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AUTOMATIC FLUID DISPENSER

Abstract

A dispenser has a housing case that defines a storage chamber, and a container inserted into the storage chamber of the housing case. A pump dispenser is mounted on a neck of the container for pumping liquid out of the container. A pump head moves between a raised position and a lowered position for dispensing the liquid out a first outlet tube that extends laterally to an outlet port. A receiver head having an opening is adapted to receive the first outlet tube, the receiver head being operably attached to a second outlet tube, the second outlet tube having a top end attached to the receiver head, and a bottom end. The dispenser further includes a pumping means for pushing the pump head of the container to the lowered position, against the bias of the at least one spring, in response to a sensing means.

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Background/Summary

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] This invention relates generally to fluid dispensers, and more particularly to an automatic fluid dispenser that dispenses fluids, in particular personal case fluids such as shampoo, conditioner, soap, and other similar products.

Description of Related Art

[0002] The prior art teaches a wide range of dispensers for dispensing fluids such as shampoo, conditioner, soap and similar products. An example of a standard liquid soap dispenser is shown in Copeland, U.S. Pat. No. 5,9102,698. This reference teaches a housing to hold a container of soap in an upright configuration, with a pump actuator at the top for dispensing the soap. This reference teaches manual actuation of the pump mechanism, and the product is dispensed from the front top of the dispenser.

[0003] Muderlak, U.S. Pat. No. 5,823,390, teaches a dispensing apparatus that houses containers of liquids such as chemicals used for deodorizing and disinfecting toilets. The dispensing apparatus includes an actuator system that includes an actuator nozzle has a receiving aperture and a dispensing aperture where the receiving aperture is operatively coupled to the vessel to receive the chemicals contained within the vessel. The dispensing aperture is coupled to the receiving aperture and is also connected to a conveying tube to direct the chemical from the vessel, through the tube and into a chemical receiving receptacle. Also included is a structure for ejecting the chemical from the vessel into the actuator nozzle. The actuator nozzle remains in an upward and outwardly pivoted position when the vessel is disengaged from the actuator nozzle to facilitate reengagement of the vessel with the actuator nozzle. Muderlak relies upon a spring (**190**, shown in FIG. **3**) that is built into the pump actuator, and does not include an exterior spring to raise the pump mechanism between pumps.

[0004] O'Maley, U.S. Pat. No. 6,431,400, teaches a dispenser apparatus for dispensing a liquid product like soap. A container of soap is inserted into a housing case. The container has an exit port at the bottom, so it is dispensed from an upside-down configuration. A chute directs the flow of the discharged product. A drive assembly causes the product to move from the container through the chute to be dispensed therefrom. A magnetic sensor is attached to a support surface of the housing case, and a wafer is attached to the container. The wafer has a magnet embedded therein, and the container is inserted into the housing case so that the wafer is received by and mates with the housing case to align the magnet with the magnetic sensor. A location of the magnet embedded in the wafer of the container is detected by the magnetic sensor of the housing case so that the container is identified. The drive means is only activated when the container is identified as an authorized container based on the location of the magnet. A similar soap dispenser that holds the soap container upside down for dispensing is also shown in Mease, U.S. Pat. No. 5,186,360.

[0005] Liao, U.S. 20110095051, teaches an automatic foam soap dispenser used for soap reservoir. The soap reservoir is maintained in an upright orientation. The automatic foam soap dispenser includes a covering housing, a control circuit board, a motor, and a sensor. The soap reservoir has a pressing head at the top thereof, the pressing head is communicated with a connecting head, and the connecting head has an extension pipe to communicate with a foam nozzle.

SUMMARY OF THE INVENTION

[0006] The present invention teaches certain benefits in construction and use which give rise to the objectives described below.

