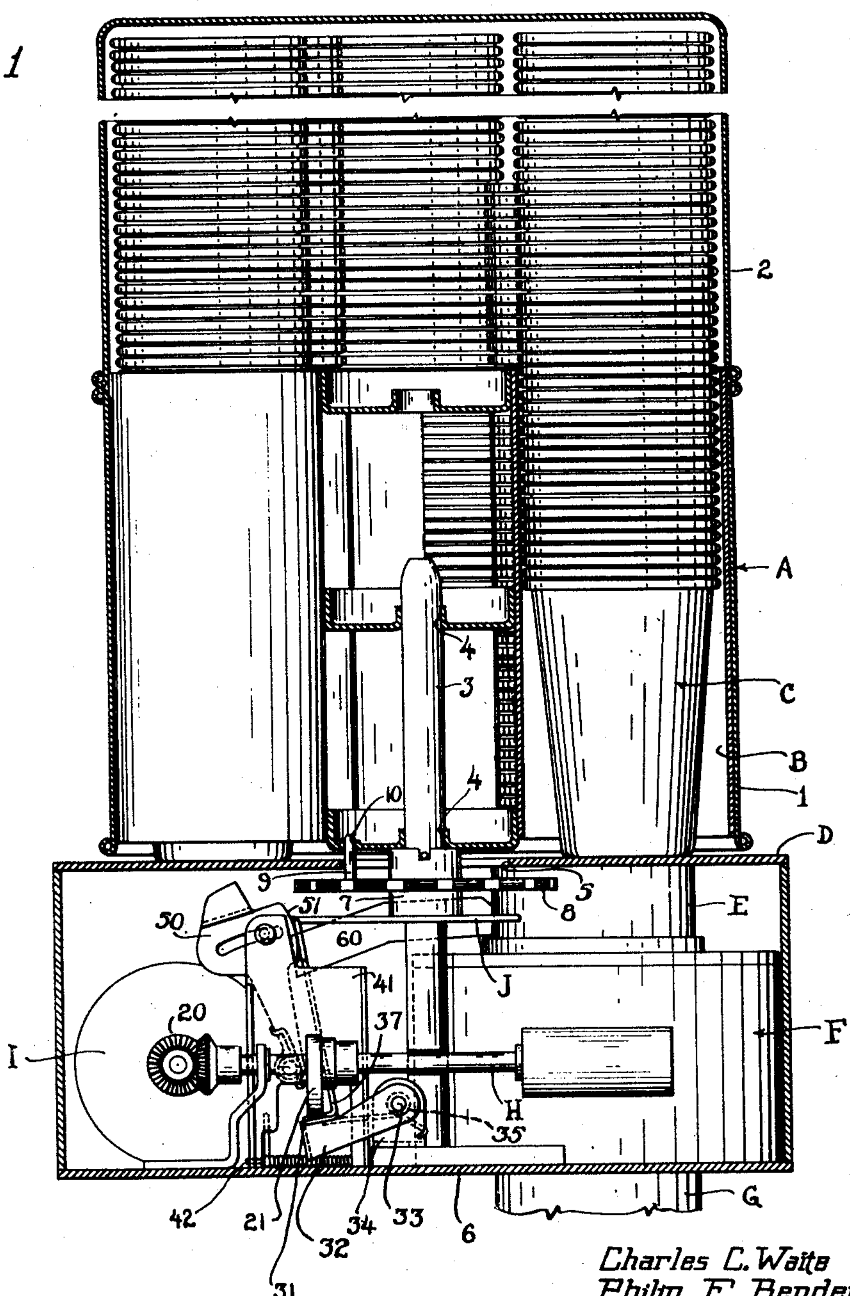
CUP DISPENSING MACHINE

Filed Sept. 10, 1946 3 Sheets-Sheet 1

Fig. 1



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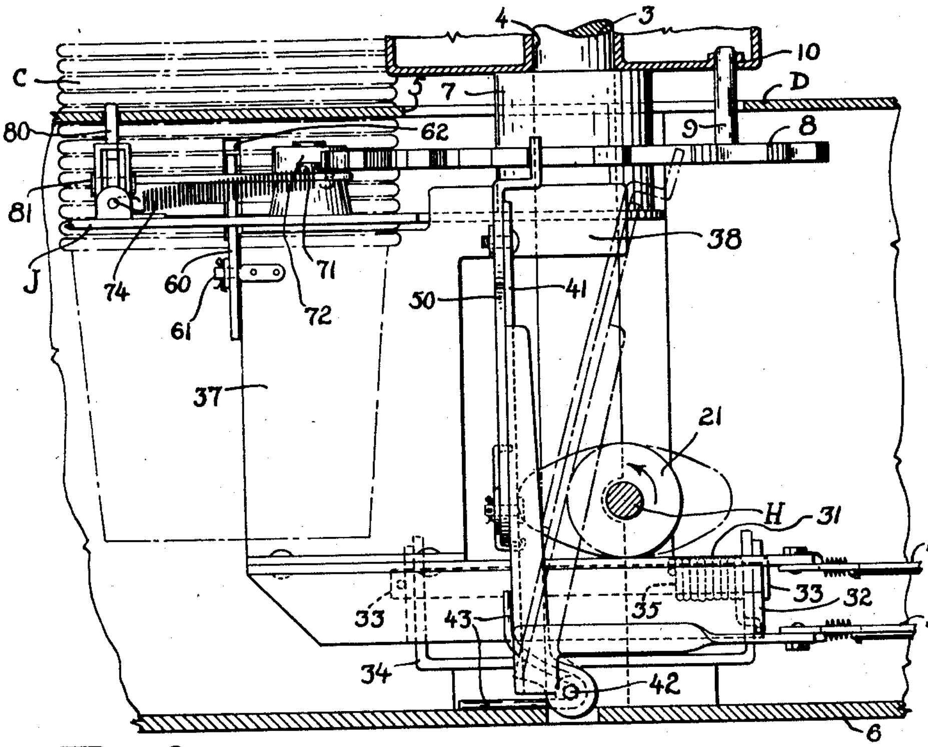

