May 8, 1956 B. CRIST 2,744,672

BEVERAGE DISPENSING MACHINE

Filed Nov. 10, 1949 3 Sheets-Sheet 1

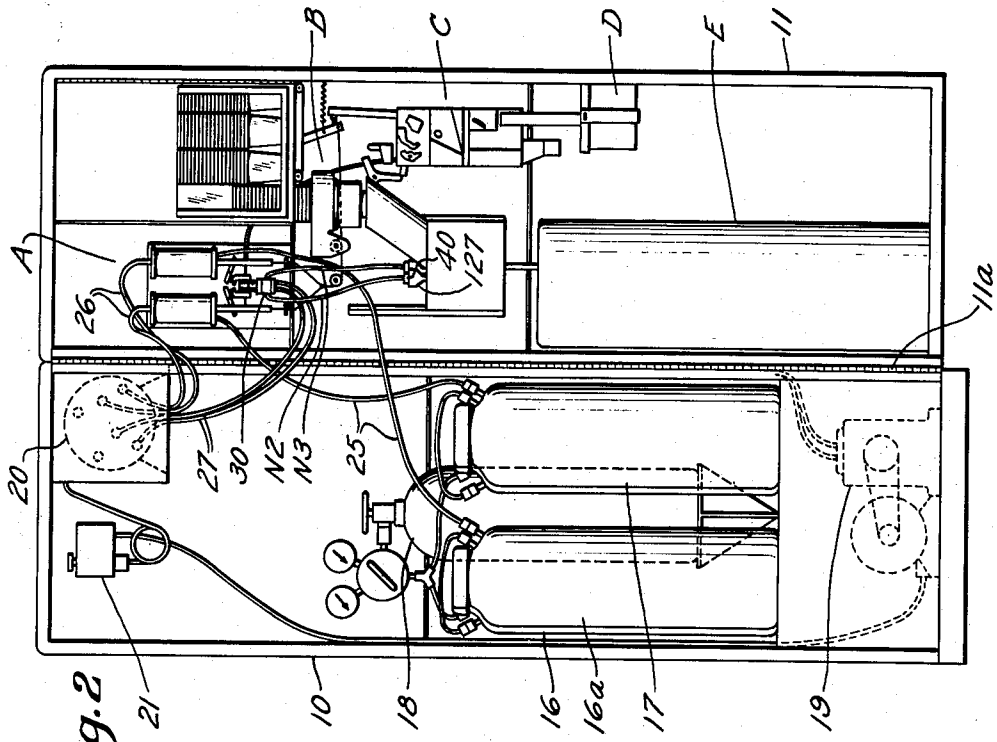

Fig. 2

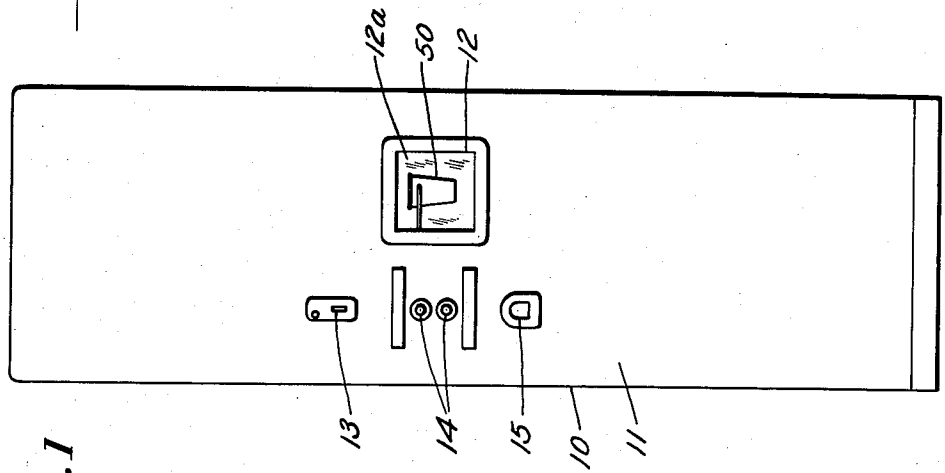

Fig. 1

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Filed Nov. 10, 1949 3 Sheets-Sheet 2

