Nov. 3, 1931. L. H. MORIN 1,830,371

CUP VENDING MACHINE

Filed July 31, 1929 4 Sheets-Sheet 1

Fig. 1.

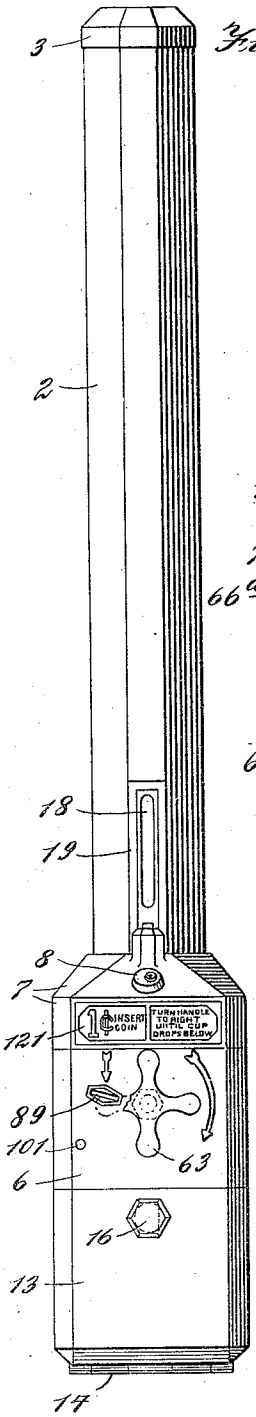
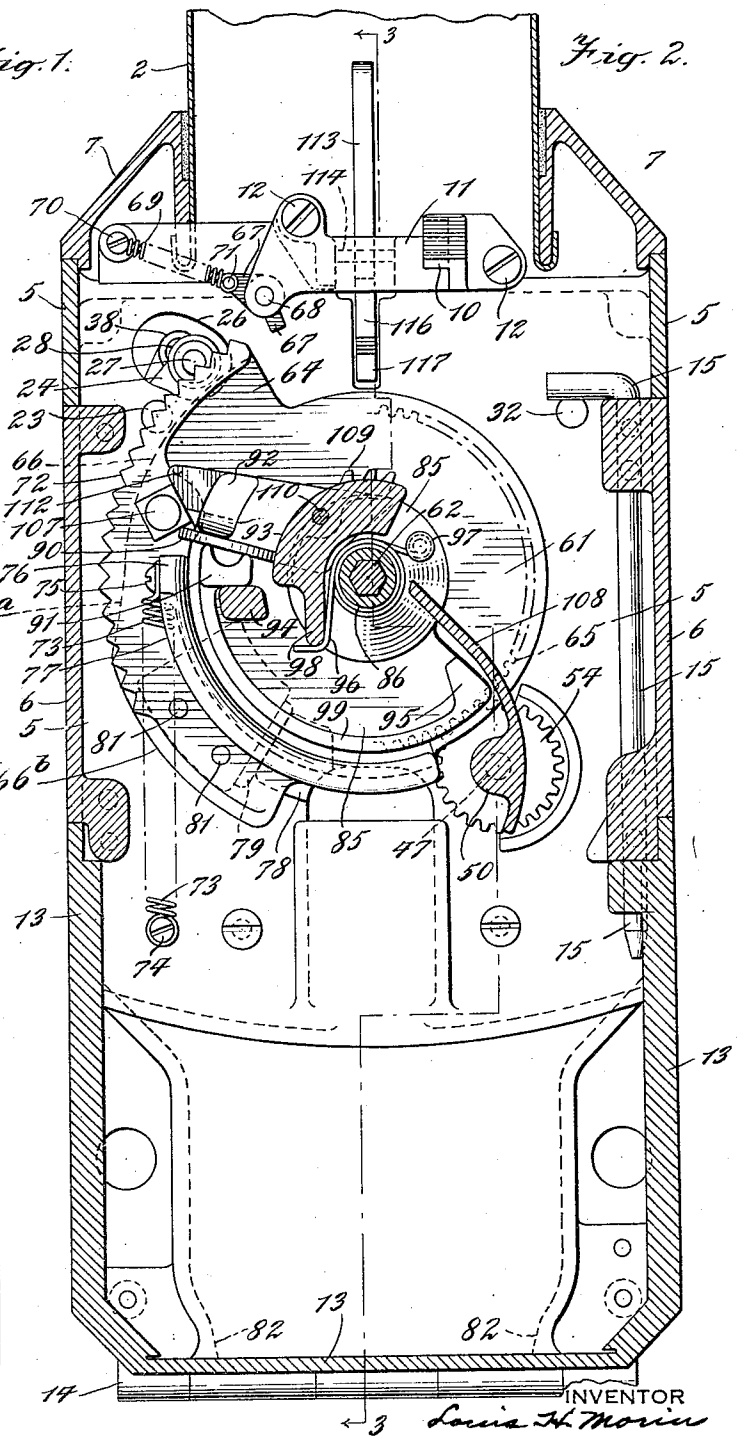


Fig. 2.

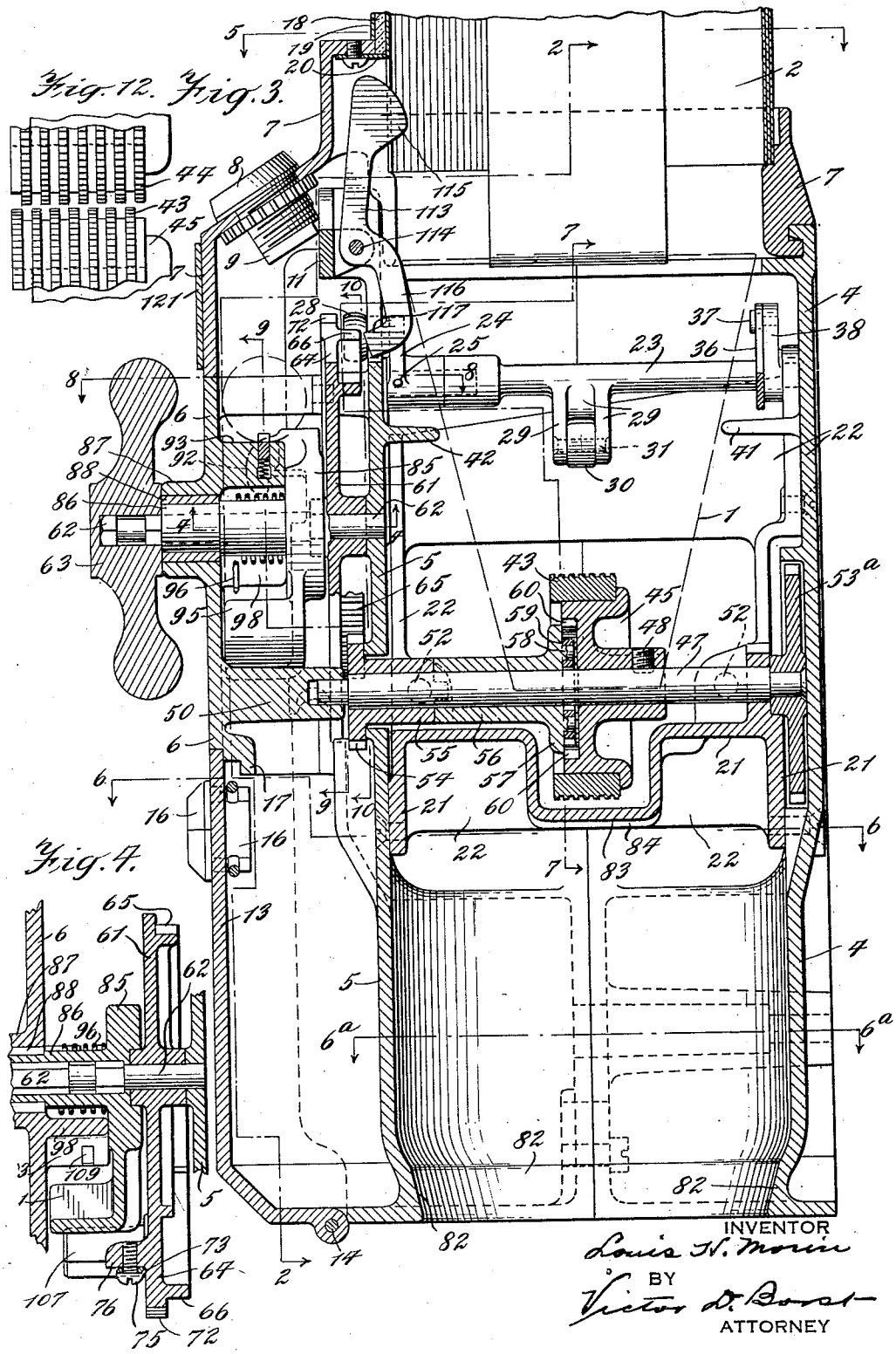


INVENTOR
Louis H. Morin
BY
Victor J. Evans
ATTORNEY

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CUP VENDING MACHINE

Filed July 31, 1929 4 Sheets-Sheet 2



INVENTOR
Louis H. Morin
BY
Victor J. Evans
ATTORNEY

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CUP VENDING MACHINE

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Fig. 5.

