BEVERAGE MACHINE WITH SEALING ARRANGEMENT BETWEEN BREW CHAMBER SECTIONS

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 63/564,222, filed March 12, 2024, and U.S. provisional application serial number 63/565,828, filed March 15, 2024, the disclosures of each of which are incorporated by reference in their entireties.

FIELD

[0002] Disclosed embodiments are related to beverage machines for forming beverages from package-free beverage tablets and methods of forming beverages with package-free beverage tablets.

BACKGROUND

[0003] Tablets of compacted beverage ingredients can be used for forming a beverage. In some arrangements, such beverage tablets are mixed directly with hot water to form a beverage. In some arrangements, water is permitted to percolate through beverage tablets to form a beverage.

SUMMARY

According to one aspect, in some embodiments, a beverage machine having a housing is provided. The beverage machine may include a liquid supply configured to provide a liquid for forming a beverage, a first brew chamber section and a second brew chamber section. The first and second brew chamber sections may be configured to enclose a beverage tablet for combining with liquid from the liquid supply to form a beverage. The beverage tablet may comprise a body of compressed beverage material. The first and second brew chamber sections may have an open state to receive the beverage tablet and a closed state to form a cavity. In the closed state, the first brew chamber section and the second brew chamber section may be moveable relative to one another between a first closed configuration and a second closed configuration. In the first closed configuration, the first and second brew chamber sections may be at a first distance from one another. In the second closed configuration, the first and second brew chamber sections may be at a second distance from

one another. The first distance may be different from the second distance. The beverage machine may further include a gasket that may be configured to provide a seal between the first brew chamber section and the second brew chamber section at the first and second closed configurations. The gasket may have a body and an extension extending from the body into the cavity formed by the first and second brew chamber sections in the closed state.

According to another aspect, in some embodiments, a beverage machine comprising a housing is provided. The beverage machine may include a liquid supply configured to provide a liquid for forming a beverage, a first brew chamber section and a second brew chamber section. The first and second brew chamber sections may be configured to enclose a beverage tablet for combining with liquid from the liquid supply to form a beverage. The beverage tablet may include a body of compressed beverage material. The first and second brew chamber sections may have an open state to receive the beverage tablet and a closed state to form a chamber volume. The beverage machine may further include a gasket configured to provide a seal between the first brew chamber section and the second brew chamber section in the closed state. The gasket may include a body and a flexible extension extending from the body into the chamber volume when the first and second brew chamber sections are in the closed state. The extension may be moveable within the chamber volume while maintaining the seal between the first brew chamber section and the second brew chamber section.

According to another aspect, in some embodiments, a method of forming a beverage is provided. The method may include moving a brew chamber from an open state to a closed state to enclose a beverage tablet between a first brew chamber section and a second brew chamber section of the brew chamber. The method may also include forming a seal between the first and second brew chamber sections with a gasket when the brew chamber is moved to the closed state and maintaining the seal between the first and second brew chamber sections with the gasket as a distance between the first and second brew chamber sections changes to permit the brew chamber to remain in a closed state. The method may further include introducing liquid from a liquid supply into the brew chamber and to the beverage tablet to form a beverage and dispensing the beverage.

BRIEF DESCRIPTION OF DRAWINGS

[0004] 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:

[0005] FIG. 1 shows a simplified cross-sectional view of a beverage machine according to an embodiment;

[0006] FIG. 2 shows a simplified cross-sectional view of a brew chamber of the beverage machine of FIG. 1 in an open state;

[0007] FIG. 3 shows a simplified cross-sectional view of the brew chamber of FIG. 2 in a partially closed state;

[0008] FIG. 4 shows a simplified cross-sectional view of the brew chamber of FIG. 2 in a partially closed state closer to the closed state than shown in FIG. 3;

[0009] FIG. 5 shows a simplified cross-sectional view of the brew chamber of FIG. 2 in a partially closed state closer to the closed state than shown in FIG. 4;

[0010] FIG. 6 shows a simplified cross-sectional view of the brew chamber of FIG. 2 in a closed state;

[0011] FIG. 7 shows a simplified cross-sectional view of the brew chamber of FIG. 2 with a beverage tablet in a compressed configuration;

[0012] FIG. 8 shows a simplified cross-sectional view of the brew chamber of FIG. 2 with a beverage tablet in an expanded configuration;

[0013] FIG. 9 shows a simplified cross-sectional view of the brew chamber of FIG. 2 with a beverage tablet in an ejected configuration;

[0014] FIG. 10 shows a perspective view of a crush plate of the brew chamber of FIG. 2;

[0015] FIG. 11A shows a simplified cross-sectional view of a sensor assembly of the brew chamber of FIG. 2 sensing a lack of a beverage tablet;

[0016] FIG. 11B shows a simplified cross-sectional view of a sensor assembly of the brew chamber of FIG. 2 sensing a size of a first beverage tablet;

[0017] FIG. 11C shows a simplified cross-sectional view of a sensor assembly of the brew chamber of FIG. 2 sensing a size of a second beverage tablet;

[0018] FIG. 11D shows a simplified cross-sectional view of an alternative embodiment of a sensor assembly of the brew chamber of FIG. 2 sensing a size of a beverage tablet;

[0019] FIG. 12 is a schematic representation of an upstream fluid system of a beverage machine according to an embodiment;

[0020] FIG. 13 shows a detailed portion of a cross-sectional view of a brew chamber of a beverage machine in a closed state according to one embodiment;

[0021] FIG. 14 shows a detailed portion of a cross-sectional view of a brew chamber of the beverage machine of FIG. 13 in a first closed configuration;

[0022] FIG. 15 shows a detailed portion of a cross-sectional view of a brew chamber of the beverage machine of FIG. 13 in a second closed configuration;

[0023] FIG. 16 depicts a perspective view of the gasket of the brew chamber of FIGS. 13-15;

[0024] FIG. 17 shows a cross sectional view of the gasket of FIG. 16; and

[0025] FIG. 18 shows a detailed portion of a cross-sectional view of the gasket in the brew chamber of the beverage machine of FIG. 13.

DETAILED DESCRIPTION

[0026] Aspects herein relate to a beverage machine configured to form beverages using beverage tablets such as the beverage tablets disclosed in embodiments below. Many brewed beverages are conventionally prepared by enclosing an amount of loose particles of beverage ingredient, such as loose coffee grinds or tea leaves, into a beverage machine. Use of loose particles of beverage ingredient to prepare brewed beverages may be inconvenient as it may require additional steps of measuring out a specific amount beverage of ingredient. Additionally, loose particles of beverage ingredient carries the potential for spillage while preparing and transporting the desired amount of beverage ingredient to and from the beverage machine. Additionally, many brewing machines that use loose particles of beverage ingredient require cleaning after each use to remove loose particles from the inside of the machine.

