LIQUID DISPENSING, DISPOSABLE CONTAINER FOR USE WITH A BEVERAGE DISPENSER

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References Cited
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ABSTRACT
A liquid dispensing system including a can open at the bottom and having a cover closing the bottom and made of a flexible material. A nipple connected to the cover extends downwardly from it and is normally closed and remains closed under the head of the liquid in the container. The nipple opens when the pressure in the container exceeds the external pressure at the nipple. A rigid back up plate lies behind the cover and has a sleeve which supports the nipple. The can may typically contain chocolate syrup and be used in a counter-top dispenser for hot chocolate.

14 Claims, 3 Drawing Figures
LIQUID DISPENSING, DISPOSABLE CONTAINER FOR USE WITH A BEVERAGE DISPENSER

RELATED APPLICATION

This application is a continuation of application Ser. No. 36,863, filed May 13, 1970 and now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to liquid dispensing systems and beverage dispensers and more particularly comprises an improvement over the system shown in our copending application Ser. No. 887,671 filed Dec. 23, 1969 entitled HOT LIQUID DISPENSER. In the following description the invention is described particularly as it may be used in a hot chocolate dispenser but it is to be understood that the invention has other applications.

Many hot chocolate dispensers store liquid chocolate concentrate in a hopper (or bowl), conveniently located on the dispenser for easy access and refilling. In those dispensers which utilize a hopper, the hopper must have a lid to protect the contents from contamination, and it must be easily removable to facilitate replenishment of the syrup supply. Those dispensers which utilize gravity feed for the chocolate must provide unrestricted flow so that the chocolate and hot water may be accurately metered so as to render uniform product. In many such devices, means have been incorporated to assist the flow so as to preserve accuracy. These means have taken the form of progressive cavity screws and plungers. In hot chocolate dispensers of this type, it has also been common practice to employ electric heaters around the hopper to reduce the viscosity of the syrup so that it can more freely flow in the system.

The best of the hopper-type dispensers are incapable of providing maximum protection for the syrup, and a skin forms due to the evaporation of the volatile components of the syrup and results in a degradation of the syrup quality.

Many of the better syrup concentrates contain dairy products to improve their flavor and texture, and these concentrates are susceptible of spoilage when stored without refrigeration when the concentrates are exposed to the air. The spoilage of course is a function of time and temperature. Consequently during periods of slow use it is common to lose a substantial amount of syrup due to spoilage. And universally users of beverage dispensers in which the syrup is stored in a hopper suffer the spoilage rather than spend the necessary time to withdraw the syrup from the hopper so as to refrigerate it.

In our copending application, supra, a beverage dispenser is shown which utilizes the syrup can as a disposable hopper. A removable cover is attached to the can and a dip tube extends into the can through the cover to withdraw the syrup. While the dispenser shown therein constitutes a substantial advantage over the various arrangements described above, the system in accordance with the present invention provides several additional advantages, which will become clear from the following detailed description.

One object of this invention is to provide a liquid dispensing system which provides a sealed container for the liquid and which allows the liquid to be withdrawn from the container readily on demand.

Another object of this invention is to provide a liquid dispensing system which provides a sealed container for the liquid, which affords easy withdrawal of the liquid from the container, and does not allow any of the container contents to drip from it after intentional withdrawal has stopped.

Yet another object of this invention is to provide a syrup storage system for beverage dispensers, which may readily be removed for refrigeration.

To accomplish these and other objects, the beverage dispenser of this invention includes a can of flavor syrup closed by a flexible lid which covers one end thereof. A nipple that serves as a check extends from the lid and is normally closed with the can in an inverted position, even under the head of the liquid in the can. It opens only when a differential pressure is applied between the exterior of the nipple and the can interior. A rigid back-up plate is contained within the lid and has a sleeve which supports the nipple. A fitting is provided on the platform which supports the can, which receives the nipple to form a coupling between the can and the syrup feeding system in the dispenser.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective view partly in section of a beverage dispenser constructed in accordance with this invention;

