Oct. 27, 1959 H. E. ALLSHOUSE ET AL 2,910,247

CARBONATED BEVERAGE DISPENSER

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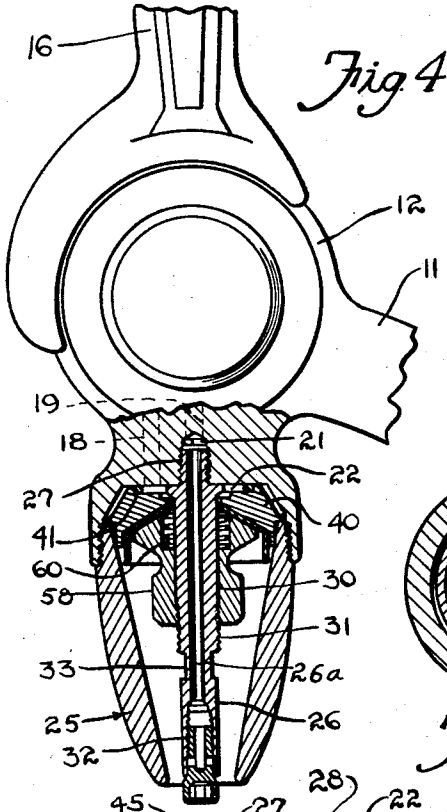


Fig. 4

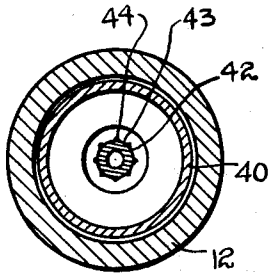


Fig. 3

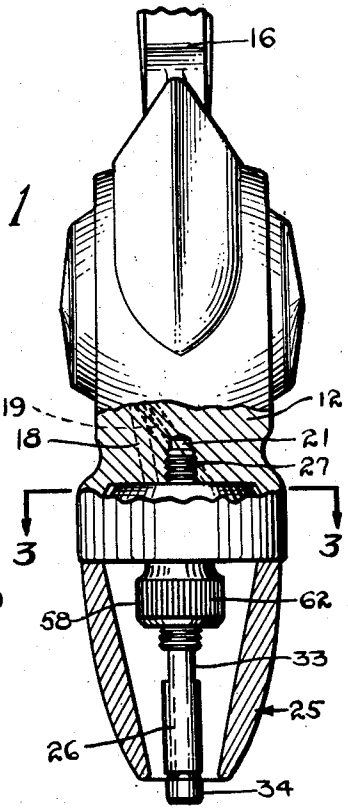


Fig. 1

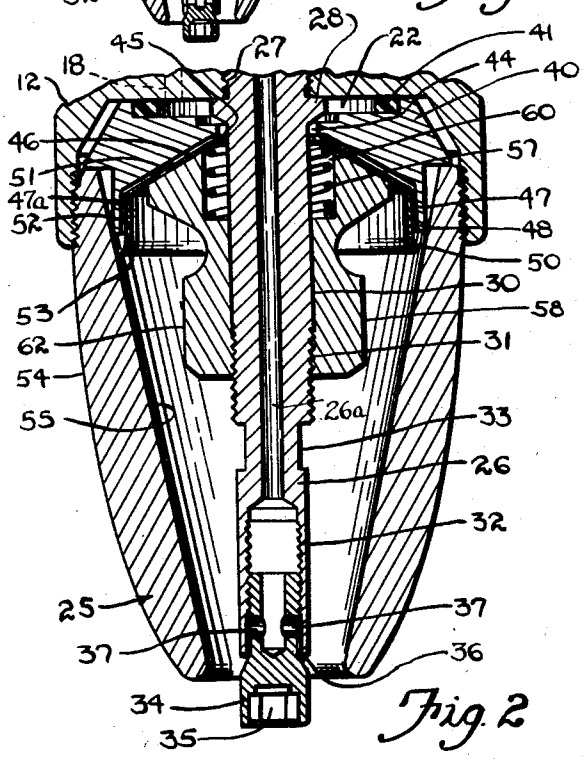


Fig. 2

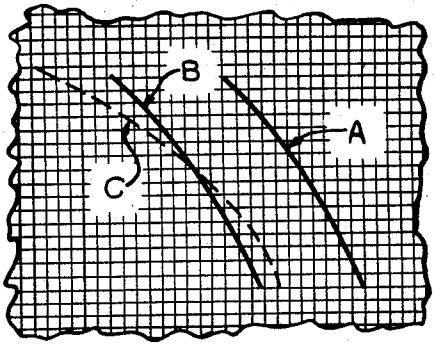


Fig. 5

INVENTORS.
Harlow E. Allshouse
BY Lewis E. Mendonca
Graham D. Harbaugh
Atty.

