BEVERAGE MACHINE AND METHODS OF FORMING BEVERAGES FROM DIFFERENT BEVERAGE CONSUMABLE TYPES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit under 35 U.S.C. § 119(e) of U.S. provisional application serial number 63/564,005, filed March 12, 2024, the disclosure of which is incorporated by reference in its entirety.

FIELD

[0002] Disclosed embodiments are related to beverage machines and methods of forming a beverage.

BACKGROUND

[0003] Beverage forming systems that use a liquid, such as water, to form a beverage are well known. For example, U.S. Patent 8,361,527 discloses a beverage forming system that uses a beverage consumable in the form of a beverage cartridge containing a beverage material to make a beverage by introducing liquid into the cartridge. Liquid provided to the cartridge may be heated in a tank prior to delivery to the cartridge.

SUMMARY

[0004] A beverage machine is provided, the beverage machine comprising: a housing, a liquid supply configured to provide a liquid for forming a beverage, a first chamber configured to hold a first beverage material for combining with liquid from the liquid supply to form a first beverage, and a second chamber comprising a beverage tablet holder configured to receive a package-free beverage tablet having a second beverage material for combining with liquid from the liquid supply to form a second beverage, wherein the beverage tablet comprises a body of compressed second beverage material.

[0005] A method of forming a beverage from a beverage tablet is provided, the method comprising, receiving a beverage tablet into a second brew chamber of a beverage machine such that the second brew chamber contacts the beverage tablet directly without intervening packaging in-between, the beverage machine having a first brew chamber configured to form a beverage from a beverage cartridge having packaging, introducing liquid from a liquid supply into the second brew chamber and to the beverage tablet to form a beverage, and dispensing the beverage.

[0006] It should be appreciated that the foregoing concepts, and additional concepts discussed below, may be arranged in any suitable combination, as the present disclosure is not limited in this respect. Further, other advantages and novel features of the present disclosure will become apparent from the following detailed description of various non-limiting embodiments when considered in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF DRAWINGS

[0007] The accompanying drawings are not intended to be drawn to scale. In the drawings, each identical or nearly identical component that is illustrated in various figures may be represented by a like numeral. For purposes of clarity, not every component may be labeled in every drawing. In the drawings:

[0008] FIG. 1 shows a perspective view of a beverage machine according to an embodiment;

[0009] FIG. 2 shows a front view of the beverage machine of FIG. 1;

[0010] FIG. 3 shows a side view of the beverage machine of FIG. 1;

[0011] FIG. 4 shows a top view of the beverage machine of FIG. 1;

[0012] FIG. 5 shows a simplified cross-sectional view of the beverage machine of FIG. 1 according to an embodiment;

[0013] FIG. 6 shows a side view of a beverage tablet inserted into a brew chamber of a beverage machine;

[0014] FIG. 7 shows a side view of a compressed beverage tablet in the brew chamber according to the embodiment of FIG. 6; and

[0015] FIG. 8 shows a side view of an expanded beverage tablet in the brew chamber according to the embodiment of FIG. 6.

[0016] FIG. 9 shows a side view of a beverage tablet inserted into a brew chamber of a beverage machine according to an alternative embodiment;

[0017] FIG. 10 shows a simplified cross-sectional view of an alternative embodiment of a beverage machine;

[0018] FIG. 11 shows a perspective view of a beverage machine according to yet another embodiment;

[0019] FIG. 12 shows a perspective view of the beverage machine of FIG. 11; and

[0020] FIG. 13 shows a schematic representation of a fluid system for the beverage machine of any embodiment.

DETAILED DESCRIPTION

[0021] A beverage machine may generally be used to form any suitable beverage, such as tea, coffee, other infusion-type beverages, beverages formed from a liquid or powdered concentrate, soups, juices, sodas, or other beverages made from dried materials. Such beverages may be made by combining a beverage ingredient, such as ground coffee, powdered drink mix, etc. with water in a brew chamber of the beverage machine.

[0022] The beverage ingredient may generally be provided in any suitable form. For instance, the beverage ingredient may be contained in a pod or cartridge having external packaging, and the brew chamber may allow for water to be introduced into the pod or cartridge to be combined with the beverage ingredient. Alternatively, the beverage ingredient may be placed into the brew chamber in loose or uncontained form, either with or without a filter.

[0023] In some embodiments, the beverage ingredient may be provided in the form of a package-free beverage tablet of compacted beverage ingredient. The beverage tablet may be able to hold its own shape, and thus may not require individual packaging to prevent dispersing of the beverage material prior to use in forming a beverage. The beverage tablet may be configured to be received within a beverage machine without packaging such that the beverage ingredients of the beverage tablet directly contact the beverage machine (e.g., a brew chamber) during a brewing process (e.g., without requiring the beverage machine to pierce through or otherwise open packaging to access the beverage ingredients).

[0024] In some embodiments, the beverage tablet comprises a solid body comprising a beverage ingredient. For example, one or more beverage ingredients of the beverage tablet may be formed into a solid body by compression, adhesion, solidification in a mold, or any of a variety of other suitable methods for making a rigid body from one or more beverage ingredients.