Fig. 2

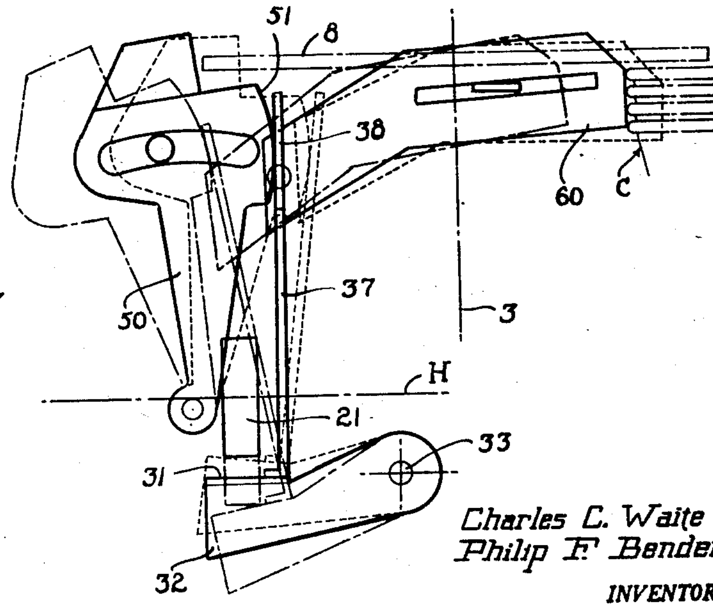

Fig. 3

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Fig. 4

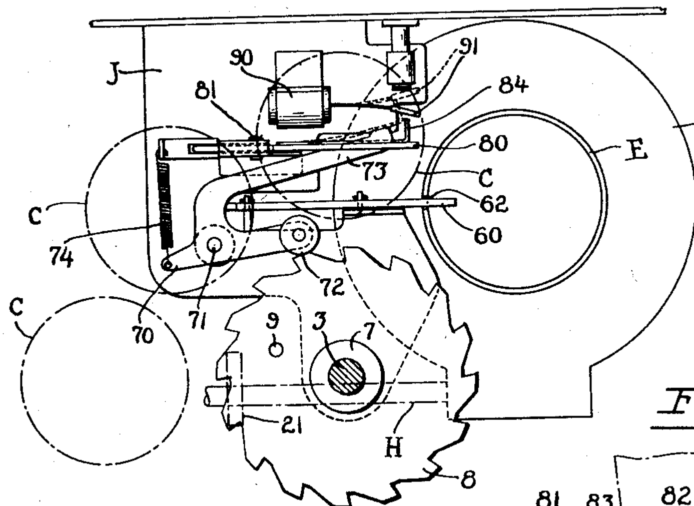


Fig. 6

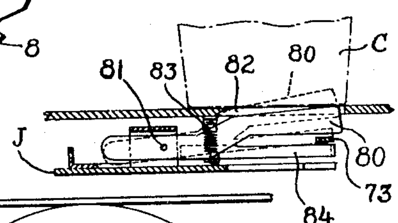
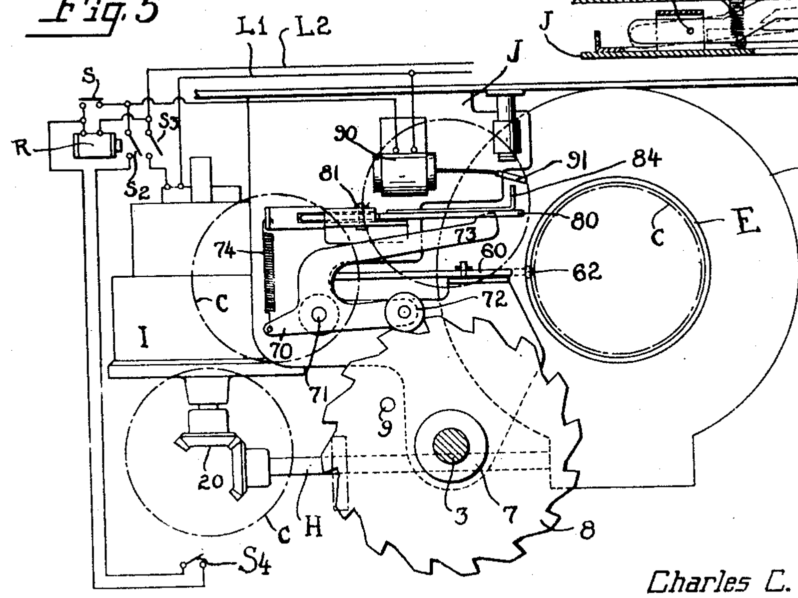


Fig. 5



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Patented Feb. 20, 1951 2,542,067

UNITED STATES PATENT OFFICE

2,542,067

CUP DISPENSING MACHINE

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Application September 10, 1946, Serial No. 695,836

6 Claims. (Cl. 312—44)

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The present invention relates to cup dispensing machines and more particularly to dispensing machines for use with automatic vending machines wherein a large supply of cups may be stored and dispensed without frequent servicing.

An object of the invention is to provide a dispensing machine of the type wherein a number of stacks of nested cups are stored in a rotatable turret, one of said stacks being in alignment with a dispensing mechanism of the usual type for dispensing the cups individually, rotation of the turret being controlled to insure that one of the reserve stacks will be brought into alignment with the dispensing mechanism as soon as the previous stack has been depleted.

A further object of the invention is to provide such a machine having a single operating motor for both the dispensing mechanism and the rotating means, and which will positively rotate and position the stacks with relation to the dispensing mechanism.

Another object of the invention is the provision of such a positively indexed rotatable turret device which will be rendered entirely inoperative upon exhaustion of the entire supply of cups and which may be associated with a drink dispensing machine or similar device in such manner as to assure that a cup will be provided upon each operation of the drink dispenser.

