

Aug. 7, 1928.

1,680,238

R. H. BAKER

VENDING MACHINE

Filed Dec. 6, 1919

4 Sheets-Sheet 1

Fig. 1.

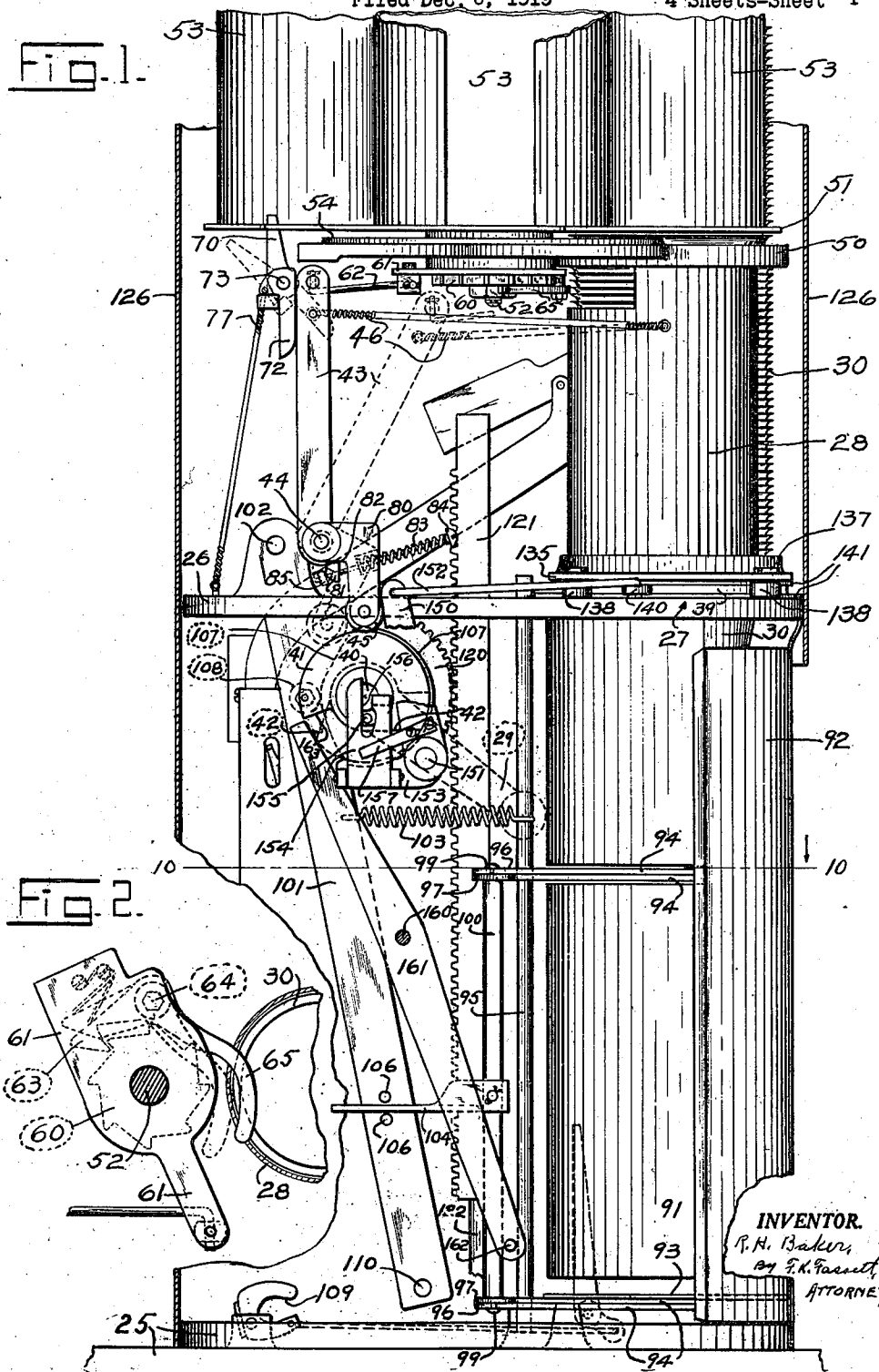
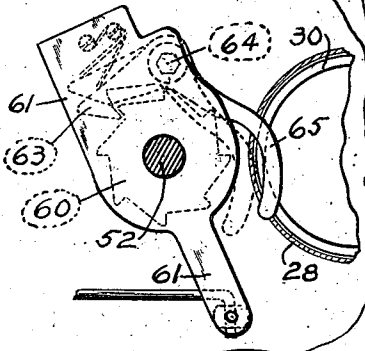


Fig. 2.



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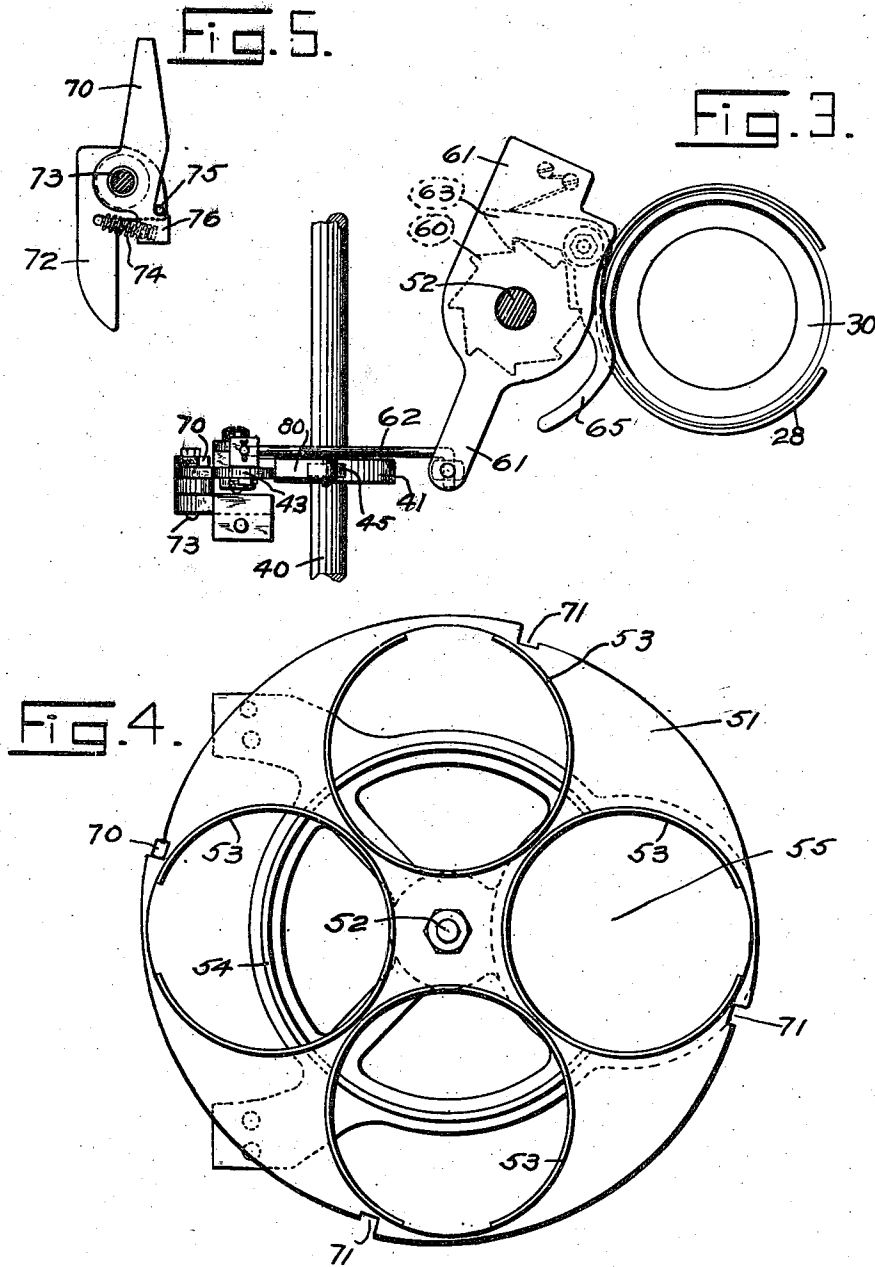
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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

