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DISPENSING SYSTEM FOR CARBONATED BEVERAGES

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2 Sheets-Sheet 1

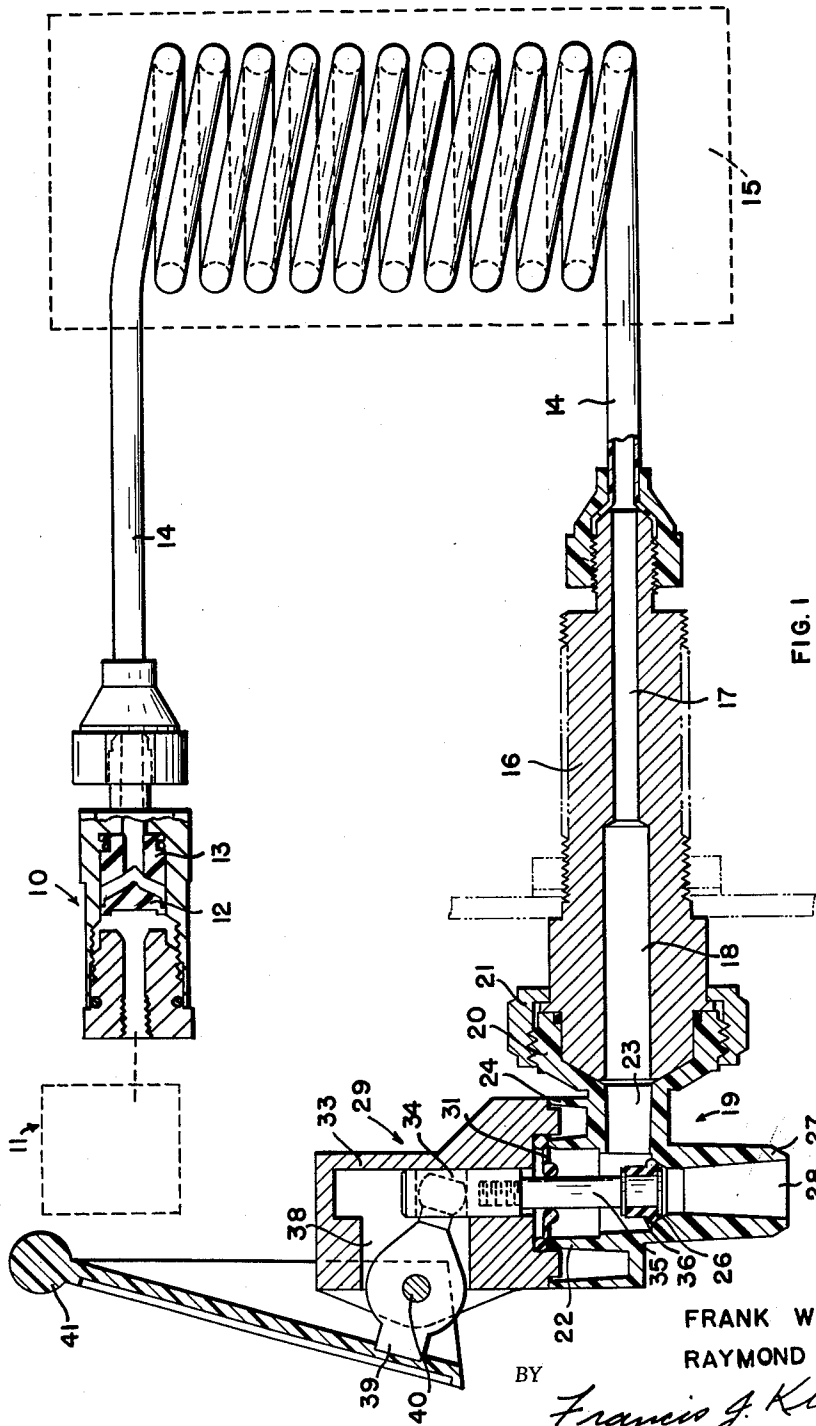


FIG. 1

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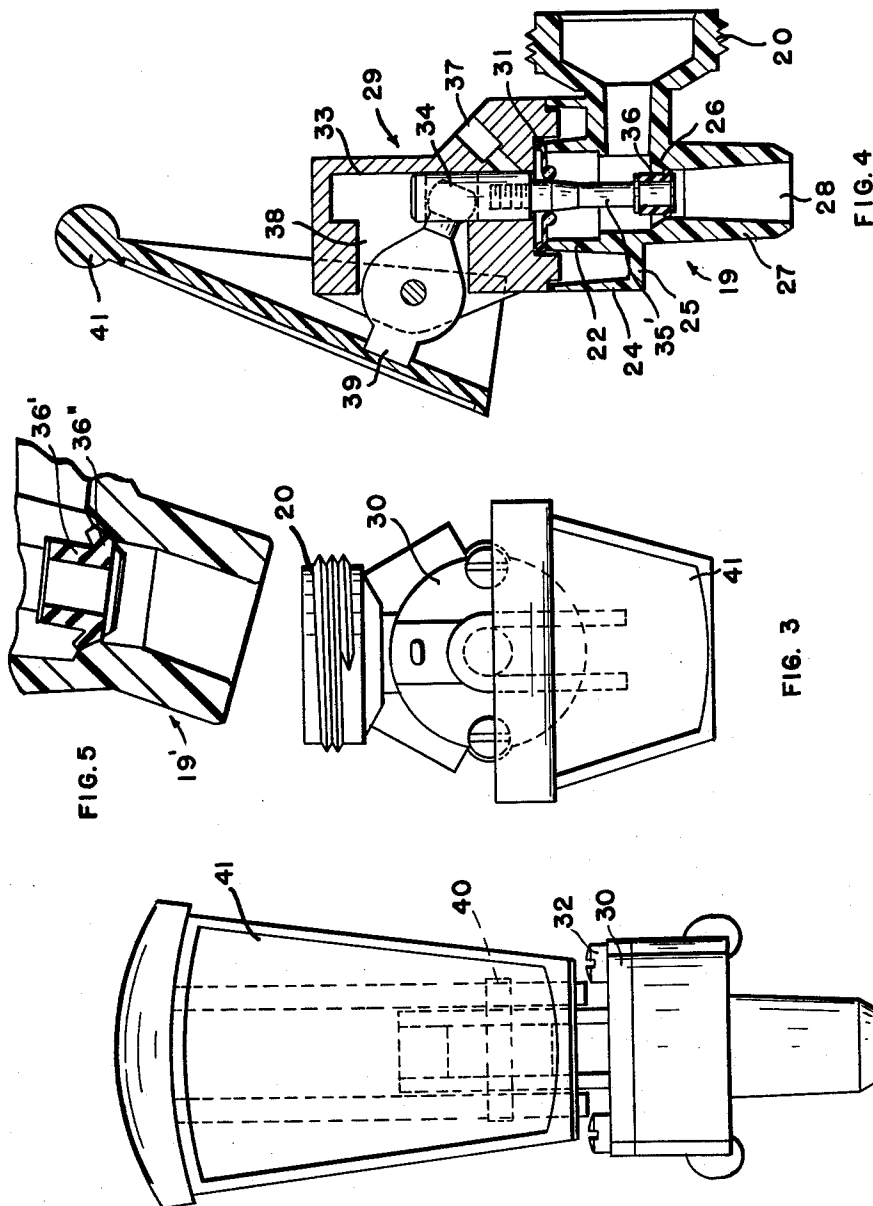
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DISPENSING SYSTEM FOR CARBONATED BEVERAGES

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The present invention relates generally to the art of dispensing beverages and more particularly to an improved system for use in dispensing carbonated beverages and the like.

As will be understood by those skilled in the art, a carbonated beverage comprises a liquid into which has been injected a predetermined volume of carbon dioxide gas under pressure. Such a beverage may or may not contain a proportion of syrup or other like flavoring substance. In the packaging, transportation, storage and dispensing of such a beverage it is usually necessary to maintain the same under pressure to prevent decarbonization of the beverage. In dispensing the beverage it is required to force the pressurized carbonated beverage to a dispensing faucet or valve where the same is discharged into a glass or drinking cup for ultimate consumption. Although such dispensing apparatus is now widely employed, the same is not completely acceptable due to the violent churning, frothing and agitation of the beverage as it issues from the dispensing valve or faucet. Such agitation and violent churning of the beverage causes the same to lose a high percentage of its carbonation. This problem—discharging a carbonated beverage from a source thereof which is maintained under considerable pressure to a drinking glass or cup which is at atmospheric pressure without losing carbonation of the beverage—has long been recognized in the art. Many attempts have been made to overcome this problem such as for example, the provision of a flow restrictor which causes the carbonated beverage to flow in a thin sheet prior to discharge from the dispensing valve or faucet. However, prior art solutions to this problem are not completely acceptable in that a high percentage of the carbonation is still lost and that the same become ineffective upon changes in temperature, expelling pressure, etc.

