SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIRECCIÓN DE NUEVAS CREACIONES

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Abogado
EMILIO FERRERO

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	Trámite	011
	Evento	378
	Actuación	430
	Oficio	
	Folios	012

Patente de Invención ■ Patente de Modelo de Utilidad ☐

Vía Nacional ☐

Vía PCT (fase nacional) ■ Cap.I ■ Cap. II ☐

No. Sol. Internacional PCT/IL2004/000818
Fecha de Presentación Internac. 2004-09-09

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

1. Documentos estudiados

Descripción: Folios: 27 a 38 como se radicó inicialmente

Reivindicaciones: Folios: 39 a 43 como se radicó inicialmente

Dibujos: Folios: 45 a 48 como se radicó inicialmente

2. Objeto de la invención

La presente solicitud se titula "APARATO, SISTEMA Y MÉTODO PARA FORMAR BEBIDAS", Folio N° 1.

La presente solicitud de patente se refiere a un método de enfriamiento y un sistema y un aparato para formar bebidas, donde el aparato incluye un recipiente para contener una bebida, un dispositivo de separación un medio de enfriamiento y un motor.

De otra parte, el pliego reivindicatorio reclama: un aparato para formar bebidas, relacionado en las reivindicaciones 1 a 10, un método de enfriamiento relacionado en las reivindicaciones 11 a 19 y un sistema de formación y dispensamiento de bebida, relacionado en las reivindicaciones 20 a 22.

El objeto de la solicitud definido anteriormente se clasificó en la IPC F25D 25/04

3. De la solicitud de Patente

3.1. Descripción (artículo 28 D 486)

El capitulo descriptivo calificado hace referencia al reclamo de la prioridad de la solicitud de patente provisional de Estados Unidos No. 60/501348 del 08 de septiembre de 2003. Sin embargo en el petitorio de la solicitud, ni en la solicitud internacional (casilla 30) se referencia tal prioridad.

Se debe modificar el capitulo descriptivo ya que esta referencia crea confusión, especialmente a la hora de evaluar la novedad de la materia reclamada.

3.2. Reivindicaciones (artículo 30 D 486)

La materia que se pretende reclamar no se encuentra bien definida dado que las reivindicaciones no muestran claramente las características técnicas que puede definir el objeto reclamado.

En primer lugar, la reivindicación 1 se limita a enumerar una serie de componentes de un aparato para formar bebidas, sin establecer las relaciones funcionales o estructurales existentes entre tales componentes, ni indicar cuales de tales elementos hacen parte del estado del arte (preámbulo de la reivindicación) y cuales corresponden a la materia **característica** que aporta la solicitud al estado del arte.

Cabe aclarar que mencionar el uso individual que se da a cada componente, no corresponde a una característica de función ni mucho menos a una característica estructural que sirva para indicar la disposición de los elementos dentro de la estructura del aparato.

Las reivindicaciones 2 y 3 no aclaran ni definen ninguna característica técnica del aparato para formar bebidas, sino que al igual que la reivindicación 1, se limitan a enumerar componentes del aparato.

Las reivindicaciones 7 a 10 se refieren a resultados del uso del dispositivo, lo cual como es bien sabido, no es materia aceptable para definir una invención de producto tal como la que se pretende proteger.

Las reivindicaciones 13 a 19, se refieren a decisiones de operación de un aparato de enfriamiento, lo cual más que características técnicas, corresponden a indicaciones de uso del aparato.

Finalmente, las reivindicaciones 20 a 22, presentan los mismos problemas de definición de la reivindicación 1, dado que no se describe cual es la materia característica de la invención en términos de características técnicas tales como las relaciones funcionales o estructurales existentes entre los componentes del sistema.

Por los motivos anteriores, el pliego reivindicatorio calificado no cumple con los requisitos exigidos en el artículo 30 de la Decisión.

4. Determinación del Estado de la Técnica

Considerando que la fecha de presentación internacional de la solicitud es el 09 de Septiembre del 2004, se buscaron documentos del estado de la técnica relacionados, con fecha de publicación anterior a esta. Se realizo búsqueda de documentos relevantes dentro del estado de la técnica, entendiendo como estado de

la técnica la definición provista en el Art. 16 D 486, y las excepciones fijadas en el Art. 17 de la misma.

No obstante, la solicitud presenta problemas de claridad, se realizó una búsqueda parcial la cual se complementara una vez se realicen los ajustes a la solicitud.

Se encontró como anterioridades los documentos relacionados a continuación que pueden afectar la patentabilidad del objeto de la presente solicitud

N°	Documento*	Título	Fecha de publicación
D1	US3400551	SLUSH BEVERAGE MACHINE	1968-09-10
D2	US6513578	FROZEN BEVERAGE MACHINE CONTROL SYSTEM AND METHOD	2003-02-04

*los documentos mencionados se anexan al expediente

5. Análisis de patentabilidad (artículo 14 D486)

En cumplimiento del Art. 14 D486 se procedió a evaluar los requisitos de novedad, nivel inventivo y aplicabilidad industrial, con el fin de establecer la patentabilidad de la invención reivindicada de la solicitud en estudio.

5.1. Novedad (artículo 16 D486)

En vista de que algunas reivindicaciones no se encuentran totalmente definidas por cuanto se limitan a enumerar elementos, a continuación se realizará una simple comparación entre los componentes reclamados y ls elementos encontrados en el estado del arte.

Las reivindicaciones 1 a 10 se refieren a un aparato para formar bebidas que comprende:

- Un recipiente para contener una bebida
- Un medio de enfriamiento
- Un dispositivo de separación para raspar partículas congeladas.
- Un motor para suministrar movimiento al dispositivo de separación
- Un aislador
- Una cubierta

La anterioridad **D1** se refiere a un aparato **10** para producir bebidas medio derretidas donde el líquido es mantenido bajo presión durante la transferencia de energía. El aparato **10** de la anterioridad incluye:

- Un contenedor **16**.
- Un medio de enfriamiento **22**.
- Un dispositivo de raspado **70**.
- Un motor 68 conectado al eje del dispositivo de raspado **70**.
- Un material aislante **18**.
- Una cubierta **14**.

Como se puede ver, la anterioridad D1 contiene las mismas características que comprende el aparato para formar bebidas de la reivindicación 1.

La reivindicación 11 se refiere a un método de enfriamiento que comprende:

- Suministrar una bebida.
- Enfriar dicha bebida a temperatura de congelamiento
- Separar partículas microscópicas de bebida congelada de una superficie interna
- Mezclar dichas partículas con la bebida y,
- Dispensar dicha bebida.

La anterioridad D1 describe el proceso de operación de aparato de enfriamiento **10** de la siguiente manera (descripción col. 3 líneas 16 a 43):

- Suministrar una mezcla de bebida en un tanque presurizado **16**.
- Enfriar la mezcla de bebida a través de los medios de enfriamiento **22** a una temperatura suficiente para que porciones de la mezcla se congelen en las paredes del tanque.
- Remover las partículas congeladas por medio de un motor **68** que mueve el dispositivo de raspado **70**.
- Mezclar dichas partículas con la bebida y,
- Dispensar dicha bebida a través de un dispensador **28**.

Se puede apreciar que la anterioridad D1 también enseña un método de enfriamiento igual al de la reivindicación 11.

De acuerdo alo expuesto anteriormente, las reivindicaciones mencionadas no cumplen con los requisitos de novedad de acuerdo al Art. 16 de la Decisión.

5.2. Nivel Inventivo (artículo 18 D486)

El problema técnico planteado en la solicitud, es el suministro de una bebida donde se mantenga el grado de congelamiento y la textura de una bebida hasta que esta es consumida. Para tal fin la solicitud presenta un método de enfriamiento y un sistema de formación y dispensamiento de bebida. Donde el método además de las características presentadas en la reivindicación 11 comprende también una para descongelar la bebida. Mientras que el sistema comprende una manguera de entrada, un aparato formador de bebida con partículas microscópicas, un grifo para dispensar la bebida, y un aparato de descongelamiento.

Como se demostró arriba, la anterioridad D1 comprende las mismas etapas que caracterizan al método de congelamiento a excepción de la etapa de descongelado. Igualmente la anterioridad presenta un sistema de formación y dispensamiento de bebida que comprende una manguera de entrada de liquido **36**, un aparato formador de bebida **10** y, un grifo para dispensar la bebida **28**.