FIG. 2 is an enlarged cross sectional view of a detail of the dispenser shown in FIG. 1; and

FIG. 3 is a fragmentary cross sectional view suggesting an alternative arrangement to that of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The beverage dispenser shown in the drawing is closely allied to the dispenser shown in our copending application, supra. Like the dispenser shown in that application, the dispenser of the present invention includes a housing 10 that contains a syrup delivery circuit 12 as well as a water delivery circuit (not shown) and an electrical control circuit (not shown). The water delivery circuit and the electrical control circuit may be identical to that in our copending application and are incorporated by reference. The housing 10 has a drip tray 18 attached to the bottom of its front wall and a mixing assembly 20 mounted above the tray. The assembly 20 is shown and described in detail in copending application Ser. No. 682,343 filed Nov. 13, 1967 entitled Hot Beverage Dispenser. Included as part of the syrup circuit and water circuit is a reserve cylinder and water control assembly 22 attached on the inside of the housing 10 to the front panel 24. The syrup circuit 12 is shown in FIG. 1 isolated both from the electrical circuit and the water circuit for clarity.

In FIG. 1 syrup can 30 is shown supported on shelf 32 forming part of the housing 10. A hood (not shown) which forms part of the housing and is shown in our copending application, supra, ordinarily covers the can 30 so as to hide it from view when the dispenser is in its normal operating condition.

In FIG. 1, the can 30 is shown connected by means of duct 34 to cylinder 36 of positive displacement pump 38 forming part of the syrup circuit. The means by which the duct 34 is connected to the can 30 comprises an important aspect of this invention and is described in substantial detail below particularly with reference to FIG. 2.
The positive displacement pump 38 includes a piston 40 moveable in the cylinder 36 and carried on the end of piston rod 42 which in turn is operated by crank 44 connected to the rotating cam 46 driven by the cam motor 48. As the cam rotates, the crank 44 moves the piston 40 up and down in the cylinder during each revolution. The pump 38 is shown in the drawing to be mounted on partition 50 in the housing 10.

The outlet duct 52 of the pump 38 is connected to the reserve cylinder and water control assembly 22, whose syrup outlet duct 53 in turn extends out of the housing to the mixing chamber 20. The duct 53 carries a check valve 54 at its discharge end to prevent air or other matter from entering the duct 53 and fouling or contaminating the syrup circuit as well as for cutting off flow at the end of the pump cycle to eliminate afterdrip.

The syrup circuit described above is substantially identical to that shown in our copending application supra. The can 30 and facility for coupling the can to the duct 34 is markedly different from that shown in our copending application, and the differences are described in detail below.

In FIG. 2, the can 30 is shown to have an open bottom end 60. The can may be opened by a common electric or manual knurled wheel drive can opener or any other convenient tool. The open end 60 of the can is covered by a lid 62 having a closure wall 64 and an upwardly extending peripheral skirt 66 which lies about the outer surface of the lower end of the cylindrical wall of the can. A pair of tabs 68 extend from opposite sides of the top edge of the skirt 66 to facilitate removal and installation of the lid 62.

A dispensing nipple 70 in the form of a duck bill check is formed at the center of the closure wall 64. The nipple 70 has a generally cylindrical body 72 which terminates in converging walls 74 and a downwardly extending central flaps 76. The flap 76 is cut as shown at 78, but no material is removed so that no stresses are applied to the nipple and the flaps are engaged to close the cup or slit and prevent flow through the nipple.

A second nipple 80 in the form of a duck bill check extends upwards from the closure wall 64 of the lid adjacent its periphery and has a cylindrical wall 82, converging wall 84 and flap 86 with a slit 88, that may be identical to the corresponding parts of the nipple 70.

A backup plate 90 lies within the closure wall 64 of the lid 62 and has an opening 92 through which the nipple 80 extends into the interior of the can 30. The periphery 94 of the backup plate 90 rests on the bead 61 of the can 30 to provide stiffness for the lid 62 and perform other functions which are described in greater detail below. The backup plate 90 also carries as an integral part thereof a cylindrical sleeve 96 which fits within the nipple 70 and supports it in the position shown. The sleeve 96 has a bead 98 on its outer surface, which stretches the nipple 70 and forms a corresponding bead 100 on the nipple wall 72 for reasons which will also become apparent below.

