

Dec. 30, 1947.

H. CAREW

2,433,736

DISPENSING APPARATUS

Filed Sept. 16, 1943

2 Sheets-Sheet 1

FIG. 1.

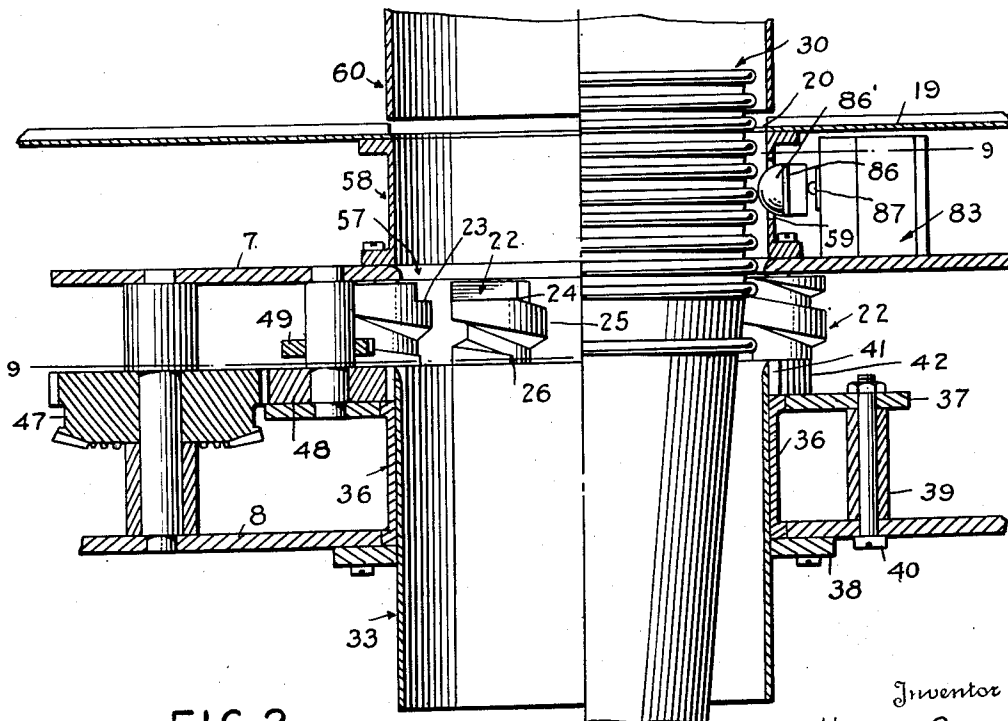
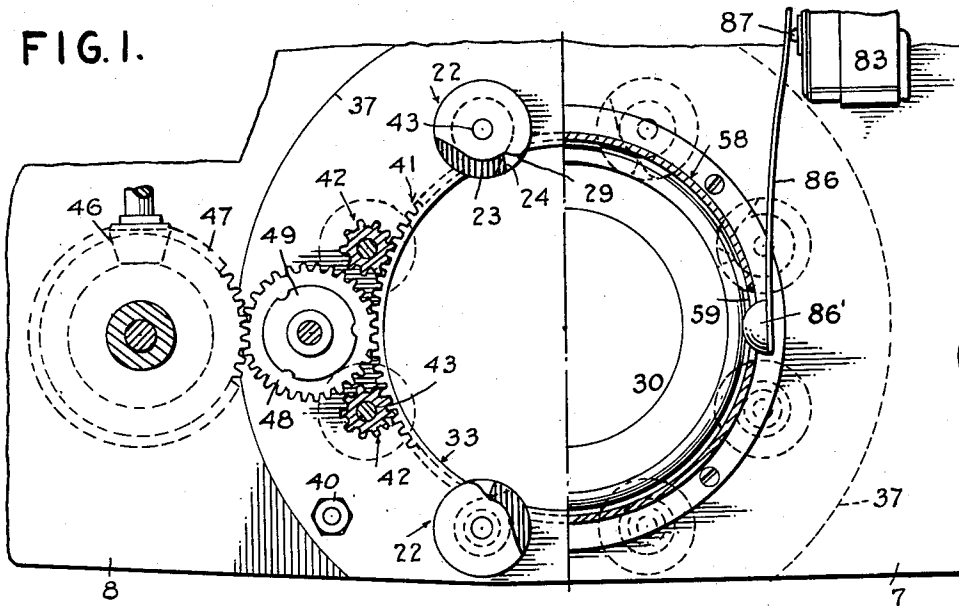


FIG. 2.