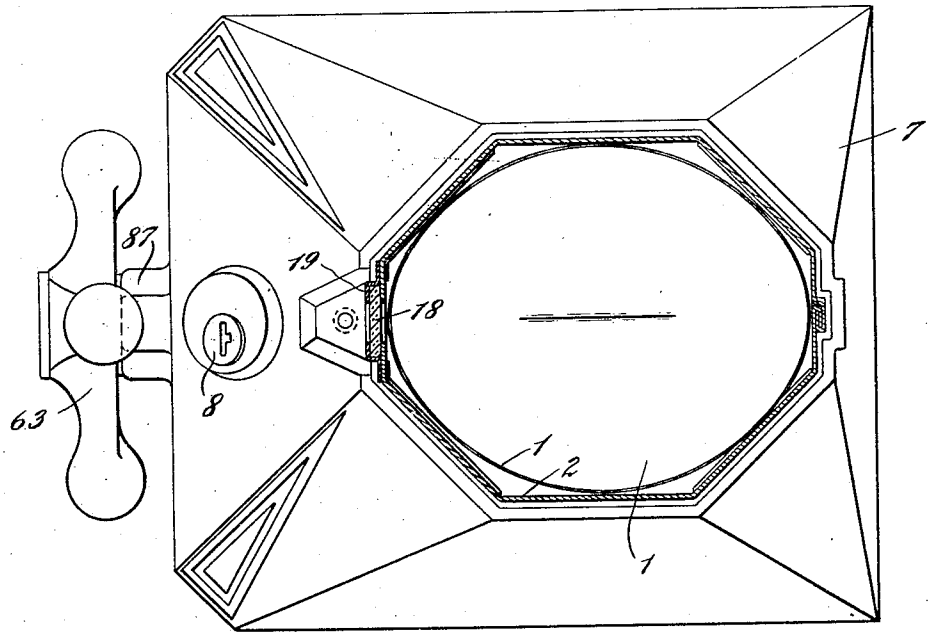
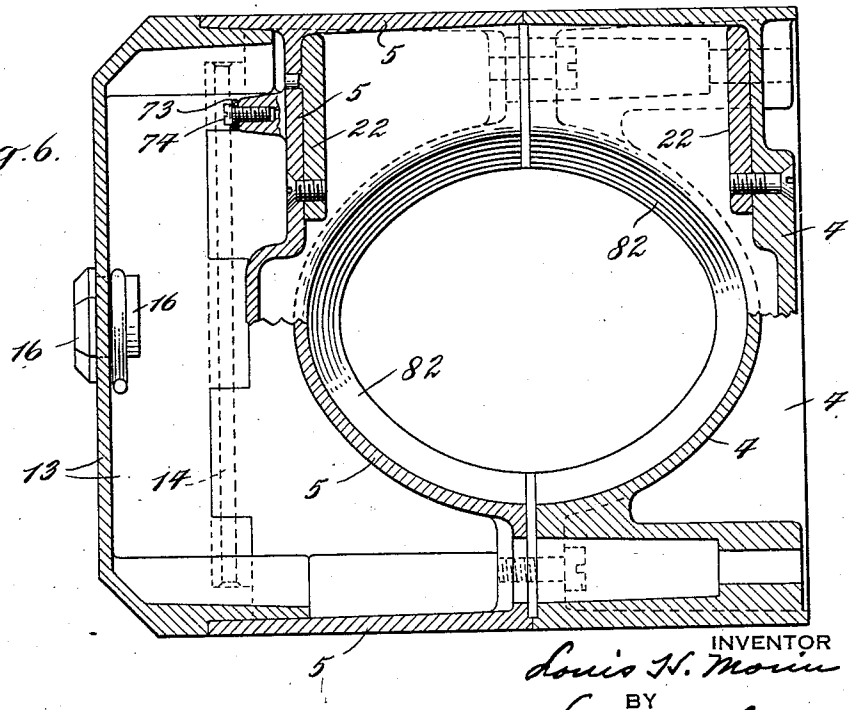


Fig. 6.



INVENTOR

Louis H. Morin

BY

Victor J. Evans

ATTORNEY

Nov. 3, 1931. L. H. MORIN 1,830,371

CUP VENDING MACHINE

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Fig. 7.

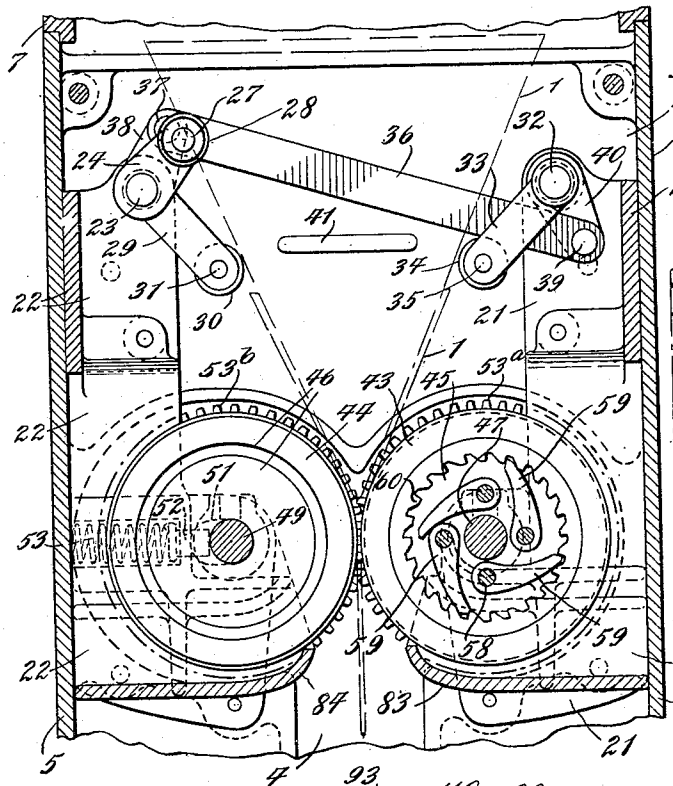


Fig. 10.

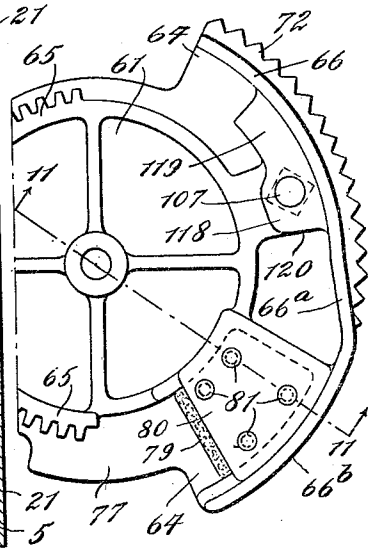


Fig. 8.

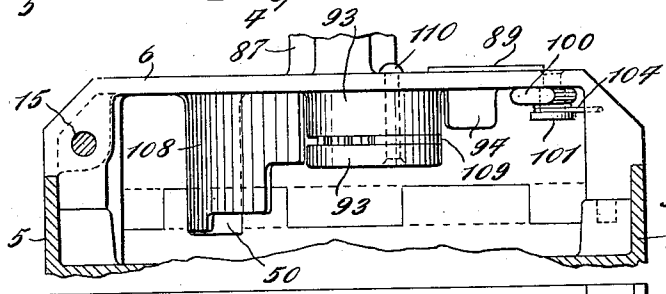


Fig. 11.

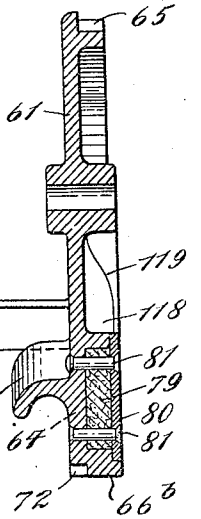
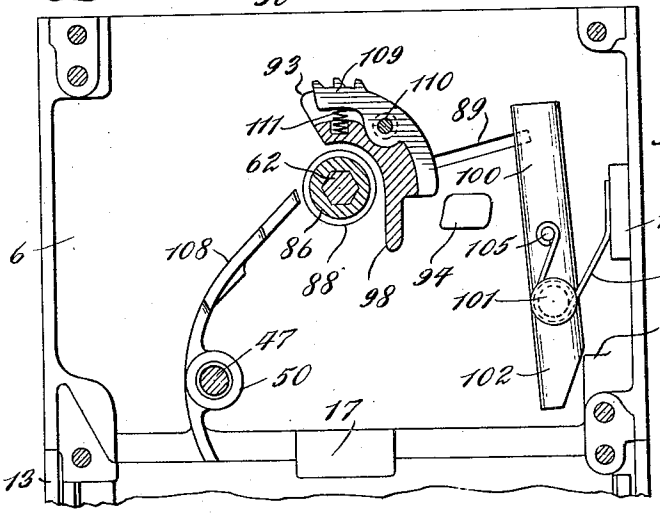


Fig. 9.



INVENTOR
Louis H. Morin
BY
Victor J. Borst
ATTORNEY

Patented Nov. 3, 1931

1,830,371

UNITED STATES PATENT OFFICE

LOUIS H. MORIN, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNITED STATES ENVELOPE COMPANY, A CORPORATION OF MAINE

CUP VENDING MACHINE

Application filed July 31, 1929. Serial No. 382,359.

It is well known to those versed in the art relating to check controlled or coin controlled service-supplying devices or automatic sales devices, including vending machines, that the constructional features, and consequently their cooperating relation and manner of operation, throughout the entire operating mechanism, commonly from a movable operating handle to a final delivery member or other service supplying member or part, is largely determined by, and must necessarily be different or varied in accordance with, the nature of the service to be provided or the kind of articles to be vended. While the vending machine of the present invention was invented and is particularly constructed and designed for the vending of paper drinking cups of a certain kind, it is of course to be understood that various features thereof might be to a greater or less extent changed or modified while still performing substantially the same final function or result, as well as also for adapting the machine to render a more or less different kind of service.

