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(54) **REFILL STATION USING AN INTELLIGENT BEVERAGE CONTAINER**

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USPC **141/1; 141/94**

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(57) **ABSTRACT**

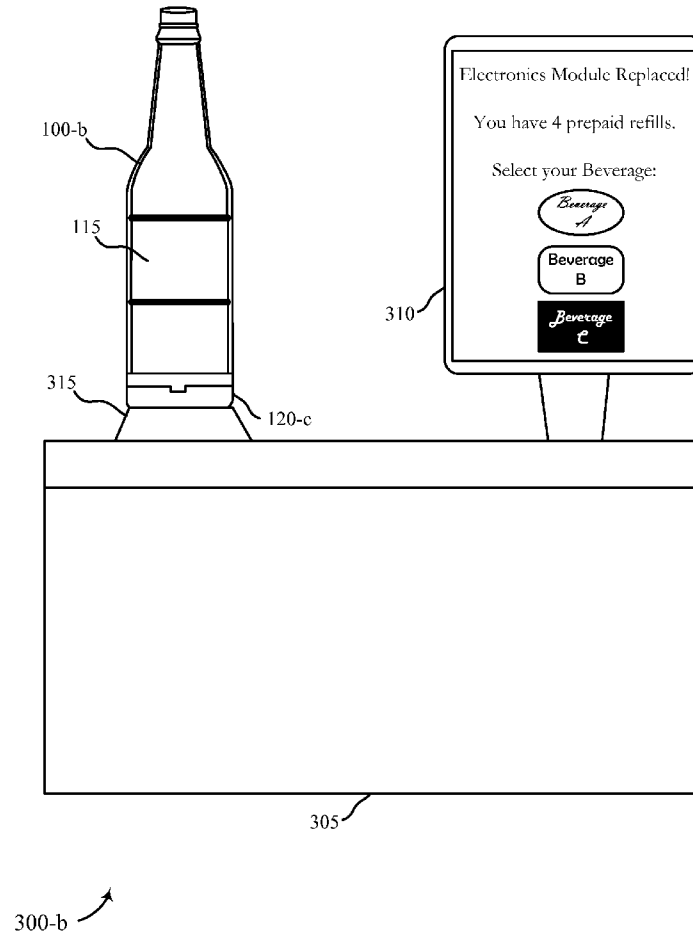
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Systems, devices, and methods are provided for conducting a refill of a beverage container. A beverage container may be detected at a refill station. The beverage container may be associated with a user account. The refill station may access information stored in the user account to determine if the beverage container is permitted to be refilled. Based on the determination, the refill station may refill the beverage container. Information indicative of the refill process may be displayed on an electronic display of the refill station. The refill station may also capture an image of the user of the beverage container and compare the captured image with an image stored in the associated user account to confirm the identity of the user. The determination that the beverage container may be refilled may be based, at least in part, on the identity confirmation.

Related U.S. Application Data

(60) Provisional application No. 61/691,609, filed on Aug. 21, 2012, provisional application No. 61/691,617, filed on Aug. 21, 2012, provisional application No. 61/691,618, filed on Aug. 21, 2012, provisional application No. 61/691,622, filed on Aug. 21, 2012, provisional application No. 61/691,627, filed on Aug. 21, 2012, provisional application No. 61/691,630, filed on Aug. 21, 2012.