[0007] The present invention provides a dispenser for dispensing a liquid. The dispenser comprises a housing case that defines a storage chamber, and a container inserted into the storage chamber of the housing case. The container has a base and a sidewall that extends upwardly to a neck that defines a top opening (best shown in FIG. **4**), which together form a liquid storage compartment for storing the liquid. A pump dispenser is mounted on the neck of the container, covering the top

opening, for pumping the liquid out of the container, the pump dispenser having a tube that extends downwardly into the liquid storage compartment of the container, and a pump head that moves between a raised position and a lowered position for dispensing the liquid out a first outlet tube that extends laterally to an outlet port. A receiver head having an opening is adapted to receive the first outlet tube of the pump dispenser, the receiver head being operably attached to a second outlet tube, the second outlet tube having a top end attached to the receiver head, and a bottom end. The dispenser further includes a pumping means for pushing the pump head of the container to the lowered position, against the bias of the at least one spring, in response to a sensing means.

[0008] A primary objective of the present invention is to provide an automatic dispenser having advantages not taught by the prior art.

[0009] Another objective is to provide an automatic dispenser that is adapted to receive a liquid container with a standard upper pump mechanism that is located at the top of the container, so that it remains upright and cannot leak, and wherein the automatic dispenser includes a fluid flow network that dispenses the liquid (soap) at a bottom of the automatic dispenser responsive to a motion sensor.

[0010] A further objective is to provide a dispenser that utilizes an RFID chip and reader for recognizing the type of liquid container in the automatic dispenser.

[0011] Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The accompanying drawings illustrate the present invention.

[0013] FIG. **1** is an exploded perspective view of an automatic dispenser according to one embodiment of the present invention;

[0014] FIG. **2** is a perspective view of the automatic dispenser of FIG. **1** once it has been assembled, the automatic dispenser being shown with a cover open and a container being inserted into a housing case;

[0015] FIG. **3** is a perspective view of the housing case, with the container removed for clarity, and also illustrating how the cover mounts onto the housing case; and

[0016] FIG. **4** is a cross sectional side elevation view of the container mounted in the housing case;

[0017] FIG. **5** is a cross-section of a lower portion of the automatic dispenser, illustrating an RFID chip in the container, and a sensor assembly in the housing case.

DETAILED DESCRIPTION OF THE INVENTION

[0018] The above-described drawing figures illustrate the invention, a wall mounted automatic dispenser for dispensing liquids such as shampoo, conditioner, soap, oils, lotion, etc., and any other such liquids that a user might want to dispense.

[0019] For purposes of this application, the term “container” is broadly defined to include any form of bottle, flask, bowl, receptacle, canister, cartridge, or other structure known in the art for containing and dispensing a liquid. The term “liquid product” is also broadly defined to include any form of liquid product, such as soap, lotion, shampoo, conditioner, or any other similar product known in the art.

[0020] FIG. **1** is an exploded perspective view of an automatic dispenser **10** according to one embodiment of the present invention. As shown in FIG. **1**, the invention includes a housing case **40** that is adapted to contain at least one container **20** of a liquid product (e.g., shampoo, soap, conditioner, lotion, etc.), wherein the container **20** can be taken out for filling and replaced in an upright position. The container **20** may be easily removed and refilled, or replaced with a new,

different container. While only one container is shown and described in this application, the housing case **40** may be adapted to contain multiple containers at once, such as for example, a container of shampoo, a container of conditioner, and a container of body wash, and such alternatives should be considered within the scope of the present invention.

[0021] In standard use, as discussed in greater detail below, the automatic dispenser **10** is actuated by a sensing means **82** such that the liquid product **12** travels from an upper pump dispenser **26** of the container **20**, through a conduit network, and out of a lower liquid outlet **49** of housing case **40**.

[0022] In this embodiment, the container **20** comprises a base **22**, and a sidewall **24** that extends upwardly to a neck **28** that defines a top opening **29**, which together form a liquid storage compartment **30** for storing the liquid. In the embodiment of FIG. **1**, the container **20** has a generally rectangular cross-section, but in other embodiments, the container **20** may have any other shape, such as a cylindrical shape, or any other suitable shape for containing the liquid. The container **20** may be of any standard construction known in the art adapted to contain soap, lotion, shampoo, etc., although any desired liquids may be dispensed, so the examples listed herein should not be considered limiting. As illustrated, the pump dispenser **26** is mounted on the neck **28** of the container **20**, covering the top opening **29**, for pumping the liquid out of the container **20**. The pump dispenser **26** has a tube **32** (shown in FIGS. **4**-**5**) that extends downwardly into the liquid storage compartment **30** of the container **20**, and a pump head that moves between a raised position and a lowered position for dispensing the liquid out of a first outlet tube **36** **36** that extends laterally to an outlet port **38**.

