Feb. 12, 1952 D. REYNOLDS 2,585,172

MIXING MECHANISM FOR LIQUID AND BEVERAGE DISPENSING APPARATUS

Filed July 6, 1948 2 SHEETS—SHEET 1

FIG. 1.

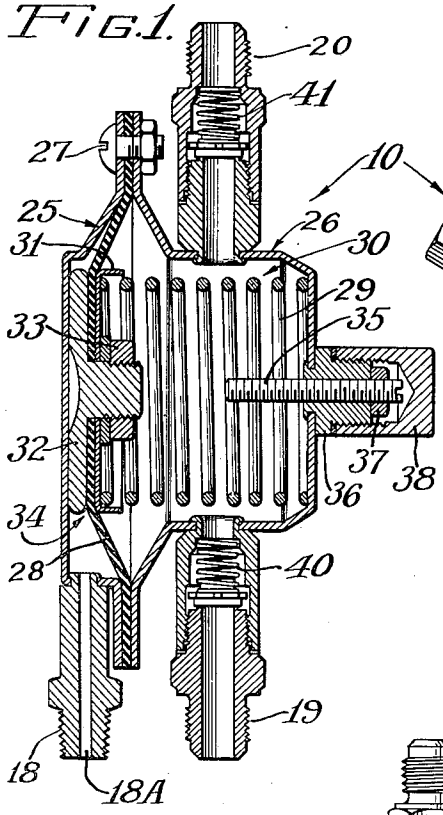

FIG. 2.

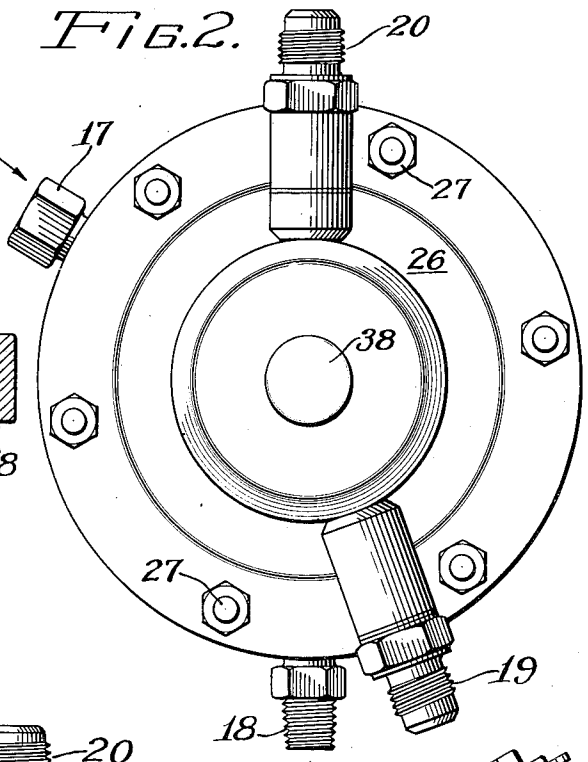

FIG. 3.