Como se puede ver, la anterioridad D1 no contempla un aparato de descongelamiento.

La anterioridad D2 se refiere a un método mejorado para controlar la consistencia de una bebida producida por una maquina de bebidas congeladas. El método de congelamiento de esta anterioridad, incluye una etapa de descongelamiento **122**, **124**, para mejorar la consistencia de la bebida.

El problema técnico objetivo de la presente solicitud, seria un método y un sistema para producir bebidas congeladas, donde se incorpore una etapa de descongelamiento para mejorar la consistencia de la bebida. Problema que se resuelve de manera obvia, mediante el sistema presentado en la anterioridad D1 junto con los elementos de descongelamiento enseñados en el documento D2.

Por lo anterior, se considera que la materia reclamada se puede derivar de manera obvia a partir de los documentos del estado del arte, motivo por el cual la presente solicitud de patente NO tiene nivel inventivo por lo cual no cumple con lo establecido en el artículo 18 de la Decisión 486.

6. Conclusión:

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

N°	Documento N°	Reivindicaciones afectadas	Requisito que afecta
D1	US3400551	1, 11, 13 a 19	Novedad
D1	US3400551	12, 20 a 22	Nivel Inventivo
D2	US6513578	12, 20 a 22	Nivel Inventivo

Se recomienda, que tenga en cuenta que el replanteamiento de esos apartes NO podrá implicar una ampliación de la protección que correspondería a la divulgación contenida en la solicitud inicial, de acuerdo a lo que establece el artículo 34 de la Decisión 486.

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta días contados a partir de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única N° 10 de 2001.

ALIX CARMENZA CÉSPEDES DE VERGEL
Directora Nuevas Creaciones (C)

El anterior requerimiento fue notificado por fijación en lista, de fecha 13 AGO. 2010

CONCEPTO TÉCNICO No. 2380	**EXAMINADOR TÉCNICO** Código No. 202082

72

Sept. 10, 1968 J. J. BOOTH ET AL 3,400,551

SLUSH BEVERAGE MACHINE

Filed June 28, 1967 3 Sheets-Sheet 1

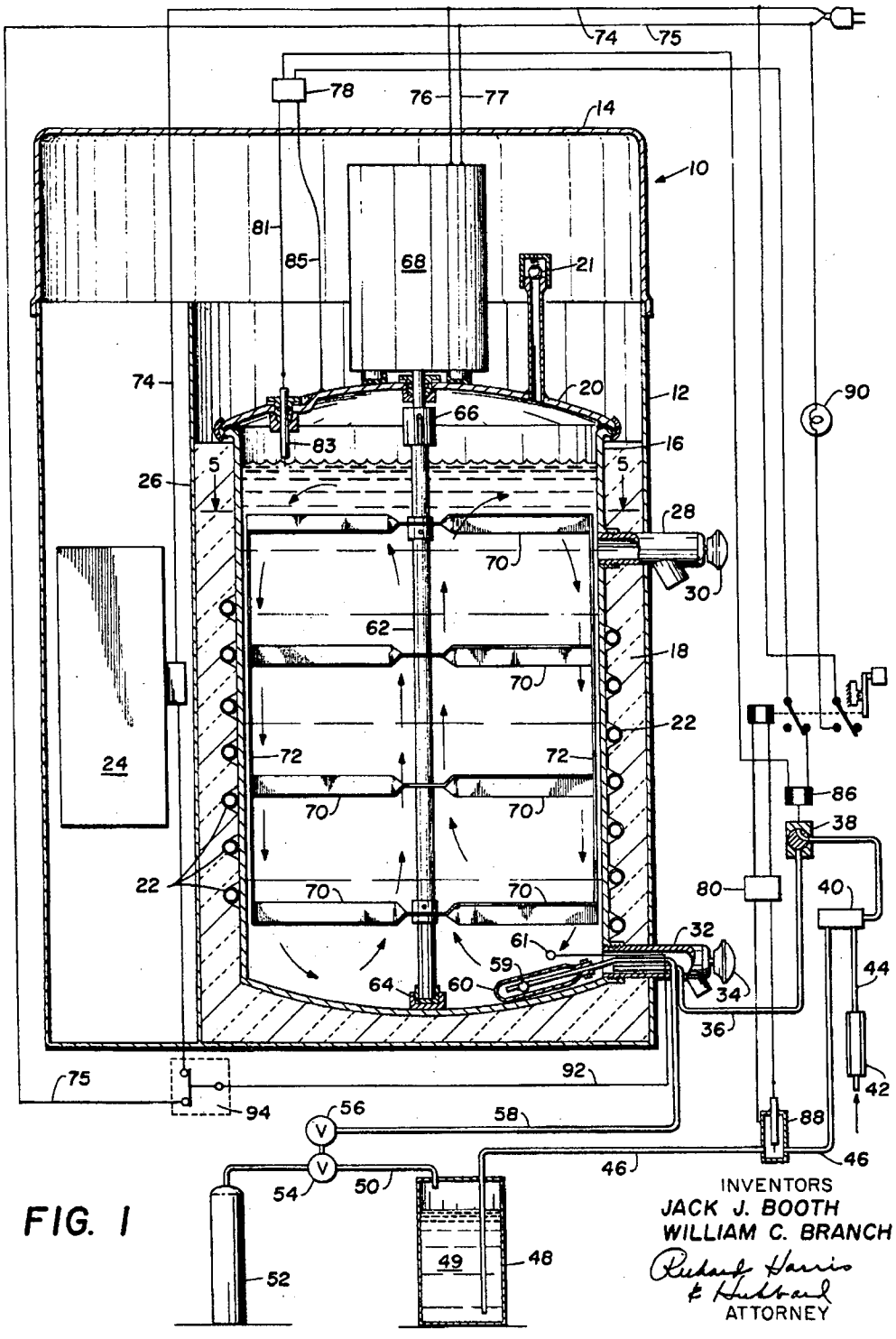

FIG. 1

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SLUSH BEVERAGE MACHINE

Filed June 28, 1967 3 Sheets-Sheet 2

FIG. 2

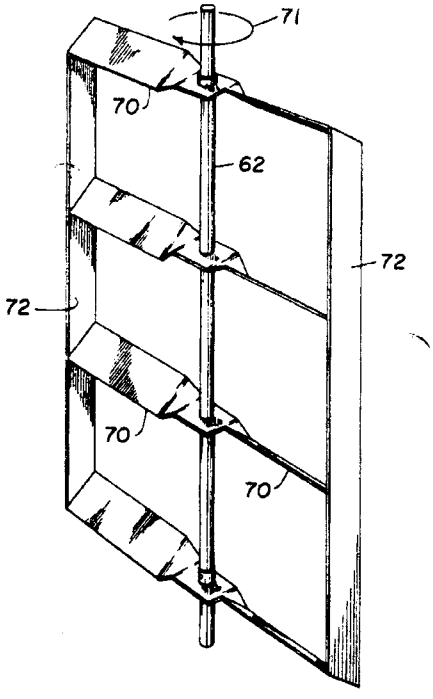


FIG. 3

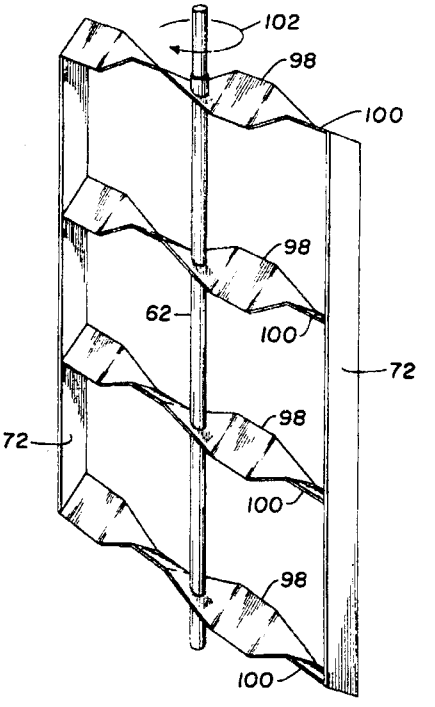
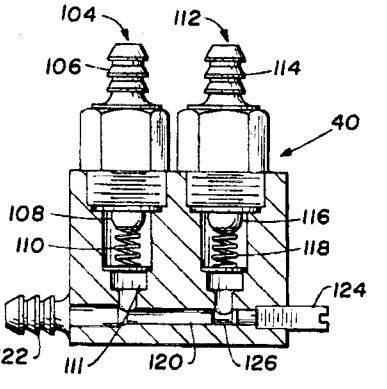


FIG. 4



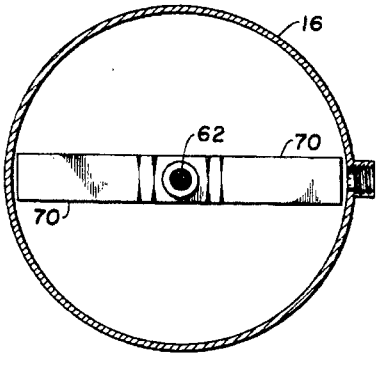


FIG. 5

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United States Patent Office 3,400,551 Patented Sept. 10, 1968

3,400,551 SLUSH BEVERAGE MACHINE

Jack J. Booth, 5006 Tanbark 75229, and William C. Branch, 6730 Greenwich Lane 75230, both of Dallas, Tex.