One of the objects of the invention is to provide a vending machine which will effectively render the service above noted. Other objects of the invention are reliability, simplicity, strength, durability, convenience in use and facility of manufacture. Other objects and advantages will hereinafter appear.

The invention includes various features of construction and combinations of parts, as will appear from the following description.

The embodiment of the invention illustrated in the accompanying drawings will now be particularly described and thereafter the invention will be pointed out in claims, reference now being had to the drawings, in which:

Fig. 1 is a reduced front elevation of a vending machine embodying the invention;

Fig. 2 is a vertical section substantially on the zig-zag line 2—2 of Fig. 3, the upper portion of the container tube or magazine being broken away;

Fig. 3 is a similar section taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is a partial horizontal section on the line 4—4 of Fig. 3 as viewed from below;

Fig. 5 is a horizontal section just above the top of the machine casing taken on the line 5—5 of Fig. 3;

Fig. 6 is a horizontal section taken as to its upper half substantially on the zig-zag line 6—6 and as to its lower half taken substantially on the line 6*a*—6*a* of Fig. 3;

Fig. 7 is for the most part a substantially central vertical section taken on the zig-zag line 7—7 of Fig. 3;

Fig. 8 is a partial horizontal section with some of the operating parts omitted taken substantially on the line 8—8 of Fig. 3;

Fig. 9 is a partial vertical section as viewed from the rear of the machine and with parts omitted taken substantially on the zig-zag line 9—9 of Fig. 3;

Fig. 10 is a partial rear elevation of a rocking operating member which comprises a gear segment, a cam and a ratchet;

Fig. 11 is a transverse section taken on the inclined line 11—11 of Fig. 10 as viewed at right angles to this line from below, and

Fig. 12 (Sheet 2) is an enlarged plan view partly broken away of the cooperating peripheral portions of a pair of feed rollers.

The cups 1 (Figs. 3, 5 and 7) in general resemble envelopes in that an individual cup is normally substantially flat and is similarly formed from a single blank of folded paper. This blank is sector shaped with its upper corners slightly rounded and also with its point suitably cut away. The upper edge of the blank of course forms the segment of a circle. This blank may be of a width according to the amount of taper required in the cup, for example the straight radial edges of the blank may be substantially at right angles to each other in the flat or unfolded condition of the blank. Flaps are folded over along substantially radial lines inward from these radial edges of a width to overlap and be secured together by means of a suitable adhesive. A bottom flap is then folded up, most conveniently at the same side with the side flaps, and secured by means of adhesive. This completes the cup. The upturned bottom flap forms a secure and convenient seal

at the bottom of the cup and provides a comparatively short straight edge along the bottom of the cup, the length of which depends upon the extent to which this flap is turned up.

Because of their upwardly flaring or downwardly tapering form, the cups 1 may be readily nested to form a stack. When thus closely nested or telescoped together, the sides of the cups necessarily bulge outward so that thereby the rims or upper edges of the cups are substantially elliptical, as shown in Fig. 5. By reason of a nested cup 1 tapering downwardly on all sides towards its bottom, its cross sectional ellipse gradually becomes more flattened as the bottom of the cup is approached, with the opposite sides of the cup there meeting or coming together to form an acute angle along the straight bottom edge of the cup. When the cups 1 are stacked together the angular bottoms of the cups will be slightly spaced from one another to form a narrow projecting margin, in addition to that provided by the thickness of the folded paper, along the bottom edge of the cup. In vending the cups 1 according to the present invention, advantage is taken of this free downwardly projecting angular bottom margin and also of the downward tapering of the nested cups in the stack.

A stack of the nested cups 1, forming a supply to be vended, is contained in an upright magazine tube 2, which may be a steel stamping, seamed together. The upper end of this tube is closed by a cap 3 secured thereon which may be a drawn steel shell. The container tube 2 is shown as of octagonal cross section elongated from front to rear in conformity with the transverse elliptical shape of the stack of nested cups 1 (Fig. 5), which is contained loosely therein for free downward gravitational movement. The cups 1 in this stack are in their upright position with their bottoms down. The lower end of the magazine tube 2 opens freely downward into the top of a multi-part casing which is open at its lower or bottom end, and the principal parts of which may be zinc die-castings, this main casing being in general substantially rectangular, as appears in Figs. 5 and 6, and being substantially larger transversely than the magazine tube 2.

The casing comprises a substantially trough-shaped back piece 4 and a substantially similarly shaped front piece 5 which join along their edges at the side and are there firmly secured together by means of dowel pins and screws, some of which appear in the drawings. Similarly firmly secured to the front casing part 5 towards its top and forwardly spaced therefrom by means of rearwardly extending lateral flanges is a front plate 6. A centrally open casing top 7 interlocks at the rear with the inner side of the upper end of the casing back 4 (Fig. 3) and has a front wall which extends forwardly at a downward inclination and then downwardly to the upper edge of the front plate 6 in alignment therewith. The inclined portion of this front wall is provided with a key-operated lock 8, the bolt 9 of which is engageable with an inclined keeper lug 10 (Fig. 2) formed on a bracket 11 shown as secured to the top and front of the front casing part 5 by means of a pair of screws 12.

The lower end of the container tube 2 has a snug fit in the octagonal opening in the casing top 7 (Figs. 2, 3 and 5). The lower end of the container tube 2 for the most part rests upon shoulders formed in the opening of the casing top 7 (Fig. 3) but at its sides the tube 2 is provided with downward extensions or tongues the ends of which are turned outwardly and upwardly to form hooks which engage beneath a downwardly extending inner flange of the casing top 7 (Figs. 2 and 3), so that thereby the lower end of the container tube 2 is firmly secured to the casing top 7 within its opening. The casing top 7 together with the magazine tube 2 may be removed from the rest of the casing by unlocking the front lock 8.

The casing is provided with a front door 13 which has rather deep or wide lower and lateral rearwardly extending flanges. The rear edge of the lower flange of this door 13 is hinged at 14 to the lower end of the main casing front 5. At the front the door 13 is in alignment with and extends up to the lower edge of the front plate 6. This door 13 may be locked in closed condition by means of a bolt 15 turned over to form a handle at its upper end and passing downward through lugs on the front plate 6 and at its lower end through a lug on the door 13 at the top thereof (Fig. 2). The handle end of this bolt 15 is readily accessible through the open top of the casing when the lock 8 has been unlocked and the casing top 7 removed. If desired a separate lock may be provided for the front door 13 in addition to or in place of the bolt 15. This separate lock is indicated by the removable plug 16 in the upper edge of the door 13, which may be replaced by a lock similar to the lock 8 and the bolt of which may engage at the back of a keeper lug 17 on the lower edge of the front plate 6 (Fig. 3). The enclosed space at the inner side of this front door 13 forms a coin receptacle or money box at the front of the front casing part 5, into the top of which discharged coins may drop from the coin controlled mechanism, as will hereinafter appear. The front of the magazine tube 2 just above the casing top 7 is provided with a glass window 18 held in place on the tube by means of a frame 19 and is held in this frame by a small removable clip 20 at the inner side of the casing top 7, secured in place by a screw (Figs. 3 and 5).

The stack of cups 1 descends by gravity from the magazine tube 2 through the casing top 7 into the upper portion of the main tubular casing body formed by the casing back piece 4 and the casing front piece 5 with the bottoms of the cups 1 formed by their angular bottom edges foremost or downward. It will be noted that the angular bottom edges of the cups and also the longer diameter of their elliptical upper edges or rims extend from front to rear in the stack of these cups in the machine. The stack of cups is supported by means of a pair of restraining members in engagement with the tapering sides of the lowermost cup at opposite points laterally of the machine and at a level shown as slightly above the middle of the height of this cup. These restraining members are shown as in the form of pivotally mounted fingers, the pivotal axes of which extend horizontally in parallel relation from front to rear in the upper portion of the casing at opposite sides thereof, and these pivotally mounted restraining fingers also form lifting fingers for raising or lifting the stack of cups. These fingers as a whole, while in general similar in construction and operation, are not only made right and left but also are somewhat differently constructed in other respects by reason of the nature of their cooperating relation with each other as well as with other parts of the operating mechanism.

Right and left frame brackets 21 and 22 in the main part of the casing are firmly secured therein to the back piece 4 and the front piece 5 by means of dowel pins and screws, as indicated in the drawings. These frame brackets form supports for the combined restraining and lifting fingers besides serving other purposes, as will hereinafter appear. The cup-engaging fingers of the combined restraining and lifting members include inwardly and downwardly inclined lever arms normally at an inclination from the horizontal of about 45° or perhaps a little more.

The left hand cup-supporting member includes a horizontal rock shaft 23 having a reduced rear end pivoted in the upper end of the frame bracket 22 and having a reduced front end portion which is pivoted in the front wall of the casing front 5. This rock shaft 23 may be a zinc die casting, excepting its reduced front end portion more desirably is formed by a steel insert, by reason of the extra strain to which this end of the shaft is subjected. A cam arm 24 is fixed upon this front reduced portion of the shaft 23 just at the rear of the wall of the casing part 5 by means of a pin 25. This cam lever projects upwardly and inwardly towards the right at an angle of about 45° and at its free end projects to the front of the wall of the casing part 5 through an opening 26 provided in this wall. This forwardly projecting end of the cam arm 23 is provided with a cam follower shown as a stud 27 which carries a small anti-friction roller 28. The cam lever 24 provides for rocking the rock shaft 23, first in a counter-clockwise direction and then permitting it to rock in the reverse direction.