[0025] In some embodiments, a package-less beverage consumable (e.g., a beverage tablet) may include a coating disposed along at least a portion of the outer surface at the periphery of the consumable. In some embodiments, the coating may bind the beverage ingredients within the interior of the consumable. In some embodiments, the beverage ingredients held within the coating may be loose, such as loose ground coffee, or compacted. The coating may be a food grade binder, an alginate, edible, soluble, or any other suitable material. In some embodiments, the coating may serve as a barrier to reduce infiltration of oxygen and/or moisture such as to maintain freshness of the beverage ingredients. Material of the package-less beverage consumable, including a coating of the consumable if one is

present, may directly contact some portion of the beverage machine, such as the brew chamber, before brewing the beverage, without intervening packaging in-between.

[0026] In some embodiments, the beverage tablet may be formed in a variety of sizes, and the beverage machine may be capable of receiving beverage tablets in the variety of sizes. In some embodiments, the beverage tablet may be generally cylindrical, and different sizes of beverage tablet may be formed by altering a height of the beverage tablet. In some embodiments, the beverage tablet may have generally flat end surfaces. In some embodiments, the beverage tablet may have domed end surfaces.

[0027] Aspects herein relate to a beverage machine that is capable of brewing beverages from different beverage consumable types, including beverage tablets, and arrangements where the beverage ingredient is provided in some other form, such as loose or contained in a cartridge having external packaging. In some embodiments described herein, a single beverage machine has two brew chambers, where one chamber is configured to receive a beverage tablet, and the other chamber is configured to receive beverage ingredient in some other form. The inventors have recognized that such a beverage machine may allow a user to brew a larger variety of beverages with a single machine.

[0028] In some embodiments, the brew chambers may be arranged such that one brew chamber is disposed behind the other brew chamber when viewing the beverage machine from a front of the beverage machine. Such a configuration may allow for a narrower footprint of the beverage machine, allowing the beverage machine to take up less width on a support surface, such as a countertop. In some embodiments, each brew chamber may be configured to dispense the beverage to a shared dispensing station, further reducing the lateral footprint of the beverage machine.

[0029] In some embodiments, the brew chambers may be arranged such that one brew chamber is disposed to a side of the other brew chamber when viewing the beverage machine from a front of the beverage machine. Such a configuration may allow for a shallower footprint, allowing the beverage machine to take up less depth on a support surface.

[0030] In some embodiments, the brew chambers may include lids configured to expose the brew chambers when the lids are in an open position to allow for insertion of the beverage consumable. In some embodiments, each brew chamber may have a separate lid. In some embodiments, the brew chambers may include a shared lid, such that moving the lid to the open position exposes both brew chambers.

[0031] Turning to the figures, specific non-limiting embodiments are described in further detail. It should be understood that the various systems, components, features, and

methods described relative to these embodiments may be used either individually and/or in any desired combination as the disclosure is not limited to only the specific embodiments described herein.

[0032] FIGS. 1-4 show various views of a beverage machine 100 in an illustrative embodiment that incorporates aspects of the invention. The beverage machine may be used to form any suitable beverage, such as tea, coffee, other infusion-type beverages, beverages formed from a liquid or powdered concentrate, soups, juices, sodas, or other beverages made from dried materials. A beverage machine 100 may include one or more brew chambers. Each brew chamber may be configured to hold a beverage material, which may be combined with liquid from a liquid supply 202 to form a beverage. The beverage machine 100 may include a dispensing station 112, where the beverage may exit the beverage machine housing 110. The dispensing station 112 may include a drip tray 114, e.g., on which a user's cup or other container may be placed to receive beverage that is dispensed from a dispensing outlet. To form a beverage, a cartridge or other container holding beverage ingredient may be provided in a brew chamber by opening the brew chamber, e.g., by lifting a lid by way of a handle, placing a beverage ingredient in the brew chamber, and closing the lid. A user interface 106 may receive input, e.g., by a user pressing one or more buttons or other input devices, and cause a dispensing operation to be performed. For example, water in a liquid supply 202 may be conditioned (e.g., heated, carbonated, or otherwise conditioned) and pumped or otherwise delivered to the brew chamber through an upstream fluid system 200 to mix with beverage ingredient to form a beverage which is dispensed at the dispensing outlet.

[0033] As discussed above, it may be desirable for the beverage machine 100 to be configured to receive beverage tablets comprised of compressed beverage material, as such beverage tablets may be more convenient than loose beverage material, but may generate less waste than conventional beverage cartridges. It may also be desirable to have a single machine that is configured to brew beverages using beverage ingredient in both beverage tablet form and in some other form, such as loose or contained in a cartridge. This may allow a user to benefit from the added convenience of brewing with beverage tablets while retaining the flexibility to brew with beverage ingredients in other conventional forms if, for example, a desired beverage ingredient is not available in beverage tablet form.

[0034] Additionally, in some embodiments, beverage tablets may be formed in a variety of sizes, allowing users to brew a variety of beverage volumes without diluting the beverage. This may require a brew chamber configured to adapt to these different sizes.

Configuring such a brew chamber to also receive beverage ingredients in conventional forms may greatly increase complexity.