Filed June 28, 1967, Ser. No. 649,541
11 Claims. (Cl. 62—135)

ABSTRACT OF THE DISCLOSURE

A slush bank is formed in a tank wherein liquid introduced at the tank bottom is mixed with diffused carbonation gas and frozen to slush under predetermined gas pressure while circulated by an impeller. Temperatures within the tank are maintained within a very narrow range in order that a bank of slush is established and maintained with relatively low energy transfer rates.

Field of the invention

This invention relates to apparatus for producing slush beverages, and more particularly to apparatus wherein liquid is maintained under carbonation gas pressure during transfer of energy thereto from a small heat pump to form and maintain a slush bank.

Prior art

Systems have heretofore been developed wherein carbonated beverages are maintained in tanks at pressures above atmospheric pressure and at temperature such that the carbonted beverage is not frozen. When such a beverage is suddenly discharged into an area of atmospheric pressure, a slushy beverage is provided due to expansion of the gas entrained therein. Illustrations of such systems may be found in U.S. Patent No. 3,044,878 to Knedlik and U.S. Patent No. 3,108,449 to Lents. Such systems have generally required refrigeration systems with relatively large compressor units, and have often required continuous agitation and sensitive temperature control in order to prevent freezing of the beverage inside the pressurized tank. Further, heretofore developed systems for producing slushy carbonated beverages have often required the introduction of excessive amounts of carbonated gas in order to prevent freezing of the beverage inside the tank.

Summary

In accordance with the present invention, a system is provided wherein a relatively small refrigeration compressor is employed in combination with a tank operated at generally low gas pressure to produce a slushy beverage. A selected pressure is maintained on a liquid which is introduced into the bottom of a cylindrical tank and is mixed with diffused carbonation gas. A refrigeration unit freezes the liquid to a slush bank, which is selectively dispensed. An impeller removes the frozen particles from the area of the refrigerated walls and maintains the frozen particles in a stratified slush bank in the upper regions of the tank. A temperature control element in the region of the fluid inlet to the tank maintaining the temperature of the frozen particles within a narrow temperature range and a pressure operated vent permit establishment and maintenance of a slush bank of uniform character.

The drawings

For a more complete understanding of the present invention and for further objects and advantages thereof, reference may now be had to the following description taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a somewhat diagrammatic view of a system according to the present invention;

FIGURE 2 is a view of a rotary impeller for use in the present invention;

FIGURE 3 is a view of a second embodiment of a rotary impeller for use in the present invention;

FIGURE 4 is a detailed view of a liquid mixing block for use in the present system;

FIGURE 5 is a sectional view taken generally along the section lines 5—5 of FIGURE 1; and

FIGURE 6 is a schematic diagram of the present level sensing system.

The preferred embodiments

Referring to FIGURE 1, a slush beverage machine designated generally by the numeral 10 includes a cylindrical main body 12 having a top 14. A pressurized tank 16 is supported inside the body 12 and surrounded by suitable insulating material 18. The pressurized tank 16 includes a top member 20 which may be sealingly attached and which includes a spring loaded relief valve 21. A nnumber of turns of cooling coils 22 are disposed about the outer circumference of the tank 16 and are connected to a suitable refrigeration unit 24. The cooling coils 22 are disposed about the lower half of the tank 16 to provide greatest cooling in the bottom region of the tank. The refrigeration unit 24 includes a compressor and the like, and is disposed within a chamber formed in the main body 12 by a dividing wall 26.

A dispensing spout 28 is located near the top of the tank 16 and includes a manually operable knob 30 which may be actuated to dispense a beverage from tank 16. A similar spout 32 is disposed near the bottom of tank 16 and includes a manually operable knob 34 for selectively draining the contents of the tank when desired. Beverage liquid may be introduced into the bottom of the tank 16 through the conduit 36 which passes through the bottom of spout 32. Conduit 36 is connected through a solenoid valve 38 to a mixing block 40, to be later described in detail.

The mixing block 40 mixes a supply of water, which is supplied through a filter 42 and a conduit 44, with a beverage syrup which is supplied through the conduit 46 from the syrup supply tank 48. Syrup 49 in the supply tank 48 is forced out through conduit 46 by pressure exerted by pressurized carbonation gas fed through conduit 50 from source 52. A regulator valve 54 provides a relatively high pressure of carbonation gas to tank 48 to force syrup from tank 48 when the control valve is opened.

A continuous flow of lower pressure carbonation gas from the source 52 is fed directly into the pressurized tank 16 through a regulator valve 56 and a conduit 58. A check valve 59 is disposed near the end of conduit 58. A porous bulb 60 is connected to the end of conduit 58 so that carbonation gas is diffused into a plurality of pinpoint bubbles which are more easily absorbed by the beverage liquid in the bottom of the pressurized tank 16. The porous bulb 60 may be made from any one of a plurality of suitable materials, such as porous stone, a porous plastic tube or the like. A temperature sensing element 61 is adjacently disposed to the porous bulb 60 in order to sense the temperature of the beverage liquid in the bottom region of the pressurized tank 16.

A rotating impeller is provided inside tank 16 and includes a shaft 62 journaled in suitable bearings in suitable bearings 64 for rotation through a connection 66 by an electric motor 68. Attached along the length of shaft 62 and extending radially outwardly therefrom are a plurality of impeller vanes 70. As may be best seen in FIGURE 2, the vanes 70 have inclined flange portions of opposite slopes. Thus, rotation of the shaft 62 in the direction of the arrow 71 will cause the carbonated beverage mixture inside the pressurized tank 16 to tend to circulate upward-

ly in the center to the top regions of tank **16**. A pair of parallel side bars **72** are connected to the ends of each of the vanes **70**. As shown in FIGURE 5, the bars **72** do not touch the side walls of the pressurized tank **16**, but are disposed very closely thereto in order to tend to remove any frozen particles from the region of the walls of tank **16**.

It is important in the practice of the invention to circulate the frozen particles along the sides of tank **16** to an upper region of the tank to provide a stratified slush bank near the dispenser spout **28**. An impeller of the type shown in FIGURE 2, rotating at approximately 30 r.p.m. having vanes 2.5 inches in width and inclined at 30°, has been found to work well in practice in combination with a 12 inch diameter pressurized tank.

In operation, the pressurized tank **16** is filled with a predetermined quantity of mixture of beverage, liquid, and water. Refrigeration is provided through the coils **22** to the walls of the pressurized tank **16**. The present device maintains a selected temperature, preferably between 25 and 26.5° F., sufficient to freeze the portions of the beverage mixture in the region of the wall. Motor **68** continuously rotates the vanes **70** of the impeller inside the pressurized tank **16** to continuously remove the frozen particles, whereby the frozen particles tend to move along the tank walls to the region of the dispenser spout **28** to form a stratified slush band. Upon manual depression of the knob **30**, the slush beverage is dispensed through spout **28**. It will be understood that while FIGURE 1 illustrates movement of the frozen partices downwardly along the sides of the tank and upwardly through the center of the tank upon rotation of the impeller in the direction of arrow **71**, that a suitable stratified slush bank could be formed in the upper regions of tank **16** by reverse rotation of the impeller. Such reverse rotation would cause circulation of the frozen particles downwardly through the middle of the tank and upwardly along the sides of the tank. The maintenance of an upper stratified slush bank enables a consistently uniform drink to be dispensed, even though a mixture of additional syrup and water is being introduced in the bottom regions of the tank. In some instances, the slush bank may build up and exist substantially throughout the length of the tank **16**.

