CLAIMS

1. A beverage forming system comprising:

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

a brew chamber arranged to hold a beverage medium for mixing with the liquid to form a beverage;

a heater tank arranged to heat liquid in the tank, the heater tank having a top, a bottom, a liquid inlet to receive liquid from the liquid supply, an outlet at the top to provide heated liquid to the brew chamber for forming a beverage; and

an expansion chamber at the top of the heater tank providing a tortuous flow path from an air inlet end to an outlet end of the expansion chamber at the tank outlet.

2. The system of claim 1, wherein the air inlet end is positioned below the outlet end.

3. The system of claim 1, wherein the flow path of the expansion chamber has a spiral shape.

4. The system of claim 1, further comprising an air pump arranged to introduce air into the air inlet end for flow through the expansion chamber and to the tank outlet.

5. The system of claim 4, wherein the air pump and the expansion chamber are arranged such that air introduced into the air inlet end at least partially evacuates a top of the heater tank of liquid.

6. The system of claim 4, wherein the flow path includes a tortuous shape arranged such that air introduced into the air inlet end travels along the tortuous shape to the outlet end.

7. The system of claim 1, wherein the expansion chamber is arranged such that air provided to the air inlet end enters the expansion chamber to provide a gas volume at

the top of the heater tank to help prevent exit of liquid from the heater tank due to expansion of liquid during heating.

8. The system of claim 1, wherein the liquid inlet is located near a bottom of the heater tank.

9. The system of claim 1, wherein the liquid supply includes a storage tank fluidly coupled to an inlet of a pump, which has a fluid outlet fluidly coupled to the liquid inlet of the heater tank.

10. The system of claim 9, wherein the pump is a positive displacement pump controllable to deliver a known volume of liquid to the heater tank.

11. The system of claim 1, wherein the brew chamber is arranged to hold a beverage cartridge that contains the beverage medium, and the outlet of the heater tank is fluidly coupled to an inlet of the brew chamber to deliver liquid to the beverage cartridge to form a beverage.

12. The system of claim 11, wherein the inlet of the brew chamber includes a piercing element arranged to pierce a portion of the cartridge to form an opening through which liquid is delivered.

13. The system of claim 12, further comprising a cartridge having a lid arranged to be pierced by the piercing element.

14. A method of forming a beverage comprising:

providing a liquid to a heater tank via a liquid inlet;

heating liquid in the heater tank;

delivering liquid from the heater tank to a beverage medium to form a beverage via an outlet at a top of the heater tank; and

introducing air into a tortuous flow path of an expansion chamber at the top of the heater tank after delivery of liquid to the heater tank is stopped to expel liquid from at least a portion of the expansion chamber.

15. The method of claim 14, wherein the step of introducing air includes introducing air at an air inlet end of the expansion chamber that is positioned below an outlet end of the expansion chamber.

16. The method of claim 14, wherein the step of introducing air includes introducing air at an air inlet end that flows from the air inlet end, through the tortuous flow path and to an outlet end.

17. The method of claim 14, wherein the flow path of the expansion chamber has a spiral shape.

18. The method of claim 14, wherein the step of introducing air includes operating an air pump arranged to introduce air into an air inlet for flow through the tortuous flow path of the expansion chamber and to the outlet.

19. The method of claim 14, wherein the step of introducing air includes introducing air into and air inlet to at least partially evacuate a top of the heater tank of liquid.

20. The method of claim 14, wherein the step of introducing air includes providing a gas volume at the top of the heater tank to help prevent exit of liquid from the heater tank due to expansion of liquid during heating.

21. The method of claim 14, wherein the liquid inlet is located near a bottom of the heater tank.

22. The method of claim 14, wherein the step of providing liquid includes delivering liquid from a storage tank to an inlet of a pump, and delivering liquid from an outlet of the pump to the liquid inlet of the heater tank.

23. The method of claim 21, wherein the pump is a positive displacement pump controllable to deliver a known volume of liquid to the heater tank.

24. The method of claim 14, wherein the step of delivering liquid includes delivering liquid to an inlet of a brew chamber arranged to deliver liquid to a beverage cartridge holding the beverage medium to form a beverage.