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CARBONATED BEVERAGE DISPENSER

Harlow E. Allshouse, Chicago, and Lewis E. Mendonca, Mount Prospect, Ill., assignors to The Bastian-Blessing Company, Chicago, Ill., a corporation of Illinois

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16 Claims. (Cl. 239—407)

This invention relates to the dispensing of carbonated water with or without syrup in the making of beverages, and particularly to an improved nozzle to discharge the carbonated water or beverage into a glass under controlled conditions with either high or comparatively low carbonation.

It has long been the quest of carbonation engineers to attain higher and higher percentages of carbonation in order to provide the ultimate in carbonated beverages. Although percentages attained yesterday are exceeded today, and today's percentages may be exceeded tomorrow, the present invention provides a retained carbonation in the beverage which exceeds anything heretofore believed possible. The percentage is so high that with some syrups such as root bear, the foaming is so great that the carbonation has to be knocked out of the water as it is dispensed, so that the drink is not too rich in syrup.

By way of a better understanding of the invention, in soda fountains where carbonated beverages are dispensed, the carbonator and carbonated water are refrigerated to approximately 36°. The water is pumped into the carbonator and CO_2 injected therein with or without substantial agitation depending upon the type of carbonator used.

The carbonated water is educted along a path subjected to refrigeration which preferably includes a water cooler and is dispensed at a draft arm where the flow of the water is spread out along a widening walled path to slow its movement with the least amount possible of any agitation which would cause loss of carbonation during the brief time that the effective pressure on the water is being reduced to atmospheric pressure.

We have discovered that over-carbonation in the water is an undesirable waste of CO_2 gas because it also generates bubbling and agitation while the water flows along its pressure-reducing path. The excess CO_2 that escapes from the water with reduction in pressure accelerates flow movement rather than permitting the flow of water to be slowed down over a widening path. On the other hand, a certain amount of ebullition occurs due to increasing water temperatures derived from the nozzle parts as the water leaves the valve and flows at decreasing pressure into a glass.

One of the objects of the present invention is to provide a water flow retarding path or throat area of substantially uniform cross section immediately following a path of increasing volume whereby the path of uniform sectional throat area counteracts the effect of CO_2 which escaped from the water while it was passing through the widening path.

A further object of the invention is to provide a thin sheet metal stamping member as one frictional wall of the path followed by the water so that very little heat is present at any time to be absorbed by the water during the dispensing operation.

In those drinks where the syrup causes a great deal of ebullition, users of the draft arm, in order to reduce foaming yet save dispensing time, have resorted with little

success to a variety of devices or mannerisms to reduce excess foaming when drawing a drink.

Consequently, having attained an unusually high percentage of carbonation, a further object of the invention is to provide, with everything else remaining the same, a nozzle which is adjustable to remove carbonation by increased agitation of the water before the carbonated water is mixed with certain syrups so that a full drink can be drawn without any waste of time.

Furthermore, when syrup has been dispensed simultaneously with the carbonated water, some difficulty has been experienced with the nozzle element not being clean between uses.

A further object of the invention is to provide a metering syrup port which is washed clean by the carbonated water passing or ebulliting through the lower part of the syrup passage so that any syrup remaining there is either washed away from behind the outlet openings or diluted sufficiently so as not to thicken or harden enough to restrict the portion.

The invention is also characterized by the breaking up of the syrup dispensed into fine streams directed laterally into downflowing carbonated water as it drops by gravity out of the mouth of the nozzle so that the syrup is dispersed for intimate intermingling and mixing with the carbonated water with little loss of carbonation.