Fig. 3

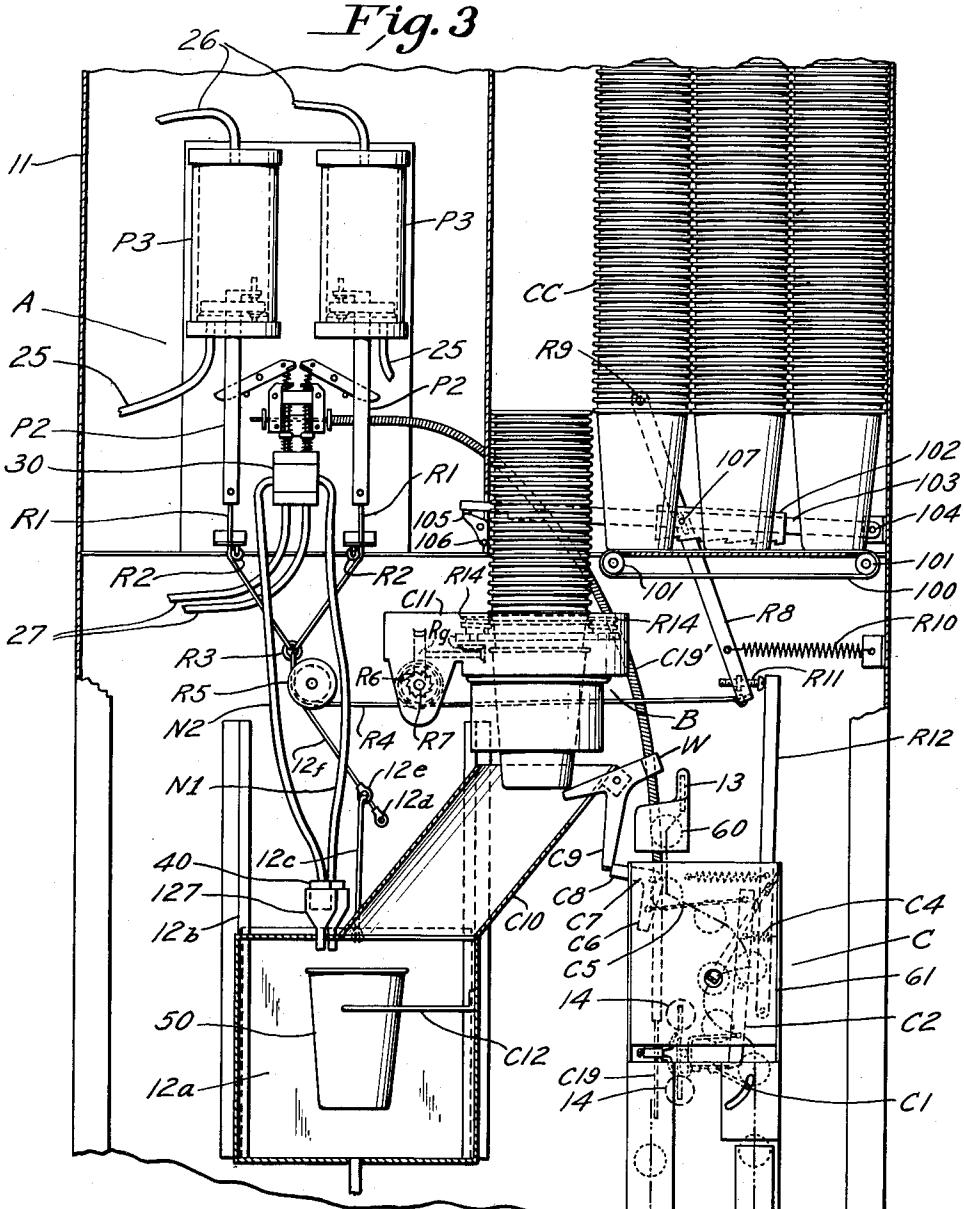


Fig. 12

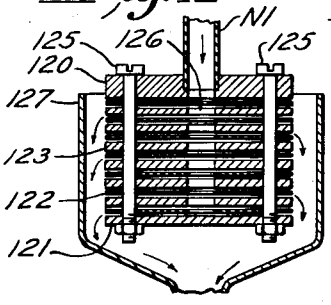
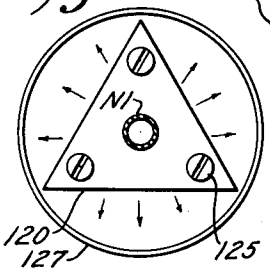