25. The method of claim 24, further comprising piercing the beverage cartridge with a portion of the inlet of the brew chamber to form an opening through which liquid is delivered to the beverage cartridge.

26. The method of claim 25, wherein a lid of the beverage cartridge is pierced to form the opening.

CLAIMS

1. A beverage forming system (100) comprising:

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

a brew chamber (49) arranged to hold a beverage medium for mixing with the liquid to form a beverage;

a heater tank (118) arranged to heat liquid in the tank, the heater tank having a top, a bottom, a liquid inlet to receive liquid from the liquid supply, an outlet at the top to provide heated liquid to the brew chamber for forming a beverage; characterized by

an expansion chamber (117) at the top of the heater tank providing a tortuous flow path from an air inlet end (118b) to an outlet end (118a) of the expansion chamber at the tank outlet.

2. The system of claim 1, wherein the air inlet end is positioned below the outlet end.

3. The system of claim 1, wherein the flow path of the expansion chamber has a spiral shape.

4. The system of claim 1, further comprising an air pump (121) arranged to introduce air into the air inlet end for flow through the expansion chamber and to the tank outlet.

5. The system of claim 4, wherein the air pump and the expansion chamber are arranged such that air introduced into the air inlet end at least partially evacuates a top of the heater tank of liquid.

6. The system of claim 1, wherein the expansion chamber is arranged such that air provided to the air inlet end enters the expansion chamber to provide a gas volume at the top of the heater tank to help prevent exit of liquid from the heater tank due to expansion of liquid during heating.

7. The system of claim 1, wherein the liquid supply includes a storage tank (110) fluidly coupled to an inlet of a pump (112), which has a fluid outlet fluidly coupled to the

liquid inlet of the heater tank (118).

8. The system of claim 1, wherein the brew chamber (49) is arranged to hold a beverage cartridge (1) that contains the beverage medium, and the outlet of the heater tank is fluidly coupled to an inlet of the brew chamber to deliver liquid to the beverage cartridge to form a beverage.

9. The system of claim 8, wherein the inlet of the brew chamber includes a piercing element (46) arranged to pierce a portion of the cartridge to form an opening through which liquid is delivered.

10. A method of forming a beverage comprising:

providing a liquid to a heater tank (118) via a liquid inlet;

heating liquid in the heater tank;

delivering liquid from the heater tank to a beverage medium to form a beverage via an outlet at a top of the heater tank; and

introducing air into a tortuous flow path of an expansion chamber (117) at the top of the heater tank after delivery of liquid to the heater tank is stopped to expel liquid from at least a portion of the expansion chamber.

11. The method of claim 10 wherein the step of introducing air includes introducing air at an air inlet end (118b) of the expansion chamber that is positioned below an outlet end (118a) of the expansion chamber.

12. The method of claim 10, wherein the step of introducing air includes introducing air at an air inlet end that flows from the air inlet end, through the tortuous flow path and to an outlet end.

13. The method of claim 10, wherein the flow path of the expansion chamber has a spiral shape.

14. The method of claim 10, wherein the step of introducing air includes operating an air

pump (121) arranged to introduce air into an air inlet for flow through the tortuous flow path of the expansion chamber and to the outlet.

15. The method of claim 10, wherein the step of introducing air includes introducing air into an air inlet to at least partially evacuate a top of the heater tank of liquid.

16. The method of claim 10, wherein the step of introducing air includes providing a gas volume at the top of the heater tank to help prevent exit of liquid from the heater tank due to expansion of liquid during heating.

17. The method of claim 10, wherein the step of providing liquid includes delivering liquid from a storage tank (110) to an inlet of a pump (112), and delivering liquid from an outlet of the pump to the liquid inlet of the heater tank (118).

18. The method of claim 10, wherein the step of delivering liquid includes delivering liquid to an inlet of a brew chamber (49) arranged to deliver liquid to a beverage cartridge (1) holding the beverage medium to form a beverage.

19. The method of claim 18, further comprising piercing the beverage cartridge with a portion of the inlet of the brew chamber to form an opening through which liquid is delivered to the beverage cartridge.