

System and Method for Confectionery Preparation

Field of Invention

The present invention relates generally to manufacture and sales of frozen confectionery and more particularly to an integrated system and method for preparation of frozen confectionery.

Background of Invention

Many apparatuses and systems have been devised for manufacture and sales of frozen confectionery such as ice cream. A typical apparatus is a discontinuous ice cream machine. The principle behind using the discontinuous ice cream machine is to freeze a fixed predetermined amount of liquid mix in batches, and then to keep resultant frozen mix in bulk dipping/display containers. The bulk dipping/display containers are then displayed in display cabinets for sales at retail outlets.

An ice cream mix is made from powdered milk or liquid milk with flavor additives, stabilizers and emulsifiers, sugar or substitutes and Milk Solids Non-Fat (MSNF). A batch of the ice cream mix is normally prepared and poured into a freezing chamber of an ice cream machine on site at the retail outlet. The freezing chamber normally operates at low temperatures of -20°C to -29°C . The low temperatures of the freezing chamber induce freezing of the ice cream mix (specifically as the ice cream mix comes into contact with a surface of the freezing chamber). The freezing chamber typically contains a dasher having scraper blades and a beater. The scraper blades and the beater act together to keep the ice cream mix in continuous motion and in continuous contact with the surface of the freezing chamber while incorporating air. Frozen ice cream mix is scraped off the surface of the freezing chamber by a blade attachment and is then folded into non-frozen portions of the ice cream mix. This process of freezing and folding occurs in a continuous cycle until the ice cream mix is entirely frozen in a consistent state. Consistent state frozen ice cream is then removed from the freezing chamber into the bulk dipping/display containers. Once suitably filled, the bulk dipping/display containers are then placed in the display cabinets for sales at the retail outlet.

Ice cream machines used in the retail outlets are typically developed or sized according to sales demand of an individual retail outlet. Generally, these ice cream machines are of a relatively large capacity, capable of fulfilling a need for large batch sizes per run. Typically, the ice cream machine can handle one flavor of ice cream per vat, with a vat capacity of between one and two quarts. There can be more than one vat per ice cream machine, depending on size and freezing capacity of that particular ice cream machine. It is only after accumulating a predetermined quantity of ice cream that the retail outlet is ready to commence business and start fulfilling customer orders. A customer order is typically processed over the counter by manually scooping different flavors of ice cream out from the bulk dipping/display containers onto a wafer cone or some other form of container. Toppings or sauces are thereafter added as desired.

Therefore in a traditional ice cream retail outlet, operation is not a strictly “make as you order” system because ice cream is pre-made and stored in bulk dipping/display containers. The traditional ice cream retail outlet also has limited product flavor combinations available to a customer and cumbersome retail outlet backroom preparations. There is also a general imprecision in quantity of ice cream scooped and given to individual customers at the traditional ice cream retail outlet. Importantly, the fact that the ice cream is not freshly made on demand and that a rolling over of left over ice cream from day to day operations occurs will undoubtedly affecting quality of ice cream sold. Furthermore, displaying the ice cream in the bulk dipping/display containers in the display cabinets at the retail outlet often result in a public display of unsightly half filled dipping/display containers.

A recent development in ice cream manufacture utilizes flash freeze technology or Liquid Nitrogen (LN₂). Such flash freeze technology allows an immediate “make as you order” capability and also provides customers with a range of flavor options. However, this range of flavor options is still hugely limited. Additionally, LN₂ is difficult to handle and regulate. Logistics of LN₂ availability, distribution and installation add further constraints to market penetration and operation.

Cold Stone is an example of the “make as you order” system. With Cold Stone, the customer chooses different mixes, which are taken from pre-prepared ice cream mixes that are stored in containers. The pre-prepared ice cream mixes are emptied onto a cold surface before additional flavors and add-ons are mashed together using spades and then scooped onto cones or containers to be served. As is apparent, Cold Stone’s operation is neither able to offer freshly made ice cream on the spot, nor able to provide an immediately available, almost limitless range of recipe options by combining and proportioning flavors as desired.

