechanism,

Fig. 6 is a detail vertical section taken at one of the rear corners of a double unit and showing a yieldable, vertical retaining strip which may be employed if desired, and

Fig. 7 is a top plan view of a double unit showing a highly efficient and somewhat different stroke-actuating mechanism for the two helical elements **20**.

In the embodiment of the invention illustrated, my novel apparatus and mechanism is contained in a large, ornamental, refrigerated cabinet C of a commercial vending machine adapted by coin control, to selectively discharge packaged articles of food which require refrigeration for safekeeping. Cabinet C, as shown, has all of the walls thereof including top and bottom, of insulated construction. Refrigeration apparatus, not shown, is provided below the base proper of the cabinet and includes coils, not shown, either mounted within portions of the wall structure or just interiorly of the walls of the cabinet. The cabinet, as illustrated, includes a front door D which is hinged at one of its vertical edges to the cabinet for swingable opening to expose the entire contents of the magazine-containing portion thereof.

Just below the lower edge of door D and below the magazine-containing portion of the cabinet, I provide as shown, a rather gradually declined chute **8** which traverses substantially the width of the bottom of the interior of the cabinet and furnishes at its forward portion, a substantially horizontal shelf portion **8***a* disposed just inwardly of a rectangular removal opening **7***a* which is normally closed by a downwardly swingable insulated door **7**. With door **7** swung to lowered position as indicated in the dotted lines an article dispensed may be readily grasped by a hand and removed through the opening **7***a*. Supported and mounted within the cabinet C and extensible forwardly therefrom for loading, are one or more double magazine and dispensing units DU which will now be described in detail. Usually, the cabinets will contain a plurality of said double units to provide selectivity of a number of different packaged food articles and/or to increase capacity and consequently, create economy in the taking care of the vending machine.

As shown in Figs. 2, 3 and 5, each double assembly comprises two units very closely mounted, one behind the other and having some partitioning walls in common. Each of said units in said double assembly comprises a plurality (as shown, four) of upwardly extending, closely clustered article magazines **10** having cut-out or opened, longitudinal corner portions which are disposed in juxtaposition, as clearly shown in Fig. 3. The cross sectional shape of the magazines **10** may be varied of course, to generally conform to the cross sectional shape of the articles such as cans, containers, packages, etc., to be housed and dispensed. A rectangular cross sectional shape as shown in the embodiment illustrated, provides for reception of and handling of quite a wide field of

articles such as rectangular cardboard containers, containing liquid or solid food and also, cylindrical containers or cans having a diameter which causes the peripheries thereof to conform closely to the rectangular cross sectional shape of the chambers or magazines.

Any suitable partitioning to provide the vertical or upwardly extending compartments or magazines closely clustered, may of course be employed, all within the scope of the invention provided that longitudinal corner portions of the magazines such as indicated by the numerals **10***a*, are open in the adjacent or clustered corners of the several magazines employed. As illustrated, a skeleton frame-work with suitable partitions, is provided, the frame-work and partitions being interconnected at their upper ends by top **9** and at bottom by horizontal tie rods **11***a* forming a spider **11**.

With a double assembly, as illustrated in Figs. 2, 3 and 5 of the drawings, an intermediate partitioning wall **12** may be employed to provide partitioning for the front and rear units both. From said intermediate wall, wall or partition-forming flanges **12***a* and **12***b* extend as shown, to form partitioning for two adjacent chambers of the front and rear units. These flange partitions **12***a* and **12***b* extend only substantially half-way or slightly less on the sides of the individual magazines **10** which they partially define.

The forward unit as shown, has a front partition or wall **13** which has extending at its medial portion, a flange partition **13***a* which is aligned with the partition **12***a* on the opposite side of the unit and which divides the width of the forward unit equally into partial formations for defining the two forward magazines. This flange partition **13***a* like the flange partition **12***a*, extends as shown about half of the width of the magazine. Opposed partition flanges **14** and **14***a* respectively extend from the opposite sides of the forward unit and with the partition flanges **12***a* and **13***a* and the wall **12** define the four clustered, vertically extending magazines **10**. Partition flanges **14** and **14***a* also extend inwardly about half the width of the individual compartments or magazines. At their upper ends, as is the case with the other partition flanges, they are connected with the rigid top **9** and their lower ends connected with the cross rods **11***a* of spider **11** at the bottom of the unit.