With these and still other objects which will appear in the foregoing full description in mind, the invention consists in the combinations and arrangements of parts and details of construction which will now first be fully described in connection with the accompanying drawing and will then be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a vertical section through a dispensing mechanism according to the present invention, showing the mechanical parts thereof in elevation;

Fig. 2 is a view, partly in section and partly in elevation, of the main operating elements of the device;

Fig. 3 is a diagrammatic view illustrating the three operative positions of the elements of the device;

Fig. 4 is a plan view of the cutout and signal mechanism incorporated in the device in operative position;

Fig. 5 is a plan view similar to Fig. 4 showing the cutout and signal mechanism in inoperative position and having the circuit diagram for the device annexed thereto; and

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Fig. 6 is a vertical section through the column supply detecting mechanism.

The circular turret structure A has incorporated therein a number of vertical compartments B each of which is adapted to receive and support a stack of nested drinking cups C. The compartments B are located concentrically about the axis of the turret A. The stacks of cups C rest, within the confines of the compartments B, upon a plate D, which also forms a cover for the operating mechanism. An opening in the plate D, having a diameter slightly larger than the diameter of the cups, receives a stack of cups C, feeding them to a dispensing mechanism F through a tube E, aligned therewith.

The dispensing mechanism F may be of any suitable type adapted to separate the bottom cup of a stack from the remainder of the cups and drop it through a conveying tube G for delivery to the user or to the filling device, when the dispenser is associated with an automatic drink vending machine. This dispensing device F forms no part of the present invention and is therefore not shown in detail.