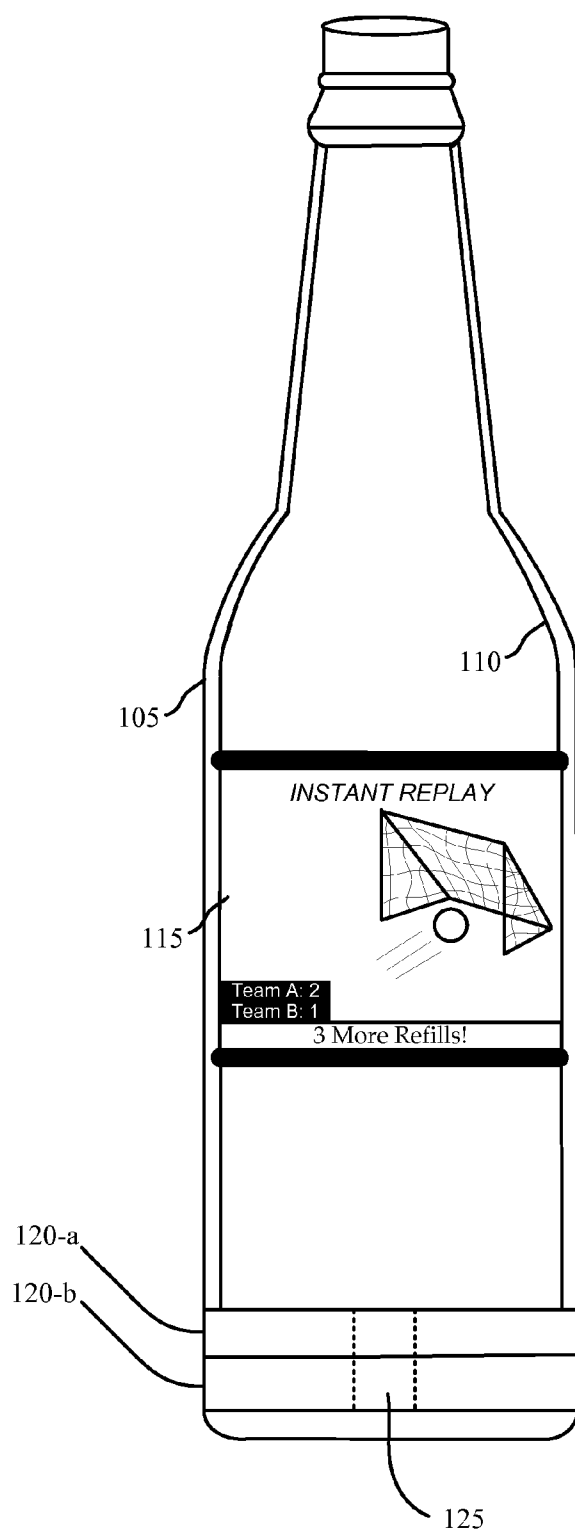


FIG. 1

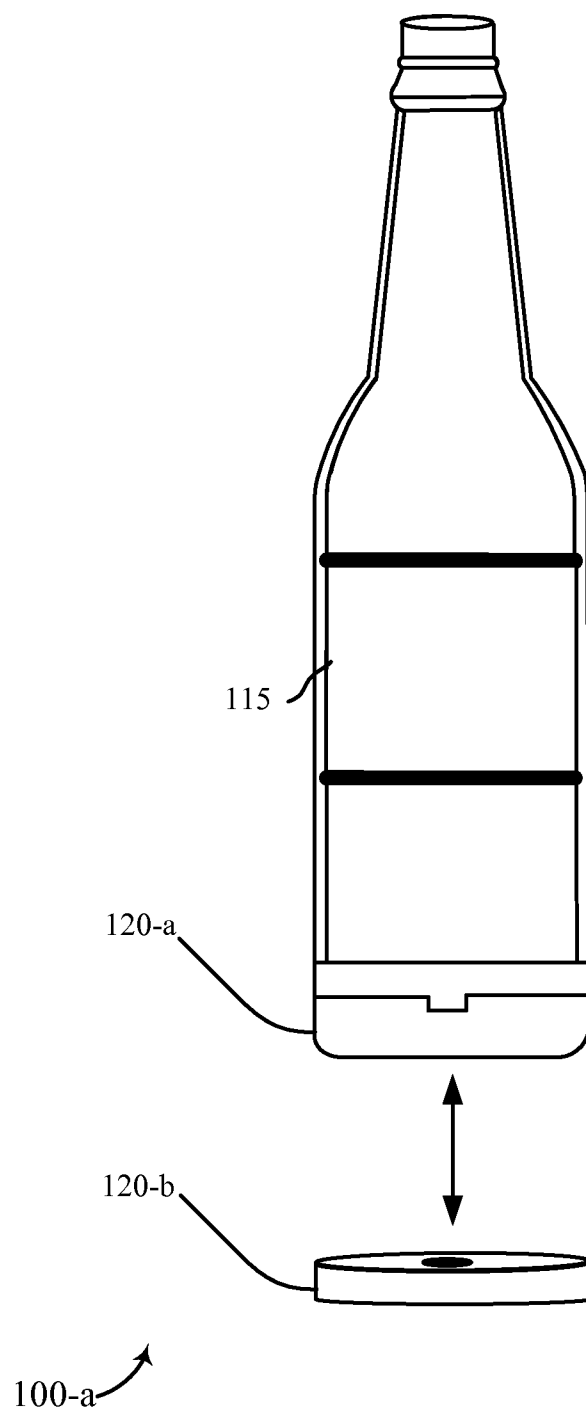


FIG. 2

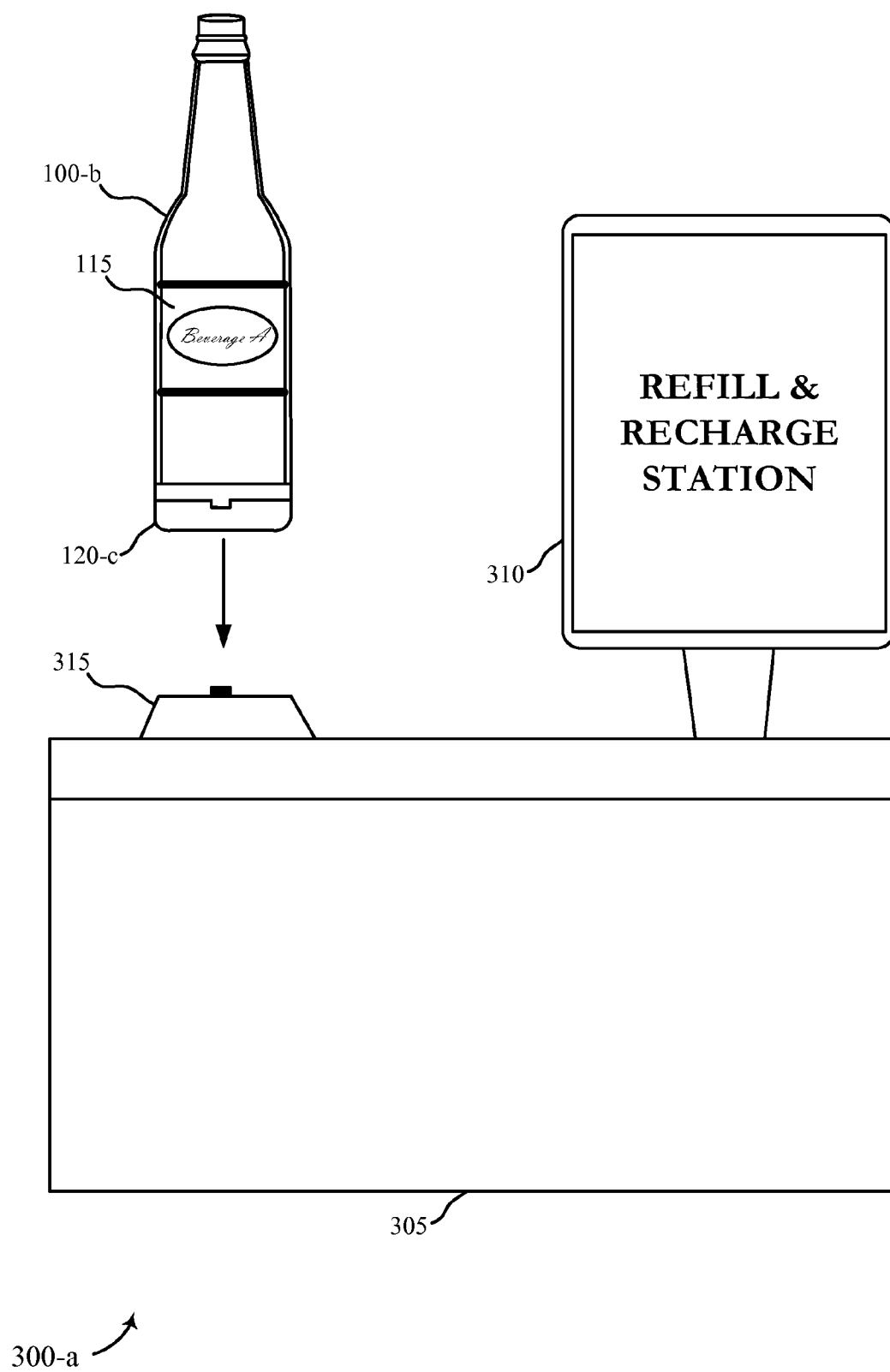


FIG. 3A

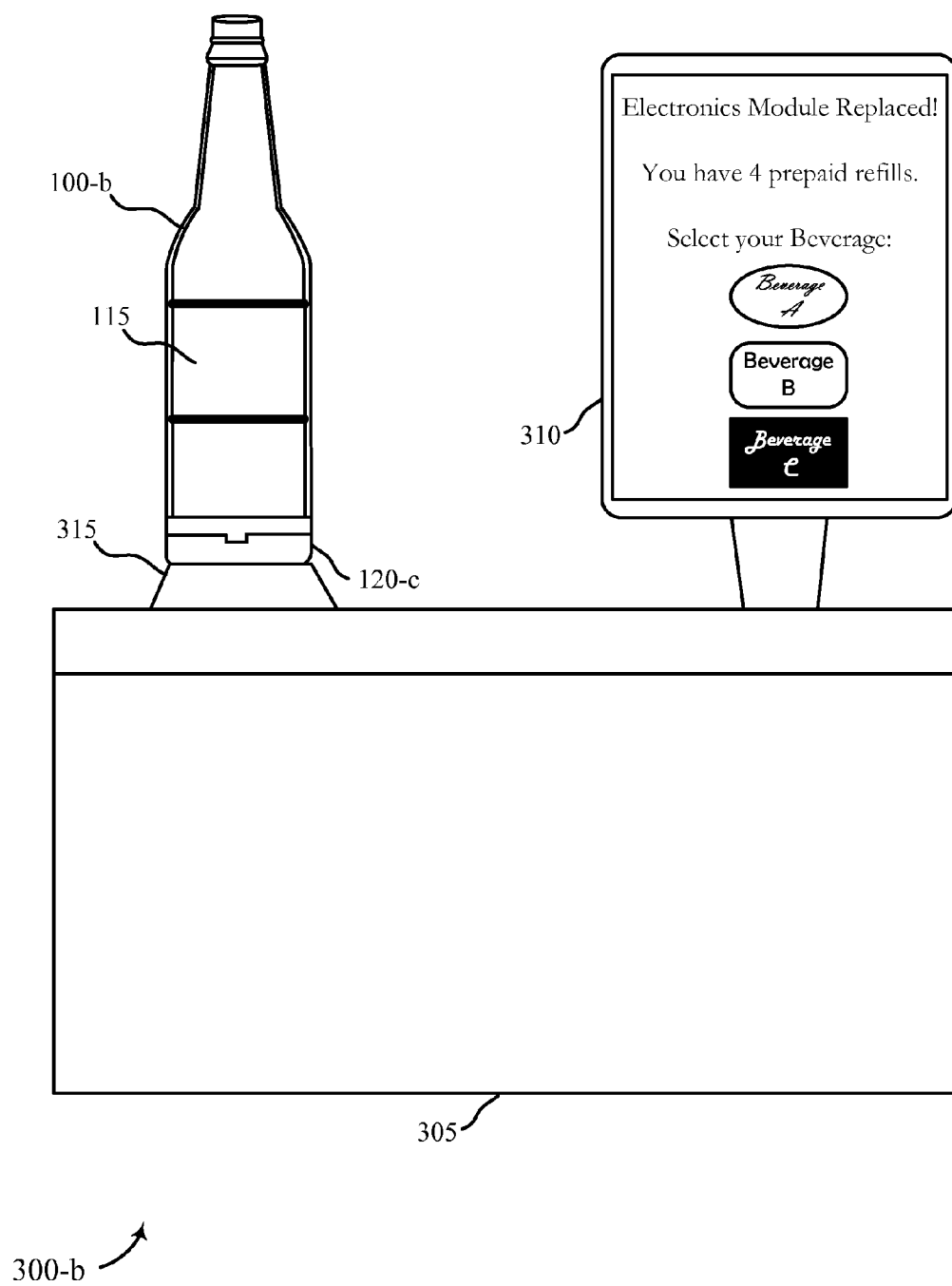