Fig. 13



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BEVERAGE DISPENSING MACHINE

Filed Nov. 10, 1949 3 Sheets-Sheet 3

Fig. 9

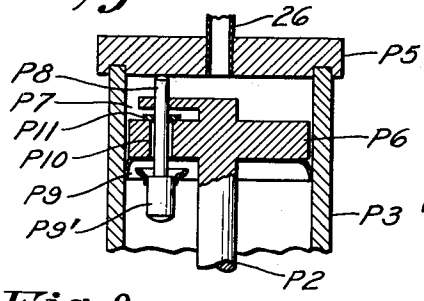


Fig. 11

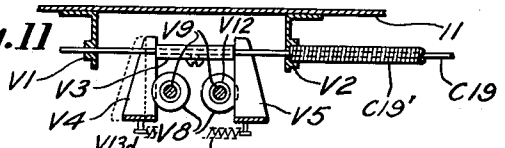


Fig. 10

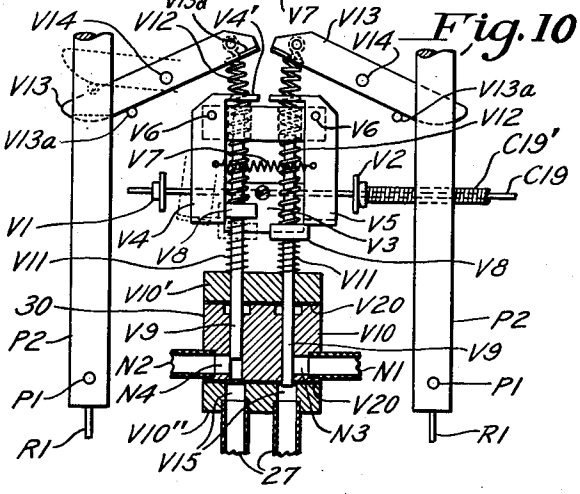


Fig. 8

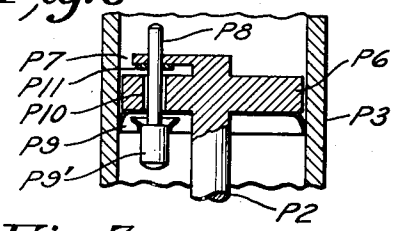


Fig. 7

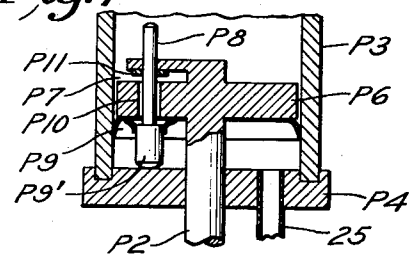


Fig. 6

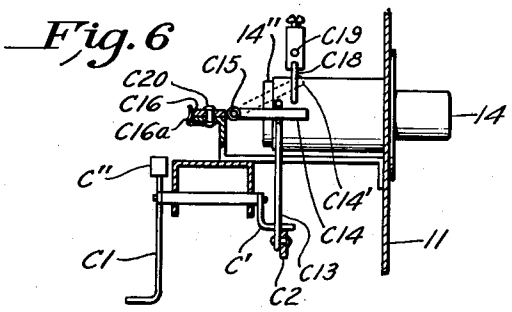


Fig. 5

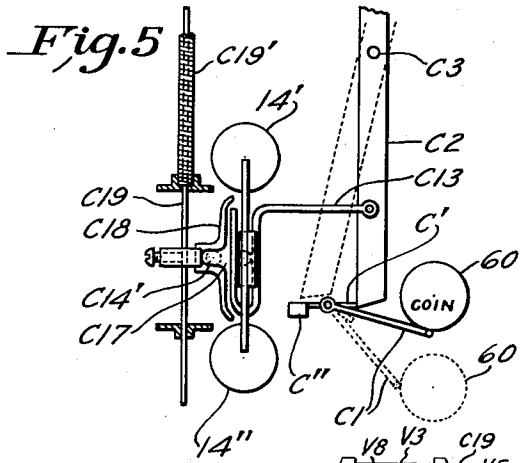


Fig. 4

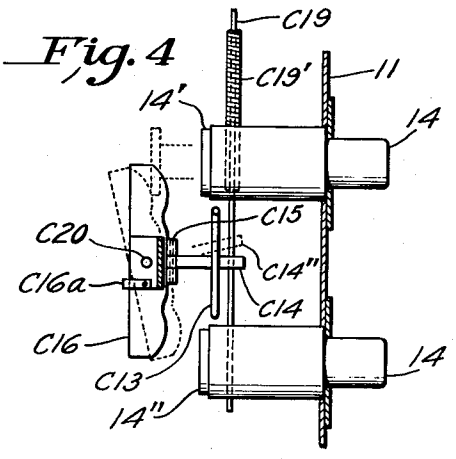
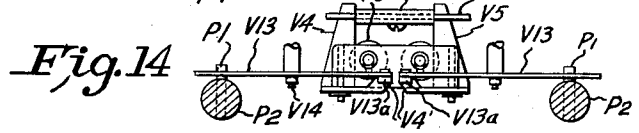


Fig. 14



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United States Patent Office 2,744,672
Patented May 8, 1956

2,744,672

BEVERAGE DISPENSING MACHINE

Buckley Crist, Plainfield, N. J., assignor, by mesne assignments, of six-sevenths to Buckley Crist, Muncie, Ind., and one-seventh to Edward Leal Haddon, Westfield, N. J.

Application November 10, 1949, Serial No. 126,594

11 Claims. (Cl. 226—46.5)

This invention relates to apparatus for dispensing a measured quantity of a beverage and is concerned more particularly with dispensing machines in which a coin or token is to be used to initiate the dispensing cycle.

A primary aim of the invention is to render available a simplified machine, devoid of complex electrical circuits and control devices, in which moderately or highly carbonated beverages may be dispensed without appreciable loss of carbonation. A still further aim of the invention is to provide a dispenser capable of delivering electively one of two or more drinks, utilizing fluid power such as carbon dioxide under pressure to actuate the drink measuring units and reset mechanisms in a prearranged cycle.

Still a further aim of the invention is to provide a vending machine type of beverage dispenser capable of delivering a measured and instantly precooled drink, into a cup automatically delivered to a filling nozzle, without need of refrigerating the bulk supply.

Still a further aim of the invention is to provide in a vending machine type of drink dispenser, a liquid system arranged as to keep the beverage under pressure greater than atmospheric not only while in the bulk containers but while in transit therefrom to the measuring unit, cooler, and delivery nozzle to the end of confining the carbonation and delivering a sparkling drink to the customer.