Inventor
HERMAN CAREW

334 *Milans Milans*

Attorneys

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H. CAREW

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FIG. 11.

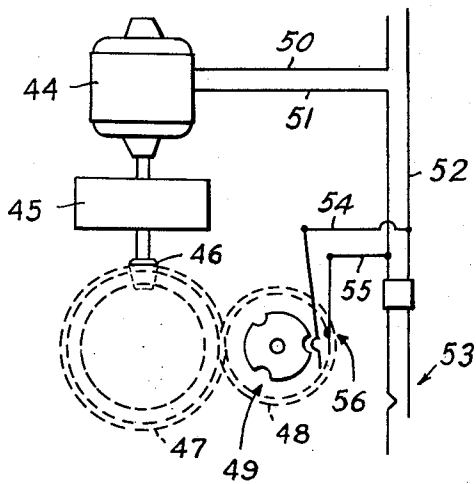


FIG. 3.

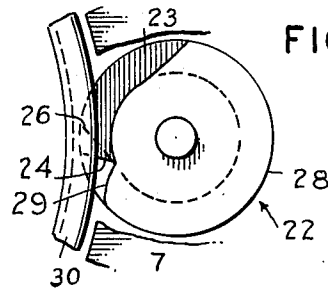


FIG. 4.

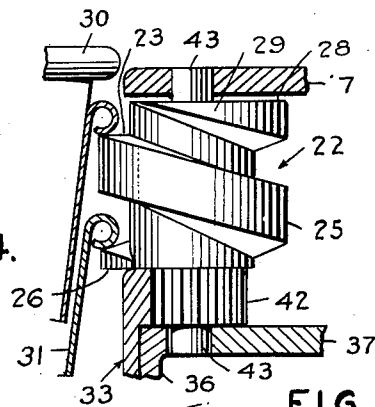


FIG. 9.

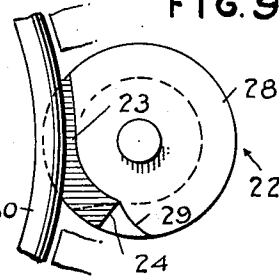


FIG. 5.

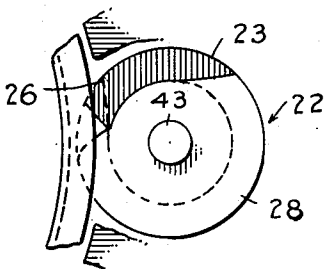


FIG. 7.

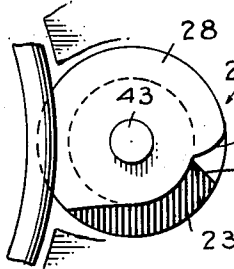


FIG. 6.

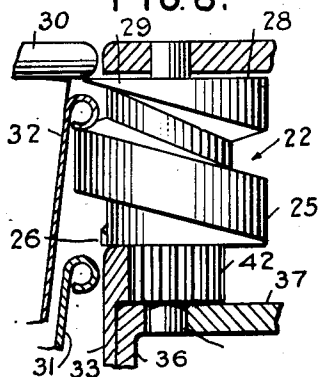


FIG. 8.

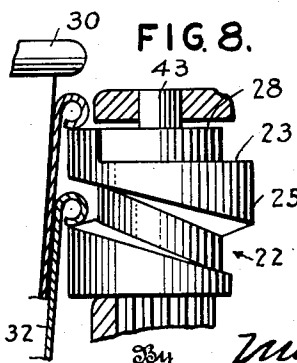
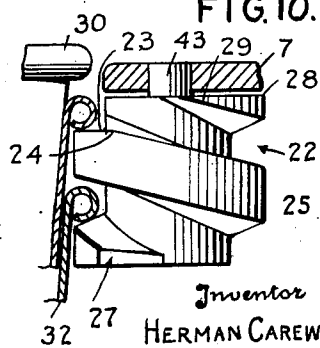


FIG. 10.