It is accordingly the primary or ultimate object of the present invention to provide a system for dispensing carbonated beverages and the like wherein the pressurized carbonated beverage may be dispensed into a drinking cup or glass for ultimate consumption without any appreciable loss of carbonation. When the dispensing system of the present invention is employed the carbonated beverage issues from the dispensing valve or faucet in a smooth stream and there is no violent agitation or churning which has characterized prior art systems for the same purpose. The system of the present invention also comprises a new and improved dispensing valve which is employed in combination with an inlet conduit interconnecting with the dispensing valve having a predetermined length dimension and internal diameter. In accordance with this object of the invention, the carbonated beverage is always dispensed with a desired degree of carbonation whereby the same is always fresh and palatable.

A further object of the present invention is to provide a highly improved and highly simplified dispensing valve or faucet. As will be hereinafter more fully apparent, the housing of our valve comprises only two formed parts and the various other component parts of the valve are characterized by their extreme simplicity in design, manufacture and assembly.

Still another object of the present invention is to provide an improved dispensing valve for use in a dispensing system which is readily and easily cleaned by even the

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most unskilled labor in a minimum of time. A beverage dispensing valve must, of course, be cleaned from time to time and the valve of the present invention is easily and completely assembled and disassembled for cleaning.

Another object of the present invention is to provide a dispensing system for carbonated beverages wherein the carbonated beverage is always dispensed at a constant rate regardless of pressure variations of the pressurized expelling means, etc. This is accomplished by employing in the system a flow control assembly which is operative to maintain a constant discharge rate. In this manner the heat exchange means usually employed for cooling the carbonated beverage can be optimally designed to insure a chilled drink even upon continuous operation of the dispensing system.

These, as well as other objects and advantages of the present invention, will be become more readily apparent upon consideration of the following specification and accompanying drawing wherein there are disclosed certain preferred embodiments of the invention.

In the drawing:

FIGURE 1 is a side view, partially in section, of one embodiment of our improved dispensing system of the present invention;

FIGURE 2 is a front end view of the dispensing valve employed in the system shown in FIGURE 1;

FIGURE 3 is a plan view of the valve shown in FIGURE 2;

FIGURE 4 is a side sectional view of a second embodiment of a valve which may be employed in the dispensing system of FIGURE 1; and

FIGURE 5 is a fragmentary sectional view of a further modified valve which may advantageously be used for dispensing carbonated beverages.

The operating principle of the present invention is the handling of the carbonated beverage throughout its flow from a suitable source such as a pressurized tank to the consumer's glass in such manner that the potentially effervescent beverage is first quietly and gradually reduced substantially to atmospheric pressure after which the beverage is collected in volume in a dispensing valve which, when opened, is operative to discharge a substantially solid stream of free-flowing beverage into the consumer's glass. Our experiments indicate that the essence of this principle lies in the maintenance of continuing quiescence in the fluid during this travel from the source to the glass to thereby prevent any "break-out" of the small nodules of gas dispersed throughout the liquid and which carbonates the same. We have found that if in any stage of the traverse of the beverage break-out is allowed to occur the resulting accumulation of concentrated quantities of the expansible gas upsets the balance of the entire dispensing system and makes for erratic operation of the same with substantial loss of carbonation.

Since one of the factors which may initiate gas break-out in a particular dispensing system is the presence of velocities and rates of discharge considerably greater than that for which the particular system is designed, we prefer to use a flow-control device in systems where the pressure of the beverage source may vary widely—for example, where pressures above eighty pounds per square inch are encountered. For lower and more uniform pressures such a device is not needed.

Referring now more particularly to FIGURE 1 of the drawing, the flow-control device referred to above is indicated generally by the reference numeral 10. A pressurized beverage source is indicated generally by reference numeral 11, and it will be understood by those skilled in the art that the function of the device 10 is to discharge liquid at a fairly constant rate of flow regardless of wide variations in pressure of the source 11, and that

this is accomplished by the impinging action of a deformable washer 12 on a harder seat 13 as results from the pressure of the entering fluid. Elements 12 and 13 constitute a valve and it will be understood that greater pressure in the source will result in more restriction in this valve to thus compensate for the greater velocity in fluid flow which would otherwise occur. Such flow-control device is well known and may be of the general kind described in U.S. Patent No. 2,460,647.