Other objects and advantages will be in part indicated in the following description and in part rendered apparent therefrom in connection with the annexed drawings.

To enable others skilled in the art so fully to apprehend the underlying features hereof that they may embody the same in the various ways contemplated by this invention, drawings depicting a preferred typical construction have been annexed as a part of this disclosure and, in such drawings, like characters of reference denote corresponding parts throughout all the views, of which:

Figure 1 of the drawings is an exterior view of a dispensing cabinet.

Fig. 2 is a view of the interior of the cabinet illustrating the dispensing apparatus.

Fig. 3 is an enlarged view of a portion of the dispensing apparatus shown in Fig. 2.

Figs. 4, 5, and 6 are enlarged side, and plan views respectively of interlocking selector buttons shown partly in section.

Figs. 7, 8 and 9 are detail fragmentary views of the drink measuring piston and valve, shown in cross-section.

Fig. 10 is a detail view, partly in section, of a portion of the drink-selector valve and operating mechanism.

Fig. 11 is a plan view of the mechanism shown in Fig. 10.

Fig. 12 is a sectional view of a delivery nozzle adapted to quiet the flow liquid as it is conducted into an open container such as a cup.

Fig. 13 is a plan view of the device of Fig. 12.

Fig. 14 is a plan view partly in section of portions of the tripping mechanism shown in Fig. 10.

Referring more particularly to Figs. 1 and 2 of the drawings a preferred form of dispensing apparatus is illustrated embodied in a tall cabinet **10**, having a full door **11** in which a drink-delivery opening **12**, coin slot **13**, drink-selector buttons **14**, and a coin-reject well **15**, are provided. Within the cabinet are placed replaceable tanks **16**, **17**, for beverages, a tank **18** of CO_2 gas or other suitable gas, regulated to 30–60 pounds pressure, drink-refrigerating apparatus including a motorized compressor indicated at **19**, an evaporator or cooler **20**, and refrigeration controls **21**. All of the parts referred to are standard commercial items and it is not believed necessary to described them in more detail.

The door **11** of the cabinet is hinged at **11***a* on one of its long sides and preferably is several inches in depth. The cavity provided thereby is constructed to house the measuring and dispensing units, indicated at A, cup-supply and cup-delivery devices B, coin-receiving and reject mechanism C, coin box D, a spill container E, and their related cooperating actuating and cycle controlling mechanisms. Flexible tubing, such as Tygon or rubber, connect the apparatus on the door with the apparatus within the cabinet, and whereby substantially the entire system and all of its parts are immediately accessible upon opening the door.

The CO_2 tank **18** is connected to the top of a tank of beverage **16**, by flexible hose equipped with quick detachable couplings, which applies a regulated and constant pressure above the beverage. The beverage is caused to flow from the bottom of the tank through another hose, to a second tank **16***a*, if two are used and connected in series, and from the bottom of the second tank to the measuring unit A via line **25**. From the measuring unit the beverage passes to the cooler **20** via line **26**, from the cooler **20** to a selector valve **30** mounted on the door via line **27**, and from the valve to a delivery nozzle **40** and cup **50**. Normally the valve **30** is closed and thus the beverage is maintained under pressure—throughout substantially the entire liquid system. By this arrangement carbonation is retained even though the beverage is caused to flow through tubing, measuring chambers, valves, etc., and is somewhat agitated thereby.

Referring more particularly to Fig. 3, the cycle is initiated by dropping a coin **60** in the slot **13** from whence it falls in a path indicated by broken lines through a conventional coin-detecting device **61** of the receiver C, and falls into a refund chute **15** if refused or into a coin box D if accepted.

The conventional coin detector, see Figs. 3 and 5, is provided with counterbalanced lever C1 upon which a valid coin is caused to fall and to be rocked clockwise thereby. The lever C1 is formed with a latch finger C' that projects normally into the path of swing of another lever C2. The lever C2 is pivoted intermediate its ends at C3 to a portion of the framing and is spring tensioned, by a spring C4, in a clockwise direction. The upper end of the lever C2 is secured by a connection C5 to one end C6 of a bell crank lever C7, also pivoted to the framing. The other end C8 of the bell crank C7 projects normally into the path of another bell crank lever C9 that conveniently is pivoted to a cup chute C10. The bell crank C9 has one arm fashioned to underly a free cup that has previously been released from a cup dispenser C11, also of standard manufacture, and holds the cup suspended. Thus, as a valid coin trips the finger C1, the lever C2 is freed to rock clockwise, and the upper end of the lever pulls bell crank C7 counterclockwise and the cup holding lever is swung by the weight of the cup to a position that allows that cup to pass down the chute to a cup rest C12.

The bell crank C9 is weighted by a weight W and the latter serves to restore the lever to cup-engaging position. Similarly the coin-rocked lever C1 is weighted as at C'' so as to be automatically self resetting.