Carbonation gas under pressure from the source **54** is supplied through the syrup in the tank **48** and the mixing block **40**, where the syrup is mixed in desired proportions with water. This mixture flows through the conduit **36** directly into the bottom of the pressurized tank **16**. Carbonation gas under pressure is diffused throughout the bottom region of the pressurized tank **16** through the porous bulb **60**. The flow of carbonation gas diffused therethrough will be absorbed by the mixture in the bottom regions of tank **16**. The valve **21** located in top **20** of the tank **16** will open upon the advent of a pressure over a predetermined magnitude, which may preferably be about 22 p.s.i. The valve **21** serves to control the uniformity of the Brix, the water to syrup ratio. More particularly, when the material freezes it expands. This tends to increase pressure. When pressure increases, less syrup flows into the tank, thereby decreasing the water to syrup ratio or the "Brix," as it is well known in the art.

By use of the valve **21**, the variations in pressure in the tank are minimized so that the Brix will be held within limits which are predetermined. Thus there results a more uniform product.

It will thus be understood that carbonation gas is being provided to the present system continuously through the porous bulb **60**, with the mixture of syrup and water being added to the tank **16** as needed. In practice, the pressure applied to the carbonation gas being supplied continuously through the conduit **58** preferably is of the order of about 20 p.s.i., while the pressure of the gas in conduit **50** will be of the higher magnitude of about 30 p.s.i. Because of the close control of temperatures maintained in the tank **16** only a relatively small compressor is required in refrigeration unit **24**. In practice, only a ⅓ HP compressor has been required, whereas prior units of similar beverage dispensing rate have required two horsepower units.

Referring again to FIGURE 1, electric power is supplied through lines **74** and **75** from a suitable source of alternating current. The motor **68** is directly connected across the source of power by wires **76** and **77**. A level control circuit **78** is connected through wire **81** to an elongated electrode **83** and through wire **85** to the case in order to provide a ground.

The electrode **83** senses the level of the beverage in tank **16**. When the level of the beverage drops to a level where electrode **83** no longer contacts the beverage liquid, a control circuit is actuated after a predetermined interval to open valve **38**. More particularly, a suitable switch is activated in the flow control circuit **80** to initiate flow to tank **16**. As a result, a mixture of syrup and water flows from the mixing block **40** through conduit **36** into tank **16**. The level of the beverage inside the tank **16** will thus be raised.

When the fluid level inside tank **16** reaches the electrode **83**, the switch in the control circuit is tripped to de-energize the solenoid **86** to stop the flow of liquid to tank **16**.

More particularly, a syrup sensor **88** is located in the conduit **46** to sense the flow of syrup through the conduit **46** when the relay **86** is actuated to open valve **38**. When the syrup in supply tank **48** is exhausted, sensor **88** senses absence of liquid in conduit **46** and provides control over the solenoid **86** in order to cut off the flow of liquid through the conduit **36**. This prevents the addition of only water from conduit **44** to tank **16**. When the syrup supply tank **48** is empty, a signal light **90** will indicate to the operator of the device that a new supply of syrup needs to be provided.

An embodiment of the control circuit is shown diagrammatically in FIGURE 6. Where consistent, like parts have been given the same reference characters as in FIGURE 1. Line **74** and **75** supply electrical power to two similar circuits **78** and **80**. The circuit **78** serves to control solenoid **86** in response to the presence or absence of liquid on the probe **82** which is mounted in the lid **20**. The circuit **80** controls the application of power to a relay **130** depending upon the presence or absence of syrup in the sensor **88**.

The circuit **78** includes a line **131** extending from line **75** to one terminal of solenoid **86**. Line **132** extends from line **75** by way of a solid state switching device **133** and thence by way of a relay control switch **134** to the second terminal of the solenoid **86**. The device is a triac device, conductive bidirectionally when suitably actuated by a control voltage applied thereto. The triac may be of the type manufactured and sold by RCA as Triac No. 40526. In accordance with the present invention, a control circuit is provided for the triac **133**. A delay is introduced after the liquid level recedes below the probe **83** before actuating the solenoid **86**. More particularly, a resistor **136** connects the line **131** to the lid **20** or to another suitable ground terminal. Probe **83** is connected to line **132** by way of a capacitor **137**. Probe **83** is also connected to one terminal of a neon discharge tube **138**. The second terminal of the tube **138** is connected to the gate terminal of a silicon controlled rectifier **139**. A suitable unit for rectifier **139** would be of the type manufactured and sold by General Electric Company as SCR-C 106-B2. The cathode of the rectifier **139** is connected to conductor **132**. The anode is connected by way of resistor **140** to line **131**. The gate terminal is connected to terminal **132** by way of resistor **141**.

A control condenser **142** is connected in series with resistor **143** and rectifier **144**, the series circuit thus found being connected between lines **131** and **132**. The juncture between condenser **142** and resistor **143** is connected to the anode of the rectifier **139** and to one terminal of a neon discharge tube **145**. The other terminal of tube **145** is connected to the gate terminal of the triac **133**.

In operation, the condenser **142** is charged at a rate dependent upon the time constant of the series circuit and thus primarily upon the relative values of resistor **143** and condenser **142**. In operation, condenser **142** begins charging through rectifier **144**. When the condenser voltage reaches a value to fire the tube **145**, the triac **133** begins to conduct. When triac **133** conducts, the solenoid **86** is energized to open valve **38** thereby causing flow of syrup-water mixture through tube **36** to tank **16**. When the liquid level in the tank rises such that it touches the bottom of the probe **83**, the capacitance in the circuit of the discharge tube **138** is such that the rectifier **139** will be fired. This discharges condenser **142**. Thereafter rectifier **139** conducts on each cycle of the alternating current voltage applied thereto. The condenser **142** will be maintained substantially discharged. Thus, as long as the liquid is in contact with the probe **83**, there will be no conduction through the triac **133** and the valve **38** will remain closed.

In accordance with the present invention, the time constant of the firing circuit for the triac **133** is of several seconds duration. In one embodiment, the resistor **143** was 15,000 ohms and the condenser **142** was 50 microfarads. The presence of resistor **140** assures positive turn-off of rectifier **139** upon reversal of the A.C. potential thereacross and places a negative potential on the rectifier **139** so that it cannot conduct. The resistor **136** is relatively high so that the lid **20** will not be at any substantial A.C. potential. In a preferred embodiment, the time constant of the circuit **78** is such that the valve **38** will open three to five seconds after the liquid level recedes below probe **83**.

The circuit **80** is similar to that of circuit **78** in most respects except that the time constant of the circuit, including the resistor **150** at the condenser **151** may be much shorter, and in some instances may be eliminated. However, in this case, the circuit is responsive to the presence or absence of syrup in the sensor **88**. When no syrup is present, the triac **152** is fired to energize relay **130**. Relay **130** controls the switch **134** and a second switch **154**. The switch **134** is in the energization circuit for the valve solenoid **86**. The switch **154** is connected in the circuit for a signal lamp **155**. Lamp **155** is energized when the syrup supply is exhausted. The opening of switch **134** accompanies the closing of switch **154** to prevent flow of water to the tank **16**. An operator, in response to energization of lamp **155**, will then replenish the supply of syrup. When this is completed, a push button **160** may be actuated mechanically to reclose the switch **134**, thereby opening the valve **38** to initiate flow. The push button **160** will be depressed manually until such time as the syrup flows in the sensor **88**. This condition will have been achieved when, upon release of the button **160**, the light **155** remains de-energized.

By reason of the control thus afforded and by reason of the presence of the control valve **21**, there may be variations in level and character of material in tank **16** without materially affecting the Brix thereof. Thus the system may be maintained in operation substantially entirely automatically while assuring constancy in the quality of the product.

A control circuit for the operation of the refrigeration unit **24** is also provided in the present invention. The temperature sensitive device **61** is connected through cable **92** to a suitable switch **94** which may provide either an open or closed circuit between the power lines **74** and **75** in order to control the operation of the refrigeration unit **24**. In the position of the switch **94**, illustrated in FIGURE 1, the temperature of the liquid in tank **16** is such that refrigeration is required. Switch **94** thus has a completed circuit between the power lines **74** and **75** in order to cause operation of the refrigeration circuitry **24**. When the temperature sensitive device **61** provides an indication that a sufficiently low temperature has been provided, the switch **94** will open the circuit between the power lines **74** and **75** in order to stop the operation of the refrigeration circuitry **24**.