Regardless of whether or not a flow-control device, such as shown at 10, is used in our system, the beverage enters the succeeding passages in our systems at a reasonably uniform rate of flow. Such succeeding passages includes, first, a long length of tubing or conduit 14 of small cross-sectional area. Conduit 14 is preferably of extruded "nylon" plastic thus having precise uniformity of internal cross-sectional area with a very smooth inner wall surface. In systems where the source 11 is maintained at room temperatures and where the dispensing valve is designed to handle discharges of the order of one ounce per second, we have found that good results are obtained if the conduit 14 is of the order of fourteen feet in length and .140 inch in diameter. In such a system four volumes of carbonization may be achieved in the consumer's glass if the temperature of the source is 70 degrees F., and three volumes at 86 degrees F. It will be understood that in such a system the conduit 14 will be coiled, as shown, for convenience of refrigeration, means for which is shown schematically at 15 in the drawing. Generally, shorter lengths of larger diameter conduit may be employed with comparable results if the beverage at the source 11 is also refrigerated, and it will be understood by those skilled in the art that the highest degree of carbonation of the beverage in the consumer's glass will be achieved if both the beverage of the source 11 is refrigerated and the longer length used for the conduit 14.

In any of the above systems the function of the conduit 14 is to reduce the pressure of the beverage substantially to atmospheric pressure in a gradual and quiescent manner to inhibit any "break-out" of the gas particles entrapped in the liquid. At the discharge end of conduit 14 the beverage enters a tubular mounting shank 16 for a dispensing valve, and as clearly shown in FIGURE 1, the fluid passage through this shank has an initial entry portion 17 of substantially the same or slightly larger cross-sectional area than the area of the passage in conduit 14. The discharge end of the passage through shank 16 is substantially enlarged as shown at 18 so that the beverage in traversing from the conduit 14 to the dispensing valve will be reduced in velocity sufficiently to enter the valve in a solid slow stream which is only sufficient to keep up with a gravity discharge from the dispensing valve into the consumer's glass. While the drawing shows the passages 17 and 18 as being two distinct bores of different diameters it will be understood by those skilled in the art that the same results may be achieved by providing a single tapered bore for this purpose.

Certain features and principles of the dispensing valve to be used with the system thus far described are highly important if optimum results are to be achieved, and such valve will now be described in each of the three embodiments illustrated.

The dispensing valve of our invention, in the preferred embodiments illustrated, comprises a lower part 19 which is preferably of molded "nylon" plastic having, first, an integral externally threaded bell-shaped extension 20 to which is attached, a fluid-tight relation, the discharge end of shank 16. A threaded bezel 21 is conveniently employed for this purpose.

Centrally disposed in the body member 19 is a tubular section 22 which provides an enlarged cavity, the function of which will be described in detail below, having connection in its lower portion with the passage 18 of

the shank 16 through an inlet opening 23 formed in the body member 19. Concentric about the tubular section 22 and substantially spaced therefrom is an outer cylindrical shell 24 which, as in the case of the section 22, is open at its top. Shell 24 is integrally connected with the section 22 by means of a lower bottom wall 25 and the plastic material surrounding the inlet passage 23. In the bottom wall of the cavity formed by the section 22 is a tapered valve seat 26 and depending below this valve seat is an integral discharge nozzle 27 having a downwardly flaring interior passage 28.

Secured to the top of the body member 19 is a second principal member 29 having a flange 30 (FIGURE 2) seated on the upper edge of the shell 24 and, as shown in FIGURES 1 and 4, this flange is provided on this bottom surface with an annular protuberance which fits within the shell 24 to thus hold the parts in alignment. The inner cylindrical surface of the protuberance retains the outer O-ring section of a sealing washer 31 and it will be observed that this O-ring section rests on the top edge of the tubular section 22 of the lower body member 19. Suitable means, such as screws 32, are employed to clamp the upper body member 29 onto the lower body member 19.

Body member 29 includes an upwardly extending centrally disposed section having a vertical bore 33 to slidably receive and guide a pin 34, to the bottom end of which is rigidly secured a valve stem (35 in FIGURE 1 and 35' in FIGURE 4). To the lower ends of these valve stems are secured annular valving elements 36, preferably made of synthetic rubber, which coact with the valve seats 26 of the body members 19. As shown, the sealing washers 31 are each provided with an inner O-ring section which fit about the valve stems to thereby normally seal off the top ends of the cavity formed by the tubular sections 22 while allowing the valve stems to have vertical sliding movement. In the embodiments of FIGURES 1 and 5 the sealing about the valve stem is continuous whereas in FIGURE 4 the valve stem 35' is formed with the tapered portion so that upon initial upward movement of the valve stem the seal between the stem and the inner O-ring section of the washer 31 is broken slightly to allow upward escape of gas and fluid which may have accumulated under pressure in the cavity of the section 22. The gas and fluid thus escaping past the valve stem is bled off from the valve assembly through a bleed port 37 as shown in FIGURE 4. The function of these described features will be explained below.