[0023] As shown in FIG. **1**, the housing case **40** defines a storage chamber **42** that is shaped so that the container **20** may be inserted into and stored within the storage chamber **42**. The storage chamber **42** contains a receiver head **44** that is adapted to engage the pump of the container. The receiver head **44** has an opening **46** adapted to receive the first outlet tube **36** **36** of the pump dispenser **26**, so that the fluid flowing out of the first outlet tube **36** flows into the receiver head.

[0024] The receiver head **44** is operably attached to a second outlet tube **48** that extends downwardly to the liquid outlet **49**. In this embodiment, the second outlet tube **48** having a top end **47***a* attached to the receiver head **44**, and a bottom end **47***b* that extends downwardly to the liquid outlet **49**, discussed in further detail below. In various embodiments, the receiver head **44** is formed with an inlet check valve which prevents liquid product **12** from backing out into the outlet port **38** of the pump dispenser **26**, and also prevents liquid from backing out when the container **20** is removed from the storage chamber **42**. Alternative structures may be implemented for preventing backflow of the liquid product **12**, e.g., resilient molding inside the opening **46** of the receiver head **44** that closes when the first outlet tube **36** is removed, or similar structures. Furthermore, a similar mechanism may be included in the liquid outlet **49**, to prevent unwanted drip of liquid product **12**.

[0025] As illustrated, at least one spring **50** is positioned beneath the receiver head **44**, in this embodiment a pair of springs, wherein a support platform **52** of the housing case **40** includes spring mounting points **53** for receiving the springs **50**. In an assembled configuration (FIGS. **2**-**4**), the springs **50** are positioned between the receiver head **44** and the support platform **52** on the spring mounting points **53**, for biasing the receiver head **44** upwardly, thereby biasing the pump head **34** toward a raised position. In one embodiment, the springs **50** are operably attached to the receiver head **44** via a pin receiver **54***a* and pin **54***b*. In this embodiment, two springs **50** bias the receiver head **44** upwardly, but any suitable number of springs may be included, and they may be connected to the receiver head **44** via any suitable means of attachment. Further details of the housing case **40** are discussed below.

[0026] FIG. **2** is a perspective view of the automatic dispenser **10** once it has been assembled, shown with a cover **56** open and the container **20** being inserted into the storage chamber **42**. FIG. **3** is a perspective view of the housing case **40**, with the container **20** removed for clarity, and also illustrating how the cover **56** mounts onto the housing case **40**. The cover **56** may be locked with a locking mechanism **57** that may be unlocked with a magnetic key (not shown), a mechanism well