FIGURE 3 illustrates a second embodiment of a rotary impeller for use in the present invention, wherein each vane radially extending from the shaft **62** includes two inclined flange portions **98** and **100** which slant in opposite directions. The particular configuration of the rotary impeller shown in FIGURE 3 causes, upon rotation of the impeller in the direction of arrow **102**, the frozen particles near the side walls of tank **16** to be dislodged and moved toward the center region of the tank. The side portions **72** in combination with the inclined flange portions **100** act to move the frozen particles from the tank side walls and downward along the tank walls. The rotating action of the inclined flange portions **98** in the center region of tank **16** causes the frozen particles to move upward in the center portion of the tank **16**, thus maintaining a fairly uniform two-phase mixture throughout tank **16**.

FIGURE 4 illustrates in detail the construction of the mixing block **40** which includes a first inlet **104** having a ridged portion **106** adapted to be connected to receive water through the conduit **44** (FIGURE 1). A check valve disposed in inlet **104** includes a ball valve member **108** which is upwardly biased by a spring **110** in order to allow only a one-way flow through inlet **104**. The rate of flow of water is controlled by a flow control washer **111** which maintains a constant flow rate over the range of pressures normally encountered in city water lines, i.e., a flow rate of from ¼ to ½ gallon per minute, where pressures range from 30 p.s.i. to 100 p.s.i.

A second inlet **112** includes a ridged portion **114** for connection to the conduit **46** through which syrup is supplied. A ball valve **116** is upwardly biased by a spring **118** in order to provide a check valve to prevent backflow through the inlet **112**. An outlet **120** is perpendicularly provided through the rectangular mixing block **40** to the inlets **104** and **112** and opens into a ridged nozzle **122** for connection to conduit **36** (FIGURE 1). A screw **124** is threadedly received in one end of the outlet **120** and includes a projection **126** which may be disposed between the opening of the inlet **112** into outlet **120**. The position of projection **126** controls the amount of syrup which is mixed with the water supplied through the inlet **104**. By retraction of the screw **124**, the projection **126** will be moved away from the inlet **112**, thereby allowing a greater amount of syrup to be mixed with the water. If desired, a control washer similar to washer **111** may be utilized to control the flow of syrup in place of the screw **124**. In such case, the flow of syrup would be regulated to approximately ⅛ the flow allowed in the water inlet.

It will thus be understood that the present invention provides a slush machine wherein relatively low carbonation pressure is normally employed, in combination with relatively low power refrigerating components, in order to freeze portions of the liquid inside the pressurized tank to establish and maintain a stratified slush bank in the upper regions of the tank. Improved contact of carbonation gas and the liquid inside the pressurized tank is obtained through the utilization of a porous bulb. Circuitry is provided to selectively control the operation of the refrigerating unit, in addition to control of the introduction of additional beverage into the unit while maintaining within predetermined limits the syrup-water ratio.

Whereas the present specification has been described in considerable detail with respect to preferred embodiments of the present invention, it is to be understood that this description is for purposes of illustration, and that changes or variations may be made by persons skilled in the art without departing from the scope of this invention as set forth in the appended claims.

What is claimed is:

1. In a system for producing a slushy drink, the combination which comprises:

(a) a vertically disposed cylindrical tank having walls and an inlet for receiving liquid in the bottom therein and having an outlet port near the top,

(b) means for introducing carbonation gas under pressure into said tank near the region of said inlet for absorption by said liquid,

(c) means for maintaining said gas in said tank above atmospheric pressure,

(d) refrigeration means including coils disposed about said tank for freezing said liquid to slush,

(e) impeller means having vanes so inclined and rotatable in said tank to circulate said liquid with said carbonation gas downward along the walls of said tank and upward in the center of said tank to maintain a stratified slush bank in at least the upper regions of said tank, and

(f) temperature sensor for sensing liquid temperature and controlling said refrigeration means to maintain said slush bank of frozen particles within a selected narrow temperature range at and slightly below the freezing point of water at the pressure within said tank.

2. The combination defined in claim 1 and further comprising a level control means for introducing additional liquid into said cylindrical tank upon withdrawal of a portion of said slush bank of frozen particles through said outlet port and a pressure relief valve in said tank for limiting the pressure in said tank to maintain substantially constant the syrup-water ratio in the presence of changes in quantity and character of the contents of said tank.

3. The combination defined in claim 1 wherein all means for introducing carbonation gas comprises:

a permeable diffusion chamber disposed near the region of said inlet for dividing gas flow into a plurality of pinpoint bubble streams through said liquid for absorption thereby.

4. The combination defined in claim 3 wherein said diffusion means comprises:

a bulb having a fixed orifice and porous outer walls disposed in the region of said inlet,

conduit means connecting said fixed orifice of said bulb to a source of carbonation gas,

whereby pinpoint bubble streams of the carbonation gas will diffuse through said porous outer walls into said liquid.

5. The combination defined in claim 1 wherein said impeller means comprises:

a rotatable shaft disposed generally along the longitudinal axis of said tank,

a plurality of vanes laterally extending from two sides of said shaft and each having inclined flange portions to move frozen particles from the region of the walls of said tank along the walls of said tank.

6. The combination defined in claim 1 and further comprising a pressure relief valve disposed through the upper portion of said cylindrical tank for venting the pressure in said tank when the pressure increases above a predetermined magnitude to control the syrup-water ratio in said tank.

7. The combination of claim 1 and further comprising:

means for providing a supply of syrup to said inlet of said cylindrical tank, and

means responsive to the absence of syrup in the flow line leading into said tank for terminating the supply of water when the supply of syrup is exhausted.

8. The combination defined in claim 1 and further comprising:

(a) a supply of beverage liquid,

(b) means for providing two supplies of carbonation gas under different pressures, one of said supplies being fed directly into the bottom of said tank, and

(c) means for feeding the other of said supplies of carbonation gas to force said liquid supply into the bottom of said tank.

9. The combination defined in claim 1 and further comprising:

(a) a first inlet for connection to a supply of beverage liquid such as syrup,

(b) a second inlet for connection to a water supply,

(c) one-way valves disposed in each of said inlets for allowing liquid flow in only one direction, and

(d) an outlet communicating with both of said inlets and said tank.

10. The combination defined in claim 9 and further comprising flow control means interposed in at least one of said inlets for controlling the amount of liquid flow therethrough.

11. The combination defined in claim 10 wherein said first and second inlets extend parallel from one side of a mixing block, and wherein

said outlet extends through said block perpendicularly to said inlets while communicating with the same, and

said flow control means includes means disposed in said outlet and adjustable to control the flow path in said outlet between said first inlet and said second inlet.

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(12) **United States Patent**
Frank

(10) **Patent No.: US 6,513,578 B2**
(45) **Date of Patent: Feb. 4, 2003**

(54) **FROZEN BEVERAGE MACHINE CONTROL SYSTEM AND METHOD**

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(21) Appl. No.: **09/908,505**

(22) Filed: **Jul. 18, 2001**

(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**[7] **F25B 29/00**
(52) **U.S. Cl.** **165/63**; 62/136; 62/342
(58) **Field of Search** 62/68, 136, 342; 165/62, 63, 61