A check housing 102 is mounted on the platform 32 of the dispenser housing 10, and its lower end 104 of reduced diameter is connected to the end of the duct 34 which carries the syrup from the can 30 to the pump 38. The check housing 102 is sized to receive the nipple 70 when supported on the sleeve 96, and a circular seat 106 is provided on the inner surface of the housing 102 so as to receive the bead 100 formed in the nipple 70 by the corresponding bead 98 on the sleeve 96.

Typically the can 30 may be a number 10 size, and after the can is opened, lid 62, previously assembled on the backup plate 90, is installed over the open top of the can. The can is subsequently inverted on the platform 32. The lid is preferably sized so that there is an interference between the skirt 66 of the lid and the can. The interference fit and the rolled bead 61 on the can prevent leakage of the contents when the can is inverted. By utilizing an elastomeric material for the lid it is possible to make the lid slightly smaller than the can diameter, thus requiring the lid to be stretched over the can.

The metal backup plate 90 serves a dual purpose, namely, it prevents the lid from distorting during mounting of the can on the dispenser, and it prevents the lid from distorting due to the external atmospheric pressure applied to the can during dispense cycles when syrup is drawn from the can by the dispenser pump.

In operation, the nipples 70 and 80 perform two separate but interrelated functions. By making the slits 78 and 88 sharp and cleanly defined slices, without removing material, thin hair-line size slits are formed which will close by elastomeric memory once the sitting knife or tool used to form it is removed. Thus, each nipple serves as a check valve which will not leak liquid during normal gravity feed conditions.

The nipple 70 serves as a unidirectional flow check valve in the syrup inlet to the pump. During a pump suction cycle, the partial vacuum is drawn on the syrup system which causes the syrup check or nipple 70 to open due to the influence of the pressure difference across the tapered portion 74. Since the pump is double acting, that is, it both pumps and refills by vacuum draw. During the dispense cycle the pressure in the syrup circuit causes the nipple 70 to close tightly. During the refill cycle a partial vacuum is drawn on the system within the housing 102 about the cone-shaped end 74 and thus the slit 78 opens allowing syrup to flow out of the can into the syrup circuit. That is, when the piston 40 moves down, it draws syrup from the can into cylinder 36, and when it rises, the pump discharges the cylinder contents to the control assembly 22 as described above in our copending application, supra.

Each time the syrup is removed from the can 30, a partial vacuum develops in the can causing the nipple 80 to open and thus bleed air into the can to relieve the vacuum. Thus it is seen that the two nipples keep the system in pressure equilibrium during the dispense cycle.

The backup plate 90, particularly with its sleeve 96 for the nipple 70, prevents the nipple from collapsing when it is inserted in the check housing 102 on the platform 32. The bead 98 on the sleeve 96 forms the corresponding bead on the nipple 70 which in turn serves as an O-ring when the can is mounted in place. The O-ring forms a seal against the seat 106 on the inner surface of the housing 102 to prevent leakage. The bead also holds the lid with the can on the machine. When the can is nearly empty, pressure within the housing 102 could blow the can with the lid off the machine in the absence of some positive engagement of the nipple in the housing. The bead and seat also serve to offer a positive seated position for the syrup can, much the same
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5 as a detent, and a positive "feel" results when the can is properly positioned with the nipple 70 in the housing 102.