[0035] FIG. 5 shows a simplified cross-sectional view of beverage machine 100 according to an embodiment. A beverage machine 100 may include a first brew chamber 102 and a second brew chamber 104. The first brew chamber 102 may be a configured to receive a beverage ingredient in some conventional form, such as in a cartridge or as loose beverage ingredient, while the second brew chamber 104 may be configured to receive a beverage ingredient formed into a beverage tablet. As explained above, other beverages in addition to coffee may be formed, as the disclosure is not so limited. In some embodiments, the first brew chamber 102 may include a cartridge holder configured to receive a cartridge having external packaging that contains a beverage ingredient. In some embodiments, either or both brew chambers may be configured to hold a beverage ingredient in multiple forms. For instance, first brew chamber 102 may be configured to form a beverage from loose beverage ingredient and from a beverage cartridge.

[0036] According to one aspect, the first brew chamber 102 is positioned in front of the second brew chamber 104, such that first brew chamber 102 is disposed between front surface 111 of the beverage machine and the second brew chamber 104. There may be certain advantages associated with positioning one brew chamber in front of another. For example, such a configuration may reduce the overall width of beverage machine 100. Many users position their beverage machines on kitchen countertops with limited available space, and a narrower beverage machine may be preferable in some situations. In some alternative embodiments, first brew chamber 102 is disposed behind second brew chamber 104.

[0037] As stated above, it may be desirable for first brew chamber 102 to include a first lid 122 and second brew chamber 104 to include a second lid 124, to allow for convenient insertion of the beverage ingredient into the respective brew chamber. Lids 122 and 124 may be configured to expose first and second brew chambers 102 and 104 when the lids are in open positions, and to cover first and second brew chambers 102 and 104 when the lids are in closed positions.

[0038] In some embodiments, such as the embodiment shown in FIG. 5, the first lid 122 may include a cartridge piercing mechanism 123 configured to pierce a beverage cartridge inserted into the first brew chamber 102. Lids 122 may be hinged, such that rotating the lid 122 about a hinge exposes and covers the first brew chambers 102. Lid 122 may be actuated via handle 127A.

[0039] In some embodiments, lid 122 may act as a lever, reducing the amount of force a user must exert on handle 127A in order to pierce the beverage cartridge or beverage tablet. Cartridge piercing mechanism 123 may include one or more needles in a top section of the first brew chamber, and one or more needles disposed in a bottom section of the first brew chamber. It is contemplated that any suitable piercing mechanism may be used in the first brew chamber in order to pierce the beverage cartridge. In use, the cartridge piercing mechanism may be configured to pierce the beverage cartridge on a top surface and a bottom surface of the beverage cartridge may flow from the liquid supply and enter the first brew chamber via a first brew chamber inlet, and enter the beverage cartridge through one of the top or bottom surfaces. The liquid may then mix with the beverage ingredient in the beverage cartridge to form a beverage. The beverage may then flow out of the beverage cartridge through the other of the top or bottom surfaces and through a first brew chamber outlet, exiting the first brew chamber. In some embodiments, the needles of the cartridge piercing mechanism are hollow, permitting water to enter the beverage cartridge through at least one needle, and permitting beverage to exit the beverage cartridge through at least one other needle.

[0040] In some embodiments, second brew chamber 104 may differ substantially in structure and operation as compared to first brew chamber 102. FIGS. 6-8 show exemplary embodiments of second brew chamber 104, as well as operation of the second brew chamber. A beverage tablet 400 may be received into second brew chamber 104 of beverage machine 100 while the second brew chamber 104 is in an expanded configuration, as shown in FIG.6. The second brew chamber may include an inlet surface 304 and an outlet surface 306. An inlet needle 310 may be coupled to the inlet surface 304, and an outlet needle 312 may be coupled to the outlet surface 306 (the inlet needle 310 and outlet needle 312 together being the tablet piercing mechanism 125). It is contemplated that inlet needle 310 may be a plurality of inlet needles, and/or outlet needle 312 may be a plurality of outlet needles. In some embodiments, inlet surface 304 may have a curved profile, a plurality of curved surfaces, a flat surface, or any suitable surface. In some embodiments, outlet surface 306 may have a curved profile, a plurality of curved surfaces, a flat surface, or any suitable surface.

[0041] A beverage tablet 400 may be inserted into the brew chamber 104. As mentioned above, beverage tablet 400 may include a body 402 formed of compacted beverage material. Body 402 may be generally cylindrical, with first end 406 and second end 408. In some embodiments, first and/or second ends are domed. In some embodiments, beverage tablet 400 includes at least one coating 404 configured to at least partially

encapsulate the body 402. Coating 404 may be configured to soften when wetted, permitting the coating to stretch without ripping or fracturing. The tablet may be configured to be pierced by needles 310 and 312 without the tablet breaking into separate loose pieces within the beverage machine. The coating may keep the tablet intact during piercing and/or other processing steps performed by the beverage machine.

[0042] Beverage tablet 400 may be inserted such that first and second ends 406 and 408 each face one of an inlet surface 304 or an outlet surface 306. In some embodiments, as shown in FIGS. 6-8, inlet surface 304 may be disposed above outlet surface 306. In some embodiments, as shown in FIG. 9, inlet surface 304 and outlet surface 306 may be disposed on sides of the second brew chamber 104. The embodiment of FIG. 9 may function in substantially the same manner as the embodiment of FIGS. 6-8.