FIG. 3B

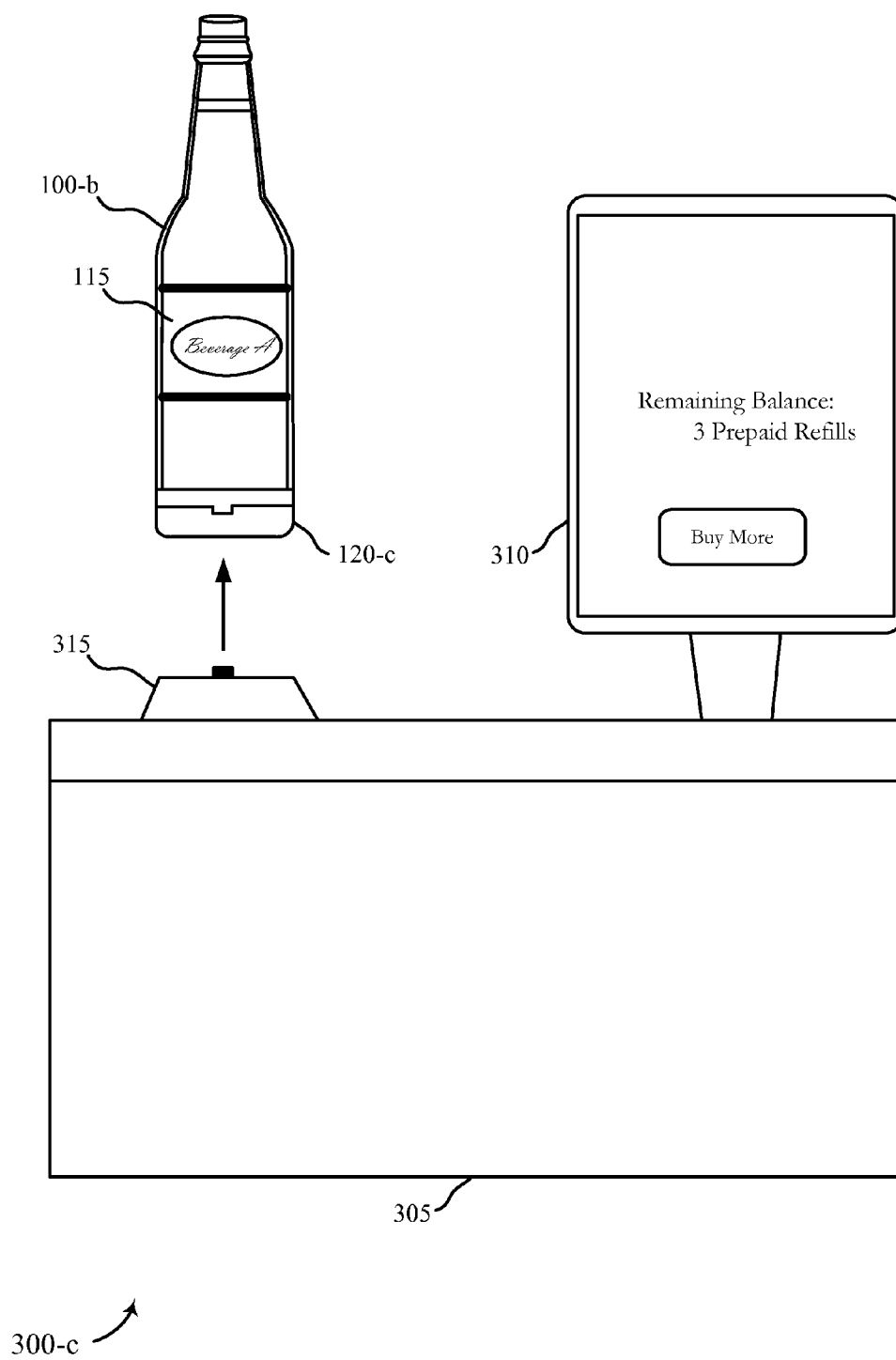


FIG. 3C

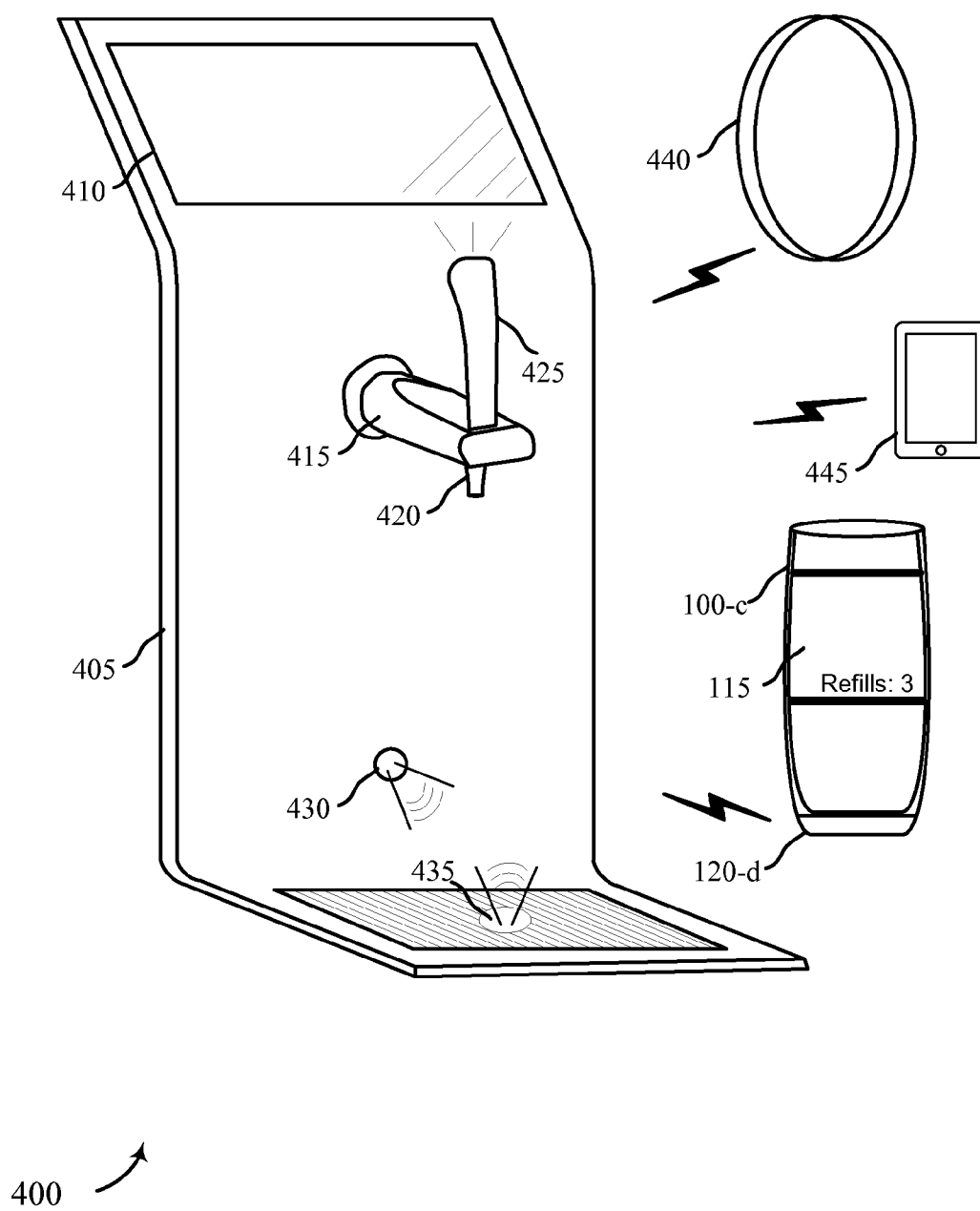
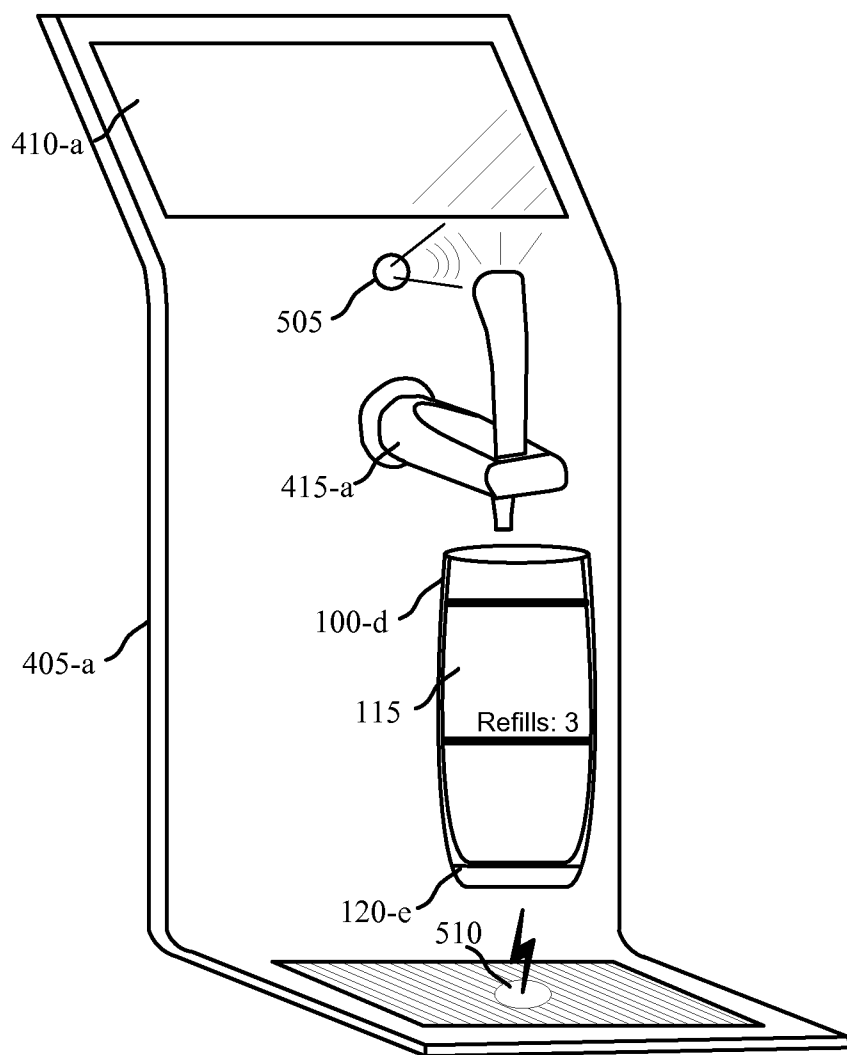
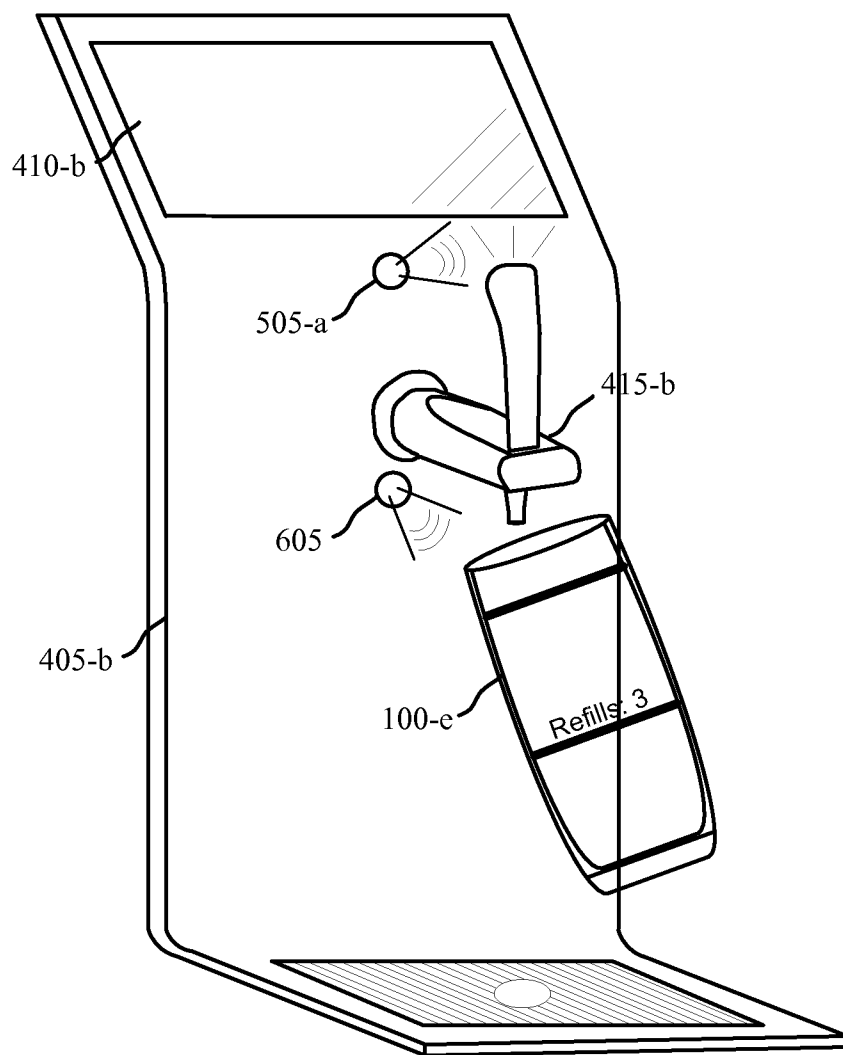