At an intermediate point along its length and in lateral alignment with the central axis of the stack of cups 1, the rock shaft 23 carries a lever arm 29 which projects inwardly or towards the right and downwardly at an inclination of about 45°, the cam lever 24 and this lever arm 29 being shown as substantially at right angles to each other. This lever arm 29 may be cast in the same piece with the rock shaft 23 as indicated. This lever arm 29 is bifurcated and between its spaced ends carries a small anti-friction roller 30 which is journaled on a pin 31. This lever arm 29 together with its terminal roller 30 constitutes a combined supporting and lifting finger for the stack of cups 1 with the roller 30 at all times in engagement with the adjacent side of the downwardly tapering lowermost cup in the stack.

A right hand rock shaft 32, which also may be a zinc die casting, has a reduced pivot end pivoted at the rear in the top of the right hand frame bracket 21 and at the front in the front wall of the front casing part 5. This rock shaft 32, in line with the center line of the stack of cups 2, carries in the same piece therewith a lever arm 33 which normally projects inwardly and downwardly at an inclination of about 45° and substantially at right angles with the left hand lever arm 29. These lever arms 29 and 33 per se may be considered as duplicates. The right hand lever arm 33 also is bifurcated and between its spaced ends carries a small cup-engaging roller 34 which is journaled on a pin 35.

Connections, shown as a linkage, are provided between the two rock shafts 23 and 32 for compelling these rock shafts to rock together in opposite direction and for transmitting such rocking movement from the left hand rock shaft 23 to the right hand rock shaft 32. These rock shafts are pivotally connected together by means of a transverse link 36 adjacent their rear ends. The left end of this link 36 is pivotally connected by a pin 37 with the end of an upstanding normally inwardly inclined lever arm 38 which may be cast on the left rock shaft 23 in the same piece therewith, and the other end of this link is pivotally connected by a pin 39 with the end of a depending normally outwardly inclined lever arm 40 which may be cast in the same piece with the right hand rock shaft 32. The two levers 38 and 40 are of the same length and have an angular relation relatively to each other and to the link 36 such that the opposite rocking movements of the rock shafts 23 and 32, and hence the arcuate movements of the cup-suporting and cup-

lifting rollers 30 and 34, will be substantially uniform and of substantially equal extent relatively to each other. These cup-engaging rollers 30 and 34 are held at their normal position for supporting the stack of cups 2 and are operated for raising and lowering the stack of cups by means of the cam lever 24, as hereinafter described.

Shelf-like rear and front guide lugs 41 and 42 for the lowermost cup are provided respectively on the rear wall of the casing back 4 and on the front wall of the casing front 5 (Figs. 3 and 7). Since the paper cups 1 individually are rather flexible the lowermost cup in the stack may be readily drawn downward away from the stack past the supporting rollers 30 and 34 and past the rounded ends of these guide lugs or ribs 41 and 42, the upper flaring portion of the cup being free to bulge outward between these rollers and guides. The nested stack of cups 1, while of course to a certain extent yieldable, is sufficiently rigid to be supported and to be lifted by the rollers 30 and 34.

Normally the acutely angular straight folded bottom edge or end of the lowermost cup 1 rests lightly upon and in the angle between a pair of similar right and left feed rollers 43 and 44 journaled at the proper position on horizontal parallel axes which are parallel with the axes of the rock shafts 23 and 32. These feed rollers are desirably of hard material such as case hardened steel. For obtaining a strong initial gripping action upon the narrow projecting bottom edge margin of the lowermost cup, as well as for assuring a positive feeding action in drawing the cup downward away from and beyond the stack-supporting restraining rollers 30 and 34, each of the feed rollers 43 and 44 is provided on its periphery with abrupt circumferential grooves which are spaced to leave between them intervening square-shouldered circumferential ridges or ribs which are of somewhat greater width than the grooves. These ribs are cross knurled or milled to provide gripping edges and the ribs on one of the feed rollers are arranged opposite to or in alignment with the grooves on the other feed roller (Fig. 12). This arrangement gives a stronger gripping effect and feeding action. These two feed rollers 43 and 44 per se may be alike or duplicates, terminating at one end with a rib and at the other end with a grooved space, and then one of these rollers turned end to end relatively to the other, thereby to obtain the above noted offsetting or alternate arrangement of the ribs and grooves relatively to each other on the respective rollers.

The feed rollers 43 and 44 are pressed on so as to be firmly fixed upon peripherally flanged and shouldered cores 45 and 46, respectively. The same zinc die casting may be used for each of these two cores. The feed rollers 43 and 44 are mounted on their respective cores 45 and 46 in relatively reversed position so that thereby one of these rollers has its terminal circumferential tooth or rib adjacent to the flange on the core while the other feed roller has its circumferential terminal end space adjacent to the flange on its core (Fig. 12). The feed rollers 43 and 44 are in vertical alignment with the cup-supporting rollers 30 and 34, and as shown in the drawings (Figs. 3 and 7) the feed roller cores 45 and 46 have their peripherally flanged ends turned towards the rear of the machine casing.

The core part 45 of the right hand feed roller 43 is fixed upon the middle portion of a horizontal shaft 47, such as by means of a set screw 48, and the core part 46 of the left hand feed roller 44 is similarly fixed upon another horizontal shaft 49 at the same level. The right hand feed roller shaft 47 is journaled adjacent to its rear end in the lower part of the right hand frame bracket 21 (Fig. 3) and the forward end of this shaft extends loosely through a large opening in the front wall of the front casing part 5 and has its reduced end journaled in a bearing formed by a lug 50 (Figs. 3, 8 and 9) which projects rearwardly from the lower portion of the front plate 6. The left hand feed roller shaft 49 is journaled adjacent to its front and rear ends in horizontal slots 51 in the lower portion of the left hand frame bracket 22. At each of these slots, a horizontally slidable bearing pin 52 at the left side of the feed roller shaft 49 is guided in the bracket frame 22 and pressed against the feed roller shaft 49 by a coiled thrust spring 53 (Figs. 3 and 7). These springs 53 press the left hand feed roller 44 firmly into cooperating feeding relation with the right hand feed roller 43. The rear ends of the feed roller shafts 47 and 49 have fixed thereon respectively similar large intermeshing spur gears 53*a* and 53*b* by which the two feed rollers 43 and 44 are positively connected together for cooperating rotation at the same rate in opposite directions.

A smaller spur gear 54 for operating the feed rollers 43 and 44 is loosely mounted on the right hand feed roller shaft 47 just at the front of the wall of the front casing part 5 and is provided with a hub sleeve 55 extending inward through the opening in this casing wall. This operating gear 54 is connected to the right hand feed roller 43 through a one-way clutch. A clutch sleeve 56 is loosely mounted on the roller shaft 47 between the feed roller core 45 and the operating gear sleeve 55 and at its rear end is provided with a clutch head 57 adjacent to the front end of the feed roller core 45. At its rear end the gear sleeve 55 is provided with a square-shouldered diametral rib which seats in a complementary diametral

groove in the forward end of the clutch sleeve 56, as shown in dotted lines in Fig. 3, so that thereby the operating gear 54 is positively connected to the clutch sleeve 56 for unitary rotation therewith in either direction. The driving gear 54 and the clutch sleeve 56 may be zinc die-castings, while the two feed roller shafts 47 and 49 may be of brass.

The rear face of the clutch head 57 carries a circumferential series of drive studs 58, shown as four in number, which may be cast thereon in the same piece therewith. The drive studs 58 pivotally carry gravity pawls 59 which project therefrom in a counter-clockwise direction (Fig. 7). The free ends of the clutch pawls 59 engage with the teeth of a continuous circular internally toothed ratchet 60 formed on the feed roller core 45, for transmitting counter-clockwise rotation only from the operating gear 54 to the right hand feed roller 43, while the operating gear 54 is free to rotate idly in the opposite direction, with the feed rollers 43 and 44 at rest. In this way steps of feed movement may be imparted to the feed rollers 43 and 44 intermittently alternating with periods of rest, each such step of feed movement being of sufficient extent for effecting the delivery of the lowermost cup 1 from the bottom of the stack, with a slight overthrow of the feeding movement of the feed rollers in order to assure that the upper edge or rim of the cup has passed completely below and is free from the feed rollers, so this cup may then drop for delivery. Operating means are provided for operating the feed rollers 43 and 44 and the lifting fingers 29 and 33 in proper timed relation as to these feed rollers and lifting fingers.

A rocking operating member 61 is pivotally mounted for to and fro movement at the front of the front wall of the front casing part 5 on a horizontal axis parallel with the axes of the rock shafts 23 and 32 and of the feed roller shafts 47 and 49 and intermediate to these shafts. This operating member 61 is shown as loosely pivotally mounted on a rotatable handle shaft 62, the inner end of which is pivoted in the wall of the front casing part 5 and which extends forwardly through the front plate 6 where its outer end has a handle knob 63 fixed thereon by means of which the entire operating mechanism of the vending machine may be manually operated. In the embodiment of the invention shown in the drawings, the operating member 61 is operated from the handle shaft 62 through the intermediary of coin controlled mechanism. For operation without coin controlled mechanism the operated member 61 may be fixed upon the handle shaft 62, for example by means of a set screw in its hub similar to the set screws 48 for the feed rollers. In such case the coin controlled mechanism may be omitted or it may be present and not used.

