Furthermore, the disclosed inhaler includes a dose counter that increments only after an actual delivery of drug from the medication canister as occurs when the canister is depressed beyond a certain point. Upon reaching a predetermined number of actuations two things occur. One is that the dose counting wheel can no longer be incremented. Secondly, a spring assembly, which needs to be cocked (i.e. compressed) in order to depress and therefore discharge medicament from the canister, is disengaged from the rest of mechanism and therefore can't be compressed and therefore can't cause the medicament canister deliver a dose.

BRIEF SUMMARY OF THE INVENTION

According to one aspect, there is provided a metered dose inhaler comprising:

a pressurized canister containing a medicament formulation,

said canister further comprising a metering valve having a spring loaded valve stem;

a cradle which fixedly holds said canister;

an inhaler body;

said cradle being slideably engaged with said inhaler body;

said cradle movable between a first, disengaged position and a second, engaged position;

a spring assembly comprising one or more springs and a spring assembly latch;

said spring assembly latch that detachably affixes said spring assembly to said cradle; said spring assembly latch having an engaged configuration in which said spring assembly is fixedly attached to said cradle and a disengaged configuration in which said spring assembly is slideably engaged with said cradle;

a cradle latch;

said cradle latch having an engaged configuration wherein said cradle is restricted to said second, engaged position and a disengaged position wherein said cradle is not restricted in its movement along said inhaler body;

said cradle further comprising a reset arm;

said reset arm comprising a cam, wherein the cam is positioned between said reset arm and said spring assembly; such that when said cam is oriented in a first position the cam lobe does not engage the cradle or the spring assembly; and when said cam is oriented in a second position said cam lobe is biased against said spring assembly which causes mechanical energy to be stored in said spring assembly by compressing the one or more springs when said cradle latch and said spring assembly latch are both in the engaged positions; whereby when the inhaler is actuated, said cradle latch disengages and allows said cradle to be biased downwards into a discharged position by the expansion of the compressed springs in the spring assembly;

a dose counter wheel; said dose counter wheel adapted to be detentably rotatable in one direction;

said cradle further comprising an actuation arm which engages with said dose counter wheel and causes said dose counter wheel to incrementally rotate each time said cradle moves from said discharged position to said first,

disengaged position; said dose counter wheel adapted to display a different dose indicia each time said dose counter wheel is incrementally rotated and wherein said dose counter wheel comprises a dropout cam;

said dropout cam adapted to cause said spring assembly latch to disengage after a predetermined number of incremental rotations when said dose counter wheel is in a predetermined position;

whereby said spring assembly can no longer be compressed by said cam lobe, thereby preventing storage of mechanical energy needed to move cradle from the first, disengaged position to the second, engaged position, thereby disabling the inhaler and preventing discharge of medicament.

According to another aspect, there is provided a medicament dispenser comprising:

a medicament formulation;

a medicament storage container; said medicament formulation contained within said medicament storage container;

a medicament dispersal unit which, when activated causes said medicament formulation to be dispersed from said medicament storage unit;

a dose counter wheel; said dose counter wheel adapted to be detentably rotatable in one direction, and wherein said dose counter wheel can be incrementally rotated each time for a predetermined number of incremental rotations and wherein said dose counter wheel comprises a dropout cam;

an actuation arm which engages said dose counter wheel and cause said dose counter wheel to be incrementally rotated each time said medicament dispersal unit is activated, wherein after the predetermined number of incremental rotation have passed, the dropout cam adapted to disable the medicament dispenser, whereby when the medicament dispenser is disabled there is no physical blocking or interference of any of the moving parts of the dispenser.

Embodiments of tThe present invention described herein discloseinvolves an actuation counter/lockout mechanism which disables a device after a predetermined number of mechanical actuations have occurred. Though described herein as being a component of a pressurized metered dose inhaler, embodiments of the invention could be a component in any type of mechanical device which can cause a movable carriage to be translated. For example, the device might be used in conjunction with a device which delivers sugar pills to experimental lab animals and would be deactivated after the animal has triggered the device a predetermined number of times. The following descriptions, discussions and drawings will be directed to the invention being incorporated into a specific class of device - that of a pMDI. However, it will be understood by one skilled in the art that this is only one of many possible types of mechanical devices that could incorporate the invention.

Embodiments of tThe present invention also discloseincludes a method for counting and displaying the number of actuation cycles of a pMDI. Furthermore, the method may include a deactivation step which prevents the inhaler from being able to actuate the pMDI canister.

The foregoing and other features and advantages of the invention are apparent from the following detailed description of exemplary embodiments, read in conjunction with the accompanying drawings. The detailed description and the drawings are merely illustrative of the invention rather than limiting the scope of the invention.