CARBONATION MACHINE AND A GAS CANISTER FOR A CARBONATION MACHINE

FIELD OF THE INVENTION

[0001] The present invention relates to carbonation machines. More particularly, the present invention relates to a carbonation machine and to a gas canister for a carbonation machine.

BACKGROUND OF THE INVENTION

[0002] Carbonation machines are commonly used in homes, offices, cafeterias, and other settings. A typical carbonation machine may be operated to inject carbon dioxide into water or another liquid that is in a bottle that may be attached to the machine. Other types of carbonation machines may be configured to dispense carbonated beverages into cups or other containers.

[0003] The carbon dioxide gas that is injected into liquid to carbonate the liquid is typically provided in canisters of compressed or liquefied gas. The carbonation machine includes a user-operable mechanism for releasing gas from the cylinder and conducting the gas to the liquid to be carbonated. Typically, operation of the gas release mechanism causes the mechanism to open a valve of the cylinder. When the gas canister is installed in the carbonation machine, a valve head that includes the valve is connected to a gas canister connector of the carbonation machine.

[0004] When a cylinder has been emptied of gas, the empty cylinder may be replaced with a full cylinder. This replacement is typically performed by a user of the machine. For example, a valve head of the cylinder may be provided with exterior male threading which may be connected to the gas canister connector by screwing into interior threading of a socket of the connector.

SUMMARY OF THE INVENTION

[0004a] According to a first aspect of the present invention, there is provided a carbonation machine comprising:

a carbonation head;

a holder that is configured to hold a gas canister, the holder comprising a connector with a socket configured to enable linear insertion of a valve of the canister into the socket, the socket including a seal with at least one lateral opening to enable fluidic flow between one or more laterally oriented ports of the valve and a conduit of the holder while preventing leakage of gas from the fluidic flow, and a holding mechanism configured to hold a lateral projection from the canister after insertion of the valve into the socket such that the valve remains in the socket; and

an activation mechanism configured to operate the valve to release the gas from the canister when inserted into the socket so as to enable the gas to flow via the conduit to the carbonation head.

[0004b] According to a second aspect of the present invention, there is provided a canister for connection to a carbonation machine, the canister configured to hold a pressurized or liquefied gas for enabling the machine to carbonate a liquid, the canister comprising a valve that is configured to hold the gas in the canister when closed, and to provide a fluidic connection between the canister and the carbonation machine or a source of the gas when opened, the valve comprising:

a body that includes at one end a canister port oriented along a longitudinal axis of the valve, wherein inflow to or outflow from the canister is via at least one exterior port of the valve that opens laterally to the longitudinal axis of the valve.

[0004c] According to a third aspect of the present invention, there is provided a valve for closing and opening a gas canister, the valve being configured to hold a pressurized or liquefied gas in the canister when closed, and to provide a fluidic connection to the canister when opened, the valve comprising:

a body that includes at one end a canister port oriented along a longitudinal axis of the valve, wherein inflow to or outflow from the canister is via at least one exterior port of the valve that opens laterally to the longitudinal axis of the valve.

[0004d] According to a fourth aspect of the present invention, there is provided an adapter comprising:

an opening that is shaped to enable insertion of a valve of a gas canister that is configured to hold a pressurized or liquefied gas for carbonating a liquid, the valve comprising a body that includes at one end a canister port oriented along a longitudinal axis of the valve, at least one exterior port that opens laterally to the longitudinal axis of the valve, and a gasket configured to fluidically isolate an exterior surface of a plunger of the valve, the plunger configured, when an inward pushing force that overcomes a restoring force is applied to the plunger, to enable fluidic communication between said at least one exterior port and the canister port; and

at least one channel that is configured to conduct pressurized gas from a longitudinally oriented filling port of a canister filling system to one or more channels that are in fluidic communication with said at least one exterior port of a valve that is inserted into the opening.