Inventor
HERMAN CAREW

Milano Milano

Attorneys

UNITED STATES PATENT OFFICE

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DISPENSING APPARATUS

Herman Carew, Easton, Pa., assignor to Dixie Cup Company, Chicago, Ill., a corporation of Delaware

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5 Claims. (Cl. 312-44)

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This invention relates to improvements in dispensing apparatus, more particularly of the type involving mechanism for removing and delivering a cup (usually paper) from a stack into operative position to receive the contents, as a drink or semi-fluid confection intended to be supplied from a given machine.

Machines possessing the general characteristics, just recited, and intended to meet the demands of trade, have seriously lacked the rapidity of operation required for speedy service, one of the handicaps being the lack of provision of any means in the art for insuring an immediate liberation of a cup from a stack and presentation of such a cup in position to receive the drink at the instant of its discharge which would usually be under pressure. The delay in operation is primarily the lapse of time occurring while removing a cup from its stack and getting the removed cup in position to properly receive the material to be discharged into the cup in a given operation of the machine, resulting in the waste of drink material discharged before the cup arrives at the receiving position.

Another factor in the feeding of a cup from a stack is that in many instances the cup is of a waterproof character, as paraffined, and the adjoining nested cups either by the adherence of the surfaces of the cups together, or by suction, or both, at times becomes stuck together resulting in the delayed delivery of the terminal cup or the feed of several cups, when one cup is intended, or creating a jam in the delivery mechanism and consequently the impairment of the cups. Retardation by suction, or otherwise, is a serious disadvantage in the delivery of a cup from a stack, in drink dispensing apparatus, so that it is altogether desirable to have a positive separation of the cup intended to be expelled or delivered from the remaining cups in the stack. My invention contemplates novel cup-dispensing mechanism for accomplishing this, two striking improvements being involved, to wit: (1) the forced separation of the cups (they are customarily tapered and nested) from each other to provide a free space entirely surrounding the innermost cup and thereby break any vacuum or original tendency to keep the cups from separating as well as, (2) permitting suspension or holding of the lowermost, but spaced cup, in position for instant or free drop away from the stack without interference of suction, friction, or other retarding influence which would exist between the nested cups prior to the forced spacing thereof referred to.

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The feature of my invention, last generally outlined, will find usefulness and be practical in what is sometimes styled a single cup dispenser, but it is particularly meritorious in connection with a drink dispensing apparatus wherein stacks or magazines of cups are contained and sold, one-by-one, with appropriate contents, and wherein the increased speed of operation is of most importance.

In the latter type of machines, they necessarily include mechanism in addition to the cup dispenser for delivering the drink to the cup, or the ingredients of the drink to the cup, as a syrup container, a water delivery means, suitable pump mechanism, etc., etc. all correlated in the combined machine to accomplish the single result, i. e., the furnishing of a cup, filling of the same, and the rendering of the filled cup accessible to the purchaser or operator without waste.

The preferred embodiment of the invention is illustrated in the accompanying drawings, forming a part hereof, and the same will be understood from the detailed description hereinafter contained, and in which other features of merit in arrangement and construction of parts of my apparatus will be specifically set forth.

In the drawings:

Fig. 1 is a detail view partly in section and partly in plan on approximately a line 9-9 of Fig. 2, including an illustration of the delivering cup stack container and its relationship to the control switch for the stacks advancing means.

Fig. 2 is a part elevation and part sectional view of the details as illustrated in Fig. 1.

Figures 3 and 4, 5 and 6, 7 and 8, and 9 and 10 are respectively pairs of views, in side elevation and top plan, illustrative of the parts of the cup separating and delivering means in their various relative positions during a cycle of cup separation and delivery.

Fig. 11 is a diagrammatic view illustrating the circuit employed in controlling the operation of the cup vending mechanism.