[0043] As discussed above, the second brew chamber 104 may include a lid 126 that opens to permit entry of a tablet into the brew chamber. The lid 126 may close after a tablet has been inserted. In some embodiments, inlet surface is connected to lid 126, such that moving lid 126 to the open position moves inlet surface 304 out of the second brew chamber 104 to allow for insertion of the beverage tablet 400.

[0044] As a wetting step, a prewetting liquid, such as water, may be introduced into the brew chamber in order to soften coating 404 to allow for deforming and piercing of the beverage tablet 400. In some embodiments, the prewetting liquid is introduced into the brew chamber through inlet needle 310. In some embodiments, prewetting liquid is introduced into the brew chamber from a separate inlet that is distinct from inlet needle 310.

[0045] In some embodiments, after the tablet coating has been softened, the beverage machine may then compress the tablet. To achieve this, in some embodiments, the inlet surface 304 and outlet surface 306 may move relative to one another, moving the second brew chamber 104 from an initial configuration (FIG. 6) to a compressed configuration (FIG. 7). In some embodiments, the inlet surface 304 moves toward the outlet surface 306, in some embodiments, the outlet surface 306 moves toward the inlet surface 304, and in some embodiments, both surfaces 304, 306 move toward each other. In some embodiments, as the beverage tablet 400 is compressed, the first and/or second ends 406 and 408 of the tablet may change shape. For example, the first and/or second ends 406 and 408 may change from a domed shape to a flattened shape.

[0046] In some embodiments, the beverage tablet 400 is wetted before lid 126 is moved to the closed position, and the beverage tablet 400 is compressed and pierced as the lid 126 moves to the closed position via force applied by a beverage machine and/or a user. In

some embodiments, the beverage tablet 400 is wetted, compressed, and pierced after the lid 126 is in the closed position and without the application of force. In embodiments where the application of force is not supplied by a user, the force necessary to compress and pierce the beverage tablet may be supplied in any suitable manner, such as via a motor.

[0047] The movement distance of the inlet surface 304 and/or outlet surface 306 may differ depending on the size of the beverage tablet. For example, the inlet surface 304 and/or outlet surface may move a greater distance when used with tablets of a shorter height as compared to tablets with a taller height. One benefit of using a cylindrical shaped beverage tablet is that different beverage tablet sizes (and thus beverage volumes and/or strengths) may be used with a beverage machine, where the beverage machine may be able to adjust along a single dimension to accommodate the different sizes. In this case, the brew chamber expands and contracts linearly to accommodate different beverage tablet heights.

[0048] In some embodiments, as the distance between the inlet surface 304 and the outlet surface 306 decreases, the beverage tablet 400 is deformed such that the tablet conforms to match the shape of the inlet surface 304 and/or outlet surface 306 in the compressed position. In some embodiments, the conforming of the beverage tablet 400 to inlet surface 304 seals the beverage tablet 400 against inlet surface 304. In some embodiments, conforming of the beverage tablet 400 to the outlet surface 306 seals the beverage tablet 400 against the outlet surface 306.

[0049] In some embodiments, compressing the beverage tablet 400 causes the compacted beverage ingredients forming the body 402 to fracture, breaking body 402 into smaller pieces. The coating 404 may remain intact and may hold the fractured pieces of the body within an encapsulated space to prevent the beverage ingredients from dispersing. The coating may stretch to permit the shape of the tablet to deform without rupture of the coating.

[0050] As the beverage tablet 400 is compressed, the inlet needle 310 pierces coating 404 and enters the beverage tablet 400 through the first end 406. In some embodiments, the outlet needle 312 may also pierce coating 404 and enter the beverage tablet 400 through the second end 408 contemporaneously with the inlet needle. In other embodiments, the outlet needle 312 pierces coating 404 after the inlet needle 310 pierces the coating 404.

[0051] A first volume of water is then injected into the beverage tablet 400 through the inlet needle 310. In some embodiments, this causes beverage tablet 400 to expand, as seen in FIG. 8. In some embodiments, as beverage tablet 400 expands, the surfaces 304 and 306 of the second brew chamber may move away from one another to allow for expansion. For example, the inlet surface 304 of the brew chamber may move away from the outlet surface

306 of the brew chamber (or vice versa, or both surfaces may move away from each other). As beverage tablet 400 expands, the contents of the body 402 may become broken up, reducing the density of the beverage ingredient in the beverage tablet 400. The coating 404, however, may remain intact, keeping the contents contained within an enclosed space and preventing the contents from dispersing in the beverage machine. The coating may stretch to permit the shape of the tablet to deform and the density of the body to change without rupture of the coating.

