United States Patent [19]

Holcomb

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[54] **MIXING DEVICE FOR A BEVERAGE DISPENSER**

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[52] **U.S. Cl.** **222/132;** 222/145; 239/433

[51] **Int. Cl.** **B67d 5/60**

[58] **Field of Search** 239/433, 428, 427; 222/145, 132

[56] **References Cited**

UNITED STATES PATENTS

1,465,390	8/1923	Frank	239/433
1,504,851	8/1924	Wren	239/433
1,531,354	3/1925	Stackpole	239/433
2,370,433	2/1945	Williams	239/433
3,455,332	7/1969	Cornelius	222/145
3,460,717	8/1969	Thomas	222/132

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[57] **ABSTRACT**

A method and apparatus for mixing a beverage includes a body through which a first stream of pressurized beverage concentrate is directed into a mixing zone in a spout, through which a second stream of water is directed and onto the first stream in such mixing zone, and through which a third stream of air is aspirated into the mixing zone by said first and second streams in the same general direction but away from the point of engagement between the first and second streams. The included angle between the first and second streams is gentle, but because of pressures used, the mixing is rather violent.

6 Claims, 4 Drawing Figures

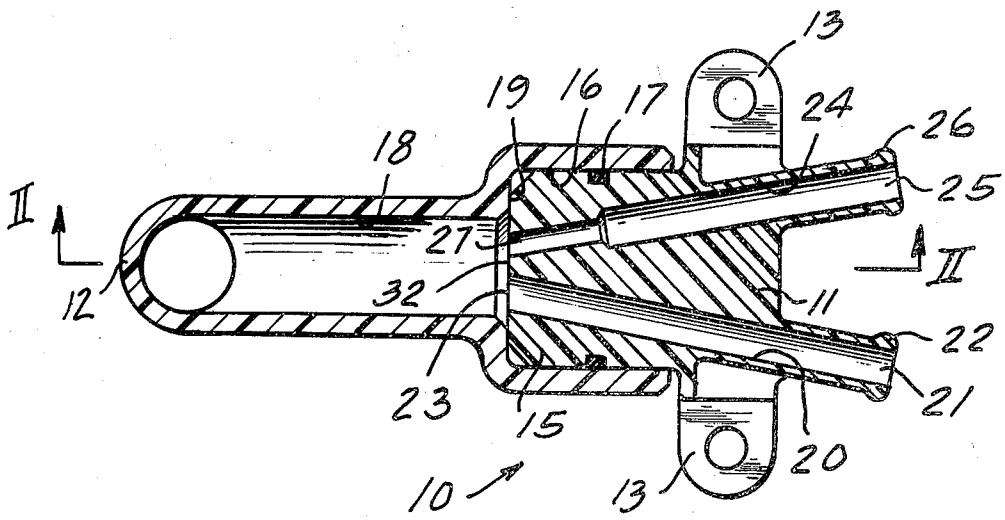


Fig. 1

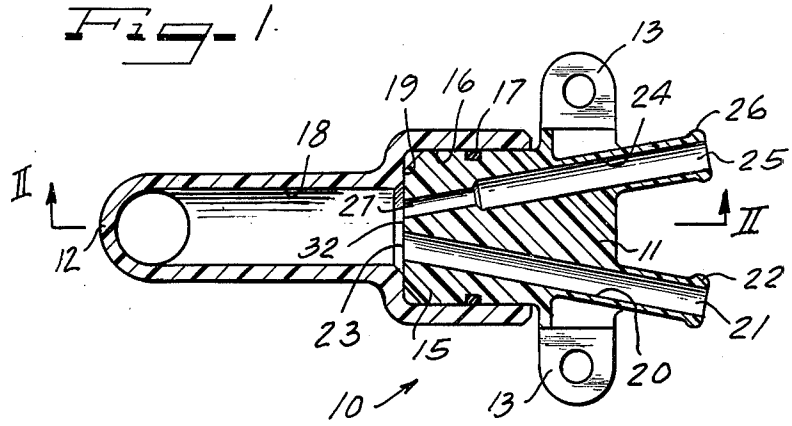


Fig. 2

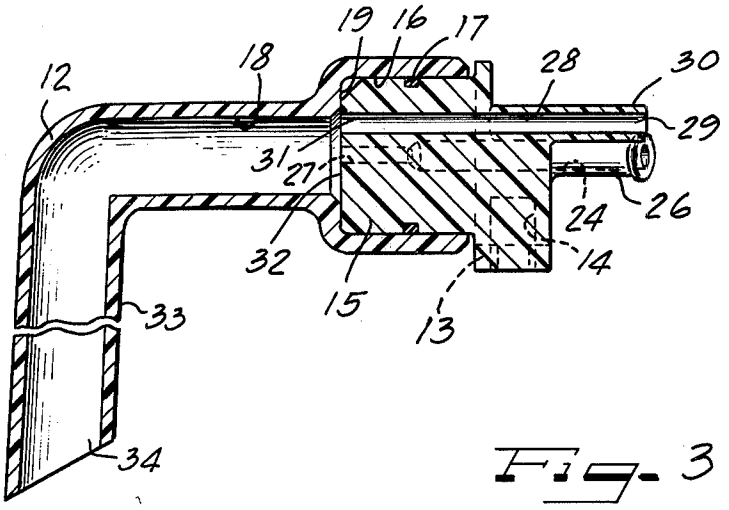


Fig. 3

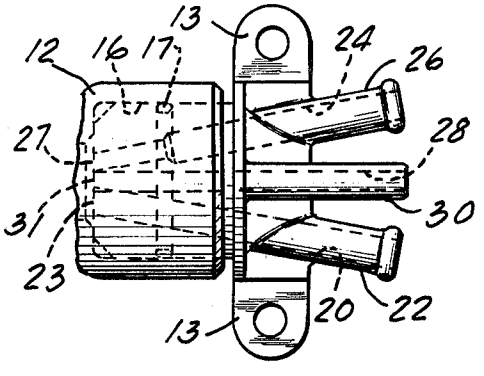
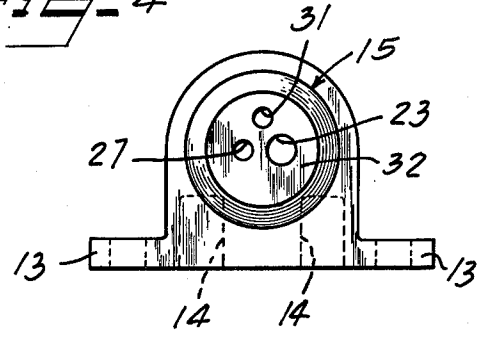


Fig. 4



MIXING DEVICE FOR A BEVERAGE DISPENSER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a device by which two liquid beverage ingredients are mixed.

2. Prior Art

Broadly speaking, mixing devices for beverage ingredients are per se known. However, their construction has been characterized by complexity in structure, high cost of manufacture, lack of ease of maintenance such as for cleaning, and more importantly, known prior devices have left something to be desired where the beverage concentrate includes pulp, such as is found in the instance of concentrated natural citrus juices.

SUMMARY OF THE INVENTION

In accordance with this invention, a method and apparatus are provided by which a first stream of beverage concentrate is directed into a mixing zone, a second stream of water is directed against the first stream with an acute angle therebetween, said streams engaging and merging in the mixing zone preferably provided in a removable spout having a flow area somewhat greater than that of the streams so as not to restrict flow therethrough.

Accordingly, it is an object of the present invention to provide a mixing device for a beverage dispenser.

Another object of the present invention is to provide a mixing device which will provide a thorough mixing of a beverage concentrate, such as a concentrated citrus juice, and water.