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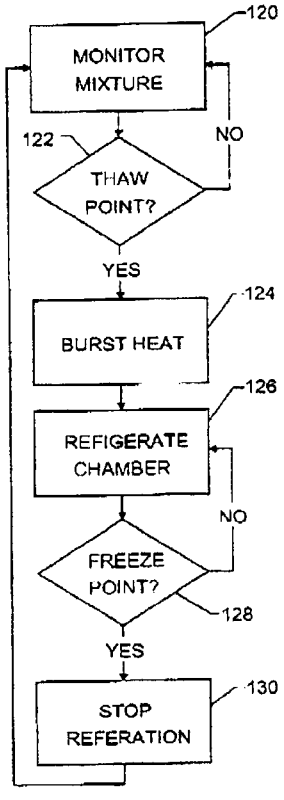
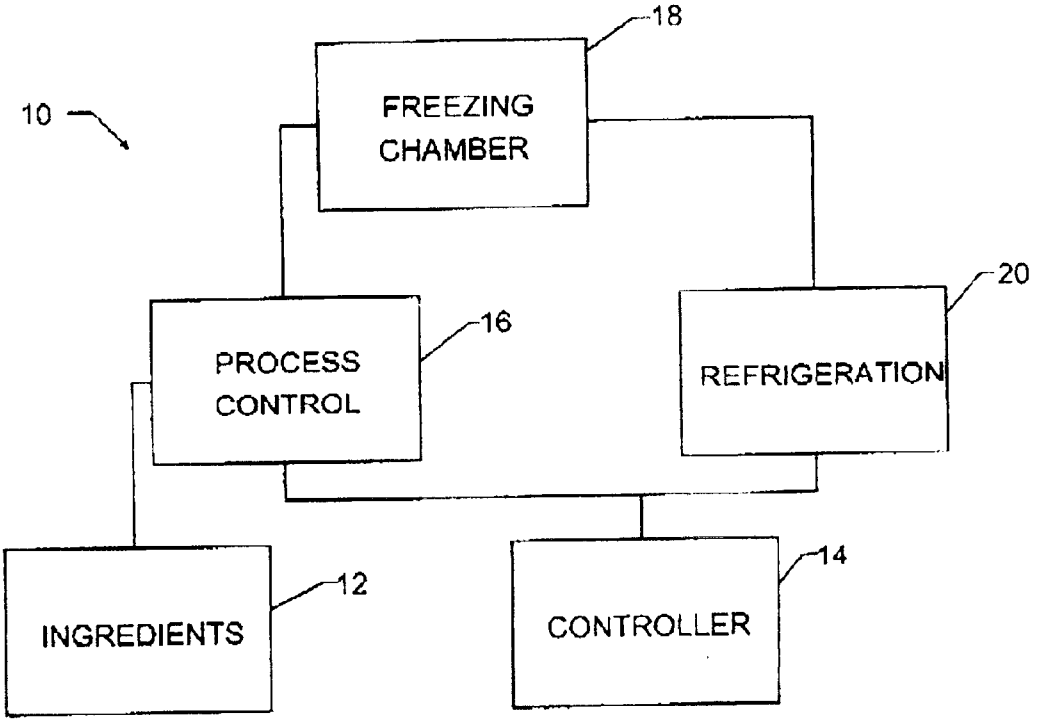
(57) **ABSTRACT**

A method of operating a frozen beverage machine is disclosed that utilizes a short "burst" heating of the beverage machine's freezing chamber. The method includes monitoring a beverage mixture within the freezing chamber of the frozen beverage machine, and heating the freezing chamber for a predetermined time period in response to the beverage mixture reaching a first predetermined state. The freezing chamber is then refrigerated until the beverage mixture reaches a second predetermined state.

23 Claims, 3 Drawing Sheets

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18
FREEZING CHAMBER
16
PROCESS CONTROL
20
REFRIGERATION
12
INGREDIENTS
14
CONTROLLER

FIG. 1

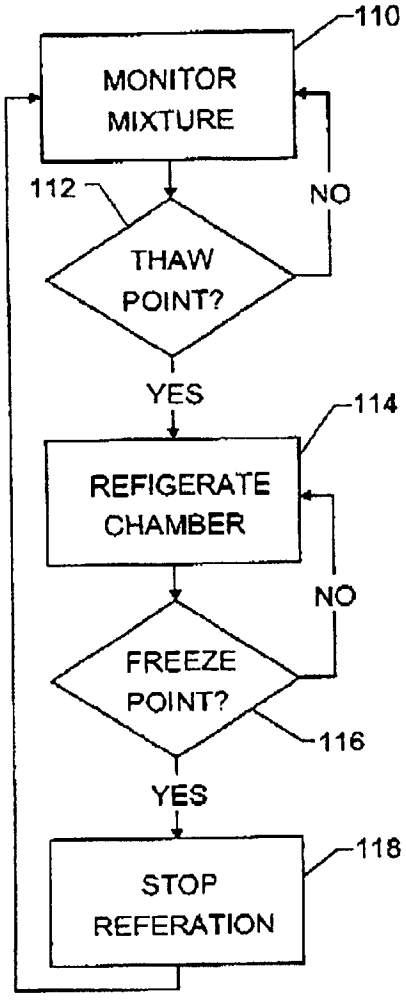

FIG. 2
(Prior Art)

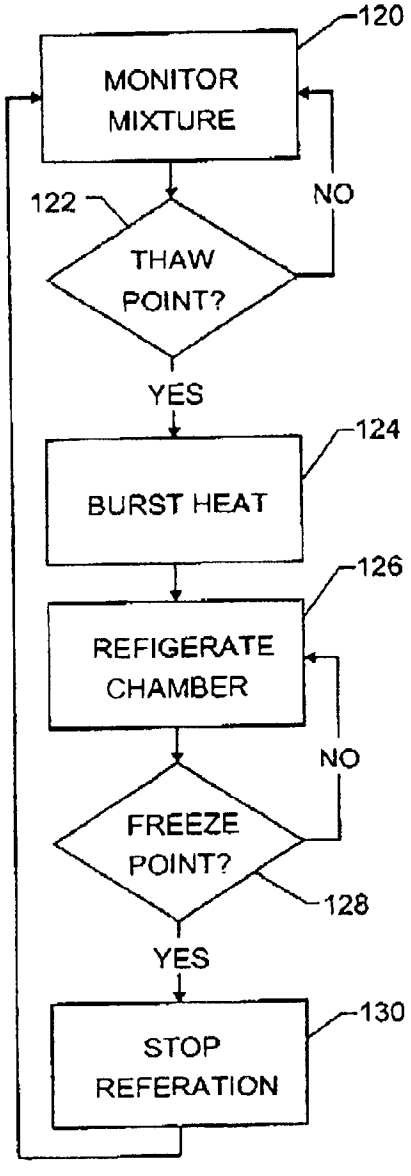

FIG. 3

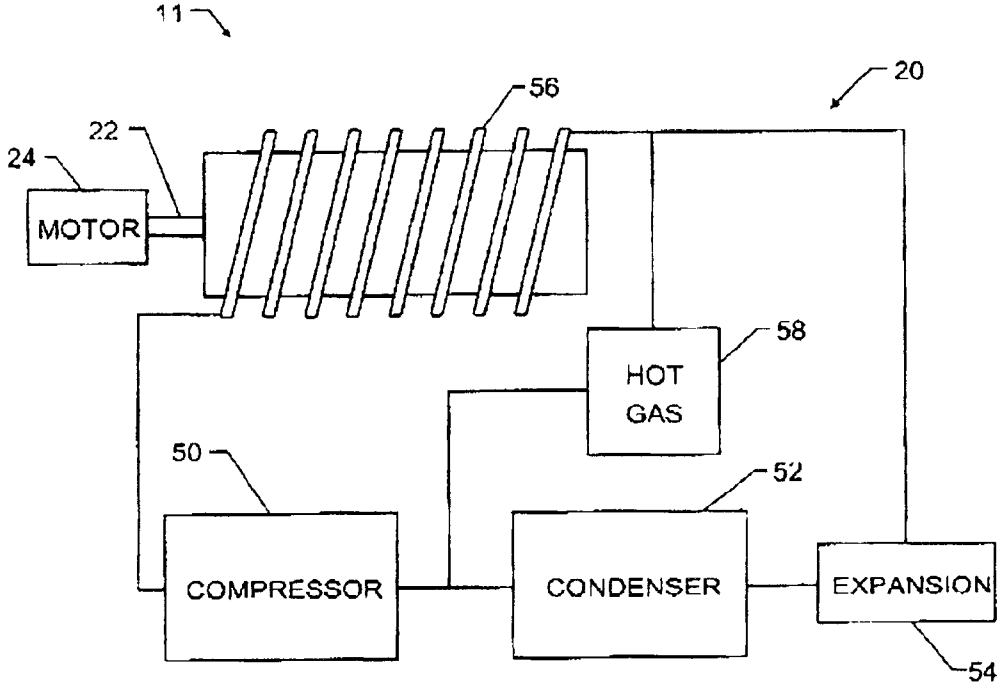
11
20
56
22
24
MOTOR
58
HOT
GAS
50
52
COMPRESSOR
CONDENSER
EXPANSION
54

FIG. 4

FROZEN BEVERAGE MACHINE CONTROL SYSTEM AND METHOD

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Patent Application Ser. No. 60/219,591, filed on Jul. 20, 2000, the entire contents of which is incorporated by reference herein.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to frozen beverage machines and more particularly to an improved method of controlling the consistency of the beverage produced by a frozen beverage machine.