Another method and apparatus for producing and dispensing aerated frozen food products such as ice cream, is described in US patent application 10/160,674 of Paul Kateman. Kateman’s method and apparatus of ice cream manufacture utilizes dry raw ingredients stored in special disposable bags. The dry raw ingredients are then mixed with ice cream base in the apparatus to form a liquid mix, the liquid mix then dispensed onto a forming plate. However, Kateman’s method and apparatus for producing and dispensing aerated frozen food products such as ice cream still provides a limited consumer choice. Kateman apparatus provides twelve flavor additives in solid powder form and an ice cream base. Due to the solid powder form of the flavor additives, the flavor additives have to be pre-mixed with the ice cream base within the apparatus prior to being discharged as a single mixed flavored ice cream. Kateman’s apparatus typically only allows combination of two flavors and does not provide any opportunity for flavor proportioning. Kateman’s apparatus blends all selected flavors together, thereby providing no attractive color or flavor variegation.

Therefore, this clearly affirms the need for a method and a system for addressing the foregoing shortcomings. There is also a dearth of apparatus that is able to produce cold confectionery, an example being ice cream, containing visually attractive color variegations.

Summary

In accordance with a first aspect of the invention, there is disclosed an apparatus for confectionery preparation comprising an acceptor for receiving a plurality of containers. The plurality of containers contains a plurality of liquid mixes. Each of the plurality of liquid mixes is contained in one of the plurality of containers and is associated with one of a

plurality of flavors. The apparatus further comprises a plurality of dispensers, each of the plurality of dispensers dispensing one of the plurality of liquid mixes. The apparatus also comprises of a valve assembly that inter-couples the acceptor and the plurality of dispensers. The acceptor delivers the plurality of liquid mixes to the valve assembly. The valve assembly is operable for controlling dispensing of each of the plurality of liquid mixes from the plurality of dispensers. The apparatus also comprises a controller for operating the valve assembly. An instruction for defining at least one of the plurality of flavors is providable to the controller. The controller operates the valve assembly based on the instruction provided, thereby controlling the dispensing of at least one of the plurality of liquid mixes. The at least one of the plurality of liquid mixes dispensed is associated with the at least one of the plurality of flavors defined by the instruction. Prepared confectionery is obtainable from the dispensed at least one of the plurality of liquid mixes with the prepared confectionary being one of frozen and chilled.

In accordance with a second aspect of the invention, there is disclosed a system for confectionery preparation comprising an acceptor for receiving a plurality of containers. The plurality of containers contains a plurality of liquid mixes. Each of the plurality of liquid mixes is containable in one of the plurality of containers and is associated with one of a plurality of flavors. The system further comprises a plurality of dispensers. Each of the plurality of dispensers is for dispensing one of the plurality of liquid mixes. The system also comprises a valve assembly. The valve assembly inter-couples the acceptor and the plurality of dispensers. The acceptor is for delivering the plurality of liquid mixes to the valve assembly. The valve assembly is operable for controlling dispensing of each of the plurality of liquid mixes from the plurality of dispensers. The system further comprises a controller for operating the valve assembly. An instruction defining at least one of the plurality of flavors is providable to the controller. The valve assembly is operable by the controller based on the instruction. The instruction control the dispensing of at least one of the plurality of liquid mixes, the at least one of the plurality of liquid mixes being associated with the at least one of the plurality of flavors defined by the instruction. Prepared confectionery is obtainable from the dispensed at least one of the plurality of liquid mixes with the prepared confectionary being one of frozen and chilled. The system further comprises a clean-in-place

(CIP) apparatus. The CIP apparatus is configurable for delivering fluid to at least one of the plurality of dispensers, the valve assembly and the acceptor for substantial cleaning thereof.

In accordance with a third aspect of the invention, there is disclosed a method for confectionery preparation comprising providing a plurality of containers and a plurality of dispensers. Each of the plurality of containers contains one of a plurality of liquid mixes that is associated with one of a plurality of flavors. Each of the plurality of dispensers is for dispensing one of the plurality of liquid mixes. The method further comprises delivering the plurality of liquid mixes to a valve assembly. The valve assembly is operable for controlling dispensing of each of the plurality of liquid mixes from the plurality of dispensers. The method also comprises receiving an instruction defining at least one of the plurality of flavors and dispensing at least one of the plurality of liquid mixes. The at least one of the plurality of liquid mixes dispensed is associated with the at least one of the plurality of flavors defined by the instruction by operating the valve assembly. The prepared confectionery of the method is obtainable from the dispensed at least one of the plurality of liquid mixes with the prepared confectionary being one of frozen and chilled.