[0052] In some embodiments, the coating may be configured to permit the tablet to expand inside the brew chamber without rupture of the coating. In some embodiments, the permitted range of expansion inside the brew chamber is from 10% to 27%, 11% to 26%, 12% to 25%, 13% to 24%, 14% to 23%, 15% to 22%, 16% to 21%, 17% to 20%, or 18% to 19%. In some embodiments, the permitted range of expansion inside the brew chamber is from 10% to 20%, 11% to 19%, 12% to 18%, 13% to 17%, 14% to 16%, or 15%. In some embodiments, the permitted range of expansion inside the brew chamber is from 14% to 30%, 15% to 29%, 16% to 28%, 17% to 27%, 18% to 26%, 19% to 25%, 20% to 24%, 21% to 23%, or 22%. In some embodiments, the permitted range of expansion inside the brew chamber is from 15% to 30%.

[0053] In some embodiments, a second volume of water may then be introduced into the beverage tablet 400 through inlet needle 310. At least some of the first and second volumes of water then flow through the beverage tablet 400, out the outlet needle 312, and to a dispensing station, forming a brewed beverage.

[0054] In some embodiments, prior to operation with a beverage machine, a beverage tablet may have a density of 500 g/l to 750 g/l. In some embodiments, the beverage tablet may have a density that ranges from 400 g/l to 850 g/l, 425 g/l to 825 g/l, 450 g/l to 800 g/l, 475 g/l to 775 g/l, 500 g/l to 750 g/l, 525 g/l to 725 g/l, 550 g/l to 700 g/l, 575 g/l to 675 g/l, or 600 g/l to 650 g/l. In some embodiments, the beverage tablet may have a density that ranges from 400 g/l to 600 g/l, 425 g/l to 575 g/l, 450 g/l to 550 g/l, 475 g/l to 525 g/l, or 500 g/l. In some embodiments, the beverage tablet may have a density that ranges from 650 g/l to 850 g/l, 675 g/l to 825 g/l, 700 g/l to 800 g/l, 725 g/l to 775 g/l, or 750 g/l.

[0055] FIG. 10 shows a simplified cross-sectional view of the beverage machine 100 according to an embodiment. In embodiments where application of force by the user is used to pierce the beverage tablet, more force may be required to pierce the beverage tablet as compared to the beverage cartridge. In some embodiments, it may be desirable for first brew chamber 102 and second brew chamber 104 to have a shared lid 126, with cartridge piercing

mechanism 123 configured to pierce a beverage cartridge inserted into the first brew chamber 102, and inlet surface 304 and inlet needle 310 configured to compress and pierce a beverage tablet inserted into the second brew chamber 104. In some embodiments, the shared lid 126 is hinged closer to the second brew chamber 104, resulting in an increased lever arm distance from a front handle 127 of the lid to the inlet needle 310 as compared to a lever arm distance from front handle 127 to the upper portion of cartridge piercing mechanism 123. This may allow more force to be applied to the beverage tablet in the second brew chamber 104 as compared to the beverage cartridge in the first brew chamber 102 without increasing the force a user exerts on handle 127.

[0056] Even if more force is not required to pierce the beverage tablet, or if application of force by a user is not used to pierce the beverage tablet, it may still nonetheless be desirable for both brew chambers to have a shared lid 128. Such a configuration may reduce the overall complexity of the beverage machine by reducing the number of moving parts in the beverage machine. Additionally, it may be less complex to connect the upstream fluid system 200 to the brew chamber through a single lid as compared to two separate lids.

[0057] Relative to a base 108 of a beverage machine 100, a first brew chamber 102 may be disposed at a height equal to a height of a second brew chamber 104. In some embodiments, the first brew chamber 102 may be disposed at an elevation below the second brew chamber 104, while in other embodiments the first brew chamber 102 may be disposed at an elevation above the second brew chamber 104.

[0058] In a beverage machine with multiple brew chambers, there may be advantages associated with dispensing beverages formed in any brew chamber from a single dispensing station 112. With a single beverage dispensing station, a beverage machine with multiple brew chambers may have a smaller form factor compared to a beverage machine with multiple beverage dispensing stations. Additionally, having a single dispensing station may help prevent a user from accidentally placing a beverage container for receiving the beverage, such as a cup, at an incorrect beverage dispensing station, as there is only one such station. However, it should be appreciated that, in other embodiments, a beverage machine may have more than one dispensing station, as will be discussed below.

[0059] In some embodiments, the beverage machine 100 may include a first outlet 116 configured to dispense a beverage formed in a first brew chamber 102, and a second outlet 118 configured to dispense a beverage formed in a second brew chamber 104. The first outlet may be fluidly connected to the first brew chamber 102 through a first flow path 117, so that the beverage formed in the first brew chamber 102 may dispense through the first

outlet 116 after travelling through the first flow path. The beverage formed in the second brew chamber 104 may be routed through a second flow path 119 so as to dispense through the second outlet 118 after travelling through the second flow path 119. In some embodiments, the first flow path 117 and the second flow path 119 may merge to a single outlet (not shown). In some embodiments, the second outlet 118 may be associated with the first brew chamber 102. In such embodiments, the second flow path 119 may route the beverage formed in the second brew chamber 104 into the first brew chamber 102 before dispensing through the second outlet 118.