Fig. 6.

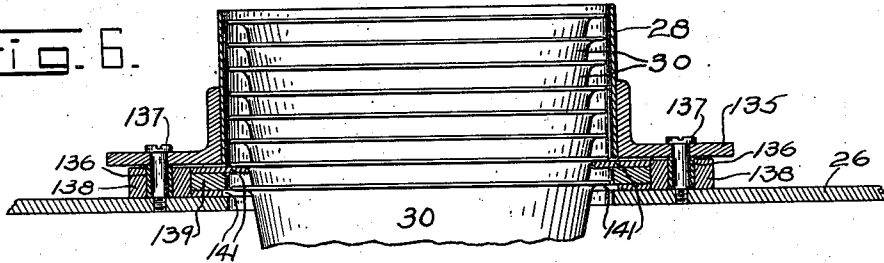


Fig. 7.

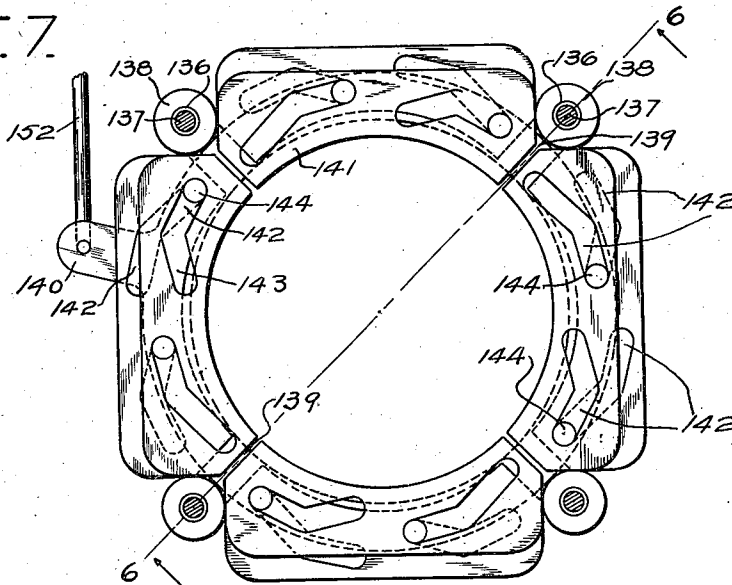


Fig. 8.

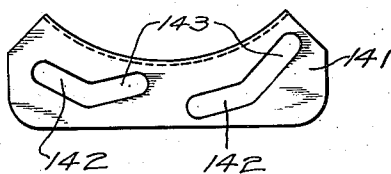
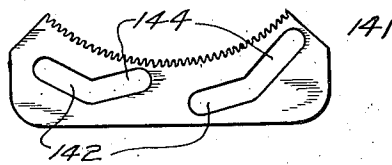


Fig. 9.