Other aspects and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

Brief Description of the Drawings

FIG. 1 shows a partial system configuration of a system for confectionery preparation according to an embodiment of the invention;

FIG. 2 shows a partial system configuration illustrating the main elements of the system for confectionery preparation as shown in FIG. 1;

FIG. 3 shows a partial system configuration of a clean-in-place (CIP) apparatus couplable to the system of FIG. 1;

FIG. 4 shows a flowchart of a CIP process comprising a preparation stage and a CIP Cycle implementable by the CIP apparatus of FIG. 3;

FIG. 5 shows a flowchart of the preparation stage of FIG. 4;

FIG. 6 shows a flowchart of the CIP cycle of FIG. 4; and

FIG. 7 shows a process flow diagram of a method for confectionery preparation implementable by the system of FIG. 1.

Detailed Description

With reference to the drawings, a system and a method for manufacturing frozen confectionery that are able to generate an almost limitless product flavor combinations and proportions are described hereinafter.

A number of apparatuses and systems for the preparation of frozen confectionery have been devised, but none are able to generate an almost limitless range of product flavor combinations and proportions. Known apparatuses employed in retail outlets for manufacture of frozen confectionery such as ice cream have also been unable to produce finished products with visually attractive color and flavor variegations.

A system for the preparation of frozen confectionery provided by the present invention comprises a valve assembly that provides means for an almost limitless product flavor combinations and proportioning. Additionally, the system requires no blending of individual flavors, but dispenses each individual flavor as it is through individual dispensing points; thereby allowing a finished product to retain a distinct color and flavor variegation. Such distinct color and flavor variegation significantly enhances visual aesthetics of the finished product and also provides valuable marketing and promotional opportunities. The use of liquid ready-mixes shortens production stages and eliminates a need for a mixing chamber and related accessories in the apparatus. Use of disposable Polyethylene Terephthalate (PET) containers to store, distribute and dispense liquid ready-mixes eliminates cumbersome

retail outlet backroom preparation of individual mixes. The elimination of cumbersome retail outlet backroom preparation of individual mixes allows the use of relatively lower skilled and cheaper labor. Additionally, the use of disposable PET containers to store and distribute the liquid ready-mixes allows for mass production, distribution and storage and also facilitates consistent finished product quality and integrity. Finally, the use of disposable PET containers to distribute, store and dispense liquid ready-mixes provides plug and produce ease to the preparation of frozen confectionery.

For purposes of brevity and clarity, the description of the invention is limited hereinafter to applications related to providing a system and a method for production of frozen confectionery that would allow an almost limitless product flavor combinations and proportions. This however does not preclude embodiments of the invention from other applications that require similar operating performance. The fundamental operational and functional principles of the embodiments of the invention remain common throughout the various embodiments.

Exemplary embodiments of the invention described hereinafter are in accordance with FIG. 1 to FIG. 7, in which like elements are numbered with like reference numerals.

An exemplary embodiment of the invention, a system 100 for preparation of frozen confectionery is described hereinafter with reference to FIG. 1 and FIG. 2. The system 100 comprises an acceptor 20 for housing a number of disposable PET containers 22. The disposable PET containers 22 contain liquid ready-mixes. The acceptor 20 keeps the liquid ready-mixes in the disposable PET containers 22 at a constant pressure and temperature. Preferably a temperature conditioner helps to regulate the temperature of the liquid ready-mixes. The acceptor 20 comprises a gas manifold 24 couplable to a pressurized carbon dioxide (CO₂) supply 26 for receiving CO₂ therefrom. The gas manifold 24 is further coupled to each of the disposable PET containers 22 for delivering CO₂ to each of the disposable PET containers. Preferably, gas tubings couples the gas manifold to each of the disposable PET containers 22. The disposable PET containers 22 are further coupled to a valve assembly 28. The valve assembly 28 is preferably an electronic valve assembly. The

valve assembly 28 comprises multiple valves (not indicated by a referral number), each one of the multiple valves coupled to a corresponding one of the disposable PET containers 22. The multiple valves may be coupled to the disposable PET containers 22 by product delivery tubings.