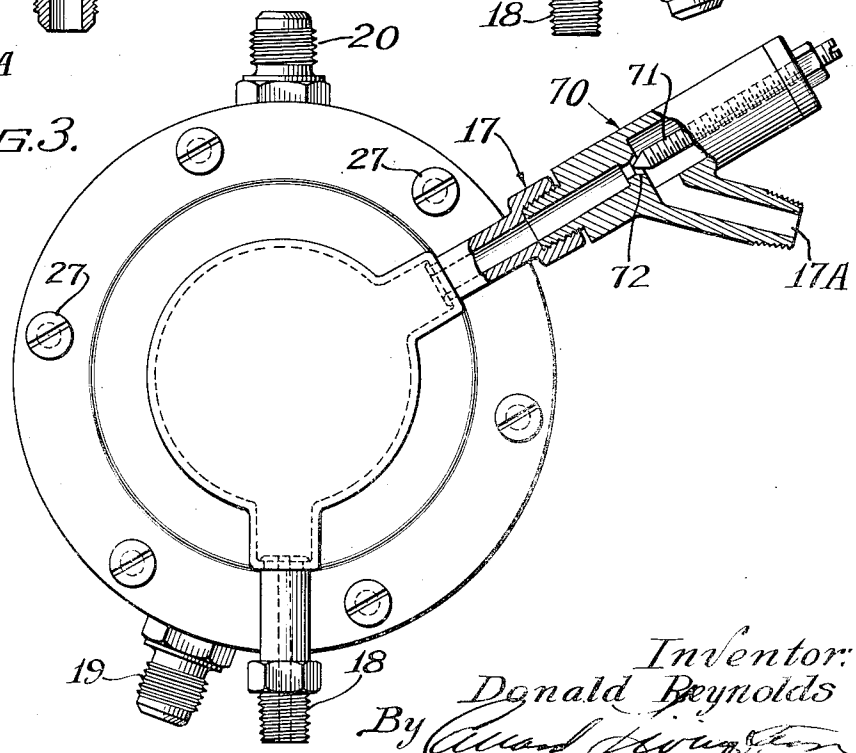

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FIG. 4.

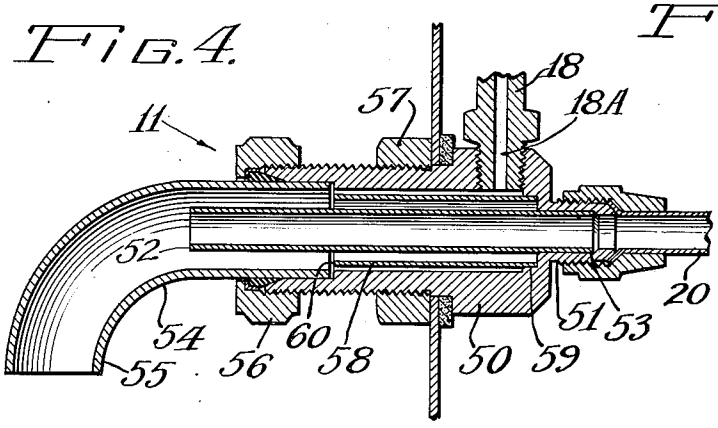


FIG. 5.

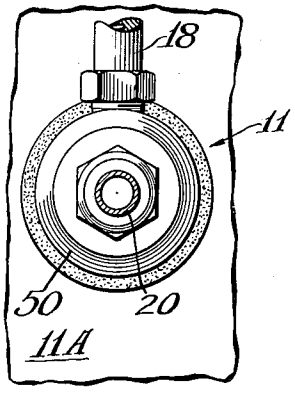
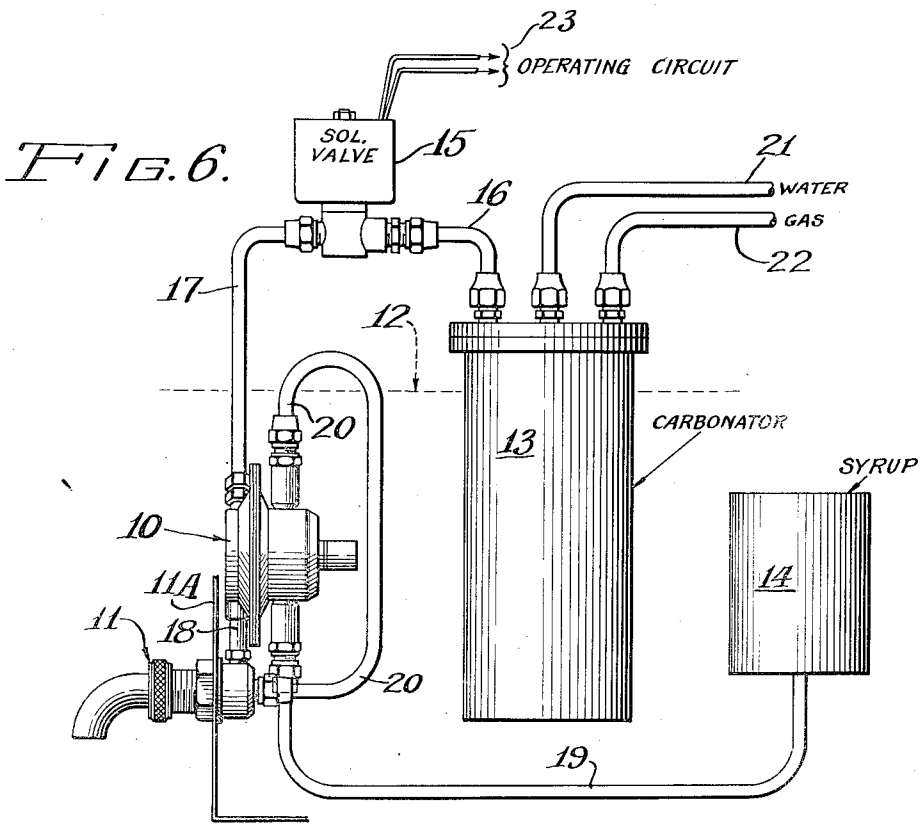