FIG. 4



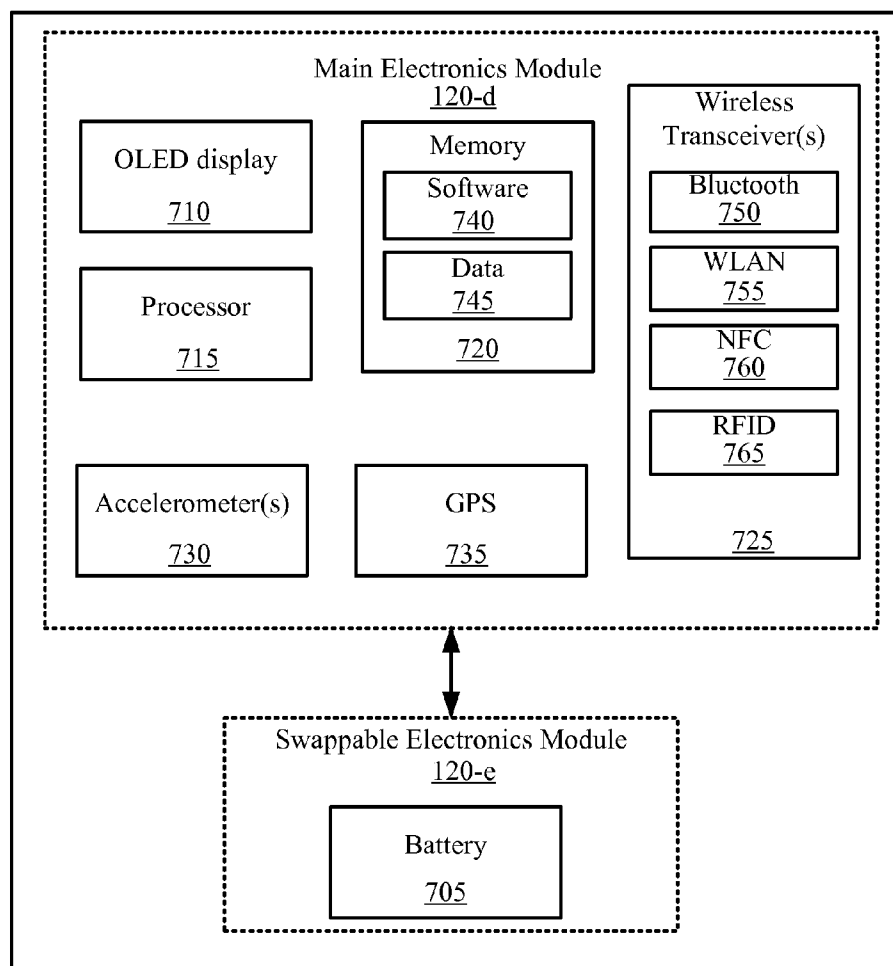
500 ↗

FIG. 5



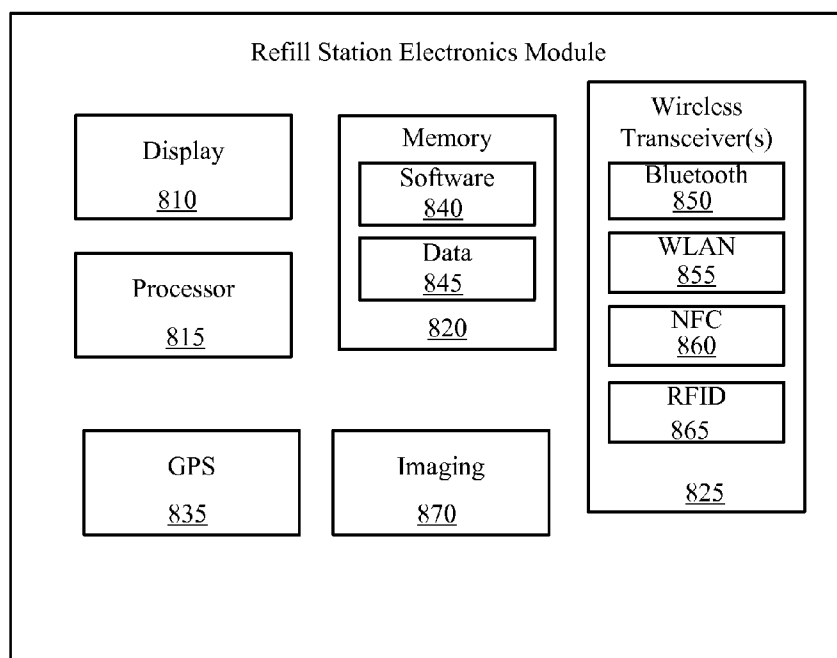
600 ↗

FIG. 6



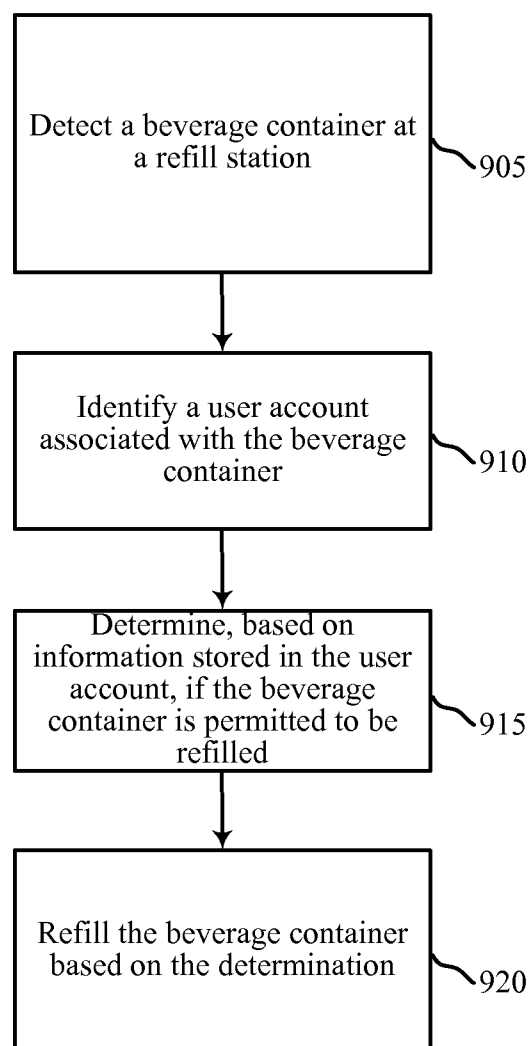
100-k

FIG. 7



800 ↗

FIG. 8



900

FIG. 9

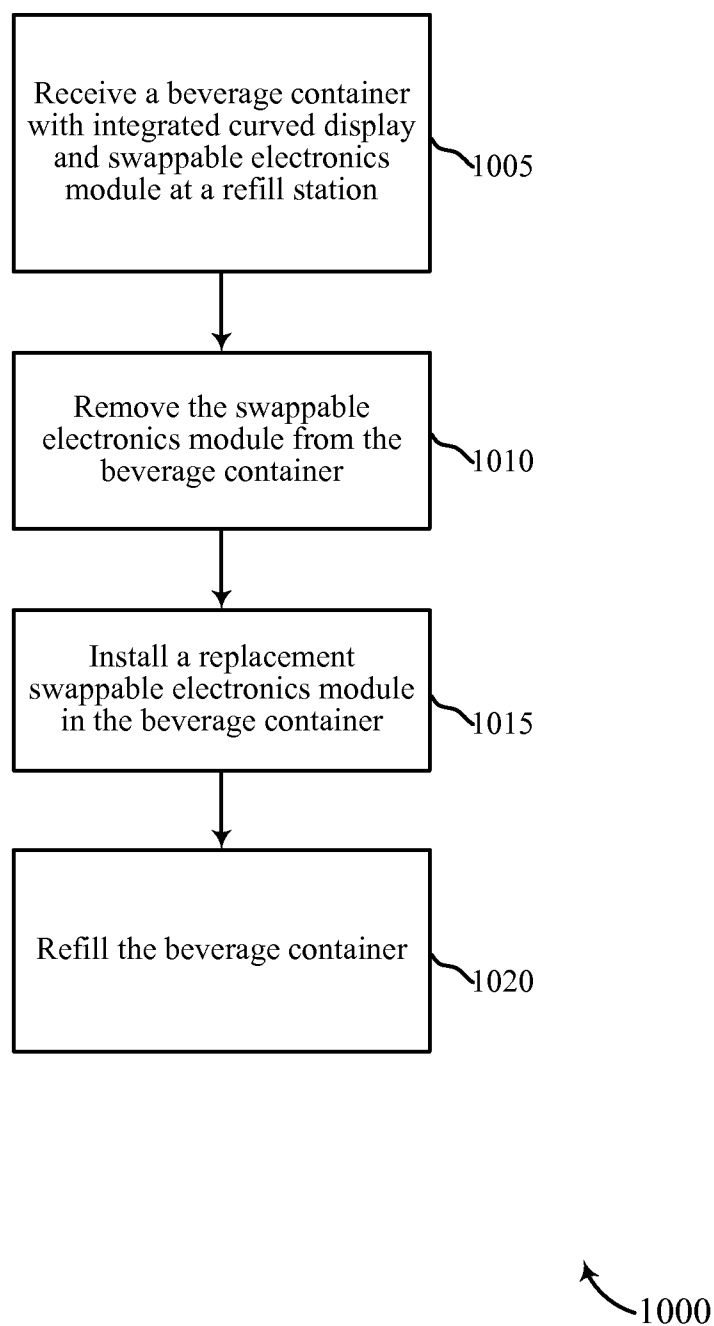
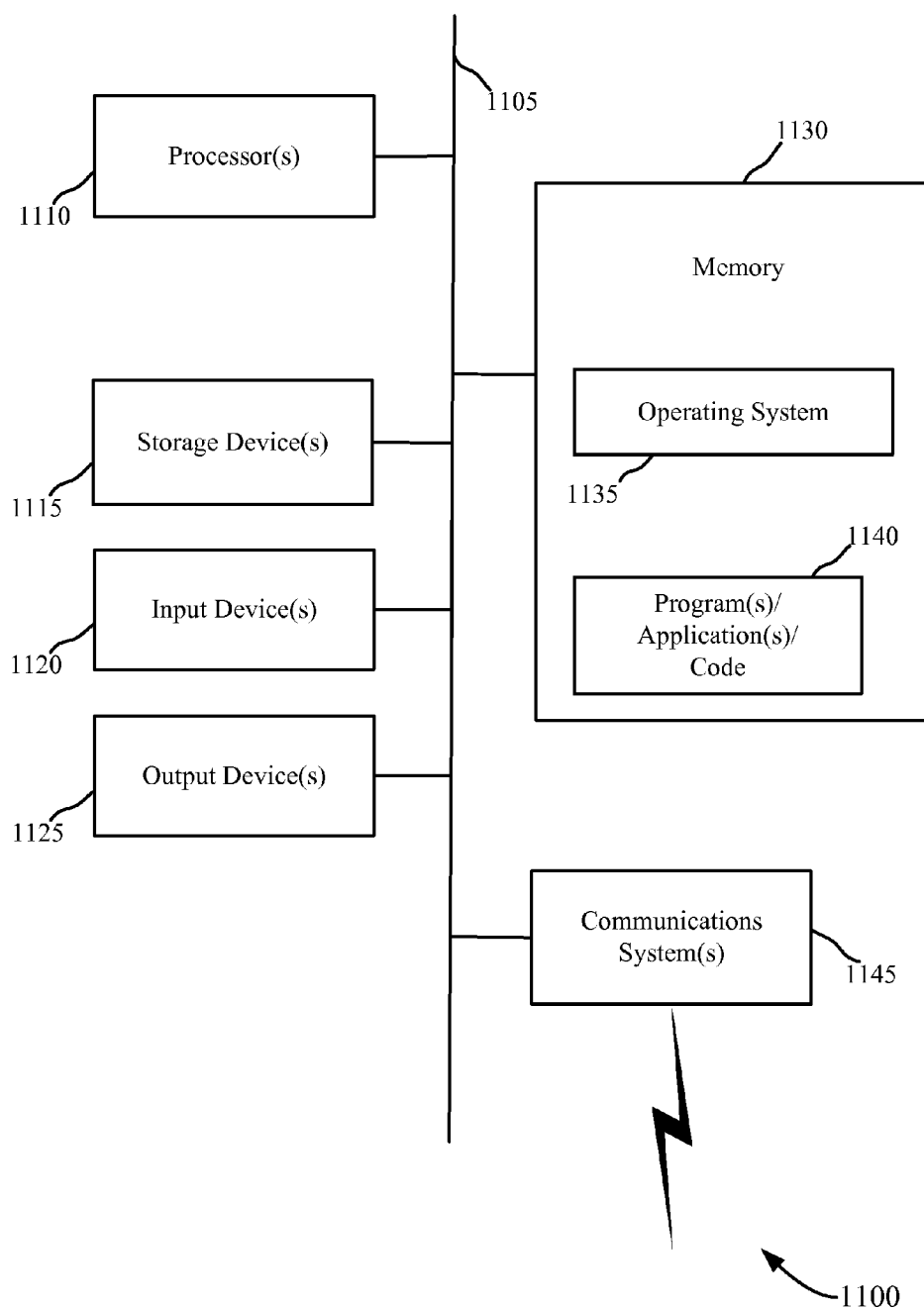