While in the system described, the syrup is drawn from the can 30 by the application of a vacuum in the chamber 103 of housing 102 about the nipple which in turn causes a pressure differential between the external pressure on the nipple 70 and the pressure within the can 30, it is to be understood that syrup could be forced from the can 30 by applying a positive pressure in the can in place of or in addition to the vacuum within the chamber 103 of housing 102. Such an arrangement is suggested in FIG. 3. In that figure, it will be noted that a duct 110 is suggested as being inserted in the cylindrical portion 82 of the nipple 80, and the duct 110 in turn is connected to a positive pressure pump 112. In such an arrangement, actuation of the pump 112 pressurizes the interior of the can 30 above the chocolate and forces the chocolate out the nipple 70. Thus it will be appreciated that while the pump 38 forms a suction to reduce the pressure on the outside of the nipple 70 within chamber 103 of housing 102, as an alternative or as a supplement, a pump could be created to create excess pressure in the can to discharge syrup. The differential pressure between that in the can and within the housing 102 about the nipple 70 is what causes the nipple 70 to open. The head of the liquid in the can itself is not sufficient to open the nipple.

The arrangement described has many advantages. For example, the nipple 80 in the system shown in FIGS. 1 and 2 serves as a continuous air vent check to maintain the inside of the can at pressure equilibrium. As syrup is drawn from the can, the partial vacuum created is relieved by air which bleeds through the nipple 80. By locating the nipple 80 remote from the nipple 70, the possibility of entraining air from the nipple 80 to the nipple 70 as syrup is being withdrawn during the pump cycle is eliminated.

A very important advantage of this system is the protection of the contents during storage as well as use. Canned products in general are thermally processed to inactivate enzymes and bacteria. Thus the canned contents are virtually sterile. But when the can is open, some other means must be provided to protect the canned contents if the life of the contents is to be prolonged. It is apparent that the sealed closure defined by the lid 62 serves to preserve the taste, odor, and general consistency of the syrup, with no skin-over. Although air is admitted to the can as syrup is drawn off, the volatile components of the syrup are trapped within the can so as to establish an equilibrium of liquid vapor, and minimize if not eliminate degradation of the contents.

As yet another desirable feature of this invention, when the use rate of the syrup is low, during overnight or weekend periods, the can 30 with the lid attached may be simply lifted from the machine and placed in a refrigerated storage compartment. This is particularly desirable when the syrups include dairy products such as cream in them.

In our copending application supra, the ease with which a system may be cleaned has been described. It is apparent that in the present application cleaning may be achieved just as readily merely by replacing the can 30 of syrup with a can of cleaning solution.

As yet another advantage of this invention, the lid serves to seal in the essential ingredients of the syrup in the can. Chocolate syrups do vary considerably from one manufacturer to another due at least in part to the desire of the manufacturers to achieve a flavor unique to their own products. The uniqueness in flavor is due in part to the flavor and odor producing ingredients in the syrup. And they are normally additives. To maintain these additives in intimate contact with the products during the entire time of use so as to in turn achieve a more consistent drink from the first to the last serving, the sealed cover for the can is necessary, and such sealing is achieved with this invention. The seal is achieved by means of the lid 62 even when the can is bent. The elastomeric material of the lid conforms to can distortion and seals against a relatively uneven or rough can surface.

While in the foregoing description the system for dispensing the can contents has been described in connection with a beverage dispenser, it is to be appreciated that the same combination of can and lid with backup plate and pump could be used to dispense other liquid products in the food line. For example, preserves and jellies could readily be dispensed from a can with this arrangement. The pressure differential on the dispensing nipple may be achieved either by pressurizing the can or by creating a vacuum about the nipple.

Having described this invention in detail, we claim:

1. A liquid dispensing system adapted to draw liquid contents from a disposable container open at a rim at one end comprising a lid having a closure wall and having a skirt made of a flexible material designed to fit over the open end of the container and form a seal about the open container end, a nipple connected to the closure wall and extending from the wall away from the container, said nipple being normally closed and remaining closed under the head of the liquid in the container when the container is oriented with its open end facing down, a rigid backup plate disposed against the closure wall of the lid and adapted to lie over the rim of the open end of the container when the lid is mounted on said container so as to prevent inward movement of said closure wall, said nipple carrying means for connecting the nipple to a duct for conveying the liquid to a desired location.

2. A system as defined in claim 1 further characterized by venting means forming part of the lid for venting the container.