FIG. 6.



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2,585,172

MIXING MECHANISM FOR LIQUID AND BEVERAGE DISPENSING APPARATUS

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2 Claims. (Cl. 225—21)

1

This invention pertains to liquid and beverage dispensing apparatus and has as its principal object the provision of improved dispensing means for carbonated beverages.

A more particular object is the provision of a novel pump for measuring out a predetermined amount of flavoring syrup and mixing same with another liquid, preferably carbonated water, under gas pressure.

Another object is the provision of spigot means for intermixing the syrup and water with a minimum of foaming.

Another object is the provision of a pump of the type hereinabove characterized, in which the actuating power is derived from the gas pressure behind the carbonated water or other compressed liquid.

Still another object is the provision of a gas-operated pump and associated dispensing instrumentalities especially suited to mounting and continued operation in a cooling bath.

Yet another object is the provision of a fluid-actuated pump consisting of two chambers separated by a diaphragm which is normally displaced by a spring, carbonated water under adequate pressure being admitted to one chamber to cause a displacement of the diaphragm which results in lowered pressure in the other chamber, with the result that syrup enters the latter chamber, and upon closure of the controlling valve means, the syrup and water, both in measured volume, are expelled through a mixing spigot.

A further object is the provision of a mixing spigot for carbonated beverages having an arrangement of sleeves for directing the syrup and the carbonated water together while suppressing foaming to a considerable extent.

Additional objects and aspects of novelty and utility in the invention will appear as the following specification proceeds in view of the annexed drawings, in which:

Fig. 1 is a vertical sectional detail of the novel pump;

Fig. 2 is a top plan view of the same;

Fig. 3 is a bottom plan view of the same;

Fig. 4 is a longitudinal sectional detail through the novel mixing spigot;

Fig. 5 is a cross-sectional detail through the mixing spigot;

Fig. 6 is a skeletonized schematic layout of the dispensing system utilizing the novel dispensing means.

Referring to Fig. 6, the dispensing apparatus comprises the novel mixing pump 10, the mixing spigot 11 mounted in a wall portion 11A of a tank

2

(not fully shown) containing a cooling bath the normal liquid level of which is indicated at 12, a carbonating tank 13 substantially immersed in said bath, a syrup reservoir 14 also substantially immersed in said bath, an electromagnetic or solenoid type valve 15 connected between the carbonated water outlet 16 from the carbonating tank, and the water feed tube 17 to the pump 10.

The water outlet from the pump connects by nipple 18 into the spigot 11, while the syrup supply source or tank 14 connects by tube 19 into the pump 10, from which a syrup delivery tube 20 leads into the spigot.

The carbonator 13 has pipe connections 21 and 22 leading respectively to supply tanks (not shown) of water and carbonating gas, so that there is always a substantial pressure behind the water tending to force it from the carbonating tank 13 into the pump 10, but the control valve 15 is normally closed, and is connected, as by conductors 23, in an operating circuit, not shown, for energization to cause it to open and admit water under pressure to the pump, which is then caused to pump a certain amount of syrup to the spigot, as will hereinafter more fully appear.