FIG. 10



REFILL STATION USING AN INTELLIGENT BEVERAGE CONTAINER

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] The present application claims the benefit of and priority to U.S. Provisional Patent Application Ser. No. 61/691,609 entitled "BEVERAGE CONTAINER WITH INTEGRATED ELECTRONIC DISPLAY," filed Aug. 21, 2012; to U.S. Provisional Patent Application Ser. No. 61/691,617 entitled "BEVERAGE CONTAINER WITH DYNAMIC LABEL," filed Aug. 21, 2012; to U.S. Provisional Patent Application Ser. No. 61/691,618 entitled "STATE-BASED CONTAINER MANAGEMENT," filed Aug. 21, 2012; to U.S. Provisional Patent Application Ser. No. 61/691,622 entitled "SOCIAL ACTIVITIES USING INTELLIGENT BEVERAGE CONTAINERS," filed Aug. 21, 2012; to U.S. Provisional Patent Application Ser. No. 61/691,627 entitled "CENTRALLY COORDINATED SOCIAL ACTIVITIES USING INTELLIGENT BEVERAGE CONTAINERS," filed Aug. 21, 2012; and to U.S. Provisional Patent Application Ser. No. 61/691,630 entitled "ACCOUNT-BASED MANAGEMENT OF INTELLIGENT BEVERAGE CONTAINERS," filed Aug. 21, 2012; of which the entirety of each application is incorporated herein by reference.

BACKGROUND

[0002] The present invention relates to methods and systems for a refill station using an intelligent beverage container.

[0003] Beverage containers are ubiquitous. While some beverage containers (e.g., aluminum cans) are designed to be used once and then recycled, other types of beverage containers (e.g., glasses, chalices, bottles, etc.) may be refilled and reused many times. Nevertheless, the labels on most refillable beverage containers contain images or text permanently printed on a paper or plastic medium or permanent markings on the material of the beverage container itself. Thus, even though a beverage container may be refilled with multiple different beverages, no solution exists for dynamically updating the label of the beverage container.

[0004] Additionally, beverages are often consumed during social gatherings. In such social gatherings, large crowds using refillable beverage containers are often required to wait in long lines for a chance to refill their beverages. Alleviating the long wait can require many bartenders which can be costly. Currently, there is no way for the beverage containers to be refilled at an intelligent refill station that ensures the user is permitted to refill their beverage, interacts with the user to enhance social networking during a beverage refill, and the like.

[0005] Thus, there is a need for an intelligent refill system utilizing an intelligent beverage container that can provide enhanced functionalities.

SUMMARY

[0006] According to a first illustrative set of examples, a method is provided. The method may include: detecting a beverage container at a refill station; identifying a user account associated with the beverage container; determining, based on information stored in the user account, if the beverage container is permitted to be refilled; and refilling the beverage container based on the determination. Detecting the

beverage container may include receiving a wireless signal associated with the beverage container. The wireless signal may be transmitted via a wireless communications module in the beverage container. The wireless communications module may include a radio frequency identification (RFID) module. According to some examples, the wireless signal may be transmitted by a wireless communications device carried by a user providing the beverage container to the refill station.

[0007] According to certain examples, the method may further include displaying information on the refill station based on the information stored in the user account and receiving an input at the refill station based on the displayed information. The displayed information may include one or more of a remaining refill balance, an image of a user, an indication of beverages acquaintance of the user are consuming, a beverage selection request, an image of an acquaintance of the user at a different refill station and an associated beverage selection request for the acquaintance, and a confirmation of an identity of the user. The input may be received via a touch-screen display of the refill station.

[0008] According to some examples, the refill station may include an image capture device and the method may further include: capturing an image of a user at the refill station; utilizing a facial recognition algorithm, based on the information stored in the user account, to confirm the identity of the user; and determining that the beverage container is permitted to be refilled based on the confirmation. A user account associated with the beverage container may be updated based on the beverage container being refilled.

[0009] According to a second set of illustrative examples, an apparatus for conducting a refill is provided. The apparatus may include: a processor; a memory in electronic communication with the processor; and instructions being executable by the processor to detect a beverage container at a refill station; identify a user account associated with the beverage container; determine, based on information stored in the user account, if the beverage container is permitted to be refilled; and refill the beverage container based on the determination. Detecting the beverage container may include receiving a wireless signal associated with the beverage container. The wireless signal may be transmitted via a wireless communications module in the beverage container. The wireless communications module may be a radio frequency identification (RFID) module. The wireless signal may be transmitted by a wireless communications device carried by a user providing the beverage container to the refill station.

[0010] According to some examples, the apparatus may also include an image capture device and the instructions are further executed by the processor to: capture an image of a user at the refill station; utilize a facial recognition algorithm, based on the information stored in the user account, to confirm the identity of the user; and determine that the beverage container is permitted to be refilled based on the confirmation.

[0011] In a third set of illustrative examples, a refill station is provided. The refill station may include a processor module and a display module. The processor module may be configured to detect a beverage container at the refill station, identify a user account associated with the beverage container, and determine if the beverage container is permitted to be refilled based on information stored in the user account. The display module may be configured to receive information from the processor module and display an image indicative of the received information to a user. The display module may be further configured to receive an input from the user and com-

municate information indicative of the input to the processor module. The processor module may be further configured to refill the beverage container based on the determination and the input received from the user. The refill station may also include a communications module in wireless communications with the beverage container and configured to transmit a message to the beverage container to cause an electronic display integrated into the beverage container to display information indicative of the refill.

[0012] According to some examples, the refill station may also include an imaging module configured to capture an image of the user of the beverage container. The processor module may also be configured to compare the captured image with information from the associated user account to confirm an identity of the user. The user account may be associated with one or more online social networks.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] A further understanding of the nature and advantages of the present invention may be realized by reference to the following drawings. In the appended figures, similar components or features may have the same reference label. Further, various components of the same type may be distinguished by following the reference label by a dash and a second label that distinguishes among the similar components. If only the first reference label is used in the specification, the description is applicable to any one of the similar components having the same first reference label irrespective of the second reference label.

[0014] FIG. 1 is a diagram of an example beverage container with an integrated display according to various embodiments of the invention.

[0015] FIG. 2 is a diagram illustrating an example bottoms-up refillable beverage container according to various embodiments of the invention.

[0016] FIGS. 3A-3C are diagrams illustrating an example refill station utilizing an intelligent beverage container according to various embodiments of the invention.

[0017] FIG. 4 is a diagram illustrating another example refill station utilizing an intelligent beverage container according to various embodiments of the invention.

[0018] FIG. 5 is a diagram illustrating another example refill station utilizing an intelligent beverage container according to various embodiments of the invention.

[0019] FIG. 6 is a diagram illustrating another example refill station utilizing an intelligent beverage container according to various embodiments of the invention.

[0020] FIG. 7 is a block diagram of an example beverage container configured according to various embodiments of the invention.

[0021] FIG. 8 is a block diagram of an example refill station configured according to various embodiments of the invention.

[0022] FIG. 9 is a flowchart diagram of an example method for utilizing an intelligent refill station according to various embodiments of the invention.

[0023] FIG. 10 is a flowchart diagram of an example method for utilizing an intelligent refill station according to various embodiments of the invention.

[0024] FIG. 11 is a schematic diagram that illustrates a representative device structure that may be used in various embodiments of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0025] Methods, systems, and devices are disclosed for an intelligent refill station that utilizes an intelligent beverage container. In one set of examples, communication may be established between a refill station and an intelligent beverage container. The communication may detect the beverage container at the refill station. The beverage container detected at the refill station may be associated with a user account for the user of the beverage container. The refill station may identify the user account associated with the beverage container. Based on information stored in the associated user account, the refill station may determine if the beverage container is permitted to be refilled. If the beverage container is determined to be permitted, the refill station may refill the beverage container.

[0026] According to certain examples, the intelligent refill station may include one or more integrated sensing devices (e.g., RFID reader, image sensor, NFC wireless device, etc.). The information from the sensing devices may be used to detect the beverage container at the refill station. Moreover, the refill station may include an integrated display and/or an image capture device. The display may be a touch screen where the user can interact with the refill station. The refill station may, based on information stored in the associated user account, provide an interface with one or more online social networks of the user to enhance the social activities associated with the user at the event and/or selecting a particular beverage.

[0027] This description provides examples, and is not intended to limit the scope, applicability or configuration of the invention. Rather, the ensuing description will provide those skilled in the art with an enabling description for implementing embodiments of the invention. Various changes may be made in the function and arrangement of elements.

[0028] Thus, various embodiments may omit, substitute, or add various procedures or components as appropriate. For instance, it should be appreciated that the methods may be performed in an order different than that described, and that various steps may be added, omitted or combined. Also, aspects and elements described with respect to certain embodiments may be combined in various other embodiments. It should also be appreciated that the following systems, methods, devices, and software may individually or collectively be components of a larger system, wherein other procedures may take precedence over or otherwise modify their application.

[0029] As used herein, the terms “hot-swappable” generally refers to the characteristics of an electronic module as defined by the ability to quickly remove and replace the electronic module with little or no down time. By way of example only, an electronic module that is hot swappable may be inserted, added, removed, and the like, without requiring disrupting a power source and/or an associated module.