As the lever C2 moves toward the left (Fig. 5) a U-shaped yoke bar C13, carried thereby also moves to the left. The yoke bar C13 straddles a pin C14 that is pivoted at C15 to a selector interlock bar C16. As the yoke bar is moved toward the left, the pin C14 is moved about its pivot to the position represented by the dotted lines C14' in Fig. 6, and into the throat portion C17 of a Y-shaped member C18 that is connected to a drink-selector valve-actuating cable C19. The interlock lever C16 is centrally pivotally supported at C20 to a part of the framing and one of its free ends is arranged to project into the path of movement of the inner ends 14' and 14'' of the selector buttons 14. The pressing of one of the buttons effects a rocking of the lever C16 (see dotted line position Fig. 4) and causes a similar rocking of the pivoted pin C14 to dotted line position C14''. If the pin C14 is caused to swing, up or down, in the plane of the lever C16, nothing happens. However, when a valid coin trips lever C2, and the yoke C13 moves the pin C14 out of the plane of lever C16 and into the throat of the Y member C18 on the valve cable C19, a rocking of lever C16, causes the pin C14 to shift the valve cable C19 up or down, as the case may be. Hence. a valid coin must first be dropped into the coin slot before actuation of one of the selector buttons 14 produces any effect. It will be seen also, that when one of the buttons 14 is pressed, the inner end 14' or 14'' engages and rocks lever C16 and the opposite end of the lever C16 blocks operation of the other button. The buttons 14 are, it will be understood, spring loaded, and return automatically to their normal positions on release of the finger pressure. Interlock bar C16 is also spring tensioned, by spring C16*a*, to a position normal to the operating ends of the selector buttons 14.

The cable C19 is contained within a sheath C19' and extends to and is connected to actuate the drink-selector valve 30. Reverting to Fig. 10, the valve end of cable C19 is guided in guide members V1, V2 located at opposite sides of the valve-control mechanism, and carries a valve-latch operating-sleeve member V3. The opposite ends of the sleeve V3 are positioned to actuated L-shaped latch levers V4 and V5 that are pivoted to the framing as at V6. A tension spring V7 connected between the levers normally constrains them to their somewhat parallel position shown in Fig. 10. The lower end of each latch lever is upset to lie in the path of a collar V8 fastened to valve pistons V9. Each valve piston is guided in a valve bore in the valve body V10 and normally is spring tensioned toward open position by a spring V11 positioned under the collar V8. The valve piston extends upwardly beyond its respective collar and centers another but slightly stronger compression spring V12, the upper end of which has an abutting engagement with a reset lever V13. Each lever V13 is pivoted to the frame intermediate its ends, and the free end thereof is constructed to lie in the path of movement of a pin P1 carried on the piston rod P2 of one of the measuring units. Stop pins V13*a* mounted in the framing are positioned so as to limit the swing of the levers V13 under the action of their respective springs V12.

The valve unit is constructed of suitable material such as stainless steel or a plastic material, and comprises the valve body V10 and two cap members V10' and V10''. Fluid lines 27, of which there may be two, one for each of two drinks, lead from the cooler 20 and connect with the ports V15 at the underside of the valve, and lines N1, and N2, connected with ports N3 and N4 at the sides of the valve, and lead to the delivery nozzle. Each of the ports V15 are aligned with one of the valve pistons, whereas the side ports N3 and N4 intersect the bores of the respective piston cylinders so that when the head ends of the pistons are withdrawn or retracted from a position shown at the right in Fig. 10 to the position shown at the left, communication between end and side ports is established. The pistons are sealed against leakage, preferably by plastic diaphragms or cup collars V20 located above and below the side ports.

The spring V11 effects a shifting of the associated valve piston upwardly whenever one of the latches V4 or V5 is pulled out by the sleeve V3 and valve cable C19. When that occurs the selected valve opens and fluid is caused to flow from the cooler to the customer's cup, meanwhile the selected piston rod P2 is rising and when the measured drink has been delivered, the pin P1 on the rod engages the dipping end of reset lever V13 and compresses the spring V12. Continued rocking of the reset lever V13, causes its offset free end V13*a* to engage an offset portion V4' formed on lever V4 and swings it again outwardly until the collar V8 on the valve piston rod V9 rides by under the power of the spring V12, and the valve closes. Although two valves are illustrated, each having similar actuating and latching means, only one valve may be operated on any one drink dispensing cycle.

Figs. 7, 8 and 9, illustrate portions of a measuring unit, of which in the present embodiment there may be two. Each unit includes cylinder P3 having heads P4 and P5, a piston P6, and the projecting piston rod P2. The piston rod projects from the lower end only of the piston cylinder thus creating a differential type of piston-and-cylinder measuring unit, the effective area of the underside of the piston P6 being less than the area of the upper side of the piston by an amount equalling the area of the piston rod P2. Fluid from the bulk supply tanks, under pressure, is led by conduit 25, to the cylinder at the underside of the piston.