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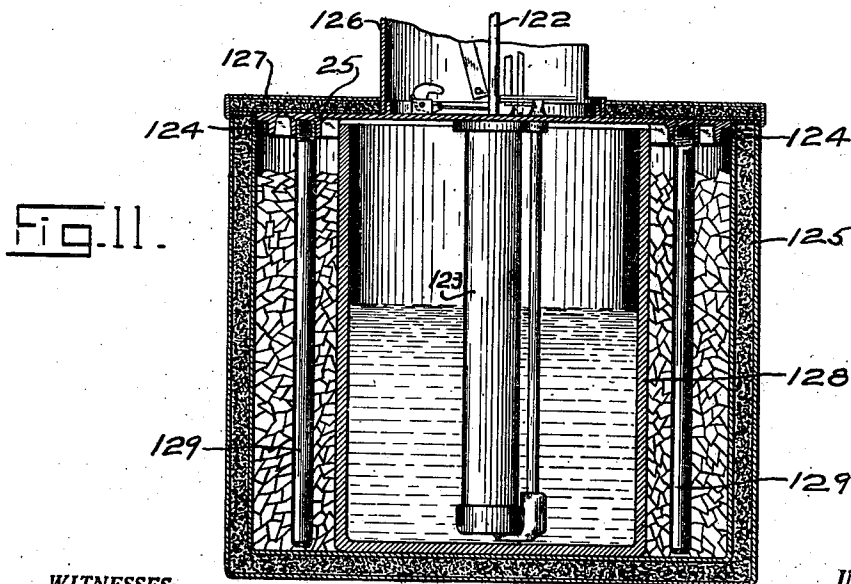
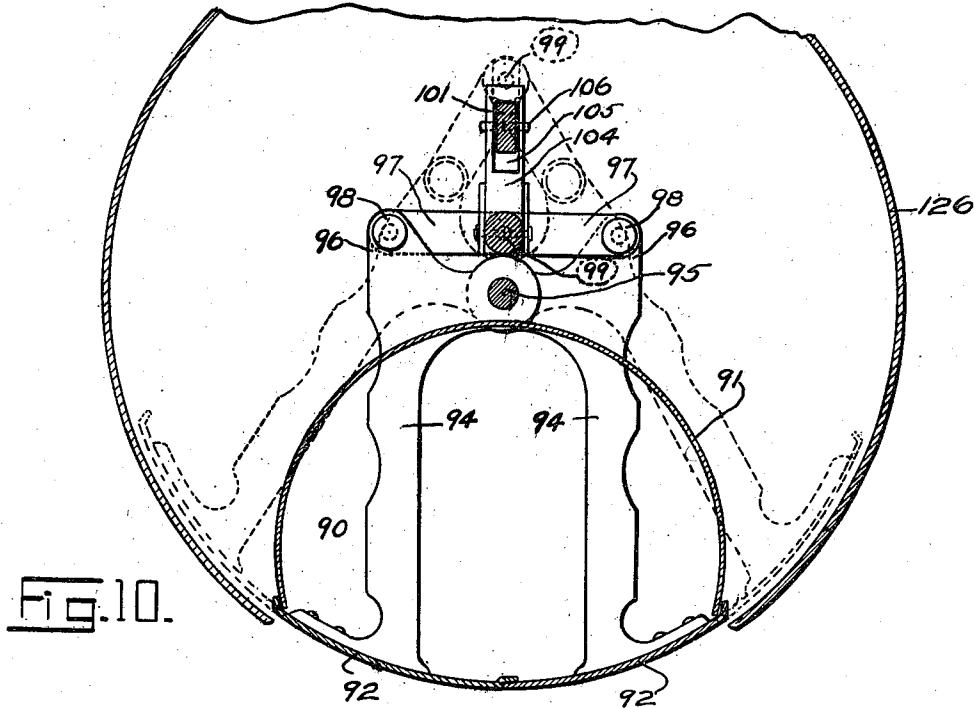
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VENDING MACHINE

Filed Dec. 6, 1919

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

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VENDING MACHINE.

Application filed December 6, 1919. Serial No. 342,973.

My present invention is an improvement over the cup and beverage vending device shown in my Patent No. 1,437,485, granted December 5, 1922 and while, like its predecessor, it relates primarily to devices for vending cups and beverages, some of its provisions are applicable to machines of other kinds; vending cups only, for example.

One of the objects of my present invention, is to increase the capacity of the cup vending section, so that a much larger number of cups may be placed in the machine than before.

Another object is to provide for this increased capacity without increasing the height of the cup storage space or the number of cups whose weight must be sustained by the cup vending mechanism.

Another object is to provide greater security for the stock of cups, whereby the customer is prevented from removing more than the single cup which he is entitled to remove.

Another object is to provide against injury to certain parts of the mechanism, should the cups obstruct the movements or proper action of the parts.

Another object is to facilitate the removal of the bottom cup from the stack, by enabling the cup vending device to grip the stack of cups, so that the bottom cup may be pulled loose from the stack even if it tends to stick to the cup above it.

Another object is to provide a simplified and greatly strengthened cup dispensing device; one that will be very positive in its action, under all circumstances.

Another object is to simplify the construction of the door mechanism of the delivery compartment, in a way which not only reduces the cost of making the machine but diminishes the chances for disorder.

Another object is to render the entire mechanism inoperative after the cup full of beverage has been drawn from the reservoir, until the door has been allowed to close.

Other objects, and advantages derived from my improved construction, will be disclosed as the detailed description proceeds.

In my former application, above mentioned, I provided a single tubular magazine for nested paper cups, at the lower end of which was a cup dispensing device. In the present machine I use an improved cup dispensing mechanism and operate it by an improved mechanism. But my improved magazine arrangement may also be used with the original cup device. I also continue to use the tubular magazine which feeds cups to the dispensing device. The supply of cups contained in this magazine is supplemented by a plurality of auxiliary magazines, which are brought successively into position to deliver their contents to the main magazine. I am aware that plural magazines to be emptied successively have been used by others, but believe I am the first to introduce a dispensing magazine whose supply is automatically replenished from time to time from auxiliary magazines; also the first to replenish a magazine before its contents has been exhausted.

In the accompanying drawings,

Fig. 1 is a side elevation of my improved machine, a portion of the hood or enclosing casing being removed, and such parts of the mechanism as are not directly associated with the cup device omitted or indifferently shown.

Fig. 2 is a fragmental plan view of a portion of the mechanism for moving the auxiliary magazines successively into position.

Fig. 3 is another fragmental plan view of the auxiliary magazine mechanism, showing the parts in a different position.

Fig. 4 is a plan view of the auxiliary magazine and its supporting structure.

Fig. 5 is an elevational detail view, showing a stop pawl for arresting the auxiliary magazines as they are brought successively into place.

Fig. 6 is a sectional elevational view on line 6-6, Fig. 7, of my improved cup vending device, showing the position of the parts when the operating handle is in normal position.

Fig. 7 is a plan view of the cup vending device, with the magazine removed, the parts being in the same position as in Fig. 6.

Fig. 8 is a composite view of the upper and lower segment.

Fig. 9 is a view of a modified form of upper segment, its gripping edge being serrated.

Fig. 10 is a plan view taken on line 10-10, Fig. 1 for the purpose of illustrating certain features of my improved door mechanism.

Fig. 11 is a sectional elevation of the

lower portion of my machine, showing the beverage reservoir and ice receptacle; this view is to be considered a part of Fig. 1; that is, the entire machine has not been shown in a single figure, because the parts shown in Fig. 1 would then have been too small to properly disclose them.

Referring now to the drawings, more particularly Fig. 1, the numeral 25 designates a base plate on which are mounted certain parts that I am about to describe. In order to render the drawings more simple much of the supporting structure has been omitted and it is sufficient to say that at a suitable distance above the base 25 is an upper base plate 26. On this upper base is mounted a cup dispensing device 27, above which is a magazine 28 containing cups 30. The cup dispensing mechanism is operated by the crank 29, which is seen in dotted lines in Fig. 1, in a manner to be hereinafter described; for the present it is sufficient to say that the motion of the crank is oscillatory, it being moved counter-clockwise and clockwise, alternately, and that as cups 30 are withdrawn one by one the stack in the magazine 28 is gradually lowered. I will now describe means for replenishing the supply.