The rocking operating member 61 has a general resemblance to a wheel with a peripheral front flange which at the left side through about 130° has a considerably wider portion 64 (Figs. 2, 10 and 11). The right half of this operating member 61 in its normal position (Fig. 2) forms a semi-circular spur gear segment 65 the teeth of which are in engagement with the operating gear 54 for the feed rollers 43 and 44. Throughout its length at the rear the wide flange 64 of the operating member 61 is provided with a cam which faces radially outward and comprises an inner arcuate circumferential initial portion 66, an intermediate radially inclined portion 66*a* and an outer circumferentially arcuate terminal portion 66*b* (Figs. 2, 3, 10 and 11). This cam is at all times in engagement with the cam roller 28, which is carried by the cam lever 24 on the left hand rock shaft 23.

The exact extent of the forward or clockwise rotation of the rocking operating member 61 from the normal position of rest thereof shown in the drawings is not critical and may be, for example, through 105° or a little more than that, in the relative proportions of the operating parts of the mechanism shown. In its clockwise movement the rocking operating member 61 rotates the feed rollers 43 and 44 through the above described one-way clutch for thereby delivering a single cup 1. The feed rollers are desirably rotated to a slightly greater extent than is absolutely required for delivering the cup in order thereby to make sure that the upper edge or rim of the cup is entirely free from the gripping action of the feed rollers, so it may drop for delivery. Of course the extent of this idle rotation or overthrow of the feed rollers is immaterial. During the return movement or counter-clockwise rotation of the rocking operating member 61, the feed rollers 43 and 44 will be at rest, by reason of the disengagement of the one-way clutch.

Normally the cam roller 28 rests upon the inner or depressed arcuate cam surface 66, for thereby holding the combined supporting and lifting fingers 29 and 33 in position for supporting the stack of cups 1 on the lift finger rollers 30 and 34. During the first part of the clockwise movement of the operating member 61 and of delivery movement of the two feed rollers 43 and 44 the cam roller 28 rides on the initial cam surface 66 and consequently without movement being imparted to the cam lever 24 and cup-supporting rollers 30 and 34. At an intermediate point of the delivery of the cup after its upper edge or rim has passed below and is free from the rollers 30 and 34, but while the upper edge of this downwardly moving cup is still projecting to a substantial extent above

the cooperating gripping surfaces of the feed rollers 43 and 44, the cam roller 28 will be engaged by the inclined cam surface 66*a* which will rock the left hand rock shaft 23 in a counter-clockwise direction, thereby raising the lifting fingers 29 and 33, the rollers 30 and 34 being moved slightly inward, to increase their pressure upon the cup, and being moved to a greater extent upward, which will lift the entire stack of cups so that the lowermost cup therein will be raised clear and free from the cup which is being delivered. The extent of the cup-lifting movement of these rollers 30 and 34 may be anything found desirable, and in the construction shown in the drawings, these rollers move through an arc of about $\frac{5}{16}$ of an inch and are raised substantially a quarter of an inch.

After the stack of cups 1 has been thus raised by the inclined cam portion 66*a*, the outer circularly arcuate terminal portion 66*b* then travels in engagement with the cam roller 28 and holds up the stack of cups until the operating member 61 has completed its forward movement and the cup being fed by the feed rollers 43 and 44 has been released thereby and delivered. At an intermediate point of the reverse or return movement of the rocking operating members 61, the intermediate inclined cam portion 66*a* again engages with the cam follower roller 28, followed by the engagement with this roller of the circularly arcuate inner cam portion 66, thereby permitting the stack of cups 1 to descend by their own weight, while the feed rollers 43 and 44 are at rest, the stack of cups then being supported upon the rollers 30 and 34 of the lever arms or lifting fingers 29 and 33 with the angular bottom margin of the terminal or lowermost cup 1 then resting lightly upon and between the cup-feeding peripheral surfaces of the feed rollers 43 and 44 preparatory to the next delivery operation of the machine.

The lifting and holding up of the stack of cups 1 separates the lowermost cup in this stack, at the proper time, from the cup which is then being fed downward for delivery. Otherwise this second cup would immediately follow the first through the feed rollers, and at a single operation of the machine, for the purpose of delivering a single cup, a second cup would be fed partly past the feed rollers by reason of their terminal overthrow movement. At the third delivery operation, the third cup would, in the same way, be fed twice as far as the second cup and so on, with an increasing feed for the successive cups, which would soon result in the delivery of two cups with a single operation of the machine. Furthermore, the machine would be likely to become clogged with cups delivered in this manner. It is therefore, desirable of course to separate and segregate the successive cup deliveries and to identify each delivery of a single cup with a single operation of the delivery mechanism of the machine.

Also for substantially similar reasons it is desirable to prevent partial incomplete operation of the delivery mechanism, which would produce somewhat similar undesirable results. That is to say, it is desirable that each delivery operation of the machine for delivering a single cup should be completed before another delivery operation can be inaugurated. In this way, the successive deliveries of the cups one by one will be separated or segregated and each delivery of a cup will correspond with or be identified with a single complete operation of the delivery mechanism of the machine. In order to time the successive delivery operations with the successive operations of the machine, means are provided to compel a full to and fro operating movement of the rocking operating member 61 before it can be reversed or moved in the opposite direction, the means shown for this purpose comprising a double acting reversible pawl-and-ratchet device.

This pawl-and-ratchet device comprises a double acting or two-way locking pawl 67 mounted on the middle portion of a pivot pin 68 which is carried by and extends between a forwardly spaced left end portion of the bracket 11 and the front wall of the front casing part 5 to which this bracket is secured. The locking end of this pawl is rectangular or square-cornered and this pivoted pawl normally occupies an intermediate position with its locking arm projecting radially inward towards the axis of the rocking operating member 61. The locking pawl 67 is normally maintained at its intermediate position (Fig. 2) by means of a coiled retractile spring 69, the outer or left end of which is anchored by a screw 70 to a forwardly projecting lug formed on the upper end of the front casing part 5 adjacent to its left side, the other end of this spring 69 being pivotally connected to a tail on the pawl 67 by means of a stud 71 which projects towards the front from this tail.

The rocking operating member 61 is provided on the periphery of its wide peripheral flange 64 with an arcuate saw-tooth ratchet 72 which in the to and fro rocking operating movement of this member 61 engages with and travels past the locking pawl 67 so that the latter escapes from each end of this ratchet, as shown for one end in Fig. 2, this ratchet 72 being shown as having a length of about 95°. The locking pawl 67 reverses on the ratchet 72 for each direction of travel of the latter, and has locking engagement to prevent reversal of the ratchet and consequently of the operating member 61 from any intermediate position of the movement of the latter in either direction.

This pawl-and-ratchet device thus prevents partial back and forth rocking movements of the operating member 61, which, if permitted, would cause the one-way clutch to impart irregular intermittent partial feed movements to the feed rollers 43 and 44. Also it is of importance that the stack of nested cups 1 shall be lifted at the proper time in relation to the operation of the feed rollers in delivering a cup, and this pawl-and-ratchet device not only assures the operation of the lift fingers 29 and 33, but assures their operation in proper timed relation with the operation of the feed rollers 43 and 44. In fact, without this pawl-and-ratchet device operating as it does, the operating member 61 could be rocked partially back and forth with the cam roller 28 at all times in engagement with the inner or depressed arcuate surface 66, so that then with this improper manner of operation the lifting fingers 29 and 33 would not be operated to be raised at all, and the stack of cups 1 would not be lifted during the feeding operation.

It will be noted of the construction shown in the drawings and as so far described, that a cup 1 is fed down and delivered during the first or forward movment of the operating member 61 while the reverse or return movement of this member is a preparatory operation in which the stack of cups is again lowered while the feed rollers are at rest. However, it should be noted that the opposite of this manner of operation could as well take their place, that is to say, the first or forward movement of the rocking operating member 61 could be the preparatory movement in which the stack of cups is lowered while the feed rollers are at rest, and the downward feeding and delivery of the cup, together with the raising or lifting of the stack of cups, would then take place during the return movement or final part of the complete to and fro operating movement of the operating member 61. In such case, the final result of the complete operation would be the same.

This other manner of operation could readily be accomplished, either by slight changes in the arrangement and relative relationship of the operating parts shown, or without any changes whatever in the construction as so far described. In the latter case, it would only be necessary to stop and leave the operating member 61 at the other end of its path of to and fro rocking movement shown in the drawings (Fig. 2) which would then become its normal position of rest. Then in effecting a delivery operation, this operating member would first be rocked in a counter-clockwise direction while its return movement would be in the clockwise direction.

With this modified manner of operation of the construction shown, the cam roller 28 would then normally rest upon the terminal portion of the outer arcuate cam face 66*b*, with the stack of cups 1 in its raised position, the operating member 61 would be rocked first in a left hand or counter-clockwise direction to lower the stack of cups, while the feed rollers 43 and 44 are at rest, and then the lowermost cup in the stack would be fed downward and delivered by the rotating feed rollers and the stack of cups raised, during the right hand or clockwise return movement of this operating member. However, the manner of operation shown is considered to be more desirable.

For convenience of operation, together with simplicity of manufacture, spring means are provided for returning the rocking operating member 61 to its normal position. Such spring means shown includes a vertically arranged coiled retractile spring 73 near the left side of the casing, anchored at its lower end to the front wall of the front casing part 5 by means of a screw 74 and directly connected at its upper end by means of a screw 75 to a lug 76 on the operating member 61 at the level of its axis. For preserving the strength of the pull of this spring on the operating member 61 in the angular movement of the latter, as well as for keeping this spring out of the way of other parts of the mechanism, a peripherally grooved segmental pulley section 77 is provided on the front of the operating member 61, upon which the return spring 73 may wind. Other means also may be effective in returning the rocking operating member 61 to its normal position, as will hereinafter appear. Obviously this spring 73 could be arranged to rock the operating member 61 in the opposite direction of its to and fro movement if so desired.