Another object of the present invention is to provide a mixing device of extremely simple construction.

A still further object of the present invention is to provide a mixing device which can be readily cleaned or serviced, such as for sanitizing.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

ON THE DRAWING

FIG. 1 is a cross sectional view of a mixing device for a beverage dispensing system provided in accordance with the principles of the present invention;

FIG. 2 is a cross sectional view taken substantially along line II—II of FIG. 1;

FIG. 3 is a fragmentary view corresponding to part of FIG. 1 with parts removed by cross sectioning being restored; and

FIG. 4 is an elevational view of the left end of FIG. 3 with a spout removed.

AS SHOWN ON THE DRAWING

The principles of the present invention are particularly useful when embodied in a mixing device for a beverage dispenser or beverage dispensing system such as shown in FIG. 1, generally indicated by the numeral 10.

The mixing device 10 includes a body 11 and a spout 12. The body 11 is provided with an integral pair of mounting brackets 13, 13, and if desired, other recesses 14, 14 (FIGS. 2 and 4) may be provided if desired to

lessen the amount of plastic material needed, to prevent warpage, and also to serve as a recess for cooperating with other mounting structure. The body 11 has a cylindrical portion 15 having a chamfered entrant end which is received in a cylindrical pocket 16 forming part of the spout 12. An O-ring 17 serves primarily as a friction device to hold the spout 12 on the cylindrical portion 15 of the body 11, and of course precludes any possible backup of beverage.

The spout 12 has a cylindrical mixing portion 18 which has a chamfered shoulder 19 against which the cylindrical portion 15 can abut.

The body 11 has a first passage 20 having an inlet 21 disposed in a hose fitting 22 for being connected to a pressurized supply of beverage concentrate. The passage 20 has an outlet or opening 23, the passage 20 being so directed as to aim a first stream of beverage concentrate into the mixing zone 18.

The body 11 has a second passage 24 which has an inlet 25 disposed on a fitting 26 by which the same is adapted to be connected to a pressurized supply of beverage ingredient such as water. The passage 24 has an outlet 27 of reduced size and is so aimed as to direct a stream of water into the mixing zone 18 and as to engage against the stream of beverage concentrate. The axes of the passages 20,24 are inclined at a gentle or acute angle to each other, the angle being 20° in this embodiment and each passage being inclined by 10° with respect to the axis of the cylindrical mixing portion 18. Thus there is a point of engagement between the streams which is disposed in the mixing zone 18 at a point which is several passage diameters from the outlets and which is nearly central along the axial length of the portion 18 of the spout 12.