[0027] Single serve beverage pods have been implemented to alleviate some of these concerns. However, such beverage pods generally contain loose beverage ingredient in a disposable packaging. Utilizing such packaging may generate additional waste.

[0028] The inventors have therefore recognized benefits of providing package-less beverage consumables that can be used with a beverage machine to form a beverage. In some embodiments, a beverage consumable comprises a tablet which includes beverage ingredient compacted into a desired shape and density. The tablet may be at least partially surrounded by a coating. Such beverage tablets may allow for the increased convenience of single-serve beverage consumables while reducing waste.

[0029] 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 tablet (e.g. the beverage ingredients and/or coating) directly contacts 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).

[0030] 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.

[0031] 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.

[0032] In some embodiments, the beverage tablet may be formed in a variety of sizes, and the beverage machine may be capable of receiving and forming beverages from 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.

[0033] In some embodiments, the beverage machine may have a brew chamber configured to receive a beverage tablet in an open state and to move to a closed state, where the beverage material inside the beverage tablet is mixed with water from a liquid supply to

form a beverage. The brew chamber may be configured to receive beverage tablets having different heights.

[0034] According to some aspects described herein, the beverage machine may have a moveable beverage tablet holder that moves a beverage tablet during a brew process. In some embodiments, the brew chamber includes a first brew chamber section and a second brew chamber section that are configured to enclose a beverage tablet to permit introduction of liquid to the beverage tablet in order to form a beverage. The first and second brew chamber sections may be moveable relative to one another to allow the brew chamber to move between the open state and the closed state. In some embodiments, the first brew chamber section may be rotatably disposed in a housing of the beverage machine, and the second brew chamber section may be slidably disposed in the housing.

[0035] In some embodiments, the first brew chamber section may be configured to receive the beverage tablet when the brew chamber is in the open state. In some embodiments, as the brew chamber moves towards the closed state, grippers coupled to the first brew chamber section may grasp the beverage tablet and the first brew chamber section may rotate into the housing, while the second brew chamber section may translate towards the first brew chamber section. The first and second brew chamber sections may form a sealed brew chamber, and the beverage tablet may be positioned inside of the sealed brew chamber between crush plates disposed on the first and second brew chamber sections.

[0036] The inventors have appreciated that the first and second brew chamber sections may move relative to each other, and therefore a dynamic sealing arrangement may be desirable to provide a seal between the first and second brew chamber sections. In some embodiments, the beverage machine may have a gasket positioned between the first brew chamber section and the second brew chamber section. The gasket may be configured to provide a seal between the first and second brew chamber sections. It should be appreciated that the seal may prevent fluids from escaping the sealed brew chamber in an area between the first and second brew chamber sections. In some embodiments, the gasket may fully provide the seal once the brew chamber is in a first closed configuration and the first and second brew chamber sections are a first distance apart from each other. The gasket may also maintain the seal as the brew chamber is moved into a second closed configuration where the first and second brew chamber sections are a second distance apart from each other. It should be appreciated that the first and second distances may be different from each other, and the first and second brew chamber sections may move between the two distances while the

gasket maintains the seal. It should be appreciated that such a configuration allows the sealed brew chamber to remain sealed as the first and second brew chamber sections move relative to each other due to various factors, including, but not limited to: vibrations and/or other component movement during the brewing process. In some embodiments, the configuration may allow for a range of manufacturing tolerances.

[0037] In some embodiments, the gasket may be fixed to the second brew chamber section and configured to seal against the first brew chamber section. Relative movement may occur between the gasket and the first brew chamber section. However, it should be appreciated that in other embodiments, the gasket may instead be fixed to the first brew chamber section and configured to seal against the second brew chamber section. Relative movement may occur between the gasket and the second brew chamber section.

[0038] In some embodiments, the gasket may further have a body and an extension extending from the body of the gasket. The extension may extend from the body of the gasket at an angle. The extension may be configured to occupy a cavity between the first and second brew chamber sections, when the brew chamber sections are in the closed state. In some embodiments, the extension may be flexible. In other embodiments, the extension may be moveable within the cavity. It should be appreciated that either the gasket body or extension may be in contact with the first or second brew chamber section to provide a seal between the first and second brew chamber sections. It should be appreciated that the cavity may be fluidly connected to the sealed brew chamber. In some embodiments it may be desirable for fluid within the sealed brew chamber to apply a pressure onto the extension during the brewing process. It should be appreciated that the upon receiving a pressure, the extension may exert a force on a portion of either the first or second brew chamber section that may create a seal or increase the strength of the seal.

[0039] In some embodiments, the beverage tablet may then be pre-wet to soften the coating of the beverage tablet, the beverage tablet may then be compressed and deformed between the crush plates. An inlet piercing mechanism (e.g. inlet piercing needles) may then pierce the beverage tablet, and water may be introduced into the beverage tablet, mixing with the beverage material to form a beverage. In some embodiments, introducing water into the beverage tablet may cause the beverage tablet to expand until the beverage tablet contacts an outlet piercing mechanism (e.g. outlet piercing needles), which may then pierce the beverage tablet and allow the beverage to exit the beverage tablet. The outlet piercing mechanism may be fluidly connected to a brew chamber outlet, allowing the beverage to exit the brew

chamber. In other embodiments, the outlet piercing mechanism may contact the tablet at the same time as the inlet piercing mechanism. In yet other embodiments, the outlet piercing mechanism may contact the tablet after the inlet piercing mechanism, but before the beverage tablet is expanded.

[0040] In some embodiments, the beverage machine may be configured to automatically eject the beverage tablet from the brew chamber after a brew operation is completed. In some embodiments, the second brew chamber section may translate away from the first brew chamber section, exposing an opening below the brew chamber. The used beverage tablet may fall through the opening into a disposal unit.

[0041] In some embodiments, the beverage machine may include an upstream fluid system configured to condition and deliver water to the brew chamber. The upstream fluid system may be capable of delivering water with different parameters (e.g. pressure, temperature, volume, etc.) In some embodiments, the beverage machine may include a sensor system configured to detect a physical dimension of the beverage tablet, such as height. Based on this detected physical dimension, a controller of the upstream fluid system may then display certain associated options to a user on a user interface and/or control parameters of the water delivered to the brew chamber.