Forming a base or main support for the different parts of the cup dispensing apparatus are parallel plates 7 and 8 suitably spaced to receive therebetween mechanism including gearing and worms to be referred to. Thereabove is another plate 19 constituting a bottom over which a suitable magazine comprising upright cylindrical tubes 50, open at the bottom, may be moved with the bottoms of the lowermost cups of the stacks resting on the upper surface of said plate until aligned with an opening 20 through the plate, when the stacks of cups to be immediately dis-

pensed registers with dispensing means therebelow.

The cups are preferably of paper tapered and nested closely together in the respective stacks.

A plurality or series of cup carrying tubes as 60, and the mechanism for shifting the same, are disclosed in and constitutes subjects matter of divisional applications filed December 18, 1945, Serial Nos. 635,688 and 635,689.

My improved cup dispensing mechanism comprises, in the main, a circularly arranged series of cup dispensing worms 22, designed to release a cup from a cup holding station the instant the machine starts its cycle of operations and to effect delivery of another cup to the cup holding station for a succeeding cycle of machine operation. Near the top of each worm 22 is a horizontal shelf 23 extending approximately one-third around the worms, which normally supports a stack of nested cups from which individual cups are dispensed, and leading from this shelf, at a point 24, is a spiral thread 25 making one complete turn around the worm and terminating, at a point below the end of the shelf 23, into a point or projection 26 for supporting a cup to be dispensed. This projection is formed by cutting off the end of the thread abruptly, as clearly shown at 27, in Fig. 10. During the course of dispensing a cup, and the delivery of another cup to the cup holding station, the stack of cups is supported on the top surfaces 28 of the worms. This auxiliary supporting surface begins at a point where the support 23 terminates and extends approximately a distance of two-thirds around the worm. In order to separate the closely nested cups each worm is provided with a wedge 29 at the top thereof, which enters between the flanges of the lowermost cup of the stack and the next adjacent one, during the rotation of the worm, as clearly shown in Fig. 6. Figs. 4, 6, 8 and 10 clearly show the various positions taken by the cup during one cycle of machine operation. In Fig. 4 the stack of cups 30, being dispensed, is shown as supported on the shelf 23 and the cup 31 is retained on the point or projection 26. This is the position of the worms and the cups when the drink dispensing apparatus is at rest and Fig. 6 discloses the movements of the worms and the cups immediately after the drink dispensing apparatus has started to operate. In this view it is shown that the cup 31 was instantly released, cup 32 of the stack 30 starting on its way down the thread 25, the stack of cups being supported on the top surface 28 and the wedge 29 entering between the flanges of the lowermost cup of the stack 30 and cup 32. Fig. 8 illustrates the stack of cups being still supported by the surface 28 and that the cup 32 is on its way down to the point or projection 26, while Fig. 10 shows that the stack of cups 30 has left the surface 28 and has dropped down onto the shelf 23. At the end of a cycle of machine operation the worms and the cups will again be in the position shown in Fig. 4 ready for another cycle of operation.

As the cups are released by the cup dispensing mechanism may drop through a rotary sleeve 33, and are located, as desired, in appropriate relationship to drink-dispensing means, not shown. The rotating sleeve 33 is journaled in a bearing 36, mounted in apertures in the plate 8 and a ring 37, and further held in position by an end thrust bearing 38, secured to the plate 8. The ring 37 is supported on the plate 8 by means of the bushings 39 and bolts 40. At the upper end of the rotating sleeve 33, and integral therewith,

is a ring gear 41 forming the drive for the worms through the medium of the pinions 42, which may be either formed integrally with the worms or attached thereto. The worms are journaled on pins 43 which are secured in openings in the plates 7 and ring 37.