The pressurized CO₂ supply 26 is preferably contained in a standard industry sized container with gas regulators 30 for setting and monitoring pressure of CO₂ supplied to the gas manifold 24 and to each of the disposable PET containers 22. The pressure of the CO₂ is adjustable depending on a variety of factors including, but not limited to, viscosity of the liquid ready-mixes. The CO₂ helps to keep the pressure within each of the disposable PET containers 22 constant and also serves as an oxygen barrier to the liquid ready-mixes, thereby helping to preserve the liquid ready-mixes. The CO₂ is also used to force the liquid ready-mixes from the disposable PET containers 22 into the valve assembly 28.

The valve assembly 28 of the system 100 is modular. The number of valves of the valve assembly 28 corresponds with the number of disposable PET containers 22. Increasing the number of disposable PET containers 22 correspondingly increases the number of flavors of the liquid ready-mixes.

The operation of the valves within the valve assembly 28 is controlled by an electronic control system 32 of the system 100. The electronic control system 32 is also known as a controller. The electronic control system 32 comprises an input console with a customer display screen 34, preferably a touch screen. The input console receives customer's instructions, also known as a recipe. The customer is able to select any combination of flavors as well as a proportion of each selected flavor. The customer's instructions may be relayed directly to a microprocessor system 36. Alternatively, the customer's instructions may be relayed to a programmable logic controller and/or a computing device. The microprocessor system 36 then relays operator-centric instructions to a slave module 38. The microprocessor system 36 relays the customer's instructions to the valve assembly 28. Relayed customer's instructions from the microprocessor system 36 to the valve assembly 28 control operations of the valve assembly 28. Therefore, the electronic control system 32

receives and relays the customer's instructions, thereby controlling operation of the valve assembly 28. By controlling the operation of the valve assembly 28 as per the customer's instructions, the electronic control system 32 is able to ensure that a finished product will have specific flavor combination and proportion in accordance with the customer's instructions.

As previously mentioned, the valve assembly 28 is modular and the number of valves 30 within the valve assembly 28 is easily increased. Therefore, an almost limitless combination of recipes, having almost limitless flavor combination and proportion is possible. A set of 16-valve combination will give a possible twelve thousand combination of flavors while a set of 32-valve will give a possible six hundred thousand combination of flavors. Additionally, specific opening timeframes of flow valves can be adjusted, thereby enabling proportions of selected flavors to be controllable. This further increases finished product variety by many folds to over 2.6 million.

The flow valves are preferably electro-mechanical valves that enable the opening timeframes of the flow valves to be precisely controlled. The precisely controlled opening timeframes of the flow valves, coupled with small diameter tubings of the valve assembly 28 facilitates dispensing of liquid ready-mixes to the nearest milliliter. Serving sizes of the finished product is specifiable by the customer to the nearest milliliter. The customer is able to control expense of his purchased product, as price of the purchased product is dependent on the serving size.

The system 100 also comprises a nozzle assembly 40. The nozzle assembly 40 is coupled to the valve assembly 28. The liquid ready-mixes are dispensed from the system 100 via the nozzle assembly 40. The nozzle assembly 40 comprises a number of dispensing points 42, also known as dispensing heads. The dispensing points 42 are mounted and spatially arranged on a three-tiered cascading tower. The liquid ready-mixes are dispensed by pressure supplied by the CO₂ onto a forming plate 44, also known as a forming platform. The liquid ready -mixes dispensed can be of different viscosities. The different viscosities of

liquid ready-mixes dispensed from the different dispensing points 42 facilitate forming of distinct flavor and color patterns or variegations in the final product.

The forming plate 44 has an enclosed vessel through which a re-circulating refrigerant is pumped from a continuous refrigeration plant (CRP) 46. The re-circulating refrigerant keeps the forming plate 44 at a specifically set sub-zero temperature. The specifically calibrated sub-zero temperature of the forming plate 44 enables freezing of the dispensed liquid ready-mixes, thereby producing the finished product. A template is optionally placed on the forming plate 44. The template can be of varying thickness and shapes, thereby enabling alteration of shapes or contours of the finished product.

A water attachment 48 adjacent to the nozzle assembly 40 allows for immediate flushing of the forming plate 44 as and when required. The water attachment 48 can be used in conjunction with a warm air nozzle 50, the warm air nozzle 50 supplying warm air. The warm air facilitates removal of debris, frost and icicles that form due to excessive condensation, especially in humid environments.