[0042] 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.

Brew Chamber Structure and Operation

[0043] FIG. 1 shows a simplified cross-sectional view of a beverage machine in an open state according to an embodiment. As discussed above, it may be desirable for beverage machine 100 to be capable of forming a beverage from beverage tablets comprised of compressed beverage material, as such beverage tablets may be more convenient than loose beverage material, but may require less packaging than conventional beverage cartridges. Beverage machine 100 may include a brew chamber 200 configured to receive a beverage tablet 400 and form a beverage using the beverage tablet 400. As will be discussed below, brew chamber 200 may be configured to receive a beverage tablet in an open state and form the beverage in a closed state. Beverage machine 100 may also include an upstream fluid

system 300 configured to condition and deliver water from a liquid supply 302 to operate the brew chamber 200 and mix with beverage material in the beverage tablet 400 to form the beverage. In some embodiments, brew chamber 200 and upstream fluid system 300 may be at least partially contained in housing 108.

[0044] In some embodiments, beverage machine 100 may include a lid 102. Lid 102 may be configured to move between an open position to permit a beverage tablet to be placed in the brew chamber 200, and a closed position in which the brew chamber 200 is in a closed state. In some embodiments, when the lid is in the closed position, the brew chamber 200 is fully enclosed in the housing 108. In some embodiments, lid 102 is operatively connected to the brew chamber 200 via linkages, such that moving the lid from the open position to the closed position moves the brew chamber 200 between an open state and a closed state.

[0045] In some embodiments, an imaging device 104 may be disposed on lid 102 and configured to image a portion of the beverage tablet 400. This portion of beverage tablet 400 may include surface indicia configured to be read by controller 301 and interpreted as corresponding to a type of beverage tablet 400 (e.g. size, roast level, etc.). Controller 301 may then present brew parameter options (e.g. volume, brew pressure, brew strength) to a user on a user interface 110 and/or otherwise control the upstream fluid system according to the type of beverage tablet detected.

[0046] In some embodiments, the beverage machine 100 may include a dispensing flow path 106 configured to receive the beverage from the brew chamber 200 and allow the beverage to exit the housing 108 through a dispensing outlet disposed at an end of the dispensing flow path 106. In some embodiments, dispensing flow path 106 may include various flow conditioning chambers configured to condition various flow parameters of the beverage prior to dispensing the beverage.

[0047] 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. It should be understood that in some embodiments, the ends of the beverage tablet 400 may be substantially identical, such that either end may be the first end 406 or the 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.

[0048] FIGS. 2-6 show simplified cross section views of a brew chamber in various stages of closing. In some embodiments, it may be desirable for the brew chamber 200 to receive the beverage tablet 400 in a vertical orientation (as seen in FIG. 2), and then rotate the beverage tablet 400 to a horizontal orientation for performing a brew operation (as seen in FIG. 6). Such a configuration may allow for capturing an image of surface indicia on the first or second end 406 or 408 when a beverage tablet is first received into the brew chamber by the imaging device 104. Such a configuration may also ensure proper positioning and alignment of the beverage tablet during a brew operation. In some embodiments, such a configuration may allow for redirection of compressive forces on the beverage tablet away from the lid 102 to avoid requiring lid 102 to be strong enough to resist these compressive forces.

[0049] Brew chamber 200 may include first brew chamber section 202 and second brew chamber section 204. Brew chamber 200 may have an open state, where first brew chamber section 202 is disconnected from the second brew chamber section 204, and a closed state, where the first brew chamber section 202 is connected to the second brew chamber section 204 to form an enclosed brew chamber 201, as seen in FIG. 6.

[0050] First brew chamber section 202 may be rotatably disposed in the housing 108, such that the first brew chamber section 202 rotates from a first, vertical-facing position (FIG. 2) to a second, horizontal-facing position (FIG. 6) as the brew chamber moves from the open state to the closed state. In some embodiments, the first brew chamber section may rotate approximately 90° between the first position and the second position. Second brew chamber section 204 may be slidably disposed in the housing 108, such that the second brew chamber section 204 translates from a retracted position (FIG. 2) to an extended position (FIG 6) as the brew chamber moves from the open state to the closed state.

[0051] First brew chamber section 202 may include a first crush plate 206 configured to receive the beverage tablet 400 in a generally vertical orientation when the first brew chamber section 202 is in the vertical-facing position. In some embodiments, first crush plate 206 may be an annular surface configured to contact a perimeter of first end 406 of beverage tablet 400. Second brew chamber section 204 may include a plunger assembly 205, back wall 208, and sidewalls 210. The plunger assembly 205 may be slidably disposed inside the second brew chamber section, such that the plunger assembly may slide relative to the back wall and sidewalls. The plunger assembly may include a plunger 212, with a plunger head

214 and a plunger shaft 216, a second crush plate 207 operatively connected to the plunger head 214, and a spring 218 connecting the plunger shaft 216 to the back wall 208.

[0052] As seen in FIGs. 3 and 4, as the first brew chamber section 202 rotates, the second brew chamber section 204 translates towards the extended position. In some embodiments, as seen in FIG. 3, the first brew chamber section 202 begins rotating before the second brew chamber section begins translating. In some embodiments, the second brew chamber section 202 begins translating as soon as the first brew chamber section begins rotating. As the first brew chamber section 202 rotates from the vertical-facing position to the horizontal-facing position, grippers 220 may contact the beverage tablet 400 to hold the beverage tablet 400 against the first crush plate 206. As a result, as the first brew chamber section rotates from the first, vertical-facing position to the second, horizontal-facing position, the beverage tablet 400 also rotates from the vertical orientation to a horizontal orientation. In some embodiments, the horizontal orientation of the beverage tablet is approximately perpendicular to the vertical orientation of the beverage tablet.

[0053] As mentioned above, it may be desirable for the beverage machine 100 to be configured to accept beverage tablets having different volumes to allow for more flexibility in beverage parameters such as volume or brew strength. In some embodiments, beverage tablets 400 may therefore be scalable along a height H. This allows for an increase in volume of the beverage tablet 400, while maintaining the same surface area of first and second ends 406 and 408. This allows the beverage tablet 400 to align with first crush plate 206 and be grasped by the grippers 220, regardless of the height (and thus the size) of the beverage tablet 400 inserted.