[0030] Systems, devices, methods, and software are described for an intelligent refill station in communication with a beverage container to be refilled.

[0031] FIG. 1 illustrates an example intelligent beverage container 100. In the example of FIG. 1, the beverage container 100 is a bottle. However, it should be understood that the principles of the present disclosure may also be applied to other types of beverage containers, including but not limited to glasses, cups, cans, mugs, pitchers, tumblers, chalices, and the like.

[0032] The intelligent beverage container 100 may include an outer surface 105 and an inner surface 110. The outer surface 105 may generally define the shape of the beverage container 100, and the inner surface 110 may define the area that holds the beverage. An electronic display 115 may be disposed between the outer surface 105 and the inner surface 110. Alternatively, the electronic display 115 may be disposed on the outer surface 105 of the beverage container 100. Generally, the electronic display 115 may be sized and shaped so as to conform to at least a portion of the beverage container 100. The electronic display 115 may be shaped such that the display area of the electronic display 115 conforms to a curvature of the beverage container 100. When the electronic display 115 is disposed between the inner surface 110 and the outer surface 105, at least a portion of the outer surface 105 of the beverage container 100 may be transparent or translucent such that the electronic display 115 is visible from the outside of the beverage container 100.

[0033] In certain examples, the curved electronic display 115 may be a thin organic light-emitting diode (OLED) display formed on a flexible polymer or other substrate such that the display area of the electronic display 115 may be flexed according to the curvature of the circumference of the beverage container 100. However, it should be understood that the principles of the present disclosure may also be applied to other types of flexible electronic displays, including, but not limited to active matrix light-emitting diode (AMOLED), passive-matrix OLED, and the like. In certain examples, the curved electronic display 115 may be a 360 degree display such that the display area of the electronic display 115 forms a substantially continuous display area around the circumference of the beverage container 100.

[0034] Alternatively, or in addition to the electronic display 115, the beverage container 100 may also comprise one or more light sources (e.g., light-emitting diodes (LEDs)) positioned around the circumference and/or length of the beverage container 100. The light sources may be disposed between the inner surface 110 and the outer surface 105 of the beverage container. Each or some of the light sources may emit light at one or more colors. The light sources may be used to attract the user's attention to one or more social activities are available.

[0035] In certain examples, the beverage container 100 may be a double-walled container in which a first wall forms the inner surface 110, a second wall forms the outer surface 105, and the curved electronic display 115 is disposed intermediate the first and second walls. The first and second walls may be made of the same or different materials. For example, in one embodiment the first and second walls may be made out of glass. In another example, the first wall may be made out of glass and the second wall may be made out of plastic.

[0036] The beverage container 100 may further include one or more electronics modules 120 configured to house control circuitry for the beverage container 100. For example, at least one electronics module 120 may include control circuitry for the curved electronic display 115. Additionally, at least one electronics module 120 may include one or more processors, memory, accelerometers, gyroscopes, wireless devices (e.g., Wireless Local Area Network (WLAN), Radio Frequency Identification (RFID), Near Field Communications (NFC), Global Positioning System (GPS)), or other input/output devices that may suit a particular application of the principles of the present disclosure. Using these electronic components

in the electronics module(s) 120 coupled with the curved electronic display 115, a user of the beverage container 100 may interact with a refill station and/or a computer network to enhance and augment the experience of social interactions.

[0037] In certain examples, one or more electronics module 120 of the beverage container 100 may be selectively removable and replaceable. For example, an electronics module 120 may house a battery or other power supply that may be selectively replaced to ensure substantially continuous up time for the curved electronic display 115. Additionally or alternatively, an electronics module 120 may house electronic memory that may be selectively replaced when the electronic memory is filled with data. In certain examples one or more of the electronics module 120 may be hot-swappable such that the curved electronic display 115 or other electronic components of the beverage container 100 remain on for all or substantially all of the time during the replacement of the module(s) 120.

[0038] In certain examples, the beverage container 100 may include a refill conduit 125 configured to interface with a refill station and refill the beverage container 100. In certain examples, electronics module 120 may be shaped such that the refill conduit 125 passes through the electronics module 120.

[0039] While the beverage container 100 shown in FIG. 1 may contain a number of integrated electronics module(s) 120, it will be understood that in certain examples at least some of the electronic functionality of the beverage container 100 shown in FIG. 1 may be implemented in a separate device. For example, one or more of the electronics module 120 may be implemented in a mobile phone, electronic bracelet, or other device that wirelessly communicates with the beverage container 100 to control the curved electronic display 115 or another aspect of the beverage container 100. Additionally or alternatively, a special-purpose device may be provided separately from the beverage container such that the special-purpose device contains one or more of the electronics module 120 and communicates with the beverage container 100 to control the curved electronic display 115 or another aspect of the beverage container 100.

[0040] The present disclosure describes various embodiments of beverage containers 100 configured to perform a number of different functions. However, in light of the foregoing description, it will be understood that a functionality described herein as being performed by the beverage container 100 may, in other embodiments, be performed by a device or module external to the beverage container 100. Such a device or module may communicate with the beverage container 100 to achieve the same or a similar effect as the beverage container 100 performing that functionality.

[0041] In certain examples, the integrated curved electronic display and other electronic components of the beverage container 100 may enable a user of the beverage container 100 to interact with an intelligent refill station managed by a central server computer system. For example, a central server computer system may communicate with the number of beverage containers 100 and/or an intelligent refill station to implement a variety of activities. The central server computer system may receive input from the beverage containers 100, from a user account associated with the beverage container, from a refill station, etc., and control the beverage containers 100 and/or the refill station to display certain images or text in response.

[0042] FIG. 2 shows an example of a beverage container 100-a in which at least one electronics module 120-b may be removable and replaceable. The beverage container 100-a may be an example of the beverage container 100 described above with reference to FIG. 1. In the example shown in FIG. 2, the electronics module 120-b may be inserted and removed from the bottom portion of the beverage container 100-a. Additionally or alternatively, the replaceable electronics module 120-b may be housed in other areas of the beverage container 100-a.

[0043] In certain examples, the electronics module 120-b may include a battery to power the curved electronic display 115 and other electronic components of the beverage container 100. When the charge stored by the battery runs low, the electronics module 120-b containing the battery may be removed and replaced with a fresh electronics module 120-b such that the user of the beverage container 100 does not have to wait for the battery to recharge.

[0044] In additional or alternative examples, at least one electronics module 120-b may store media files or other personalized data associated with the user of the beverage container 100. When the memory of the electronics module 120-b reaches capacity, the electronics module 120-b with the full memory may be swapped out for a fresh electronics module 120-b and the data may be retrieved from the memory.

[0045] In certain examples, the replaceable electronics module 120-b of the beverage container 100-a may be hot-swappable such that the replaceable electronics module 120-b may be exchanged while the curved electronic display 115 remains on or with a nominal amount of down time. In certain examples, the beverage container 100-a may include a smaller secondary battery for powering the remaining electronics of the beverage container 100-a while a replaceable electronics module 120-b containing the main battery supply is exchanged.

[0046] FIGS. 3A-3C illustrate an example of a system 300 for refilling an intelligent beverage container 100-b with integrated curved display 115 and electronics module 120. The intelligent beverage container 100-b of FIGS. 3A-3C may be an example of the intelligent beverage containers 100 described above with reference to FIG. 1 or FIG. 2.

[0047] At FIG. 3A, the beverage container 100-b may be brought to a refill station 305. The refill station 305 may have a refill dock 315 and a display 310. The electronic display of the beverage container 100-b may be activated and display, for example, a label for the beverage with which it was most recently filled.

[0048] At FIG. 3B, the beverage container 100-b may mechanically and electronically interface with the refill dock 315. In certain examples, the beverage container 100-b and the refill dock 315 may have complementary quick release or similar mechanical features to allow for refilling the beverage container 100-b. Additionally, an electronic connection may be established between the refill dock 315 and the beverage container 100-b. The electronic connection may be wireless or wired. The display 310 of the refill station 305 may indicate a number of prepaid refills associated with the beverage container 100-b and prompt a user associated with the beverage container 100-b to select a beverage for the refill. Additionally or alternatively, the user may purchase a refill at the refill station in real time. The selected beverage may then be dispensed from a tap in the refill station 305 through the refill dock 315 into the beverage container 100-b.

[0049] In certain examples, the refill dock 315 may also replace one or more electronic modules associated with the beverage container 100-b, as described with reference to FIG. 2. In certain examples, a user may place the beverage container 100-b on the refill dock 315 and press down to replace the one or more electronic modules of the beverage container 100-b.

[0050] In additional or alternative examples, the refill station 305 may further communicate with the beverage container 100-b to pull data (e.g., user files, photos, and other data) from the beverage container 100-b, push data (e.g., software updates, prepaid refill balances, coupons, etc.) to the beverage container 100-b, and perform other electronic transactions with the beverage container 100-b. For example, a user may log in to an account and associate the beverage container 100-b with the account at the refill station 305.

[0051] In other examples, the refill station 305 may establish a wireless connection with the beverage container 100-b to exchange one or more informational elements. The refill station 305 may detect the beverage container 100-b based on, for example, an RFID wireless connection. Once the connection is established, the refill station 305 may receive a unique ID number assigned to the beverage container 100-b. The refill station may, alone or in combination with a central server computer system, determine a user account associated with the beverage container 100-b. The user account may be a locally stored database of information and/or received via a social interface module in connection with one or more online social networks. Information stored in the associated user account may include, but is not limited to, the number of refills remaining, the previous beverage(s) consumed, the number of beverages consumed, the user's identity, and the like. Utilizing the information from the user account and/or one or more rules associated with refilling a beverage container, the refill station 305 may determine whether the user is permitted to refill the beverage container 100-b. Examples of when a user may be permitted to refill a beverage container include, but are not limited to, the user being an appropriate age to consume a specific type of beverage, a user having at least one refill balance remaining, the user not having consumed more than a predetermined number of beverages within a given time period, etc.

[0052] The user may interact with the refill station 305 via, for example, the display 310 during the refill process. The display 310 may be a touch screen such that messages may be displayed to the user and the user may input a response to the messages via the display 310.

[0053] At FIG. 3C, the beverage container 100-b may be removed from the refill dock 315 of the refill station 305, and the electronic display 310 of the refill station may indicate an updated number of prepaid refills associated with the beverage container 100-b. According to certain embodiment, a prompt may be displayed on the display 310 asking the user if he would like to share his refill experience, or other information, via one or more of the online social networks associated with the user account.