[0060] In some embodiments, a second flow path 119 includes one or more channels. The one or more channels may include open channels, such as troughs, or closed channels, such as tubes. In some embodiments, the first and second flow paths may be distinct such that there is no fluid communication between the first and second flow paths. In some embodiments, mixing of a beverage formed in a first brew chamber 102 and a beverage formed in a second brew chamber 104 may be prevented. In other embodiments, a beverage formed in a first brew chamber 102 may be permitted to mix with a beverage formed in a second brew chamber 104. In some embodiments, fluid communication may occur between the first and second flow paths. In some embodiments, beverages may be mixed at a point downstream from the first brew chamber, e.g., in a mixing chamber, or mixed mid-stream as the beverages are dispensed out of the beverage machine.

[0061] A second outlet 118 of a beverage machine 100 may be disposed adjacent to a first outlet 116. In some embodiments, such as the embodiment shown in FIGS. 5 and 10, the second outlet may be disposed behind the first outlet. In other embodiments, the second outlet may be disposed lateral to the first outlet. Generally, the relative positions of the first and second outlets may be in any suitable configuration such that beverages formed in either the first brew chamber 102 or second brew chamber 104 dispense at a single dispensing station, as the disclosure is not limited in this regard.

[0062] FIGS. 11 and 12 show front perspective views of a beverage machine 100 according to another embodiment. As mentioned above, it may be desirable for brew chambers 102 and 104 to be disposed side-by-side when viewed from a front of the beverage machine 100. Such a configuration may reduce the overall depth of the beverage machine 100, which may be desirable for users with a shallower support surface to place the beverage machine 100 on. In some embodiments, the side-by-side brew chambers may dispense to a shared dispensing station. In other embodiments, as seen in FIGS. 11 and 12, brew chamber 102 is configured to dispense a beverage to first dispensing station 112A, while second brew

chamber 104 is configured to dispense to second dispensing station 112B. In some embodiments, the beverage machine may be configured to dispense a beverage to both dispensing stations simultaneously. In some embodiments, the beverage machine may be configured to only dispense a beverage to one dispensing station at a time.

[0063] In some embodiments, the side-by-side brew chambers may include a shared lid configured to move between an open position, where both brew chambers are exposed, and a closed position, where both brew chambers are covered. In some embodiments, as seen in FIGS. 11 and 12, brew chamber 102 may have a first lid 122 actuated by first handle 127A, while second brew chamber 104 may have a second lid 124 actuated by second handle 127B.

[0064] In some embodiments, as seen in FIGS. 1-4 ,11, and 12, a user interface 106 may be provided with a beverage machine 100. The user interface may be oriented so as to be viewed by a user positioned at the front of the beverage machine. A user interface 106 may include one or more of the following: a display, one or more buttons, and one or more indicator lights. The user may provide commands to the beverage machine through the user interface by, for example, pressing a button or touching a touch screen. The beverage machine may perform different functions in response to the commands from the user. For example, a beverage may be formed in a first brew chamber 102 in response to a user inputting a first type of command via the user interface, while a beverage may be formed in a second brew chamber 104 in response to a user inputting a second type of command via the user interface. Information may be communicated to the user through a display or indicator lights of the user interface.

[0065] It should be understood that a user interface may include any number or combination of the above-mentioned components, or any other appropriate components. In some embodiments, a user interface may include only a single touch screen that both receives commands from a user and communicates information to the user. In other embodiments, a user interface may include multiple buttons and multiple indicator lights. A user interface may include knobs, scroll wheels, mechanical switches, microphones, touch sensors, light sensors, or any other suitable components configured to receive input from a user. Additionally, a user interface may include displays, lights, speakers, haptic devices, or any other suitable components configured to provide information to a user.

[0066] A beverage machine may include a fluid system that is upstream of any brew chambers. The upstream fluid system 200 may include, for example, a liquid supply, a liquid heater, pumps, and valves, to name a few components. A beverage machine 100 with a first

brew chamber 102 and a second brew chamber 104 may include a user interface 106 that allows a user to choose between forming a beverage in the first brew chamber and forming a beverage in the second brew chamber. There may be advantages associated with a beverage machine with multiple brew chambers but only a single upstream fluid system. For example, such a beverage machine may be smaller and less complex than a beverage machine with separate upstream fluid systems associated with each brew chamber. In a beverage machine with only a single upstream fluid system, choosing between forming a beverage in the first brew chamber and the second brew chamber may include fluidly connecting the first brew chamber or the second brew chamber to the upstream fluid system. Consequently, such a beverage machine may require a valve, such as a three-way valve, for selecting between brew chambers.