[0054] As seen in FIG. 5, in some embodiments, the first brew chamber section 202 reaches the horizontal-facing position before the second brew chamber section 204 reaches the extended position. As or after the first brew chamber section 202 reaches the horizontal-facing position, second crush plate 207 contacts second end 408 of the beverage tablet 400. As the second brew chamber section 204 continues to translate towards the extended position, the plunger assembly 205 stops translating due to the contact between the second crush plate 207 and the second end 408. Because back wall 208 continues to translate towards the extended position, spring 218 is compressed between back wall 208 and plunger shaft 216. Spring 218 thus pushes second crush plate 207 against the second end 408 of the beverage tablet, resulting in a compressive force exerted on the beverage tablet 400 due to contact between the first and second crush plates 206 and 207. This compressive force may be

sufficient to hold the beverage tablet 400 between the first crush plate 206 and second crush plate 207, but not sufficient to significantly deform the beverage tablet. Because a shorter beverage tablet would cause the spring 218 to compress less than a taller beverage tablet would, spring 218 may have mechanical properties (e.g. stiffness and length) sufficient to allow for beverage tablets having different heights to be inserted. The mechanical properties of the spring 218 may be selected such that the shortest desired beverage tablet is held with sufficient force between the first and second crush plates, and such that the tallest desired beverage tablet is not held with a compressive force sufficient to cause significant deformation of the beverage tablet.

[0055] In some embodiments, once the beverage tablet is held against the first crush plate 206 by the second crush plate 207, the grippers 220 may release from the beverage tablet 400. In some embodiments, as seen in FIG. 5, sidewalls 210 may push the grippers 220 away from the beverage tablet 400 and out of the brew chamber 201. Grippers 220 may be configured to lock into a gripper open position, such that the grippers 220 are prevented from moving back towards the beverage tablet 400 until the brew chamber 200 is moved back towards the open state.

[0056] The second brew chamber section 204 then slides to the fully extended position, where sidewalls 210 contact gasket 211 on the first brew chamber section, creating an enclosed brew chamber 201 as seen in FIG. 6. One embodiment of the sealing gasket 211 and the sealing of the first and second brew chamber sections is further illustrated in detail in FIGs. 13-18.

[0057] Because the beverage tablet 400 is held against the first crush plate either by the grippers or by the crush plates as the brew chamber moves to the closed state, beverage tablet 400 is approximately centered inside brew chamber 201 when in the closed state, such that an approximately equal gap G extends from an outer perimeter of the beverage tablet 400 to an inner perimeter of the sidewalls 210 along the entire outer perimeter of the beverage tablet 400.

[0058] In some embodiments, first brew chamber section 202 includes a brew chamber outlet 222 configured to connect to dispensing flow path 106 when the first brew chamber section 202 is in the horizontal-facing position, and to disconnect from the dispensing flow path 106 when the first brew chamber section 202 is not in the horizontal-facing position. Such a configuration may allow the brew chamber 200 to be connected to the dispensing flow path 106 without requiring flexible tubing or some other bending channel

structure. In some embodiments, a sealing gasket 211 may be positioned between brew chamber outlet 222 and dispensing flow path 106 to prevent the beverage from leaking.

[0059] FIGS. 6-9 show simplified cross section views of a brew chamber 200 in various stages of a brew operation. Once the brew chamber 200 is in the closed state, the beverage tablet 400 may be pre-wet. Pre-wetting the beverage tablet allows for the coating 404 of the beverage tablet 400 to soften, allowing the coating 404 to be pierced and stretched without cracking or fracturing.

[0060] To pre-wet the tablet, water is introduced into the brew chamber 201. In some embodiments, water is introduced into the brew chamber 201 through inlet puncture needles 232. In other embodiments, water is introduced into the brew chamber 201 via a different inlet. In some embodiments, sidewalls 210 include a vent 246 disposed in an upper portion of the sidewalls 210, where the vent is configured to be opened while water is being introduced into the brew chamber 201. Such a vent 246 may allow ambient air in the brew chamber 201 to escape the brew chamber, allowing liquid to flow into the brew chamber. The beverage tablet 400 is then soaked for a suitable amount of time. In some embodiments, the suitable amount of time is 1-5 seconds. The water is then at least partially drained from the brew chamber via a drain 248 disposed in a lower portion of the sidewalls 210. In some embodiments, the drain leads to a disposal unit.

[0061] Once the beverage tablet is prewet, the plunger 212 is configured to move towards the beverage tablet. This causes first and second crush plates 206 and 207 to exert a compressive force on the beverage tablet 400 and causes the beverage tablet 400 to deform, as seen in FIG 7. In some embodiments, the vent 246 and drain 248 are open during deformation of the beverage tablet 400 in order to allow any remaining water from pre-wetting to exit the brew chamber 201.

[0062] In some embodiments, hydraulic pressure may be used to push the plunger 212. Water may be pumped into a hydraulic chamber 226 between plunger head 214 and hydraulic wall 228. The water expands the size of the hydraulic chamber 226 by pushing the plunger 212 towards the beverage tablet 400. However, it is contemplated that any suitable mechanism may be used to push the plunger, such as a motor.

[0063] In some embodiments, as the beverage tablet 400 deforms, the beverage tablet diameter/width increases for at least a portion of the tablet, reducing gap G between the outer perimeter of the beverage tablet and the inner perimeter of the sidewalls 210. In some embodiments, as the beverage tablet deforms, the first end 406 conforms to the shape of first

crush plate 206 and/or the second end 408 conforms to the shape of the second crush plate 207, sealing the beverage tablet against the first crush plate 206 and/or the second crush plate 207. In some embodiments, as seen in FIG. 10, second crush plate 207 may have a rippled surface 209, and second end 408 of the tablet may conform to the shape of the rippled surface 209.

[0064] The inlet piercing needles 232 are coupled to move with the plunger head 214, and are aligned with openings 213 (see FIG. 10) in the second crush plate 207. In some embodiments, initially, as seen in FIGS. 1-6, the inlet piercing needles 232 do not pass through the openings in the second crush plate 207, as the springs 230 bias the plunger head 214 away from the second crush plate 207. Thus, in some embodiments, prior to deformation of the beverage tablet, the inlet piercing needles 232 are not exposed in the brew chamber and do not make contact with the beverage tablet. Instead, the inlet piercing needles 232 are positioned behind the second crush plate 207. As the beverage tablet 400 deforms, the force exerted by the plunger 212 is sufficient to compress springs 230 between second crush plate 207 and the plunger head 214. This causes the plunger head 214 to move towards the second crush plate 207 as the beverage tablet 400 is deformed, exposing inlet piercing needles 232.