3. In combination with the system of claim 2, pump means connected to one of the nipple and venting means for creating a differential pressure between the interior of the container and the outside of the nipple causing the nipple to open and liquid to flow through it.

4. In the combination of claim 3, said venting means being a second nipple connected to the closure wall and extending into the container and through the backup plate and being exposed to the atmosphere, said second nipple being normally closed and opening when the pressure within the container reaches a preselected value below atmospheric so as to allow air to enter the container.

5. In the combination of claim 3, said pump means being a vacuum pump connected to said first-mentioned nipple for reducing the pressure about the outside of the nipple.
6. A liquid dispensing system as described in claim 1 further characterized by:
a sleeve forming part of the backup plate and extending into the nipple for supporting it,
a bead formed on the sleeve and forming a corresponding bead on the nipple when the plate is assembled with the sleeve in the nipple,
a fitting for receiving the nipple and forming a seal with its outer surface, said fitting being capable of connecting the nipple to a duct for conveying the liquid to a desired location,
and a seal in the inside of the fitting for gripping the bead on the nipple when the container is mounted with the nipple in the fitting.

7. A liquid dispensing system comprising:
a cylindrical drum for containing liquids, open at one end and closed at the other,
a lid having a closure wall extending over the open end and having a skirt engaging the cylindrical wall of said drum, said lid sealing the open end closed,
a nipple extending outwardly from the closure wall of the lid and having a closure biased to a closed position when the atmospheric pressure within the drum and outside the closure are equal and maintaining its closed position under the head of a liquid in the container when the drum is oriented with the lid down,
pump means secured to the lid for creating a greater pressure in the drum than outside the closure causing flow of the liquid from the drum through the nipple,
a means comprising a unidirectional flow valve for communicating with the interior of said drum to permit simultaneous adjustment of pressure in said drum when said pump means is operative to cause flow through said nipple,
said lid being made of flexible rubber-like material and said nipple being formed as an integral part thereof,
and a rigid plate disposed against the closure wall of the lid and operatively engaging the open end of the drum.

8. A liquid dispensing system as described in claim 7 further characterized by:
a sleeve connected to the plate and extending into the nipple,
said nipple having converging sides and a slit at the end which forms the closure.

9. A liquid dispensing system as described in claim 7 further characterized by:
said means comprising a unidirectional flow valve being formed on the lid for allowing air to bleed into the drum when its internal pressure is less than atmospheric.

10. A liquid dispensing system as described in claim 9 further characterized by:
a fitting receiving the nipple internally with the drum in an inverted position and with the lid down, and said pump means including a suction pump secured to the fitting and reducing the pressure outside the closure to open it.

11. A liquid dispensing system as described in claim 9 further characterized by:
said means comprising a unidirectional flow valve comprising a second nipple formed as part of the lid and extending into the drum.

12. A liquid dispensing system as described in claim 11 further characterized by:
said pump means being connected to the second nipple for pressurizing the interior of the drum.

13. A beverage dispenser comprising:
a housing, a container for carrying liquid flavor syrup, said container having one open end and a closed end, means for mounting said container on said housing, a lid having a closure wall extending over the opened end and having a skirt engaging the wall of said container, said lid sealing the opened end closed and being removable from said container,
a check valve extending outwardly from the closure wall of the lid and having a closure in a closed position when the atmospheric pressure within the container and outside the closure are equal and maintaining its closed position under the head of syrup in the container when the container is oriented with the lid facing down, electrically operated pump means interconnected with the lid for creating a greater pressure in the container than outside the closure causing flow of the liquid from the container through the check valve, and means comprising a unidirectional flow valve for communicating with the interior of said container to permit simultaneous adjustment of pressure in said container when said pump means is operative to cause flow through said check valve.

14. A beverage dispenser in accordance with claim 13 and further comprising said check valve comprising a nipple having a closure biased to said closed position, said pump means comprising a duct and suction pump, a discharge nozzle for dispensing a beverage connected to the duct, and a fitting on the housing for receiving the nipple in sealed relationship when the container is mounted on the housing.