The crank 29 is rigidly attached to a shaft 40; on this shaft is rigidly secured a concentric 41, which is mutilated to form a cam 42. A lever 43 is mounted to rock on a fixed center 44 carried by the upper base 26. This lever is composed of two parts, but since the parts normally act as though they were integral, the fact that they are not will be ignored for the present. The first operation performed by the customer, after inserting the necessary coin (in a slot not shown), is to rotate the shaft 40 by means of the crank 29 somewhat over half of a revolution, counter-clockwise, as seen in Fig. 1. The lower end of the lever 43 carries a roller 45 which normally rests on the concentric 41, but when the crank is operated as above described the concentric is rotated till the cam 42 reaches approximately the position indicated by dotted lines, carrying the cam entirely clear of the roller 44 and allowing the lever 43 to rock to the position shown in dotted lines, the lever being moved to this position by a spring 46. Upon the return of the crank to its normal position the cam 42 engages the roller 45 and rocks the lever 43 up to its normal position, the roller riding on the concentric during the remainder of the movement of the crank.

At the upper end of the magazine 28 is mounted a plate 50, on which a carrier 51 is mounted to rotate on an axis 52 (see also Fig. 4). The carrier 51 supports four tubular auxiliary magazines 53, each of which is adapted to receive a stack of cups. The tubes 53 are open at both ends, and the cups, which are inserted at the upper end, drop

down and rest upon the plate 50. The plate is provided with an annular rib 54 on which the cups rest, and this enables them to slide freely as the carrier 51 rotates. The plate 50 is provided with a circular hole 55, which registers with and is approximately the same size as the dispensing magazine 28, and whenever the carrier swings to a position where one of the tubes 53 registers with this hole the content of that tube drops by gravity into the magazine 28.

The axis 52 is a shaft rigidly secured to the carrier, and it extends through the plate 50 and below the plate carries a ratchet wheel 60. A lever 61 is mounted to rock on the shaft 52, said lever being connected by a link 62 to the upper end of the lever 43, so that when the crank 29 is operated counter-clockwise as above described the lever 61 is rocked from the position it occupies in Fig. 3 to the position it occupies in Fig. 2. The lever carries a spring-actuated pawl 63 pivoted at 64, which pawl is provided with an arm 65. When the lever assumes the position it occupies in Fig. 2 the arm 65 invades dispensing magazine 28 a short distance, as is seen in Fig. 2, provided the stack of cups in the magazine has been lowered sufficiently to permit this invasion. Otherwise the arm is arrested by coming in contact with the cups, as indicated with dotted lines in Fig. 2. When it is so arrested the pawl 63 is kept from engaging the ratchet wheel 60, and upon the return of the crank 29 to its normal position the lever 61 swings idly and the carrier 51 is not moved. When the stack of cups has been lowered to such an extent that the arm 65 can swing into the magazine the pawl 63, on the return of the crank, engages a tooth of the ratchet 60 and moves the carrier one step. In the present case the ratchet wheel is provided with eight teeth, and since there are but four auxiliary magazines, it follows that two operations of the crank 29 are required to remove one auxiliary magazine and bring a new one into position over the dispensing magazine. By giving the lever 61 a longer stroke the operation of bringing a new auxiliary magazine into position could be effected with one operation of the crank. On the other hand, by adding teeth to the ratchet wheel 60 and shortening the stroke of lever 61, the mechanism may be arranged so that three or more operations of the crank 29 will be necessary to bring a new auxiliary magazine into place. This adaptability is a desirable feature, as while moving the carrier by two steps is quite satisfactory in the present case it might in some cases be desirable to utilize more or fewer movements of the crank for the purpose. More or fewer auxiliary magazines may be mounted on the carrier and the ratchet mechanism modified accordingly.

The carrier 50 is retained in a position with one or another of the auxiliary magazines in place over the magazine 28, by a pawl 70 which engages notches 71 in the carrier. The pawl is composed of two parts, the pawl itself, 70, and a tail 72, these two parts being mounted to rock on a common fixed axis 73, which is supported by means not shown. By means of a compression spring 74 the two parts of the pawl are yieldingly held in a certain relationship, this relationship being determined by a pin 75 on the tail bearing against a lug 76 on the pawl (see Fig. 5). The pawl is held in place in a notch 71 by the lever 43 bearing against the tail 72, as in Fig. 1. When the crank is operated so as to cause the lever 43 to move away from the tail 72, the pawl is rocked out of the notch in which it has reposed, by a spring 77 attached to the tail 72, to the position shown in dotted lines in Fig. 1. On the return of the lever 43 to its normal position the tail 72 is returned to its normal position, as in Fig. 1. This brings the pawl into engagement with the carrier while the carrier is still in motion and before a notch 71 has arrived to receive it; as the tail is moved into position the spring 74 is compelled to yield, allowing the pawl to bear against the perimeter of the carrier till the notch reaches the pawl, which is then thrown into the notch by the spring. As it takes two operations of the crank to bring a fresh auxiliary magazine into place, it follows that after the first of these operations the carrier stops with the pawl midway between two notches. No notches are provided at these intermediate points because they might interfere with replenishing the magazines, as will be explained presently. The absence of intermediate notches necessitates the pawl remaining displaced with respect to the tail, with consequent compression of spring 74, but this is of no consequence. The portions of the perimeter of the carrier intermediate the notches 71 are made slightly spiral, so as to make the wall at the far side of each notch somewhat higher than the wall at the near side. This high far wall serves as a stop in the event that the machine is operated too rapidly, preventing the possibility of the carrier over rotating.

When the caretaker comes to renew the supply of cups he may find the supply entirely exhausted, even in the main magazine 28, and find the carrier in one of the intermediate positions; i. e., with no auxiliary magazine in place over the main magazine. In such case he has only to turn the carrier around by hand one-eighth of a revolution when it will be stopped by the pawl 70 dropping into one of the notches 71, and he is enabled to do this by reason of the fact that there are no intermediate notches.

Replenishment of the magazines is a very

simple operation. If the main magazine is empty the caretaker simply drops a stack of cups into the auxiliary magazine above it, which will drop clear through to the cup dispensing device. It is immaterial which auxiliary is above the main magazine at the time this is done, as they are all alike. The main magazine may be partly full, or it may be quite full and the stock extend up into the auxiliary magazine above it. He simply fills all of the auxiliary magazines to the top and that is all he needs to do. It is to be noted that the magazines are free from mechanism or any other encumbrance; there is nothing which might be overlooked or forgotten by the caretaker and later interfere with the operation of the machine.