The dispensing mechanism F is operated by a shaft H connected to an operating motor I. Upon each single complete rotation of the shaft H, the mechanism F delivers a single cup to the delivery tube G from the superimposed stack C. As one stack nears exhaustion the mechanism embodied in the present invention, described hereinafter, causes the turret to be rotated sufficiently to bring another stack into alignment with the opening in the plate D, through which the cups fall to the dispensing mechanism F. At such time as the stacks of cups in all the compartments B have been exhausted, the device is rendered entirely inoperative and a signal device energized to inform the user of that fact.

The turret A comprises two sections, 1 and 2, the lower section 1 forming a plurality of supporting and guiding compartments B, the divisions between the compartments being formed by curved sheet metal plates or other suitable means. The upper section 2 fits securely over the lower section 1 to protect and support the upper ends of the cup stack C, being easily removable for replenishing the supply of cups.

A post 3 centers the turret structure A, being inserted through axial bearings 4 in the lower section 1 thereof in such manner as to permit the turret to rotate thereon. The post 3 extends downwardly through a central opening 5 in the plate D and is secured to the bottom plate 6 of the entire structure. A collar 7 is attached to the post 3, within the opening 5, its upper end supporting the lower section 1 of the turret to maintain the same a short distance above the surface of plate D upon which the stacks of cups rest.

A ratchet member 8 having spaced teeth or notches is carried rotatably in a groove formed in the sleeve 7 and carries a pin 9 which extends upwardly therefrom, through the opening 5 and enters an opening 10 formed in the lower turret section 1. Thus, when the ratchet 8 is rotated, the turret likewise rotates to move the stacks of cups concentrically about the axial post 3.

The electric motor I is secured to the lower plate 6 for rotating the shaft H, either directly or through suitable gear members 20, upon energization. The shaft H carries a suitably shaped cam member 21 for rotation therewith.

The cam 21 acts upon a cam follower surface 31 carried by arms 32, journaled by a pivot pin 33 in brackets 34 mounted upon the base plate 6. A spring 35, coiled about the pivot pin 33 and having one end attached to the support 34 and its opposing end bearing against the lower surface of the cam follower surface 31, urges the latter constantly upward and against the periphery of cam 21. A control plate 37 is attached to a portion of, and extends upwardly at right angles to, the cam follower surface 31, being rocked therewith by the action of the cam 21 on the cam surface 31, as illustrated in Fig. 3 of the drawings. The pivotal movement of the control plate 37 is thus regulated and interrelated with the operation of the other elements of the mechanism by cam 21.

Cam 21 also coacts with the surface of an operating plate 41, the latter being pivotally attached for rocking movement upon the base plate 6 by means of the pivot pin 42. This plate 41 is also urged into constant contact with the cam 21 by a spring 43 mounted on the pivot pin 42, bearing against the surface of the plate 41 and the base plate 6. Pivotally mounted on the plate 41 is a pawl 50, spring biased and constantly urged toward the ratchet 8. The surface 51 of the pawl 50 is engaged by an extension 38 formed on the control plate 37, and the pivotal movement of pawl 50 is limited thereby.

A feeler arm 60, pivotally mounted upon pivot pin 61 at the rearward edge of the rocking control plate 37, moves within an opening or slot 62 formed in the tube E and associated structure of the dispensing mechanism F. The spring 35, acting upon the follower surface 31 and its attached plate 37 causes the feeler arm 60 attached to plate 37 to be urged toward the stack of cups being fed to the dispensing mechanism F. Contact of the feeler arm 60 with the cup stack will arrest its movement in the full line position of Fig. 3, consequently limiting the rocking movement of the control plate 37. Upon reduction of the number of cups in the feeding stack to three or four, or to a point below the feeler arm slot 62, the arm 60 is allowed to move farther toward the axis of the dispensing mechanism F (into the right hand broken line position of Fig. 3), so that the control plate 37 may rock to the full limit of its arc of rotation as determined by the cam 21 and cooperating cam surface 31. As a consequence, the pawl member 50, which previously had been held from engagement with the ratchet 8 by the extension 38 on the plate 37, engages the ratchet 8. The plate 41, on which the pawl 50 is mounted, being simultaneously rocked by the cam 21, moves the ratchet one step, thus rotating the turret A. Upon the next operation of the device the same result is effected, moving the ratchet one more step, sufficiently to revolve the turret to a point where another compartment B is located over the dispensing mechanism F and its feeding tube E, so that the stack of cups contained therein will fall through the opening in plate D to the dispensing mechanism F. Upon subsequent operation of the device, the new supply of cups, extending upwardly into the turret, will engage the feeler arm 60, preventing its full movement and subsequently limiting the movement of the pawl 50, so that the pawl 50 and ratchet 8 will not again engage until the new stack of cups has been depleted to a point below the slot 62, at which time the feeler arm 60 will make a full movement, allowing engagement of pawl 50 with ratchet 8 and subsequent rotation of the turret A, in two steps, to bring another stack of cups into feeding position.