The rear unit of the double assembly, as shown in Figs. 2 and 3, is divided into a clustered, four magazine storage composition by a partition flange **15***a* which as shown, is integral with and extended perpendicularly inwardly and medially of a rear wall **15**, similar in general structure to the wall **13** of the forward unit. The partition **15***a* is substantially aligned with the partition flange **12***b* provided by the intermediate wall **12** of the double assembly. Partition flanges **16** and **17** connected with the bottom spider structure **11** and the top **9** of the double assembly, like partitions **14** and **14***a* of the forward unit, divide the rear unit transversely, it being noted that the four magazines or compartments formed in the rear unit all have their clustered, inner corners cut away or open for the purposes later to be described. If desired on loading sides of the units of the assembly, retaining means in addition to the swingable doors **18** and **19** may be provided for preventing lateral displacement of the articles or packages from the vertical magazine. Such means may comprise as shown in Fig. 6, yieldable vertical strips **36** hinged at their upper and lower ends at outside edges on pintles **36***a* and urged outwardly in parallel relationship to the doors by suitable means such as torsion springs **36***b*.

Side doors **18** and **19** respectively are hinged at their forward vertical edges to the forward wall partition **13**, closing the sides respectively of the front and rear units. Centered in each of said units and cooperating with the several magazines of the cluster, is a combined discharge and conveying member **20** in the form of a single, helically arranged, open or skeleton element mounted for rotation or progressive rotation on its longitudinal axis, said axis extending parallel with and in central relation to the center, longitudinal lines of each of said magazines **10**. In the form of the invention illustrated, said member constitutes a helically coiled rod **20** having axially affixed thereto, within the confines of the convolutions, a vertical shaft **20***a*. Radial connecting rods **20***b* may serve to secure the coil **20** to shaft **20***a*. Said connecting rods are spaced apart considerable distances longitudinally of the shaft. The shaft **20***a* of each of said members is suitably journaled at its lower and upper ends in bearing **11***b* in the spider **11** and in bearing **21** supported from the top **9** of the assembly. The external diameter of the combined discharge and conveying member **20** is such as will be seen from Fig. 3, that the helical element traverses the open corners **10***a* of the several magazines in the cluster of one unit. The pitch of the coil is such, related to the diameter, that the convolutions thereof are spaced apart slightly greater in distance than the height of the articles to be dispensed.

When two units are combined into a double assembly which is very convenient for automatic vending machines, as in the embodiment of the invention illustrated, the shafts **20***a* of the two units in such assembly are interconnected for driving simultaneously as by an endless chain **22** which is trained about suitable sprockets **23** affixed to the upper ends of the respective shafts.

While various actuating mechanisms, coin controlled, may be employed for progressively rotating or turning the helical elements **20** of the two units in a double assembly, I provide as an exemplary means, a very simple stroke-actuated device as illustrated in Figs. 5 and 2. This mechanism may be conveniently mounted upon the assembly top **9** and comprises a solenoid S having its armature or plunger A pivotally connected to an elongated link **24**, the outer end of which is pivotally connected to an actuating arm **25** having its opposite end pivoted on a fulcrum lug **26**, said arm in general being disposed transversely of the elongated link **24** and carrying a pivoted pawl **25***a* which engages a ratchet wheel **27** pivotally mounted on a vertical axis on the top of member **9**.