known in the art of this type of product.
[0027] As shown in FIGS. **1-3**, in this embodiment, the housing case **40** comprises a rear wall plate **58** that may be attached to a vertical surface (not shown) via any suitable means of attachment, e.g., mechanical fasteners such as screws, bolts, hooks, slide rails, and such, or non-mechanical fasteners such as an adhesive, suction cups, magnets, hook-and-loop strips, etc. The wall plate **58** supports the rest of the components of the housing case **40** on the vertical surface (i.e., a wall).
[0028] In this embodiment, a lower portion **60** of the housing case **40** is in the form of a lower platform **60** extends forward from the bottom of the wall plate **58**, wherein the lower platform **60** supports the container **20** when the container **20** is inserted into the storage chamber **42**. A sensor housing **80** is positioned beneath the lower platform **60** for housing the sensing means **82** and the liquid outlet **49**, best shown in FIGS. **4-5** and discussed further below. In alternative embodiments, the lower portion **60** may include additional structures other than the lower platform **60**. In this embodiment, a pair of sidewalls **62** also extend forward from the rear wall plate **58** on either side of the rear wall plate **58**.
[0029] As shown, the pair of sidewalls **62** may each include a hinge aperture **63***a* for receiving hinge pins **63***b* of the cover **56** (FIG. **3**), so that the cover **56** may attach to the sidewalls **62** and hinge downwardly for removing/replacing the container **20** (FIG. **2**). However, in other embodiments, the cover **56** may hinge in a different direction, or it may be removably attached via another means, e.g., be fully removable via a press-release button, switch, or similar mechanism. The cover **56** may be locked and unlocked in the closed position via a key (not shown), wherein the key may include at least one magnet for retracting at least one locking post **64**. Since this type of locking mechanism is well known in the art, it is not described in further detail herein. Furthermore, in alternative embodiments, the cover **56** may be locked in place via a different mechanism, e.g., via a turn-key, or any other suitable locking means. As shown in FIGS. **1** and **3**, the cover **56** may also include a window **66** positioned adjacent the sidewall **24** of the container **20** when the container **20** is within the storage chamber **42**, so that the level of remaining liquid product **12** inside the container **20** may be seen without having to open the cover **56**.
[0030] As illustrated, a stabilizing structure **67** may be included in the storage chamber **42**, adapted to extend on either side of the neck **28** of the container **20** when the container **20** is positioned in the storage chamber **42**, which may help with correctly positioning the container **20** so that unwanted shifting does not occur. In alternative embodiments, the stabilizing structure **67** may be formed to abut a different part of the container **20**, and many other similar stabilizing structures may otherwise be implemented. In further alternatives, the stabilizing structure **67** may be excluded entirely.
[0031] As shown in FIGS. **1-3**, the housing case **40** includes a pumping means **70** located between the sidewalls **62** for pushing the pump head **34** of the container **20** to the lowered position, against the bias of the at least one spring **50**, in response to the sensing means **82**. The pumping means **70** may include an assembly housing **72** that houses a gearbox assembly (not shown) that is actuated by the sensing means **82**. In this embodiment, the sensing means **82** is in the form of a motion sensor; however, other forms of sensors known in the art may be used (e.g., touch sensor, heat sensor, other form of electromagnetic sensors known in the art, etc.).
[0032] When actuated, the gearbox assembly rotates to move an upper platform **74** of the pumping means **70** from a raised position to a lowered position. The spring **50** or springs discussed above assist in the receiver head **44** (and the upper platform **74**) being returned back to the raised position. In this manner, the upper platform **74** functions to pump liquid out of the container **20** and into the receiver head **44** and second outlet tube **48**. In alternative embodiments, the pumping means **70** may include mechanisms other than a gear box, which may be any means known in the art for moving the upper platform **74** from the raised position to the lowered position, and back to the raised position.
[0033] As illustrated in FIG. **3**, a battery housing **76***a* with a battery cover **76***b* may be positioned

beneath the assembly housing **72** for supplying power to the automatic dispenser **10**. However, the batteries may be positioned elsewhere in/on the housing case **40**, or the automatic dispenser **10** may include a different form of power source (e.g., a wired connection to a power outlet or external battery, solar power, etc.).

[0034] FIG. **4** is a cross sectional side elevation view of the container **20** mounted in the housing case **40**. FIG. **4** illustrates the top opening **29** of the container **20**, the pair of springs **50** mounted on the spring mounting points **53**, and also shows the first outlet tube **36** of the pump dispenser **26** operably connected to the opening **46** of the receiver head **44** of the storage chamber **42**. The second outlet tube **48** extends downwardly from the receiver head **44** and into the sensor housing **80**, wherein the liquid outlet **49** is positioned beneath the sensor housing **80**. Liquid **12** in the container **20** is thus directed to the liquid outlet **49** in the bottom of the system.