As described above, upon each single rotation of shaft H and cam 21, all the component parts of the mechanism are set in motion, the limitation upon their full movement being determined by the number of cups in the feeding stack. Operation of the turret rotating means is effected before the feeding stack is fully exhausted, thus guaranteeing that the stack will be replenished before the last cup in the feeding stack is delivered.

A spring-biased indexing arrangement, coupled with a cut-out and signal means, is illustrated in Figures 4 and 5. The indexing lever 70 is pivotally mounted at 71 upon a supporting plate J, and carries a roller 72 thereon for engagement in the notches or teeth of the ratchet wheel 8. A spring 74 connected to the end of the lever 70 and to a projection on the plate J urges the roller 72 against the ratchet wheel 8. When the pawl 50 engages a tooth of the ratchet wheel 8 to rotate the same, the roller 72 is tripped out of a notch thereof. As below described, the resulting movement of the indexing lever 70 is utilized for controlling the mechanism. The pawl member 50 having rotated the ratchet wheel 8 a predetermined distance, approximately equal to the arcuate distance between the teeth or notches on the wheel 8, releases the ratchet wheel 8 and roller 72 is forced into a notch of the wheel 8. In this way the ratchet wheel and the turret A to which it is connected are positively positioned, so that at the end of each two such step movements, one of the cup stacks will be in exact alignment with the opening in the plate D and the dispensing mechanism F.

A feeler arm 80, pivotally mounted at 81 on plate J, is aligned with a slot 82 in the plate D. The feeler arm 80 is positioned to engage a stack of cups in the reserve position immediately preceding the feeding position. A spring 83 urges the free end of the arm 80 upwardly against the bottom of the stack in this reserve position. The length of the arm 80 is such that upon the first step of movement of the stack toward the feeding mechanism, the arm is still depressed, and upon the second step, the next succeeding stack will move over the slot to keep the arm 80 depressed. However, when the last stack within the turret A moves from this reserve position to feeding position, the remaining compartments B being empty, the arm 80 will move upwardly as shown in dotted lines in Fig. 6.

Attached to the feeler arm 80 is a flexible arm 84, extending parallel thereto, but vertically spaced therefrom as shown in Fig. 6. Arm 84 is formed with a right angle projection for engaging and operating a switch operating member 91. When the arm 80 is in depressed position (solid lines Fig. 6) the extension 73 of the index lever 70 will, upon movement of the ratchet wheel 8 pass idly between the arms 80 and 84 without affecting either of them. When the last cup stack has been moved to the feeding position, so that arm 80 has moved upwardly, the extension 73 of indexer 70 will engage the flexible arm 84, upon the next rotation of the ratchet. Flexible arm 84 will then engage switch arm 91 and operate the switch 90 to render the entire dispensing mechanism inoperative and at the same time energize a signal device, if desired, to inform the user of the exhaustion of the cup supply. In this way possibility of operation of the device without delivery of cups is prevented. When the device is employed in combination with an automatic drink dispensing machine, the entire machine may be at the same time rendered inoperative.

Fig. 5 shows schematically suitable circuit elements for correlating the mechanism above described. When the switch S, which may be coin operated, is energized, a circuit is closed to the relay R causing the relay contacts S_2 and S_3 to close. Contacts S_2 establish a maintaining circuit, the operation of switch S being ordinarily momentary. Closing contacts S_3 energizes the motor I to rotate the shaft H and initiate a cycle of operation of the dispensing mechanism. The switch S_4, operated by a projection on the control plate 37, is included in the relay maintaining circuit and held open in the neutral, non-operative position of the device, when the cam 21 has its high portion turned downward to depress the follower surface 31. Upon operation of the device, as the cam 21 rotates, the follower surface 31 is urged upwardly and the switch S_4 closed until the end of the movement, when the cam 21 again depresses the surface 31. Thus the switch S_4 acts as a limit switch to open the circuit for the motor I when one complete rotation of the shaft H (and one complete cycle of operation of the entire dispensing mechanism) has been accomplished.