[0005] There is thus provided, in accordance with an embodiment of the invention, a carbonation machine including: a carbonation head; a holder that is configured to hold a gas canister, the holder including a connector with a socket, the socket including a seal with at least one lateral opening to enable fluidic flow between one or more laterally

CLAIMS

1. A carbonation machine comprising:

a carbonation head;

a holder that is configured to hold a gas canister, the holder comprising a connector with a socket configured to enable linear insertion of a valve of the canister into the socket, the socket including a seal with at least one lateral opening to enable fluidic flow between one or more laterally oriented ports of the valve and a conduit of the holder while preventing leakage of gas from the fluidic flow, and a holding mechanism configured to hold a lateral projection from the canister after insertion of the valve into the socket such that the valve remains in the socket; and

an activation mechanism configured to operate the valve to release the gas from the canister when inserted into the socket so as to enable the gas to flow via the conduit to the carbonation head.

2. The carbonation machine of claim 1, wherein the seal comprises two gaskets, the lateral opening comprising a gap between the two gaskets.

3. The carbonation machine of claim 2, wherein each of the two gaskets is shaped in the form of an O-ring with flattened faces.

4. The carbonation machine of claim 2, wherein each of the two gaskets has a U-shaped cross section oriented such that openings of the two gaskets face one another.

5. The carbonation machine of claim 1, wherein the seal comprises a single gasket with one or more opening holes.

6. The carbonation machine of claim 5, wherein the gasket has a U-shaped cross section.

7. The carbonation machine of claim 6, wherein an opening of the U-shaped gasket faces inward, and the opening holes are located on an outward facing convex surface of the gasket.

8. The carbonation machine of claim 6, wherein an opening of the U-shaped gasket faces outward and the opening holes are located on an inward facing convex surface of the gasket.

9. The carbonation machine of claim 1, wherein the holding mechanism comprises a plurality of teeth that are outwardly slidable to enable insertion of the lateral projection and inwardly slidable to prevent removal of the lateral projection past the teeth, wherein a release mechanism to enable removal of the valve from the socket is configured to outwardly retract the teeth to enable passage of the lateral projection.

10. The carbonation machine of claim 1, wherein the holding mechanism comprises a yoke with a noncircular opening configured to allow passage of the lateral projection, the lateral projection comprising a noncircular lateral projection, when the noncircular lateral projection is aligned with the opening, and to prevent passage of the noncircular lateral projection when the canister is rotated such that the noncircular lateral projection is not aligned with the opening.

11. The carbonation machine of claim 1, further comprising a yoke that is configured to support the lateral projection and a handle that is raisable to enable placement of the lateral projection on the yoke, the handle connected by a raising mechanism to the yoke such that when the handle is lowered, the yoke raises the valve to insert the valve into the socket.

12. The carbonation machine of claim 11, wherein the handle comprises a cover that is configured to cover at least part of the canister when the handle is lowered.

13. The carbonation machine of claim 1, wherein a base of the carbonation machine includes an opening for placement of the canister, and wherein at least a part of a floor of the opening is uneven so as to cause tilting of the canister when placed into the opening into an orientation that is substantially aligned with the socket.

14. The carbonation machine of claim 1, further comprising a cradle that is tiltable outward to enable insertion of the canister into the cradle, the cradle configured to, when rotated inward, to insert the valve into the socket.

15. The carbonation machine of claim 1, further comprising a platform for supporting the canister erectly and configured to, when rotated, to lift the canister to insert the valve into the socket.

16. A canister for connection to a carbonation machine, the canister configured to hold a pressurized or liquefied gas for enabling the machine to carbonate a liquid, the canister comprising a valve that is configured to hold the gas in the canister when closed, and to provide a fluidic connection between the canister and the carbonation machine or a source of the gas when opened, the valve comprising:

a body that includes at one end a canister port oriented along a longitudinal axis of the valve, wherein inflow to or outflow from the canister is via at least one exterior port of the valve that opens laterally to the longitudinal axis of the valve.

17. The canister of claim 16, wherein the valve comprises a poppet that is slidable along the longitudinal axis and which, when in an open position, allows fluidic communication between at least one the exterior port and the canister port to enable inflow to the canister via said at least one exterior port or outflow from the canister via said at least one exterior port, and which, when in a closed position that is more distal to the canister port than the open position, prevents fluid communication between the at least one exterior port and the canister port.