[0035] FIG. **5** is a cross-section of a lower portion **60** of the automatic dispenser **10**, illustrating an RFID tag **92** in the container **20**, and a sensor assembly **84**. As shown in FIGS. **4**-**5**, the sensor assembly **84** is mounted on the lower portion **60** of the housing case **40**, beneath the container **20** once the container **20** has been inserted into the storage chamber **42** of the housing case **40**. In this embodiment, the sensor assembly **84** includes the sensing means **82** that senses motion of a user within a preset radius, and communicates with the pumping means **70** to operate the automatic dispenser **10**; and a reader module **86** that reads the RFID tag **92** of the container **20**. In this embodiment, the sensing means **82** is in the form of an infrared sensor. In other embodiments, the sensing means **82** may instead be a microwave sensor, an ultrasonic sensor, a dual sensor, or other motion sensing technology. Since this type of sensor is well-known in the art, it is not discussed further herein.

[0036] As shown in FIG. **5**, in some embodiments, the RFID tag **92** is operably mounted on the bottom of the container. In this embodiment, it is mounted in a recess **88** of a bottom surface **89** of the container **20**. In this embodiment, the container **20** may further include a bottom cap **90** that covers the RFID tag **92**, to protect the tag from damage. The cap **90** may be mounted via a threaded connection, a frictional engagement, adhesive or thermal welding, or other means known in the art.

[0037] A reader module **86** is positioned beneath the RFID tag **92** when the container is in the housing, such as in/on the sensor housing **80**, or other suitable structures in this portion of the device. In this embodiment, the reader module **86** is an induction reader for inductively reading the RFID tag **92**. The reader module **86** may be operably connected with any form of electronics, communications, and other electronics for reporting information from the RFID tag **92**. The reader module **86** senses the RFID tag **92** to detect the type of container **20** that has been inserted into the storage chamber **42**. If the container **20** does not have an RFID tag **92**, the reader module **86** may block the automatic dispenser **10** from operating. In one embodiment, such as in the instance of multiple containers being inserted into the housing case **40**, the reader module **86** may determine from which container **20** liquid product **12** is dispensed, and/or out of which liquid outlet **49** it is dispensed, in the case of multiple liquid outlets. For example, there may be a mechanism for selecting the desired liquid product to be dispensed prior to motion sensing for dispensing (e.g., a button selection or similar).

[0038] As shown in FIGS. **4**-**5**, the housing case **40** of the system may further include a sensing strip **100** (also shown in FIG. **3**) that includes a level detection reader **102**. The sensing strip **100** extends outwardly to abut the container, so that the level detection reader **102** is able to sense the fluid level in the container. In this embodiment, the level detection reader **102** is in the form of a PCB circuit board located between the wall plate **58** of the dispenser housing and the container **20**, above the lower platform/lower portion **60**, so that it is able to detect (e.g., inductively or otherwise) the level of the liquid product **12** inside the liquid storage compartment **30**. This solves the problem of having to open the cover **56** in order to check the remaining amount of liquid product **12**, and makes it possible to check the liquid condition of one or more machines at any time and prepare the amount of liquid to be replaced in advance, thus improving the efficiency of

the work.
[0039] In use, the cover **56** of the housing case **40** is unlocked and hinged open, and the container **20** is inserted into the storage chamber **42** and connected to the receiver head **44** (as shown in FIG. **4**). The reader module **86** is then able to read the RFID tag **92** of the container **20** to determine if it is an approved container **20**, if it is in the correct slot (if there are multiple containers in a single housing), what liquid is in the container, where it was purchased, when, and any other details regarding the container that may be desired to be tracked and monitored.
[0040] The level detection reader **102** is also able to detect the the level of liquid product within the container **20** (a user can also visually see the level of liquid product **12** via the window **66** on the cover **56**). The RFID information, and the information about the level of liquid in the container, is able to be transmitted (e.g., Bluetooth®, or any other wired or wireless connection) to a monitoring computer (e.g., smart phone or tablet computer with a suitable app, etc.), so that when the liquid product **12** reaches a certain level, a maintenance person can be alerted to refill or replace the container. This can be done by opening the cover **56** via the key (e.g., typically a magnetic device) and remove the container **20**, wherein the an inlet check valve (or similar) prevents backflow of the liquid product **12** out of the receiver head **44**. The container **20** can then either be refilled, or replaced with a new container, and the entire process repeats as necessary.
[0041] While in use, the sensing means **82** is able to detect motion (or other signal or triggering mechanism) to actuate the pumping means **70** to pump the pump dispenser **26** of the container **20**, so that the liquid product **12** travels from the liquid storage compartment **30**, into the receiver head **44**, down the second outlet tube **48**, and out of the liquid outlet **49**.
[0042] The title of the present application, and the claims presented, do not limit what may be claimed in the future, based upon and supported by the present application. Furthermore, any features shown in any of the drawings may be combined with any features from any other drawings to form an invention which may be claimed.
[0043] As used in this application, the words “a,” “an,” and “one” are defined to include one or more of the referenced item unless specifically stated otherwise. The terms “approximately” and “about” are defined to mean +/−10%, unless otherwise stated. Also, the terms “have,” “include,” “contain,” and similar terms are defined to mean “comprising” unless specifically stated otherwise. Furthermore, the terminology used in the specification provided above is hereby defined to include similar and/or equivalent terms, and/or alternative embodiments that would be considered obvious to one skilled in the art given the teachings of the present patent application. While the invention has been described with reference to at least one particular embodiment, it is to be clearly understood that the invention is not limited to these embodiments, but rather the scope of the invention is defined by claims made to the invention.