The drive for the cup dispensing mechanism comprises an electric motor 44 and a suitable train of gearing of the proper ratio to impart only one complete revolution to the worms 22 during one operation of the cup dispensing mechanism. In this instance the train of gearing includes, a set of reduction gears encased in a housing 45 and gears 46, 47, and 48, the latter gear being in mesh with the ring gear 41, formed integrally with the rotating sleeve 33, as clearly shown in Fig. 1 of the drawings. On the gear 48 is mounted a notched ring 49 for controlling the drive of the cup dispensing mechanism through one complete cycle of operation. A simple circuit for this control is shown in Fig. 11 of the drawings wherein conductors 50, 51 and 52 are connected to the electric motor 44 and the starting switch 53. Connected into this circuit, by conductors 54 and 55, is the control switch 56 operated by the notched ring 49. As this type of a control is in common use it is sufficient to say that on closing the circuit to the motor momentarily, by actuation of the switch 53, the notched ring 49 will be moved to such an extent as to close the control switch 56 for continuing the running of the electric motor. At the end of a cycle of operation of the machine the notched ring will have moved to such an extent as to bring one of its notches opposite the control switch so as to permit the opening of the circuit to the electric motor and stop the operation of the cup dispensing mechanism.

Directly above the cup dispensing mechanism, and registering with the opening 57 in the plate 7, is a guide sleeve 58 for directing the stacks of nested cups to the cup dispensing mechanism. This guide sleeve 58 is secured between the plate 7 and the bottom of the cup holder 19, in line with the opening 20 of the cup holder, and is provided with an aperture 59 for receiving the end of an operating arm of a control switch, to be later further described.

Suitable electric motor actuating means (not shown) is utilized to effect the shifting of the tubes 60 and contained cups and over the bottom plate 19 to bring a new stack of cups into registration with the opening 20 therein as the stack of cups in the aligned tube 60 nears exhaustion; and for controlling the time of starting and stopping the running of said motor, a switch 83 is placed in circuit with the motor, the switch being arranged adjacent to the stack of cups being dispensed.

This switch is of a type which will be closed when its operating lever 86 is out of contact with the switch button 87. The aperture 59, in the sleeve 58, receives the end of the switch lever 86 so that the same may be engaged by the cups within the sleeve. During the normal operation, when a sufficient number of cups are present at the dispensing station, the switch 83 is held open by contact of the cup flanges with the smooth round end 86' of the switch lever 86 and the motor remains inactive, but as the supply of cups are depleted and the flange of the uppermost cup of a stack passes below the end of the switch lever 86, the switch 83 will be permitted to close, setting the electric motor in motion, which results in the advancement of the stacks of cups by the carrier members and the placing of a fresh

stack of cups at the cup dispensing station and within the sleeve 58. As soon as the new stack of cups drops into position, permitted by the bottom opening 20, the switch 83 will again be opened due to the contact of the cup flanges with the end 86' of the switch lever 86.

The cup dispensing mechanism being designed so that a cup has been separated from the stack in a preceding cycle of operation, but is retained at a point permitting instantaneous release, is intended and thus designed for very rapid operation, compared to the separation and delivery of cups in prior machines of the type in view. The idea of providing a holding station for a cup which has been separated from the stack of cups being dispensed and mechanism insuring practical instant presentation of the cup to a filling means is believed to be fundamentally new in the art. The operation of this cup dispensing apparatus is as follows. When the switch 53 is closed, either by the depositing of a coin in the machine or manually operating the same (not necessary to be shown herein) the motor 44 is started and kept in operation by a control switch 56 operated by a notched ring 49, the cup dispensing mechanism having been placed in operation, the worms 22 immediately release the cup at the cup holding station to permit it to drop to the drink supply mechanism, the details of which are not shown herein. The quick release of the cup is due to the fact that it requires only the slightest amount of movement of the worms to withdraw the points or projections 26 from beneath the small flange of the cup. The worms continuing to rotate will separate another cup from the stack, held at the cup dispensing station, by the wedges 29, at the upper end of the worms. As the cup is separated from the stack it is deposited on the screw threads 25 and conveyed down to the points or projections 26, as herein termed the cup holding station. When the cup has reached this position, one cycle of operation of the drink dispensing apparatus has been completed and the notched ring 49 has moved to such an extent as to place one of its notches opposite the control switch 56, permitting the control switch to open the circuit to the electric motor 44. As the drink dispensing apparatus is continued in operation, the supply of cups of the stack, at the cup dispensing station, will be depleted and as soon as the topmost cup of the stack passes by the end of the switch lever 86 the circuit will be closed so as to set the motor into operation to advance the carrier members and deposit a new stack of cups at the cup dispensing station. As the new stack of cups drops into position the cup will immediately operate the switch lever 86 to open the circuit to the electric motor, stopping the same.