Upon exhaustion of the entire supply of cups, i. e. when the feeler arm 60 has detected the depletion of the feeding stack and the detector arm 80 has moved upwardly, the switch mechanism 90 is operated, to break the circuit to the mechanism and render it inoperative.

A second cam-controlled switch S_5 is provided, which has no function with regard to the operation above described, but may be actuated upon each cup dispensing operation in desired relation to the cup dispensing cycle. This switch may be coupled in any desirable manner to the drink dispensing device or other mechanism with which the present cup dispensing machine is associated, for the purpose of coordinating the operation of the related devices.

What is claimed is:

1. In a turret type cup dispensing machine including a cup dispenser and an operating motor therefor, and in combination, turret rotating means for bringing stacks of cups successively into feeding position over the cup dispenser, means for coupling said turret rotating means to the dispenser operating motor for operation thereby, a circuit for said operating motor connected to a source of current, control means for actuating said coupling means upon depletion of the stack of cups in feeding position over said dispenser to bring another stack of cups into feeding position, feeler means positioned to contact the stack of cups in a reserve position, said feeler means being adapted to control a switch in said motor circuit and so arranged that when the last reserve stack of cups is moved into the feeding position and has become depleted, said switching means is opened to disable said motor circuit, thereby preventing the energization of the operating motor.

2. In a turret type cup dispensing machine including a cup dispenser and an operating motor therefor, and in combination, a ratchet and pawl driven by the cup dispensing operating motor and cooperating to rotate the turret for bringing stacks of cups successively into reserve position and into feeding position over the cup dispenser, said pawl being normally withheld from said ratchet, a feeler member for determining when the stack in feeding position is depleted, said feeler member releasing said pawl to operate said ratchet upon such depletion, a spring-biased indexing member cooperating with said ratchet upon each movement thereof for positively positioning said turret in predetermined angular positions, and means cooperating with the cup stack in the reserve position and released for actuation when there is no stack in that position, said means being actuated by said indexing member to prevent operation of the operating motor when the last cup stack has been depleted.

3. In a turret type cup dispensing machine including means for dispensing cups from a stack in feeding position thereover and turret means for bringing stacks successively to a reserve position and into feeding position, turret rotating means, control means for operating said turret rotating means and comprising a feeler for determining depletion of a stack in feeding position, and feeler means associated with said turret adjacent said reserve position for determining the absence of a stack therein and inactivating said turret rotating means.

4. In a turret type cup dispenser, and in combination, means for rotating a turret step by step through a predetermined angle, the angular spacing of the stacks of cups in the turret being a multiple thereof, indexing means for positioning the turret after each movement thereof, a feeler for the stack of cups in feeding position, yielding means for protracting the feeler toward the stack in feeding position and retracting it therefrom upon the dispensing of each cup, and means operable by said feeler upon depletion of a stack in feeding position to actuate said turret drive means upon each dispensing of a cup, a second feeler adapted to feel the bottoms of cups in said turret in the position next to said feeding position, and control means connected to said second feeler means and adapted to be conditioned by the movement of said second feeler means due to the absence of a stack of cups in said position next to said feeding position, whereby said turret drive means is disabled upon the depletion of the last stack of cups in the feeding position.

5. In a turret type cup dispenser, and in combination, means for rotating a turret step by step through a predetermined angle, the angular spacing of the stacks of cups in the turret being a multiple thereof, indexing means for positioning the turret after each movement thereof, a feeler for the stack of cups in feeding position and operable upon depletion of a stack in feed-

ing position to initiate the indexing of the succeeding stack of cups to said feeding position, a second feeler for feeling the stack of cups in the succeeding position, and means interconnected with said second feeler for conditioning control means when there are no longer any cups in said succeeding position, whereby said control means will inactivate the turret drive means when the last stack of cups in said feeding position is depleted.

6. In a turret type cup dispenser of the kind in which a turret is rotated step by step to bring stacks of cups successively into dispensing position, a first feeler means cooperating with the stack in said dispensing position for feeling the cups in said dispensing position and for conditioning control means to effect the moving of a succeeding reserve stack into said dispensing position when the preceding stack in the dispensing position is exhausted, and other feeler means cooperating with the stack of cups in said next succeeding reserve position, said last feeler means cooperating with said control means to disable the operation of said dispenser when the

last column moved into the dispensing position under control of said first feeler means has been depleted.

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