The body 11 has a third passage 28 shown in each view except FIG. 1 which has an inlet 29 disposed in a fitting 30 by which the same can be connected to a hose communicating with the atmosphere at a selected point. The passage 28 has an outlet 31 which communicates with the mixing zone 18. The passage 28 is directed substantially parallel to the axis of the mixing zone 18 and is so disposed in the body 11 as to be directed to bypass the point of engagement between the first and second streams, namely adjacent to the radial outer extremity of the cylindrical mixing portion 18 as best seen in FIG. 2, at the upper surface.

As best seen in FIG. 2, the first or beverage concentrate outlet 23 is the largest which enables pressure on the concentrate storage tank to be minimized and also which enables the handling of a refrigerated and hence viscous beverage concentrate. The outlet 27 of the first or water passage 20 is the smallest so as to produce relatively high stream velocities. The outlet 31 of the third or air passage 28 is of intermediate size. Thus the three outlets 23, 27 and 31 are spaced from each other at the upstream end of the cylindrical mixing portion 18 and lie in the same surface, here a flat plane 32 which is perpendicular to the axis of the mixing portion 18.

The spout has a downturned portion 33 which turns down well downstream of the point where the streams engage. Throughout the entire spout, there is a greater flow area than that of the passages, namely from the flat plane 32 to the discharge end 34. The downturned portion 33 is of circular crosssection, and the axis of the water passage is nearly tangential to such circular cross-section, thereby making the edge of the water stream substantially tangential.

In operation, a first stream of beverage concentrate is directed into the mixing zone **18.** The beverage concentrate may constitute unfrozen concentrated juice such as orange juice and it may constitute any of the well known flavored syrups such as a cola or lemon-lime syrup. Such beverage concentrate is urged through the mixing device **10** under pressure to provide a volumetric rate of at least 0.4 ounces per second, and in this embodiment, a mean velocity through the outlet **23** of at least 2.2 feet per second.

The second stream which normally is water is directed onto the first stream in the mixing zone **18,** and even though it has a smaller flow area, the pressure is proportionately increased so as to provide a higher volumetric rate than that of the beverage concentrate, here at least 1.5 ounces per second. Under these conditions, the mean velocity at the outlet **27** is at least 47 feet per second, thereby producing rather violent mixing. If it is desired to aerate the beverage, the inlet **29** is functionally open as shown and thus the first and second streams jointly aspirate air through the outlet **31** into the mixing zone. The aspirated air flows in the same general direction, substantially parallel to the axis of the mixing zone **18,** but is directed away from the point where the first and second streams engage. If aeration is not desired, the inlet **29** is blocked.

In this embodiment, the diameter of the beverage concentrate passage **20** is 3/16 inch. The diameter of the water outlet **27** is 0.78 inch. The diameter of the air passage **28** is ⅛ inch.

In that the velocity of the water stream is much greater than the velocity of the concentrate stream, any deflection of the water stream by the concentrate stream is not appreciable. The stream of mixture engages the upper end of the downturned portion tangentially and thereby the mixture is caused to swirl. The water stream picks up and retains the syrup, and in one sample, approximately one and one-half revolutions of swirling took place along the vertical portion **33** of the spout **12.** The degree of separation of water and syrup or other concentrate progressively diminishes so as to be fully mixed prior to discharge from the lower end of the spout. Owing to their physical properties, it is somewhat more difficult to effect complete mixing of concentrated citrus juice than say the well known types of flavored syrup. However, even the difficult-to-mix juice concentrate is completely uniformly blended by this device.

Although various minor modifications may be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon all such embodiments as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. A mixing device for beverage dispenser, comprising:

a. a body having a beverage concentrate passage with an inlet for pressure concentrate, and a water passage with an inlet for pressurized water, said passages having spaced outlets, the axes of said passages converging at a point beyond said outlets; and

b. a separate spout detachably secured to said body, said spout having a mixing portion in which said point is located, the axis of the mixing portion being horizontal, and a discharge portion of circular cross-section extending transversely to the axis of the mixing portion, the axis of said water passage being substantially tangent to said circular cross-section for swirling the mixture about the axis of said discharge portion, the cross-sectional flow area of said spout being at all points larger than the combined flow areas of said passage outlets.

2. A mixing device for a dispenser according to claim **1** in which said body has mounting means by which said beverage concentrate passage and said water passage are maintained in a horizontal plane.

3. A mixing device according to claim **1** in which the axis of said water passage in said body is substantially perpendicular to the axis of said discharge portion of said spout.

4. A mixing device according to claim **1** in which said passage outlets lie in a single flat surface of said body.

5. A mixing device according to claim **1** in which the flow area of the water outlet is smaller than the flow area of the concentrate outlet.

6. A mixing device according to claim **1** in which said body has an air passage therethrough, the outlet of which is disposed adjacent to a surface extremity of said mixing portion.

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