[0065] Inlet piercing needles 232 then pierce the coating 404 at the second end 406 and enter body 402 of the beverage tablet 400. In some embodiments, inlet piercing needles 232 are hollow needles fluidly connected to the upstream fluid system 300.

[0066] In some embodiments, water is then introduced into the beverage tablet 400 through the inlet piercing needles 232. This allows the water to contact the beverage material inside of the beverage tablet and form a beverage. This also causes the beverage tablet 400 to expand as water is pushed into the beverage tablet, as seen in FIG. 8. The beverage tablet expands until the first end contacts the outlet piercing needles 234. The outlet piercing needles 234 then pierce the beverage tablet, allowing the beverage to exit the brew chamber 201 via brew chamber outlet 222, and flow along dispensing flow path 106 to exit the housing 108.

[0067] In some embodiments, it may be desirable to include blocker plate 236 configured to selectively cover the outlet piercing needles 234. Such a blocker plate may reduce the likelihood of a piercing injury to the user as they load the beverage tablet into the beverage machine (as seen in FIG. 2). Also, in some embodiments, such a blocker plate may increase backpressure in the beverage tablet 400 during a brew operation, as pressure in the beverage tablet 400 must reach a pressure sufficient to push the blocker plate 236 and expose

the outlet piercing needles 234. The blocker plate may include springs 238 configured to bias the blocker plate in an expanded configuration, where the blocker plate 236 covers the outlet piercing needles 234. As the beverage tablet 400 expands, springs 238 are compressed and the blocker plate 236 is pushed towards a compressed configuration, exposing the outlet piercing needles 234.

[0068] As seen in FIG. 9, in some embodiments, it may be desirable to automatically eject the beverage tablet 400 from the brew chamber 200 once a brew operation is complete without any interaction from the user. For instance, in embodiments where lid 102 is linked to the brew chamber 200, as discussed above, it may be desirable to eject the beverage tablet 400 from the brew chamber 200 without requiring actuation of the lid back to the open position. Therefore, the hydraulic chamber 226 may be drained and the second brew chamber section 204 may be disengaged from a linkage connecting the second brew chamber section 204 with the rest of the brew chamber 200 and/or lid 102. In some embodiments, a solenoid is used to disconnect the second brew chamber section. The second brew chamber section 204 may then be moved towards the retracted position, e.g. via a biasing spring. As the section brew chamber section is retracted, the compressive force on the beverage tablet is removed and an opening 240 is exposed below the brew chamber 200. As mentioned above, grippers 220 may be in a locked position until the brew chamber 200 is moved towards the open position, so the grippers 220 may not re-grasp the beverage tablet 400. Springs 238 may then push the blocker plate 236 towards the expanded configuration, pushing the beverage tablet 400 off of the outlet piercing needles 234 and away from the first brew chamber section and towards the opening 240. Alternatively, or in addition, springs 230 may push the second crush plate 207 to an expanded configuration, pushing the beverage tablet off of the inlet piercing needles 232 and away from the second brew chamber section and towards the opening. The beverage tablet 400 then falls through opening 240 into a disposal unit. In some embodiments, the disposal unit is the same unit where water drains from the brew chamber during the pre-wetting operation and/or from the void after the brew operation is completed.

[0069] Once the rest of brew chamber 200 is moved back to the open state, e.g. by moving the lid 102 from the closed position to the open position, second brew chamber section 204 may be reconnected with the linkage, allowing the brew chamber to be reset for another brew operation.

Sensor System for Tablet Size Detection

[0070] As mentioned above, in some embodiments, beverage tablet 400 may be scalable along a height H and beverage machine 100 may be configured to form a beverage with beverage tablets 400 having different heights. In some embodiments, it may be desirable to control the upstream fluid system 300 to deliver liquid to the brew chamber 200 with different flow parameters (e.g. volume, pressure, etc.) depending on the height of the beverage tablet 400 inserted. It may therefore be desirable for the beverage machine 100 to be configured to recognize which beverage tablet is placed in the beverage machine in order to control the upstream fluid system 300 accordingly. Additionally, or in the alternative, it may be desirable for the beverage machine 100 to be configured to recognize if the brew chamber 200 has been closed, but no beverage tablet 400 has been placed in the brew chamber 200 (in other words, an empty brew chamber 200).

[0071] While the imaging device 104 may be configured to recognize beverage tablet height, it may nevertheless be desirable to have an additional sensor system 241 configured to detect beverage tablet height to function as a backup (e.g. if the indicia on the beverage tablet is removed or not read by the imaging device), to function as a 2-step verification of the beverage tablet height, and/or to recognize if a beverage tablet has not been placed in the beverage machine 100 prior to closing of the brew chamber 200. FIGs. 11A-11C show schematic representations of the sensor system 241 detecting no beverage tablet (empty brew chamber), a shorter beverage tablet, and a taller beverage tablet, respectively.

[0072] In some embodiments, the second brew chamber section 204 may include a microswitch 242 and a trigger 244. One of the microswitch 242 or the trigger 244 may be disposed on sidewalls 210 or some other portion of the second brew chamber section 204, and the other of the microswitch 242 or trigger 244 may be disposed on the plunger 212 (e.g. on plunger shaft 216). As discussed above in relation to FIGs. 2-6, as or after the first brew chamber section 202 reaches the horizontal-facing position, second crush plate 207 contacts second end 408 of the beverage tablet 400. As the second brew chamber section 204 continues to translate towards the extended position, the plunger 212 stops translating due to the contact between the second crush plate 207 and the second end 408 of beverage tablet 400. If no beverage tablet 400 is in the brew chamber when the second brew chamber section 202 moves to the extended position, as is the case in FIG. 11A, the second crush plate 207 does not contact any second end of a beverage tablet 400, the plunger 212 does not stop translating with the second brew chamber section 204, and the sidewalls 210 do not move

relative to the plunger 212. As a result, trigger 244 never contacts microswitch 242 when no beverage tablet is present in the brew chamber. The controller 301 will then interpret receiving no signal from the microswitch 242 as detecting lack of presence of a beverage tablet 400 in the brew chamber. If a shorter beverage tablet 400 is in the brew chamber, as in FIG. 11B, the sidewalls 210 will move enough relative to the plunger 212 during movement of the second brew chamber section 204 to bring the microswitch 242 into contact with trigger 244, triggering the microswitch 242. The microswitch 242 will then send a signal that the microswitch is triggered to the controller 301. The controller 301 will interpret receiving a triggered signal as indicating that a shorter beverage tablet is in the beverage machine 100. If a taller beverage tablet 400 is in the brew chamber, as in FIG. 11C, the sidewalls 210 will move further relative to the plunger 212 during movement of the second brew chamber section 204 to the extended position than if a shorter beverage tablet 400 were present. In such a situation, the microswitch 242 (together with the sidewalls 210) will move far enough to be triggered by trigger 244, but then continue to move with the sidewalls 210 until the trigger 244 no longer contacts and triggers the microswitch 242. The controller 301 will interpret the microswitch being first triggered and then untriggered as corresponding to the taller beverage tablet 400.