2. Description of Related Art

Frozen beverage machines are known in the art and have been used for years. These devices produce, for example, a frozen carbonated beverage by freezing a mixture of ingredients typically including syrup, water and carbon dioxide in a freezing chamber. The mixture freezes on the inner surface of the chamber, which is surrounded by a helical coil through which a refrigerant passes. A rotating shaft is disposed inside the chamber which has a plurality of outwardly projecting blades that scrape the mixture off the inside wall of the freezing chamber. Once the carbonated beverage is in the desired frozen state, the product is dispensed from the chamber through a product valve.

A control system controls the refrigeration system to maintain the temperature of the ingredients within the freezing chamber. Small ice crystals that are formed during the initial freezing process will continue to grow to larger crystals. These larger ice crystals present significant quality and operational problems with the frozen beverage machine.

First, since the consistency of a frozen beverage is determined to a large extent by the amount and size of the ice crystals present in the beverage mix, the texture and consistency of the dispensed frozen beverage will over time deteriorate and will thus likely become objectionable to a consumer. Further, the ice crystals can attach and freeze on surfaces inside the freezing chamber causing maintenance and other operational problems, and the ice crystals can stop or reduce the flow of the beverage out of the machine's dispensing valve. Still further, the instrumentation systems that control the operation of the machine do not function as well due to the larger ice crystals present in the frozen beverage mixture. The beverage then does not flow well so that it can be controlled and produce a consistent drink.

In an attempt to alleviate these and other problems associated with the formation of large ice crystals in the freezing chamber, known frozen beverage machine systems completely defrost the beverage mixture in the freezing chamber. The frozen beverage mixture is returned to a liquid state on a periodic basis (typically every three to six hours), and then the mixture is refrozen. This removes the larger ice crystals. The defrost and refreeze process typically takes from five to 30 minutes or longer. Unfortunately, when the mixing chamber is defrosting, no product can be served to the consumer. This results in lost sales and unhappy customers.

The present invention is directed to improved frozen beverage machine operation methods which overcome, or at least minimizes, problems associated with the prior art.

SUMMARY OF THE INVENTION

The present invention provides methods for operating a frozen beverage machine so as to improve the consistency of drinks produced by such machines. It is beneficial to extend the time between defrost cycles, or even to eliminate the complete defrost cycles associated with prior art systems entirely, to keep the frozen beverage machine operable without interruption. The operation of the machine and the quality of the product must not substantially deteriorate during the extended periods of no complete defrost. To improve drink consistency, a novel modification to frozen beverage machine operation is disclosed. Instead of employing a defrost cycle that takes the frozen product completely back to a liquid state, the freezing chamber of the frozen beverage machine is heated for a shorter time period on a more frequent basis. This "burst" heating of the freezing chamber can control the size of ice crystals and create advantages to improve the operation of the frozen beverage machine, and in turn, improve the consistency of the beverage produced.

In one aspect of the present invention, the burst heating is conducted on a frequent basis to maintain a consistent frozen drink to reduce the size and amount of ice crystals in the freezing chamber of a frozen beverage machine. The frozen beverage mixture within the freezing chamber approaches a less frozen state, but is not taken to a liquid state as in known defrost cycles, thus maintaining the beverage mixture in a desired consistency.

In an exemplary method of operating a frozen beverage machine in accordance with the invention, the freezing chamber is monitored, and the freezing chamber is heated for a predetermined time period (less than 15 seconds in some embodiments) each time the compressor is to be turned on to refrigerate the freezing chamber. The freezing chamber is then refrigerated until the beverage mixture reaches the desired consistency.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

FIG. **1** is a block diagram of portions of a frozen beverage machine;

FIG. **2** is a flow diagram illustrating a prior art refrigeration cycle of a frozen beverage machine;

FIG. **3** is a flow diagram illustrating a method of operating a frozen beverage machine in accordance with aspects of the present invention; and

FIG. **4** is a block diagram illustrating a frozen beverage machine in accordance with embodiments of the present invention.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and are is herein described in detail. It should be understood, however, that the description herein of specific embodiments is not intended to limit the invention to the particular forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE INVENTION

Illustrative embodiments of the invention are described below. In the interest of clarity, not all features of an actual implementation are described in this specification. It will of course be appreciated that in the development of any such

actual embodiment, numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which will vary from one implementation to another. Moreover, it will be appreciated that such a development effort might be complex and time-consuming, but would nevertheless be a routine undertaking for those of ordinary skill in the art having the benefit of this disclosure.

FIG. **1** is a simplified block diagram schematically illustrating components of a typical frozen beverage machine **10**. The frozen beverage machine **10** includes an ingredients supply source **12**, a controller **14**, a process flow block **16**, at least one freezing chamber **18** and a refrigeration system **20**. The ingredient supply source **12** may include, for example, a water supply tank, syrup supply tanks and a carbon dioxide tank.

Ingredients for a frozen beverage mixture are provided from the ingredient supply **12** to the process flow block **16**, which controls the flow of the ingredients into the freezing chamber **18** as directed by the controller **14**. The controller **14** may comprise an appropriately programmed microprocessor and suitable memory devices encoding program instructions for executing the processes described and illustrated herein. The operation of the control block **16** and other control instrumentation is described, for example, in U.S. Pat. No. 5,706,661 issued to the present inventor, and which is incorporated by reference herein in its entirety.

The refrigeration system **20** functions to keep the beverage mixture within the freezing chamber **18** at the desired consistency, and may also be controlled by the controller **14**. The beverage mixture within the freezing chamber **18** is refrigerated such that it freezes on the inner surface of the freezing chamber **18**. A rotating shaft (not shown in FIG. 1) is disposed inside the chamber and blades extending outwardly therefrom scrape the mixture off the inside wall of the freezing chamber **18**. Once the beverage is in the desired frozen state, the product is dispensed from the chamber **18** through a dispensing valve.

FIG. **2** is a flow diagram illustrating a typical refrigeration cycle for the freezing chamber **18** of the frozen beverage machine **10**. In block **110**, the beverage mix within the freezing chamber **18** is monitored—any of a number of variables associated with the beverage mixture and/or freezing chamber **18** may be monitored to determine the condition of the beverage mixture. Typically, the beverage mixture is monitored to determine whether it is in a frozen or liquid state. If the mixture has reached a predetermined "thaw" point in decision block **112**, the refrigeration system **20** cools the chamber **18** (block **114**) until the beverage mixture reaches a "freeze" point as determined in decision block **116**, at which point the refrigeration is stopped (block **118**), and the process repeats.

At periodic intervals, typically every three to six hours, the freezing chamber is defrosted. The freezing chamber **18** is warmed so that the beverage mixture returns to an unfrozen, liquid state. Then the chamber **18** is refrigerated until the beverage mixture reaches a desired consistency. The defrost and refreeze process typically takes from about five to 30 minutes. A separate heater may be provided to facilitate the defrosting of the freezing chamber, or hot gas from the refrigeration system may be used to accomplish defrosting.

In accordance with the present invention, a short, or "burst" heating of the chamber **18** occurs on a regular, more frequent basis. In one embodiment, the burst heating takes place each time the refrigeration system **20** cycles on to refreeze the chamber **18**. As the freezing chamber **18** sits for a period of time without the refrigeration system **20** freezing the liquid, the beverage mixture within the chamber **18** approaches the less frozen thaw point. As discussed above, in known frozen beverage machines, the refrigeration system would then cycle on to refreeze the beverage mixture at this point (block **114** of FIG. **2**).

With the system of the present invention, however, a burst heating is initiated when the beverage mixture reaches the thaw point. Thus, the burst heating is initiated in response to a monitored variable associated with the beverage mixture and/or the freezing chamber **18**, rather than completely defrosting the system at periodic time intervals. Moreover, the burst heating does not take the beverage mixture to a completely liquid state as with known defrost processes, but rather, enables the larger ice crystals to melt out without reducing the quality of the drink to an unacceptable frozen drink quality. The burst heating may be used in conjunction with fill defrost cycles, or may be used in place of the full defrost to eliminate the undesirable aspects associated with the full defrost.