In order to guard against injurious strains in case the cups should become jammed in the magazine, or if for any other reason the free movement of the carrier were impeded, I make the lever 43 in two parts, yieldingly connected. This will be understood by reference to Fig. 1, where the lower angular member of the lever, indicated by the numeral 80, is seen to be mounted on the same axis as the lever proper, 43. The connection between the parts 43 and 80 is made rigid in one direction by a lug 81 carried by the lower end of the former, bearing against the edge of the latter at 82, and the parts are yieldingly held in this position by a compression spring 83, one end of which is seated in the bottom of a pocket formed in member 80, and a rod 84 whose head bears on the outer end of a spring and passing through the spring, through the member 80 and lug 81, has a nut 85 screwed on its end, whereby the tension of the spring may be adjusted. If when the crank is returned to normal position the lever 43 were obstructed, the member 80 would be moved as usual, while the compression of the spring 83 allowed the lever 43 to remain stationary, thereby preventing injury to the mechanism. Although such an occurrence is very improbable unless the machine is out of order, a provision of this kind serves to prevent serious injury to the parts; furthermore, it is quite possible the obstruction of the lever 43 would prove to be only temporary, and that in the next or some subsequent operation of the crank the trouble would adjust itself and the machine go on operating without having failed to perform its ultimate duty. For example, if the trouble arose from failure of a new stack of cups to drop properly into the main magazine, the machine would still be in condition to sell a cup and drink to each customer without fail as long as any cups remained in the main magazine. So that from the time the trouble arises until it manifests itself to a customer the machine might make forty or fifty sales, and during all of this time there is the possi-

bility that the trouble may correct itself, or that it may be discovered and corrected by the caretaker. This is one of the advantages of replenishing the magazine before it has
5 been emptied.

The cups are sold from a compartment 90 (see Fig. 10), which is formed by a circular wall 91, circular doors 92, the upper base plate 26 and a bottom plate 93 (see also
10 Fig. 1). This part of the apparatus is well described in the above mentioned application and it is only necessary now to describe certain improvements in the mechanism for supporting and operating the doors. As before,
15 before, each door is carried by an upper and lower hinge arm 94, said arms being mounted to swing on a central rod 95, each arm having a rearward extension 96. The extensions of the upper arms are connected by a
20 pair of links 97, one end of each link being pivotally attached at 98 to one of the extensions, with the free ends of the links pivotally connected to each other at the knuckle 99, the links being of such length that when
25 the doors are together, in other words closed, the two links lie in a straight line, forming a toggle which prevents the doors being moved apart. This is clearly shown in Fig. 10, where it will readily be seen that any
30 attempt to open the doors would tend to swing the extensions 96 toward each other, which cannot be done while the links are in alignment. To open the doors it is necessary to break the toggle, i. e., to move the knuckle
35 99 away from a straight line drawn from one center 98 to the other, and by drawing the knuckle away from the door axis 95 the extensions are swung toward each other, swinging the doors apart, as is shown in
40 dotted lines in Fig. 10. The lower arms are similarly connected, and in order to obtain a simultaneous operation of both pairs of links I have used as pivots 99 tenons formed on the ends of a vertical bar 100, and operate
45 the doors by moving the bar backward or forward by mechanism now to be described.

A lever 101 is pivoted at 102 to the upper base 26 and is drawn toward the axis of the
50 doors by a spring 103. The lever is connected to the bar 100 by a link 104, that is pivotally attached to the bar and has a slot 105 through which the lever passes. The link is kept in its proper position on the
55 lever by pins 106. A cam 107, rigidly secured to the shaft 40, engages a roller 108 mounted on the lever 101 and swings the lever away from the axis of the doors on the initial or counter-clockwise movement of
60 the crank 29; this draws the bar 100 to the rear of the machine and opens the doors. As soon as the crank is returned to its normal position, removing the cam 107 from the path of the roller 108, the spring 103 tends
65 to draw the lever forward and close the door.

But the lever is then restrained by the retaining pawl 109, mounted on the base 25, and a pin 110 carried by the lower end of the lever, engaging the pawl until after the cup,
70 which has been set on the bottom of the compartment to be filled with beverage as the crank is returned, is removed from the compartment. As the mechanism for this purpose is fully shown and described in my application, Serial No. 241,131, and does not
75 form part of the present invention, further reference to it is not necessary. It will be seen that by a single connection to the lever the doors are opened and closed quite as effectively as in my earlier construction, in
80 which each pair of hinge arms was connected to the lever by a separate link. The advantage of the present arrangement is that the upper and lower hinge arms may now be alike, the links also may be the same, and it is less trouble to assemble the parts than
85 before.

As in my previous machine, the liquid is drawn from a reservoir located below the base plate with a pump operated by the
90 crank. For this purpose I mount a gear 120 on the shaft 40, with which is enmeshed a rack 121; connected to the lower end of the rack is the piston rod 122 of the pump 123, shown in Fig. 11, which figure is to be
95 treated as part of Fig. 1. It is not necessary to describe the pump further than to say that it is rigidly attached to the lower side of the base plate 25, and that it is so constructed that its cylinder fills with liquid
100 on the counter-clockwise movement of the crank, which liquid is discharged into a cup which has been set on the bottom 93 of the compartment, on the return of the crank to normal position. The base plate is supported
105 on lugs 124 secured to the upper inside wall of the ice chamber 125, which constitutes the main support or body of the machine. The operating mechanism above the base 25 is covered by a casing or hood 126,
110 while the portion of the base outside of the hood is covered by an insulated cover 127, preferably made in two parts as in my former machine. The beverage is contained in a suitable reservoir 128 set down in the ice
115 chamber 125, the space outside of the reservoir being filled with broken ice. In order to clean the various parts, particularly the reservoir, it is necessary to remove the cover and lift off the base plate 25, the pump, of
120 course, coming with the plate. In order to protect the pump and also to afford an opportunity to work on the mechanism when it is not in place on the machine, I provide the base with three or more legs 129, that
125 project slightly farther than the pump on which to stand the base. When in place in the machine these legs extend down in the space reserved for ice, so that even if the legs have become soiled when standing on
130

the floor or elsewhere they are not put in the reservoir, with the possibility of contaminating its contents. On the other hand, the legs keep the pump from contact with the floor and possible soilure.