The invention also contemplates a construction and arrangement of parts which is easy to assemble, use, disassemble, clean and reassemble by digital manipulation without disturbing or changing its working characteristics.

These being among the objects of the invention, other and further objects and advantages will become apparent from the drawings, the description relating thereto and the appended claims.

In the drawings:

Fig. 1 is an elevation partially in section showing the construction of a typical draft arm provided with a nozzle embodying the invention.

Fig. 2 is an enlarged section showing the internal arrangement of the nozzle.

Fig. 3 is a horizontal section taken upon line 3—3 in Fig. 1.

Fig. 4 is a side view partially in section of the preferred embodiment adjusted to provide low carbonation, and

Fig. 5 is a comparison of carbonation performance expressed in curves.

In the preferred embodiment of the invention the carbonated water is conducted through a conically diverging passageway between already spaced walls, one of which is defined by a stainless steel sheet metal stamping of low heat conductivity. The passageway terminates in a downwardly extending cylindrical passageway which leads to an outwardly turned lip on the sheet metal member. This lip partially redirects the flow to the inwardly converging conical wall of a low heat conductive plastic nozzle member which carries the water over the laterally-opening discharge ports of a syrup conduit where the water can wash the syrup ports to keep them clean.

The position of the sheet metal member can be lowered to increase the cross-sectional area of the conical portion of the passageway to knock out carbonation when desired.

Reference is hereby made to the Mendonca No. 2,657,952, Steczynski No. 2,056,986 and McMahon No. 2,521,472 patents for ancillary details and arrangement of parts in a soda fountain which are of interest with respect to the present invention.

In the drawings, a draft arm is illustrated having a curved goose-neck **11** having an enlarged body portion **12** at its upper end which houses the various valve elements. A conduit (not shown) within the goose neck conducts carbonated water to a carbonated water passage **18** in the head portion. A passageway **19** is also provided

in the head portion for syrup. When the handle is in its upright or "off" position, both passages are closed. When the handle **16** is moved either forwardly or backwardly from the "off" position carbonated water is supplied through conduit **18** to the recess **22** in the bottom of the body **12**. When the handle is moved forwardly syrup is supplied through passage **19** to the axial passage **21** in the bottom of the body. In only the forward position of the handle is the syrup passageway opened for flow of syrup therethrough. Thus a movement of the handle rearwardly dispenses only carbonated water whereas movement of the handle forwardly dispenses carbonated water and syrup, both the syrup and carbonated water being supplied under pressure by means not shown.

The nozzle **25** which handles the syrup beyond the valve comprises a stem **26** threaded at its upper end **27** and having a passageway **26***a* therethrough to be received in sealed relationship with the passage **21** by the joint made between the bottom of the recess **22** and the upper shoulder of the radial flange **28** on the stem. Below the flange, the stem is cylindrical and smooth for a short distance as at **30**. The stem below the cylindrical surface is externally threaded as at **31** and internally threaded at the lower end at **32**. Flats **33** upon the sides of the stem providing wrenching surfaces and a distributor plug **34** is received in the lower end where it is located for vertical adjustment by means of an Allen wrench socket **35** at its lower end. The surface of the plug co-operating with the opening at the lower end of the stem is conical so that between the margins of the opening and the conical surface a circular flow area or port **36** may be varied at will to control the flow of syrup from the syrup tank at the nozzle without disturbing the syrup tanks and other connections.

The stem has an opening through the center thereof and communication with the port **36** is had through radial openings **37** in the wall portion of the plug where it overlaps the stem.

Once the stem is threaded into place upon the gooseneck body **12** a collar **40** is slipped upwardly into place having a flange seal **41** marginally on its upper surface engaging the body **12** in sealed relationship. The center opening **42** of the collar is broached to accommodate guide lands **43** engaging the walls of the stem in guided relation and grooves **44** for the passage of the carbonated water. Below the opening **42**, the collar umbrellas outwardly horizontally around the center opening **24** and downwardly to provide a surface first upon a horizontal plane at **45**, then along a frusto conical surface at **46** which terminates in a downwardly extending cylindrical wall **47** defined by a circumferential flange **48**.

