MEDICATION BOTTLE WITH ANTI-TAMPERING FEATURES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a division of U.S. patent application Ser. No. 16/569,747 filed Sep. 13, 2019, which claimed the benefit of priority to U.S. Provisional Patent Application No. 62/731,263, filed Sep. 14, 2018. The entire disclosure of the above applications are incorporated by reference herein.

FIELD

[0002] The present disclosure relates to anti-tampering features for medication bottles.

BACKGROUND AND SUMMARY

[0003] Current smart packaging safeguards for pills, such as locking caps and tamper-evident packages, help deter children and the elderly against unintentional drug abuse. Such existing packaging had limited success against intentional drug abuse; taking someone else's prescription, even if for a legitimate medical complaint, such as pain or taking a medication to feel euphoria. As indicated in 2016 National Survey on Drug Use and Health, 50 percent of prescription opioid users got their last painkillers from a friend or relative, with 40.4 percent paying nothing for the pills.

[0004] To improve the tamper-evident packaging safeguard, a new generation of active packaging technology features an aversive effect of a non-toxic compound with a disgusting taste. The idea is that breaking open the existing tamper-evident pill bottle (e.g., by crushing or cutting it), will release the aversive compound onto the opioid pills, giving them a nauseating taste and vomiting effect. The central hypothesis is that giving opioid pills from a broken package a horrible taste with a non-toxic natural compound (e.g., denatonium benzoate) will decrease overdose risk.

[0005] In accordance with the present invention, a medication bottle includes an outer vial or container wall, an inner vial or container wall and a fluid, such as an aversive liquid, located between the walls. In another aspect, the fluid is located within separate compartments or channels located between the walls where the walls contact or are secured to each other. A further aspect provides a removeable cap including multiple user authentication sensors, at least one of which is a biometric sensor.

[0006] The present medication bottle is advantageous over traditional constructions. For example, the fluid of the present bottle changes a characteristic (such as taste, smell or function) of medication within the bottle in a tampered condition, thereby rendering it undesirable to use. In other words, the medication is thereby contaminated. Furthermore, use of multiple separated compartments or channels to hold the fluid in a nominal (i.e., untampered) condition, reduces the ability to externally drain the fluid without medication contamination. Moreover, at least two step authentication via user-biometric and/or with device based (e.g., RFID or password code) sensing, circuitry and software, creates cap-to-container temper-resistant protection. Additional features and advantages of the present bottle can be ascertained from the following description and associated claims as well as from the appended figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. **1**A is a diagrammatic perspective view showing a first embodiment of the present medication bottle;

[0008] FIG. **1**B is a diagrammatic perspective view showing a second embodiment of the present medication bottle;

[0009] FIG. **1**C is a diagrammatic perspective view showing a third embodiment of the present medication bottle;

[0010] FIG. **2**A is a perspective view showing the third embodiment of the present medication bottle;

[0011] FIG. **2**B is a fragmentary and enlarged diagrammatic view, taken within circle **2**B of FIG. **2**A, showing the third embodiment of the present medication bottle;

[0012] FIG. **3** is a circuit block diagram showing the third embodiment of the present medication bottle;

[0013] FIG. **4**A is a perspective view showing the third embodiment of the present medication bottle;

[0014] FIG. **4**B is an enlarged and perspective, diagrammatic view, taken within circle **4**B of FIG. **4**A, showing the third embodiment of the present medication bottle;

[0015] FIG. **4**C is a fragmentary and enlarged, perspective view, taken within circle **4**C of FIG. **4**A, showing the third embodiment of the present medication bottle;

[0016] FIG. **5** is a circuit diagram showing an RFID circuit employed in the third embodiment of the present medication bottle;

[0017] FIG. **6** is a diagrammatic side view showing an optional weighing feature employed in any of the embodiments of the present medication bottle;

[0018] FIG. **7** is a diagrammatic perspective view showing a fourth embodiment of the present medication bottle;

[0019] FIGS. **8**A-F are a series of views showing manufacturing and testing steps for any of the embodiments of the present medication bottle;

[0020] FIG. **9** is a diagrammatic illustration showing the third embodiment of the present medication bottle and its uses;

[0021] FIG. **10** is a partially exploded side elevational view showing the third embodiment of the present medication bottle;

[0022] FIG. **11** is a bottom perspective view showing the third embodiment of the present medication bottle, in a disassembled state;

[0023] FIG. **12** is a diagrammatic perspective view showing a fifth embodiment of the present medication bottle;

[0024] FIG. **13** is a diagrammatic perspective view showing a cap of the fifth embodiment of the present medication bottle;

[0025] FIG. **14** is a perspective view showing the cap of the fifth embodiment of the present medication bottle;

[0026] FIG. **15** is a side elevational view showing the cap of the fifth embodiment of the present medication bottle; and

[0027] FIGS. **16** and **17**A-B are software logic flow diagrams employed with the third, fourth or fifth embodiments of the present medication bottle.

DETAILED DESCRIPTION

[0028] Example embodiments will now be described more fully with reference to the accompanying drawings.

[0029] Three variants are shown in FIGS. **1**A, **1**B, and **1**C of smart bottles **21** for prescription solid formulations of medication **23** in the form of tablet pills or gel capsules **23**. The bottle models of FIG. **1**A through **1**C are equipped with increasingly more smart features (sensors and software).