The system 100 further comprises an optional hot plate 52. The hot plate produces edible flour or other wraps to contain the finished product, if preferred.

Another embodiment of the present invention takes the form of the above-described system 100, with an addition of an auxiliary clean-in-place (CIP) apparatus 200 as shown in FIG. 3. The CIP apparatus 200 comprises a CIP tank 210 and a CIP pump 212, which are mounted on a dolly. The CIP tank 210 contains cleaning solutions including, but not limited to cold or hot water, sanitizer and detergent. The CIP pump 212 pumps the cleaning solutions out of the CIP tank 210. The CIP apparatus 200 also comprises an adaptor rack 214 that is fitted on the CIP tank 210. The adaptor rack 214 comprises holes into which a steel tube of an adaptor 216 can be placed. The CIP apparatus 200 further comprises a collection trough 218. The collection trough 218 has a tube 220 that is able to transfer liquid from the collection trough 218 back to the CIP tank 210 or alternatively to a draining point. The CIP apparatus 200 has two output points. The first output point 222 is couplable to a CIP manifold 224, the CIP

manifold 224 further couplable to the system 100. The second output point 226 is couplable to the adaptor 216 that is placed on the adaptor rack 214.

The CIP apparatus 200 implements a CIP process 300 as shown in FIG. 4. The CIP process 300 comprises of two main stages, a preparation stage 400 and a CIP cycle 500. The CIP process 300 is implementable as a software program that is executable by the electronic control system 32.

FIG. 5 shows steps in the preparation stage 400 of the CIP process 300. In a first step 410 of the preparation stage 400 of the CIP process 300, the carbon dioxide supply 26 is decoupled from each of the disposable PET containers 22. In a step 420 of the preparation stage 400, the disposable PET containers 22 are decoupled from the valve assembly 28. The disposable PET containers 22 are then removed from the acceptor 20. In a step 430, the carbon dioxide supply 26 is coupled directly to the valve assembly 28. The CO₂ supply 26 may be coupled directly to the valve assembly 28 by connecting the CO₂ manifold 24 to the product delivery tubings. In a next step of the preparation stage, step 440, the collection trough 214 is placed under the dispensing points 42 of the nozzle assembly 40. CO₂ is supplied in a step 450 after the electronic control system 32 is activated to a "Sanitation" mode. In a CO₂ flush, the CO₂ supplied pushes out remnants of the liquid ready-mix from the product delivery tubings, the valve assembly 28 and the nozzle assembly 40 onto the collection trough 218. Discharged remnants of liquid ready-mix on the collection trough 218 are then drained via the draining point. When all the remnants of the liquid ready-mix are discharged, the CO₂ supply 26 is then decoupled from the valve assembly 28 in a step 460. In a step 470 of the preparation stage 400, the valve assembly 28 is coupled to the CIP manifold 224, the CIP manifold 224 further coupled to the first output point 222 of the CIP apparatus 200. The valve assembly 28 is preferably coupled to CIP manifold 224 via the product delivery tubings. In a step 480, the adaptor 216 is disconnected from the disposable PET container 22 and placed on the adaptor rack 214. In a step 490, the adaptor 216 is connected to the second output point 226 of the CIP apparatus 200. Completion of the steps 410 to 490 completes the preparation stage 400 of the CIP process 300.

The CIP cycle 500 starts after the CIP preparation stage 400 is completed. The CIP cycle 500 is an important part of the CIP process 300. A first step of the CIP cycle 500, step 510, is a clean water flush. The duration of the clean water flush is adjustable as required to ensure removal of all liquid ready-mix remnants from the system 100. Discharge of the clean water flush is drained away via the draining point. A second step of the CIP cycle 500, step 520, is a detergent flush. Discharge of the detergent flush is collected in the collection trough 218 and transferred back to the CIP tank 210 for recycling. In a step 530, clean water is flushed through the system 100 and drained via the draining point. A step 540 is a sanitizer flush. Discharged sanitizer from the dispensing points is collected in the collection trough 218 and transferred back to the CIP tank 210 to be recycled. In a step 550, clean water is again flushed through the system 100 and drained via the draining point. In a step 560 of the CIP cycle 500, hot water is flushed through the system 100 in an attempt to remove stubborn products or smells. Temperature of the hot water is preferably above 65°C. Duration of the step 560 is adjustable as required. In a step 570 of the CIP cycle 500, the valve assembly 28 is decoupled from the CIP manifold 224. In a step 580, the CO₂ supply 26 is connected to the valve assembly 28. The CO₂ flushes out remnant water from the product delivery tubings, the valve assembly 28 and the nozzle assembly 40. In a step 590 of the CIP cycle 500, the adaptor 216 is disconnected from the second output point 226 of the CIP apparatus 200. The adaptor 216 is then reconnected to the disposable PET containers 22.