[0067] FIG. 13 is a schematic diagram of a fluid system of a beverage machine in an illustrative embodiment. The fluid system may include a liquid supply 202, such as a cold-water tank. In general, the liquid supply may be a reservoir configured to hold liquid. The water level of the cold-water tank may be monitored by a sensor 204. If the sensor 204 detects that there is insufficient water in the cold-water tank, the sensor may send a signal to a user interface 106 to alert a user. Water from the cold-water tank may pass through a filter 208 and a check valve 210 before being pumped by a pump 212 into a hot water tank 214. The water may be heated within the hot water tank 214 (e.g., via a heating element inside the hot water tank 214), and/or may be heated while traveling along the pathway to the hot water tank 214 (e.g., via an in-line heater). An air pump 222 may be connected to the hot water tank 214 to introduce air into the hot water tank for delivery of hot water to the brew chambers. The beverage machine may include a pressure release valve 216 that may be connected to a pressure transducer 218 that monitors pressure levels. In the case that the pressure transducer determines that pressure levels are too high, the pressure release valve may reduce the pressure levels through a vent 220. In some embodiments, the vent is passive, and not controllable. In embodiments in which the vent is controllable, the vent may be directly connected to the hot water tank. A valve 224 may selectively fluidly connect the hot water tank 214 to a first brew chamber 102 and a second brew chamber 104. In some embodiments, various components of the upstream fluid system 200, such as pumps 212 and 222, value 224, hot water tank 214, and pressure relief valve 216 may be controlled by a controller 226, which may receive commands from the user interface 106.

[0068] According to one aspect, the user-selectable options that are provided by a user interface are determined based on the state of a valve that controls flow of liquid to

either a first brew chamber or a second brew chamber. For example, the valve may have a first configuration in which a first brew chamber 102 is fluidly connected to a hot water tank 214 and a second configuration in which a second brew chamber 104 is fluidly connected to the hot water tank 214. When the valve is in the first configuration, the user interface provides a first set of options. When the valve is in the second configuration, the user interface provides a second set of options. In some embodiments, the user-selectable options that vary based on the state of the valve are volume selection options. Alternatively, or in addition, other possible user-selectable options that may vary based on the state of the valve include, but are not limited to: beverage type options, temperature selection options, brew strength options, flavoring options, options relating to addition of ingredients such as sugar, cream or whipped cream, and/or options relating to amount of carbonation.

[0069] In some embodiments, the valve may have a third configuration in which both brew chambers 102 and 104 are fluidly connected to hot water tank 214, and the user interface 106 may provide a third set of options. In some embodiments, a first user interface provides a first set of options for forming a beverage in the first brew chamber, and a second user interface provides a second set of options for forming a beverage in the second brew chamber.

[0070] In some embodiments, the valve 224 is actuated by a controller 226, as stated above. In some embodiments, the valve is operated manually by a user. For example, a user may interact with a physical interface, such as pushing a button, pulling a lever, or moving a slider, where the physical interface is mechanically coupled to the valve to change the configuration of the valve. As an illustrative example, pulling a lever to a first position actuates the valve to open fluid communication to the first brew chamber and to close fluid communication to the second brew chamber. Pulling the lever to a second position actuates the valve to open fluid communication to the second brew chamber and to close fluid communication to the first brew chamber.

[0071] In embodiments where the valve is operated manually by a user, a controller may still be included to perform other operations beyond actuating the valve. The state of the valve may be sent to the controller to determine the user-selectable options provided by the user interface. A sensor may be used to determine the state of the valve. In embodiments that include an actuator, the state of the actuator may be used to determine the state of the valve.

[0072] The valve 224 may include a three-way valve, or multiple two-way valves working in concert. In embodiments with additional connections, other valve configurations, such as four-way valves, may be used. It should be appreciated that any suitable valve or

combination of valves that selectively connects at least one input to at least two outputs may be used, as the disclosure is not limited in this regard. Examples of possible valves include, but are not limited to, solenoid valves, ball valves, butterfly valves, pinch valves, or any other suitable type of valve.

[0073] It should be understood that embodiments of the upstream fluid system 200 are simply exemplary embodiments, and that any upstream fluid system which may selectively deliver liquid to two separate brew chambers is contemplated. For instance, each brew chamber may have separate hot water tanks, pumps, or liquid supplies. In some embodiments, the beverage machine 100 includes two entirely separate upstream fluid systems, each upstream fluid system to condition and deliver water to one of the respective two brew chambers.

[0074] While the present teachings have been described in conjunction with various embodiments and examples, it is not intended that the present teachings be limited to such embodiments or examples. On the contrary, the present teachings encompass various alternatives, modifications, and equivalents, as will be appreciated by those of skill in the art. Accordingly, the foregoing description and drawings are by way of example only.

CLAIMS

What is claimed is:

1. A beverage machine comprising:

a housing;

a liquid supply configured to provide a liquid for forming a beverage;

a first chamber configured to hold a first beverage material for combining with liquid from the liquid supply to form a first beverage; and

a second chamber comprising a beverage tablet holder configured to receive a package-free beverage tablet having a second beverage material for combining with liquid from the liquid supply to form a second beverage, wherein the beverage tablet comprises a body of compressed second beverage material.

2. The beverage machine of claim 1, further comprising a user interface oriented to be viewed by a user positioned at a front of the beverage machine.

3. The beverage machine of claim 2, wherein the first chamber is disposed between the front of the beverage machine and the second chamber.

4. The beverage machine of claim 2, wherein the first chamber is disposed between the front of the beverage machine and the first chamber.

5. The beverage machine of claim 1, wherein the first chamber is disposed at a same height as the second chamber.

6. The beverage machine of claim 2, wherein the first chamber is disposed adjacent to the second chamber.

7. The beverage machine of claim 1, further comprising a lid disposed above the first chamber and the second chamber, the lid being movable relative to the housing between an open position and a closed position, wherein moving the lid to the open position exposes the first chamber and the second chamber.