As illustrated in Figs. 7 and 9, each of the pistons P6 is provided with a poppet valve means P7 that at certain positions of the piston, opens and establishes communication between both sides of the piston. In the Fig. 7 position of the piston the valve means P7 is closed, and fluid pressure from the tank, assuming the cycle has been properly initiated, enters the cylinder and lifts the piston. The fluid ahead of the piston is simultaneously displaced through conduit 26 to the cooling coils 20 and thence to the nozzle. The valve means P7 includes a stem P8 that projects through an opening P10 in the piston and when the piston is elevated the stem P8 eventually will contact the head P5 and further motion of the piston will cause the valve P9 at the underside of the piston to open. The stem P8 of the valve means also carries a disc P11 frictionally held thereon, which upon relative movement between the stem and the piston P6 at the top of the stroke, substantially seals the opening P10 through the piston P6 while the piston is completing the final portion of its upward movement and while the under valve P9 is opening. When valve P9 is opened, sufficient flow through port P10 occurs to build up pressure above the piston and it starts on its downward movement against the smaller effective pressure of the fluid in the small end of the cylinder. As soon as the piston P6 starts downward, the disc P11 and stem P8 lift slightly, valve P9 remains open as in Fig. 8, and the fluid from the underside of the piston P6 is transferred to the upper side through the opening P10. It will be understood that as the piston reaches the end of its upward stroke, the pin P1 on the rod P2 engages the valve reset lever V13 and the latter at the proper time will engage and upset the valve-locking lever V4, so that the valve plunger V9 is released and quickly shifted to valve-closed position. This action closes off the flow to the delivery nozzle and pressure is built up in the upper end of the measuring cylinder.

As the measuring piston reaches the bottom of its stroke, a projection P9' on the valve stem engages the head end P4 and further downward movement of the piston relative thereto effects a closing of the valve P9

(Fig. 7), and the motion ceases until the next dispensing cycle is instituted.

As illustrated most clearly in Fig. 3, each of the measuring pistons, if two are employed, has a flexible cable R1 secured to the lower ends of the rods. The cables R1 are threaded over grooved pulleys R2 and are united at R3 to a single cable R4 threaded over a pulley R5. Cable R4 also is wound at least once around a pulley R6 on a rotatable shaft R7 journaled in the cup release unit C11. The end of the cable R4 thence passes to and is secured to spring tensioned pivotally-mounted lever R8. Lever R8 is pivoted at R9 to the framing and a spring R10 connected to the free end of the lever and the framing pulls on the lever and keeps the cable R4 taut. The free end of the lever R8 is also provided with an adjustable abutment screw R11 positioned to abut the upper end of another lever R12 projecting from the coin-receiving mechanism. Lever R12 is pivoted at its lower end to the coin mechanism and forms an actuating element for rejecting coins that may be dropped before the dispensing cycle, once initiated, is completed. Lever R12 is spring tensioned to follow the abutment screw R11 as the latter is pulled away upon movement of the pistons upwardly, and in addition to operating coin-rejecting means, engages the upper end of lever C2 and actuates same to the full line position in Fig. 5 wherein the yoke piece C13 is retracted and the hinged pin C14' withdrawn from the slot C17 in the valve-actuator piece C18. Coin-receiving, detecting and rejecting mechanisms per se are well known and detail description of the particular construction is believed unnecessary except as in the herein explained operational environment.

As one of the measuring pistons moves upwardly on its delivery stroke, the cable R1 attached to the rod, moves upwardly, and its connection with cable R4 causes the latter to move in opposition to the spring R10 and revolve the pulley R6. Pulley R6 has a one-way connection with shaft R7, as for example a pawl and ratchet device, and the shaft R7 rotates the thread-like spools R14 through gearing indicated at R*g*, and another cup is released. Cup dispensers of this character are well known (see for example the Patent to Parks No. 2,565,084, Fig. 2 for a similar cup-release) and need not be explained further except to note that small thread like wheels R14, positioned adjacent the cup rims of a stack of cups, function to separate and drop a single cup on each operational cycle. The released cup falls toward the chute C10, but is caught and suspended by the projecting arm of the bell crank C9, poised in readiness for the next cycle.

In the embodiment illustrated, four stacks CC of cups are shown, one stack being in operative position relative to the dispenser C11. The other stacks are positioned laterally to one side and upon the upper run of a normally inactive conveyor belt 100. The conveyor belt 100 is guided by rolls 101 journaled in the door framing. Motive power is furnished, at the proper time, by a special toothed member 102 that is mounted for reciprocating movement on a movable bar 103. The bar 103 is pivoted to the framing at 104 and the free end thereof rests normally upon a cup-responsive latch lever 105. The latch lever is pivoted to the framing offset from the cup and carries a detector finger 106 that projects forward into the path of downward travel of the cups. If cups are present in sufficient quantity in the dispenser C11, the detector finger 106 is pushed outward, which movement rocks the other end of latch 105 in an upward direction and lifts the bar 103. In this position the toothed member is spaced from the conveyor and its reciprocations have no effect thereon. However, after the stack of cups fall to a point level with the conveyor the finger 106 rides by the rim of the uppermost cup in that stack and the lever 105 is rocked, the bar 103 drops, and the toothed member 102, drops into engagement with the conveyor belt. The toothed member 103 has a pin and slot connection 107 with the spring tensioned lever R8 and as the latter is actuated in response to delivery stroke of a measuring piston, the conveyor is advanced until the leading stack of cups thereon arrives over the dispenser C11 where they fall into those remaining therein. As the stack falls, the finger 106 on the bar latch member 105 is rocked reversely and the bar and toothed member 103 is again unclutched from the conveyor until another supply of cups is called for.