As shown, ratchet wheel **27** is provided with eight ratchet teeth, thereby upon eight strokes or cycles of solenoid S, revolving the shaft **20***a* of one of the helical elements of the double assembly through a complete revolution. Simultaneously of course, through the driving chain **22**, the second helical element **20** of the second unit is driven through a complete revolution. The two helical elements **20** of the two units of a double assembly are relatively positioned or angled so that the element **20** of the forward unit is advanced rotationwise, one-eighth of a revolution ahead of the element **20** of the associated rear unit of the double assembly. Each of the helical elements **20** terminates at its lower end in a supporting and discharge foot **20***d* which controls the release or dropping of the lowermost packages or containers from the respective, vertical magazines of the units.

Referring again to the actuating mechanism for helical elements **20** of the two units, a suitable mechanism is provided, connected with the shaft **20***a* of the rear element **20** to precisely retain the two helical elements in progressed positions. This mechanism, as illustrated, comprises a ratchet wheel **28** having its teeth disposed directionally opposite to the teeth of ratchet **27** and having an equal number of teeth (8, as shown), said teeth being successively engaged by a retaining pawl **29** of bell crank lever type, said pawl being intermediately pivoted on a pin **29***a* to the top **9** of the assembly and being normally urged into engagement with the ratchet by a contractile spring **30**. The end of retaining pawl **29** opposite from the toothed ratchet-engagement-end constitutes an abutment **29***b* which is positioned to be engaged by a striker arm **31** intermediately carried by the reciprocating link **24** of the solenoid armature.

Striker arm 31, as shown, is pivoted at its inner end and urged outwardly into engagement position with abutment 29*b* by a contractile spring 31*a*. Thus, in the actuating movement of armature A and link 24, striker arm 31 hits the abutment 29*b* thereby releasing momentarily the retaining tooth of pawl 29 and simultaneously, the ratchet wheel 27 is driven through one eighth of a revolution by pawl 25*a*.

To facilitate loading of the articles or package goods into the clustered, vertical magazines of the assembly or units, I prefer to provide a trolley hanger mechanism supported from the top of the cabinet C and extensible through the open front of the cabinet when the door D is open (see Fig. 4). To this end, as shown, I provide within the interior and at the top portion of the cabinet at each side thereof, two or more supporting rollers 32, upon which at each side is mounted an extensible channel rack 33 having the outer portion thereof slotted to slidably accommodate a hanger strap 34 at each side of the double unit assembly and fixedly connected with the top thereof. Rollers 34*a* are provided in the hanger strap to smoothly roll in the track afforded by the interior of the channel member of rack 33, said rollers having pins projecting through the slot 33*a* of said rack.

Thus, as shown in Fig. 4, the entire assembly or double unit may be positioned and supported exteriorly of the front of the cabinet.

In loading, the articles or packages such as filled cartons, cans or the like with the assembly or units extended in overhanging relation at the front of the cabinet, are readily positioned in the respective vertical magazines through the open sides of the unit or assembly with the doors 18 and 19 swung to open position. The articles are successively disposed between adjacent convolutions of the coils of the helical elements 20 from the respective open sides of the assembly. The assembly, as illustrated, comprising a double unit when fully loaded has all of the eight clustered magazines substantially filled with packaged goods, the successive articles of each magazine being spaced only a very slight distance apart.

After loading the doors 18 and 19 are closed and the assembly is pushed horizontally inward within the cabinet and the main cabinet door D is closed and locked.

In Fig. 7, a stroke-operated, actuating mechanism of simple and efficient form is illustrated for turning through fractional revolutions the two helical elements 20 of a double unit.

Ratchet wheels 40 and 41 respectively are secured to the upper ends of the shafts 20*a* of the two helical elements, said shafts as in the mechanism previously described being suitably journaled in bearings supported on the top 9 of the unit. A longitudinally shiftable carrier plate 42 is disposed in slightly spaced relation below the ratchets 40 and 41 and extending longitudinally of the top thereof and having slotted portions, not shown, to facilitate sliding upon the shafts or bearings for the shafts. Thus the plate is guided for shifting from the dotted line position shown to the full line position. Carrier plate 42 is shifted by a lever arm 43 which is fulcrumed at one end in a bracket 43*a* and is connected medially with the central portion of plate 42 through a keeper bracket 44 having a central screw 44*a* which pivotally connects the parts 43 and 44 together.