During the entire duration of the CIP process 300, the valves 30 within the valve assembly 28 remain open. The CIP process 300 is controlled by the electronic control system 32. After the CIP process 300 is completed, the disposable PET containers 22 are then coupled again to the CO₂ supply 26 and the valve assembly 28 within the acceptor 20. The connection of the disposable PET containers 22 to the CO₂ supply 26 and the valve assembly 28 is preferably via the adaptors 216 that are connected onto the disposable PET containers 22.

The CIP process 300 is typically performed at the end of each day's operation or when an operator deems the production unit in need of cleaning. The CIP process 300 allows for thorough cleaning of the system 100 without the need for tedious dismantling of the system 100 parts. The CIP process 300 shortens cleaning or sanitation time considerably, and also

significantly reduces resource consumption. A Flush-In-Place (FIP) process is optionally performed on the forming plate 44 after each product serving to avoid product flavor cross contamination. The FIP process is a cold or hot water flush and a hot air flush of the forming plate 44. An operator easily performs the FIP process.

FIG. 7 gives an overview of an integrated method 600 of confectionery preparation as provided by the present invention. In a step 610 of the integrated method 600, liquid ready-mixes are supplied in disposable PET containers 22. The liquid ready-mixes are associated with different flavors. In a step 620, the disposable PET containers 22 are coupled to the acceptor 20. The acceptor 20 maintains the liquid ready-mixes at a dispensing ready state, typically at a chilled temperature and a constant pressure. The disposable PET containers 22 are couplable to the CO₂ supply 26 and to the valve assembly 28.

In a step 630, CO₂ is supplied to the gas manifold 24 and thereafter to each of the disposable PET containers 22. The CO₂ facilitates transfer of the liquid ready-mixes from the disposable PET containers 22 into the valve assembly 28. As previously described, the valve assembly 28 enables almost limitless flavor combination and proportion.

Operation of the valve assembly 28 is controllable by the electronic control system 32. The electronic control system 32 comprises the input console, the input console having the customer display 34 or a user interface. In a step 640, the customer inputs instructions into the input console via the customer display 34 or the user interface. The customer's instructions specify at least one flavor and a proportion corresponding to the at least one flavor selected. The customer's instructions are relayed via the user interface to the microprocessor system 36 of the electronic control system 32 in a step 650. In a step 660, the microprocessor system 36 relays the customer's instructions to the valve assembly 28, thereby controlling the operation of the valve assembly 28 and dispensing of the liquid ready-mixes.

Dispensing of liquid ready-mixes onto a forming surface, preferable the forming plate 44 occurs in a step 670. The dispensing of the liquid ready-mixes occurs through the dispensing

points 42 of the nozzle assembly 40. Associated flavors of the dispensed liquid ready-mixes and a proportion of each of the dispensed liquid ready-mixes are determinable by the customer's instructions.

In a step 680 of the method 600, forming of the finished product takes place on the forming plate 44. The forming plate 44 has an enclosed vessel through which the re-circulating refrigerant is pumped from the Continuous Refrigeration Plant 46. The re-circulating refrigerant keeps the forming plate at a specifically calibrated sub-zero temperature for freezing the dispensed liquid ready-mixes on the forming plate 44. The different viscosities of each of the dispensed liquid ready-mixes facilitate formation of distinct flow patterns and color variegation in the finished product. The integrated method 600 optionally comprises a CIP process 300 in a step 690. The CIP process 300 is normally performed at the end of each day's operations.

From the foregoing, it will be appreciated that the integrated system and method for the preparation of confectionery as provided by the present invention are novel and provide significant desirable advantages. The electronic control system receives customers' instructions, otherwise known as recipes, and transmits the customers' instructions to the valve assembly. The valve assembly is modular, allowing addition of more valves as required. Individual valves can be directed to open for specified time periods, thereby releasing specific quantities or proportions of the liquid ready-mixes as desired. The plurality of valves within the electronic valve assembly and their controllable differential opening timeframes allow for almost limitless product flavor combination and proportion, thereby offering the customer an almost limitless finished product variety.