The filling nozzle 40 (of which there may be one for each highly carbonated drink) is connected to the end of the filling tube N2 leading from the valve 30, and is located over and adjacent the mouth of a cup on the retainer C12. The nozzle 40 comprises, essentially, a plurality of closely spaced plates or membranes that provide flow passageways on the order of .001" thick in cross-section. The liquid is caused to flow between the plates and flows from the outer edges in a quiet stream without appreciable loss of carbonation and without excessive effervescing in the cup. This principle of throttling carbonated liquids without loss of carbonation may be practiced in various ways, and a preferred form of structure that has proven effective is disclosed more particularly in Figs. 12 and 13, in which 120 and 121 indicate retaining plates, and 122 and 123 indicate a laminae of intermediate plates. All are arranged in a somewhat regular stack and are clamped together by clamp bolts 125. Fig. 12 illustrates the plates with considerably exaggerated spacing of their apposed surfaces, in actual practice however, the spacing will be within the range .0005" to .002" and good results are obtained with a spacing of one one-thousandth (.001") of an inch. Thru all but the bottom-most plate 121 a hole 126 is formed, preferably centrally of their surface areas, which communicate with relatively high pressure liquid in the delivery line N1 (or N2). The purpose of the mechanism is to release the beverage, more especially highly carbonated beverages, into the customer's cup without appreciable loss of carbonation and without the effervescing and foaming that otherwise occurs when passing carbonating liquid from a high pressure source to low pressure or an open vessel. What seems to occur in a device of this character is that the high pressure liquid in forcing its way through the thin passageways between the plates, is caused to give up pressure energy and seeps from the margins of the plates and passageways in a relatively quiet stream. It has been found that best results are obtained by conducting the high pressure flow to a medial region of the plates so that it may spread laterally between the ever lengthening crevices whereby its force is dissipated as it reaches the margins of the plates. The sheeted liquid collects around the margins of the plates and runs down the sides thereof in a relatively quiet stream. Preferably a funnel shaped collector 127 is provided and disposed around the assembly of plates to conduct the liquid to the customer's cup.

During the dispensing cycle, all movements and motions derive their power from the measuring unit which in turn is powered by the high pressure liquid. Thus complex electrical circuits, controls, motors, etc. and their attendant disadvantages are avoided and a dispensing machine rendered available that is substantially entirely mechanically controlled and operated. The utilization of a differential type measuring unit, which functions as a motor, and the mounting thereof on the door of the cabinet also renders it possible to provide the cup opening 12 in the front with a sliding panel 12*a* and guide the panel in guides provided by rails 12*b* secured to the door. A cable 12*c* anchored at one end 12*d* to the door and at the other end to the panel is threaded through a terminal eye 12*e* of another cable 12*f* connected to the junction ring R3 previously mentioned. Thus, as the piston of the measuring unit moves upwardly on its dispensing cycle, the cable 12*f* is lifted and its pulley-like connection with the panel cable 12*c* raises the door panel 12*a*. At the completion of the dispensing operation, the

customer will remove the filled cup from the retainer C12, and thereafter the door panel 12*a* closes as the piston of the measuring unit retracts.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can, by applying current knowledge, readily adapt it for various utilizations by retaining one or more of the features that, from the standpoint of the prior art, fairly constitute essential characteristics of either the generic or specific aspects of this invention and, therefore, such adaptations should be, and are intended to be, comprehended within the meaning and range of equivalency of the following claims.

Having thus revealed this invention, I claim as new and desire to secure the following combinations and elements, or equivalents thereof, by Letters Patent of the United States:

1. An apparatus for dispensing a precooled measured quantity of a carbonated beverage without appreciable loss of carbonation, combining a normally closed container for the beverage, means for applying a pressure greater than one atmosphere to the beverage in the container, a system of fluid conduits including a delivery conduit connected with the container and a normally closed shut-off valve in the delivery conduit adjacent the delivery and thereof, means for actuating said valve to an open position, a measuring unit inserted in the conduit between the said valve and the container, a beverage cooling means inserted in the delivery conduit between the measuring unit and the said valve said cooling means having a storage capacity at least equal to the capacity of said measuring unit, means located on the downstream side of the said valve constructed and arranged to spread the liquid passing the valve into a relatively thin sheet whereby to relieve the measured and precooled liquid of pressure energy, and means responsive to the action of said measuring unit on completion of a measuring operation to effect actuation of said valve to a closed position.

2. The combination of claim 1 in which the measuring unit comprises a differential type of piston and cylinder, means for actuating the valve to open position, and means controlled by the movement of the piston for closing said valve at the end of a measuring cycle.