FIG. **3** is a flow diagram illustrating aspects of a burst heating cycle in accordance with embodiments of the present invention. As in the prior art refrigeration system illustrated in FIG. **2**, the beverage mix is monitored by an appropriate means in block **120**. The value of the monitored variable is compared to a first predetermined value representing the thaw point in decision block **122**. Rather than refrigerating the chamber **18** upon reaching the thaw point, a burst heating is initiated in block **124** in response to the variable reaching the predetermined thaw point in block **122**. In an exemplary embodiment of the invention, the duration of the burst heating is less than 15 seconds, though it may be longer. With the burst heating of the present invention, the beverage mixture does not reach a completely thawed, liquid state as in known full defrost processes. The burst heating operates to remove the larger ice crystals that form as the frozen beverage mixture is contained in the freezing chamber **18**.

Upon completion of the burst heating, the chamber **18** is refrigerated (block **126**) until the monitored variable reaches a second predetermined value (the freeze point), as determined in decision block **128**, at which time the refrigeration is ceased (block **130**) and the process repeats.

The burst heating may be accomplished in several manners. For example, upon the beverage mixture reaching the thaw point, the initiation of the refrigeration system may simply be delayed, thus allowing the temperature of the mixture to warm beyond the thaw point to melt some of the formed ice crystals. Alternatively, the freezing chamber **18** may be heated using a heat source for a short period. This may be accomplished via a heater associated with the freezing chamber **18**, or by cycling hot gas from the refrigeration system **20** around the chamber **18**.

FIG. **4** is a block diagram schematically illustrating portions of a frozen beverage system **11** in accordance with an exemplary embodiment of the present invention that uses the refrigerant to heat the freezing chamber **18**. The system **11** includes a freezing chamber **18**, and a rotating shaft **22** having a plurality of outwardly projecting blades (not shown) is disposed inside the chamber **18**. The shaft **22** is driven by a motor **24**, such that the blades mix the ingredients and scrape the mixture off the inside wall of the freezing chamber **18**.

The refrigeration system **20** includes a compressor **50**, a condenser **52**, an expansion valve **54** and an evaporator coil

56 surrounding the freezing chamber **18**. The compressor **50** provides the motive force for the particular refrigerant contained within the refrigeration system **20**. The compressor **50** forces the refrigerant through the condenser **52**, where the refrigerant vapor liquefies. The liquid refrigerant passes through the expansion valve **54**, expanding the high-pressure liquid refrigerant to a low-pressure vapor. The low-pressure, low-temperature refrigerant discharged from the thermostatic expansion valve **54** is then directed through the evaporator coil **56** for absorbing heat and thus refrigerating the freezing chamber **18** surrounded by the evaporator coil **56**.

The torque of the motor **24** is monitored to determine the state of the beverage mixture within the freezing chamber **18**. When the mixture is in a more thawed, liquid state, the torque required to turn the shaft **22** is relatively low. As the mixture becomes more frozen, more torque is required to turn the shaft **22**. Thus, in such an embodiment, the variable monitored in the flow diagram of FIG. **3** is motor torque (block **120**). When the torque falls to a first predetermined level representing the thaw point in decision block **122**, the burst heating is initiated.

The refrigeration system **20** of the exemplary embodiment illustrated in FIG. **4** further includes a hot gas bypass valve **58**. When the burst heating is initiated in block **124** of FIG. **3**, the compressor **50** is started and the hot gas bypass valve **58** is opened for a short period (less than 15 seconds in one embodiment), allowing the refrigerant to bypass the condenser **52** and expansion valve **54**. Thus, the refrigerant is not liquefied, but remains a hot gas. The hot gas is directed through the coil **56**, warming the chamber **18**. When the burst heating period is completed, the compressor **50** continues to operate, the hot gas valve **58** closes, and the expansion valve **54** opens to refrigerate the freezing chamber **18** (block **126** of FIG. **3**). The motor torque is monitored, and when it reaches a second predetermined level representing the freeze point, the refrigeration is stopped as shown in block **130** and the process repeats.

In further embodiments, other variables are monitored to determine the state of the beverage mixture, and the burst heating of the chamber **18** is then conducted in response to the measured variable. For instance, the temperature of the mixture may be monitored using any appropriate means, such as a thermometer. The burst heating would then be initiated in response to the mixture temperature reaching a predetermined thaw temperature. Alternatively, the viscosity of the mixture may be determined by monitoring an appropriate variable, with the burst heating being initiated in response thereto.

The methods of operating frozen beverage machines disclosed herein thus provide a beverage having a stable consistency, resulting in an enhanced beverage product. Further, since the frozen beverage mixture within the freezing chamber is more consistent, the performance of the instrumentation systems controlling the equipment operation is enhanced, resulting in the following benefits:

a) Liquid refill is controlled more consistently, which controls the pressure in the freezing chamber.

b) The thaw-freeze cycles are more consistent and produce an improved frozen drink.

c) When gases such as carbon dioxide are injected into the freezing chamber to create a frozen carbonated beverage, the control of the instrumentation and the quality of the resulting drink is improved.

d) When the frozen beverage machine sits for an extended period of time without a drink being dispensed, the "casual" drink is of higher quality due to the improved consistency of product throughout the frozen chamber.

e) The control of build-up of large ice crystals reduces freeze-ups in the dispensing valve and in the inlet liquid orifice to the freezing chamber.

f) The burst heating cycles keep the average temperature of the metal components of the freezing chamber from becoming too cold, thus preventing or at least reducing ice accumulations effecting machine operations.

Thus, the methods and devices of the disclosed invention, including implementation of short burst heating in frequent cycles greatly enhances the operation of the frozen dispenser and the quality of the dispensed drink. Maintenance of the equipment is reduced due to improved operation of the control instrumentation systems and mechanical components such as valves. Reduced downtime of the equipment will result from reduction or elimination of extended defrost cycles required to take the frozen mixture to a liquid.

The particular embodiments disclosed above are illustrative only, as the invention may be modified and practiced in different but equivalent manners apparent to those skilled in the art having the benefit of the teachings herein. Furthermore, no limitations are intended to the details of construction or design herein shown, other than as described in the claims below. It is therefore evident that the particular embodiments disclosed above may be altered or modified and all such variations are considered within the scope and spirit of the invention. Accordingly, the protection sought herein is as set forth in the claims below.

What is claimed is:

1. A method of operating a frozen beverage machine, comprising:

monitoring a beverage mixture within a freezing chamber of the frozen beverage machine;

heating the freezing chamber for a predetermined time period in response to the beverage mixture reaching a first predetermined state; and

refrigerating the freezing chamber until the beverage mixture reaches a second predetermined state.

2. The method of claim **1**, wherein monitoring the beverage mixture includes monitoring the torque required to turn a shaft situated in the freezing chamber.

3. The method of claim **1**, wherein monitoring the beverage mixture includes monitoring the temperature of the beverage mixture.

4. The method of claim **1**, wherein the predetermined time period is less than 15 seconds.

5. The method of claim **1**, wherein heating the freezing chamber includes flowing a hot gas through a coil surrounding the freezing chamber.

6. The method of claim **5**, wherein flowing a hot gas comprises flowing uncondensed refrigerant through the coil.

7. The method of claim **1**, wherein the heating of the freezing chamber does not result in the beverage mixture reaching a completely liquid state.

8. A program storage device readable by a machine and encoding a program of instructions for operating a frozen beverage machine, comprising:

monitoring a beverage mixture within a freezing chamber of the frozen beverage machine;

heating the freezing chamber for a predetermined time period in response to the beverage mixture reaching a first predetermined state; and

refrigerating the freezing chamber until the beverage mixture reaches a second predetermined state.

9. A control system for a frozen beverage machine having a freezing chamber, the control system comprising:

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De: Superintendencia de Industria y Comercio [expelinea@sic.gov.co]
Enviado el: Miércoles, 18 de Agosto de 2010 04:04 p.m.
Para: HASBLEYDI CALVO ROJAS
CC: Jaros
Asunto: ConfirmaciXn Solicitud expedientes
Importancia: Alta

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Estimado Usuario:

Hemos recibido su solicitud la cual será atendida dentro de las 3 horas hábiles siguientes a la recepción de este correo en el horario de 8:00 a 15:30 horas, en la sede Centro de la SIC, tercer piso del edificio Bochica ubicado en la Cra 13 Nro 27-00 en Bogotá DC.

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