[0054] FIG. 4 is a diagram of an example system 400 for a refill station 405 utilizing an intelligent beverage container 100 in accordance with aspects of the present disclosure. The system 400 may be an example of the system 300 described above with reference to FIGS. 3A-3C. The beverage containers 100 of the present example may be examples of the beverage containers 100 described above with reference to previous Figures. The system 400 may comprise one or more

refill stations **405** (one being shown for clarity) operatively coupled to one or more beverage containers **100** and, optionally, a central server computer system to conduct a refill process. Generally, the system **400** illustrates a few of the exemplary ways the refill station **405** may detect the beverage container **100-c**.

[0055] The refill station **405** may comprise an integrated display **410** and a refill tap **415** including a refill spigot **420** and a refill handle **425**. The beverage container **100-c** may electronically interface with the refill station **405**. That is, the refill station **405** may detect the beverage container **100** via an electronic connection. The electronic connection may be wireless, optical, and the like. The display **410** of the refill station **405** may indicate a number of prepaid refills associated with the beverage container **100-c** and prompt a user associated with the beverage container **100-c** to select a beverage for the refill. Additionally or alternatively, the user may purchase a refill at the refill station **405** in real time. The selected beverage may then be dispensed from the refill tap **415** in the refill station **405** into the beverage container **100-c**.

[0056] According to certain examples, the refill station **405** may detect the beverage container **100-c** in a variety of manners. In one example, the refill station **405** may detect the beverage container **100-c** via a wireless connection. The refill station **405** may include one or more integrated wireless devices (e.g., Wireless Local Area Network (WLAN), Radio Frequency Identification (RFID), Near Field Communications (NFC), etc.). The wireless devices may communicate with a corresponding wireless device of the beverage container **100-c** to establish an operable wireless link. In certain example, the wireless link may be a limited coverage area that covers the proximate area of the refill station **405**. Accordingly, when the wireless link is established it may indicate that the beverage container **100-c** has been detected at the refill station **405**.

[0057] According to certain examples, the wireless connection may additionally or alternatively be established between the refill station **405** and one or more devices apart from the beverage container **100-c** but are worn or carried by the user of the beverage container **100-c**. In the illustrative example shown in FIG. 4, the user may also wear a bracelet **440** and/or carry a mobile communications device **445** that are each associated with the user account of the user. The user's device may include an integrated wireless device (e.g., NFC and/or RFID) that can establish an electronic link with the refill station **405**. The refill station **405** may detect the user's devices when they are within a predetermined range of the refill station **405** and, accordingly, determine the beverage container **100-c** is at the refill station **405**.

[0058] According to certain examples, the refill station **405** may detect the beverage container **100-c** via one or more optical mechanisms. As one example, the refill station **405** may comprise one or more integrated optical imaging sensors **430** and/or **435**. The optical sensors may be positioned on the refill station **405** in a location such that when the beverage container **100-c** is positioned beneath the refill tap **415**, the optical sensors can read an image on the beverage container **100-c**. The image may be etched on the beverage container **100-c** or printed on a removable label positioned on the beverage container **100-c**. Exemplary images may include, but are not limited to, one or more alphanumeric characters, a barcode, a Quick Response Code (QR Code), and the like. The refill station **405** may, alone or in combination with a central server computer system, receive the image and deter-

mine information necessary to identify the beverage container **100-c** and, therefore, the associated user account.

[0059] According to certain examples, the refill handle **425** may have an integrated light source that can be activated when the refill station **405** detects the beverage container **100-c**.

[0060] FIG. 5 is a diagram of an example system **500** for a refill station **405-a** utilizing an intelligent beverage container **100** in accordance with aspects of the present disclosure. The system **500** may be an example of the systems **300** and/or **400** described above with reference to FIGS. 3A-3C and 4. The beverage containers **100** of the present example may be examples of the beverage containers **100** described above with reference to previous Figures.

[0061] The refill station **405-a** may comprise an integrated display **410-a**, a refill tap **415-a**, an image sensor **505**, or a wireless device **510**. According the example shown in FIG. 5, the refill station **405-a** includes the wireless device **510** proximate a bottom portion of the beverage container **100-d** during a refill process. The wireless device **510** may be, for example, a NFC, RFID, etc., communication device. When the beverage container **100-d** is positioned at the refill station **405-a**, the wireless device **510** may establish a connection with the electronics module **120-e** of the beverage container **100-d**. As discussed above, the refill station **405-a** may alone, or optionally in conjunction with a central server computer system retrieve information from a user account associated with the beverage container **100-d**. Based on the information stored in the user account, the refill station **405-a** may interact with the user via, for example, the display **410-a** to determine if the refill is authorized and, if so, complete the refill process.

[0062] According to certain examples, the refill station **405-a** may be configured to capture an image of the user of the beverage container **100-d** using the image sensor **505**. The refill station **405-a** may alone, or optionally in conjunction with a central server computer system utilize a face-recognition algorithm to verify the identity of the user using information stored in the associated user account. Accordingly, the refill station **405-a** may determine whether the refill is authorized based on the confirmation of the user associated with the beverage container **100-d**.

[0063] According to further examples, during the refill process the refill station **405-b** may retrieve information from the associated user account indicative of the friends or acquaintances of the user of the beverage container **100-b**. In some examples, the refill station **405-a** may communicate with other refill stations at the same event or with refill stations at other locations via a network (e.g., wireless network and/or the Internet). The refill station **405-a** may determine whether any of the friends or acquaintances of the user at the refill station **405-a** are concurrently using a different refill station. If so, the refill station **405-a** may display a live image of the friends on the display **410-a**. Accordingly, the friends may also be provided a display of the user at refill station **405-a** on the display at the refill station they are using. As such, the refill stations may permit the friends to interact via the display and/or one or more integrated microphones/speakers. In some examples, the refill station may display a prompt to at least one of the friends asking if he would like to purchase his friend a beverage. In some examples, the refill station **405-a** may permit one or more of the friends to post a status update on their online social network indicative of the friends activities at the refill stations.

[0064] FIG. 6 is a diagram of an example system **600** for a refill station **405-b** utilizing an intelligent beverage container

100 in accordance with aspects of the present disclosure. The system **600** may be an example of the systems **300**, **400**, and/or **500** described above with reference to FIGS. 3A-3C, **4**, and **5**. The beverage containers **100** of the present example may be examples of the beverage containers **100** described above with reference to previous Figures.

[0065] According to the example illustrated in FIG. 6, the refill station **405-b** may comprise an integrated display **410-b**, a refill tap **415-b**, a first image sensor **505-a**, and a second image sensor **605**. Once the beverage container **100-c** has been detected at the refill station **405-b** and the refill determined to be authorized, the refill station **405-b** may be further configured to provide a visual indication of the proper refilling technique to the user. In particular, the refill station **405-b** may utilize the second image sensor **605** to monitor a position and/or orientation of the beverage container **100-b** during the refill process. The refill station **405-b** may compare the monitored position and/or orientation with extrinsic data relating to a proper refill technique. According to some examples, the refill station **405-b** may display an outline of a virtual beverage container positioned and/or orientated according to a proper refill technique and also show a live feed from the second image sensor **605**. Accordingly, the user can be provided real-time feedback as to whether they are refilling the beverage container **100-c** properly.

[0066] FIG. 7 is a block diagram of an example intelligent beverage container **100-k**. The beverage container **100-k** of the present example may be an example of the beverage containers **100** described above with respect to the previous Figures. The beverage container **100-k** of the present example may include a main electronics module **120-d** and a swappable electronics module **120-e** in communication with each other. The main electronics module **120-d** may include circuitry implementing a number of electronic components that are permanently associated with the beverage container **100-k**. The swappable electronics module **120-e** may include circuitry implementing a number of electronic components that can be interchangeably associated with different beverage containers **100**. While the example of FIG. 7 shows only a battery **705** in the swappable electronics module **120-e** and all other electronic components in the main electronics module **120-d**, each of the electronic components shown in FIG. 7 may be implemented by either the main electronics module **120-d** or the swappable electronics module **120-e**. In still other examples, only a main electronics module **120-d** or a swappable electronics module **120-e** may be used to implement all of the electronic components for a beverage container **100-k**.

[0067] In the present example, the main electronics module **120-d** may include an OLED display **710** integrated into the beverage container **100-k** as described above with respect to FIG. 1. Alternatively, the beverage container **100-k** may include another type of flexible or curved electronic display. The main electronics module **120-d** may further include a processor **715** and a memory **720**. The processor **715** may execute software **740** stored in the memory **720** to control the OLED display **710**, track data about the use of the beverage container, implement social interaction activities, implement aspects related to a refill process, and the like. The memory **720** may store data **745** containing information for communicating with a central server computer system, a refill station, and/or other beverage containers **100** to implement social interaction activities among a number of beverage containers **100**. The wireless transceiver(s) **725** may include one or more

of a Bluetooth transceiver **750**, a WLAN transceiver **755**, an NFC transceiver **760**, or other types of transceivers that may suit a particular application of the principles of this disclosure.

[0068] The main electronics module **120-d** may further include one or more accelerometers **730** to detect movement of the beverage container, a GPS module **735** to detect location, and/or other types of motion sensors or input devices. The processor **715** may receive input from these devices and take action based on the input. Additionally or alternatively, the processor **715** may report the input to a network server and receive instructions from the network server based on the input.

[0069] FIG. 8 is a block diagram of an example refill station electronics module **800**. The refill station electronics module **800** of the present example may be an example of the refill stations **305** and/or **405** described above with respect to the FIGS. 3A-6. The refill station electronics module **800** of the present example may include a display **810** integrated into the refill station as described above with respect to FIGS. 3A-3C and 4-6. The display **810** may be a touch-screen display such that a user may provide inputs to the refill station electronics module **800** via the display **810**. The refill station electronics module **800** may further include a processor **815** and a memory **820**. The processor **815** may execute software **840** stored in the memory **820** to control the display **810**, track data about the use of the refill station, implement social interaction activities for the users of the refill station, implement aspects related to a refill process, and the like. The memory **820** may store data **845** containing information for communicating with a central server computer system, a different refill station, and/or other beverage containers **100** to implement social interaction activities among a number of beverage containers **100** during a refill process. The wireless transceiver(s) **825** may include one or more of a Bluetooth transceiver **850**, a WLAN transceiver **855**, an NFC transceiver **860**, a RFID transceiver **865**, or other types of transceivers that may suit a particular application of the principles of this disclosure.