[0073] In some embodiments, the controller 301 may be configured to automatically reset the second brew chamber section by controlling the second brew chamber section 204 to automatically move to the retracted position if no beverage tablet is detected in the brew chamber 200.

[0074] While the above microswitch and trigger system may distinguish between three different states (e.g. tall beverage tablet, short beverage tablet, and lack of a beverage tablet present in the brew chamber), it may be desirable to detect more than three states. Therefore, in some embodiments, the plunger 212 may have multiple triggers 244, as in FIG. 11D. In such a configuration, the controller 301 may be configured to detect how many times the microswitch has been triggered, as well as the final state (e.g. triggered or untriggered) of the microswitch, in order to determine the size and/or presence of a beverage tablet in the brew chamber 200. For instance, in the embodiment of FIG. 11D, the microswitch being triggered twice and left in the triggered state, as seen in FIG. 11D, may correspond to a second tallest height beverage tablet, while the microswitch being triggered twice and left in an untriggered state may correspond to the tallest beverage tablet 400. Alternatively, in some embodiments, the microswitch 242 may be replaced by a different sensor, such as a

potentiometer. The potentiometer may be linked to the plunger 212, such that the plunger 212 may adjust the electrical resistance of the potentiometer depending on the position of the plunger 212 relative to the sidewalls 210. This change in resistance may then be interpreted as a position by the controller 301.

[0075] Of course, any suitable mechanism for detecting the position of the plunger 212 relative to the sidewall 210 may be used. For instance, if a motor is used to drive the plunger 212 against the beverage tablet 400, motor position may be monitored to determine plunger position. Alternatively, the volume of liquid entering the hydraulic chamber 226 may be monitored (e.g. by measuring pump revolutions of a pump 312 of the upstream fluid system 300). Alternatively, a hall effect sensor, or any other suitable position sensing system may be used, as the present disclosure is not so limited.

[0076] Additionally, while some embodiments above disclose detecting size of a beverage tablet 400 as the second brew chamber section is moved to the extended position, it is contemplated that movement of the plunger 212 relative to other portions of the second brew chamber section 204 while the beverage tablet 400 is deformed during a brew operation may be used to detect size of the beverage tablet 400, as the disclosure is not so limited.

Upstream Fluid System

[0077] FIG. 12 is a schematic diagram of an upstream fluid system 300 of a beverage machine in an illustrative embodiment. As mentioned above, beverage machine 100 may include an upstream fluid system 300 located upstream of brew chamber 200 and configured to condition and deliver liquid from liquid supply 302 to the brew chamber 200. The upstream fluid system 300 may include, for example, a liquid supply, a liquid heater, pumps, and valves, to name a few components. The beverage machine 100 may include a controller 301 configured to receive a user's input from a user interface 110 and control the upstream fluid system 300 to deliver liquid to the brew chamber 200 with the desired brew parameters (e.g., temperature, volume, flow rate, etc.).

[0078] The upstream fluid system 300 may include a liquid supply 302, such as a cold-water tank. In general, the liquid supply may include a reservoir configured to hold liquid. The water level of the cold-water tank may be monitored by a sensor 304. If the sensor 304 detects that there is insufficient water in the cold-water tank, the sensor may send a signal to a user interface 110 to alert a user. Water from the cold-water tank may pass through a filter 308 and a check valve 310 before being pumped by a pump 312 into a hot water tank

314. The water may be heated within the hot water tank 314 (e.g., via a heating element inside the hot water tank 314), and/or may be heated while traveling along the pathway to the hot water tank 314 (e.g., via an in-line heater). An air pump 322 may be connected to the hot water tank 314 to introduce air into the hot water tank 314 for delivery of hot water to the brew chamber, and for purging the hot water tank and brew chamber of water and/or beverage from the brew chamber. The beverage machine may include a pressure release valve 316 that may be connected to a pressure transducer 318 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 320. In some embodiments, the vent 320 is passive, and not controllable. In embodiments in which the vent is controllable, the vent may be directly connected to the hot water tank.

[0079] While the above embodiments of upstream fluid system 300 disclose pump 312 as delivering water to hot water tank 314, and separate air pump 322 moving water from the hot water tank 314 and though brew chamber 200, it is contemplated that a single pump may move water through the entire upstream fluid system 300 and through the brew chamber 200. It should be understood that the upstream fluid system 300 disclosed in embodiments above is only exemplary, and that any upstream fluid system configured to condition and/or deliver liquid and/or air to a brew chamber may be used.

[0080] In some embodiments, it may be desirable to deliver unheated water to the brew chamber 200, e.g. to pre-wet the beverage tablet or to operate the hydraulic system. The upstream fluid system 300 may include a bypass valve 324 between pump 312 and hot water tank 314. In some embodiments, the bypass valve 324 may be controlled by the controller. In other embodiments, the bypass valve 324 may be passive. In some embodiments, the upstream fluid system 300 may not include bypass valve 324, and heated water is used to pre-wet the beverage tablet and/or operate the hydraulic system.

[0081] In some embodiments, the controller may be configured to detect the beverage tablet height H using sensor system 241. In some embodiments, the controller may control the upstream fluid system to deliver water to the brew chamber 200 with parameters (e.g. pressure, volume, etc.) based on the detected height. In some embodiments, the controller may present various options to a user (e.g. beverage volume options) based on the detected height H.

[0082] The beverage machine 100 may include a user interface 110 to allow a user to control the beverage machine. A user interface 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 110 by, for example, pressing a button or touching a touch screen. The beverage machine may activate a beverage forming cycle, or may perform various other functions in response to the commands from the user. For example, a beverage having a first set of brew parameters (e.g. temperature, volume, strength, etc.) may be formed by the beverage machine 100 in response to a user inputting a first set of commands via the user interface, while a beverage having a second set of brew parameters may be formed by the beverage machine 100 in response to a user inputting a second set of commands via the user interface. Information may be communicated to the user through a display or indicator lights of the user interface.