The opposite end of shift lever 43 is pivotally connected with the extension link 45 of a solenoid armature 46. A coil spring 47 urges the link 45 longitudinally to the left as viewed in Fig. 7.

Rigidly mounted upon the upper surface of shift plate 42 are two series of driving and positioning elements, one supplied for each of the ratchets 40 and 41. Thus, an upstanding driving lug 48 is positioned in opposed relation at the left peripheral edge of ratchet 40, having a substantially flat terminal abutment 48*a* adapted in cam fashion, to engage and turn ratchet 40 from the full line position of ratchet 40 in Fig. 7 to the dotted line position when the armature 46 is pulled inward by energization of the electromagnetic coil 46*a* through of course right hand shifting of plate 42 to the dotted line position. Similarly, for ratchet 41, there is provided the upstanding lug 49 having the abutment 49*a* disposed for similar action relatively to ratchet 41.

To definitely determine and center the movements or partial turns of ratchets 40 and 41 and consequently, the intermittent driving of the helical elements 20, stop means in the nature of abutment teeth are affixed to the shift plate 42 opposing the right peripheral portion of the ratchets as shown in Fig. 7. To this end, for ratchet 40 a tooth 50 is provided which in return or left hand shift motion of plate 42, precisely engages and determines the "at rest" position of said ratchet. Cooperating therewith is a second abutment 51 which in the left hand shifting or return movement of plate 42 to the full line position illustrated engages the inclined side of another tooth of ratchet 40. The application of directional forces applied by teeth 50 and 51, is in opposite directions relative to the shaft 20*a* so that the shaft is positively retained in a precise, determined position after the driving stroke derived from lug 48*a*.

Similarly, for ratchet 41, lugs or teeth 52 and 53 are provided having the same relationship and function for ratchet 41 as the teeth 50 and 51 previously described in relation to the associated ratchet 40.

With said mechanism, in each cycle of operation of shift plate 42 the two ratchets are driven counter-clockwise as viewed in Fig. 7 through 22½ degrees and at the end or return of the shift stroke, are positively locked in the desired predetermined positions.

Operation

With the magazines of the double unit illustrated loaded or partially loaded with articles or packages, a purchaser or consumer effects a cycle of the actuating mechanism through energizing the coil of solenoid S. It is to be understood that any circuit control mechanism or switch may be employed which in the case of vending machines, employ coin control mechanism (not shown).

Energization of the electromagnetic coil of solenoid S draws armature A inwardly and consequently, longitudinally moves the attached actuating link 24 which in turn through engagement of the pawl 25*a* with ratchet wheel 27 turns shaft 20*a* of the helical discharge element through an eighth revolution. The stroke of link 24 and its relationship with lever 25 and pawl 25*a* is such that in combination with the retaining pawl 29 and ratchet wheel 28 of the rear unit, both helical elements are moved through exactly one eighth of a revolution in the form illustrated and stopped at such point.

In such cycle of operation the lowermost package or article disposed in both sets of clustered magazines and at such time supported on the foot 20*d* of one of said helical elements, is released and dropped through the turning of the respective helical element through 45 degrees. The helical element of the second clustered unit is of course also moved 45 degrees but being set 22½ degrees back in a clockwise direction from the first unit still retains the lowermost article in one of the magazines of the second unit.

Upon the next coin controlled or other switch or mechanical operation of the actuating link 24, each of the helical elements 20 of the two units is turned in similar or clockwise direction through another 45 degrees whereupon the lowermost package from the second unit is dropped.

Simultaneously to the release and dropping of packages during each cycle of operation, all of the packages in the four vertical clustered magazines of each unit are positively conveyed downwardly by the screw conveyor action of the helical elements, between convolutions of which the articles are disposed. Thus, even though

there be some friction between the articles or packages and the walls or partition flanges of the magazines, the articles will nevertheless be successively moved downwardly in a positive manner. The helical units therefore, have the triple functions of retaining the articles for loading in prearranged order; positively conveying the articles successively downward and successively dropping one article at a time from one of the two units upon each cycle of operation.