8. The beverage machine of claim 7, wherein the first chamber comprises a cartridge holder configured to receive a cartridge having the first beverage material.

9. The beverage machine of claim 8, further comprising a first piercing mechanism configured to pierce the cartridge when the lid is moved to the closed position, and a second piercing mechanism configured to pierce the beverage tablet when the lid is moved to the closed position.

10. The beverage machine of claim 1, further comprising a first lid disposed above the first chamber and a second lid disposed above the second chamber, the first lid being movable relative to the housing between a first lid closed position and a first lid open position, wherein moving the first lid to the first open position exposes the first chamber, the second lid being movable relative to the housing between a second lid closed position and a second lid open position, wherein moving the second lid to the second lid open position exposes the second chamber.

11. The beverage machine of claim 10, wherein the first chamber comprises a cartridge holder configured to receive a cartridge having the first beverage material.

12. The beverage machine of claim 11, further comprising a first piercing mechanism configured to pierce the cartridge when the first lid is moved to the first lid closed position, and a second piercing mechanism configured to pierce the beverage tablet when the second lid is moved to the second lid closed position.

13. The beverage machine of claim 1, further comprising a first chamber outlet configured to allow the first beverage to exit the first chamber; and a second chamber outlet configured to allow the second beverage to exit the second chamber.

14. The beverage machine of claim 13, wherein the first chamber outlet is configured to allow the first beverage to exit the housing at a dispensing outlet, and the second chamber outlet is configured to allow the second beverage to exit the housing at the dispensing outlet.

15. The beverage machine of claim 13, wherein the first chamber outlet is configured to allow the first beverage to exit the housing at a first dispensing outlet and the second chamber outlet is configured to allow the second beverage to exit the beverage machine at a second dispensing outlet.

16. The beverage machine of claim 15, further comprising a dispensing station configured to receive the first beverage from the first dispensing outlet or the second beverage from the second dispensing outlet.

17. The beverage machine of claim 15, further comprising a first dispensing station configured to receive the first beverage from the first dispensing outlet; and a second dispensing station configured to receive the second beverage from the second dispensing outlet.

18. The beverage machine of claim 1, further comprising a first flow path configured to deliver liquid from the liquid supply to the first chamber, and a second flow path configured to deliver liquid from the liquid supply to the second chamber.

19. The beverage machine of claim 18, further comprising a valve configured to direct liquid from the liquid supply along the first flow path or the second flow path.

20. The beverage machine of claim 1, wherein the beverage tablet holder is configured to directly contact the beverage tablet without an intervening package.

21. The beverage machine of claim 1, wherein second chamber comprises at least one movable surface configured to compress and deform a beverage tablet received in the beverage tablet holder.

22. The beverage machine of claim 21, wherein the at least one movable surface is configured to compress and deform the beverage tablet to seal the beverage tablet along a surface of the second chamber.

23. The beverage machine of claim 22, wherein the beverage machine is configured to introduce a volume of water to the second chamber to prewet and soften a coating of the beverage tablet prior to compression of the tablet by the at least one movable surface.

24. The beverage machine of claim 23, further comprising at least one inlet needle configured to pierce the coating of the beverage tablet after the coating has been prewet and introduce a second volume of water to the beverage tablet inside of the coating.

25. The beverage machine of claim 24, further comprising at least one outlet needle configured to pierce the coating and allow the second volume of water to exit the beverage tablet.

26. A method of forming a beverage from a beverage tablet, the method comprising:

receiving a beverage tablet into a second brew chamber of a beverage machine such that the second brew chamber contacts the beverage tablet directly without intervening packaging in-between, the beverage machine having a first brew chamber configured to form a beverage from a beverage cartridge having packaging;

introducing liquid from a liquid supply into the second brew chamber and to the beverage tablet to form a beverage; and

dispensing the beverage.

27. The method of claim 26, further comprising:

applying a force to the beverage tablet, causing the beverage tablet to deform and conform to a shape of the first brew chamber.

28. The method of claim 26, further comprising piercing the beverage tablet with at least one inlet needle, and wherein the liquid from the liquid supply is introduced into the tablet through the at least one inlet needle.

29. The method of claim 28, further comprising piercing the beverage tablet with at least one outlet needle.

30. The method of claim 29, wherein brewed beverage exits the beverage tablet through the at least one outlet needle.

31. The method of claim 26, further comprising, introducing a prewetting liquid into the first brew chamber to wet the beverage tablet and soften a coating of the beverage tablet.

32. The method of claim 26, wherein the step of introducing liquid from the liquid supply into the brew chamber causes the causes the beverage tablet to expand and lowers a density of a beverage ingredient of the tablet.

33. The method of claim 26, further comprising directing the liquid through a valve toward the first brew chamber in response to a user selection.

34. The method of claim 33, wherein the user selection is made by a user interacting with a user interface.

35. The method of claim 26, further comprising:

receiving a beverage cartridge having packaging into the first brew chamber;

introducing liquid from the liquid supply into the first brew chamber to form a second beverage; and

dispensing the second beverage.