Below the collar is provided an umbrella guide **50** telescoping on the stem and nesting within the collar with a clearance of .003" between the upper face thereof and the flow surface face of the collar to define an annular passage. Preferably this guide **50** is a sheet metal stamping of stainless steel dimpled upwardly at **51** at three places around the guide to provide the .003" clearance within in very close tolerances. The apron **52** of the guide, however, extends below the flange **48** and curves outwardly below the flange as at **53**.

In this connection, it is of interest to note that the collector **54** which preferably is formed of plastic is threaded at its upper end for attachment at the bottom of the draft arm body **12** and its inner collecting surface **55** passes close to the lip of the outward curve **53** to receive the carbonated water therefrom in gravity flow relationship. It is preferred to make the collector **54** of plastic material for it has been found that it conducts less heat to the chilled carbonated water from the room and is less likely to cause breakage if struck by a glass. The inside wall **55** of the collector is preferably frusto-conical in shape, to define roughly an included apex angle of 25° so that the lower end passes close to the lower end of the stem **26** when the carbonated water washes past the outlet **36**.

The guide **50** is preferably held in place by a compression spring **57** and locknut assembly **58**. The locknut is received upon the threaded portion **31** of the stem, and when tightened, it positively holds the guide rigidly in place. However, the compression spring is received in a cavity **60** to urge the guide into place whenever a looseness of the locknut places such burden upon the spring. Thus, whenever the locknut is loosened as knurled at **62** for that purpose, the guide **50** is free to drop down to the extent permitted by the spring and the looseness.

The effort of the spring is not heavy and its effect is relaxed completely upon a couple of back-off turns of the locknut.

The drawing is to scale and the outside diameter of the cylindrical portion **52** of the guide is $1\frac{1}{16}$". The remaining dimensions are in proportion.

In operation, as already mentioned either carbonated water or carbonated water and syrup can be dispensed selectively from the draft arm depending upon the position of the handle on either side of its middle upright position.

Whenever carbonated water is flowing, it flows freely through the broached opening and grooves to the horizontal portion **45** where the flow area begins to expand. Thus a rapid reduction of pressure begins, followed by a less gradually increasing flow area over the conical portion **46** which is inclined to the vertical at approximately 57°. The flow of the carbonated water is frictionally slowed down quite measurably and with 100 pounds applied pressure of CO_2 in the carbonator of a non-agitating type, little if any surplus CO_2 gas is released in the flow reducing passageway, there being enough clearance to accommodate some ebullition.

In order, however, to assure gravity flow of the carbonated water, the cylindrical portion **47***a* of the passageway applies further friction on the carbonated water so that it will flow by gravity over the lower portion of the cylindrical portion of the guide, and then flow outwardly gently against the collector wall and downwardly to recollect at the bottom thereof where it passes into a glass held below the nozzle.

When syrup is being dispensed, adjustment of the plug **34** will restrict the port opening enough that syrup will be spread evenly around the plug with some ejective force to drive the syrup into the path of flowing water. Both are intimately mixed without any syrup sugar concentration in portions of the carbonated water that would cause localized extensive ebullition.

In those instances where syrups such as root beer cause great amounts of ebullition, the carbonation of the draft arms described is much too high and the locknut **58** can be backed down by hand so that the flow retarding characteristic is diminished and carbonation is knocked out of the water by sufficient flow agitation above the lower lip of the spray guide that substantial amounts of CO_2 gas will be liberated and downward flow of the carbonated water along the collector wall will be initially accelerated.

Once the water passes the lip of the guide in either instance it is frictionally retarded by the wall even though gravity has a tendency to accelerate its downward movement. However, the length of this wall is not critical within limits of good appearance since the carbonated water is slowed to gravity speed at the lip of the guide. The slowing of the water to mere gravity flow at the lip of the guides accomplishes the carbonation-saving characteristic of the draft arm nozzle. Moreover, the distance between the lip edge and the collector is not critical so long as the area for high carbonation water is enough to permit free flow of the carbonated water and not too much to cause the water leaving the lip to drop any substantial distance before it comes in contact with the collector surface.