The upward extension of body member 29 is formed with the forwardly opening slot 38 which communicates with the bore 33 and pivotally mounted in this slot is a lever 39 to which, with aid of the pivot pin 40, is rigidly attached a handle 41. The rear end of lever 38 is formed with a bulbous portion received in a slot formed in the upper portion of pin 34, and it should be obvious that upon movement of the handle 41 forward and backward the valve stems 35 and 35' will be raised and lowered, respectively.

When the valve thus far described is in actual use the handle 41 will, of course, normally remain in retracted or back position. The valving element 36 will then be tightly fitted on its seat and thus the cavity in the tubular section 22 will be closed both top and bottom. The beverage to be dispensed will fill this cavity and the inlet port 23 at the pressure of the source. If now the handle 41 is moved forwardly the valving elements 36 will be opened and the beverage will flow downwardly through the flared passage 28 into the consumer's glass. In the embodiment of FIGURE 1 a momentary initial squirt may issue from the nozzle 27 upon initial opening of the valve due to the pressure existent in the cavity above the valve and possibly the accumulation of a slight amount of compressed gas in the upper portion of the cavity. Almost immediately, however, the pressure is dissipated and the beverage flows downwardly in substantially a solid stream and at a slow gravity rate to thus effect a minimum of disturbance

of the beverage and a consequent minimum loss of carbonation. The flow proceeds at a slow gravity rate made possible by the loss of head in the restricting line 14, the progressive increase in the cross-sectional area of the passage as it approaches the valve, and by the existence of the cavity in the valve, all as explained above. The cavity is important in providing space for a quiet pool or quantity of beverage which, when the valve is open, is constantly replenished by a slow moving large volume of incoming beverage which flows at a rate generally commensurate with the gravity discharge from the cavity of the valve. In this way there is a minimum of disturbance and the highest possible degree of carbonation is retained.

If it is desired to avoid entirely the high velocity momentary discharge which sometimes occurs upon breaking of the valve seal in the assembly of FIGURE 1, the modification of the valve assembly shown in FIGURE 4 may be used. Here, the parts are so dimensioned that upon initial upward movement of the valve stem and immediately prior to the complete breaking of the main valve seal the tapered portion of the valve stem 35' enters into the inner O-ring section of the sealing washer 31. This action allows any pressure entrapped in the cavity of the valve and any compressed gas therein to be vented out throughout bleed port 37 prior to the opening of the main valve so that the discharge of the beverage downwardly through the nozzle 27 is slow and solid from the very beginning. The loss of beverage through the bleed port 37 during normal operation of the valve assembly is negligible. In actual installations a drain line may be connected to the port 37, if desired.

In the modification of the valve shown in FIGURE 5 the valving member 36' is provided with an upwardly and outwardly flaring lip 36'' the lower conical surface of which is adapted to lie against the conical valve seat when the valve is closed. Since the member 36' is made of artificial rubber or other resilient material the fluid pressure existent in the cavity of the valve will force the other free edge of the lip 36'' into sealing relation with the conical valve seat even though the valving member is not in its lowermost limiting position. This arrangement avoids the necessity for always moving the operating handle of the valve assembly firmly to a closing position to avoid drip from the faucet. It will be understood that at soda bars and the like employees must work swiftly and normally manipulate the faucet handles with a quick flipping movement.

It should now be apparent that we have provided an improved dispensing system for carbonated beverages and an improved dispensing valve or faucet for use in such system which accomplishes the objects initially set out. By the use of the principles of the invention it is possible to devise a particular system tailored to the use to which the same is to be put—i.e. as to temperature and pressure of the source, as to rates of discharge desired, and as to the particular character of the beverage—whereby the beverage is dispensed into the consumer's glass with a minimum loss of carbonation, with the minimum loss of beverage, and under highly sanitary conditions as required by the health codes. Certain pre-mixed carbonated beverages containing particularly fruit-flavored syrups are difficult to dispense with a high degree of carbonation but the results of extensive tests of the principles of the present invention shows that the problem is solved by the use of the present invention. It should be noted also that all the parts, including the dispensing valve assembly, are easily taken apart for inspection and cleaning as is required by the various health codes in the handling of food products such as pre-mixed carbonated beverages and beer which contain rapidly oxidizable ingredients.