From the foregoing I believe that the principle and construction of the preferred embodiment of my invention will be fully apprehended, but it is to be further understood that the invention may be embodied in machines varying the detail and arrangement from that illustrated, without departing from the spirit of the invention and as embraced within the hereto appended claims.

I claim:

1. In a cup dispensing apparatus, a holder for a stack of nested cups having an opening in the bottom thereof, a cup dispensing mechanism axially aligned with the opening of said holder, comprising a plurality of circularly arranged cup delivery worms including a top horizontal surface providing an auxiliary support at the upper ends

for the stack of cups, step-down horizontal portions in the upper ends of the worms providing a normal support for the stack, means to separate the lowermost cup of the stack as said cup leaves the normal support, and downwardly extending conveying means of constant pitch leading from the normal support, the lower end of which forms a cup-holding station, means adapted to impart rotary unidirectional motion to the worms, and automatically operated control mechanism for automatically interrupting the operation of the rotating means when a cup has reached the holding station whereby immediately upon the next operation of the worm the cup at said holding station drops.

2. In a cup dispensing apparatus a holder for a stack of cups having an opening in the bottom thereof, a cup dispensing mechanism axially aligned with the opening in said holder, comprising a plurality of circularly arranged cup delivery worms, including a top horizontal surface providing an auxiliary support at the upper end for the stack of cups, step-down horizontal portions in the upper ends of the worms providing a normal support for the stack so that the stack of cups may drop from the auxiliary support onto the normal support, a downwardly extending conveying screw of constant pitch leading from the normal support making one complete turn around the worm, the lower end of which forms a cup-holding station, said conveying screw having means at the upper end of the worm to separate the lowermost cup of the stack as said cup leaves the normal support, means adapted to impart rotary unidirectional motion to the worms and automatically operated control means for automatically interrupting the operation of the cup dispensing mechanism when a cup has reached the holding station whereby immediately upon the next operation of the cup-dispensing mechanism the cup at said holding station drops.

3. In a machine of the character described, cup dispensing instrumentalities comprising rotatable worms and mechanism adapted to impart a rotary unidirectional motion to the worms whereby one cup may be instantly dropped and another placed in position for dropping at the start of a succeeding operation of the machine, including means on each worm adapted to engage the lip of the lowermost cup of a stack of nested cups to separate said cup from the stack and conduct the same to the lower end of the worm, the upper portion of the worm being formed with horizontal supporting surfaces so correlated that the remaining cups of the stack will be supported and ride upon one of said surfaces while the separated cup feeds from the other of said surfaces to the lower end of the worm in position to be dropped therefrom at the start of the next operation of the machine, in combination with automatically operated mechanism for automatically interrupting the rotation of the worm so that in the interval between the dropping of the first cup from the end of the worm and the next succeeding operation of the machine another cup will be conducted by the worm to the lower end thereof for similar instant dropping upon the next operation of the machine.

4. In a machine of the character described, a cup dispensing mechanism comprising a holder for a supply of cups, and automatically operated instrumentalities movable unidirectionally for initially removing a cup from said supply and for feeding the same to substantially a point of dropping therefrom, in combination with means for

automatically interrupting the operation of the feeding means when the cup has reached said point to support the cup for instant dropping at the start of repeated movement of said feeding means to similarly position another cup at said point.

5. In a machine of the character described cup dispensing instrumentalities including means for supporting a stack of cups, and mechanism co-operatively associated therewith for separating a cup from said stack and feeding the same to a holding station, including a plurality of worms of constant pitch the lower ends of which constitute said holding station, mean adapted to impart rotary unidirectional motion to the worms including automatically operated control means and for automatically interrupting the rotation thereof when one cup has reached said station whereby the cup will be supported for dropping at the start of continued rotation of the worms to similarly place another cup in said holding station.

HERMAN CAREW.

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