18. The canister of claim 17, wherein the valve comprises a resilient restoring structure configured to apply a restoring force to the poppet to maintain the poppet at the closed position;

19. The canister of claim 18, wherein the valve comprises a plunger with an exterior surface that is exposed to the exterior of a body of the valve and configured, when an inward pushing force that overcomes the restoring force is applied to the plunger, to slide the poppet from the closed position to the open position.

20. The canister of claim 19, wherein the valve comprises a gasket configured to fluidically isolate the exterior surface of the plunger from being a path of fluidic flow between the at least one exterior port and the canister port.

21. The canister of claim 20, wherein a cross section of the gasket is U-shaped, an opening of the gasket being oriented toward the canister.

22. The canister of claim 16, wherein the at least one exterior port is oriented substantially perpendicular to the longitudinal axis.

23. The canister of any of claims 16–22 comprising at least two exterior ports that open laterally to the longitudinal axis of the valve.

24. The canister of claim 23, wherein the at least two exterior ports are substantially equally spaced about the longitudinal axis of the valve.

25. A valve for closing and opening a gas canister, the valve being configured to hold a pressurized or liquefied gas in the canister when closed, and to provide a fluidic connection to the canister when opened, the valve comprising:

a body that includes at one end a canister port oriented along a longitudinal axis of the valve, wherein inflow to or outflow from the canister is via at least one exterior port of the valve that opens laterally to the longitudinal axis of the valve.

26. The valve of claim 25 comprising a poppet that is slidable along the longitudinal axis and which, when in an open position, allows fluidic communication between the at least one exterior port and the canister port to enable inflow to the canister via said at least one exterior port or outflow from the canister via said at least one exterior port, and which, when in a closed position that is more distal to the canister port than the open position, prevents fluid communication between the at least one exterior port and the canister port.

27. The valve of claim 26 comprising a resilient restoring structure configured to apply a restoring force to the poppet to maintain the poppet at the closed position.

28. The valve of claim 27 comprising a plunger with an exterior surface that is exposed to the exterior of the body and configured, when an inward pushing force that overcomes the restoring force is applied to the plunger, to slide the poppet from the closed position to the open position.

29. The valve of claim 28 comprising a gasket configured to fluidically isolate the exterior surface of the plunger from being a path of fluidic flow between the at least one exterior port and the canister port.

30. The valve of claim 29, wherein a cross section of the gasket is U-shaped, an opening of the gasket being oriented toward the canister.

31. The valve of any of claims 25–30 comprising at least two exterior ports that open laterally to the longitudinal axis of the valve.

32. The valve of claim 31, wherein the at least two exterior ports are substantially equally spaced about the longitudinal axis of the valve.

33. An adapter comprising:

an opening that is shaped to enable insertion of a valve of a gas canister that is configured to hold a pressurized or liquefied gas for carbonating a liquid, the valve comprising a body that includes at one end a canister port oriented along a longitudinal axis of the valve, at least one exterior port that opens laterally to the longitudinal axis of the valve, and a gasket configured to fluidically isolate an exterior surface of a plunger of the valve, the plunger configured, when an inward pushing force that overcomes a restoring force is applied to the plunger, to enable fluidic communication between said at least one exterior port and the canister port; and

at least one channel that is configured to conduct pressurized gas from a longitudinally oriented filling port of a canister filling system to one or more channels that are in fluidic communication with said at least one exterior port of a valve that is inserted into the opening.

34. The adapter of claim 33, wherein the valve comprises structure to enable attachment of the adapter to a filling head of the filling system.

35. The adapter of claim 34, wherein the at least one channel comprises at least one laterally oriented channel that is configured to be in fluidic communication with the filling port when the adapter is attached to the filling head.

36. The adapter of claim 33, wherein the adapter comprises structure to enable attachment of the adapter to the valve, a distal end of the adapter configured to connect to a filling head of the filling system.

37. The adapter of claim 36, where the at least one channel comprises a longitudinally oriented channel at the distal end that is configured to be in fluidic communication with the filling port when the distal end is connected to the filling head.