Stop means are provided for limiting the rocking to and fro movement of the operating member 61 in each direction of its movement. The return stop of this operating member comprises a strong lug 78 which projects forward from the wall of the front casing part 5 at the rear of the operating member 61 below and somewhat to the left of its axis. The other cooperating element of the return stop comprises a cushion shock absorbing member carried by the operating member 61 to abut against the stop lug 78. This cushion member may be a piece, such as a thick plate or block 79, of hard compressed felt countersunk flush with or set into a pocket formed on the rear side of the lower portion of the wide flange 64 of the operating member 61.

The rear side of this pocket is closed by a cover plate 80, which, together with the felt cushion block 79, is firmly secured to the flange 64 of the operating member 61 by means of four rivets 81. The cushion stop block 79 projects from its pocket towards the

stop lug 78 for abutting engagement therewith in the spring-returned movement of the operating member 61. The spring 73 imparts a rather rapid return movement to the operating member 61, together with the reverse or return rotation of the feed roller operating gear 54 along with the released clutch element 56—57, and the momentum of these moving parts is absorbed by the cushion element 79 without jar or noise. Forward stop means are provided for the rocking operating member 61 indirectly through the intermediary of the coin controlled mechanism, which is to be described presently.

When a delivered cup 1 is dropped by the feed rollers 43 and 44 into the lower part of the tubular main casing, this cup in its descent through the open bottom end of the casing, will be caught and supported by a downwardly tapering constricted lower end portion 82 of the casing which will engage with the tapering sides of the upwardly flaring cup and will support the cup with its bottom or lower end projecting below the casing so that the cup, which is yieldable, can then be readily grasped and easily pulled out. The cup of course can readily be sprung open for use merely by finger pressure upon its opposite fold lines and, in fact it will be thus sprung partly open in passing through the elliptical restriction 82 (Figs. 3 and 6) of the casing exit.

The lower ends of the frame brackets 21 and 22 are respectively provided with shelf portions 83 and 84 which form guards immediately beneath the feed rollers 43 and 44 respectively, and have their inner spaced edge portions turned upwardly into close proximity to the ribbed and knurled feed surfaces of these feed rollers. These guards act somewhat in the manner of strippers to assure the complete disengagement of the cup from the feed rollers.

The coin controlled mechanism will now be described. Some of the parts and features of the above described dispensing mechanism have a cooperating relation with some of the parts and features of the coin controlled mechanism, such as is commonly the case in the operating mechanism of a vending machine.

A coin carrier 85 in the space between the front plate 6 of the casing and the operating member 61 is fixed on the middle portion of the handle shaft 62. The coin carrier may be a zinc die casting with the handle shaft, which may be of steel, cast therein as an insert, while the handle knob 63 may be detachably held upon the outer end of the shaft by means of a set screw (not shown). The coin carrier is in general of somewhat irregular segmental shape, located for the most part to the left of and below the handle shaft 62. At its front side the coin carrier 85 has a tubular stem 86 which extends forward on the handle shaft 62 to the inner side of the hub of the handle knob 63. An outer boss 87 formed on the front of the front plate 6 has a brass bushing 88 fixed therein which forms a bearing for the outer reduced end portion of the coin carrier stem 86.

The front plate 6 has through it a coin slot 89 which is at the left side of, slightly above and substantially radial to the common axis of the handle shaft 62 and coin carrier 85. A proper coin 90, which in the machine shown is a penny, may be inserted edgewise through the coin slot 89 into a substantially radial coin-holding slot provided on the coin carrier 85, with the outer radial edge portion of this coin projecting from the coin-holding slot beyond the periphery of the coin carrier 85. This coin-holding slot is provided between and is formed by means of lower and upper lugs 91 and 92 which project from the front of the peripheral portion of the coin carrier 85. The lower lug 91 moves the coin 90 while the upper lug 92 holds the coin in position relatively to the lower lug 91. The top of the coin-moving lug 91 is substantially U-shaped, providing radially inner and outer rounded ridges which engage with the coin 90 at opposite sides of its center. The holding lug 92 engages with the coin about from its center outwardly, with a radial edge portion of the coin 90 exposed. The radially inner edge of the coin 90 abuts against and in its movement is guided by the circularly arcuate outer surface of a coin guide 93 which projects inwardly from the front plate 6 and may be cast thereon.

The front face of the coin carrier 85 between the slot-forming lugs 91 and 92 forms a stop for the rear edge of the coin while the forward edge of the coin may move adjacent to and be guided by the inner surface of the front plate 6. The coin guide 93 extends from below the coin-holding slot and lower side of the coin 90 therein, upwardly and to the right above and to the right of the axis of the coin carrier 85 and terminates abruptly in an overhanging radial end which will permit the coin 90 to drop out of the coin-holding slot when it reaches this end of the coin guide and after the coin has traveled through an arc of about 105°. The coin carrier 85 has a slight overthrow beyond this point where the coin 90 passes beyond the abrupt upper end of the coin guide 93, to assure that the coin will be discharged, and the coin carrier may rock through an angle of about 110° for this purpose.

A stop lug 94 for the coin carrier 85, located at the left side of and just below the coin carrier axis, projects from the front plate 6 and may be cast thereon. A lug 95 which projects forward from the lower and right hand end of the coin carrier 85 will abut against the lower side of the stop lug 94 to stop the forward or clockwise movement of

the coin carrier, while the lower side of the coin-moving lug 93 will abut against the upper side of this stop lug 94 to stop the return or counter-clockwise movement of the coin carrier with its coin-holding slot then in alignment with and immediately inward from the coin slot 89 in the front plate 6. The coin carrier 85 is automatically returned to this normal position by means of a coiled torsion spring 96 which surrounds its stem 86, one end of this return spring being secured to the coin carrier by means of a stud 97 while the other end of the spring is anchored under a rib 98 which projects downwardly from the lower end of the coin guide 93.

The periphery of the coin carrier 85 at its front side is provided with a wide forwardly projecting arcuate flange 99 which, radially outward from the stop lug 94, extends from the coin-moving lug 91 around the lower edge of the coin carrier to the coin carrier stop lug 95. The forward edge of this flange 95 is in close proximity to the inner face of the front plate 6, so that while the coin carrier 85 is being operated in its rocking to and fro movement, the coin slot 89 will be closed or blocked by this flange 99 against the insertion of a coin, until the coin carrier has been returned to its normal position.

Should the edge of an inserted coin be left projecting into the coin slot 89 in the front plate 6, it is obvious that the coin carrier 85 would be locked by this coin against movement. In order to prevent this, coin-positioning means are provided to impart final inward movement to the inserted coin and to position the coin properly in the coin carrier between the slot-forming lugs 91 and 92 with the radially inward edge of the coin against the coin guide 93 and with the outer or forward edge of this coin inward from the inner face of the front plate 6 and thus clear of the coin slot 89.

For this purpose a coin-positioning lever 100 (Figs. 8 and 9), which is flat with rounded edges, is pivoted on the inner headed end of a stud 101 on the front plate 6 with this lever close to the inner side of this plate. The pivot stud 101 is located some distance below the outer end of the coin slot 89 with the lever 100 projecting upward across the radially outward end portion only of the coin slot 89. This lever 100 below its pivot stud 101 has a tail arm 102 shown as beveled at its end which abuts against a lug 103 on the front plate 6 to limit the extent to which the lever 100 may pass over or cover the coin slot 89. A two-armed wire spring 104 having a coil on the inner headed end of the pivot stud 101, has the end of one of its arms connected to the lever 100 by a small pin 105 while the end of its other arm, above the pivot stud 101, abuts against a lug 106 on the front plate 6.

This spring 104 normally yieldingly holds the lever 100 with its tail arm 102 abutting against the lug 103 and with its rounded edge portion adjacent to its upper end passing across the radially outer end portion of the coin slot 89 in the front plate 6 (Fig. 9). When a proper coin is pushed inward through the coin slot 89, its rounded edge will push the lever 100 aside, but during the latter part of the inward movement of this coin, the spring-pressed lever 100 will have an increasing tendency to move the coin inward and will finally move this coin inward clear of the coin slot 89 with its forward edge at the inner side of the front plate 6. It may be noted that a coin-positioning lever operating in substantially the same manner is claimed in my Patent No. 1,657,836 of January 31, 1928.

With the rocking operating member 61 at its normal position (Fig. 2) and when the coin carrier 85 carries no coin, the coin carrier may be freely and idly rocked to and fro between its limits of movement or between any intermediate points. When the coin carrier 85 carries a coin 90, this coin itself forms a coupling member which directly engages with a cooperating coupling member on the operating member 61 for moving the latter away from its normal position until the coin has been discharged at the termination of the clockwise part of the to and fro operating movement of the operating member 61. For thus cooperating with the coin 90, to be moved thereby, a stud 107 projects to the front from the wide flange 64 of the operating member 61 and may desirably be a steel insert cast into a thickened portion of the flange 64. This projecting stud is shown as square with two of its opposite corners in radial alignment with the common axis of the operating member 61 and coin carrier 85, so that thereby its flat faces or sides are radially inclined 45°.