From the foregoing description, it will be seen that I have provided a highly efficient, high capacity dispensing mechanism for vending machines and the like which eliminates the necessity for elaborate electrical or electronic systems which makes possible manufacture and sale of such machines at relatively low cost and which is practically foolproof, requiring little if any service expense.

With my improved structure, the complicated shifting magazines usually actuate through racks or chains or both and the complex electric and electronic circuits of the prior art devices are eliminated to the end that manufacturing cost and service charges are very materially decreased.

It will of course be understood that various changes may be made in the form, details, arrangement and proportions of the parts witnout departing from the scope of my invention.

What is claimed is:

1. Dispensing mechanism for controllably discharging a multiplicity of articles one at a time having in combination a plurality of more than two, substantially vertical article-magazines closely clustered together around a central axis with longitudinal corner portions thereof disposed in juxtaposition, said magazines being in the form of chutes and having open lower ends for article-discharge, said corner portions being longitudinally cut away for intercommunication of the interior of said magazines with a common discharge-controlling and conveying element, an elongated, helically arranged discharge-controlling and conveying element mounted for axial revolution on said central axis of the cluster of said magazines and having an external diameter to intersect the adjacent, longitudinally cut away corners of all of said magazines with peripheral portions of said element extending interiorly into said corners for supporting and conveying the respective articles of a series disposed in each and all of said magazines, the convolutions of said helically arranged element being of a pitch and spaced apart to accommodate therebetween the vertical dimension or height of each of the several articles to be dispensed, said helical element terminating at its lower end in a free foot extremity from which said articles may be successively dropped, and controlled actuating mechanism for intermittently driving said helically arranged element through a predetermined partial revolution bearing the relationship to 360° of the number of magazines employed in said clusters.

2. Dispensing mechanism for controllably discharging a multiplicity of articles one at a time having in combination a plurality of more than two, substantially vertical article-magazines closely clustered together around a central axis with longitudinal corner portions thereof disposed in juxtaposition, said magazines being in the form of chutes and having open lower ends for article-discharge, said corner portions being longitudinally cut away for intercommunication of the interior of said magazines with a common discharge-controlling and conveying element, an elongated, helically arranged discharge-controlling and conveying element mounted for axial revolution on said central axis of the cluster of said magazines and having an external diameter to intersect the adjacent, longitudinally cutaway corners of all of said magazines with peripheral portions of said element extending interiorly into said corners for supporting and conveying the respective articles of a series disposed in each and all of said magazines, the convolutions of said helically arranged element being of a pitch and spaced apart to accommodate therebetween the vertical dimension or height of each of the several articles to be dispensed, said helical element terminating at its lower end in a free foot extremity from which said articles may be successively dropped, and controlled actuating mechanism for intermittently driving said helically arranged element through a predetermined partial revolution.

3. Dispensing mechanism for controllably discharging a multiplicity of articles one at a time having in combination a plurality of more than two substantially vertical article magazines closely clustered together around a central axis with longitudinal corner portions thereof disposed in juxtaposition, said magazines being in the form of chutes and having open lower ends for article discharge, said corner portions being longitudinally cut away for intercommunication of the interior of said magazines with a common discharge controlling and conveying element, an elongated, helically arranged discharge controlling and conveying element mounted for axial revolution on said central axis of the cluster of said magazines and having an external diameter to intersect the adjacent longitudinally cut away corners of all of said magazines with peripheral portions of said elements extending interiorly into said corners for supporting and conveying the respective articles of a series disposed in each and all of said magazines, the convolutions of said helically arranged element being of a pitch and spaced apart to accommodate therebetween the vertical dimension or height of each of the several articles to be dispensed, and controlled actuating mechanism for intermittently driving said helically arranged element through a predetermined degree of revolution to successively discharge said articles from the lower end of said helical element.

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