I will now describe the mechanism for dispensing cups, but wish to preface the description by saying that the present device embodies the broadly new principle which was employed in the machine disclosed in the application mentioned above; namely, that of placing the lower end of a stack of nested cups accessible to the customer and securing the cup next to the lower one, while leaving the lower one free to be detached from the stack by the customer. This principle is entirely different from that employed in any other cup vending or dispensing device, in that the lower cup is not separated from the stack mechanically. It is left attached to the stack by friction, and possibly some adhesion, and the customer has simply to overcome these in removing the cup. The magazine 28 is supported by a plate 135, which in turn is carried by four sleeves 136 that rest on the upper base 26. Screws 137, that pass through the plate 135, sleeves 136 and screw into the base 26, hold the magazine firmly in place. Each of the sleeves acts as a journal for a roller 138, these rollers being arranged around and serving as a guide or bearing for and oscillatory operating ring 139, which is a simple annulus with a short arm 140 extending from one side. The operating ring is interposed between two expansible rings, each comprising a series of flat segmental elements 141. Each segment has two slots punched in it, comprising a part 142 which is concentric to the axis of the operating ring, and a part 143 that is eccentric to said axis, and the operating ring carries studs 144 that play in these slots. The slots of the upper and lower segments are preferably just alike, but by inverting the segments of one series they are made to act reciprocally; that is, when one group of studs 144 is playing in the concentric part of the slots in one series of segments the other group of studs is playing in the eccentric part of the slots in the other series of segments, and vice versa. The result of this arrangement is that during the first half of a movement of the operating ring in a given direction one series of segments is stationary, the studs moving in the concentric part of its slots, while the other series of segments is being moved radially by reason of the studs on the operating ring moving in the eccentric part of its slots. During the remainder of the movement of the operating ring the segments of the first series are moved, while those of the second series remain stationary. The relation of the concentric and eccentric parts of the slots

is such that when the studs 144 are in the concentric part of the slots the ring formed by these segments is in a state of contraction; also, when the operating ring is midway between the extremities of its range of movement, both rings are contracted. I will now describe the mechanism for operating the cup dispensing device.

In my former machine I rotated the operating ring in one direction during the counter-clockwise motion of the crank and in the opposite direction upon the return of the crank. In my present mechanism the operating ring is oscillated once during the counter-clockwise movement of the crank and remains stationary during the return of the crank. For this purpose I mount an arm 150 on a rock shaft 151 and connect the arm to the arm 140 of the operating ring by a link or rod 152. Secured to arm 150, or to the rock shaft is an arm 153, to which is pivotally attached a bifurcated pawl or lever 154. In a hub secured on the end of shaft 40 I set a stud 155, its axis parallel but offset with reference to the axis of the shaft, and forming in effect a crank or wrist pin on the end of the shaft. When the parts are in normal position, as in Fig. 1, this stud lies in the slot 156 formed in the lever 154. A flat spring 157 secured to the arm 150 keeps the lever 154 pressed gently against the hub that carries the stud 155. During the early part of the movement of the crank the stud 155, moving in an arc, rocks the lever 154 to the right, the arm 150 being simultaneously rocked to the right. Because of the stud traversing an arcual path it presently reverses the direction of movement of the lever 154 and then rocks it to the left, finally returning it to its normal position as the stud passes the upper extremity of the long tine of the fork, further movement of the stud having no effect on the lever. On the return movement of the stud it passes the end of the long tine without moving the lever and presently reaches the end of the short tine. The end of the short tine is beveled, as is indicated by a dotted line, and when the stud engages this bevel the lever is swung on its pivot, allowing the stud to continue on its way. When the stud reaches the position shown in Fig. 1, the lever 155 is thrown back to its normal position by the spring 157 and the parts are once more in normal position. At one point the slot 156 is broadened by cutting away the short tine. This permits a limited movement of the crank 29 without disturbing the lever 154; it also leaves plenty of room for the stud to enter the slot on the return of the crank. If through wearing of the parts, or for any other reason, the lever has not been moved quite to its normal position during the first movement of the crank, the stud will engage

the left hand wall of the slot and move the lever to its right position as the crank reaches home.

Thus a complete cycle of the cup dispensing mechanism is effected during the first half of a cycle of the crank. That is, beginning with the parts as they are in Fig. 1, the upper ring of segments 141 being contracted, as in Figs. 6 and 7, (1) the lower ring is contracted; (2) the upper ring is expanded; (3) the upper ring is contracted, and (4) the lower ring expanded. The cups I use are made of paper and have an outwardly extending flange at their upper edge. Being smaller at their lower than their upper end the cups "nest," and with the exception of the bottom cup, which is wholly exposed, there is nothing but the flange and a small portion of the body of each cup exposed. This will be understood by looking at the portion of the stack of cups that is seen protruding from the vertical slit in the front of magazine 28. It will be noted that the auxiliary magazines also have vertical slits in one side to show the cups within. Assuming the machine to contain a supply of cups, and the parts to be in normal position, the stack of cups in magazine 28 will be supported by the upper ring of the cup dispenser. The contraction of the lower ring prepares it for supporting the stack of cups, and upon the expansion of the upper ring, the stack drops till the flange on the lower cup comes to rest on the lower ring. In the third stage of the cycle the upper ring is contracted around the exposed part of the second cup; then when the lower ring is expanded the stack again depends upon the upper ring for support. The cup device is so positioned on the upper base 26 that the lower end of the stack of cups hangs in the compartment 90, the base 26 having an aperture which permits this. The door having opened during the operation of the cup mechanism, the customer is now enabled to reach into the compartment, grasp the cup and pull it loose from the next cup, to which it is attached by friction and possibly some adhesion. But since the upper ring is contracted around the body of the next cup he cannot detach it, as the flange will not pass through the contracted ring.

In the machine disclosed in my former application previously referred to, I relied entirely on the flange on the cup to prevent more than one cup being taken. The present cup dispensing device may be arranged to act in this same way, but I have devised an improvement which consists in making the upper ring of such diameter that when contracted it will grip the body of the second cup and not rely on the flange to prevent the cup being removed. The manner of doing this is illustrated in Fig. 8, which is a composite view of the upper and lower sector,

141. The upper sector is made like the full line portion of the figure, the circle formed by the four arcual edges that confront the cup being small enough to grip the cup. The dotted arc, having a slightly longer radius than the other, shows the position of the confronting edge of the lower sector when the ring is contracted, it being of such diameter as not to grip the body but support the stack by affording a rest for the flange of the lower cup. In some cases it may be desirable to serrate the gripping edge of the upper sectors, as in Fig. 9.