This stud 107 is located on the operating member 61 at a position so that with this operating member and the coin carrier 85 both at their normal positions (Fig. 2), the outer edge of the inserted coin 90, which projects radially beyond the periphery of the coin carrier, will be in close proximity to and just below and inward from the lower radially inner inclined face of this stud 107, for moving the latter immediately upon movement of the coin carrier 85. This inclined face of the stud 107 will press the opposite edge of the coin 90 against the coin guide 93, so that thereby this inclined face of the stud, acting as a cam, will dislodge the coin from the coin-holding slot in the coin carrier when the coin has been moved beyond the upper end of the coin guide 93. When the coin is discharged by the coin carrier, it will be received upon and will slide down an inclined chute 108, from the lower end of which it will drop into the coin box at the inner side of the front

door 13. This coin chute 108 may be cast upon the front plate 6 and at its upper edge is notched around the adjacent peripheral parts of the operating member 61 and coin carrier 85 (Figs. 2, 8 and 9).

An undersized slug, the diameter of which is less than the distance between the radially inner corner of the operating stud 107 and the guiding surface of the coin guide 93, will not operate the delivery mechanism of the machine. If such a slug should engage with the stud 107 it will be pushed aside by the inclined cam face of this stud and will be discarded by the coin carrier 85 when the slug passes beyond the upper end of the coin guide 93. In order to make it more certain that such a small sized slug will be discarded with a single movement of the coin carrier, means are provided to prevent return movement of the coin carrier from a partially advanced position when it carries such a slug.

For this purpose an arcuate ratchet member 109 is mounted in a deep slot in the outer or guiding surface of the coin guide 93, substantially flush therewith, and is pivoted intermediate of its length on a pivot pin 110 which forms a rivet passing through the coin guide 93 and the front plate 6 (Figs. 2, 8 and 9). This ratchet member 109 has ratchet teeth, shown as three in number, projecting above the upper portion of the coin guide 93 and inclined towards its adjacent upper end. This toothed end of the ratchet member 109 is urged upwardly by means of a small coiled compression spring 111 which is seated in a recess in the bottom of the slot in the coin guide 93 below this end of the ratchet member 109, the depending tail arm of this ratchet pawl 109 serving as a stop against the bottom of the slot in the coin guide 93.

As soon as an undersized slug has passed over and been engaged by the first ratchet tooth it encounters, then reverse or return movement of the coin carrier is thereby prevented and it is necessary that the coin carrier must be fully advanced for discarding this slug before the coin carrier can be returned to its normal position preparatory to the insertion of a proper coin in its coin-holding slot, which has been freed from the slug which would block the insertion of a coin.

The upper end of the coin carrier 85 is provided with a peripheral and, as a whole, substantially radial tapering projection or lug 112 having a lower radially inclined face which is normally in engagement with or abuts against the upper and radially inner inclined face of the operating stud 107 (Fig. 2). It will be noted that this projection 112, in engagement with the upper side of the stud 107, and the coin 90 in engagement with the lower side of this stud, will lock or couple the operating member 61 and the coin carrier 85 together against movement relatively to each other in either direction. Also the coin 90 is locked by the stud 107 in the coin-holding slot of the coin carrier against possibility of escape therefrom until it has been discharged at the upper end of the coin guide 93.

This projection 112 on the coin carrier 85 by its engagement with the operating stud 107 prevents return movement of the coin carrier 85 independently of the operating member 61 when the latter has been moved away from its normal position, and this assures that the coin 90 will be kept locked in the coin-holding slot of the coin carrier. The operating member 61 of course can only be moved forward by means of a coin carried by the coin carrier 85 and when this operating member has been moved forward or clockwise only a short distance, it will be locked against return movement by the locking pawl 67, as hereinbefore set forth. Return movement of the coin carrier 85 from a partially advanced position is not then permitted, since that would move the coin away from the operating stud 107, so that to and fro movement of the coin carrier under such conditions would be likely to throw the coin out of or dislodge it from the coin-holding slot of the coin carrier and the coin would then be lost in the machine.

Some further note may be taken of the manner of operation of the mechanism as so far described. It will be noted that the peripherally projecting coin carrier lug 112, in cooperation with the operating stud 107 directly, together with the cooperating coin carrier stop lugs 94 and 95 indirectly, forms a stop for limiting the forward or clockwise movement of the operating member 61. This prevents overthrow of the operating member 61, such as might cause the cam roller 28 to run off the trailing end of the terminal cam surface 66*b*, as well as otherwise disarrange the operating mechanism.

It will be also noted that this operating stud 107, against which the coin carrier projection 112 abuts, may serve as a return stop for the coin carriers 85, through the intermediary of the return stops 78 and 79 for the operating member 61. However, it is desirable to provide a separate return stop for the coin carrier 85, as hereinbefore described, in order to assure that the coin-holding slot of the coin carrier will be brought correctly into alignment with the coin slot 89 in the front plate 6. It will be further noted that the coin carrier return spring 96, acting through the intermediary of the peripheral coin carrier lug 112 and the operating stud 107, would also be effective alone to return the operating member 61 to its normal position.

An advantage of the separate return spring 73 for the operating member 61 is that it permits a lighter spring to be employed for returning the coin carrier 85, in view of the fact that the coin carrier is separately op-

erated many times idly, as well as also for discarding slugs, which may be not only small slugs as above noted but also frail slugs such as of paper or of thin metal, which will be bent and discarded without operating the member 61. Another advantage of the separate spring 73 is that it cooperates with the inclined coin-engaging cam face of the operating stud 107 in dislodging the coin from the coin-holding slot in the coin carrier 85 when the coin has passed the upper end of the coin guide 93 by which the coin 90 is maintained in operating engagement with this inclined cam face of the operating stud 107.

For operating the machine shown as a dispensing device without need of inserting a coin, should that be desired in some installations, it is only necessary to drive a sufficiently thick lug between the coin carrying lugs 91 and 92 of the coin carrier, to project into operating engagement with the operating stud 107, and at its other end to pass above or clear the ratchet teeth of the slug ratchet 109. Or on the other hand, if desired, the coin carrier 85, together with the other parts of the coin controlled mechanism per se, may be omitted, the operating member 61 then being fixed upon the handle shaft 62 and provided with a separate forward stop, which it is obvious may be readily done in several very simple ways, for example, by attaching a lug to the front face of the casing wall 5 to be in the path of the shoulder shown on the operating member 61 at the leading end of its cam surface 66 and ratchet 72.

When the stack of cups 1 in the magizine tube 2 requires replenishing the coin carrier 85 is automatically locked at a forward position in which its front flange 99 closes the coin slot 89 in the front plate 6 against the insertion of a coin, thereby to prevent the loss of coins in the machine. For accomplishing this, an upstanding feeler lever 113 is pivoted by means of a pin 114 between a pair of lugs on the back of the front top bracket 11 (Figs. 2 and 3). The feeler lever 113 at its upper free end, has an inwardly tapering rounded feeler projection 115 to engage with the stack of nested cups 1, while not interfering with their free downward movement, nor with the lifting of the stack of cups in the operation of the machine, nor with the insertion of a fresh stack of cups into the magazine tube 2.

The feeler lever 113 has a downwardly extending locking arm 116 forming a locking pawl which at its lower end is provided with a forwardly projecting locking end 117, the upper end of the wall of the front casing part 5 being provided with a vertical slot as shown in Figs. 2 and 3 for the accommodation of this locking arm 116 and its locking end 117. The two arms 113 and 116 of the combined feeler lever and locking lever are disposed at a slight angle to each other, so that the most of the weight of both of these arms is at the rear of the pivot 114, so that this lever as a whole has a normal tendency to swing by gravity in a clockwise direction as viewed in Fig. 3. Thus the feeler end 115 of the feeler lever 113 will be pressed lightly by gravity against the upper edge portion of the telescoped cups 1 in the stack in the position of this lever which appears in Fig. 3, in which, however, the stack of cups has been omitted for clarity of illustration, excepting the lowermost cup which is shown in broken lines. In this position of the feeler lever 113 its locking end 117 will be in withdrawn position at the rear of the upper margin of the path of movement of the operating member 61, so that the latter may be rocked freely back and forth clear of this locking end.

On its back the wide flange 64 of the operating member 61 is provided with a locking lug 118, which forms the above noted thickened portion in which the inner end of the operating stud 107 is fixed (Figs. 2, 10 and 11). The advancing or forward end of this lug 118, as the operating member 61 moves in the clockwise direction, forms an inclined cam face 119 while the other or trailing end of this lug forms an abrupt shoulder 120. When the upper edge or rim of the uppermost or last cup 1 in the stack descends below the lower surface of the feeler end 115 of the feeler lever 113, this lever will be rocked by gravity to move its locking end 117 into the path of movement of this locking lug 118. The inclined cam face 119 of this lug will ride past this locking lever end 117, but soon after the operating member 61 begins its return movement the shoulder 120 will abut against the locking end 117, thereby stopping the return movement of the operating member 61, which will take place at an advanced position of about 90° from the normal position thereof shown in Fig. 2.

When the operating member 61 is thus locked against further return movement, the coin carrier 85 will also be locked against further return movement by its peripherally projecting lug 112 abutting against the operating stud 107 on this operating member 61. In this locked position of the coin carrier 85, its front flange 99 will extend across or close the coin slot 89 in the front plate 6, thereby preventing the insertion of a coin through this slot. Should it be desired to arrange or adapt the machine shown to operate as a dispensing device without using a coin, as hereinbefore noted, the feeler lever 113 may be retained in toto, or this feeler lever may be omitted, that being substantially immaterial.