In one of its preferred forms, the pump 10 consists of two separable shell sections 25 and 26, Fig. 1, secured together as at 27 to clamp therebetween a diaphragm 28, which is normally displaced by a spring 29 situated in the syrup chamber 30 formed by the diaphragm and shell on the side of said spring, the latter seating in a cup washer 31 secured to the diaphragm by a header bolt 32 engaged with nut means 33.

The space between the shell portion 25 and the diaphragm forms the water chamber 34. Diaphragm displacement-limiting means is provided in the form of a set screw 35 threaded into a boss 36 staked into the shell 26, and provided with a lock nut 37 and cap nut 38.

In the operation of the pump, the spring 29 normally displaces the diaphragm to the position shown in Fig. 1, thereby creating a lowered pressure in syrup chamber 30, so that the lower or inlet spring check valve 40 opens to admit syrup from supply line 19, the upper outlet valve 41 remaining closed at this time.

When the solenoid control vavle 15 is energized and opened, water under pressure from the carbonating tank 13 passes via tubes 16 and 17 into the pump water chamber 34 with sufficient head to compress the spring 29 and displace the diaphragm toward the right so as to expel the measured volume of syrup theretofore contained in syrup chamber 30 past outlet valve 41, it being

observed in Fig. 1 that the water outlet fitting 18 has a relatively constricted orifice or throttle passage 18A calculated to permit the build-up of back pressure in the water chamber of the pump in such manner that the water and syrup arrive at the spigot 11 substantially at the same time for mixing and expulsion in the special spigot means cooperating with said pump.

Referring to Fig. 4, the spigot means an elongated chamber element or nipple 50 having a nipple portion 51 into which the syrup feed line 20 connects, there being an elongated syrup guiding tube 52 force-fitted into said latter nipple as at 53 to extend beyond the length of the main chamber element 50 substantially to the curve 54 or inflection of the spigot piece 55, which is secured in the main chamber element 50 by means of a shouldered jam nut 56 threaded onto the chamber element.

A water-deflecting and anti-foam tube 58 is fitted into a seat 59 in the head of the main chamber element, with the mouth 60 of said tube terminating appreciably in advance of the terminus or mouth of the syrup tube 52 and approximately at the inner or mounting end of the spigot, the walls of this anti-foaming tube 52 being spaced both from the syrup tube 52 and the inner periphery of the main chamber element 50, with the innermost or mounting terminus of the anti-foaming tube 59 situated close beneath the orifice 18A of the water delivery tube 18.

In the operation of the spigot means of Fig. 4, the syrup issues from the end of the tube 52 near the curve of the spigot piece, responsive to action of the pump as previously described; and the water issuing from the orifice portion 18A works along the body of the anti-foaming insert or tube 58 and the relatively confined space between said tube and the main chamber element 50, which confinement largely suppresses the escape of gas from the water and formation of objectionable foam, which is in general a serious problem in dispensers of carbonated beverages, it being essential to the delivery a beverage having acceptable gas content to prevent such gas escape and foaming at all times in the dispensing operations.

The spigot assembly may be dismantled for cleaning by removal of the nut 56 and the mounting nut 57, the anti-foaming tube 58 being preferably removably seated with this object in view.

It is desirable, but not essential, to provide an adjustable orifice device 70 on the water inlet side of the line, as shown in Fig. 3, wherein the water inlet is connected at 17A, and the orifice screw 71 is adjusted relative to the orifice seat 72 so as to get the ideal pressure balance between the outlet orifice 18A and the inlet pressure for maximum response and sensitivity of the diaphragm; this adjustment being particularly desirable where there may be pressure variations in the gas supply system.

The pressure behind the water, i. e. in the carbonator, is preferably of the order of 70 p. s. i., and the pump as described herein is designed for this relatively high pressure; and while such pressures are commonly employed in the art, a significant problem attendant thereto is the tendency to produce foam as a result of movement of the carbonated water, and for gas to escape from the water in the dispensing operation, there being here two aspects of the problem, namely, that of the tendency of the gas to escape from the water responsive to any movement thereof; and that of the water and syrup to produce foam as a result of the mixing operation in bringing the moving, gas-laden water into admixture with the relatively viscous syrup.