There are two principal advantages in gripping the stack; (1) it facilitates the removal of the lower cup, and (2) it makes removal of the second cup practically impossible without destroying the cup. In warm weather, or when the machine is in a warm place, the paraffin with which the cups are coated is apt to get a little soft and make the cups stick together. In such cases it is easier to loosen the lower cup if the stack is not free to move. If the stack is securely gripped, the customer may apply a rotary strain on the cup, which is very effective for detaching it. With the present method of operating the cup device the stack remains in the grip of the upper ring when the crank returns to its home position, so that even if the customer holds the door open he does not have an opportunity to pull on a cup when it is protected by its flange only, as was the case in my former machine. To prevent his holding the door open and attempting to extract cups during the next operation, when the crank has reached the point in its movement at which the lower ring is supporting the stack and the upper ring is expanded, I provide mechanism which prevents re-operation of the machine till after the door has closed. This mechanism will now be described.

On a fixed center 160 I loosely mount a lever 161 which has a stud 162 projecting laterally from its lower end into the path of the vertical bar 100 that connects the door toggles together. One extremity of the concentric 41 terminates at the cam 42, as described; the other extremity of this concentric terminates in a radial face 163. The lever 161 is adapted to swing by gravity so that its upper end gets under this face 163, and acts as a lock to prevent the crank 29 rotating. The parts are so proportioned that when the door is quite closed the bar 100 bearing against the stud 162 will hold the upper end of the lever 161 out of the path of the concentric 41. This is the normal condition and is shown in Fig. 1. When the crank is operated the concentric 41 rotates with the shaft 40, counterclockwise; the cam 45 is so positioned on the shaft that it does not engage the roller 108 and start to open the door till the stack of cups has

been gripped by the upper ring, in the fourth stage of the cup dispenser cycle. When the door starts to open, the lever 161, being released from restraint by the bar 100, rocks by gravity till its upper end lies against the concentric 41. It is thus ready to drop under the face 163 as soon as the crank reaches home, and there is no way to dislodge it except to allow the door to close. So the machine is locked till the door has closed.

Although I have shown the cup device with four segments in each ring, this number is not essential. It may be made with three, five or more segments in each ring. The present cup device embodies a principle that was employed in my former device, which is the encircling of the cups by members having the contour of the parts they encircle, and moving to and from the cup in paths which if extended would lead through the sides of the cups. This permits of considerable pressure being applied for the purpose of gripping the cups, and also permits of the gripping faces being serrated without danger of cutting or abrading the cups. With cups of the kind I prefer to use, the distance between the lips of the adjacent cups will be from one-eighteenth to one-twenty-fifth of the height of a single cup, according to size of cup used, from which it follows that to cut a stack in two it would be necessary to cut through from eighteen to twenty-five cups. It follows, therefore, that there are from eighteen to twenty-five circular thicknesses of paper, one within the other and in close contact, to sustain the pressure of the segments against the cup that is being gripped. This, coupled with the fact that the gripping members encircle the cup, makes it possible, notwithstanding the cups are only paper, to grip them as though they were in a vice, without any danger of the cups collapsing. The friction of the studs 144 in the slots tends to move the segments tangentially, this thrust being sustained by the rollers 135. As the operating ring bears against certain of the rollers, according to the direction in which it is being moved, and tends to rotate them, there is some slipping of parts in contact with each other. While the friction thus encountered is negligible, it may be eliminated by making each roller in three parts; i. e., three separate rollers, one in a plane of each segment and one in the plane of the operating ring. Other changes in the structure of the cup device or other parts of my machine, may be made without departing from the scope or intent of the claims.

Having shown and described the preferred embodiment of my invention, I claim the following:

1. In a dispensing device, a tubular magazine adapted to accommodate a stack of

nested cups, a dispensing mechanism at one end thereof whereby the cups are dispensed one at a time; a revoluble carrier containing a plurality of auxiliary magazines adapted to register with the dispensing magazine successively as the carrier rotates; an operating element whereby the dispensing means is actuated, a ratchet wheel on said carrier, a lever connected to and rocked by the operating element each time it is actuated, a pawl carried by said lever and adapted to engage the ratchet wheel and rotate it intermittently, and an arm carried by the pawl, adapted to engage the cups in the dispensing magazine and prevent the pawl engaging the ratchet wheel, until by its diminution in size the stack is removed from the path of the arm.

2. In a dispensing device, a tubular magazine adapted to accommodate a vertical stack of nested cups, a dispensing mechanism at the bottom thereof whereby cups are dispensed one at a time; a revoluble carrier containing a plurality of auxiliary tubular magazines, open at their lower ends, a plate below the magazine, in which cups in the tubes may rest and slide as the magazine rotates, said plate having an opening registering with the dispensing magazine, through which the auxiliary stacks of cups drop as the tubes come successively into registration with the dispensing magazine; and means for bringing said tubes successively into registration with the dispensing magazine, comprising a ratchet wheel on said carrier, a lever connected to and rocked by the operating element each time it is actuated, a pawl carried by said lever and adapted to engage the ratchet wheel and rotate it intermittently, and an arm carried by the pawl, adapted to engage the cups in the dispensing magazine and prevent the pawl engaging the ratchet wheel, until by its diminution in size the stack is removed from the path of the arm.

3. In a dispensing device, a revoluble carrier supporting a plurality of auxiliary magazines, a ratchet wheel on said carrier, a pawl mounted on a lever and adapted to rotate the carrier step by step as the arm is oscillated; a shaft, a cam thereon, a lever rocked by said cam when the shaft is rotated, a connection between said lever and the pawl-carrying lever, whereby the latter is rocked and the pawl made to move the carrier, a stop pawl, notches on the carrier adapted to receive said pawl, the pawl thereby stopping the carrier at the point where the propelling pawl ceases to move the carrier, the carrier being then locked against rotation in either direction; and means, comprising a spring, whereby the stop pawl is moved to enter the notches.

4. In a dispensing device, a dispensing magazine, means for dispensing articles

therefrom, an operating element whereby said means is actuated; an auxiliary magazine, and means operated by said operating element for moving the auxiliary magazine into a position where its contents can be transferred to the dispensing magazine, said means comprising a medium adapted to temporarily yield and thereby avoid abnormal strain being put on the parts of the device in case of some disarrangement of the device or its contents.