The operation, as well as the construction, has been described. Vending machines constructed substantially as shown have operated satisfactorily. A name plate 121, giving

instructions, is secured on the depending front flange of the casing top 7 (Figs. 1 and 3). Desirable further information may be displayed on the front door 13. The casing may display further ornamentation in addition to that shown in Fig. 5 on the casing top 7.

It is obvious that various modifications may be made in the construction shown in the drawings and above particularly described, within the principle and scope of the invention as defined in the appended claims.

I claim:

1. In a cup dispensing machine, the combination of means for guiding for downward gravitational movement an upright stack of nested cups with their bottoms downward and of which the sides of the nested cups taper downward and meet in an angle at the bottom, movably mounted restraining members engaging with the opposite tapering sides of the lowermost cup for supporting the stack, feeding means for delivering the cups singly in successive segregated relation including a gripping device to engage the downwardly projecting angular bottom margin of the lowermost cup and draw this cup downward away from and below the said restraining members by which the stack of cups is still supported, and means operating in timed relation with the feeding operation of the said gripping device to raise the said restraining members thereby to lift the stack of cups immediately that the upper edge of the lowermost cup which is being delivered passes below the said restraining members and to hold up the stack of cups until the said lowermost cup has been fully delivered below the gripping device so that thereby the second cup cannot immediately follow the first to the gripping device and then to lower the said restraining members for the descent of the stack of cups to its original normal position so that thereby the next cup which has now become the lowermost cup may be likewise delivered at the next cup-delivering operation of the machine.

2. In a cup dispensing machine, the combination of means for guiding for downward gravitational movement an upright stack of nested cups with their bottoms downward and of which the sides of the nested cups taper downward and meet in an angle at the bottom, movably mounted restraining members engaging with the opposite tapering sides of the lowermost cup for supporting the stack, feeding means for delivering the cups singly in successive segregated relation including a pair of opposed cooperating feed rollers positioned to engage and grip between them the downwardly projecting angular bottom margin of the lowermost cup and draw this cup downward away from and below the said restraining members by which the stack of cups is still supported, and means operating in timed relation with the feeding operation of the feed rollers to raise the said restraining members thereby to lift the stack of cups immediately that the upper edge of the lowermost cup which is being delivered passes below the said restraining members and to hold up the stack of cups until the said lowermost cup has been fully delivered below the feed rollers so that thereby the second cup cannot immediately follow the first through the feed rollers and then to lower the said restraining members for the descent of the stack of cups to its original normal position so that thereby the next cup which has now become the lowermost cup may be likewise delivered at the next cup-delivering operation of the machine.

3. In a cup machine, the combination of means for guiding for downward gravitational movement an upright stack of nested cups with their bottoms downward and of which the sides of the nested cups taper downward and meet in an angle at the bottom, movable restraining members mounted to be raised normally engaging with the opposite tapering sides of the lowermost cup for supporting the stack, feeding means for delivering the cups singly in successive segregated relation including a pair of opposed cooperating feed rollers to engage and grip between them the downwardly projecting angular bottom margin of the lowermost cup and draw this cup downward away from and below the said restraining members by which the stack of cups is still supported, operating means for the feed rollers for imparting successive steps of feed movement thereto of an extent to deliver the lowermost cup in the stack below the feed rollers at each such step of their feed movement, and operating means for the said restraining members operating in timed relation with the operation of the feed rollers to raise the said restraining members during the feeding movement of the feed rollers immediately after the upper edge of the cup being delivered has passed below the said restraining members for thereby lifting and holding up the stack of cups until the feed rollers have stopped rotating and then to lower the said restraining members while the feed rollers are stationary preparatory to another similar delivery operation by reason of the lowermost cup in the stack having descended with its angular bottom in engagement with the feed rollers in position to be gripped thereby at the next successive delivery operation of the machine.

4. In a cup dispensing machine, the combination of means for guiding for downward gravitational movement an upright stack of nested cups with their bottoms downward and of which the sides of the cups taper downward and meet in an angle at the bottom, combined restraining and lifting fingers pivotally mounted for inward and upward

rocking movement at all times in engagement with the opposite tapering sides of the lowermost cup for supporting the stack, feeding means for delivering the cups singly in successive segregated relation including a pair of opposed cooperating feed rollers positioned to engage and grip between them the downwardly projecting angular bottom margin of the lowermost cup and draw this cup downward free from the said fingers by which the stack of cups is still supported, operating means for the feed rollers for imparting thereto successive steps of feed movement with intervening periods of rest by which the lowermost cup in the stack will be delivered at each step of feed movement of the feed rollers, and operating means for the said fingers operating in timed relation with the operation of the feed rollers to raise the said fingers and lift the stack of cups during the feed movement of the feed rollers after the upper edge of the cup being delivered thereby has been freed from the said fingers and to hold up the stack of cups until the feed rollers have come to rest and then to lower the said fingers while the feed rollers are at rest thereby permitting the stack of cups to descend preparatory to the next succeeding delivery operation.

5. In a cup dispensing machine, the combination of means for guiding for downward gravitational movement an upright stack of nested cups with their bottoms downward and of which the sides of the nested cups taper downward and meet in an angle at the bottom, a pair of combined restraining and lifting fingers at all times in engagement with the opposite tapering sides of the lowermost cup for supporting the stack and pivotally mounted for upward rocking movement to lift the stack, connections between the said fingers for operating one of them from the other, a pair of cooperating feed rollers positioned to engage and grip between them the downwardly projecting angular bottom margin of the lowermost cup and draw this cup downward while the stack of cups is supported by the said fingers, intermeshing gears connecting together the said feed rollers, an operating gear for the feed rollers coaxial with one of them, a driving connection including a one-way clutch between this operating gear and feed roller, a cam follower for operating the said fingers connected to one of them, and a pivotally mounted rocking operating member for the feed rollers and the lifting fingers comprising a gear segment in engagement with the said operating gear and a cam in engagement with the said cam follower and shaped to cause the said fingers to lift the stack of cups during the feed movement of the feed rollers immediately after the cup being fed is freed at its upper edge from the said fingers and in the reverse direction of movement of the said rocking operating member to lower the stack of cups while the feed rollers are at rest by reason of the disengagement of the said one-way clutch.

6. The invention defined in claim 5, in combination with spring means for rocking the said operating member in one direction of its movement, manual means for rocking this member in the other direction of its movement, and a double acting reversible pawl-and-ratchet device for compelling a substantially full movement of the said rocking operating member before it can be moved in the opposite direction for thereby timing the successive delivery operations with the successive operations of the machine.

7. In a cup dispensing machine, the combination of a casing open at the bottom, an upright container tube opening at its lower end into the top of the casing for guiding a stack of nested cups downward into the casing with their bottoms down and of which the sides of the nested cups taper downward and meet in an angle at the bottom, a pair of parallel horizontal rock shafts journaled in the upper part of the casing one at each lateral side thereof, linkage connecting together the rock shafts for similar concomitant rocking movement in opposite direction, an inwardly extending downwardly inclined lever arm carried by each rock shaft forming fingers which engage with the opposite tapering sides of the lowermost cup for supporting the stack, a cam lever fixed upon the forward end portion of one of the said rock shafts, a forwardly projecting cam follower mounted on the cam lever, a pair of feed roller shafts laterally disposed and journaled in the casing below and in parallel relation with the said rock shafts, a pair of cooperating feed rollers fixed respectively on the feed roller shafts with the angular bottom of the lowermost cup in the stack normally resting thereon therebetween, intermeshing gears connecting together the feed roller shafts, a yieldable spring journal mounting for one of the feed rollers for pressing it against the other feed roller, an operating gear loosely mounted upon the forward end portion of the shaft of the said other feed roller, a driving connection including a one-way clutch interposed between this operating gear and the feed roller on the same shaft, a rocking operating member pivoted on the front of the casing on an axis parallel with the said shafts comprising a gear segment in engagement with the said operating gear and a cam in engagement with the said cam follower and shaped to cause the said fingers to lift the stack of cups during the feed movement of the feed rollers immediately after the cup being fed is freed at its upper edge from the said fingers and in the reverse direction of movement of the said rocking operating member to lower the stack of cups while the feed rollers are at

rest, means for limiting the rocking movement of the said operating member, manual means for rocking the operating member in the direction to operate the feed rollers for delivering a cup, and spring means for returning the operating member.

8. In a machine of the class described, the combination with restraining devices to support a stack of nested wedge-shaped cups, by engagement with the tapering sides of the lowermost cup of said stack, of feeding means to engage the bottom edge of said lowermost cup to discharge the same from the machine, and means responsive to the operation of said feeding means, when the upper edge of said lowermost cup has cleared said restraining means, for elevating the latter to produce a positive separation between said lowermost cup and the cup immediately above it in said stack, whereby the discharge of said last-named cup with said lowermost cup is prevented.

9. In a machine of the class described, the combination with restraining devices to support a stack of nested wedge-shaped cups, by engagement with the tapering sides of the lowermost cup of said stack, of feeding means to engage the bottom edge of said lowermost cup to discharge the same from the machine, means responsive to the operation of said feeding means, when the upper edge of said lowermost cup has cleared said restraining means, for elevating the latter to produce a positive separation between said lowermost cup and the cup immediately above it in said stack, whereby the discharge of said last-named cup with said lowermost cup is prevented, and means brought into action at the completion of each discharge operation of said feeding means for restoring said restraining means to normal position.

In witness whereof, I hereunto subscribe my signature.

LOUIS H. MORIN.