The system as provided by the present invention provides the customer with an ability to personally customize his purchased product, thereby creating a personalized recipe. This empowers the customer and also significantly enhances the customer's experience and satisfaction. A further advantage of the system and method for the preparation of confectionery as provided by the present invention is that no blending of dispensed liquid ready-mixes occurs, thereby allowing the finished product to retain distinct flavor and color

variegation. The distinct flavor and color variegation significantly enhances visual aesthetics of the finished product, and when taken together with the integrated system and method's ability to recall and reproduce customers' recipes, provides valuable marketing and promotional opportunities.

In the foregoing manner, a system and a method for preparation of confectionery are described according to exemplary embodiments of the invention. Although exemplary embodiments of the invention have been disclosed, it will be apparent to one skilled in the art in view of this disclosure that numerous changes and/or modifications can be made without departing from the scope and spirit of the invention.

Claims:

1. An apparatus for confectionery preparation comprising:
 - an acceptor for receiving a plurality of containers, each of a plurality of liquid mixes being containable in one of the plurality of containers and being associated with one of a plurality of flavors;
 - a plurality of dispensers, each of the plurality of dispensers for dispensing one of the plurality of liquid mixes;
 - a valve assembly inter-coupling the acceptor and the plurality of dispensers, the acceptor for delivering the plurality of liquid mixes to the valve assembly, the valve assembly being operable for controlling dispensing of each of the plurality of liquid mixes from the plurality of dispensers; and
 - a controller for operating the valve assembly,wherein an instruction defining at least one of the plurality of flavors is providable to the controller, the controller operating the valve assembly based on the instruction to thereby control the dispensing of at least one of the plurality of liquid mixes, the at least one of the plurality of liquid mixes being associated with the at least one of the plurality of flavors defined by the instruction, and prepared confectionery is obtainable from the dispensed at least one of the plurality of liquid mixes, the prepared confectionery being one of frozen and chilled.
2. The apparatus as in claim 1, the valve assembly further for controlling quantity of each of the plurality of mixes being dispensed from the plurality of dispensers.
3. The apparatus as in claim 2, the instruction further defining at least one quantity associated with the defined at least one plurality of flavors.
4. The apparatus as in claim 1, each of the plurality of containers being a polyethylene terephthalate (PET) container.

5. The apparatus as in claim 1, further comprising:
a gas source for providing pressurized gas to the acceptor for pressuring each of the plurality of containers to thereby deliver the plurality of liquid mixes to the valve assembly.
6. The apparatus as in claim 5, the pressurized gas being carbon dioxide.
7. The apparatus as in claim 1, further comprising:
a temperature conditioner for regulating the temperature of the plurality of liquid mixes.
8. The apparatus as in claim 1, the valve assembly comprising:
a plurality of valves, each of the plurality of valves for interconnecting one of the plurality of containers to one of the plurality of dispenser, and each of the plurality of valves being independently operable and controllable by the controller.
9. The apparatus as in claim 1, the controller comprising:
at least one of a programmable logic controller (PLC), a programmable integrated circuit (PIC), a micro-processor and a computing device
10. The apparatus as in claim 1, the controller comprising:
an input means for receiving the instruction.
11. The apparatus as in claim 1, further comprising:
a forming platform for receiving the dispensed at least one of the plurality of liquid mixes associated with the at least one of the plurality of flavors defined by the instruction, the temperature of the forming platform being controllable for forming the prepared confectionery from the dispensed at least one of the plurality of liquid mixes.