5. In a cup vending device, two expansible rings arranged one above the other, each adapted, when contracted, to support a stack of nested cups, and when expanded to allow the cups to pass through it; an operating element whereby said rings are expanded and contracted alternately and reciprocally; a magazine to contain the cups and guide them to the rings; auxiliary magazines adapted, when brought into the proper relationship therewith to discharge their contents into the main magazine; and means actuated by said operating element for bringing the auxiliary magazine successively into the required relationship with the main magazine.

6. In a cup dispensing device, two expansible rings arranged one above the other, each adapted when contracted to encircle a cup and support it; the lower one, when contracted, having a diameter small enough to support the cup by affording a rest for the flange or lip that surrounds the upper edge of the cup, the upper ring having a smaller diameter than the lower one, so that when contracted it will grip the cup below the lip and thereby support it; the rings being spaced apart a distance such that when two or more nested cups are supported by the lip of the lower one resting on the lower ring, the upper ring will be in a position to close in and grip the second cup, below its lip; and means for expanding and contracting the rings.

7. In a cup dispensing device, two expansible rings arranged one above the other, each adapted when contracted to encircle a cup and support it; the lower one, when contracted, having a diameter small enough to support the cup by affording a rest for the flange or lip that surrounds the upper edge of the cup, the upper ring having a smaller diameter than the lower one, so that when contracted it will grip the cup below the lip and thereby support it; the gripping surfaces being serrated so as to increase their gripping power; the rings being spaced apart a distance such that when two or more nested cups are supported by the lip of the lower one resting on the lower ring, the upper ring will be in a position to close in and grip the second cup, below its lip; and means for expanding and contracting the rings.

8. In a cup dispensing device, a series of flat segmental plates arranged in a circle and adapted to move radially in or out, said plates having eccentrically disposed slots; an operating ring adapted to oscillate on an axis substantially co-incident with that of the aforesaid circle, and having studs which extend into the slots in the plates, whereby the plates are moved in or out when the ring is oscillated.

9. In a cup dispensing device, two circular series of flat segmental plates, arranged one above the other, with an operating ring between them and adapted to oscillate on its own axis, which axis substantially co-incides with the axis of said series of plates; each plate having slots that for a portion of their lengths are concentric to said axis and for the remainder of their extent eccentric thereto, the operating ring carrying studs which extend into said slots, so that as the ring is oscillated the segments will be moved radially or remain stationary, according to whether the studs are operating in the concentric or eccentric parts of the slots; the formation of the slots being so correlated that when studs are working in the concentric part of the slots in one series of plates, other studs will be operating in the eccentric portions of the slots in the other series of plates, and vice versa.

10. In a cup dispensing device, two series of flat segmental plates, arranged one above the other with an operating ring between them, adapted to oscillate on its own axis, which axis substantially co-incides with the axis of said series of plates; guide rollers surrounding said operating ring, the aforesaid plates lying between said rollers and abutting them end on; each of said plates having two slots to accommodate studs projecting from the operating ring, a portion of each slot being concentric to the axis of the ring, with the remainder of the slot eccentric thereto, whereby the plates are moved radially in or out, or remain stationary as the ring is oscillated, according to whether the studs are operating in eccentric or concentric portions of the slots, the eccentric portions of the slots in one series of plates being opposite in direction to those in the other series, so that when one series is being moved by the ring the other series is stationary, and vice versa.

11. In a vending machine, in combination: a compartment having a door; means for mounting a stack of nested cups so that a customer may, by inserting his hand in the compartment, grasp the lower cup and remove it from the stack; devices whereby the stack is gripped at a point which does not include the lower cup, leaving the lower cup free to be detached from the stack but securing the remainder against removal; means for operating the gripping devices, whereby

to release the stack and grip it at a point which leaves the bottom cup free; means for opening the door after the stack has become regripped and means to prevent operation of the gripping devices till after the door has been closed.

12. In a vending machine, in combination: a compartment having a door; means for mounting a stack of nested cups so that a customer may, by inserting his hand in the compartment, grasp the lower cup and separate it from the stack; devices whereby the stack is gripped at a point above the bottom cup, leaving the bottom cup free to be removed but securing the remainder against removal; an operating element, means operated thereby for opening the door during part of the cycle of said element, means also operated by said element for operating said gripping devices during an earlier part of said cycle, whereby to release the stack and grip it at a point which leaves the bottom cup free, and means to prevent the operating element beginning a new cycle before the door is closed.

13. In a vending machine, in combination: a compartment having a door; means for supporting a plurality of cups in the compartment where they are accessible to the customer's hand and removable from the compartment one at a time; means for securing all but one of the cups so that they cannot be removed from the compartment, but leaving that one free to be removed; means for opening the door, means for freeing a new cup after the previously freed one has been removed, and means for preventing the operation of the last mentioned means until after the door has been closed.

14. In a vending machine, in combination: a compartment having a door; means for mounting a stack of nested cups therein so that a customer may, by inserting his hand, grasp the lower cup and remove it from the stack; said means consisting of two expansible rings, one above the other, the upper one adapted to tightly encircle the exposed part of the second cup, thereby holding the stack firmly while leaving the bottom cup free to be detached, the lower one being adapted to

encircle the cups loosely but afford a support for the lip formed on the upper edge of the cups; an operating element, means operated thereby, whereby the lower ring is contracted, the upper one expanded, allowing the stack to drop till the lip of the bottom cup rests on the lower ring, the upper ring then contracted so as to grip the exposed part of the second cup, and finally the lower one expanded, so that the lower cup can be detached by hand from the stack; means then operated by the operating element for opening the door, and means which prevents the subsequent operation of the ring mechanism till after the door has been closed.

15. In a vending machine, in combination: a compartment having a door; means for mounting a stack of nested cups therein so that a customer may, by inserting his hand, grasp the lower cup and remove it from the stack; said means consisting of two expansible rings, one above the other, the upper one adapted to tightly encircle the exposed part of the second cup, thereby holding the stack firmly while leaving the bottom cup free to be detached, the lower one being adapted to encircle the cups loosely but afford a support for the lip formed on the upper edge of the cups; a reciprocal member which when moved from normal position first contracts the lower ring and then expands the upper ring, and on its return to normal position contracts the upper ring and then expands the lower one; an oscillatory shaft carrying a wrist pin, a lever connected to said wrist in such way as to be rocked to and fro by approximately one-half of a revolution of the shaft, means for disconnecting the wrist from the lever so that on the return of the shaft the lever is not rocked, and a connection between the lever and said reciprocal member; means for opening the door after the cycle of the lever is completed, and means controlled by the door, whereby the shaft is prevented from again rocking the lever till after the door has been closed.

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