Since various changes may be made in the above specifically described embodiments of the invention without departing from the spirit thereof reference should be had to the appending claims in determining the scope of the invention herein disclosed.

We claim:

1. Apparatus for dispensing a carbonated beverage from a pressurized source thereof into a consumer's glass or the like comprising in directly connected sequence an elongated conduit of small cross-sectional area adapted to be connected to said source and in which the pressure existent in the beverage of the source is substantially dissipated during flow of the beverage therethrough, terminal conduit means adapted to be connected with the outlet end of said elongated conduit and being of increasing cross-sectional area in the direction of beverage flow, said areas being so proportioned that said conduits are completely filled with liquid during dispensing flow, and a dispensing valve connected to the outlet end of said terminal conduit and being operative to receive beverage therefrom, said valve having a cavity therein and an inlet port for connecting said cavity with the outlet end of said terminal conduit means, said inlet port having a cross-sectional area substantially equal to the cross-sectional area of the outlet from said terminal conduit means, and said valve also having a downwardly disposed controlled outlet for said cavity of a cross-sectional area substantially equal to the cross-sectional area of said inlet port, the arrangement being such that upon opening of said outlet port a pool of beverage remains in said cavity and the beverage flows through said valve in substantially a solid stream and is discharged from said cavity under conditions of free gravity flow.

2. Apparatus according to claim 1 further including a flow control device at the inlet end of said elongated conduit to effect a substantially uniform rate of flow of the beverage into said elongated conduit regardless of variations in the pressure of said source.

3. A dispensing valve for carbonated beverages comprising a body member having an enlarged cavity therein provided with an inlet port in its side wall whereby the beverage may be transmitted to said cavity from a suitable beverage source, said valve having an outlet port and an associated annular sealing surface in the bottom wall of said cavity, a vertically reciprocal valve stem having a yieldable valving element carried by its lower end, said element having a peripheral rib adapted to overlies said annular sealing surface and to be flexed into pressure contact therewith by the beverage pressure developed in said cavity when said valve is closed to thereby effect a self-sealing action at said outlet port, said inlet and outlet ports being of substantially equal cross-sectional area whereby during opening of the valve a pool of beverage will remain in said cavity and the beverage will be discharged from said cavity under conditions of substantially free gravity flow, and means to reciprocate said valve stem.

4. The dispensing valve according to claim 3 further characterized in that said annular sealing surface tapers inwardly in the direction of beverage flow through said outlet port.

5. The dispensing valve according to claim 3 further including a downwardly directed nozzle leading from said outlet port, the passage through said nozzle flaring outwardly in the direction of beverage flow.

6. A dispensing valve particularly for carbonated beverages comprising a body member having a beverage-receiving cavity therein, a valved outlet port in the bottom wall of said cavity, a downwardly extending discharge nozzle communicating with said port, and an inlet port in the side wall of said cavity adjacent the bottom wall thereof, said inlet port being of substantially the same cross-sectional area as the cross-sectional areas of said outlet port whereby during normal operation said cavity remains filled with a quiescent body of beverage under no pressure, said valved outlet port comprising a tapered valve seat forming the upper extremity of the passage through said nozzle and a yieldable valving element having a peripheral rib adapted to rest on said seat for closing the valve and to be retracted into said cavity for opening

the valve, said passage being of increasing cross-sectional area below said seat and thus providing a venturi-like passage for the flow of beverage downwardly out of said cavity upon opening of the valve.

7. A dispensing valve particularly for carbonated beverages comprising a body member having an enlarged beverage-receiving cavity therein and an inlet port in a side wall of the cavity, an outlet port for said cavity having a cross-sectional area at least equal to the cross-sectional area of said inlet port, means to valve said outlet port comprising an annular seat formed in a wall of said cavity concentric about said outlet port, a valve stem extending into said cavity through a wall thereof opposite said outlet port and mounting on its inner end an annular valve member for co-action with said seat, a bleeder outlet port for said cavity in a wall thereof opposite said first outlet port, means to move said stem rectilinearly in opposite directions, and means comprising said stem to open said bleeder port upon initial movement of the stem in a direction tending to open said first outlet port and prior to the effective opening of said first outlet port.

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