Where CO_2 volumes of 4.1 to 4.3 have been attained in the Mendonca construction under predetermined conditions, volumes of 5 or more have been attained with the present invention under the same conditions. By way

of comparison in actual working conditions with the same plastic nozzle member and some agitation occurring after the water left the nozzle, Fig. 5 shows the comparative curves of CO_2 content, the difference in the slope of the curves being an index to the relative efficiency of the respective nozzles.

The temperature is shown in the vertical axis and the relative CO_2 along the horizontal axis. The curve A indicates the CO_2 content with the locknut tightly in place. Curve B shows the results with the locknut backed off two turns of a 24 N.F. two-thread at 31. Curve C indicates the results attained with the Mendonca nozzle with like input of water subjected to 100 lbs. of CO_2. The relative increased content with higher temperatures indicate the non-agitative content with mere gravity flow established at the lip of the guide. At 125 lbs. of CO_2, Mendonca can reach 4.3 volumes, but the curve A also is higher, being 5. which is above the 4.7 volume which heretofore has been considered the maximum possible at 40° F.

Although the flare of the lip 53 may be reduced somewhat, the cylindrical wall 47 and the lower extending apron of the guide are shown in their optimum relationship for quieting the flow of the carbonated water for maximum carbonation.

The initial reduction of pressure being at the entrance of the horizontal portion 45, appreciably greater or lesser flow pressure in the carbonated water is not critical since the opening is unyielding. Thus, for highest carbonation there is ample flow slowing area present to handle CO_2 pressures above the pressures indicated.

Consequently, having described the preferred embodiment of the invention and the relative relation of the parts it will be apparent to those skilled in the art how the objects are attained and how various changes can be made therein without departing from the spirit of the invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. A draft arm nozzle comprising a body having a central syrup passageway and a carbonated water passageway, a stem having a passageway in communication with said syrup passageway, an adjustable plug in the lower end of the stem for metering the flow of syrup from said stem, an element in said body having a lower wall defining a downwardly facing cavity having a central horizontal section, an outwardly and downwardly frusto-conical intermediate section and a depending outer section, a guide mating with said lower wall in nested spaced relationship to define an annular passage and terminating downwardly beyond said depending section in a downwardly and outwardly flaring lower edge and a collector member covering and spaced from said lower edge and stem.

2. A draft arm nozzle comprising a body having a central passageway for syrup and another passageway for carbonated water, a stem having a passageway in communication with said syrup passageway and an adjustable plug in the lower end thereof for metering the flow of syrup from said stem, a collar received upon said stem to engage said body in sealed relationship and having a passage therethrough in communication with the passageway for carbonated water, said collar having a lower wall defining a central horizontal section, a downwardly and outwardly frusto-conical intermediate section and a cylindrical outer section, a guide received on said stem mating with said lower wall in nested spaced relationship to define a downwardly opening passage therebetween and terminating below said cylindrical wall in an outwardly flaring lip, and a collector covering said lip in close proximity therewith and said stem and supporting said collar against said body in sealed relationship.

3. A draft arm comprising a body having a central passageway for syrup and another passageway for carbonated water, a stem having a passageway in communication with said syrup passageway, means in the lower end of the stem for adjusting the amount of flow of syrup from the lower end of the stem, a collar received on said stem whose lower wall defines a downwardly facing cavity having a central horizontal section, an outwardly and downwardly frusto-conical intermediate section and a depending cylindrical outer section, a guide slidably received on said stem and mating with said lower wall in nested closely spaced relationship therewith to define an annular passage and terminating below said cylindrical wall, and a collector nozzle having a tapering surface in close proximity to said cylinder wall and extending in close proximity to the lower end of said stem.

4. A draft arm nozzle comprising a body having a passageway for carbonated water therethrough, an element in said body whose lower wall defines a cavity having a central horizontal section, an outwardly and downwardly frusto-conical intermediate section and a cylindrical outer section; a guide member mating with said lower wall in nested spaced relationship therewith to define an annular passage and terminating downwardly beyond said cylindrical wall in an outwardly flaring lip; and a tapering collector member covering said lip in close priximity and extending downwardly therefrom.