The present dispensing system, by reason of the novel construction and operation of the pump and spigot means, brings the water and syrup into confluence immediately prior to dispensation into the cup.

In the latter respect, the spring-loaded pump, having previously aspirated a measured charge of syrup, effects a timed interdependent displacement of the water and syrup, since the expulsion of the syrup must always be a function of the movement of the water into and from the pump into the coaxial spigot mixing and foam-preventing means.

Prior art devices solve the foaming problem principally by dispensing the syrup into a cup first, and thereafter discharging the carbonated water into the syrup from a distance sufficient to permit the water to reach atmospheric pressure before it enters the syrup. This method does not produce the most palatable drink; it causes loss of gas and poor or unreliable mixing, among other things.

For best results with the novel coaxial spigot means, the outermost terminus of the innermost or syrup tube 52 should be in advance of the discharge terminus of the spigot tube 55, and preferably situated close to the point of inflection or curvature 54 of said tube.

The orifice 18A is preferably of the order of $^3/_{32}$ inch to $\frac{1}{8}$ inch, inside diameter; the innermost coaxial tube is preferably of the order of $\frac{1}{4}$ inch inside diameter; and the inside diameter of the spigot is preferably of the order of $\frac{5}{8}$ inch, this latter dimension being always such that there is no back pressure to the discharge of the carbonated water over the projecting portions of the innermost tube in these regions; in other words, atmospheric pressure must prevail within the spigot mixing and outflow regions, otherwise foaming will occur.

If the innermost or syrup tube terminus is substantially at or near the terminus of the outermost or spigot tube 55, there is no proper mixing of syrup and water; if said terminus is at or near the terminus 60 of the anti-foam tube, back-pressure may be set up causing foaming as a result of too abrupt intermixing of the water and syrup such that any slight initial foaming here immediately affords a sufficient blockage to aggravate the condition in the formation of increasingly great amounts of foam; hence the terminus of the syrup tube is for this reason also carried measurably beyond that of the anti-foam tube.

The spacing between the outer surface of the anti-foam tube 59 and the inner wall of the main chamber or spigot jacket 50 is as close as practicable to give a reasonably quick delivery or outflowing of the water. The closer this clearance is, the more effective is the foam-suppressing action in the confining space through which the water is thus forced to travel.

The foregoing dimensional specifications are not intended to be limiting, but are illustrative of some of the conditions found satisfactory in the commercial embodiment disclosed herein.

I claim:

1. Beverage dispensing means comprising in combination, means for concurrently flowing syrup and water under gas pressure into a dispensing spigot having a spout portion defining a mixing chamber, a syrup tube of uniform diameter having a terminus disposed substantially in

advance of the terminus of the spout portion, and tubular means of uniform diameter concentric about said syrup tube forming, in cooperation with inner wall portions of the spigot, a narrow and confining annular, rectilinear water passage for the aforesaid water, which passage is of uniform, annular, volumetric magnitude at all points and terminates substantially in advance of the aforesaid terminus of the syrup tube.

2. Foam suppressing means for dispensing of carbonated beverages and comprising a jacket having a chamber portion of uniform internal diameter, a first tube of uniform external and internal diameter fitted concentrically within said jacket portion, means closing said jacket chamber and said tube at confronting axial end regions, an inlet port to said chamber near said ends for directing carbonated liquid into the annular space between the outside of said tube and the inside of said jacket chamber for flow toward the remaining ends of said tube and jacket chamber, and a second tube entering said

confronting closed end portions of the jacket chamber and first tube, and of lesser diameter than the latter, and extending concentrically through and beyond said first tube, means for connecting a second fluid supply to said entering part of the second tube, and means supported by said jacket and defining a mixing chamber and dispensing outlet communicating with said remaining ends of the jacket chamber and the first and second tubes.

DONALD REYNOLDS.

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