[0083] 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.

Sealing Gasket

[0084] FIG. 13 is a detailed cross section view of a portion of a beverage machine 500 in a closed state according to one embodiment. It should be understood that beverage machine 500 may operate in a similar manner as described above. The beverage tablet 600 is held between a first brew chamber section 502 and a second brew chamber section 504, while the first 502 and second 504 brew chamber sections are in a closed state. In addition, the first brew chamber section 502 and the second brew chamber section 504 may be moveable relative to each other. A gasket 511 is positioned between the first 502 and second 504 brew chamber sections to provide a radial seal between the two chamber sections. In addition, the seal may be pressure activated. It should be appreciated that the seal may prevent fluids from the brewing process from leaking into other areas of the beverage machine 500 while the machine is both static and moving.

[0085] FIGs. 14 and 15 illustrate the first brew chamber section 502 and second brew chamber section 504 in a closed state having a first closed configuration and a second closed configuration, forming a closed brew chamber having a chamber volume 503. It should be appreciated that once in the closed state, the beverage machine 500 may introduce water from a liquid supply 506 into the brew chamber to brew a beverage as described above. Once in the closed state, the first brew chamber section 502 and the second brew chamber section 504 may be a first distance D1 apart in the first closed configuration as shown in FIG. 14. In addition, there may be a cavity 514 between the first brew chamber section 502 and the second brew chamber section 504. It may be desirable to fully provide a seal in the cavity 514 between the first brew chamber section 502 and the second brew chamber section 504, with a gasket 511.

[0086] The gasket 511 may be fixed to a sidewall 510 of the second brew chamber section 504, so that a body 512 of the gasket moves with the second brew chamber section 504. An extension 513 of the gasket may extend from the body 512 of the gasket substantially at an angle into the cavity 514 towards the first brew chamber section 502, contacting the first brew chamber section 502. The configuration of the gasket 511 and the gasket extension 513 may provide a seal in the cavity 514 between the first brew chamber section 502 and the second brew chamber section 504. It should be appreciated that the extension 513 may divide the cavity 514 into a first volume 515 and a second volume 516. The second volume 516 of the cavity 514 may be part of the chamber volume 503 of the sealed brew chamber 501. It should be appreciated that the gasket 511 seal may prevent liquids such as a brewed beverage from the sealed chamber 501 from moving between the second volume 516 and the first volume 515. In addition, a fluid entering the second volume 516 may exert a pressure onto the gasket extension 513. The pressure may compress the gasket extension 513 radially inwardly, exerting a force against the first brew chamber section 502. Increasing the pressure may increase the strength of the seal and may reduce the likelihood of the seal breaking.

[0087] In addition, the extension 513 of the gasket may be flexible so that it may be moveable within the cavity 514. FIG. 15 illustrates the first brew chamber section 502 having moved relative to the second brew chamber section 504 into the second closed configuration, so that the distance between the brew chamber sections changes from D1 to D2. The gasket 511 may be configured so that the extension 513 remains in contact with the first brew chamber section 502 and so that the body 512 remains fixed to the sidewall 510, thus

maintaining a seal at both distance D1 and distance D2 and maintaining a seal as the distance changes from D1 to D2 and vice versa. It should be understood that the first brew chamber section 502 may move relative to the second brew chamber section 504, or the second brew chamber section 504 may move relative to the first brew chamber section 502. In addition, any suitable direction of movement between the first and second brew chamber sections may be utilized. For example, the first and second brew chamber sections may move vertical relative to each other, horizontal relative to each other, or a combination of vertical and horizontal movement. In addition, the first and second brew chamber sections may move towards each other or away from each other. The first and second brew chamber sections may also move between multiple closed configurations and are not limited to two closed configurations. It may be desirable for the beverage machine 500 to maintain a seal as the first and second brew chamber sections move through a plurality of closed configurations where the first and second brew chamber sections are at different distances from one another. For example, in some embodiments, such an arrangement may help to maintain promote a sealed brew chamber despite manufacturing tolerances, vibrations during the brewing process, or any other factors that contribute to distance variability between the first and second brew chamber sections.

[0088] FIG. 16 illustrates a perspective view of the gasket 511 and FIG. 17 illustrates a cross section view of the gasket 511. The gasket 511 has a body 512 and an extension 513 extending from the body at an angle as shown in the profile of the cross section view in FIG. 17. The angled extension 513 may be desirable to allow the extension 513 to more easily maintain contact with the first or second brew chamber sections while the first and/or second brew chamber sections move relative to each other.

[0089] In addition, the angle A of the extension 513 may allow a fluid to partially exert a pressure on the extension 513.

[0090] The angle A of extension may be an acute angle, being for example 30°, 45°, or 60°, however other angles are also considered. In some embodiments, the angle A may be at least 20°, 25°, 30°, 35°, 40°, 45°, 50°, 55°,60°, 65° or 70°. In some embodiments, the angle A may be less than 90°, 85°,80°, 75°, 70°, 65°, 60°, 55°, 50°, 45° or 70°. Combinations of the above-referenced ranges are also possible. For example, in some embodiments, the angle A may be 20° to 80°, 30° to 80°, 40° to 75°, 50° to 70°, or 55° to 65°. In some embodiments, the angle A is 61° to 63°.

[0091] FIG. 18 illustrates an enlarged view of the gasket 511 forming a seal between the first 502 and second 504 brew chamber sections. During a brew cycle, the inside of the brew chamber 501 becomes pressurized to a pressure P, resulting in a pressure P to be exerted onto the gasket extension 513.

[0092] According to one aspect, the geometry of the gasket may increase sealing performance of the gasket. In some embodiments, the angle A (FIG. 17) of the gasket extension 513 creates a pocket of space 517 between the gasket extension 513 and the second brew chamber section 504. This pocket of space 517 is part of the inside of the brew chamber, and thus is at the same pressure P when the brew chamber is pressurized. This pocket of space 517 may allow the pressure P to push the extension 513 of the gasket against the first brew chamber section 502, thereby causing the gasket to exert a force F on the first brew chamber section 502. This force F may serve to form a seal or increase the strength of a seal. The precise angle A (FIG. 17) of the gasket extension 513 may be varied based on the geometry of the first and second brew chamber sections to increase sealing performance. The shape of the profile of the gasket body 512 or gasket extension 513 may be different for different embodiments. For example, in some embodiments, the extension may have a substantially triangular or rounded profile so that the gasket may effectively provide a seal between the first and second brew chamber sections.

