cause a burn. Also, such testing methods may be unsanitary or otherwise contaminate the beverage.

Some more advanced containers may include a thermometer positioned within the container so that the consumer can assess the temperature without risking a burn or contaminating the beverage. However, even such advanced containers generally permit the consumer to view the temperature reading only from the thermometer itself or an integrated thermometer output display. Such containers generally lack the ability to track the temperature readings over time or permit the consumer to ascertain the temperature of the beverage from a remote location (e.g., while container is in a car and consumer is running errands).

Another disadvantage of known beverage containers is the possibility of spilling or otherwise inadvertently releasing some of the beverage from the container. Certain types of lids are designed to minimize spilling. For example, such lids may include a removable barrier positionable over a pour spout or drinking opening. However, such lids do not effectively minimize spillage if the barrier is not in place when the container tips over.

Clearly, there is a need for a container management system configured to permit detecting, tracking, recording, and communicating information about the container or its contents, such information which may include temperature of the container contents or instructions to automatically cover a lid opening. Certain embodiments of the present invention satisfy this need.

SUMMARY OF THE INVENTION

Certain embodiments of a container management system and related methods include a container system having a lid or a retainer, either of which may be configured to communicate with or include a computer system. The container management system also may be comprised of various sensors, action elements, computer elements, and additional components, which are described in more detail below.

According to a first aspect of the present invention, there is provided a container management system, comprising: a lid configured to removably connect to a retainer, the lid including: a lid shell element having a dispensing aperture, and a lid support element having a lid support opening, each of which are configured to be securable together using securement elements; an interior lid compartment formed between the lid shell element and the lid support element when the lid shell element and the lid support element are secured together; internal computer elements, including at least a processor and system memory, positioned in the interior lid compartment; and a first sensor to: detect information about the lid, the retainer, or contents of the retainer; and communicate with at least one of the computer elements, wherein the first sensor either is positioned in the interior lid compartment or is physically attached to the lid; and, the retainer defines a retainer space configured to receive a beverage; wherein at least some portion of the lid support element is sized and shaped to extend into the retainer space when the lid is removably connected to the retainer, thereby permitting the first sensor to be exposed directly or indirectly to the contents of the retainer while simultaneously being supported by the lid support element.

According to a second aspect of the present invention, there is provided a container management system, comprising: a lid configured to removably connect to a retainer, the lid including: a lid shell element having a dispensing aperture, and a lid support element, each of which are configured to be securable together using securement elements; an interior lid compartment formed between the lid shell element and the lid support element when the lid shell element and the lid support element are secured together; internal computer elements, including at least a processor and system memory, positioned in the interior lid compartment; and a first sensor to: detect information about the lid, the retainer, or contents of the retainer; and communicate with at least one of the computer elements, wherein the first sensor either is positioned in the interior lid compartment or is physically attached to the lid; wherein the lid support element

includes an inner frame element and an outer frame element; and, wherein the outer frame element includes a generally disc-shaped upper outer frame element and a lower outer frame element configured to extend almost to a bottom or to a bottom of a retainer space.

According to a third aspect of the present invention, there is provided a container management system, comprising: a lid configured to removably connect to a retainer, the lid including: a lid shell element having a dispensing aperture, and a lid support element, each of which are configured to be securable together using securement elements; an interior lid compartment formed between the lid shell element and the lid support element when the lid shell element and the lid support element are secured together; internal computer elements, including at least a processor and system memory, positioned in the interior lid compartment; and a first sensor to: detect information about the lid, the retainer, or contents of the retainer; and communicate with at least one of the computer elements, wherein the first sensor either is positioned in the interior lid compartment or is physically attached to the lid; an open/close lid opening assembly configured to block or unblock the dispensing aperture based on receiving certain detected information; wherein the open/close lid opening assembly is comprised of: a motor; a crank powered by the motor and in mechanical communication with an actuator element; the actuator element disposed to cause movement of a lever arm assembly; and the lever arm assembly disposed to block or unblock the dispensing aperture or block or unblock an entrance to a product tube leading to the dispensing aperture, upon movement caused by the actuator element.

There is also provided an advanced container management system, comprising: a lid configured to removably connect to a retainer defining a retainer space, the lid including a dispensing aperture, internal computer elements and a lid support element, the lid support element includes an inner frame element and an outer frame element; and, wherein the outer frame element includes a generally disc-

shaped upper outer frame element and a lower outer frame element, the outer frame element generally surrounding at least part of the inner frame element, the inner frame element supporting a portion of the internal computer elements, the lower outer frame element is sized and shaped to extend into the retainer space when the lid is removably connected to the retainer, thereby permitting a first sensor to be exposed directly or indirectly to the contents of the retainer while simultaneously being supported by the lid support element; the first sensor to detect information about the lid, the retainer, or contents of the retainer and configured to communicate with an external computer system, wherein the first sensor is positioned in the lid support element.

There is provided an improved container management system including a retainer and a lid having a lid opening configured as a drink aperture, comprising: a processor; a system memory in communication with the processor via a communication infrastructure and storing instructions that, when executed by the processor, cause the processor to: receive detected information obtained by a sensor about the lid, the retainer, or contents of the retainer; and activate an action element in response to the detected information, wherein said action element is an open/close lid opening assembly configured to block or unblock said drink aperture in response to receiving certain detected information.

There is provided an upgraded container management system, comprising: a lid having a dispensing aperture, wherein the lid is configured to removably connect to a retainer, a sensor to detect information about the lid, the retainer, or contents of the retainer and configured to communicate with one or more internal computer elements; the one or more internal computer elements, including at least a processor, positioned in a compartment within the lid or a compartment within the retainer and configured to communicate with the sensor and with an application software executed by the processor or an external computer system.

the lid base includes a mechanical push button assembly including:

a button having a front button surface and a button latch element,

a button biasing element configured to bias the button in a certain direction,

a button fulcrum against which the button may be biased and which connects the button to the lid base; and

the lid base cover includes a lid catch element configured to accept the button latch element and thereby removably secure the lid base cover in a generally closed position and whereby pushing the button releases the button latch element from the lid catch element such that the lid base cover transitions to a generally open position.

18. The container management system of claim 17, wherein the mechanical push button assembly further includes a button lock configured to prohibit release of the lid base cover from the lid base when the button lock is engaged.