5. A draft arm nozzle comprising a body having a passageway for carbonated water therethrough; a stem member secured to the body; a collar received on said stem whose lower wall defines a cavity having a central horizontal section, an outwardly and downwardly frusto-conical intermediate section and a cylindrical outer section; a guide of low heat conductive material mating with said lower wall in nested closely spaced relationship therewith to define an annular passage and terminating downwardly beyond said cylindrical wall in an outwardly flaring lip; adjustable means received on said stem engaging said guide in rigidly supported relationship; resilient means intermediate said adjustable means and guide, and a tapering collector member supporting said collar in sealed relationship with said body and covering said lip in close proximity and extending downwardly therefrom.

6. A draft arm nozzle comprising a body having a recess in the bottom face thereof and a passageway for carbonated water therethrough terminating in said recess, a collar member received in said recess and having a bottom wall defining a cavity having an outwardly and downwardly frusto-conical section and a depending outer section, a guide member mating with said lower wall in nested relationship therewith to define an annular passage and terminating below said depending wall in a downwardly extending lip, means carried by one of said members releasably for supporting the two members in closely spaced relationship, and a tapering collector element covering said lip in close proximity and said guide member and extending downwardly therefrom.

7. The combination called for in claim 6 in which the guide member and collector element are made of a material having low heat conductivity.

8. The combination called for in claim 6 including an adjustable element for supporting said members rigidly with respect to each other.

9. The combination called for in claim 6 in which the collector member engages the body to support the collar in place for ready removal and cleaning and to locate the lip a predetermined distance within said tapered collector element.

10. A draft arm nozzle comprising a body having a passageway for carbonated water therethrough, a collar having a downwardly facing cavity terminating marginally in an internal cylindrical wall, a depending stem secured to said body, a guide received on said stem mating with said surface in nested relationship therewith and terminating below said cylindrical wall, releasable

means received on said stem for supporting said guide, a tapering collector means covering the guide and extending downwardly therefrom for supporting the collar in releasable relationship.

11. A draft arm nozzle comprising a body having a central passageway for syrup and another passageway for carbonated water, a stem having a passageway in communication with said syrup passageway, an adjustable plug in the lower end of the stem for controlling the flow of syrup from said stem, an element in said body having a lower wall defining a cavity having a central horizontal section, an outwardly and downwardly frusto-conical intermediate section and a cylindrical outer section, and a guide mating with said lower wall in nested spaced relationship and a collector member covering said stem.

12. A draft arm nozzle comprising a body having a central passageway for syrup and another passageway for carbonated water, a stem having a passageway in communication with said syrup passageway, an element in said body having a lower wall defining a central horizontal section, an outwardly and downwardly frusto-conical intermediate section and an inwardly cylindrical outer section, and a guide mating with said lower wall in nested spaced relationship.

13. A draft arm nozzle comprising a body having a central passageway for syrup and another passageway for carbonated water, a stem having a passageway in communication with said syrup passageway, an element in said body having a lower wall defining a central horizontal section, an outwardly and downwardly frusto-conical intermediate section and an inwardly cylindrical outer section, a guide mating with said lower wall in nested relationship and having an outwardly flared lip below said cylindrical section, and a collector member covering said lip and stem.

14. A draft arm nozzle comprising a body having a passageway for carbonated water therethrough, a collar having a cavity terminating marginally in an inner cylindrical wall, a depending stem secured to said body, a guide received on said stem mating with said cavity in nested relationship therewith and terminating below said cylindrical wall, and a tapering collector means covering the guide and extending downwardly therefrom for supporting the collar.

15. A draft arm nozzle comprising a body having a passageway for carbonated water therethrough, a collar having a cavity terminating marginally in an inner cylindrical wall, a depending stem secured to said body, a guide received on said stem mating with said cavity in nested relationship therewith and terminating below said cylindrical wall, releasable means received on said stem for supporting said guide, and a tapering collector means covering the guide and extending downwardly therefrom for supporting the collar in releasable relationship.

16. A draft arm nozzle comprising a body having a passageway for carbonated water therethrough, a collar having a cavity terminating marginally in an inner cylindrical wall, a depending stem secured to said body, a guide received on said stem mating with said cavity in nested relationship therewith and terminating below said cylindrical wall, spring means received on said stem for supporting said guide, and a tapering collector means covering the guide and extending downwardly therefrom for supporting the collar in releasable relationship.

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