12. A system for confectionery preparation comprising:
 - an acceptor for receiving a plurality of containers, each of a plurality of liquid mixes being containable in one of the plurality of containers and being associated with one of a plurality of flavors;
 - a plurality of dispensers, each of the plurality of dispensers for dispensing one of the plurality of liquid mixes;
 - a valve assembly inter-coupling the acceptor and the plurality of dispensers, the acceptor for delivering the plurality of liquid mixes to the valve assembly, the valve assembly being operable for controlling dispensing of each of the plurality of liquid mixes from the plurality of dispensers;
 - a controller for operating the valve assembly, an instruction defining at least one of the plurality of flavors is providable to the controller, the valve assembly is operable by the controller based on the instruction to thereby control the dispensing of at least one of the plurality of liquid mixes, the at least one of the plurality of liquid mixes being associated with the at least one of the plurality of flavors defined by the instruction, and prepared confectionery is obtainable from the dispensed at least one of the plurality of liquid mixes, the prepared confectionery being one of frozen and chilled; and
 - a clean-in-place (CIP) apparatus, the CIP apparatus being configurable for delivering fluid to at least one of the plurality of dispensers, the valve assembly and the acceptor for substantial cleaning thereof.
13. The system as in claim 12, the valve assembly further for controlling quantity of each of the plurality of mixes being dispensed from the plurality of dispensers.
14. The system as in claim 13, the instruction further defining at least one quantity associated with the defined at least one plurality of flavors.
15. The system as in claim 12, each of the plurality of containers being a polyethylene terephthalate (PET) container.

16. The system as in claim 12, further comprising:
a gas source for providing pressurized gas to the acceptor for pressuring each of the plurality of containers to thereby deliver the plurality of liquid mixes to the valve assembly.
17. The system as in claim 16, the pressurized gas being carbon dioxide.
18. The system as in claim 12, further comprising:
a temperature conditioner for regulating the temperature of the plurality of liquid mixes.
19. The system as in claim 12, the valve assembly comprising:
a plurality of valves, each of the plurality of valves for interconnecting one of the plurality of containers to one of the plurality of dispenser, and each of the plurality of valves being independently operable and controllable by the controller.
20. The system as in claim 12, the controller comprising:
at least one of a programmable logic controller (PLC), a programmable integrated circuit (PIC), a micro-processor and a computing device
21. The system as in claim 12, the controller comprising:
an input means for receiving the instruction.
22. The system as in claim 12, further comprising:
a forming platform for receiving the dispensed at least one of the plurality of liquid mixes associated with the at least one of the plurality of flavors defined by the instruction, the temperature of the forming platform being controllable for forming the prepared confectionery from the dispensed at least one of the plurality of liquid mixes.

23. A method for confectionery preparation comprising:
- providing a plurality of containers, each of the plurality of liquid mixes being containable in one of the plurality of containers and being associated with one of a plurality of flavors;
 - providing a plurality of dispensers, each of the plurality of dispensers for dispensing one of the plurality of liquid mixes;
 - delivering the plurality of liquid mixes to a valve assembly, the valve assembly being operable for controlling dispensing of each of the plurality of liquid mixes from the plurality of dispensers;
 - receiving an instruction defining at least one of the plurality of flavors; and
 - dispensing at least one of the plurality of liquid mixes associated with the at least one of the plurality of flavors defined by the instruction by operating the valve assembly,
- wherein prepared confectionery is obtainable from the dispensed at least one of the plurality of liquid mixes, the prepared confectionery being one of frozen and chilled.
24. The method as in claim 23, the valve assembly further being operable for controlling quantity of each of the plurality of mixes being dispensed from the plurality of dispensers.
25. The method as in claim 24, the instruction further defining at least one quantity associated with the defined at least one plurality of flavors.
26. The method as in claim 23, each of the plurality of containers being a polyethylene terephthalate (PET) container.
27. The method as in claim 23, further comprising:
- providing pressurized gas to the acceptor for pressuring each of the plurality of containers to thereby deliver the plurality of liquid mixes to the valve assembly.

28. The method as in claim 27, the pressurized gas being carbon dioxide.
29. The method as in claim 23, further comprising:
regulating the temperature of the plurality of liquid mixes.
30. The method as in claim 23, the valve assembly comprising:
a plurality of valves, each of the plurality of valves for interconnecting one of the plurality of containers to one of the plurality of dispenser, and each of the plurality of valves being independently operable and controllable by the controller.
31. The method as in claim 23, dispensing at least one of the plurality of liquid mixes associated with the at least one of the plurality of flavors defined by the instruction comprising:
dispensing at least one of the plurality of liquid mixes associated with the at least one of the plurality of flavors defined by the instruction on a forming platform, the temperature of the forming platform being controllable for forming the prepared confectionery from the dispensed at least one of the plurality of liquid mixes.