3. A portable apparatus for measuring and dispensing a precooled quantity of a carbonated beverage without appreciable loss of carbonation, comprising a cabinet, a normally closed tank within the cabinet for the beverage to be dispensed, means in the cabinet for applying a pressure greater than one atmosphere to the beverage in the tank, a door hinged to the cabinet, a delivery conduit connected with a tank, a shut-off valve mounted to the door of the cabinet and located in the delivery conduit adjacent the delivery end thereof, a measuring unit mounted on the door of the cabinet and operatively connected in the conduit between the said valve and tank, a beverage cooling means mounted in the cabinet and operatively connected in the conduit between the measuring unit and the said valve, and pressure throttling means located on the downstream side of the valve constructed and arranged to spread the liquid passing the valve into a thin sheet whereby to relieve the measured and precooled liquid of pressure energy, the stated mountings of the elements recited rendering the elements readily accessible when the cabinet door is open.

4. The combination of claim 3 in which the measuring unit comprises a differential type of piston and cylinder, coin-controlled means mounted on the door and initiated into action from the exterior thereof for actuating the valve to open position, and means controlled by the movement of the piston for closing said valve at the end of a dispensing cycle.

5. In a system for dispensing a measured quantity of a liquid beverage, the combination of a measuring unit comprising a differential type piston and cylinder having a small capacity end and relatively large capacity end, a conduit connecting the small end of the cylinder with a source of supply liquid under pressure, valve means in the piston operative in one direction of piston movement to seal an opening formed in the piston whereby fluid under pressure entering the smaller end of the cylinder advances the piston and thereby expels the liquid from the larger end of the cylinder and operative at the end of the displacement stroke to open said opening in the piston whereby the pressure liquid passes through the opening in the piston into the larger end of the cylinder and retracts the piston, a delivery conduit leading from the larger end of the cylinder, a normally closed valve means in the delivery conduit for controlling the flow of displaced liquid from the cylinder and the movement of the piston, and means for actuating said normally closed valve means to open position whereby to cause the liquid to flow and the piston to move on a displacement stroke, and means actuated by the piston at the end of its displacement stroke to effect closing of said delivery conduit valve means.

6. In a machine for dispensing a measured quantity of a liquid beverage into a container to be supplied by the machine, the combination of a source of liquid under pressure to be dispensed, a measuring unit having a differential piston member and a cooperative cylinder member having a small capacity end and relatively large capacity end, a conduit leading from the supply liquid to the small end of the cylinder, a delivery conduit leading from the large end of the cylinder, valve means in the piston operative when closed to confine the pressure liquid to the small end of the cylinder at one side of the piston to advance the piston and when opened to place both ends of the cylinder in liquid communication whereby the pressure liquid is caused to retract the piston, means responsive to the movement of the piston in an advancing direction to open the valve in the piston, additional valve means in the delivery conduit for controlling the outflow of the liquid displaced from the large end of the cylinder, a filling nozzle operatively connected in the delivery conduit on the downstream side of said additional valve, a cup release means operative when actuated to position a cup in filling relation with the nozzle, means to actuate said cup release means to cause a cup to be positioned in filling relation with the said nozzle, means for actuating said additional valve means to open position, means interlocking said two last mentioned means to assure actuation of said cup release means prior to the actuation of said additional valve means to open position, and means actuated by the piston and responsive to a predetermined movement of said piston to actuate said additional means to closed position.

7. The combination of claim 6 including means operatively arranged and actuated by the action of the measuring unit in a liquid displacing direction to render the means for controlling the actuation of the cup release means ineffective.

8. The combination of claim 7 including means actuated by the measuring unit as it approaches the end of its liquid displacing cycle to close said additional valve means.

9. A liquid system operable to dispense a measured quantity of a beverage comprising a normally closed vessel for the beverage, means for applying a pressure greater than one atmosphere to the beverage in the vessel including a delivery conduit connected with the vessel and a normally closed shut-off valve in the conduit adjacent the delivery end thereof, a measuring unit serially connected in the conduit between the shut-off valve and vessel, said measuring unit comprising a differential type of piston and a cooperating cylinder, said cylinder having an inlet for fluid at the small side of the piston and an outlet for fluid at the large side of the piston, normally closed valve means in the piston operative when open to pass liquid from one side thereof to the other, means for actuating the valve to open position, and additional

means responsive to the movement of the piston in a dispensing direction, to close said shut-off valve on completion of the dispensing operation and to open the valve in the piston whereby pressure fluid is caused to flow from the small end of the cylinder through the piston into the large end of the cylinder and cause the piston to retract.

10. The combination of claim 9 including means located on the downstream side of the shut-off valve constructed and arranged to spread the liquid passing the valve into a thin sheet whereby to relieve the liquid of pressure energy, and means operative to collect the liquid.

11. A means for converting pre-mixed high pressure carbonated beverage to low pressure carbonated beverage without appreciable loss of carbonation comprising a plurality of members having opposed surfaces closely spaced so as to provide flow passageways approximately one one-thousandth of an inch in thickness and of a surface area that progressively increases in width in the direction of flow of liquid therethrough, conduit means communicating with the space between the members for conducting the high pressure carbonated beverage to the

flow passageways, and means at the exit of the space between the members for collecting the beverage that emerges therefrom, said close spacing of the members and the progressively widening flow passageways formed therewith serving effectively to cause the liquid to spread in a widening sheet as it flows toward the exit.

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