[0070] The refill station electronics module **800** may further include one or more a GPS module **835** to detect location, and/or other types of motion sensors or input devices. The refill station electronics module **800** may further include one or more imaging modules **870**. The imaging modules **870** may provide a signal indicative of, for example, the user of the refill station, the beverage container **100** being refilled, a code on the beverage container **100**, and the like. The processor **815** may receive input from these devices and take action based on the input. Additionally or alternatively, the processor **815** may report the input to a central server computer system via a network connection and receive instructions from the central server computer system based on the input.

[0071] FIG. 9 is a flowchart of a method **900** for conducting a refill process in accordance with aspects of the present disclosure. Aspects of the method **900** may be performed by one or more of the systems **300**, **400**, **500**, **600**, and/or **800** of FIGS. 2-6 and 8. In one implementation, the refill station may execute one or more sets of codes or computer executable instructions to control the functional elements of the systems **300**, **400**, **500**, **600**, and/or **800** to perform aspects of the functions described below. In another implementation, the electronics module **120** of the beverage containers **100** may execute one or more sets of codes or computer executable

instructions to control the functional elements of the beverage container **100** to perform aspects of the functions described below.

[0072] At block **905**, a beverage container may be detected at a refill station. The beverage container may be an intelligent beverage container with an integrated wireless transceiver. The beverage container may be detected at the refill station by establishment of a wireless connection between the refill station and the beverage container. According to certain examples, the beverage container may have a unique ID code imprinted on the outside of the beverage container. The beverage container may be detected at the refill station by an imaging sensor integrated into the refill station capturing an image of the ID code and executing one or more sets of computer executable code to extract the ID code from the image.

[0073] At block **910**, the refill station may identify a user account associated with the beverage container. The refill station may identify the associated user account based on a unique ID number from the beverage container. The user account may include information stored in a local database and/or include information obtained from an online social network. The refill station may retrieve information from the associated user account corresponding to the user of the beverage container. At block **915**, it may be determined, based on information stored in the user account, if the beverage container is permitted to be refilled. The beverage container may be permitted to be refilled if the user account indicates at least one refill balance remaining, the user of the beverage container is of an appropriate age to consume the beverage, the user of the beverage container has not consumed too many beverages within a time period, and the like. At block **920**, the beverage container may be refilled based on the determination. The refill station may update the information stored in the user account based on the refill activities.

[0074] FIG. **10** is a flowchart of a method **1000** for conducting a refill process in accordance with aspects of the present disclosure. Aspects of the method **1000** may be performed by one or more of the systems **300**, **400**, **500**, **600**, and/or **800** of FIGS. **2-6** and **8**. In one implementation, the refill station may execute one or more sets of codes or computer executable instructions to control the functional elements of the systems **300**, **400**, **500**, **600**, and/or **800** to perform aspects of the functions described below. In another implementation, the electronics module **120** of the beverage containers **100** may execute one or more sets of codes or computer executable instructions to control the functional elements of the beverage container **100** to perform aspects of the functions described below.

[0075] At block **1005**, a beverage container with an integrated curved display and swappable electronics module may be received at a refill station. At block **1010**, the swappable electronics module may be removed from the beverage container. At block **1015**, a replacement swappable electronics module may be installed in the beverage container. At block **1020**, the beverage container may be refilled.

[0076] A device structure **1100** that may be used for a beverage container **100**, a central server computer system, a refill station, or other computing devices described herein, is illustrated with the schematic diagram of FIG. **11**. This drawing broadly illustrates how individual system elements of each of the aforementioned devices may be implemented, whether in a separated or more integrated manner. The exemplary structure is shown comprised of hardware elements that

are electrically coupled via bus **1105**, including processor(s) **1110** (which may further comprise a DSP or special-purpose processor), storage device(s) **1115**, input device(s) **1120**, and output device(s) **1125**. The storage device(s) **1115** may be a machine-readable storage media reader connected to any machine-readable storage medium, the combination comprehensively representing remote, local, fixed, or removable storage devices or storage media for temporarily or more permanently containing computer-readable information. The communications systems interface **1145** may interface to a wired, wireless, or other type of interfacing connection that permits data to be exchanged with other devices. The communications system(s) interface **1145** may permit data to be exchanged with a network.

[0077] The structure **1100** may also include additional software elements, shown as being currently located within working memory **1130**, including an operating system **1135** and other code **1140**, such as programs or applications designed to implement methods of the invention. It will be apparent to those skilled in the art that substantial variations may be used in accordance with specific requirements. For example, customized hardware might also be used, or particular elements might be implemented in hardware, software (including portable software, such as applets), or both.

[0078] These components may, individually or collectively, be implemented with one or more Application Specific Integrated Circuits (ASICs) adapted to perform some or all of the applicable functions in hardware. Alternatively, the functions may be performed by one or more other processing units (or cores), on one or more integrated circuits. In other embodiments, other types of integrated circuits may be used (e.g., Structured/Platform ASICs, Field Programmable Gate Arrays (FPGAs) and other Semi-Custom ICs), which may be programmed in any manner known in the art. The functions of each unit may also be implemented, in whole or in part, with instructions embodied in a memory, formatted to be executed by one or more general or application-specific processors.

[0079] It should be noted that the methods, systems and devices discussed above are intended merely to be examples. It must be stressed that various embodiments may omit, substitute, or add various procedures or components as appropriate. For instance, it should be appreciated that, in alternative embodiments, the methods may be performed in an order different from that described, and that various steps may be added, omitted or combined. Also, features described with respect to certain embodiments may be combined in various other embodiments. Different aspects and elements of the embodiments may be combined in a similar manner. Also, it should be emphasized that technology evolves and, thus, many of the elements are exemplary in nature and should not be interpreted to limit the scope of the invention.

[0080] Specific details are given in the description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, well-known circuits, processes, algorithms, structures, and techniques have been shown without unnecessary detail in order to avoid obscuring the embodiments.

[0081] Also, it is noted that the embodiments may be described as a process which is depicted as a flow diagram or block diagram. Although each may describe the operations as a sequential process, many of the operations can be performed in parallel or concurrently. In addition, the order of the

operations may be rearranged. A process may have additional steps not included in the figure.

[0082] Moreover, as disclosed herein, the term “memory” or “memory unit” may represent one or more devices for storing data, including read-only memory (ROM), random access memory (RAM), magnetic RAM, core memory, magnetic disk storage mediums, optical storage mediums, flash memory devices or other computer-readable mediums for storing information. The term “computer-readable medium” includes, but is not limited to, portable or fixed storage devices, optical storage devices, wireless channels, a SIM card, other smart cards, and various other mediums capable of storing, containing or carrying instructions or data.

[0083] Furthermore, embodiments may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks may be stored in a computer-readable medium such as a storage medium. Processors may perform the necessary tasks.

[0084] Having described several embodiments, it will be recognized by those of skill in the art that various modifications, alternative constructions, and equivalents may be used without departing from the spirit of the invention. For example, the above elements may merely be a component of a larger system, wherein other rules may take precedence over or otherwise modify the application of the invention. Also, a number of steps may be undertaken before, during, or after the above elements are considered. Accordingly, the above description should not be taken as limiting the scope of the invention.

What is claimed is:

1. A method comprising:
 - detecting a beverage container at a refill station;
 - identifying a user account associated with the beverage container;
 - determining, based on information stored in the user account, if the beverage container is permitted to be refilled; and
 - refilling the beverage container based on the determination.
2. The method of claim 1, further comprising:
 - wherein detecting the beverage container comprises receiving a wireless signal associated with the beverage container.
3. The method of claim 2, wherein the wireless signal is transmitted via a wireless communications module in the beverage container.
4. The method of claim 3, wherein the wireless communications module comprises a radio frequency identification (RFID) module.
5. The method of claim 2, wherein the wireless signal is transmitted by a wireless communications device carried by a user providing the beverage container to the refill station.
6. The method of claim 1, further comprising:
 - displaying information on the refill station based on the information stored in the user account; and
 - receiving an input at the refill station based on the displayed information.
7. The method of claim 6, wherein the displayed information comprises one or more of a remaining refill balance, an image of a user, an indication of beverages acquaintance of the user are consuming, a beverage selection request, an

image of an acquaintance of the user at a different refill station and an associated beverage selection request for the acquaintance, and a confirmation of an identity of the user.

8. The method of claim 6, wherein the input is received via a touch-screen display of the refill station.

9. The method of claim 1, wherein the refill station comprises an image capture device and the method further comprises:

- capturing an image of a user at the refill station;
- utilizing a facial recognition algorithm, based on the information stored in the user account, to confirm the identity of the user; and
- determining that the beverage container is permitted to be refilled based on the confirmation.

10. The method of claim 1, further comprising:

- updating the user account associated with the beverage container based on the beverage container being refilled.

11. An apparatus for conducting a refill comprising:

- a processor;
- a memory in electronic communication with the processor; and
- instructions being executable by the processor to,
 - detect a beverage container at a refill station;
 - identify a user account associated with the beverage container;
 - determine, based on information stored in the user account, if the beverage container is permitted to be refilled; and
 - refill the beverage container based on the determination.

12. The apparatus of claim 11, wherein detecting the beverage container comprises receiving a wireless signal associated with the beverage container.

13. The apparatus of claim 12, wherein the wireless signal is transmitted via a wireless communications module in the beverage container.

14. The apparatus of claim 13, wherein the wireless communications module is a radio frequency identification (RFID) module.

15. The apparatus of claim 12, wherein the wireless signal is transmitted by a wireless communications device carried by a user providing the beverage container to the refill station.

16. The apparatus of claim 11, wherein the apparatus further comprises an image capture device and the instructions are further executed by the processor to:

- capture an image of a user at the refill station;
- utilize a facial recognition algorithm, based on the information stored in the user account, to confirm the identity of the user; and
- determine that the beverage container is permitted to be refilled based on the confirmation.

17. A refill station comprising:

- a processor module configured to detect a beverage container at the refill station, identify a user account associated with the beverage container, determine if the beverage container is permitted to be refilled based on information stored in the user account; and
- a display module configured to receive information from the processor module and display an image indicative of the received information to a user, the display module further configured to receive an input from the user and communicate information indicative of the input to the processor module;

wherein the processor module, based on the determination and the input received from the user, is further configured to refill the beverage container.

18. The refill station of claim **17**, further comprising:

a communications module in wireless communications with the beverage container and configured to transmit a message to the beverage container to cause an electronic display integrated into the beverage container to display information indicative of the refill.

19. The refill station of claim **17**, further comprising:

an imaging module configured to capture an image of the user of the beverage container.

20. The refill station of claim **19**, wherein the processor module is further configured to compare the captured image with information from the associated user account to confirm an identity of the user.

21. The refill station of claim **17**, wherein the user account is associated with one or more online social networks.

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