[0093] The gasket body 512 may have troughs 512A configured to couple to protrusions 504A, 510A of the second brew chamber section 504 and form a seal. The protrusions 504A and 510A intrude into the troughs 512A of the gasket to secure the gasket body 512 to the second brew chamber section 504. The sidewall 510 may be coupled to the rest of the second brew chamber section 504 to secure the body 512 of the gasket 511. In some embodiments, an O-ring 518 may form an additional seal between a portion of the sidewall 510 and the rest of the second brew chamber section 504. In addition, the protrusions 510A and 504A may seal one end of the gasket.

[0094] It should be appreciated that in some embodiments, the gasket may be fixed to the first brew chamber section 502 instead of the second brew chamber section, and the first brew chamber section 502 may have one or more protrusions to secure the gasket 511.

[0095] The gasket may be made of rubber, silicone, or other flexible materials capable of forming a seal.

[0096] Although the drawings depict the gasket to be fixed to the second brew chamber section 504, it should be appreciated that in other embodiments, the arrangement

may be reversed such that the gasket may instead be fixed to the first brew chamber section 502, and configured to seal against the second brew chamber section 504.

[0097] 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 brew chamber section and a second brew chamber section, the first and second brew chamber sections being configured to enclose a beverage tablet for combining with liquid from the liquid supply to form a beverage, wherein the beverage tablet comprises a body of compressed beverage material, the first and second brew chamber sections having an open state to receive the beverage tablet and a closed state to form a cavity;

wherein in the closed state, the first brew chamber section and the second brew chamber section are moveable relative to one another between a first closed configuration and a second closed configuration, wherein in the first closed configuration, the first and second brew chamber sections are at a first distance from one another and wherein in the second closed configuration, the first and second brew chamber sections are at a second distance from one another, the first distance being different from the second distance; and

a gasket configured to provide a seal between the first brew chamber section and the second brew chamber section at the first and second closed configurations, wherein the gasket comprises a body and an extension extending from the body into the cavity formed by the first and second brew chamber sections in the closed state.

2. The beverage machine of claim 1, wherein the liquid from the liquid supply is provided through the second brew chamber section.

3. The beverage machine of claim 2, wherein the first brew chamber section is configured to hold the beverage tablet while in the open state.

4. The beverage machine of claim 2, wherein the gasket is fixed to the second brew chamber section.

5. The beverage machine of claim 2, wherein the second brew chamber section is moveable relative to the first brew chamber section while the first brew chamber section and the second brew chamber section are in the closed state.

6. The beverage machine of claim 5, wherein the gasket is configured to maintain a seal between the first brew chamber section and the second brew chamber section as the second brew chamber section moves from the first closed configuration to the second closed configuration.

7. The beverage machine of claim 6, wherein the first brew chamber section is rotatably disposed relative to the housing, and wherein the second brew chamber section is slidably disposed relative to the housing.

8. The beverage machine of claim 4, further comprising a first at least one piercing needle disposed in the first brew chamber section, and a second at least one piercing needle disposed in the second brew chamber section, the first and second at least one piercing needles being configured to pierce the beverage tablet.

9. The beverage machine of claim 8, wherein one of the first and second at least one piercing needles is configured to introduce liquid from the liquid supply into the beverage tablet, and wherein the other of the first and second at least one piercing needles is configured to allow the beverage to exit the beverage tablet.

10. A beverage machine comprising:

a housing;

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

a first brew chamber section and a second brew chamber section, the first and second brew chamber sections being configured to enclose a beverage tablet for combining with liquid from the liquid supply to form a beverage, wherein the beverage tablet comprises a body of compressed beverage material, the first and second brew chamber sections having an open state to receive the beverage tablet and a closed state to form a chamber volume; and

a gasket configured to provide a seal between the first brew chamber section and the second brew chamber section in the closed state, wherein the gasket comprises a body and a flexible extension extending from the body into the chamber volume when the first and second brew chamber sections are in the closed state, the extension configured to be

moveable within the chamber volume while maintaining the seal between the first brew chamber section and the second brew chamber section.

11. The beverage machine of claim 10, wherein the flexible extension is angled such that, with the first and second brew chamber sections in the closed state, a pocket of space is formed between the flexible extension and the second brew chamber section, and wherein the flexible extension is configured to move towards the first brew chamber section to apply a force onto the first brew chamber section when the chamber volume is pressurized.

12. The beverage machine of claim 10, wherein the flexible extension is angled such that, with the first and second brew chamber sections in the closed state, a pocket of space is formed between the flexible extension and the first brew chamber section, and wherein the flexible extension is configured to move towards the second brew chamber section to apply a force onto the second brew chamber section when the chamber volume is pressurized.

13. The beverage machine of claim 10, further comprising a cavity formed by the first and second brew chamber sections in the closed state, wherein the extension is divides the cavity into at least two volumes, a first volume oriented towards the first brew chamber section and a second volume that is part of the chamber volume, such that the extension is moveable within the first and second volumes.

14. A method of forming a beverage, the method comprising:

moving a brew chamber from an open state to a closed state to enclose a beverage tablet between a first brew chamber section and a second brew chamber section of the brew chamber;

forming a seal between the first and second brew chamber sections with a gasket when the brew chamber is moved to the closed state;

maintaining the seal between the first and second brew chamber sections with the gasket as a distance between the first and second brew chamber sections changes to permit the brew chamber to remain in a closed state;

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

dispensing the beverage.

15. The method of claim 14, further comprising applying a pressure to the gasket with the introduced liquid.

16. The method of claim 15, further comprising receiving a beverage tablet into the first brew chamber section when the first brew chamber section is in an open configuration, the beverage tablet comprising a body of compressed beverage material.

17. The method of claim 16, further comprising rotating the beverage tablet from a first orientation to a second orientation while moving the first brew chamber section from the open configuration to a closed configuration.

18. The method of claim 17, wherein the second orientation is perpendicular to the first orientation.

19. The method of claim 18, further comprising grasping the beverage tablet with at least one gripper when rotating the beverage tablet from the first orientation to the second orientation.

20. The method of claim 14, further comprising wetting the beverage tablet with a first volume of water.