Claims

1. A dispenser for dispensing a liquid, the dispenser comprising: a housing case that defines a storage chamber; a container inserted into the storage chamber of the housing case, the container having a base, and a sidewall that extends upwardly to a neck that defines a top opening, which together form a liquid storage compartment for storing the liquid; a pump dispenser mounted on the neck of the container, covering the top opening, for pumping the liquid out of the container, the pump dispenser having a tube that extends downwardly into the liquid storage compartment of the container, and a pump head that moves between a raised position and a lowered position for dispensing the liquid out a first outlet tube that extends laterally to an outlet port; a receiver head having an opening adapted to receive the first outlet tube of the pump dispenser, the receiver head being operably attached to a second outlet tube, the second outlet tube having a top end attached to the receiver head, and a bottom end; a sensing means for sensing motion beneath the housing case; and a pumping means for pushing the pump head of the container to the lowered position, against

the bias of the at least one spring, in response to the sensing means.

2. The dispenser of claim 1, wherein the sensing means includes a motion sensor.

3. The dispenser of claim 1, wherein the pumping means includes: an assembly housing that houses a gearbox assembly that is actuated by the sensing means; wherein the gearbox assembly rotates to move an upper platform of the pumping means from a raised position to a lowered position, and then back to the raised position, when actuated; and wherein the upper platform abuts the top of the pump head of the container when the container is within the storage chamber, such that the upper platform functions to pump the liquid product out of the container and into the receiver head.

4. The dispenser of claim 1, further comprising: an RFID tag operably mounted in a recess of a bottom surface of the container; and a sensor assembly mounted on a bottom portion of the housing case, beneath the container once the container has been inserted into the storage chamber of the housing case.

5. The dispenser of claim 4, wherein the RFID tag is read by a reader module of the sensor assembly to determine the type of liquid product within the container when it is within the storage chamber of the housing case.

6. A dispenser for dispensing a liquid, the dispenser comprising: a housing case that defines a storage chamber; a container inserted into the storage chamber of the housing case, the container having a base, a sidewall that extends upwardly to a neck that defines a top opening, which together form a liquid storage compartment for storing the liquid; a pump dispenser mounted on the neck of the container, covering the top opening, for pumping the liquid out of the container, the pump dispenser having a tube that extends downwardly into the liquid storage compartment of the container, and a pump head that moved between a raised position and a lowered position for dispensing the liquid out an outlet tube that extends laterally to an outlet port; a receiver head having an opening adapted to receive the outlet tube of the pump dispenser, the receiver head being operably attached to the outlet tube, the outlet tube having a top end attached to the receiver head, and a bottom end; at least one spring positioned between the receiver head and a support platform of the housing case, for biasing the receiver head upwardly, thereby biasing the pump head toward the raised position; a sensing means for sensing motion beneath the housing case; and a pumping means for pushing the pump head of the container to the lowered position, against the bias of the at least one spring, in response to the sensing means.